

## VI. *High Frequency Trading*

### A. Introduction

Three recent incidents have sparked a heightened regulatory interest in financial market technology, with high-frequency trading (“HFT”)<sup>1</sup> receiving the bulk of regulatory attention.<sup>2</sup> First, on March 23, 2012, BATS Global Markets, Inc. (“BATS”) declined to proceed with its IPO because of a “technology failure.”<sup>3</sup> Second, on May 18, 2012, “poor design” in NASDAQ’s computer programs complicated

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<sup>1</sup> HFT uses sophisticated computer programs to trade large quantities of stocks automatically and rapidly, when the programs determine their users will profit from such trades. See *High-Frequency Trading (HFT) Definition*, INVESTOPEDIA, <http://www.investopedia.com/terms/h/high-frequency-trading.asp#axzz2AMeybWjF> (last visited Oct. 23, 2012). For a more thorough description of HFT, see Jonathan Brogaard, *High-Frequency Trading*, CENTER FOR THE STUDY OF FIN. REG. NEWSLR. (Ctr. for the Study of Fin. Regulation, Mendoza Coll. of Bus., Univ. of Notre Dame, Notre Dame, Ind.), Winter 2011, at 3, available at [http://business.nd.edu/uploadedFiles/Academic\\_Centers/Study\\_of\\_Financial\\_Regulation/pdf\\_and\\_documents/2011\\_Newsletter\\_Winter.pdf](http://business.nd.edu/uploadedFiles/Academic_Centers/Study_of_Financial_Regulation/pdf_and_documents/2011_Newsletter_Winter.pdf) (“High-frequency traders have a variety of distinguishing features. These include: (1) utilizing computing systems that quickly analyze data and subsequently generate, route, and execute orders; (2) using co-located servers, direct or sponsored access providers to interact with exchanges, and low latency, direct data feed services; (3) having extremely short holding periods; (4) submitting many orders that are cancelled shortly thereafter; (5) closing the trading day near a market neutral position; (6) frequently switching between being long and short in an asset; and (7) tightly controlling inventory.”).

<sup>2</sup> See MARY SCHAPIRO, CHAIRMAN, SEC. & EXCH. COMM’N, INTRODUCTORY REMARKS AT SEC’S MARKET TECHNOLOGY ROUNDTABLE (Oct. 2, 2012), <http://www.sec.gov/news/speech/2012/spch100212mls.htm> (citing all three incidents); *Computerized Trading: What Should the Rules of the Road Be?: Hearing Before the S. Subcomm. on Sec., Ins., & Inv. of the S. Comm. on Banking, Hous. & Urban Affairs*, FED. NEWS SERV. (WEST), Sept. 20, 2012 (statement of Sen. Jack Reed, Chairman, S. Subcomm. on Sec., Ins., & Inv. of the S. Comm. on Banking, Hous. & Urban Affairs) (citing all three incidents); CAROL CLARK, FED. RESERVE BANK OF CHI., HOW TO KEEP MARKETS SAFE IN THE ERA OF HIGH-SPEED TRADING (2012), available at [http://www.chicagofed.org/digital\\_assets/publications/chicago\\_fed\\_letter/2012/cfloctober2012\\_303.pdf](http://www.chicagofed.org/digital_assets/publications/chicago_fed_letter/2012/cfloctober2012_303.pdf) (citing all three incidents).

<sup>3</sup> Letter from Eric Swanson, Gen. Counsel & Sec’y, BATS Global Mkts., to Elizabeth Murphy, Sec’y, SEC 1 (Sept. 27, 2012), available at <http://www.sec.gov/comments/4-652/4652-15.pdf>.

Facebook's IPO.<sup>4</sup> Finally, on August 1, 2012, Knight Capital lost \$440 million in less than an hour because of a "software malfunction."<sup>5</sup> These incidents demonstrate the growing use of financial market technology and its potential to disrupt markets.<sup>6</sup> Such disruptions have drawn regulatory attention to HFT because it is a prominent subset of financial market technology whose malfunctions could have systemic implications.<sup>7</sup> Given recent disruptions and the potential for even more disastrous consequences from an HFT glitch, the Securities and Exchange Commission ("SEC") has turned to data-gathering software and regulations to help it learn more about HFT with the object of informing regulatory measures. Furthermore, the SEC has adopted programs to freeze problematic trading in individual stocks, under one regulation, and all stocks, under another. Additionally, the SEC and self-regulatory organizations ("SROs") may adopt additional programs to prevent potential technology-related disasters by freezing a firm's trading activities if the firm initiates a series of erroneous trades.

### **B. Background on HFT**

HFT is one of the most prevalent forms of financial market technology.<sup>8</sup> Studies show that HFT is responsible for 51% of all stock trades in the United States and estimate that it will generate

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<sup>4</sup> Nina Mehta, *Nasdaq Chief Blames Software for Delayed Facebook Debut*, BLOOMBERG (May, 21, 2012, 6:23 PM), <http://www.bloomberg.com/news/2012-05-20/nasdaq-ceo-says-poor-design-in-ipo-software-delayed-facebook.html> ("Nasdaq OMX Group Inc. (NASDAQ), under scrutiny after shares of Facebook Inc. were hit by delays and mishandled orders on its first day, blamed 'poor design' in the software it uses for driving auctions in initial public offerings.").

<sup>5</sup> CLARK, *supra* note 2.

<sup>6</sup> See Nathaniel Popper, *In Search of a Market Speed Limit*, N.Y. TIMES, Sept. 9, 2012, at BU1, available at <http://www.nytimes.com/2012/09/09/business/high-frequency-trading-of-stocks-is-two-critics-target.html>.

<sup>7</sup> See David Larrabee, *Poll: Are High-Frequency Trading Reforms Needed*, CFA INST. BLOG (Aug. 16, 2012), <http://blogs.cfainstitute.org/investor/2012/08/16/are-high-frequency-trading-reforms-needed/>.

<sup>8</sup> See Nathan D. Brown, Note, *The Rise of High Frequency Trading: The Role Algorithms, and the Lack of Regulations, Play in Today's Stock Market*, 11 APPALACHIAN J.L. 209, 213 (2012).

maximum profits of \$1.25 billion this year.<sup>9</sup> Though impressive, these figures have fallen from their 2009 levels, when HFT accounted for 61% of all stock trades and generated profits of \$4.9 billion.<sup>10</sup> Despite its diminishing popularity and profitability, HFT still accounts for the majority of stock trades in the United States and is likely to continue to play a role in U.S. financial markets.<sup>11</sup> Consequently, regulators cannot ignore HFT and its concomitant problems.

As a high-profile and profitable innovation, HFT has its proponents and opponents. Proponents maintain that it has “added liquidity to the market, reduced spreads and helped align prices across markets.”<sup>12</sup> Opponents argue that “HFT allows for accelerated price discovery of large volume stock orders, increases volatility within the market place, and helps to destroy the capital market structure.”<sup>13</sup> Despite these strong sentiments, academics have yet to provide firm and incontrovertible conclusions as to many aspects of HFT.<sup>14</sup> Moreover, some academic conclusions may be circumspect because HFT firms often provide researchers with the necessary funding or data to conduct their studies and thus may have influenced those conclusions.<sup>15</sup>

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<sup>9</sup> Nathaniel Popper, *High-Speed Trading No Longer Hurling Forward*, N.Y. TIMES, Oct. 14, 2012, at B1, available at <http://www.nytimes.com/2012/10/15/business/with-profits-dropping-high-speed-trading-cools-down.html>.

<sup>10</sup> *Id.*

<sup>11</sup> *See id.*

<sup>12</sup> Michael Chlistalla, *High-Frequency Trading: Better Than its Reputation?*, RES. BRIEFING, (Deutsche Bank Research, Frankfurt, Ger.), Feb. 7, 2011, at 4, available at [http://www.dbresearch.com/PROD/DBR\\_INTERNET\\_EN-PROD/PROD000000000269468.pdf](http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000269468.pdf).

<sup>13</sup> Brown, *supra* note 8, at 210.

<sup>14</sup> Chlistalla, *supra* note 12.

<sup>15</sup> *Computerized Trading: What Should the Rules of the Road Be?: Hearing Before the S. Subcomm. on Sec., Ins., & Inv. of the S. Comm. on Banking, Hous. & Urban Affairs*, 112th Cong. (2012) (written testimony of David Lauer, Market Structure and HFT Consultant, Better Markets, Inc.), [http://banking.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore\\_id=56ef1df0-6c9a-4c53-99e8-2ad7a614afe2](http://banking.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=56ef1df0-6c9a-4c53-99e8-2ad7a614afe2).

## B. Regulatory Measures to Aid SEC in Data Collection

One cannot fix a problem if one cannot identify its causes and effects. As of today, the SEC does not have access to data necessary to analyze HFT to inform possible regulatory responses.<sup>16</sup> Without regulation, the required information is inaccessible.<sup>17</sup> Accordingly, the SEC has implemented two important data-gathering regulations to assist it in acquiring data.<sup>18</sup>

### 1. Consolidated Audit Trail

The SEC's first information-gathering regulation is the consolidated audit trail ("CAT").<sup>19</sup> CAT requires SROs to devise "a system capable of capturing a complete record of all transactions relating to an order, from origination to execution or cancellation."<sup>20</sup> The rule was adopted on July 11, 2012,<sup>21</sup> and went into effect on October 1, 2012,<sup>22</sup> but will not be operational for another four or five years.<sup>23</sup>

CAT will provide the SEC with previously unavailable information necessary for an exhaustive analysis of HFT.<sup>24</sup> Such an analysis will inform future regulations on HFT.<sup>25</sup> Most importantly, CAT allows the SEC to identify firms engaged in HFT, which, in turn, will allow the SEC to determine whether, and to what extent, more regulation is necessary.<sup>26</sup>

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<sup>16</sup> See Consolidated Audit Trail, 77 Fed. Reg. 45,722, 45,733 (Aug. 1, 2012) (to be codified at 17 C.F.R. pt. 242).

<sup>17</sup> See *id.*

<sup>18</sup> Nina Mehta, *SEC Leads from Behind as High-Frequency Trading Shows Data Gap*, BUS. WK. (Oct. 1, 2012, 7:00 PM), <http://www.bloomberg.com/news/2012-10-01/sec-leads-from-behind-as-high-frequency-trading-shows-data-gap.html>.

<sup>19</sup> See generally Consolidated Audit Trail, 77 Fed. Reg. at 45,722.

<sup>20</sup> *Id.* at 148, 45723 n.5.

<sup>21</sup> Yin Wilczek, *SEC Adopts Rule for Consolidated Audit Trail; Dissenters Object to Changes from Proposal*, 44 Sec. Reg. & L. Rep. (BNA) 1359 (July 16, 2012).

<sup>22</sup> Consolidated Audit Trail, 77 Fed. Reg. 45,722, 45,722 (Aug. 1, 2012).

<sup>23</sup> Wilczek, *supra* note 21.

<sup>24</sup> See Consolidated Audit Trail, 77 Fed. Reg. at 45,733.

<sup>25</sup> See *id.*

<sup>26</sup> See *id.*

In its adopted form, CAT lays the groundwork for future HFT-specific regulation.<sup>27</sup> However, in its proposed form, CAT would have done more to regulate HFT.<sup>28</sup> The proposed rule required SROs to report trade data in real time; the adopted rule requires SROs to report trade data “by 8 a.m. the next trading day.”<sup>29</sup> The SEC determined that the marginal benefits of real-time reporting were not justified given its cost.<sup>30</sup> However, by replacing real-time reporting with next-day reporting, the SEC may have passed up a significant opportunity to regulate HFT, because, as one commentator argues, “[r]eal-time policing for potential malfeasance is the most efficient way to regulate [HFT].”<sup>31</sup> Despite the adopted rule’s possible shortcomings, CAT will nevertheless provide the SEC with unprecedented access to market data.<sup>32</sup>

## 2. Market Information Data Analytics System

Another recent SEC response to the lack of information concerning HFT is the market information data analytics system (“MIDAS”).<sup>33</sup> MIDAS will allow the SEC to “gain access to every bid to buy stocks and every offer to sell shares on each of the nation’s [thirteen] public exchanges” in an attempt to supervise HFT firms and their activities.<sup>34</sup> The program will be operational by the end of 2012.<sup>35</sup>

Despite providing the SEC with unprecedented access to HFT-related information, MIDAS will not provide information

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<sup>27</sup> *See id.*

<sup>28</sup> Edgar Perez, Op-Ed., *Don’t Ban the Trades; Regulate Them in Real Time*, N.Y. TIMES, Aug. 7, 2012, <http://www.nytimes.com/roomfordebate/2012/08/06/how-to-regulate-high-frequency-trading/regulate-high-frequency-trading-in-real-time>.

<sup>29</sup> *Id.*

<sup>30</sup> *See* Consolidated Audit Trail, 77 Fed. Reg. 45,722, 45,767–68 (Aug. 1, 2012).

<sup>31</sup> Perez, *supra* note 28.

<sup>32</sup> Wilczek, *supra* note 21.

<sup>33</sup> *See* Nathaniel Popper & Ben Protess, *To Regulate Rapid Traders, S.E.C. Turns to One of Them*, N.Y. TIMES, Oct. 8, 2012, at B1, available at [http://www.nytimes.com/2012/10/08/business/sec-regulators-turn-to-high-speed-trading-firm.html?pagewanted=all&\\_r=0](http://www.nytimes.com/2012/10/08/business/sec-regulators-turn-to-high-speed-trading-firm.html?pagewanted=all&_r=0).

<sup>34</sup> *See id.*

<sup>35</sup> Mehta, *supra* note 18.

concerning dark pool trading or the identity of traders.<sup>36</sup> However, these ostensible deficiencies prove to be nothing of the sort upon a thorough consideration of the nature of dark pools and the presence of other regulatory measures. First, dark pools are “*off-exchange* venues where [investors] can deal anonymously,”<sup>37</sup> and MIDAS’s regulatory reach extends only to *exchanges*.<sup>38</sup> However, MIDAS’s failure to extend to dark pools will not hinder the SEC in collecting data on HFT, because dark pools are devoid of HFT and consist of investors seeking asylum from HFT.<sup>39</sup> Second, MIDAS will not provide the SEC with the identity of traders.<sup>40</sup> However, including such information in MIDAS’s data feeds would be superfluous, as CAT will provide the SEC with information concerning the identity of traders.<sup>41</sup> Thus, in light of the nature of dark pools and CAT’s capabilities, any concern about MIDAS’s supposed deficiencies is unwarranted.

Although MIDAS’s critics generally recognize that such a program is desirable, they worry about the impartiality of the program.<sup>42</sup> The SEC purchased MIDAS from Tradeworx, an HFT firm, for \$2.5 million.<sup>43</sup> Starting with the premise that purchasing a program from an HFT firm to monitor HFT is “reminiscent of the fox guarding the hen house,” David Lauer, a consultant for Better Markets, Inc., concludes that the SEC should have built its own program or should have sought to purchase a similar program from a technology firm without a horse in the HFT race.<sup>44</sup> Though ostensibly appealing, the “fox guarding the hen house” premise is nothing more than rhetorical prejudice cloaked as policy, for MIDAS

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<sup>36</sup> Popper & Protess, *supra* note 33.

<sup>37</sup> *High-Frequency Trading: The Fast and the Furious*, ECONOMIST, Feb. 25, 2012, <http://www.economist.com/node/21547988> (emphasis added).

<sup>38</sup> Popper & Protess, *supra* note 33. (“With the Tradeworx program, the agency will gain access to every bid to buy stocks and every offer to sell shares on each of the nation’s 13 public exchanges.”).

<sup>39</sup> See *High-Frequency Trading: The Fast and the Furious*, *supra* note 37.

<sup>40</sup> Popper & Protess, *supra* note 33.

<sup>41</sup> See *id.*

<sup>42</sup> See *Computerized Trading: What Should the Rules of the Road Be?: Hearing Before the S. Subcomm. on Sec., Ins., & Inv. of the S. Comm. on Banking, Hous. & Urban Affairs*, 112th Cong. (2012) (written testimony of David Lauer, Market Structure and HFT Consultant, Better Markets, Inc.) [hereinafter *Computerized Trading Hearing*].

<sup>43</sup> See Popper & Protess, *supra* note 33.

<sup>44</sup> See *Computerized Trading Hearing*, *supra* note 42.

will provide the SEC with data feeds that are independent of their provider.<sup>45</sup> Consequently, whether the data comes from an HFT firm or a non-HFT firm is irrelevant. Hence, any fear that MIDAS will provide fraudulent, skewed, or otherwise misleading data is unwarranted.

Though the “fox guarding the hen house” premise may be faulty, the critic’s disjunctive conclusion may nevertheless find support elsewhere. The first disjunct—recommending that the SEC build its own program—finds no such support. The SEC’s developing its own program would have been too costly and time-consuming.<sup>46</sup> The second disjunct—suggesting that the SEC purchase a MIDAS-like program from a non-HFT firm—may be supportable. Nanex, a data provider, offers a similar service for “less than \$1,000 a month.”<sup>47</sup> However, as one pragmatic supporter has argued, MIDAS will address a deficiency in the SEC’s data-gathering abilities; thus, even though it is not the *most desirable* response, it is nonetheless a *desirable* means of remedying a defect in the SEC’s ability to collect information on markets.<sup>48</sup>

#### **D. Regulatory Responses Designed to Mitigate the Effects of Computer Glitches**

As an immediate step toward reigning in HFT’s adverse consequences, the SEC has tweaked existing regulatory tools to account for the increasing role of technology in financial markets.<sup>49</sup>

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<sup>45</sup> Popper & Protess, *supra* note 33.

<sup>46</sup> *See id.*

<sup>47</sup> Linette Lopez, *The SEC is Building A New \$2.5 Million System To Track Market Data In Real Time—Here’s Why It’s Child’s Play*, BUS. INSIDER (Oct. 12, 2012, 4:56 PM), <http://www.businessinsider.com/the-sec-builds-market-data-system-midas-2012-10>.

<sup>48</sup> Popper & Protess, *supra* note 33 (reporting statement of Henry T. C. Hu, Professor Banking and Finance Law, Univ. of Tex.) (“‘You don’t want to let the perfect be the enemy of the good,’ Mr. Hu said. ‘The world is too fast-moving for that.’”).

<sup>49</sup> Tom Steinert-Threlkeld, *SEC Approves Market-Wide & Single-Stock Circuit Breakers*, SEC. TECH. MONITOR (June 1, 2012), <http://www.securitiestechmonitor.com/news/market-wide-single-stock-circuit-breaker-pilots-approved-by-sec-30675-1.html> (reporting statements of Mary Schapiro, Chairman, U.S. Sec. & Exch. Comm’n) (“In today’s complex electronic markets, we need an automated and

The first freezes trading in a *particular stock* when its price deviates from an acceptable calculated price. The second freezes trading in *all stocks* when the market falls by a predetermined percentage. Both programs will operate for one year on a trial basis to determine whether the programs are effective as adopted.<sup>50</sup>

### 1. Limit Up-Limit Down

The SEC's first trade-freezing program is the limit up-limit down mechanism, which freezes trades in particular stocks.<sup>51</sup> On May 31, 2012, the SEC approved an SRO proposal to establish a limit up-limit down mechanism to "replace the existing single-stock circuit breaker pilot."<sup>52</sup> The single-stock circuit breaker froze trading in a given stock whenever that stock was traded at a price "at or outside" a predetermined range.<sup>53</sup> The SROs' desire to "reduce the negative impacts of sudden, unanticipated price movements in . . . stocks, thereby protecting investors and promoting a fair and orderly market" induced the change.<sup>54</sup> The limit up-limit down mechanism will attempt to carry out this purpose by altering the single-stock circuit breaker program in three ways.<sup>55</sup> First, the limit up-limit down mechanism seeks to prevent specious trading before it occurs, instead of waiting for it to occur before freezing trading.<sup>56</sup> Second, the limit up-limit down mechanism creates a fifteen-second period (called a "Limit State") during which trading is altered, but not frozen, so as to give the market an opportunity to correct itself before freezing trading in a given stock.<sup>57</sup> Third, to prevent unnecessary interference with trading, unacceptable price fluctuations in quotes—as opposed to trades—will prompt Limit States or trading freezes.<sup>58</sup> Beginning on February 4, 2013, the limit up-limit down mechanism will be

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appropriately calibrated way to pause or limit trading if prices move too far too fast.").

<sup>50</sup> *Id.*

<sup>51</sup> Order Approving, on a Pilot Basis, the National Market System Plan to Address Extraordinary Market Volatility, Exchange Act Release No. 34-67091; File No. 4-631, at 6 (May 31, 2012).

<sup>52</sup> *See id.*, at 4, 10 n.36.

<sup>53</sup> *Id.* at 40.

<sup>54</sup> *Id.* at 10.

<sup>55</sup> *Id.* at 41.

<sup>56</sup> *Id.*

<sup>57</sup> *Id.*

<sup>58</sup> *Id.*



effective for a one-year pilot period to allow the SROs' experience with the mechanism to inform a final rule.<sup>59</sup>

## 2. Market-Wide Circuit Breakers

On the same day it approved the limit up-limit down mechanism, the SEC also approved an SRO proposal to amend the market-wide circuit breaker program as another trade-freezing program to respond to problems resulting from flaws in financial market technology.<sup>60</sup> Market-wide circuit breakers freeze trading in all stocks when the market drops by a predetermined percentage.<sup>61</sup> The previous program had “only been triggered once, in 1997.”<sup>62</sup> In proposing this amendment, the SROs sought to account for the increasing speed at which trading occurs in financial markets.<sup>63</sup> To achieve this end, the recent amendment will allow require that the market-wide circuit breakers “be triggered by a smaller market-wide decline but last for a shorter period of time.”<sup>64</sup>

In support of these changes, the SEC has argued that reducing the percentages by which the market must fall to initiate a trading freeze will be “less disruptive to the markets.”<sup>65</sup> The SEC reasons that, although the reductions may cause the market to experience a greater *quantity* of trading freezes than it had under the supplanted regime, these freezes will be shorter and thus will be of a less disruptive *quality* under the new circuit breakers.<sup>66</sup>

The new market-wide circuit breaker program will commence on February 4, 2013 and will remain in effect for one year trial period.<sup>67</sup> During its operation, the SEC seeks comments on an interesting question: “Should the market-wide circuit breakers be triggered if trading is limited or halted in a sufficient number of individual securities, and, if so, how should such additional trigger

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<sup>59</sup> *Id.* at 44–45.

<sup>60</sup> Notice of Filing of Amendments No. 1 and Order Granting Accelerated Approval of Proposed Rule Changes as Modified by Amendments No.1, Exchange Act Release No. 34-67090, at 3, 18 (May 31, 2012) [hereinafter Notice].

<sup>61</sup> *Id.* at 4.

<sup>62</sup> Steinert-Threlkeld, *supra* note 49.

<sup>63</sup> Notice, *supra* note 60, at 11.

<sup>64</sup> *Id.*

<sup>65</sup> *Id.* at 14.

<sup>66</sup> *Id.*

<sup>67</sup> *Id.* at 17.

be designed?”<sup>68</sup> If the SEC determines that coordinating the market-wide circuit breaker program and the limit up-limit down mechanism will add to market stability, the SEC may revise and intertwine the programs after the trial period.<sup>69</sup>

### C. Kill Switches: The Likely Future of HFT Regulation

Whereas the limit up-limit down mechanism addresses problems associated with trading a particular *stock* and the market-wide circuit breakers address problems across the entire *market*, kill switches seek to address problems stemming from a *firm*.<sup>70</sup> Essentially, a kill switch is a computer program that exchanges could use to freeze all of a firm’s market activities when the firm’s trading software goes haywire.<sup>71</sup> Given a general regulatory preference for freezing trading whenever problems may occur, a kill switch would be a logical next step in addressing problems associated with financial market technology, specifically HFT. Moreover, after “executives of all four major national exchange operators . . . as well as the Financial Industry Regulatory Authority” supported kill switches at the SEC’s Market Technology Round Table on October 2, 2012, kill switches seem to be on the horizon.<sup>72</sup> Despite prominent SRO acceptance of kill switches to address issues stemming from financial market technology in the abstract,<sup>73</sup> questions remain as to how kill switches will operate in practice.<sup>74</sup>

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<sup>68</sup> *Id.* at 15.

<sup>69</sup> *Id.* at 10.

<sup>70</sup> Gregg Wirth & John D’Antona, *SEC WRAP: A Collection of SEC Roundtable Coverage*, TRADERS MAG. ONLINE NEWS (Oct. 3, 2012), <http://www.tradersmagazine.com/news/sec-roundtable-technology-structure-110375-1.html> (stating, in reference to kill switches, “we don’t want a problem at a single firm to become a market problem”).

<sup>71</sup> *Id.*

<sup>72</sup> *Id.* (“Executives of all four major national exchange operators—BATS, NYSE Euronext, Direct Edge and Nasdaq—as well as the Financial Industry Regulatory Authority said . . . they are prepared to set up [kill switches].”).

<sup>73</sup> See *infra* notes 75-77 and accompanying text (outlining one objection to kill switches as an abstract solution to HFT and offering the idea that such a critique is unlikely to stop the implementation of kill switches).

<sup>74</sup> See *infra* notes 78-86 and accompanying text (describing different types of kill switches and problems associated with some of them).

Though kill switches have garnered wide support, not all experts believe that they provide a workable solution to the problems associated with HFT.<sup>75</sup> One software expert argues that kill switches are an insufficient regulatory response to the undesirable consequences of HFT because computer programmers “are smart enough to write code around whatever situation can trigger the kill switch.”<sup>76</sup> Given that prominent SROs have expressed support for kill switches, this critique seems unlikely to thwart the implementation of kill switches.<sup>77</sup>

In light of prominent SRO support for kill switches, the main debate concerns which type of kill switch would be most effective to address problems associated with HFT and financial market technology. Within this debate, regulators disagree about the reach of the kill switches across exchanges and who (or what) will decide to flip the kill switch.<sup>78</sup>

First, regulators must determine whether kill switches will freeze a firm’s trading activity across all exchanges (“systemic kill switches”) or whether they will freeze a firm’s trading activity at individual exchanges (“selective kill switches”).<sup>79</sup> Lou Steinberg, Managing Director and Chief Technology Officer of TD Ameritrade, has argued against systemic kill switches because “they effectively shut down business with no chance of recovery within a reasonable period.”<sup>80</sup> Furthermore, he argues, delaying all of an individual company’s trading operations may deter the public from working with the company in the future.<sup>81</sup> Because of this potential fallout from applying systemic kill switches, Steinberg contends, exchanges

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<sup>75</sup> See Linette Lopez, *A Software Expert Explains How High Frequency Trading Programs Crash, And How Little We’re Doing to Stop Them*, BUS. INSIDER (Oct. 4, 2012, 2:28 PM), <http://www.businessinsider.com/how-high-frequency-trading-programs-crash-2012-10>.

<sup>76</sup> *Id.*

<sup>77</sup> See Wirth & D’Antona, *supra* note 70.

<sup>78</sup> Letter from Lou Steinberg, Managing Dir. and Chief Tech. Officer, TD Ameritrade, to Elizabeth Murphy, Sec’y, U.S. Sec. & Exch. Comm’n at 2 (Oct. 1, 2012), *available at* <http://www.sec.gov/comments/4-652/4652-31.pdf>.

<sup>79</sup> *Id.* (defining “systemic kill switches” as those that “cut all connectivity” and “selective kill switches” as those that “cut connectivity to a specific destination.”).

<sup>80</sup> *Id.*

<sup>81</sup> *Id.* (acknowledging that a systemic kill switch may prevent economic harm but will “probably increase[ ] the reputational harm exponentially”).

may opt against applying kill switches in many situations that might warrant their application and may thereby undermine their existence.<sup>82</sup>

Second, regulators must determine whether an individual will be responsible for “flipping” the kill switch when a computer identifies a problem (“manual kill switches”) or whether the computer itself will throw the switch automatically upon finding a problem (“automated kill switches”).<sup>83</sup> Proceeding from the same premise that militates in favor of kill switches—namely, that “software is imperfect”—Steinberg argues that automated kill are undesirable because they, themselves, may be faulty.<sup>84</sup> Furthermore, kill switches might be necessary in some unforeseen circumstances to which the kill switches are not programmed to respond.<sup>85</sup> Steinberg concludes that selective, manual kill switches are, therefore, superior to systemic, automated kill switches as a regulatory response to problems associated with HFT.<sup>86</sup> Only time will tell if the SEC or SROs will consider Steinberg’s arguments in their rulemaking.

#### **D. Conclusion**

Regulators have adopted or are considering adopting tools to mitigate and prevent disasters resulting from flaws in financial market technology, specifically HFT. In adopting CAT and MIDAS, the SEC will acquire information relevant to implementing future HFT-specific regulations.<sup>87</sup> Through the limit up-limit down

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<sup>82</sup> *Id.* at 2-3 (arguing that, given the effect a systemic kill switch might have on a company’s ability to rebound from a glitch and on a company’s reputation, “there will be a strong reluctance to use such an extreme mitigation strategy.”).

<sup>83</sup> *Id.* at 3 (defining “automated kill switches” as those that “are triggered automatically” and implicitly defining “manual kill switches” as those that require “the application of human judgment . . . to activate the switch.”).

<sup>84</sup> *Id.* (“Kill switches that are triggered automatically carry more potential harm than manual ones.”).

<sup>85</sup> *Id.* (“Any thresholds set based on the above logic will not trigger at arguably appropriate times.”).

<sup>86</sup> *Id.* (“Selective kill switches that cut connectivity to a specific destination, given multiple options for routing, make more sense. Also, the application of human judgment should not be overlooked in the decision to activate the switch.”).

<sup>87</sup> *See supra* notes 24–26, 34 and accompanying text.

mechanism and the market-wide circuit breaker program, the SEC has created ways in which it can freeze trading in individual stocks and all stocks when technology-related problems arise.<sup>88</sup> Finally, given a general preference for freezing trading whenever technology-related problems arise, regulators will likely implement kill switches, but only if they can agree on which type of kill switch is most desirable.<sup>89</sup> Perhaps most interestingly, these three recent categories of responses show that regulators acknowledge that technology and its concomitant problems are here to stay, and have opted for a type of technological homeopathy to address HFT.

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<sup>88</sup> *See supra* notes 51, 61.

<sup>89</sup> *See supra* notes 70–74.

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