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Has Regulation Affected the High Frequency Trading Market?

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The origin of trading dates back to as early as 3000 BC.[1] Trading fundamentally began as a way to obtain other goods and advance one's life through the exchange of goods.[2] However, while these individuals were attempting to advance their lives through the honest conduct of trade, others used trading to manipulate and deceive consumers to advance their position in society.[3] The evolution of trading has made drastic steps from the simple trading of everyday commodities to the trading of synthetic collateral debt obligations.[4] As the market has evolved, so have manipulation and deceit tactics with trade.[5] The proliferation of the technological advancements has made manipulation and deceit tactics more complex.[6]

As technology rapidly advances society, there are a few industries that have

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[1] George W. Robbins, *Notions About the Origins of Trading*, 11 J. MARKETING 228, 231 (1947).

[2] *Id.* at 236.

[3] *Id.* at 235-36.

[4] *The Evolution Of Trading: Barter System to Algo Trading*, QUANTIINSTI (July 18, 2018), https://www.quantinsti.com/blog/evolution-trading-barter-system-algo-trading; Christopher Whittall & Mike Bird, *Crisis-Era Scourge Reignites Worries*, WSJ, Aug. 29, 2017, at B1.

[5] *See generally* Donald C. Langevoort, *Words From on High About Rule 10b-5: Chiarella's History, Central Bank's Future*, 20 DEL. J. CORP. L. 865, 870-81 (1995); *Timeline: A History of Insider Trading*, N.Y. TIMES (Dec. 6, 2016), https://www.nytimes.com/interactive/2016/12/06/business/dealbook/insider-trading-timeline.html.

[6] Ray Adams, *Technology Makes Fraud Easy*, ALLIANT TECH. GROUP (May 12, 2017), https://www.allianttechnology.com/technology-makes-fraud-easy.

not been drastically impacted by disruptive technology.[7] The financial markets are no different.[8] Over the past ten years, algorithmic trading has quickly revolutionized the financial markets and continues to dominate an industry that for many years remained largely uninfluenced by society's technological advances.[9] Algorithmic trading is "a type of trading done with the use of mathematical formulas" and market data "run by powerful computers" to execute trades.[10] One of the most commonly used platforms of algorithmic trading is high frequency trading.[11] High frequency trading ("HFT") uses a computerized algorithm and pre-determined market parameters to execute large orders through the use of high speed.[12]

   HFT, began in the 1830s with the use of high speed telegraphs to orchestrate trades across other exchanges.[13] However, the general public did not widely recognize HFT until Michael Lewis wrote the infamous book, *Flash Boys,* which was published in 2014.[14] The book discusses Brad Katsuyama, founder of the Investors Exchange ("IEX") and former employee of Royal Bank of Canada ("RBC"), and his story that led him to create, as he describes, a safer and more investor friendly market.[15] Lewis argues Katsuyama realized, while working at RBC, that investors were being "cheated" out of large sums of money because high-frequency traders were jumping the market by using high speed cables and complex algorithms to purchase stock before an investor had an opportunity to do so. These high speed traders then sold these stocks back to the investor at an

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[7]   *See, e.g.,* Felix Salmon & Jon Stock, *Algorithms Take Control of Wall Street*, WIRED (Dec. 27, 2010, 12:00 PM), https://www.wired.com/2010/12/ff-ai-flashtrading.

[8]   *Id.*

[9]   *Id.*

[10]   *Algorithmic Trading*, INVESTOPEDIA, https://www.investopedia.com/terms/a/ algorithmictrading.asp (last visited Feb. 27, 2018); *see also* Shobhit Seth, *Basics of algorithmic trading: Concepts and examples*, INVESTOPEDIA (Oct. 22, 2018) https://www.investopedia.com/articles/active-trading/101014/basics-algorithmic-trading-concepts-and-examples.asp.

[11]   Seth, *supra* note 10.

[12]   *Id.* (explaining high frequency trading "attempts to capitalize on placing a large number of orders at rapid speeds across multiple markets" using computerized algorithms and pre-determined market parameters).

[13]   Bob Pisani, *Plundered by Harpies an Early History of High-Speed Trading*, MOAF, 20, 21-22 (2014).

[14]   *See* Michael Lewis, *Michael Lewis Reflects On His Book Flash Boys, A Year After It Shook Wall Street To Its* Core, VANITY FAIR (Mar. 11, 2015), https://www.vanityfair.com/ news/2015/03/michael-lewis-flash-boys-one-year-later; Seth Merrin, *Comment: Old news, flash boys,* FIN. TIMES (Apr. 4, 2014), https://www.ft.com/content/99cf0096-bbe6-11e3-84f1-00144feabdc0; *see generally* MICHAEL LEWIS, FLASH BOYS: A WALL STREET REVOLT 1-5 (2014).

[15]   Andrew Ross, *Flash Boys by Michael Lewis – review*, THE GUARDIAN (May 16, 2016), https://www.theguardian.com/books/2014/may/16/flash-boys-michael-lewis-review; *see also* Lewis, *supra* note 14.

increased price.[16] Lewis' argument regarding the morality of HFT continues to be a highly debated topic among industry experts.[17] While industry experts remain conflicted on HFT, the public generally fell into Lewis' narrative in *Flash Boys* that HFT was a predatory trading tactic.[18] The general public reacted with panic and fear that HFT was not widely understood by financial regulators and that bad actors would continue to use HFT to exploit investors.[19] This public reaction triggered the U.S. Securities and Exchange Commission ("SEC"), the U.S. Commodity Futures Trading Commission ("CFTC"), and the Financial Industry Regulatory Authority, Inc. ("FINRA") to focus resources and attention on preventing HFT from creating an unfair and unbalanced market.[20]

HFT and high frequency traders are not inherently bad, as depicted in *Flash Boys*. In fact, HFT has actually made trading more efficient and provided numerous benefits for investors who are looking to improve their position in the market.[21] However, the issue at hand is that HFT is used as a tool by bad actors to manipulate the market.[22]

This Comment illustrates how the SEC, the CFTC, and FINRA have used their resources since the implementation of HFT to shift the regulatory landscape and how this shift has affected the market. Section I of this Comment will discuss HFT in greater detail and how the effectiveness of algorithmic trading and

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16   Alan Tovey, *High-frequency trading: when milliseconds mean millions*, TELEGRAPH (Apr. 2, 2014), https://www.telegraph.co.uk/finance/newsbysector/banksandfinance/10736960/High-frequency-trading-when-milliseconds-mean-millions.html.

17   Eric Levenson & Dashiell Bennett, *Is High-Frequency Trading as Bad as Michael Lewis Wants You to Think?,* THE ATLANTIC (Apr. 1, 2014), https://www.theatlantic.com/business/archive/2014/04/is-high-frequency-trading-as-bad-as-michael-lewis-wants-you-to-think/359903/ (highlighting arguments that HFT brings fairness and efficiency to markets, increases market activity and liquidity, and reduces risk).

18   Anthony B. Benvegna, *A Guiding Light to a More Efficient Market: Why High-Frequency Trading is Not a Flash in the Dark,* 16 J. INT'L BUS. & L. 309, 323, 326 (2017); Kurt Schacht, *Light needs to be shed on the trade practices of 'Flash Boys'*, THE HILL (Jan. 4, 2018, 8:40 AM), http://thehill.com/opinion/finance/367295-court-ruling-will-help-shed-light-on-trade-practices-of-flash-boys (explaining that after the publication of *Flash Boys* lawsuits were filed and the SEC initiated examination of HFT).

19   Levenson & Bennett, *supra* note 17.

20   *See generally* Exemption for Certain Exchange Members, 80 Fed. Reg. 18036, 18038 (Apr. 2, 2015) (discussing a proposed rule by the SEC in response to HFT practice); COMMODITY FUTURES TRADING COMM'N., *Regulation Automated Trading*, 80 Fed. Reg. 78824, 78825-26 (Dec. 17, 2015) (providing a notice of proposed rule-making in response to HFT practice).

21   Matt Levine, *Michael Lewis Doesn't Like High-Frequency Traders*, BLOOMBERG (Mar. 31, 2014 12:25 PM), https://www.bloomberg.com/view/articles/2014-03-31/michael-lewis-doesn-t-like-high-frequency-traders.

22   Mary Jo White, Chair, SEC, Speech at Sandler O'Neill & Partners, L.P. Global Exchange and Brokerage Conference: Enhancing Our Equity Market Structure (June 5, 2014) (transcript available at https://www.sec.gov/news/speech/2014-spch060514mjw); *see generally* Levine, *supra* note 21.

technological advances in the financial industry took trading volume away from the traditional floor traders. Then, Section II of this Comment will analyze how bad actors have used HFT to manipulate the market and how agencies have enforced against those manipulative practices. Section III will discuss the future landscape of HFT for investors. In addition, Section III will examine the regulatory oversight role certain federal agencies hold and how the enactment of new regulations can further protect investors, leaving them less vulnerable from exploitation. Finally, Section IV will argue whether oversight and regulation of HFT has limited bad actors' profitability causing them to focus on exploiting less regulated markets like cryptocurrency.

I. THE METEORIC RISE OF HIGH FREQUENCY TRADING

A. Factors of the High Frequency Trading Takeover

"Speed kills," a phrase boxers commonly used to describe the ultimate advantage to winning a boxing match;[23] is also used by financial experts to describe HFT.[24] Since the 1700s, speed has provided a major competitive advantage in trade.[25] Today, speed plays a significant role in the success of HFT through technological advances.[26] HFT uses complex algorithms, along with market data, to purchase and sell a number of shares at a quoted price.[27] The algorithm uses market data and research to determine an order in which to buy shares of a stock, often a large amount of shares, then quickly places an order to sell within a short period of time.[28] Experts like Michael Lewis may characterize

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[23]   Jonathan Snowden, *How I Learned to Stop Hating and Admit Floyd Mayweather's a Boxing Revolutionary*, BLEACHER REPORT (Aug. 23, 2017), http://bleacherreport.com/articles/2728783-how-i-learned-to-stop-hating-and-admit-floyd-mayweathers-a-boxing-revolutionary.

[24]   *See generally* E*TRADE FIN. CORP., *Speed Wins, Speed Kills*, THE ATLANTIC, http://www.theatlantic.com/sponsored/etrade-social-stocks/speed-wins-speed-kills/333 (last visited Feb. 1, 2019).

[25]   Pisani, *supra* note 13, at 21-23 (describing fair dealing concerns in trading as technology progressed with faster boats, stagecoaches, telegraph and the stock ticker).

[26]   Martin L. Scholtus & Dick van Dijk, *High-Frequency Technical Trading: The Importance of Speed*, TINBERGEN INST., 1, 14 (2012) (showing the importance of speed in technical trading strategies with fastest reaction time of 5 ms).

[27]   Ryan Wagner, *Is High Frequency Trading Ethical?*, SEVEN PILLARS INST., https://sevenpillarsinstitute.org/case-studies/high-frequency-trading/ (last visited Feb. 1, 2019); *see also* Richard Finger, *High Frequency Trading: Is it a Dark Force Against Ordinary Human Traders and Investors?*, FORBES (Sept. 30, 2013), https://www.forbes.com/sites/richardfinger/2013/09/30/high-frequency-trading-is-it-a-dark-force-against-ordinary-human-traders-and-investors/#6626f4c76352.

[28]   Matt Levine, *High-Frequency Trading May Be Too Efficient*, BLOOMBERG (Apr. 2,

this practice as front-running, but this is actually beneficial for the market because it causes prices to reveal that there are informed buyers in the market, creating substantial market efficiency.[29] The difference between what the high-frequency trader buys and then quickly sells, yields the traders a small profit or loss.[30] Due to the high volume of trades that are made from HFT, high-frequency traders often make a consistent profit, making the practice enticing to traders.[31]

There are three main components that provide high frequency traders with a competitive advantage, which are 1) proprietary algorithms; 2) co-location; and 3) high speed fiber-optic cables.[32] The combination of these components provide a competitive advantage that is separated by microseconds.[33]

Proprietary algorithms are mathematic strategies, unique to each HFT firm, that create the trading strategy for how the firm goes in and out of trades within fractions of seconds.[34] The algorithms provide the foundation and strategy for the execution of each trade, which often factors recently released market data – for instance, how many bids are made on a specific price point, and market correlations.[35] These algorithmic strategies are based upon certain benchmarks, including volume-weighted average price ("VWAP"), time-weight average price ("TWAP"), and percentage of volume ("POV").[36]

2014, 4:26 PM), https://www.bloomberg.com/view/articles/2014-04-02/high-frequency-trading-may-be-too-efficient.

[29]   *Id.*; *see generally* Bill Conerly, *Flash Boys And High Frequency Trading: Trust Markets, Not Regulators*, FORBES (Dec. 28, 2016, 9:32 AM), https://www.forbes.com/sites/billconerly/2016/12/28/flash-boys-and-high-frequency-trading-trust-markets-not-regulators/#758217171585 (describing that if HFT is as Michael Lewis depicts, this behavior is front running).

[30]   Matt Levine, *Why Do High-Frequency Traders Never Lose Money*, BLOOMBERG (Mar. 20, 2014, 9:34 AM), https://www.bloomberg.com/view/articles/2014-03-20/why-do-high-frequency-traders-never-lose-money; Wagner, *supra* note 27; *see also* Finger, *supra* note 27.

[31]   Levine, *supra* note 30; Matthew Leising, *Virtu Never Loses (Well, Almost Never)*, BLOOMBERG (Aug. 11, 2016, 12:00 AM), https://www.bloomberg.com/news/features/2016-08-11/virtu-never-loses-well-almost-never-in-quest-to-upend-markets (describing how a HFT firm, Virtu Financial, lost money on only one day over a five-year span).

[32]   Mark Buchanan, *Physics in Finance: Trading at the Speed of Light*, NATURE (Feb. 11, 2015), https://www.nature.com/news/physics-in-finance-trading-at-the-speed-of-light-1.16872 (discussing the correlation of having complex algorithm and fiber optic cables to increase speed in high frequency trades); Geoffrey Rogow, *Colocation: The Root of All High Frequency Trading Evil?*, WSJ (Sept. 20, 2012, 1:57 PM), https://blogs.wsj.com/marketbeat/2012/09/20/collocation-the-root-of-all-high-frequency-trading-evil (discussing how co-location provides faster trades by having a short distance to travel to execute a trade order).

[33]   Buchanan, *supra* note 32; Rogow, *supra* note 32.

[34]   Kristin N. Johnson, *Regulating Innovation: High Frequency Trading in Dark Pools*, 42 J. CORP. L. 833, 857 (2017).

[35]   *Id.* at 855, 858; *see also* Finger, *supra* note 27.

[36]   *Execution Algorithms,* NASDAQ (Dec. 2015), https://business.nasdaq.com/media/execution-algos-member-presentation-december-2015_tcm5044-46779.pdf.

Co-location is a process that has allowed high frequency traders to place their "trading computers inside the same data center where the exchange holds their computer servers," particularly the exchange's "matching engine."[37] This results in quick execution given the short distance for the signal to travel in order to execute the trade.[38]

B. The Rise and Plateau of HFT in the Equities and Commodities Markets

HFT is a form of electronic trading that uses complex algorithms to place bids and offer orders at a microsecond speed, using pre-determined market parameters.[39] Diverse groups of investors use HFT across multiple markets.[40] Traditionally, trading took place on the floor of an exchange, such as the New York Stock Exchange. However, due to technological advances, floor trading is nearly non-existent. The truth is, trading no longer occurs on the floors of the exchange and now occurs almost entirely electronically, in fact, the floor is essentially used as a set for MSNBC.[41]

Studies from various institutions, including Congressional Research, indicate the transition from floor traders to algorithmic trading began around 2006.[42] In 2006, HFT only amounted to approximately 26 percent of trading in the United States.[43] However, around 2005-2006, society made significant advancements in technology, such as increasing the accessibility of advancements in high-speed telecommunication services.[44] As accessibility and costs of technology

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[37] *Definition of Co-location*, FIN. TIMES, http://lexicon.ft.com/Term?term=co_location (last visited Jan. 26, 2019); Rogow, *supra* note 32.

[38] Rogow, *supra* note 32.

[39] Wagner, *supra* note 27; *see also* Finger, *supra* note 27.

[40] *See generally* Tim Worstall, *Don't Worry, Be Happy – High Frequency Trading Is Over, Dead, It's Done*, FORBES (Mar. 25, 2017, 6:15 AM), https://www.forbes.com/sites/timworstall/2017/03/25/dont-worry-be-happy-high-frequency-trading-is-over-dead-its-done/#121b20d4dcf8 (The HFT market is much broader than it is often depicted. HFT, which is typically described as used by hedge funds and proprietary traders, is used by significant more individuals such as banks, commodities brokers, etc. The trading platform is utilized across equity markets, fx markets, the UST market, and recently cryptocurrencies.).

[41] Matt Levine, *NYSE Needed Some Pretend Traders*, BLOOMBERG (Dec. 14, 2018, 11:32 AM), https://www.bloomberg.com/opinion/articles/2018-12-14/nyse-needed-some-pretend-traders.

[42] RENA S. MILLER & GARY SHORTER, CONG. RESEARCH SERV., R44442, HIGH FREQUENCY TRADING: OVERVIEW OF RECENT DEVELOPMENTS 1 (2016).

[43] Bonnie Kavoussi, *SEC May Monitor High-Frequency Trading With Consolidated*, THE HUFFINGTON POST (Dec. 10, 2011), https://www.huffpost.com/entry/sec-high-frequency-trading_n_987378; *see generally* Michael J. McGowan, *The Rise of Computerized High Frequency Trading: The Use and Controversy*, 16 DUKE L. & TECH REV. 1, 3 (2010).

[44] John B. Horrigan, *Broadband Adoption in the United States*, PEW RES. CTR. (July 2,

began to decrease, firms quickly transitioned from floor traders to HFT.[45] These technological advances revolutionized the financial markets landscape because traders realized the advantage speed brings when trading electronically versus trading by out-cry on the floor of an exchange.[46]

By 2009, HFT controlled approximately 73 to 80 percent of the trading volume in the United States.[47] Some industry experts credit HFT as a fundamental reason for the resurgence of the stock market.[48] HFT's trading volume exponentially increased because it gave traders the opportunity to trade on a volatile market following the collapse of the housing market.[49] In 2009 alone, market analysts estimated HFT firms earned 7.2 billion dollars.[50] At this point in time, HFT established its position as the future of trading.[51]

On May 6, 2010, the landscape and optimism of HFT completely changed. The market dropped more than ten percent in a span of thirty-six minutes.[52] This event is known as the Flash Crash.[53] There remains to be large uncertainty as to the specific events that actually led to the Flash Crash.[54] However, the general consensus is that improper use of HFT by multiple bad actors increased price volatility, including Navinder Singh Sarao's spoofing activities, had a direct correlation to the Flash Crash of 2010.[55]

2008), http://www.pewinternet.org/2008/07/02/broadband-adoption-in-the-united-states/.

[45]   Frank Chaparro, *Credit Suisse: Here's how high-frequency trading has change the stock market*, BUS. INSIDER (Mar. 20, 2017, 4:23 PM), http://www.businessinsider.com/how-high-frequency-trading-has-changed-the-stock-market-2017-3.

[46]   *Id.* (correlating the data of accessibility to broadband internet to the changes in trading volume by high frequency trading).

[47]   X. Frank Zhang, *The Effect of High-Frequency Trading on Stock Volatility and Price Discovery*, YALE U. SCH. OF MGMT. at 2 (2010).

[48]   Charles Duhigg, *Stock Traders Find Speed Pays, in Milliseconds*, N.Y. TIMES, July 23, 2009, at A17; Matthew Philips, *High-Frequency Trading and the Roiling Markets*, NEWSWEEK (May 31, 2010, 8:00 PM), http://www.newsweek.com/high-frequency-trading-and-roiling-markets-73147.

[49]   Duhigg, *supra* note 48; Philips, *supra* note 48 (explaining high frequency trading provides liquidity, which improves markets efficiency).

[50]   Dr. Orçun Kaya, *High Frequency Trading: Reaching the Limits*, AUTOMATED TRADER, http://www.automatedtrader.net/articles/high-frequency-trading/156775/high-frequency-trading-reaching-the-limits (last visited Apr. 4, 2019).

[51]   Duhigg, *supra* note 48.

[52]   Andrei Kirilenko et al., *The Flash Crash: The Impact of High Frequency Trading on an Electronic Market*, 72 J. FIN. 967, 967-68 (2014).

[53]   *Id.*; *see also* Tom Bailey, *US Treasury take aim at high frequency traders*, WORLD FIN. (July 14, 2015), https://www.worldfinance.com/strategy/government-policy/us-treasury-takes-aim-at-high-frequency-traders (demonstrating how there have been other "flash crashes" since the large scale 2010 crash, including one that affected the United States Treasury, all of which have been linked to HFT).

[54]   Matt Levine, *Guy Trading at Home Caused the Flash Crash*, BLOOMBERG (Apr. 21, 2015, 6:37 PM), https://www.bloomberg.com/view/articles/2015-04-21/guy-trading-at-home-caused-the-flash-crash.

[55]   *Id*.

According to the CFTC, the Flash Crash occurred because a mutual fund, Waddell & Reed, placed an order to sell $4.1 billion of E-Mini S&P futures contracts that failed to account for time or price.[56] The lack of accountability for time or price meant that the trade would still continue to sell, even if the price dipped, until all of the shares were sold.[57] Typically, a trade of this size would take a few hours or a day to be completed.[58] Due to the trade's lack of accountability for price and time, this trade was completed in twenty minutes.[59] Generally, an institutional order of that size would be broken down into smaller orders to improve its efficiency for execution.[60] In this instance, the trade was not broken down which resulted in a substantial ripple effect upon the rest of the market.[61] Yet, by the end of the day, the market stabilized and was only down about three percent from the previous day.[62] While the CFTC originally claimed the Flash Crash was not directly linked to HFT, they did concede that the practice of HFT increased price volatility in the market and exacerbated the event.[63]

After the Flash Crash, HFT's percentage of volume and profitability began to decrease, despite not being determined as the direct cause of the Flash Crash.[64] Additionally, the Flash Crash placed increased pressure on the SEC and CFTC to implement new regulatory oversight and procedures over HFT markets in an effort to prevent bad actors from creating the next flash crash.[65] The Flash Crash was likely an indirect link to the incremental decline in HFT revenues and decreased profits that HFT firms have been facing since 2010.[66]

C. The Current State of the High Frequency Market

How does an entire industry overthrow a century long practice like floor trading, to being declared dead just after its 10th anniversary?[67] While the

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[56] Andrei Kirilenko et al., *supra* note 52.

[57] Tom C.W. Lin, *The New Market Manipulation*, 66 EMORY L.J. 1253, 1260-61 (2017) (explaining how Waddell & Reed's program executed the order "without regard to price or time" leading to these consequences).

[58] *Id.* at 1261.

[59] *Id.*

[60] *Id.* at 1260.

[61] *Id.*

[62] *Id.* at 1261.

[63] Andrei Kirilenko et al., *supra* note 52.

[64] *See generally* Alexander Osipovich, *High-Frequency Traders Fall on Hard Times,* WSJ, Mar. 21, 2017, at B13 (explaining the noticeable decline in HFT after Flash Crash in 2010).

[65] Andrei Kirilenko et al., *supra* note 52.

[66] *See* Osipovich, *supra* note 64 (explaining the noticeable decline in HFT after Flash Crash in 2010).

[67] *See* Worstall, *supra* note 40 (highlighting that HFT transformed the manner of

declaration that HFT is dead is largely incorrect, the answer to the question, why is HFT declining, is multifaceted. There are many factors that ultimately have led to the rapid decline of HFT profitability.[68]

The first factor is the revolutionary technological advancements made in the trading industry became widely adopted.[69] Investment companies were forced to either adapt to the change or drown in their complacency.[70] As a result, the HFT market was inundated with new competitors, which led to a quick market maturation.[71] The competitive advantages of co-location and fiber optic cables began to diminish because other asset managers, as well as HFT firms, are also co-locating their trading computers in the same data center as the exchanges.[72] The technological advantage that once separated high-frequency traders from the rest of the equity market quickly dwindled.[73]

The second factor that led to the decline in HFT firms' profits is the stabilization of the markets.[74] When HFT boomed, the market was in a state of vulnerability following the collapse of the housing market.[75] Price volatility largely determines the profit margins that high frequency traders will earn.[76]

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investment faster than politicians could regulate); Irene Aldridge, *HFT is Dead! Long Live HFT!*, HUFFINGTON POST (Apr. 3, 2017, 12:48 PM), https://www.huffingtonpost.com/entry/hft-is-dead-long-live-hft_us_58e27c21e4b0ca889ba1a85e (writing that some commentators believe the HFT market is no longer profitable).

[68]   *See* Worstall, *supra* note 40 (arguing that HFT went through the same cycle of capitalism similar to any other technology); Frank Chaparro, *High-speed trading firms have been hoping for market chaos just like this*, BUS. INSIDER (FEB. 5, 2018, 11:51 PM), http://www.businessinsider.com/high-speed-trading-firms-have-been-hoping-for-market-chaos-just-like-this-2018-2 (analyzing how market volatility actually benefits HFT traders and sustains the market).

[69]   Ziyang Fan & Cristian Rodriguez Chiffelle, *These 5 technologies have the potential to change global trade forever*, WORLD ECON. F. (June 06, 2018), https://www.weforum.org/agenda/2018/06/from-blockchain-to-mobile-payments-these-technologies-will-disrupt-global-trade.

[70]   Olivia Oran, *Goldman Sachs licks wounds in equities trading as peers grab share*, REUTERS (Apr. 18, 2017, 5:19 PM), https://www.reuters.com/article/us-goldman-sachs-results-equities/goldman-sachs-licks-wounds-in-equities-trading-as-peers-grab-share-idUSKBN17K2IF(discussing Goldman Sachs' failure to adapt to technology allowed competitors to overtake their majority in the market share).

[71]   Worstall, *supra* note 40.

[72]   *See* Gregory Meyer et al., *How high-frequency trading hit a speed bump*, FIN. TIMES (Jan. 1, 2018), https://www.ft.com/content/d81f96ea-d43c-11e7-a303-9060cb1e5f44 (detailing the rise of technology and its effect on the stock market).

[73]   *See id.* (explaining that the benefits of colocation were not significant in the long-term).

[74]   *Id*.

[75]   *See* Paul Kosakowski, *The Fall of the Market in the Fall of 2008*, INVESTOPEDIA, https://www.investopedia.com/articles/economics/09/subprime-market-2008.asp (last updated Apr. 25, 2019) (highlighting the collapse of the housing market as the backdrop for market volatility).

[76]   Meyer et al., *supra* note 72.

Accordingly, as stability of the market increases, the chance of significant profitability decreases for high frequency traders.[77] However, since 2010, the market has continually become more stable.[78] In 2017, the DOW Jones reached an all-time high, showing that traders were once again confident in the markets, which reflects the limited ability for HFT firms to trade on the volatility of the market.[79]

Finally, the most important factor is the regulatory attention and enforcement actions which have closed the loopholes that once allowed bad actors to use HFT as a tool to exploit the market.[80] HFT can be used as a tool by traders to manipulate or deceive the market, if not provided proper oversight. Therefore, the SEC, CFTC and FINRA's enforcement actions against violations of manipulation through HFT have validated the need for greater oversight over these practices.

II. AGENCIES HAVE PROTECTED THE MARKET WITHOUT SPECIFIC HIGH-FREQUENCY TRADING REGULATIONS

Given the novelty of HFT in the financial markets, government agencies scrambled to figure out means to regulate such practices.[81] Agencies spent a significant amount of time and resources formulating the most effective means to provide oversight and generate regulations to prevent bad actors from using HFT as a tool to manipulate the market.[82] However, initially, there were no substantive steps made beyond committee meetings and proposed regulations, which were not published to the Federal Register.[83] Therefore, from 2006 to 2011, HFT went largely unaddressed, as government agencies attempted to create meaningful regulations.[84] During this time, abusive trading practices

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[77]   *Id.*

[78]   *See* Paul R. La Monica, *The Obama Bull Mark: A 140% Jump in the Dow*, CNN MONEY (Jan. 10, 2017, 12:03 PM), http://money.cnn.com/2017/01/10/investing/obama-stock-market-trump/index.html.

[79]   Tom Huddleston, Jr., *The Stock Market Again Closed at New Record Highs on Monday*, FORTUNE (Dec. 18, 2017), http://fortune.com/2017/12/18/stock-market-record-highs/; Worstall, *supra* note 40.

[80]   *See generally* MILLER & SHORTER, *supra* note 42.

[81]   JOINT CFTC-SEC SUMMARY REPORT, RECOMMENDATIONS REGARDING REGULATORY RESPONSE TO THE MARKET EVENTS OF MAY 6, 2010 (2010); *see also* Courtney Comstock, *How The SEC Defines High Frequency Traders For Regular People*, BUS. INSIDER (Oct. 1, 2010, 2:16 PM), http://www.businessinsider.com/definition-high-frequency-traders-2010-10.

[82]   JOINT CFTC-SEC SUMMARY REPORT, *supra* note 81, at 7.

[83]   *Id.*; *see also* McGowan, *supra* note 43, at 15-16.

[84]   *See* JOINT CFTC-SEC SUMMARY REPORT, *supra* note 81, at 7; McGowan, *supra* note 31, at 15.

continued to materialize including spoofing,[85] insider-trading,[86] abusive trading practices in the dark pools,[87] and many others.[88]

Following the Flash Crash in 2010, the SEC and CFTC held a joint-advisory committee acknowledging many issues HFT created in the market, including: co-location, price volatility, and liquidity issues.[89] Because the Flash Crash dropped the market ten percent in a matter of thirty-six minutes,[90] it was vital for the SEC and CFTC to devise recommendations to protect investors from another flash crash.[91] These recommendations included minimum quoting requirements and circuit breaker procedures.[92]

Following these recommendations, the CFTC spearheaded a subcommittee meeting with the intent to define HFT and introduce a new subcommittee to provide oversight and surveillance.[93] While these agencies have been enforcing violations against fraudulent or manipulative behavior in the market, HFT remains undefined by statutes or regulation.[94] Therefore, the SEC, CFTC, and FINRA have regulated HFT under broad securities regulations.[95]

A. CFTC Has Regulatory Authority over HFT and has Used Anti-Spoofing Statutes to Prevent Manipulation of the Markets

In 2012, the CFTC began significant progress towards regulating HFT during a subcommittee meeting. The subcommittee defined HFT as:

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[85]   MILLER & SHORTER, *supra* note 42, at 1, 7 (defining spoofing as bidding or offering with the intent to cancel the bid or offer before execution).

[86]   *See generally* Mercer Bullard, *HFT isn't the problem—insider trading is: Op-ed*, CNBC (Apr. 4, 2014, 10:41 AM), https://www.cnbc.com/2014/04/04/hft-isnt-the-probleminsider-trading-is-op-ed.html (defining insider trading as a person trades on material (important), nonpublic information in violation of a legal duty).

[87]   FINRA, *Getting Up to Speed on High-Frequency Trading* (Nov. 25, 2015), http://www.finra.org/investors/getting-speed-high-frequency-trading (defining dark pools as Stocks that are listed on a particular exchange do not need to actually trade on that exchange).

[88]   *See generally* McGowan, *supra* note 43, at 12-20.

[89]   JOINT CFTC-SEC SUMMARY REPORT, *supra* note 81, at 2.

[90]   Kirilenko et al., *supra* note 52, at 967-70.

[91]   JOINT CFTC-SEC SUMMARY REPORT, *supra* note 81, at 14; *see also* Kirilenko et al., *supra* note 52.

[92]   JOINT CFTC-SEC SUMMARY REPORT, *supra* note 81, at 3-4.

[93]   *CFTC Examines High-Frequency Trading*, FUTURES INDUS. ASS'N (Mar. 30, 2012, 12:45 AM), https://secure.fia.org/ptg-ownloads/FIA%20report%20on%20CFTC%20HFT%20discussion%20March%202012.pdf.

[94]   Peter J. Henning, *High-Frequency Trading Falls in the Cracks of Criminal Law*, N.Y. TIMES (Apr. 7, 2014, 11:46 AM), https://dealbook.nytimes.com/2014/04/07/high-frequency-trading-falls-in-the-cracks-of-criminal-laws.

[95]   *See* Johnson, *supra* note 34, at 871-72.

> High frequency trading is a form of automated trading that employs:
> (a) algorithms for decision making, order initiation, generation, routing, or execution, for each individual transaction without human direction;
> (b) low-latency technology that is designed to minimize response times, including proximity and co-location services;
> (c) high speed connections to markets for order entry; and
> (d) high message rates (orders, quotes or cancellations).[96]

The purpose of this definition was to provide a launching ground for the committee to implement new regulations.[97] However, as of May 2019, the CFTC has not successfully implemented this definition in any regulation, therefore the CFTC began using the anti-spoofing statutes in the Dodd-Frank Act in order to enforce violations against abusive HFT practices.[98]

Spoofing is the practice of traders making large volume trades, but before the trades are fully executed, the traders cancel the trade with the intentions of misleading other traders.[99] Spoofing is an issue because a bad actor is artificially creating interest by making the appearance that a stock is trading at a certain price, but the bad actor has no real intention of honoring the bid or the offer.[100] This act is "a form of price manipulation."[101] HFT makes spoofing easier by using the high-speed algorithms to cancel trades in mere microseconds, without high-speed technology, spoofing would be nearly impossible to accomplish.[102]

In 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act provided an anti-disruptive practices authority to the CFTC. Following the adoption of the Dodd-Frank Wall Street Reform and Consumer Protection Act, the CFTC issued an interpretive order called Disruptive Trading Practices, which has been the basis of most of the CFTC's claims against high frequency

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[96]   Joan Manley et al., *CFTC Technical Advisory Committee: Sub-Committee on Automated and High Frequency Trading Working Group 1*, CFTC 3 (June 2012), http://www.cftc.gov/idc/groups/public/@newsroom/documents/file/wg1presentation062012.pdf.

[97]   *Id.* at 4; *CFTC Examines High-Frequency Trading*, *supra* note 93.

[98]   7 U.S.C. § 6c(a)(5) (2012); Jan Paul Miller et al., *The Anti-Spoofing Provision of the Dodd –Frank Act: New White Collar Crime or 'Spoof' of a Law?*, THOMPSON COBURN LLP, https://www.thompsoncoburn.com/docs/default-source/News-Documents/spoofing.pdf?sfvrsn=0 (last visited Mar. 4, 2018).

[99]   Meric Sar, *Dodd-Frank and the Spoofing Prohibition in Commodities Markets*, 22 FORDHAM J. CORP. & FIN. L. 383, 384-85 (2017); Miller et al., *supra* note 98.

[100]   Sar, *surpa* note 99; Miller et al., *supra* note 98.

[101]   *Id.*

[102]   Miller et al., *supra* note 98.

traders.[103] In 2013, the CFTC released an interpretation of the anti-spoofing provision and clarified the requirements needed for a violation of the anti-spoofing statute.[104] The interpretation focused on an intent requirement that extended beyond recklessness.[105] In order for an individual to be in violation under the anti-spoofing provision, one must buy or sell a security with the intent to cancel the order before fulfillment of the order.[106]

There continues to be a controversy regarding the direct cause of the Flash Crash in 2010.[107] However, one of the believed causes of the Flash Crash is Navinder Singh Sarao's spoofing activity.[108] In 2015, Navinder Singh Sarao was indicted for spoofing and having a potential connection to the Flash Crash.[109] Sarao used automated algorithms to spoof E-mini S&P 500 future contracts.[110] His process included artificially lowering the price of E-mini S&P 500 future contracts by placing a large fake sell order.[111] He would then buy shares at the lower price and turn off his algorithm.[112] This gave the appearance that there was no longer a large sell order, which would motivate investors to buy the shares he had just bought at the artificially lowered price.[113] On May 6, 2010, Sarao's process, allowed him to sell 62,077 E-Mini Future contracts for a net profit of $879,018.[114] Sarao continued this spoofing operation for approximately five years following the Flash Crash and there has not been a major once since. Therefore, the combination of Sarao's spoofing actions and the Waddell & Reed trade likely caused the catastrophic effect of the Flash Crash.[115]

Since 2017, the CFTC has focused on enforcing violations against traders that participate in spoofing.[116] A notorious spoofing case involved a Deutsche Bank

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[103] Sar, *supra* note 99, at 385 n. 4.

[104] CFTC, Antidisruptive Practices Authority, 78 Fed. Reg. 102 31890, 31890-92 (2013).

[105] *Id.*; Sar, *supra* note 98, at 397.

[106] Antidisruptive Practices Authority, 78 Fed. Reg. 102 31890-92 (2013); Sar, *supra* note 99, at 397-400.

[107] Levine, *supra* note 54.

[108] *Id.*

[109] Matt Levine, *Market Milking and Research Troubles*, BLOOMBERG (Feb. 13, 2017, 9:21 AM), https://www.bloomberg.com/view/articles/2017-02-13/market-milking-and-research-troubles.

[110] Levine, *supra* note 54.

[111] *Id*.

[112] *Id*.

[113] *Id*.

[114] *Id.*

[115] *Id.*

[116] Sar, *supra* note 99, at 385, 398, 406; *see also* Zach Brez et al., *CFTC 2018 Enforcement: Where is the Puck Going*, LAW.COM (Jan 29, 2018), https://www.law.com/newyorklawjournal/sites/newyorklawjournal/2018/01/26/cftc-2018-enforcement-where-the-puck-is-going/?slreturn=20180204162838; Liz Moyer, *UBS, Deutsche Bank and HSBC to Pay Million in Spoofing Settlement, CFTC Says*, CNBC (Jan. 31 2018, 8:32 AM), https://www.cnbc.com/2018/01/29/ubs-deutsche-bank-and-hsbc-to-pay-

trader, David Liew.[117] From 2009 to 2012, David Liew conspired with other metal traders to place a large volume of orders to buy and sell metal future contracts but intended to cancel these orders before they were fulfilled.[118] The CFTC used chat room communications to expose David Liew's spoofing practices reflecting that spoofing expands far beyond an individual.[119] Further, the language in the chatroom transcripts suggest the culture of investing in future commodities encourages spoofing and can be a very widespread issue.[120] David Liew's plea settlement was the CFTC's eighth successful spoofing case and has sparked the CFTC's interest in continuing to crack down on spoofing cases.[121] At the beginning of 2018, the CFTC issued eight different Anti-Spoofing Enforcement Actions against three major banks: Deutsche Bank, HSBC, and UBS.[122]

Navinder Sarao and David Liew are bad actors that used HFT algorithms as a tool to manipulate the market and exploit investors.[123] The CFTC remains consistent by enforcing violations, pursuant to the anti-spoofing provision.[124] Thus, the CFTC has made it clear that manipulation of the markets through HFT will not be acceptable in the future and they will continue to use their authority to protect investors and maintain a fair market.[125]

B. SEC Enforcement has Used Anti-Manipulation Statutes Rule 10b-5 of the Exchange Act and Section 17(a) of the Securities Act to Enforce High Frequency Trading Violations

In June 2014, SEC Chair Mary Jo White publicly addressed the Sandler O'Neill & Partners, L.P., Global Exchange and Brokerage Conference regarding

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millions-in-spoofing-settlement.html.

[117] *In re* David Liew, CFTC No. 17-14, 1 (June 2, 2017); Todd Ehret, *IMPACT ANALYSIS: Latest U.S. Spoofing Cases Show Regulators' Highlight Chat Rooms*, REUTER (June 13, 2017, 2:40 PM), https://www.reuters.com/article/bc-finreg-regulators-chatrooms/impact-analysis-latest-u-s-spoofing-cases-show-regulators-focus-highlight-chat-rooms-idUSKBN1942JD.

[118] *In re Davis Liew*, CFTC No. 17-15, 1-2; Ehret, *supra* note 117.

[119] Ehret, *supra* note 117.

[120] *Id.* (showing the financial institutions have a culture for encouraging spoofing and that it is an industry-wide issue).

[121] *Id.*

[122] Moyer, *supra* note 116.

[123] *See* Ehret, *supra* note 117; Levine, *supra* note 54.

[124] Press Release, James McDonald, Director of Enforcement, Commodity Future Trade Comm'n, Statement of CFTC Director of Enforcement James McDonald (Jan. 29, 2018).

[125] *Id.*; Ehret, *supra* note 117.

the affairs and issues before the SEC.[126] HFT was one of these five issues.[127] White went on to discuss how monumental the advances in technology have been for the market but believed that those same advances were being used to exploit the market.[128] In addition, she argues that HFT, in and of itself, is not the issue.[129] Rather, the issue is how HFT is used as a tool to exploit the market. Moreover, she argues there needs to be a dedicated effort by the Commission to promote fairness in the market place.[130] She stated that limiting vulnerability from exploitation by regulating HFT would be a great start.[131] White's speech emphasized that traders who participated in off-the-market trades will have to register with FINRA.[132] This requirement limits traders' ability to take advantage of investors in the dark pool.[133] When the speech was made, the SEC had not enforced any HFT violations.[134] Thus, this speech foreshadowed the exhausting effort the Commission would make to limit bad actors using HFT as a tool to exploit the market.[135]

As stated above, the SEC, along with the CFTC, were relatively early in recognizing that certain traders used HFT to mislead and manipulate the market.[136] The SEC does not have any specific regulations that provide regulatory oversight on HFT violations.[137] However, the SEC has been consistent in enforcing Rule 10b-5 of the Exchange Act and Section 17(a) of the Securities Act to penalize violations of securities laws through the use of HFT.[138]

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[126]   White, *supra* note 22.

[127]   *Id.*

[128]   *Id*.

[129]   *Id*.

[130]   *Id*.

[131]   *Id*.

[132]   *Id*.

[133]   Dave Michaels, *SEC Preparing to Finalize Transparency Rules for Dark Pools, Mary Jo White Says*, WALL ST. J. (Sept. 14, 2016, 4:32 PM), https://www.wsj.com/articles/dark-pools-convince-sec-to-delay-transparency-rules-mary-jo-white-says-1473876535 (defining dark pools as "competitors to stock exchanges that don't publicly display investors' bids and offers"); White, *supra* note 22.

[134]   Paul Carberry et al., *SEC Announces First-Ever Market Manipulation Case Against High-Frequency Trading*, WHITE & CASE (Oct. 21, 2014), https://www.whitecase.com/publications/alert/sec-announces-first-ever-market-manipulation-case-against-high-frequency-trading; White, *supra* note 22.

[135]   *See* Andrew Ackwerman, *Rapid-Fire Traders Face Finra Oversight,* WALL ST. J., Mar. 26, 2015, at C3; Carberry et al., *supra* note 134; White, *supra* note 22.

[136]   JOINT CFTC-SEC SUMMARY REPORT, *supra* note 81, at 2, 7.

[137]   MILLER & SHORTER, *supra* note 42.

[138]   15 U.S.C. § 77q(a) (2010); *In re* Latour Trading LLC, Exchange Act Release No. 73125, (Sept. 17, 2014), https://www.sec.gov/litigation/admin/2014/34-73125.pdf (finding that Latour's flawed calculations violated Section 17); John C. Coffee, Jr. *Cheating the Algorithm: The New "Pump and Dump" Fraud*, THE CLS BLUE SKY BLOG (July 24, 2017), http://clsbluesky.law.columbia.edu/2017/07/24/cheating-the-algorithm-the-new-pump-and-dump-fraud.

The Commission is able to use these statutes based on their broad language.[139] These provisions of securities regulations have been at the forefront of many recent SEC enforcement actions.[140]

  The first case against HFT activity by the SEC was brought against Athena Capital in 2014.[141] At the time, the SEC had never enforced nor attempted to prosecute against improper use of HFT.[142] The SEC used its regulatory authority under Rule 10b-5 of the Securities and Exchange Act of 1934, which prohibits the manipulation in connection with the purchase or sale of any security.[143] For a period of about six months in 2009, Athena Capital was using a complex HFT algorithm to initiate high-speed trades in the final two seconds of the trading period of the NASDAQ.[144] These trades affected tens of thousands of stocks over the six-month period.[145] Athena Capital would trade on the imbalanced messages that were sent from the NASDAQ.[146] Imbalanced messages are sent out by NASDAQ during the last five minutes of trading that state the true supply and demand of a stock based on completed buy-and-sell orders.[147] This strategy of large rapid-fire purchase or sale order on imbalanced messages would manipulate the closing price on a day-to-day basis.[148] Athena was required to pay one million dollars in fines for the manipulation of the markets in violation of Section 10(b) and Rule 10b-5 of the Securities and Exchange Act of 1934.[149] Athena Capital's use of HFT facilitated and exploited its manipulative trade practices.[150] The Commission concluded that while HFT itself is not illegal, there are still plenty of loopholes that can allow bad actors to exploit the

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[139] Daniel J. Bacastow, *Due Process and Criminal Penalties under Rule 10b-5: The Unconstitutionality and Inefficiency of Criminal Prosecutions for Insider Trading*, 73 J. CRIM. L. & CRIMINOLOGY 96, 96 (1982).

[140] Joseph De Simone et al., *Increased Public and Private Scrutiny of High-Frequency Trading*, MAYER BROWN 1-2 (May 14, 2014).

[141] SEC Press Release, Sec. & Exchange Comm'n, SEC Charges New York-Based High Frequency Trading Firm with Fraudulent Trading to Manipulate Closing Prices (Oct. 16, 2014), http://www.sec.gov/News/PressRelease/Detail/PressRelease/1370543184457#.VG zWaZPF81d; Carberry et al., *supra* note 134.

[142] SEC Press Release, *supra* note 141.

[143] *Id.*

[144] *Id.*

[145] *Id.*

[146] *Id.*

[147] NASDAQ, *Net Order Imbalance Indicator Support Document,* 4 (Dec. 2008), https://data.nasdaq.com/pdf/noii_support.pdf; *see also* Will Kenton, *Net Order Imbalance Indicator (NOII),* INVESTOPEDIA (May 30, 2018), https://www.investopedia.com/terms/n/ net-order-imbalance-indicator-noii.asp.

[148] SEC Press Release, *supra* note 141.

[149] *Id.*

[150] *Id.*

market.[151]

C. FINRA and SEC Work Together to Close the Door on the Dark Pools that Could Be Exploited by Bad Actors Using HFT

As HFT began to replace floor traders, there was a similar correlation taking place between over-the-counter trading and exchange trading.[152] One example of over-the-counter trading is the dark pool.[153] Dark pools are private exchanges that are used to trade securities.[154]

The SEC has two different pieces of regulation addressing dark pools, Regulation ATS and Regulation NMS. These two regulations are supposed to provide oversight and transparency to alternative trading markets.[155] Regulation ATS requires safeguards to protect confidential trading information in the dark pools.[156] These safeguards are not specified in Regulation ATS and are left to the discretion of the dark pool operators, which have led to some significant issues in the past.[157] Alternatively, Regulation NMS requires dark pool trades to the confines of the National Best Bid Offer ("NBBO").[158] The NBBO means that an order must be executed at the best price offered across multiple exchanges.[159] Therefore, there can be time delay issues with the securities information processor that causes dark pools to trade on old information.[160] This concept is called the latency arbitrage.[161] This can leave openings for bad actors with HFT algorithms to exploit the dark pool's prices.[162]

In addition, as the landscapes of the dark pools have drastically changed, from

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[151] *Id.*; *see* White, *supra* note 22, at 860.

[152] Johnson, *supra* note 34, at 860.

[153] *Id.* at 864.

[154] Elvis Picardo, CFA, *An Introduction to Dark Pools*, INVESTOPEDIA (May 5, 2017, 3:54 PM), https://www.investopedia.com/articles/markets/050614/introduction-dark-pools.asp.

[155] Luis A. Aguilar, Sec. Exch. Comm'n., Public Statement on Shedding Light on Dark Pools (Nov. 18, 2015); *see* Johnson, *supra* note 34, at 869-72.

[156] 17 CFR § 242.300-04; Aguilar, *supra* note 155.

[157] *See generally* SEC Press Release, Barclays, Credit Suisse Charged with Dark Pool Violation (Jan. 31, 2016), https://www.sec.gov/news/pressrelease/2016-16.html; Moyer, *supra* note 116.

[158] Will Kenton, *National Best Bid and Offer*, INVESTOPEDIA, https://www.investopedia.com/terms/n/nbbo.asp (last visited Apr. 9, 2018).

[159] *Id.*

[160] Matt Levine, *Goldman Sachs Got Lost in Its Own Dark Pool*, BLOOMBERG (July 1, 2014, 1:06 PM), https://www.bloomberg.com/view/articles/2014-07-01/goldman-sachs-got-lost-in-its-own-dark-pool.

[161] *Id*.

[162] Linette Lopez, *As Promised, the New York Attorney General has Begun his War on High-Frequency Trading Firms*, BUS. INSIDER (Apr. 16, 2014, 4:06 PM), http://www.businessinsider.com/schneiderman-subpeonas-hft-firms-2014-4.

an investor haven to a potential predatory hot spot, Regulation ATS and Regulation NMS have failed to provide sufficient oversight to protect competitive investors in off-exchange markets.[163] Nevertheless, FINRA and the SEC have made it a regulatory focus to shed some light into the dark pools and attempt to close some of the loopholes in the regulation of dark pools.[164]

SEC Chair Mary Jo White recommended traders participating in off-exchange venues register with FINRA, subjecting off-exchange venues that offer NMS stocks listed on national exchanges to oversight and regulation.[165] This recommendation was eventually acted upon to make the dark pools more transparent.[166] The issues with dark pools were a large contention in Michael Lewis' book, *The Flash Boys*, demonstrating that they can be a venue that encourages large, powerful high-frequency traders to undercut the participants in the dark pools such as large banks, asset managers, and hedge funds. Despite the required safeguards to prevent HFT transactions from entering the dark pools,[167] cases involving Barclays Capital Inc., Credit Suisse Securities, and Goldman Sachs demonstrate that bad acting high-frequency traders are swimming in the deep end, circling the waters waiting for dark pool operators to give them an opportunity to exploit dark pool participants.[168]

In the Barclays Capital Inc. case, Barclays owned and operated a dark pool called Barclays LX ("LX").[169] The SEC found LX made material misleading statements regarding their protection against predatory trading tactics.[170] They led investors to believe Barclays was actively monitoring their dark pools to prevent predatory behavior from high-frequency traders, but in actuality their investors were not provided such protection[171] and were often put into more aggressive and risky situations.[172] The SEC ordered a 70 million dollar settlement and required Barclays to implement an independent third party surveillance of their dark pools.[173]

In another noteworthy case, Credit Suisse Securities owned and operated a

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[163] Aguilar, *supra* note 155; *see generally* Johnson, *supra* note 34, at 867.

[164] Johnson, *supra* note 34, at 879; Press Release, FINRA, FINRA Makes Dark Pool Data Available Free to the Investing Public (June 2, 2014); Aguilar, *supra* note 155.

[165] White, *supra* note 22.

[166] Johnson, *supra* note 34, at 866-67.

[167] Lewis, *supra* note 14.

[168] Liz Moyer, *Barclays and Credit Suisse to Settle 'Dark Pool' Inquiries*, N.Y. TIMES (Jan. 31, 2016), https://www.nytimes.com/2016/02/01/business/dealbook/barclays-and-credit-suisse-to-settle-dark-pool-inquiries.html?action=click&contentCollection=DealBook&module=RelatedCoverage&region=EndOfArticle&pgtype=article.

[169] SEC Press Release, *supra* note 157; *see generally* Moyer, *supra* note 168.

[170] *Id.*

[171] *Id.*

[172] *Id*.

[173] *Id.*

dark pool called "Crossfinder."[174] Crossfinder is the second largest dark pool.[175] Crossfinder represented that they used a feature called, Alpha Scoring, to help prevent predatory trading activity and kick the "opportunistic" traders out of the dark pool.[176] In addition, Credit Suisse was supposed to keep trading information confidential.[177] However, Alpha Scoring was not adequately preventing predatory trading activity and instead was sending confidential trading information outside of its dark pool, leaving investors open for exploitation by potential bad acting high frequency traders.[178]

Finally, in the case against Goldman Sachs, FINRA fined them for violating Rule 611 of Regulation NMS, which requires off-exchange markets to offer securities at the NBBO.[179] In addition, Rule 611 requires dark pool operators to have written procedures and policies to prevent trade through orders.[180] A trade through order is a market order that is not made at the NBBO.[181] Rule 610, which requires dark pools to offer securities at the NBBO, prevents market makers and traders from making trades at a price quote that is drastically different from what is offered on the exchanges.[182]

In this case, Goldman Sachs owned and operated a dark pool called Stigma-X.[183] However, Goldman Sachs failed to have the requisite written procedures or policies to prevent trade through orders.[184] Therefore, Goldman's noncompliance with Rule 610 allowed investors to purchase stocks at prices

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[174] *Id*.

[175] Joe Rennison, *Barclays and Credit Suisse to pay $154m over dark pools*, FIN. TIMES (Jan. 31, 2016), https://www.ft.com/content/d160fc2a-c84c-11e5-be0b-b7ece4e953a0 (explaining Crossfinder is the second-largest dark pool according to FINRA).

[176] SEC Press Release, *supra* note 157; *see* Moyer, *supra* note 168.

[177] *Id*.

[178] *Id.*

[179] Tom Huddleston, Jr., *Goldman Sachs fined $800,000 for dark pool violations*, FORTUNE (July 1, 2014), http://fortune.com/2014/07/01/goldman-finra-fine/; Memorandum from Sec. & Exch. Comm'n Division of Trading and Markets to SEC Market Structure Advisory Committee 3 (Apr. 30, 2015) (on file with SEC), https://www.sec.gov/spotlight/ emsac/memo-rule-611-regulation-nms.pdf ("The core of Rule 611 is paragraph (a)(1), which promotes intermarket price protection of orders by restricting the execution of trades on one venue at prices that are inferior to displayed quotations at another venue.").

[180] *Trade Through*, INVESTOPEDIA, https://www.investopedia.com/terms/ t/tradethrough.asp (last visited Feb. 3, 2019); Memorandum from Sec. & Exch. Comm'n Division of Trading and Markets to SEC Market Structure Advisory Committee, *supra* note 179, at 3 (explaining Rule 611 "requires a 'trading center' to implement policies and procedures that are reasonably designed to prevent 'trade-throughs' on that trading center of "protected quotations'" not fitting certain exceptions).

[181] Investopedia, *supra* note 180.

[182] Sec. & Exch. Comm'n, Exchange Act Release No. 34-53829; 17 CFR Part 242 1 (May 18, 2006); *see* Picardo, *supra* note 154.

[183] Huddleston, *supra* note 179.

[184] *Id*.

inferior to market price.[185]

    These three cases emphasize SEC and FINRA's failure to provide adequate regulation and enforcement of off-exchange markets by showing a backward-looking regulatory strategy.[186] Dark pools were supposed to be a safe haven to protect investors and the overall market;[187] however, owners and operators are leaving gaping holes in the oversight of their dark pools. These holes in oversight allow bad actors to use private information to beat customers to the order, resulting in a manipulation of the price.[188] Nothing substantial has been proven with regards to bad acting high frequency traders exploiting the lapses of dark pool operators' ability to protect investor information.[189] However, these cases show that allowing dark pool operators to self-regulate their pools without specific safeguards or guidelines give bad actors an opportunity to take advantage of the released confidential trading information.[190] Therefore, the SEC, CFTC, and FINRA should stop allowing dark pools to be self-regulated, and instead implement significant regulations and oversight over the dark pools, to prevent potential openings for bad actors.[191]

III. GOVERNMENT REGULATION HAS FACTORED INTO THE PROFITABILITY OF HFT FIRMS

    HFT firms were extremely successful in the first few years after HFT became a prominent component of the overall trading market, especially with regards to their share of market revenue and profitability.[192] However, over the past four years HFT firms have seen a significant decrease and overall plateau of their revenue and profitability, while their percentage of trading volume has increased.[193] This decline in profitability has led many well established HFT firms to shut their doors.[194] There are many contributing factors to the decrease

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[185] Levine, *supra* note 160.

[186] Moyer, *supra* note 168; *see generally* Aguilar, *supra* note 155; FINRA, *supra* note 164.

[187] Matt Levine, *Dark Pools Turned Out to Be Really Murky*, Bloomberg (Feb. 1, 2016), https://www.bloomberg.com/view/articles/2016-02-01/dark-pools-turned-out-to-be-really-murky.

[188] *Id*.

[189] *See generally* Levine, *supra* note 160.

[190] Moyer, *supra* note 168; Levine, *supra* note 160.

[191] Levine, *supra* note 160.

[192] Annie Massa & Charlotte Chilton, *They're the World's Fastest Traders. Why Aren't They Thriving?*, Bloomberg (July 13, 2017), https://www.bloomberg.com/news/articles/2017-07-13/they-re-the-world-s-fastest-traders-why-aren-t-they-thriving; Osipovich, *supra* note 64.

[193] Massa & Chilton, *supra* note 192; Osipovich, *supra* note 64.

[194] Osipovich, *supra* note 64.

in profitability in HFT trading firms, including increased competition, overall market maturation, and lower price volatility.[195] In addition, increased government regulation and oversight has affected profitability in the financial industry.[196] Government regulation is a contributing factor to the decrease in profitability by HFT firm because increased cost of compliance and moves trading volume to less regulated markets.[197]

A. Intensified Government Regulation is a Factor in Decreased Profitability

Profitability in any industry is largely influenced by many different factors.[198] In manufacturing, or a goods-based industry, some of the factors that contribute to how companies maintain profitability are the price of raw materials, the number of competitors, and the logistical expenses.[199] The financial industry is not any different.[200] However, the contributing factors to profitability in the financial industry are significantly different from a goods-based industry due to the lack of costly resources.[201] The HFT market has suffered a decrease in profitability because of increased competition, increased expense for obtaining code and high-speed equipment, low market volatility, and government regulation.[202] Moreover, there is a noticeable trend among CEOs across many

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[195] Massa & Chilton, *supra* note 192.

[196] Kasia Moreno, *Regulatory Environment Has More Impact on Business Than the Economy, Say U.S. CEOs*, FORBES (Aug. 12, 2014, 4:22 PM), https://www.forbes.com/ sites/forbesinsights/2014/08/12/regulatory-environment-has-more-impact-on-business-than-the-economy-say-u-s-ceos/#23c15d5d684d (explaining how government regulations limit revenue growth and profitability in the financial sector).

[197] *See id.* (discussing the past and future effects of relevant government regulations).

[198] *See* Steve Culp, *Low Profitability Is A Risk Factor in Many Industries*, FORBES (Dec. 19, 2017, 10:10 AM), https://www.forbes.com/sites/steveculp/2017/12/19/low-profitability-is-a-risk-factor-in-many-industries/#3622018c6aae (explaining how profitability in certain industries is affected by factors such as digital disruption and shifting consumer preferences).

[199] *See id.*; *Factors that affect the profitability of firms*, ECONOMICS HELP, https://www.economicshelp.org/microessays/profit/ (last visited Apr. 10, 2019) (discussing how the increased cost of raw materials and competition can affect profitability).

[200] *See* John Detrixhe, *Even when they're profitable every day, high-frequency traders aren't making much money*, QUARTZ (Aug. 8, 2017), https://qz.com/1048912/high-frequency-traders-like-virtu-financial-virt-find-it-hard-to-make-money-even-when-theyre-profitable-every-day/ (explaining how increased competition in high-frequency trading has impacted profitability).

[201] *See The Financial Services Industry in the United States*, SELECTUSA, https://www.selectusa.gov/financial-services-industry-united-states (last visited Apr. 10, 2019) (describing the various industry subsectors in the financial services industry, what each does and what each requires to operate); Detrixhe, *supra* note 200; Culp, *supra* note 198.

[202] Massa & Chilton, *supra* note 192 (discussing how "fierce competition among high-frequency traders" has battered their profits); *see also* Osipovich, *supra* note 66 ("High-

different industries where government regulation has had a significant influence on profitability.[203] While there is a decline in profitability in the HFT market, there is also a consistent increase in government regulation.[204]

Over the last ten years, regulation over the HFT market has become a large focus for the CFTC, SEC, and FINRA.[205] This focus is based on providing oversight to ensure that bad actors are not using HFT and other algorithmic trading platforms to manipulate investors.[206] With the two specific regulations, Regulation AT and Regulation SCI, it appears that government and agency regulation will have a continued effect on profitability.[207] This opinion is largely based around certain regulations that have been proposed. For example, if Regulation AT implements risk control measures this will impact the overall price and trade volume that high-frequency traders are allowed to make.[208] This

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frequency trading firms revenue from U.S. equities trading has sunk as volatility dropped.").

[203] Moreno, *supra* note 196.

[204] *See generally* Moreno, *supra* note 196 (discussing how government regulations have limited profitability and that there has been an increase in government regulations directed at the financial sector and financial services companies).

[205] *See* MILLER & SHORTER, *supra* note 42, at 11-12 (explaining that proposals which would allow for FINRA regulatory oversight over HFT have been advanced by the SEC).

[206] *See id.* at 9 ("On November 24, 2015, the CFTC released a proposed rule, Regulation Automated Trading, governing certain HFT practices. In this regulation, the CFTC also refers frequently to algorithmic trading systems (ATS), which are computerized trading systems based on automated sets of rules or instructions used to execute a trading strategy.").

[207] *See generally* Osipovich, *supra* note 66; Moreno, *supra* note 196 (discussing how the financial services sector is one of the sectors most affected by the regulatory environment in the United States and how these regulations will continue to hurt profitability); 17 C.F.R. § 242.1001 (2015) (explaining how Regulation SCI operates and that each SCI entity "shall establish, maintain, and enforce written policies and procedures reasonably designed to ensure that its SCI systems operate in a manner that complies with the Act and the rules and regulations thereunder."); Regulation Automated Trading, 81 Fed. Reg. 85,335 (proposed Nov. 25, 2016) ("Regulation Automated Trading is a comprehensive Commission effort to reduce risk and increase transparency in algorithmic order origination and electronic trade execution on all U.S. futures exchanges. The proposed rules […] modernize the Commission's regulatory regime, promote the safety and soundness of trading on all contract markers, and seek to keep pace with evolving technologies.").

[208] *See* Holly Bell, *The Potential Effects of Reg AT: Unintended Risks and Diminished Cooperation with Market Participants*, MERCATUS CTR. GEO. MASON (Mar. 16, 2016), https://www.mercatus.org/publication/potential-effects-reg-unintended-risks-and-diminished-cooperation-market-participants ("The Commission's proposal would require proprietary trading firms that use algorithmic trading and access the market directly to […] be subject to the CFTC's associated risk control and recordkeeping requirements. Requiring firms engaged in trading for their own account to […] be subject to a host of new requirements creates an unnecessary barrier to participating in the markets."); *see generally* Regulation Automated Trading, 81 Fed. Reg. 85,334, 85,336 (proposed Nov. 25, 2016) ("Regulation AT would require pre-trade risk controls and other measures for the Algorithmic Trading of AT Person customers in order to promote the continued safety and

type of risk control will help protect investors to a certain extent but also provides some significant burdens on market participants.[209] However, this ultimately led FTC Chairman Giancarlo to decide that during his tenure he will not pursue implementing Regulation Automated Trading ("Regulation AT").[210] While it appears Chairman Giancarlo does not intend to continue with Regulation AT, the CFTC should re-prioritize a revised version of Regulation AT after Giancarlo's term as Chairman expires in April 2019.

Regulations of this magnitude have the potential to have an impact on the profitability of the HFT market.[211] The federal agencies need to implement oversight and monitoring over algorithmic trading without overstepping their boundaries.[212] However, overregulating the market by providing specific regulations regarding high-frequency traders, can have a drastic impact on the profitability of the HFT market.[213]

B. Regulation SCI and How the Exchanges Can Provide Oversight over HFT Activity

In 2014, the SEC adopted Regulation Systems Compliance and Integrity ("Regulation SCI") to strengthen and monitor the technological infrastructure of the securities market.[214] This regulation does not specifically regulate HFT; however, it provides oversight on HFT activity.[215] The regulation provides that SCI entities, self-regulatory organizations, plan processors, clearing agencies, and alternative trading systems need to monitor their technological standards, implement procedures, and report any disruptive behavior immediately to the

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soundness of Commission-regulated markets.").

[209] *See* Bell, *supra* note 208 (explaining how the proposed risk controls will protect against significant market disruption but may compromise "market participants' ability to quickly respond to disruptive events with well-tailored solutions.").

[210] J. Christopher Giancarlo, Chairman, Commodity Futures Trading Comm'n, Remarks at FIA Expo Chi., Ill.: "A Week in the Life of the CFTC" (Oct. 17, 2018) (explaining why the Chairman will not advance the current iteration of the Regulation).

[211] Moreno, *supra* note 196.

[212] Bell, *supra* note 208.

[213] *See* Norbert Michel, *Time to Fix the Overregulation Problem in Financial Markets*, Forbes (May 3, 2016, 7:26 AM), https://www.forbes.com/sites/norbertmichel/2016/05/03/time-to-fix-the-overregulation-problem-in-financial-markets/2/#1ea30b2612ec.

[214] Regulation Systems Compliance and Integrity, 79 Fed. Reg. 72251, 72252 (Dec. 5, 2014) (to be codified 17 C.F.R. pts. 240, 242, 249); Annette L. Nazareth et al., *SEC Adopts Regulation SCI to Strengthen Securities Market Infrastructure*, HLS Program on Corp. Governance (Jan. 7, 2015), https://corpgov.law.harvard.edu/2015/01/07/sec-adopts-regulation-sci-to-strengthen-securities-market-infrastructure.

[215] Michael Morelli, *Implementing High Frequency Trading Regulation: A Critical Analysis of Current Reforms*, 6 Mich. Bus. Entrepreneurial L. Rev. 201, 205, 216 n. 64, 222-23 (2017).

SEC under Form SCI.[216] This regulation aimed to provide oversight and monitoring of the markets by requiring the exchanges to efficiently monitor trading activity for disruptive behavior or bad actors. However, since implementation in 2015, the SEC has only brought one enforcement action, pursuant to Regulation SCI. Thus, it remains unclear how effective the regulation has been since it has been implemented.[217] Accordingly, impact of Regulation SCI on HFT is uncertain. However, if the SEC maintains its efforts in enforcement actions, it will require exchanges to provide much stricter oversight on trading activity.

C. The CFTC Should Re-Prioritize Regulation AT Following the Departure of Commissioner Giancarlo

Due to the continued issues regarding bad actors using HFT as a predatory trading method, the CFTC has proposed a comprehensive regulation addressing algorithmic trading.[218] The regulation is called Regulation AT.[219] Regulation AT focuses on providing risk control measures that provide limits to order sizes, order execution time, and order cancellation processes to limit spoofing.[220] Regulation AT provides a completely redeveloped regulatory and oversight landscape to algorithmic trading, especially HFT. [221] Among the new oversight provisions, the CFTC looks to implement: new trader registration, risk control framework, and source code requirements.[222]

Regulation AT classifies individuals engaging in automating trading as ("AT Persons").[223] This classification is largely be based on whether an individual is

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[216] Nazareth et al., *supra* note 214.

[217] Julie DiMauro, *NYSE's lapses lead to first enforcement under 'Reg SCI' continuity rule*, REUTERS (Mar. 29, 2018, 10:24 AM), https://www.reuters.com/article/bc-finreg-reg-sci-continuity-rule/nyses-lapses-lead-to-first-enforcement-under-reg-sci-continuity-rule-idUSKBN1H51VU.

[218] Donald L. Horowitz, *"Regulation AT" - What You Need To Know About the CFTC's Proposed Rules for Algorithmic Trading*, OYSTER CONSULTING (Dec. 2, 2015), http://oysterllc.com/2015/12/regulation-at-what-you-need-to-know-about-the-cftcs-proposed-rules-for-algorithmic-trading.

[219] Regulation Automated Trading, 81 Fed. Reg. 85333, 85334 (proposed Nov. 25, 2016) (to be codified at 17 C.F.R. pts. 1, 38, 40, 170); Horowitz, *supra* note 218.

[220] Horowitz, *supra* note 218.

[221] Megan Woodward, *The Need for Speed: Regulatory Approaches to High Frequency Trading in the United States and the European Union*, 50 VAND. J. TRANSNAT'L L. 1359, 1384-87, 1393-94 (2017).

[222] *Id.* at 1384-86; Peter Y. Malyshev et al., *Regulation Automated Trading: The CFTC's Supplemental Proposal and Beyond*, 37 NO. 1 FUTURES & DERIVATES L. REP. NL 1, 1-2, 4 (2017).

[223] Woodward, *supra* note 221, at 1385-86; Malyshev et al., *supra* note 222.

a registered market participant and whether they are engaging in algorithmic trading.[224] This regulation expands the oversight protection that the CFTC would have over traders that engage in HFT.[225] Second, Regulation AT requires AT Persons to implement certain risk control measures such as: pre-trade risks limiting both the price and the quantities of orders[226], a "kill switch" control which would immediately stop trades in the case of a possible Flash Crash or other disruptive behavior in the market,[227] and provide annual reports to the CFTC on how they are complying with the risk control measures.[228]

The third, and most controversial provision of Regulation AT, are the source code requirements.[229] These requirements force AT Persons to submit their proprietary algorithm and code to the CFTC.[230] This provision is the most controversial because the code is arguably the largest competitive advantage for high frequency traders; the fear is that if this code is submitted to the CFTC, it would not be protected and could be stolen.[231] If a HFT firm's code breaks or is stolen it could lead to another Flash Crash.[232] However, if there were more than just one firm's code that broke there could be substantial damage to the market.[233]

Ultimately, this regulation would provide protection to investors from bad actors that have previously used HFT to negatively influence the market.[234] However, Chairman Giancarlo has determined that he will not move forward with implementing Regulation AT, as he believes the CFTC does not have adequate resources to provide oversight over thousands of automated traders and that Regulation AT did not tackle any of the complex policy issues that automated trading has created.[235] Therefore, following the expiration of Chairman Giancarlo's term, it is necessary for the CFTC to re-introduce a revised version of Regulation AT, or work with the SEC to continue to build a regulatory strategy to address the issues that have arisen since the electronic

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[224] Malyshev et al., *supra* note 222, at 1-2.

[225] Paul M. Architzel et al., *CFTC Proposes "Regulation AT" for Automated Trading*, WILMERHALE (Dec. 15, 2015), http://www.wilmerhale.com/uploadedfiles/shared_content/editorial/publications/wh_publications/client_alert_pdfs/2015-12-15-final-cftc-proposes-regulations-for-automated-trading.pdf.

[226] *Id.*

[227] *Id.*

[228] *Id.*

[229] *Id.*; Matt Levine, *Source Code and Chicken Indexes*, BLOOMBERG (Nov. 7, 2016, 9:19 AM), https://www.bloomberg.com/view/articles/2016-11-07/source-code-and-chicken-indexes.

[230] Architzel et al., *supra* note 225; Levine, *supra* note 229.

[231] Levine, *supra* note 229.

[232] *Id.*

[233] *See generally id.*

[234] Woodward, *supra* note 221, at 1384-88.

[235] Giancarlo, *supra* note 210.

trading takeover.

IV. HFT ALLURE WILL 'DIE' IN REGULATED EXCHANGES BUT WILL CONTINUOUSLY BE USED AS A TOOL IN LESS REGULATED OFF-EXCHANGES

Electronic trading has clearly established itself as a replacement for floor traders.[236] HFT and algorithmic trading make trades more efficient, increases competition, and is ultimately beneficial to investors looking to increase their position in the market.[237] However, HFT is used by a small subset of bad actors as a tool to exploit the market through spoofing, Rule 10b-5 manipulation of the purchase or sale of securities, and dark pool operators failing to provide oversight.[238] These isolated incidents caused the CFTC, SEC, and FINRA to focus resources and provide oversight and regulation on HFT activities.[239] While the regulatory agencies have focused on activities surrounding HFT, the market has become more stabilized, reduced price volatility, has had increased competition and has matured.[240] Overall, the combination of these factors has led to a steady decline in revenue and trading volume by HFT firms.[241]

The future landscape of HFT remains uncertain.[242] As some have proclaimed, HFT is dead.[243] This statement is blatantly exaggerated but it does speak to the point that the "allure" behind HFT, largely created following the release of *Flash Boys*, has dissipated.[244] HFT and algorithmic trading, in general, will not die until there is a new technological advancement that shifts the way trades are

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[236] Ruzbeh Bacha, *High Frequency and Algo Trading Are Taking Over Markets- What It Means for You*, MEDIUM (Aug. 22, 2017), https://medium.com/@ruzbehb/high-frequency-and-algo-trading-are-taking-over-markets-what-it-means-for-you-7017dec1308e.

[237] Levine, *supra* note 21; Levine, *supra* note 28; Bacha, *supra* note 236.

[238] JOINT CFTC-SEC SUMMARY REPORT, *supra* note 81.

[239] *See generally* Exemption for Certain Exchange Members, Exchange Act Release No.34-74581, File No. S7-05-15 (2015) (proposed April 2, 2015) (to be codified as 17 C.F.R. Part 240); FINRA, Regulatory Notice 15-09 (2015); CFTC, Regulation Automated Trading, 80 Fed. Reg. 242 (Dec. 17, 2015).

[240] THIERRY RIJPER ET AL., HIGH FREQUENCY TRADING 8 (2010); Meyer et al., *supra* note 72.

[241] Osipovich, *supra* note 64.

[242] *See generally* Joe Ciolli, *Wall Street is at war with itself over the future of stocks*, BUS. INSIDER (Aug. 1, 2017, 7:12 AM), http://www.businessinsider.com/stock-market-today-wall-street-earnings-growth-forecasts-2017-7 (explaining the uncertainty of trading, as a whole).

[243] Aldridge, *supra* note 67; Worstall, *supra* note 40.

[244] Viktor Tachev, *High-Frequency Trading: Why HFT Will Likely Stay in the Long Run*, TFAGEEKS (Aug. 18, 2017), http://tfageeks.com/2017/08/18/why-high-frequency-trading-is-here-to-stay/.

executed.[245] Technological advances will continue to impact our society and the financial markets.[246] However, as the SEC and CFTC begin to add more regulation to the exchanges, such as Regulation AT and Regulation SCI, HFT revenue and trading volume will continue to decline.[247]

Therefore, as bad actors use HFT as a tool to exploit the market, government agencies must continue to provide oversight and investor protection over the exchanges. However, as government agencies provide adequate oversight, bad actors will begin to move to less regulated off-exchange markets, such as cryptocurrency exchanges and cryptocurrency dark pools.[248] Bad actors can and will utilize HFT as a tool to exploit under-regulated markets. As the SEC, CFTC, and FINRA continue to add protection and oversight in the markets, the financial markets will see HFT algorithms manipulate the cryptocurrency marketplace.[249] The issue remains that HFT is not inherently bad nor cheat the 'little guy', as Michael Lewis claims.[250] HFT will continue to positively influence the market.[251] However, as bad actors continue to use technology to manipulate the market, there remains a need for regulators to introduce regulations and to require the agencies and the exchanges to provide oversight over algorithmic trading activity.

Yet, regulation has affected the HFT market by allowing the market to mature, making the market more enticing for new movers by decreasing profitability.[252] The purpose of financial regulators such as SEC, CFTC, and FINRA is to provide fair and efficient markets for investors.[253] In order to accomplish this mission, federal regulators must focus resources and provide oversight over trading activity. As the market continues to involve, regulators must propose regulation such as Regulation AT. A piece of regulation like Regulation AT

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[245] *Id.*

[246] *See* Salmon & Stock, *supra* note 7.

[247] *See generally* Mark D. Young et al., *CFTC Proposes Regulation AT for Automated Trading*, SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP (Jan. 20, 2016), https://www.skadden.com/insights/publications/2016/01/cftc-proposes-regulation-at-for-automated-trading; PwC, REG. SCI: READY FOR THE OPENING BELL?, (2015), https://www.pwc.com/us/en/financial-services/regulatory-services/publications/assets/reg-sci-progress.pdf.

[248] Annie Massa, *High-Speed Traders in Search of New Markets Jump to Bitcoin*, BLOOMBERG (Nov. 22, 2017, 5:00 AM), https://www.bloomberg.com/news/articles/2017-11-21/bitcoin-draws-high-speed-traders-seeking-markets-to-transform.

[249] *Id*.

[250] White, *supra* note 22.

[251] Levine, *supra* note 28; Levine, *supra* note 21.

[252] Massa & Chilton, *supra* note 192 (discussing how "fierce competition among high-frequency traders" has battered their profits); *see also* Osipovich, *supra* note 66 ("High-frequency trading firms revenue from U.S. equities trading has sunk as volatility dropped.").

[253] MARC LABONTE, CONG. RES. SERV., R44918, WHO REGULATES WHOM? AN OVERVIEW OF THE U.S. FINANCIAL REGULATORY FRAMEWORK 4-5 (2017).

allows regulators to keep up with the technological advancements that affect market, without being too burdensome on the market. A slight increase in tailored regulation and oversight that monitors HFT will ultimately lead to a significantly more fair and balanced market.