



# Consumer Federation of America

## White Paper: Toward A U.S. Equity Market Structure That Serves All Investors

**By: Micah Hauptman  
Financial Services Counsel**

### **Executive Summary**

Our current equity market structure reflects in many ways the achievement of the Exchange Act's goal of having multiple competing venues linked through technology. While competition and technology have brought great progress to our equity markets, the pendulum has swung too far. Excessive competition has resulted in a market that is unnecessarily complex, fragmented, lacking basic transparency mechanisms, and ridden with conflicts of interest; and, the technological arms race has led to trading activities that disadvantage long-term investors, expose the financial system to excessive risks, and shake investor confidence.

The key issues in this report are as follows:

**I. Excessive off-exchange trading increases market opacity and results in deteriorating market quality. To redirect trading back onto venues that provide displayed prices, a trade-at rule should be implemented.**

Despite a 1975 congressional mandate that U.S. equity markets be transparent, the reality is that our markets are increasingly opaque. Almost 40 percent of share volume is now traded off-exchange, primarily by broker-dealer internalizers and dark pools. This trading occurs with little to no price transparency. The relative decrease of displayed prices in our equity markets indicates that our national market system has failed to deliver this critical component of a transparent, competitive, and efficient market, to the detriment of investors and market quality.

Our national market system functions best when displayed liquidity is promoted to the maximum extent possible. Publicly displayed price quotes provide investors and the market with transparent and accessible liquidity, and provide price discovery on a forward-looking basis, indicating the prices at which trades can be made immediately. These are all necessary components to form an efficient and well-functioning market, an environment in which different venues can compete to deliver to investors the best prices and executions available.

In order to encourage displayed liquidity, a trade-at rule should be adopted. A trade-at rule would encourage venues to display their prices by preferencing the routing of trades to venues that are providing displayed quotes for inclusion in the consolidated data feed. As a result, a higher percentage of trading would occur on lit venues and a lower percentage of trading would occur off-exchange. This would increase transparency of prices and re-centralize liquidity between exchanges, making that liquidity more accessible. Promoting pre-trade price transparency will also foster healthy price competition between venues, which will ultimately result in better values for investors.

**II. Venues' provision of inducements to encourage trading on their platforms, such as maker-taker pricing and payment for order flow, creates conflicts of interest for brokers and misplaced incentives for firms that are not trading in their broker capacity. Those inducements also lead to unnecessary complexity in the marketplace. Maker-taker pricing should be eliminated, or at the very least, the Securities and Exchange Commission should conduct a well-designed pilot program that produces meaningful information about the consequences of eliminating maker-taker pricing. Payment for order flow should be allowed, but subject to a requirement that retail brokers that receive payment for order flow provide their customers with significant price improvement.**

There are a multitude of trading venues in our national market system competing for business and offering brokers inducements for their business. In addition, brokers have a large degree of flexibility when making routing decisions on their clients' behalf. These dynamics of intense competition between venues, a willingness to provide inducements for brokers' business, and broad broker flexibility have created the conditions for which it is more likely that brokers will route their clients' orders in ways that serve the brokers' best interests, rather than their clients'. Brokers' routing decisions can also lead to market imbalances of supply and demand, in which orders have trouble interacting. This can adversely affect market quality.

In addition to affecting brokers' routing decisions, maker-taker pricing creates misplaced trading incentives generally, such that traders are more likely to trade based on the economics of the inducement rather than the economics of the underlying trade. This can lead to unnecessary and unproductive trading volume. Finally, maker-taker pricing creates unnecessary market complexity. Because of the growth in competition between trading venues, exchanges continuously seek unique and creative ways to differentiate themselves by offering different pricing models that attract different types of traders. However, no reasonable justification has been offered for creating these new venues and pricing schemes.

If the distortions that result from maker-taker pricing cannot be cured comprehensively, maker-taker should be eliminated. Recognizing that eliminating maker-taker pricing wholesale is not something the Securities and Exchange Commission (Commission) is likely to embark on, the Commission should, at the very least, conduct a well-designed pilot program that produces meaningful information about the consequences of eliminating maker-taker pricing. To counterbalance the harms to market quality that result from internalization and to guarantee that investors receive significant benefits from internalization, payment for order flow should be allowed, but subject to a requirement that retail brokers that receive payment for order flow must provide significant price improvement to their customers.

**III. As a result of disparities in how market data is provided to different market participants, certain traders receive data ahead of others, which puts them at an unfair advantage and harms market integrity. To level the playing field and restore integrity to the market, market data must be provided in a way that ensures no market participant has favored access.**

Exchanges currently are allowed to structure their data transmission systems so that they circumvent the market data that is provided to the public by the consolidated data feed. As a result, certain preferred customers, by and large high frequency traders, are able to receive and make valuable trading decisions based on that data faster than the public. Data is therefore provided in a manner that is unfair and unreasonably discriminatory.

Exchanges have the financial incentive to maintain a meaningful differential between the times at which critical trading information can be accessed by different market participants. Selling access to the same market data at different speeds makes the faster data much more valuable, which in turn, generates greater profits for the exchanges. And, exchanges own and control the market data that they provide to the public and to preferred customers, which allows them to structure their data transmission systems so as to maximize their profits. The same exchanges that provide direct feeds to preferred customers also comprise the voting members of the Consolidated Tape Association (CTA), a committee that governs and operates the consolidated data feed.

The significance of certain market participants' receiving market data ahead of the public cannot be overstated. First, any perception that exchanges are operating a two-tiered market based on a market participant's ability to pay for favored access can harm investor confidence and tarnish market integrity. Second, beyond perception, investors are tangibly being harmed as a result of certain market participants' receiving, and trading on, advance information.

Providing all market participants with equal access to information is the cornerstone of a fair and efficient market. Thus, the Commission should strive to ensure a level playing field for all market participants, with no favored access. Toward this end, the Commission should revise Rule 603(a) of Reg. NMS to make clear that a direct, proprietary feed cannot be received by any market participant before the consolidated feed is published. The Commission must also bring enforcement actions when it finds that exchanges' provision of market data violates its rules.

Additionally, given the exchanges' conflicts of interest related to owning and controlling market data, substantial revisions must be made to the CTA's governance and transparency, so as to ensure that the consolidated data feed operates for the public benefit rather than for exchanges' profit motives.

**IV. High frequency trading (HFT) firms engage in certain practices that are harmful to other market participants, market quality, integrity, and stability. Those practices should be rooted out. High frequency traders also engage in certain practices that are beneficial to market quality, and those practices should be rewarded.**

With the increase in automated trading and improvements in technological innovation, our markets have become faster, to the point that trades occur in the span of microseconds. While the technological sophistication that HFT firms use and the dominant role that they play in the market does not by itself suggest harm to investors or the market, HFT firms can, and indeed do, deploy their technological advantages and dominant role in ways that are unproductive and harmful to investors and to the market. For example, HFT firms often pay exchanges to receive market data ahead of the public. Using that data combined with their technological prowess, they send quotes faster than, and execute profitable trades ahead of, others.

Additionally, HFT firms engage in trading activities that are in some cases intentionally predatory and manipulative. In other cases, they engage in trading activities that are not intentionally predatory and manipulative, but that nonetheless disadvantage other traders and adversely affect market quality. HFT firms also expose the market to broader systemic risks. Seemingly, any catalyst -- either internal via a computer or software malfunction, or external via another market participant's activities -- can set off a chain reaction that causes instability for HFT firms, and in turn, the overall market. When such events happen, market liquidity evaporates and volatility

skyrockets. As a result of these activities, HFT has become perhaps the single greatest driver of the perception that there is a two-tiered market that is not serving the interests of long-term investors.

Several proposals, including requiring minimum resting times and batching of orders have been offered to reduce the specific harms that HFT can create. They deserve further attention and scrutiny. In addition, while many may be quick to vilify HFT, we should recognize the important role that HFT can play in our markets. HFT firms contribute the lion's share of trading volume to the market and are the market's de-facto liquidity providers. If the Commission accepts this premise, it must subject HFT firms to liquidity provision obligations. First, this would mean requiring them to register with the Commission and be much better regulated. It would also require them to continuously provide meaningful quotes to the market so as to smooth over any imbalances in supply and demand, regardless of whether the particular market conditions suit them. In consideration of their liquidity provision obligations, HFT firms should be compensated. Re-establishing this critical market making role and holding HFT firms accountable for their actions will improve day-to-day market quality and promote long-term market stability.

## **Introduction**

In 1975, Congress deemed our nation's securities markets an "important national asset that must be preserved and strengthened," and passed section 11A of the Securities Exchange Act, which directed the Securities and Exchange Commission (Commission) to facilitate the establishment of a National Market System (NMS).<sup>1</sup> According to Congress' findings, new data processing and communications techniques could create the opportunity for a more efficient and effective securities market, composed of multiple competing venues linked through technology.<sup>2</sup> With these findings in mind, Congress sought to fulfill a broad range of objectives, which were described in the Senate Report: "The basic goals of the Exchange Act remain salutary and unchallenged: to provide fair and honest mechanisms for the pricing of securities, to assure that dealing in securities is fair and without undue preferences or advantages among investors, to ensure that securities can be purchased and sold at economically efficient transaction costs, and to provide, to the maximum degree practicable, markets that are open and orderly."<sup>3</sup>

It is undeniable that technological improvements in our securities markets these last two decades have been vast and significant. However, we have gotten to a point where market participants' quest to win a technological arms race is overshadowing the purpose of the markets, which is to bring together buyers and sellers and match supply with demand. In this context, some market participants who are seeking any trading advantage they can get are paying exchanges for advance access to market data, and the exchanges are providing that data to them, at the expense of many investors and market integrity. Moreover, a small number of high frequency traders contribute an inordinate amount of trading volume at lightning speeds, but without appropriate safeguards. As such, their activities pose excessive risks to the system.

Similarly, competition between venues and traders has brought costs down appreciably for investors. However, excessive competition has also resulted in unnecessary and harmful market complexity and fragmentation. As a result of this complexity and fragmentation, liquidity is dispersed between countless trading venues, many of which operate with little to no transparency. And in trading venues' competition for business, they are engaging in race-to-the-bottom practices. They are providing inducements to trade that create conflicts of interest for brokers and other misplaced incentives for traders that are not trading in their broker capacity. Moreover, the incentives to trade that venues provide are creating even greater complexity to an already overly complex marketplace.

In short, while technology and competition have brought great progress to our equity markets, the pendulum has swung too far, to the point that all market participants are not being offered an efficient and effective marketplace. Therefore, we must reassess how our equity market structure can best fulfill the timeless objectives that Congress spelled out in the Exchange Act in 1975.

## **Overview of U.S. Equity Market Structure**

Our current equity market structure reflects in many ways the achievement of the Exchange Act's goal of having multiple competing venues linked through technology. There are currently 11 registered stock exchanges, at least one significant electronic communications network (ECN),

---

<sup>1</sup> Exchange Act Section 11A(a)(1), 15 U.S.C. 78k-1(a)(1) (1975).

<sup>2</sup> *Id.*

<sup>3</sup> S. Rep. No. 94-75, 94th Cong., 1st Sess. 2 (1975).

more than 40 dark pools, and more than 250 broker-dealer internalizers,<sup>4</sup> all of which are competing for order flow, liquidity, and market share. However, the fragmentation of the market has led to dispersed liquidity, in which investors' buy and sell orders are being sent to a multitude of venues, which makes it more difficult for those orders to match. This is a marked change from a little more than a decade ago, when only two registered exchanges, the New York Stock Exchange (NYSE) and NASDAQ, dominated, and liquidity was centralized.

The migration of trading from exchanges to off-exchange venues was the result of several regulatory changes that made it easier for alternative trading systems, including ECNs and dark pools, to compete directly with exchanges. First, in 1997 the Commission implemented the Order Handling Rules in response to various price quoting and price fixing abuses by NASDAQ market makers.<sup>5</sup> The rules required NASDAQ market makers to publish competing quotes from ECNs alongside their own quotes, in an effort to democratize the market and encourage pricing discipline of NASDAQ market makers.<sup>6</sup> Thus, a defining characteristic of an ECN is that it provides its best priced quotes for inclusion in the consolidated data feed, either voluntarily or if certain trading thresholds are met.<sup>7</sup> ECNs, such as Instinet, Island, and Archipelago, became increasingly prominent in the late 1990s and early 2000s, threatening the exchanges' business.<sup>8</sup> Ultimately, however, ECNs did not last in the marketplace. In some cases, NASDAQ and NYSE bought or merged with ECNs to capture their technology and neutralize their competitive advantages. In others, ECNs such as BATS and DirectEdge decided to become registered exchanges.

Despite the Order Handling Rules' approach to increase the display of quotations by ECNs, alternative trading systems (ATSs) remained largely outside the national market system. In response, as more electronic trading venues were sprouting up in the late 1990s, the Commission adopted Reg. ATS. Reg. ATS was designed to better integrate those venues into the national market system by giving them a choice: they could either register as exchanges or register as broker-dealers and comply with Reg. ATS.<sup>9</sup> Under Reg. ATS, a venue operates like an exchange, matching buy and sale orders. However, a venue under Reg. ATS does not face many of the regulatory requirements that apply to exchanges, including requirements that relate to: the disclosure about its operations; the publication and approval by the Commission of its rules; granting equal access to different traders; and self-regulatory responsibilities. Both dark pools and ECNs are regulated under Reg. ATS. The distinguishing characteristic is that dark pools, in contrast to ECNs, do not provide their best priced quotes for inclusion in the consolidated data feed.<sup>10</sup> Because Reg. ATS allows a trading venue to operate with much less transparency and regulatory scrutiny than a registered

---

<sup>4</sup> Chair Mary Jo White, "Enhancing Our Equity Market Structure," Sandler O'Neill & Partners, L.P. Global Exchange and Brokerage Conference, New York, N.Y., June 5, 2014, <http://1.usa.gov/1mfkOvW>.

<sup>5</sup> Order Execution Obligations, Securities and Exchange Commission, Release No. 34-37619A, 17 CFR 240 (September 6, 1996) <http://1.usa.gov/1pz6XV5>.

<sup>6</sup> *Id.*

<sup>7</sup> *See, e.g.*, Concept Release on Equity Market Structure, Exchange Act Release No. 34-61358, 17 CFR 242 (Jan. 21, 2010) <http://1.usa.gov/1jMHbYB>.

<sup>8</sup> In 2002, Instinet merged with Island, and the following year, it split into Inet ECN and Instinet, which operated as a broker. In 2005, Inet was bought by NASDAQ. Archipelago merged with the NYSE in 2006. BATS and DirectEdge began as ECNs but later became exchanges in 2008 and 2010 respectively, before merging in 2014. Citi's LavaFlow is currently the only significant ECN, with approximately 1 percent of market share.

<sup>9</sup> Regulation of Exchanges and Alternative Trading Systems, Securities and Exchange Commission, Release No. 34-40760, 17 CFR 202, 240, 242 and 249 (December 8, 1998) <http://1.usa.gov/1pz70QZ>.

<sup>10</sup> *See, e.g.*, Concept Release, *supra* note 7.

exchange, ATSS (and in particular dark pools) have proliferated in the last decade. The most significant dark pools are run by Credit Suisse, Barclays, and UBS.<sup>11</sup> Broker-dealers also internalize orders, executing trades from their own inventory, instead of executing them at other venues. When broker-dealers internalize orders, they do not submit their best priced quotes for inclusion in the consolidated data feed.<sup>12</sup>

The shift from exchange trading to off-exchange trading and the proliferation of non-exchange venues has been significant. Whereas in 2005 the NYSE alone executed approximately 79 percent of share volume in NYSE-listed stocks, all eleven registered exchanges combined currently execute just over 60 percent of total share volume.<sup>13</sup> That means the remaining amount, almost 40 percent of share volume, is now traded off-exchange, and the vast majority of that is traded in dark pools and through broker-dealer internalization. This dynamic has contributed to an increase in undisplayed liquidity, trading for which there is no price transparency.

Additionally, registered exchanges' business models and incentives have undergone a transformation in recent years. Until the early 2000s, exchanges operated as member-owned, non-profits. However, starting in the early 2000s, exchanges demutualized and became for-profit, investor-owned entities.<sup>14</sup> Exchanges' new profit motives created conflicts of interest that have resulted in practices that are antagonistic to investors' interests. These include providing data at different costs and at different speeds to different market participants and encouraging an increase in trading volume because it means more revenue for them, but at the expense of market quality.

With the increase in automated trading and improvements in technological innovation, our markets have also become faster, to the point that information is disseminated and trades occur in microseconds and milliseconds. Some short term, professional high frequency trading (HFT) firms are able to use their technological prowess to trade at other market participants' expense, in many cases through predatory trading strategies; some HFT activities expose the financial system to excessive risk, either because they are able to rapidly drain liquidity from the market, which leads to flash crashes, or because their computers and software can experience a glitch that directly affects other traders and the market.

A market that is excessively complex and fragmented, that lacks basic transparency mechanisms, that is ridden with conflicts of interest, that does not provide fair access and pricing for all market participants, and that is perpetually exposed to destabilizing events is likely to imbue in investors a belief that the market is not designed to serve their interests. Unfortunately, that is precisely the impression that our current equity markets are giving many investors. For example, according to the Chicago Booth/Kellogg School Financial Trust Index, only 15 percent of respondents trust the stock market.<sup>15</sup> The risk that is likely to flow from that impression is that investor confidence will deteriorate and investors will abstain from investing. And indeed, the data shows that investor participation in the stock market has decreased in the last decade:

---

<sup>11</sup> ATS Transparency Data, aggregated trade data reported by ATSS pursuant to FINRA Rule 4552, FINRA, <http://bit.ly/1s4Thoj>.

<sup>12</sup> Concept Release, *supra* note 7.

<sup>13</sup> Market Volume Summary, BATS, <http://bit.ly/1gwTMOB>.

<sup>14</sup> Sofia Brito Ramos, *Why Do Stock Exchanges Demutualize and Go Public?*, March 13, 2006, <http://bit.ly/1kzdosx>.

<sup>15</sup> Chicago Booth/Kellogg School Financial Trust Index Reveals Public Sentiment on Corporate Accountability, Compensation, February 7, 2014, <http://bit.ly/1s4Tnwn>.

- According to a study by the Pew Research Center, stock ownership by U.S. households has shrunk from more than 65 percent in 2002, to 45 percent in 2013.<sup>16</sup> Moreover, investor participation has lagged the stock market recovery, and as a consequence, investors have not fully participated in the stock market's recent growth.
- One key measure of investor confidence is net inflows into equity mutual funds.<sup>17</sup> Since the May 2010 Flash Crash, when the Dow Jones Industrial Average dropped almost 1,000 points, the largest intraday decline in its history, new cash inflows into equity mutual funds have been on net negative 188 billion, according to our analysis of data published by the Investment Company Institute.<sup>18</sup>

These figures suggest the market is better serving short-term professional traders than long-term, largely retail investors. As the Commission repeatedly has recognized, where the interests of long-term investors and short-term professional traders diverge, the focus must be on protecting the interests of long-term investors, as they provide capital to form and grow businesses, and accept the risk of ownership of listed companies over an extended period of time.<sup>19</sup>

It is therefore essential to reform the aspects of our equity market structure that are not delivering on the objectives that Congress intended when it directed the Commission to establish an NMS: to provide fair and honest mechanisms for the pricing of securities, to assure that dealing in securities is fair and without undue preferences or advantages among investors, to ensure that securities can be purchased and sold at economically efficient transaction costs, and to provide, to the maximum degree practicable, markets that are open and orderly. Additionally, these supplementary principles should guide the Commission's market structure reform efforts:

- Foster transparency in the marketplace;
- Ensure high market quality, dependable, and accessible liquidity;
- Minimize conflicts of interest by brokers and exchanges;
- Guarantee a level playing field for all market participants; and
- Promote systemic stability and resiliency.

This paper discusses some of the key areas where our current equity market structure falls short of delivering on these pursuits and suggests possible policy solutions to address those shortfalls, relating to:

- The rise of off-exchange trading;
- Venues' provision of trading inducements;
- How market data is provided; and
- High frequency trading.

---

<sup>16</sup> Alec Tyson, *Economic recovery favors the more-affluent who own stocks*, PEW RESEARCH CENTER, May 31, 2013, <http://bit.ly/1zNAE9o>.

<sup>17</sup> We acknowledge that this is an imperfect indicator, as it does not include exchange-traded fund (ETF) inflows, which have become increasingly popular. However, that information is not available at this time.

<sup>18</sup> ICI Investment Company Fact Book, Investment Company Institute, Chapter 2, Figure 2.4, <http://bit.ly/1pTC3UP>.

<sup>19</sup> See, e.g., Concept Release, *supra* note 7.

**I. Excessive off-exchange trading increases market opacity and results in deteriorating market quality. To redirect trading back onto venues that provide displayed prices, a trade-at rule should be implemented.**

Our national market system functions best when displayed liquidity is promoted to the maximum extent possible. Publicly displayed price quotes provide investors and the market with transparent and accessible liquidity, and provide price discovery on a forward-looking basis, indicating the prices at which trades can be made immediately. These are all necessary components to form an efficient and well-functioning market, creating an environment for different venues to compete to deliver to investors the best prices and executions available. Despite a 1975 congressional mandate that U.S. equity markets be transparent, the reality is that they are increasingly opaque.<sup>20</sup>

**The Shift to Off-Exchange Trading**

When Reg. NMS was implemented in 2007, trading was more centralized, with the vast majority of trading taking place on venues that displayed quotes in the consolidated data feed. For example, in 2007 the NYSE executed 79 percent of trading volume in NYSE-listed stocks.<sup>21</sup> The remaining 21 percent was executed off-exchange primarily by broker-dealer internalizers.<sup>22</sup> In recent years, however, more and more trading has migrated off-exchange to so-called “dark” or undisplayed venues, including dark pools and broker-dealer internalizers. As a result, the NYSE currently executes only about 20-25 percent of trading volume in NYSE-listed stocks, with the remaining 75-80 percent of trading in NYSE-listed stocks occurring on other registered exchanges, ECNs, and dark venues, including dark pools and through broker-dealer internalizers.<sup>23</sup>

Looking at all U.S.-listed stocks, registered exchanges currently execute about 60 percent of trade volume, with the remaining 40 percent occurring off-exchange.<sup>24</sup> Within this 40 percent, dark pools recently matched 15.4 percent of trading volume, according to an analysis by Credit Suisse.<sup>25</sup> As ECNs do not contribute significantly to trade volume, it is reasonable to assume that most of the remaining 25 percent of trading volume was executed by broker-dealer internalizers. These figures are consistent with the Commission’s analysis that, in May 2013, “dark” venues collectively executed approximately 35 percent of trading volume in U.S.-listed equities.<sup>26</sup> The Commission’s figures included dark pool and broker-dealer internalizer volume and excluded approximately 1 percent of off-exchange volume executed by ECNs.<sup>27</sup> “Dark” venues execute their trades without displaying quotes on a forward-looking basis and including them in the consolidated data feed. Instead, they only report trades to the Financial Industry Regulatory Authority (FINRA) through Trade Reporting Facilities (TRFs). However, reporting trades after they have occurred may not

---

<sup>20</sup> Robert Bloomfield, Maureen O’Hara, and Gideon Saar, *Hidden Liquidity: Some New Light on Dark Trading*, December 5, 2011, <http://bit.ly/1s519Tl>.

<sup>21</sup> Concept Release, *supra* note 7; Equity Market Structure Literature Review Part I: Market Fragmentation, by Staff of the Division of Trading and Markets, U.S. Securities and Exchange Commission (October 7, 2013) <http://1.usa.gov/1s51ky2>.

<sup>22</sup> *Id.*

<sup>23</sup> See U.S. Equities Market Volume Summary, NASDAQ, <http://bit.ly/UN9Czr>.

<sup>24</sup> Market Volume Summary, BATS, <http://bit.ly/RaecFV>.

<sup>25</sup> John D’Antona Jr., *Credit Suisse’s Crossfinder Top Dark Pool During First Finra Reporting Period*, TRADERS MAGAZINE ONLINE NEWS, June 19, 2014, <http://bit.ly/1slOpIY>.

<sup>26</sup> Equity Market Structure Literature Review Part I: Market Fragmentation, FN 19, *supra* note 21.

<sup>27</sup> *Id.*

reflect where the market is currently and does not enhance price discovery.<sup>28</sup> Even exchanges, which traditionally maintained pre-trade price transparency, now allow traders to hide all or a portion of their orders on the order book, which has further decreased the extent to which price quotes are displayed.<sup>29</sup>

Some of this move to dark venues has occurred at the behest of institutional investors, who may prefer to use undisplayed liquidity for a variety of reasons. Trading anonymity reduces the risk of tipping their hand to the market with regard to their trading strategies. More acutely, trading anonymity, at least in theory, reduces the risk that inappropriate liquidity providers, such as predatory HFT, will spot their trading intentions and respond in ways that harm them.<sup>30</sup> Trading anonymity also reduces the risk of moving the market when executing large orders.<sup>31</sup> Retail brokers may also prefer to use undisplayed liquidity by routing their orders to wholesale brokers, also known as wholesale market makers, who internalize orders. Many retail brokers choose to route this way to avoid costly access fees that exchanges may charge and to generate revenue through payment for order flow arrangements that wholesale market makers provide. In addition, because of new competitive pressures from other venues promising anonymity and protection from predatory traders, exchanges have allowed traders to use hidden orders, which are not publicly displayed prior to execution. Perversely, while many traders recognize that displayed liquidity is a public good and should be encouraged, their individual incentives are to use undisplayed liquidity for their own benefit. In other words, they want others to trade transparently without having to trade transparently themselves. These incentives help to explain why the vast majority of institutional and retail investors' orders are traded in the dark.

### **Relevant Academic Literature on Fragmentation Between Lit and Dark Markets**

The relative decrease of displayed prices in our equity markets indicates that our national market system has failed to deliver this critical component of a transparent, competitive, and efficient market, to the detriment of investors and market quality. Recent academic literature that focuses on the effects of fragmentation between lit and dark trading venues largely corroborates that an increase of dark trading can detract from market quality, both in the form of higher transaction costs and less efficient price discovery.<sup>32</sup> However, the papers vary with respect to their conclusions regarding the level at which dark trading may lead to those negative outcomes.<sup>33</sup>

A 2012 study by the CFA Institute, *Dark Pools, Internalization, and Equity Market Quality*,<sup>34</sup> for example, concluded that while a certain amount of dark venue trading activity can be beneficial for decreasing bid-offer spreads, there are levels of dark venue trading activity that can lead to

---

<sup>28</sup> See Concept Release, *supra* note 7.

<sup>29</sup> Bloomfield et al., *supra* note 20; According to BlackRock, hidden order types account for between 11 and 14 percent of exchange-based volume, and that volume, while not undertaken at dark venues, should still be considered dark liquidity. US Equity Market Structure: An Investor Perspective, BlackRock, April 2014, <http://bit.ly/1iyHyVn>.

<sup>30</sup> The actual extent to which institutional investors are protected from predatory HFT as a result of their using undisplayed liquidity has been called into question recently. See *infra*, note 150.

<sup>31</sup> *Id.*; See also Letter from Karrie McMillan, General Counsel, Investment Company Institute, to Ms. Elizabeth M. Murphy, Secretary, SEC, Concept Release on Equity Market Structure at 12-13 (April 21, 2010) <http://bit.ly/1s4TLuN>.

<sup>32</sup> Equity Market Structure Literature Review Part I: Market Fragmentation, *supra* note 21; See also Carole Comerton-Forde and Tālis J. Putniņš, Dark Trading and Price Discovery, November 19, 2013 <http://bit.ly/1olRvrm>.

<sup>33</sup> *Id.*

<sup>34</sup> Rhodri Preece, CFA, *Dark Pools, Internalization, and Equity Market Quality*, CFA INSTITUTE, 2012, <http://cfa.is/1kze5IE>.

deteriorating market quality, in the form of increasing bid-offer spreads. Estimates of the turning points vary based on market capitalization: from 12.6 percent for broker-dealer internalization and 19.3 percent for dark pool trading in large cap stocks to 44.4 percent for broker-dealer internalization and 63.9 percent for dark pool trading in small cap stocks. If we consider the turning points for large cap stocks, as they are where stock ownership is most concentrated, we are well past the point at which the relative amount of internalization has become harmful to market quality, according to this analysis. Further, we are at an inflection point at which the relative amount of dark pool trading is becoming harmful.

A 2014 study by Weaver, *The Trade-At Rule, Internalization, and Market Quality*,<sup>35</sup> found that there was a more direct negative relationship between off-exchange trading and deteriorating market quality. Specifically, Weaver concluded that off-exchange trading is associated with wider spreads, higher price impact per trade, and increased volatility. Weaver examined trade data submitted by broker-dealers to FINRA through Trade Reporting Facilities (TRFs),<sup>36</sup> which show all off-exchange trading, including by ECNs, dark pools, and broker-dealer internalizers. Weaver found, for example, that a NYSE-listed stock with 40 percent of its volume reported through a TRF, will on average increase the cost of trading 1.28 cents throughout the market system compared with a similar stock with no TRF reporting. This increased cost would result in investors' in aggregate paying \$3,890,624 more per stock per year due to off-exchange trading.

A 2011 study by O'Hara and Ye, *Is Market Fragmentation Harming Market Quality*,<sup>37</sup> deserves special attention, as it shows the opposite—that increased fragmentation among lit and dark venues is associated with narrower spreads as well as lower price impact. While O'Hara and Ye, like Weaver, used TRF data, the content of their data was materially different from Weaver's, based on the timing that their data was pulled. Specifically, O'Hara and Ye's data included a significant amount (approximately 50 percent) of off-exchange trading volume attributable to BATS and DirectEdge, which were then ECNs. ECNs, like exchanges, provide their best-priced orders for inclusion in the consolidated quotation data. Thus, while ECNs are considered off-exchange venues, they still provide displayed liquidity. Consequently, including ECN data in off-exchange trading volume is imperfect as it includes data that should not be included for this analysis. However, by the time Weaver pulled and analyzed his data, BATS and DirectEdge had become exchanges and thus their trade data was not included in Weaver's TRF dataset. Furthermore, ECN trading volume generally was considered extremely low and not likely to skew Weaver's findings. As a result, the data that Weaver used, while still inherently limited to the extent that it includes ECN data at all, is likely to capture a more meaningful measure of dark venues' trading, and, in turn, dark liquidity's effects on market quality.

From the evidence, it appears that at best, the opportunity to trade on dark venues creates a “free-riding” problem in which market participants are seeking to take advantage of the benefits that result from others' displaying of best priced quotes, but they themselves are unwilling to trade on a

---

<sup>35</sup> Daniel G. Weaver, *The Trade-At Rule, Internalization, and Market Quality*, April 17, 2014, <http://bit.ly/XxIMx4>.

<sup>36</sup> The TRFs are facilities of FINRA. The trade data is submitted by broker-dealers to FINRA after the trades occur. <http://bit.ly/1lsAY5b>.

<sup>37</sup> Maureen O'Hara and Mao Ye, *Is Market Fragmentation Harming Market Quality?*, March 10, 2009, <http://bit.ly/WWrn18>.

venue that displays their quotes.<sup>38</sup> The free rider problem acts as a disincentive to display liquidity if market participants know that their quotes will simply be used to facilitate dark trading. Free riding becomes a concrete problem when it decreases displayed liquidity, and starts a damaging feedback loop. At worst, the opportunity to trade on dark venues creates dynamics that are harmful to investors and that lead to deteriorating market quality, including wider spreads, higher price impact, increased volatility, higher transaction costs, and impaired price discovery.<sup>39</sup>

### **Policy Proposals to Preference Displayed Liquidity**

Current policy focuses exclusively on ensuring that orders are routed to *any* venue that executes trades at the best displayed price (National Best Bid and Offer, or NBBO), regardless of whether the venue that is executing the trade is actually displaying the best price. In order to encourage displayed liquidity, the focus should be on preferencing the routing of trades to venues *that are themselves* displaying the best price. A so-called trade-at rule would encourage venues to display their prices. As a result, a higher percentage of trading would occur on lit venues and a lower percentage of trading would occur off-exchange. For example, Rosenblatt Securities, which publishes monthly statistics on dark pool trading volumes, estimates that the introduction of a trade-at rule could cut trading volumes in dark pools by half.<sup>40</sup> This would increase transparency of prices and re-centralize liquidity between exchanges, making that liquidity more accessible. All of these benefits would redound to investors and to overall market quality.

A trade-at rule would still allow venues offering undiscovered liquidity to execute trades. However, they would only be allowed to do so with significant and meaningful price improvement. For example, a venue offering undiscovered liquidity would have to improve the price of a trade by a set amount, such as one cent.<sup>41</sup> In addition, there would be certain narrowly crafted exemptions designed to strike an appropriate balance between promoting displayed liquidity and protecting institutional investors from being preyed upon or having the market move away from them when they show their trading intentions. Such an exemption could apply to large block trades, in which a minimum number of shares, say 10,000, are traded at a given time. Currently, many dark venues, and most specifically broker-dealer internalizers, advertise to their customers that they execute orders with price improvement relative to the NBBO. Yet, evidence suggests that the price improvement that they are providing is only tiny fractions of cents. Such de minimis price improvement is not sufficient to justify the loss of transparency, as it generally does not leave investors materially better off than executing at the NBBO.<sup>42</sup> To justify the loss of transparency,

---

<sup>38</sup> See, e.g., Letter from Kurt Schacht, CFA, Managing Director, James Allen, CFA, Head, Capital Markets Policy, and Rhodri Preece, CFA, Director, Capital Markets Policy, CFA Institute, to Ms. Elizabeth M. Murphy, Secretary, SEC, Proposal to Establish a Retail Liquidity Program to Attract Additional Retail Order Flow to the Exchange 2-3 (November 30, 2011) (“Non-displayed internalization pools remove the incentive for market participants to display orders because they allow privileged participants to effectively free-ride off the price discovery function fulfilled by displayed limit orders.”)

<sup>39</sup> See generally Regulation NMS, Securities and Exchange Commission, Release No. 34-51808, 17 CFR 242 (June 9, 2005): (“Displayed limit orders benefit all market participants by establishing the best prices, but, when bypassed, do not themselves receive a benefit, in the form of an execution, for providing this public good. This economic externality, in turn, creates a disincentive for investors to display limit orders and ultimately could negatively affect price discovery and market depth and liquidity.”) <http://1.usa.gov/1yLK99A>.

<sup>40</sup> John Bakie, ‘Trade-at’ rule would hit US dark pool volumes, THE TRADE NEWS, May 13, 2014, <http://bit.ly/1jHBxuo>.

<sup>41</sup> See, e.g., Concept Release, *supra* note 7 (defines significant price improvement as the minimum allowable quoting increment, currently \$0.01).

<sup>42</sup> See *infra* for fuller discussion of price improvement in the payment for order flow context.

there must be significant and meaningful price improvement, and a trade-at rule can achieve that balance.

The strength of our free market is rooted in providing the public meaningful information, to the maximum extent possible. Preferring the routing of trades to venues that are providing displayed quotes for inclusion in the consolidated data feed will help promote those goals by providing pre-trade price transparency that will foster price competition between venues, which will ultimately result in better values for investors.

- II. Venues’ provision of inducements to encourage trading on their platforms, such as maker-taker pricing and payment for order flow, creates conflicts of interest for brokers and misplaced incentives for firms that are not trading in their broker capacity. Those inducements also lead to unnecessary complexity in the marketplace. Maker-taker pricing should be eliminated, or at the very least, the Commission should conduct a well-designed pilot program that produces meaningful information about the consequences of eliminating maker-taker pricing. Payment for order flow should be allowed, but subject to a requirement that retail brokers that receive payment for order flow provide their customers with significant price improvement.**

### **Vaguely Defined Standards Regarding Brokers’ Best Execution Obligation**

There are a multitude of trading venues in our national market system competing for business and offering brokers inducements for their business. In addition, brokers have a large degree of flexibility when making routing decisions on their clients’ behalf. These dynamics of intense competition between venues, a willingness to provide inducements for brokers’ business, and broad broker flexibility have created the conditions for which it is more likely that brokers will route their clients’ orders in ways that serve the brokers’ best interests, rather than their clients. In addition to brokers’ routing decisions resulting in harm to their clients, their routing decisions can adversely affect market quality.

As a starting point, a broker owes a common law fiduciary duty to his or her client to seek best execution when making routing decisions. The duty of best execution is considered “a broker’s bedrock obligation,” to provide reasonable care and undivided loyalty to the client, helping him or her to achieve his or her objectives, and maximizing the economic benefit for the client.<sup>43</sup> However, this best execution duty is a loose, imprecise, principles-based standard that is designed to offer flexibility, with a certain degree of subjectivity for the broker. While the Commission has never explicitly defined the duty of best execution, it has issued guidance on the considerations a broker must take into account when fulfilling the duty, which courts have echoed. According to that guidance, to obtain the most favorable terms reasonably available under the circumstances, a broker must consider price, order size, trading characteristics of the security, speed of execution, clearing costs, and the cost and difficulty of executing an order in a particular market, as well as the potential for price improvement.<sup>44</sup> However, recent case law has not developed to reflect these considerations in relation to the modern realities of our new market structure.<sup>45</sup> Many of the cases that have been brought have been based on clear-cut and persistent violations of the duty.<sup>46</sup> As a consequence, the

---

<sup>43</sup> See, e.g. Norman S. Poser and James A. Fanto, *Broker-Dealer Law and Regulation*, (4<sup>th</sup> Edition and Supp. 2013), Aspen Publishers § 1603[B].

<sup>44</sup> *Id.*; Disclosure of Order Execution and Routing Practices, Securities and Exchange Commission, Release No. 34-43590, 17 CFR 240 (November 17, 2000) <http://1.usa.gov/1xXA2ex>; *Newton v. Merrill Lynch, Pierce, Fenner & Smith, Inc.* 135 F.3d 266 (3rd Cir. 1998).

<sup>45</sup> See, e.g. Stanislav Dolgoplov, *High frequency Trading, Order Types, and the Evolution of the Securities Market Structure: One Whistleblower’s Consequences for Securities Regulation*, May 8, 2014, <http://bit.ly/1jqjdq1>.

<sup>46</sup> See, e.g. Press Release, Securities and Exchange Commission, “SEC Sanctions Nebraska-Based Investment Adviser for Best Execution Failures in Selecting Mutual Fund Share Classes,” October 2, 2013; <http://1.usa.gov/1o6nOj4>; Dexter Johnson, *Achieving “Best Execution” and Recent SEC Enforcement*, THE INVESTMENT PROFESSIONALS REGULATION BLOG, August 5th, 2013, <http://bit.ly/1tNLKuI>.

outer limits on what constitutes and what violates the duty to seek best execution have not kept pace with our evolving market dynamics.<sup>47</sup>

Meanwhile, other trading inducements stemming from maker-taker pricing and payment for order flow arrangements interfere with brokers' routing decisions and compromise their bedrock obligations to seek best execution for their clients. The extent to which individual investors are being harmed by brokers' routing practices that are the result of skewed incentives is not precisely known, but according to research and consulting firm Woodbine Associates, brokers' routing decisions could be costing mutual funds, pension funds, and other ordinary investors as much as \$5 billion combined annually.<sup>48</sup>

### **Maker-Taker Pricing Background**

Under the maker-taker pricing model (MTPM), a venue such as an exchange pays and charges different traders depending on what impact the traders' orders have on the venue's liquidity. Under the original MTPM, a venue pays traders "maker" rebates upon execution of their non-marketable (resting) limit orders, which make liquidity available for other traders. In addition, a venue charges traders "taker" fees for executing marketable orders, which immediately access the liquidity provided by non-marketable limit orders. A venue charges traders higher taker fees than it pays in maker rebates, and keeps the difference.

Under the Access to Quotations Rule of Reg. NMS (Rule 610(c)), the maximum a venue can charge for a fee is \$0.30 per 100 shares.<sup>49</sup> So, for example, a venue may charge one broker a taker fee of \$0.30 per 100 shares for executing a market order. The venue may then pay another broker a maker rebate of \$0.20 per 100 shares for posting a non-marketable limit order that the market order is executed against. In this example, the venue would pocket the \$0.10 per 100 share difference between the taker fee and maker rebate. For brokers and exchanges, while those amounts may be minimal by themselves, they become economically significant in the aggregate.

Maker-taker pricing was originally conceived in response to the decentralization and automation of trading that was prompted by the Order Handling Rules in 1997.<sup>50</sup> There were suddenly more venues competing for orders, seeking to attract buyers and sellers to trade on their platforms. Josh Levine, CEO of Island ECN, an electronic communications network that was created to rival NASDAQ, sought to encourage traders to send their buy and sell orders to the Island venue. And so, he created a pricing mechanism that would pay traders to provide liquidity to Island's pool in the form of resting limit orders, and charge traders for taking liquidity from Island's pool in the form of market orders.<sup>51</sup> Other venues soon followed Levine's lead, and developed more and more creative

---

<sup>47</sup> See, e.g., Testimony of Erik R. Sirri, "Equity Market Structure: A Review of SEC Regulation NMS," Before the House Subcommittee on Capital Markets and Government Sponsored Enterprises, February 28, 2014, <http://1.usa.gov/1o6nUXW>. ("Existing interpretations of the duties of "best execution", however, have not have kept pace with the changes in market structure and with automated trading.")

<sup>48</sup> Press Release, Woodbine Associates, Inc., Capital Markets Consulting and Research, "U.S. Equity Exchange Performance," May, 2012, <http://bit.ly/1IRfIRO>.

<sup>49</sup> Regulation NMS, Securities and Exchange Commission, Release No. 34-51808, 17 CFR 242 at 185 (June 9, 2005) <http://1.usa.gov/1yLK99A>.

<sup>50</sup> Order Execution Obligations, Securities and Exchange Commission, Release No. 34-37619A, 17 CFR 240 (September 6, 1996) <http://1.usa.gov/1pz6XV5>.

<sup>51</sup> Scott Patterson, *Dark Pools: The Rise of the Machine Traders and the Rigging of the U.S. Stock Market* 159 (Crown Business 2012).

and complex pricing mechanisms to attract different traders. According to *Wall Street Journal* reporter and *Dark Pools* author Scott Patterson, Levine “would come to regret the maker-taker model in later years.”<sup>52</sup>

In addition to creating a mechanism to encourage the provision of liquidity, maker-taker pricing is also justified as a mechanism to compensate market participants for the risk of adverse selection, the costs resulting from a trader’s posting of a limit order that ends up being executed at a price that is no longer favorable to the trader.<sup>53</sup> One can view the posting of a non-marketable limit order as providing other market participants an option to trade against that order. The longer a non-marketable limit order is available, the longer the option is available, and accordingly, the greater the risk of adverse selection. This phenomenon likely explains why certain traders who post non-marketable limit orders continuously cancel and update their orders, so as not to expose themselves to adverse selection costs. However, if traders have constructed a way to insulate themselves from adverse selection costs, rebates should no longer be justified on the grounds that they compensate traders for the risk of adverse selection.<sup>54</sup>

### **Maker-Taker Distorts Brokers’ Incentives**

There is evidence both from academic research and market participants’ real world experience suggesting that maker-taker pricing distorts brokers’ trading incentives and routing practices. For example, Angel, Harris, and Spatt have observed that, “[The maker-taker pricing model] has distorted order routing decisions, aggravated agency problems among brokers and their clients, unlevelled the playing field among dealers and exchange trading systems, produced fraudulent trades, and produced quoted spreads that do not represent actual trading costs.”<sup>55</sup> Chester Spatt, professor of finance at Carnegie Mellon and former chief economist at the Commission, recently testified before Congress that, “Indeed, most routing decisions are not based on the effectiveness or timeliness of anticipated execution given equilibrium behavior.”<sup>56</sup> Norgest Bank Investment Management has observed that these incentives are “likely to distort the true supply and demand price discovery process to the detriment of the market.”<sup>57</sup> And, Jeffrey Sprecher CEO of InterContinental Exchange (ICE), which now owns the NYSE, has also been very critical about the incentives that MTPM creates. Sprecher has argued for the elimination of this payment method, saying, “I don’t like the idea that you pay people to trade—I don’t think that it should be done. I don’t think it should be legal. It puts wrong incentives in the market.”<sup>58</sup> However, because of the intense competition in our modern trading landscape, and the likelihood that acting alone to

---

<sup>52</sup> *Id.*

<sup>53</sup> Andrei A. Kirilenko and Andrew W. Lo, *Moore’s Law vs. Murphy’s Law: Algorithmic Trading and Its Discontents*, March 19, 2013, <http://bit.ly/1rkroJD>; Stanislav Dolgoplov, *The Maker-Taker Pricing Model and Its Impact on Securities Market Structure*, June 27, 2014, <http://bit.ly/1mfme9M>.

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

<sup>55</sup> Angel, Harris, Spatt, *Equity Trading in the 21<sup>st</sup> Century*, 8. *Recommendations for SEC Rulemaking Attachment* February 23, 2010 <http://1.usa.gov/1smLNvo>; James Angel, professor of finance at Georgetown University, is also a director of DirectEdge Exchanges, which employs various MTPMs.

<sup>56</sup> Chester Spatt, Statement for House Subcommittee on Capital Markets and Government Sponsored Enterprises (GSEs) hearing on “Equity Market Structure: A Review of SEC Regulation NMS,” February 28, 2014, <http://1.usa.gov/1olRS5n>.

<sup>57</sup> Norgest Bank Investment Management, *High Frequency Trading—An Asset Manager’s Perspective*, November 1, 2013 <http://bit.ly/1xXAM3k>.

<sup>58</sup> Bradley Hope, *New Boss Prepares To Reorient NYSE*, WALL STREET JOURNAL, Nov. 13, 2013, <http://on.wsj.com/1qUfgyB>.

eliminate trading inducements would devastate its business, NYSE does not seem to be willing to lead the charge by eliminating its own MTPM. Regulation is therefore needed to bring about the necessary changes to these misplaced incentives so that all market participants are held to the same standards.

Industry participants have raised specific concerns that brokers appear to be tailoring their activities to maximize the revenue they receive from rebates and minimize the costs they pay in access fees. All else being equal, with two venues offering the same price and quantity, brokers are likely to route their market orders in the most “cost-effective” way to the venue that charges the lowest access fee.<sup>59</sup> Even seemingly minor differences between venues’ maker-taker pricing models may cause brokers to re-route their orders to maximize the rebates that they earn and minimize the fees that they pay.<sup>60</sup> All else not being equal, brokers may be routing their orders in ways that do not maximize the economic benefits for their clients, and may even be to their clients’ economic detriment.<sup>61</sup> Indeed, Angel, Harris, and Spatt have observed that, “Many brokers first send marketable limit orders to so-called dark pools to see if they can get an order filled without paying exchange access fees or filled at an improved price for the customer. The practice accounts for much of the marketable order flow going first into dark markets, and it ensures that limit orders sent to exchanges often execute only when they are the last orders standing or when traders who cannot access dark markets trade with them.”<sup>62</sup> The Investment Company Institute (ICI) has raised similar concerns, saying, “brokers may refrain from posting limit orders on a particular exchange because it offers lower liquidity rebates than other markets, even though that exchange offers the best possibility of an execution for those limit orders.”<sup>63</sup> Routing in this manner is likely to create market imbalances that negatively affect execution quality.

High rebate venues are also likely to charge high access fees, and low rebate venues are also likely to charge low access fees. As a consequence, brokers are likely to send their nonmarketable limit orders, which commonly result in a broker rebate, to the venue that provides the highest rebate. By the same token, they are likely to send their market orders, which commonly result in a broker access fee, to the venue that charges the lowest access fee. Alternatively, they are likely to route their market orders to wholesale market makers to execute against their own inventory. Wholesale market makers do not commonly charge fees and in many cases pay brokers to route their orders to them.<sup>64</sup> The result of these routing decisions is that for high rebate venues, there could be “congested” limit order queues, with very few market orders to execute against. By the same token, for low rebate venues, there could be insufficient limit orders available to execute against any market orders that arrive. Viewing these dynamics through a broader lens, limit order books and markets in general are supposed to provide an opportunity for market participants with supply to interact with market participants with demand for that supply. However, if a market is providing incentives to market participants with supply to go one place and market participants with demand

---

<sup>59</sup> See Robert H. Battalio, Shane A. Corwin, and Robert H. Jennings, *Can Brokers Have it All? On the Relation between Make-Take Fees and Limit Order Execution Quality*, March 5, 2014, <http://bit.ly/1gBR7N2>.

<sup>60</sup> See Testimony of Erik R. Sirri, *supra* note 47.

<sup>61</sup> See Battalio et al., *supra* note 59.

<sup>62</sup> Angel, Harris, and Spatt, *Equity Trading in the 21<sup>st</sup> Century: An Update*, June 21, 2013, <http://bit.ly/1osrQSn>.

<sup>63</sup> Letter from Karrie McMillan, General Counsel, Investment Company Institute, and Dan Waters, Managing Director, ICI Global, to Teresa Rodriguez Arias, International Organization of Securities Commissioners, Public Comment on Consultation Report: Regulatory Issues Raised by Changes in Market Structure, May 10, 2013, <http://bit.ly/1nkGyGo>.

<sup>64</sup> Battalio et al., *supra* note 59.

to go another place, neither participants' needs are being met and that market is no longer fulfilling its purpose.

A recent academic study by Battalio et al., *Can Brokers Have it All?*<sup>65</sup> provides empirical evidence to substantiate these concerns. Battalio et al. examined popular retail brokers' order routing decisions of non-directed orders,<sup>66</sup> and they appear to maximize rebates and minimize fees.<sup>67</sup>

- Out of ten popular retail brokers, five (Charles Schwab, Morgan Stanley, Just2Trade, Edward Jones, and LowTrade) sent 100 percent of their orders to wholesale market makers, which do not commonly charge access fees.
  - Of those five, Schwab appeared to be the only broker that received compensation for routing orders to its wholesale market maker, UBS.
- Of the remaining five retail brokers, four (Ameritrade, E\*Trade, Fidelity, and Scottrade) routed a significant percentage of their limit orders to EDGX, the venue that offers the highest rebates. While those four sent a significant percentage of their limit orders to EDGX, they sent zero percent of their market orders to EDGX, the venue that charges the highest taker fee, the regulatory maximum of \$0.30 per 100 shares. Instead, the four brokers routed the majority of their market orders to wholesale market makers, thus avoiding having to pay exchange access fees.
  - Ameritrade (96 percent), E\*Trade (98 percent), and Fidelity (97 percent) routed the vast majority of their market orders to wholesale market makers pursuant to payment for order flow arrangements, meaning that instead of the retail brokers' market orders' resulting in the retail brokers' having to pay fees, the retail brokers received compensation for directing their market orders to wholesale market makers.
- Interactive Brokers was the only broker to execute limit orders at multiple venues, including 47 percent of NYSE-listed stocks at the NYSE, which pays the lowest rebates. Notably, Interactive Brokers also executed a significant percentage (33 percent) of market orders at exchanges that charge access fees. These figures suggest that MTPM did not influence Interactive Brokers' routing decisions.

Battalio et al.'s findings are consistent with the proposition that rebates and fees negatively affect broker routing decisions and execution quality. According to their research, all else equal, fill rates for displayed limit orders are lower and take longer on venues with higher fees than venues with lower fees.<sup>68</sup> The results of their analysis suggest that routing limit orders to the venue that offers the highest rebates is inconsistent with maximizing limit order execution quality and, therefore, likely to be inconsistent with the broker's responsibility to obtain best execution for customer orders.<sup>69</sup>

---

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

<sup>66</sup> Non-directed orders are orders in which the routing decisions are left to the broker.

<sup>67</sup> While it appears they are maximizing rebates and minimizing access fees, it is not certain. Battalio's research is based on analysis of Rule 606 Reports, which do not distinguish between marketable and non-marketable limit orders. Thus, it is possible that marketable limit orders are being routed to venues and resulting in access fees. However, given that nine of the ten brokers route the vast majority of their market orders to market makers rather than to venues with taker fees, it is likely that the majority of limit orders routed to EDGX are nonmarketable.

<sup>68</sup> Battalio et al., *supra* note 59.

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

At a recent U.S. Senate Permanent Subcommittee on Investigations hearing, TD Ameritrade's Vice President Steven Quirk told the panel that his company earned roughly \$80 million in maker-taker payments in 2013.<sup>70</sup> Sen. Carl Levin (D-Mich.) commented that it was “a frankly pretty incredible coincidence” that the company's judgment about what venue provided the best execution just so happened to be the venue offering the highest rebates.<sup>71</sup>

### **Payment for Order Flow Distorts Brokers' Incentives**

Closely related to MTPM is another trading inducement provided to brokers, payment for order flow (PFOF). Under a PFOF arrangement, a wholesale market maker pays a retail broker for the retail broker's routing of orders to the wholesale market maker.<sup>72</sup> This arrangement benefits the wholesale market maker, who receives a steady stream of inventory and business.<sup>73</sup> Depending on the economics of each trade, the wholesale market maker can either internalize the trade, executing the order against its own inventory, or the wholesale market maker can route the order to another venue, such as an exchange.<sup>74</sup> PFOF also benefits the retail broker, who receives a steady flow of revenue for the routing of its orders, and seemingly outsources its best execution duty.<sup>75</sup> Depending on the economics, if an order is a non-marketable limit order, the retail broker can decide whether to route that order to a venue that is providing a liquidity rebate, which might be in excess of the amount the retail broker would receive under the terms of a PFOF arrangement, or the retail broker can route the order pursuant to the PFOF agreement to the wholesale market maker, if that is more profitable.<sup>76</sup> For marketable orders, a retail broker can minimize its expenses by routing those orders to the wholesale market maker so the retail broker doesn't have to pay any exchange access fees.<sup>77</sup>

Many prominent retail brokerage firms receive payment for order flow from wholesale market makers. For example, Charles Schwab has an agreement with UBS; it also has PFOF agreements with Citadel, Goldman Sachs, and KCG Americas (formerly known as Knight Capital).<sup>78</sup> Similarly, TD Ameritrade has PFOF arrangements with Citadel and Citi.<sup>79</sup> E\*Trade has PFOF agreements with G1 Execution Services, Citi, KCG Americas, and Citadel.<sup>80</sup> Fidelity has PFOF arrangements with KCG Americas, Citadel, Goldman Sachs, Two Sigma Securities, UBS, and National Financial Services.<sup>81</sup> Scottrade has PFOF agreements with Citadel, KCG Americas, Citi, and G1.<sup>82</sup> According to a recent *Wall Street Journal* article, analysts estimate PFOF agreements bring in “anywhere from \$92.5 million in annual revenue for E\*Trade to \$100 million for Schwab and \$227 million for TD

---

<sup>70</sup> William Alden, *At Senate Hearing, Brokerage Firms Called Out for Conflicts*, NEW YORK TIMES DEALBOOK, June 17, 2014, <http://nyti.ms/1pe7lak>; Scott Patterson, *TD Ameritrade Executive Says Orders Go to Venues That Pay Highest Fees*, WALL STREET JOURNAL, June 17, 2014, <http://on.wsj.com/1pTCLBE>.

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

<sup>72</sup> Remarks of Richard Y. Roberts, Commissioner, Securities and Exchange Commission, “Payment for Order Flow,” The 1993 Ray Garrett Jr. Corporate And Securities Law Institute, Chicago, Illinois, April 29, 1993, <http://1.usa.gov/1qUfnu7>.

<sup>73</sup> *Id.*

<sup>74</sup> *Id.*

<sup>75</sup> *Id.*

<sup>76</sup> See Battalio et al., *supra* note 59.

<sup>77</sup> *Id.*

<sup>78</sup> Arrangements with Market Venues, For the Quarter Ending June 30, 2014, Charles Schwab, <http://bit.ly/1s4UZ9d>.

<sup>79</sup> SEC Rule 606 Report, First Quarter 2014, TD Ameritrade, <http://bit.ly/1khSUUH>.

<sup>80</sup> SEC Rule 606 Report, Second Quarter 2014, E\*Trade Financial, <http://bit.ly/1dWczGw>.

<sup>81</sup> SEC Rule 606 Report, Second Quarter 2014, Fidelity Brokerage Services LLC, <http://bit.ly/1qUfoOG>.

<sup>82</sup> SEC Rule 606 Report, Second Quarter 2014, Scottrade, Inc., <http://bit.ly/1qDwopA>.

Ameritrade.”<sup>83</sup> TD Ameritrade’s Vice President Steven Quirk confirmed these figures at the U.S. Senate Permanent Subcommittee on Investigations hearing in June. He told the committee that his company earned \$236 million in 2013 as a result of payment for order flow.<sup>84</sup>

The concerns that relate to MTPM’s influence on brokers’ routing practices also relate to PFOF, in that they are likely to tailor their activities to maximize the revenue they receive from the inducements and minimize the costs they pay, irrespective of their best execution obligations. Their routing practices are also likely to contribute to supply and demand imbalances in the market. PFOF creates additional concerns, as the orders that retail brokers route to wholesale market makers rarely make their way to lit venues, which raises market transparency and integrity concerns. As a result, PFOF decreases displayed liquidity, which can harm market quality.<sup>85</sup> As discussed above, undisplayed liquidity can lead to higher transaction costs and less efficient price discovery. PFOF also has negative implications for other investors whose nonmarketable limit orders remain unfilled when wholesale market makers effectively step in front of them by internalizing the counter-side market orders at sub-penny intervals, rather than competing to match orders at penny intervals in a transparent market.<sup>86</sup>

Many have argued that PFOF benefits retail investors, as retail brokers are able to provide their clients’ orders with price improvement relative to the best displayed prices when their orders are internalized by wholesale market makers. However, the amount of price improvement that investors receive is in fact minimal, and in our view, not sufficient to counterbalance the negatives associated with PFOF. For example, according to Eric Hunsader of Nanex, the most common price improvement amount for all NMS stocks is only \$0.0001 per share. At this level of price improvement, if an investor buys 100 shares of stock for \$25 per share, he or she will save one penny on the \$2,500 order.<sup>87</sup> This is perhaps why retail brokers typically focus on the percent of shares that receive price improvement relative to the National Best Bid and Offer (NBBO), but downplay the amount of price improvement that shares receive. A prime example is TD Ameritrade, which provides on its website easily accessible, comprehensive charts, showing that over 90 percent of all shares receive price improvement.<sup>88</sup> However, TD Ameritrade’s order execution statistics fail to say exactly how much price improvement, on average, those shares receive. The best information that we could find on the company’s website was that, “The amount of improvement can vary from fractions of a penny per share to whole pennies over the NBBO.”<sup>89</sup> Such a broad and vague range suggests TD Ameritrade is not willing to admit the actual amount of price improvement, on average, that it provides. According to one former employee of TD Ameritrade, it is fractions of cents per share better than the NBBO the vast majority of the time.

In 2011, as the NYSE was increasingly losing business to wholesale market makers, it requested that the Commission allow it to compete with wholesale market makers by internalizing retail order

---

<sup>83</sup> Bradley Hope, *Fallout From High frequency Trading Hits Brokerages*, WALL STREET JOURNAL, April 6, 2014, <http://on.wsj.com/XxJGtt>.

<sup>84</sup> Matt Egan, *'Flash Boys' in the hot seat at hearing*, CNN MONEY, June 17, 2014, <http://cnnmon.ie/1olSiIX>.

<sup>85</sup> See *supra* discussion on off-exchange trading for fuller discussion.

<sup>86</sup> See Dennis Dick, CFA, *Exploring the Hidden Costs of Price Improvement*, BRIGHT TRADING LLC, <http://1.usa.gov/1olSlo0>.

<sup>87</sup> Sub-Penny Update, Nanex, January 29, 2014, <http://bit.ly/UNb456>.

<sup>88</sup> Order Execution Statistics, Market and Limit Order Price Improvement, <http://bit.ly/1lsCqEv>.

<sup>89</sup> Order Execution, Frequently Asked Questions, TD Ameritrade, <http://bit.ly/1AOPa2g>.

flow at sub-penny prices through a Retail Liquidity Program (RLP).<sup>90</sup> To do this, the Commission had to grant the NYSE an exemption from the Sub-Penny Quote Rule, which prohibits market participants from displaying, ranking, or accepting stock quotes that are priced less than one penny per share.<sup>91</sup> The Sub-Penny Quote Rule was promulgated to address the practice of “stepping ahead” of displayed limit orders by trivial amounts, and to further encourage the display of limit orders and improve the depth and liquidity of trading in NMS stocks.<sup>92</sup> Several commenters raised concerns about providing an exemption to the NYSE for the RLP. Citing the original reasons behind the rule and the implications for providing an exemption, the commenters cautioned that such an exemption could discourage displayed liquidity by allowing dark liquidity to step ahead of, and thereby gain an execution advantage over, posted limit orders for only a trivial amount and that the discouraging of displayed liquidity could lead to decreased price discovery and wider spreads.<sup>93</sup> However, the Commission justified its decision to offer an exemption to the Sub-Penny Quote Rule by pointing to NYSE’s statements that the proposal would provide more price competition within the wholesale marketplace, and reallocate existing retail order flow from broker-dealer internalizers to the NYSE rather than from lit trading to dark trading.<sup>94</sup> The Commission also pointed to NYSE’s statements that further price competition in the wholesale marketplace would benefit retail investors by providing a greater opportunity for price improvement.<sup>95</sup>

The NYSE boasts that since the RLP’s inception in August 2012, orders totaling 2.62 billion shares have been executed through RLP, providing retail investors with \$4.4 million in savings (through March, 2014). The savings have come from providing, on average, \$0.0021 price improvement per share.<sup>96</sup> If an investor buys 200 shares of stock for \$20.00 per share and receives NYSE’s average price improvement, the investor will pay \$3,999.58 for \$4,000.00 of stock, not counting any commissions or other transaction costs the investor pays. The \$0.42 cents saved pale in comparison to those costs.

### **MTPM Distorts Trading Incentives Generally**

In addition to MTPM’s effect on brokers’ routing practices, MTPM leads to other trading practices that adversely affect market quality. Certain traders have structured entire businesses around “capturing” or “harvesting” rebates, using complex order types, such as “add liquidity only” and “post only” orders, to ensure that they never pay take fees and always collect a rebate.<sup>97</sup> These inducements create misplaced incentives for traders to trade based primarily, if not exclusively, on

---

<sup>90</sup> Self-Regulatory Organizations; New York Stock Exchange LLC; NYSE Amex LLC; Order Granting Approval to Proposed Rule Changes, as Modified by Amendments Nos. 1 and 2, Adopting NYSE Rule 107C to Establish a Retail Liquidity Program for NYSE-Listed Securities on a Pilot Basis Until 12 Months From Implementation Date, and Adopting NYSE Amex Rule 107C to Establish a Retail Liquidity Program for NYSE Amex Equities Traded Securities on a Pilot Basis Until 12 Months From Implementation Date, and Granting Exemptions Pursuant to Rule 612(c) of Regulation NMS, Release No. 34-67347 (July 3, 2012) (RLP Order) <http://1.usa.gov/1mfn3Q2>.

<sup>91</sup> *Id.*

<sup>92</sup> Regulation NMS, Securities and Exchange Commission, Release No. 34-51808 at 29, 17 CFR 242 (June 9, 2005) <http://1.usa.gov/1qUfuG7>.

<sup>93</sup> RLP Order, *supra* note 90; Letter from Schacht et al., *supra* note 38; *Is The Proposed NYSE Retail Liquidity Program Just A Trojan Horse?*, THEMIS TRADING, October 14, 2011, <http://bit.ly/1AOPfCU>.

<sup>94</sup> RLP Order at 16, *supra* note 86.

<sup>95</sup> *Id.*

<sup>96</sup> Steven W. Poser, *Inside the Markets*, NYSE EXCHANGES, April 17, 2014, <http://bit.ly/P8SYHA>.

<sup>97</sup> *See* Dolgoplov, *supra* note 53.

the economics of the inducement rather than the economics of the underlying trade, which can result in unnecessary and unproductive trading volume.

Furthermore, MTPM may encourage trading in stocks that do not benefit from increased trading, reinforcing preexisting incentives to trade in already highly liquid, large-cap stocks rather than less liquid, smaller-cap stocks.<sup>98</sup> Because highly liquid large-cap stocks are less volatile and more predictable, they may be easier to trade, but are not likely to benefit from increased trading.<sup>99</sup> Less liquid, smaller-cap stocks, on the other hand, which might benefit from increased trading, are less attractive to trade in due to their increased volatility.<sup>100</sup> That is because the benefit of a rebate is outweighed by the cost of a stock's price moving away from the trader. Also, because trading volume in smaller-cap stocks is relatively low, a trader is unlikely to make enough money by rebate trading to make the endeavor worthwhile.

### **MTPM Causes Unnecessary Market Complexity**

Maker-taker pricing also has created unnecessary complexity in the marketplace. Because of the growth in competition between trading venues, exchanges continuously seek unique and creative ways to differentiate themselves by offering different pricing models that attract different types of traders. The original MTPM as constructed in the late 1990s has given way to even more complicated pricing structures. Furthermore, these pricing models are likely aimed not at encouraging the provision of liquidity or providing investors with tangible benefits but rather are aimed at generating more revenue for the exchanges that employ them.

- For example, several venues have created inverted maker-taker pricing, charging fees for limit orders (which add liquidity) and providing rebates for market orders (which remove liquidity). Thus, the incentive for traders under such pricing models is to take liquidity, rather than add it. NASDAQ OMX BX is an example of an exchange that operates an inverted pricing structure.<sup>101</sup>
- Some exchanges, such as BATS and DirectEdge, which merged earlier in the year, each operate both types of pricing structures, with different pricing schedules, meaning that one company now operates four different U.S. equity exchanges.<sup>102</sup> According to the company, it decided to keep all four exchanges and not consolidate them into larger pools of liquidity because, “Each exchange has its own trading ecosystem that meets the needs of various customers. By continuing to offer four unique pools of liquidity, we continue to provide customers with choice for executing their trading strategies... We will continue to price all four order books in the interest of maintaining the various trading ecosystems in the industry.”<sup>103</sup> However, it is not clear which customers' needs are being met, or how they are

---

<sup>98</sup> John C. Heaton, Joseph L. Gidwitz Professor of Finance of University of Chicago Booth School, Transcript: Is high frequency trading good for financial markets?, December 10, 2013, <http://bit.ly/1uf7GMC>. (“We all talk about Liquidity. Really, when we're talking about high frequency trading, it's mostly in large cap stocks.”); See Larry Tabb, CEO, TABB Group, Written Testimony to the United States Senate Committee on Banking, Housing, and Urban Affairs Washington, DC September 20, 2012, <http://1.usa.gov/1uf7LjB>.

<sup>99</sup> *Id.*

<sup>100</sup> *Id.*

<sup>101</sup> NASDAQ OMX BX Pricing List – Trading and Connectivity, <http://bit.ly/1IsCSTI> (According to NASDAQ's site, “With a rebate to remove liquidity, BX offers attractive economics for liquidity takers.” For example, according to current general pricing schedule, firms that add liquidity are charged \$0.0020 per share, and firms that remove liquidity are paid rebates of \$0.0004 per share.)

<sup>102</sup> U.S. Stock Exchanges, BATS Global Stock and Options Markets, <http://bit.ly/1IsCX9C>.

<sup>103</sup> Integration FAQ, BATS Global Stock and Options Markets, <http://bit.ly/1smMZiD>.

being met, by these different pricing systems, and why their needs couldn't be met under a simpler, streamlined system, with deeper liquidity.

BATS and DirectEdge are not the only exchanges to operate multiple exchanges. Speaking at the 15<sup>th</sup> Annual Credit Suisse Financial Services Forum in February 2014, ICE's CEO Jeffrey Sprecher admitted to the fact that NYSE operates more venues than is necessary as a result of MTPM. Putting MTPM in the larger context of how it affects market complexity, he said: "[A]t the NYSE, we have five exchange medallions, and because they all have—some have options in them—but they all have different pricing structures. And if we could get rid of maker-taker pricing, we would theoretically just be able to go down to one medallion, and we would eliminate the number of exchanges which are fragmenting the markets."<sup>104</sup>

Venues also vary their MTPM pricing schedules for different traders based on the volume that they trade. Because trading venues keep the small difference between the rebates they pay and the fees they charge, their incentive is to increase the amount of trading volume so that small difference becomes significant in the aggregate. And so, venues have structured their MTPM to give the biggest rebates to the traders who transact the largest volume. For example, BATS BZX has six volume tiers depending on a trader's average daily added volume ("ADAV"), calculated as the number of shares added.<sup>105</sup> BZX provides rebates of \$0.0025 per share for the lowest ADAV tier and increases to \$0.0032 for the highest ADAV tier.<sup>106</sup> Such a payment structure encourages trading for its own sake. Traders' natural tendency is going to be to trade just to hit their volume tiers to increase their rebates per share traded, which can lead to even more trading volume. Additionally, traders may increase their trading at the end of every month if they are close to the next highest tier, even if those trades are not by themselves financially profitable. Such trading, by itself, does not result in any material benefit to market quality, because volume, by itself, does not improve liquidity.

### **Policy Proposals to Cure Distortions Created by Maker-Taker and Payment for Order Flow**

Some commentators<sup>107</sup> have suggested that the negative effects of MTPM could be ameliorated if brokers were required to pass on their rebates and fees to investors. While such an idea sounds appealing, since it would better align brokers' interests with the interests of their customers, it is not clear how such a regulation would interact with the flat-fee commissions that most brokers already charge.<sup>108</sup> If a pass-through mechanism results in investor confusion about the costs they are paying,

---

<sup>104</sup> Jeffrey C. Sprecher, Chairman & CEO, IntercontinentalExchange, Remarks at the 15th Annual Credit Suisse Financial Services Forum (Feb. 12, 2014), <http://bit.ly/1smN3i6> (registration required) (there are three equity trading platforms and two options trading platforms at the NYSE); *See also* Stanislav Dolgoplov, *supra* note 53.

<sup>105</sup> BATS BZX Exchange Fee Schedule, Effective June 2, 2014, <http://bit.ly/XxKdLT>.

<sup>106</sup> *Id.*

<sup>107</sup> *See, e.g.*, Angel et al., *supra* note 62 ("We recommend that the SEC require that all brokers pass through the fees and liquidity rebates to their clients [in order to] ensure that brokers route all orders to best serve their clients, rather than to enrich themselves."); *See also* Press Release, Sen. Charles Schumer, "Schumer to SEC: Reform 'Maker-Taker' System by Requiring Broker Rebates to go to Investors," May 10, 2012, <http://1.usa.gov/1olSHen>; *See also* Letter from Greg Tusar, Managing Director, Goldman Sachs Execution and Clearing, L.P. and Matthew Lavicka, Managing Director, Goldman Sachs and Co., to Ms. Elizabeth M. Murphy, Secretary, SEC, Concept Release on Equity Market Structure at 3 (June 25, 2010) <http://bit.ly/1tNNHHu>.

<sup>108</sup> *See e.g.*, Commissions, Interactive Brokers, ("IB's Cost Plus commission models are not guaranteed to be a direct pass-through of exchange and third-party fees and rebates. Costs passed on to customers in IB's Cost Plus commission schedule may be greater than the costs paid by IB to the relevant exchange, regulator, clearinghouse or third party. For

or results in retail investors' paying substantially more for their trades, that would be a negative result. Furthermore, such a requirement is likely to be administratively cumbersome, requiring brokers and institutional investors to more comprehensively account for where and when rebates and fees are made and how that affects net costs for their customers and their different fund accounts. Finally, a pass-through requirement does nothing to stop firms that are not trading on their clients' behalf from trading solely for the purpose of capturing rebates, which also may have negative implications on market quality. However, if these concerns can be adequately addressed, then the Commission should consider requiring brokers to pass on the benefits they receive from maker-taker pricing to their customers.

Perhaps a much simpler and more broadly beneficial solution is to eliminate MTPM entirely. Eliminating MTPM would first address the conflict of interest brokers have to route their customers' orders in ways that maximize their revenue, minimize their costs, and lead to order imbalances. Brokers then would have increased incentive to route their customers' orders in ways that fulfill their duty of best execution.

Eliminating MTPM would also have broader benefits to overall market quality. First, it would redirect incentives for firms that are not trading in their broker capacity from trading based on the economics of the rebate to trading on the economics of their underlying trades. This change would reduce unnecessary and unproductive trading volume, especially in stocks that would not benefit from increased trading. Second, it would remove a source of market complexity, as venues would no longer be able to use MTPM to create differing pricing structures. This change would result in fewer venues and a less fragmented market structure, in which, conceivably DirectEdge and BATS could go from four equity platforms to one, NYSE could go from three to one, and NASDAQ could go from three to one.<sup>109</sup>

It bears mentioning here that we support policies to compensate bona fide market makers for their liquidity providing activities. However, those policies, discussed below in the HFT section, should not be confused with venue's provision of trading inducements, such as maker rebates. Under our proposal to compensate bona fide market makers, registered market making HFT firms would receive compensation only after they have fulfilled their obligations to provide liquidity to the market. If they do not provide liquidity when it is needed most, they would not receive any compensation. Thus, under our proposal, bona fide market makers would be rewarded for providing a public good to the market, and penalized for not fulfilling their obligations. This would be in contrast to inducements to trade, which compensate traders at the front end, and without regard to whether they are providing meaningful liquidity to the market.

Recognizing that eliminating MTPM wholesale is not something the Commission is likely to embark on, the Commission should, at the very least, conduct a well-designed pilot program that produces meaningful information about the consequences of eliminating MTPM.

Regardless of what the Commission decides regarding MTPM, it should lower the \$0.30 per 100 share cap under the Access to Quotations Rule of Reg. NMS (Rule 610(c)). Because high rebate

---

example, IB may receive volume discounts that are not passed on to customers. Likewise, rebates passed on to customers by IB may be less than the rebates IB receives from the relevant market.") <http://bit.ly/1AOPwps>.

<sup>109</sup> This refers to equity trading platforms only.

venues are also likely to charge high access fees, and low rebate venues are also likely to charge low access fees, if the maximum fee is reduced, the amount offered through rebates will also likely be reduced. Reducing the amount provided in rebates will reduce the economic incentive that rebates create. In addition, reducing the access fees that exchanges charge will also close the gap between what exchanges charge and what off-exchange venues, such as dark pools, charge. For example, IEX charges \$0.09 per 100 shares for orders executed through its dark pool.<sup>110</sup> While lowering the fee cap would reduce the amount of rebates venues provide and close the gap between what exchanges and off-exchange venues charge, and therefore be a step in the right direction, it would not completely eliminate the misplaced trading incentives and costs to market quality that MTPM produces.

PFOF raises the same conflicts for brokers as MTPM and leads to decreased displayed liquidity, which can harm market quality.<sup>111</sup> However, we also recognize that PFOF can result in tangible benefits to retail investors. To ensure that investors are benefiting in significant terms and to counterbalance the harms to market quality that result from decreased displayed liquidity, PFOF and internalization should be allowed only if it complies with the Sub-Penny Rule and a trade-at rule. Re-examining the example above in which an investor buys 200 shares of stock for \$20.00 per share and receives NYSE's average price improvement, the investor will pay \$3,999.58 for \$4,000.00 of stock. In contrast, under our proposal, the investor would be required to receive a minimum of \$0.01 per share price improvement, which would result in the investor paying \$3,998.00 and saving \$2.00 on the transaction. Such an approach strikes a reasonable balance by reducing broker conflicts and promoting displayed liquidity, but also by allowing for internalization provided that it benefits investors significantly.

### **Policy Proposals to Improve Market Quality Metrics**

In 2001, the Commission promulgated two rules to improve public disclosure of order execution and routing practices in response to increasing competition and resulting fragmentation in the market. According to the Commission's adopting release, "By making visible the execution quality of the securities markets, the rules are intended to spur more vigorous competition among market participants to provide the best possible prices for investor orders."<sup>112</sup> Under Rule 11Ac1-5 (Rule 605), market centers are required to publish monthly reports that include statistical measures of execution quality.<sup>113</sup> Under Rule 11Ac1-6 (Rule 606), broker-dealers are required to publish quarterly reports that identify the venues to which customer orders are routed for execution, and whether they receive compensation for their routing choices.<sup>114</sup> These rules were originally intended to provide meaningful data to investors so they could accurately gauge how their orders are being handled. However, these disclosures are so inaccessible and convoluted that no retail investor is likely to utilize them productively. Furthermore, it is unreasonable to expect that given the changes in speed, technology, complexity, and dark trading in our markets, retail investors would ever utilize them productively. Instead of modernizing the reporting metrics to serve a purpose that cannot reasonably be fulfilled, the reporting metrics should be modernized to provide the most relevant information that will, in turn, allow market participants, regulators, and third party analysts to assess the quality of order execution practices. Toward this end, Healthy Markets Initiative has

---

<sup>110</sup> Frequently Asked Questions, IEX, <http://bit.ly/YqEXuk>.

<sup>111</sup> See section on off-exchange trading for fuller discussion.

<sup>112</sup> Disclosure of Order Execution and Routing Practices, *supra* note 44.

<sup>113</sup> *Id.*

<sup>114</sup> *Id.*

proposed very detailed execution benchmarks and measurements that regulators should seriously consider adopting.<sup>115</sup>

In addition, FINRA is currently conducting a review of brokers' routing policies and practices, and the execution quality of customers' orders. FINRA has sent targeted examination letters, requesting firms to provide detailed explanations of how they route in different scenarios, how their pricing affects their customers, and how they evaluate execution quality of their orders.<sup>116</sup> We urge FINRA to publish the responses so investors and the market can analyze them. We also urge FINRA to require the firms to provide data to support the firms' responses. If they cannot support their policies and practices with concrete data, FINRA should not hesitate to further investigate the firms' activities for possible rule violations. FINRA should also share the information that it accumulates with the Commission, which is itself engaged in a broad review of market structure issues.

While not directly relating to market quality metrics disclosure, other significant improvements to disclosure are necessary. Those include requiring all ATSS, including dark pools, to publicly disclose their Form ATSS so that the public can see how these venues operate.<sup>117</sup> If the Form ATS disclosures do not provide critical details about an ATS' participants, segmentation, and fee structure, they should be required to include those. This information will allow market participants, regulators, and third party analysts to assess whether an ATS' terms of access and service are such that it makes sense to trade on that venue. Currently, dark pools' disclosure of this form is voluntary, and as a result, only a few provide it.

---

<sup>115</sup> Healthy Markets Initiative Vision and Principles, Healthy Markets, <http://bit.ly/1kULuqL>.

<sup>116</sup> Targeted Examination Letters, Re: Order Routing and Execution Quality of Customer Orders, FINRA, July 2014, <http://bit.ly/1oyEInC>.

<sup>117</sup> A sample Form ATS is available here: <http://1.usa.gov/1kkXUIc>.

**III. As a result of disparities in how market data is provided to different market participants, certain traders receive data ahead of others, which puts them at an unfair advantage and harms market integrity. To level the playing field and restore integrity to the market, market data must be provided in a way that ensures no market participant has favored access.**

Providing all market participants with equal access to information is the cornerstone of a fair and efficient market. Selective disclosure of information provides an undue benefit to those who receive the information, harms market participants who do not receive the information, and harms market integrity. It is for these reasons that insider trading and fair disclosure laws exist. The Commission has rightly cautioned that, if the investing public does not believe it is on an equal playing field with market insiders, the public will lose confidence in the integrity of the securities market.<sup>118</sup> Unfortunately, the Commission's concerns are becoming reality, as market data is currently being disseminated in ways that preference certain market participants over others. Therefore, it must be the Commission's priority to ensure that market data is provided in a way that ensures no one has favored access.

When Congress mandated a national market system in 1975, it emphasized that the systems for collecting and distributing to the public consolidated market data, including pre-trade quotes and post-trade reports, would "form the heart of the national market system."<sup>119</sup> According to the Commission's 2010 Equity Market Structure Concept Release, the Commission has emphasized the importance of consolidated market data so that "the public has ready access to a comprehensive, accurate, and reliable source of information for the prices and volumes of any NMS stock at any time during the day. This information serves an essential linkage function by helping assure that the public is aware of the best displayed prices for a stock, no matter where they may arise in the national market system."<sup>120</sup>

Toward that end, the Commission sought to ensure that exchanges would disseminate the most current market data to all investors from a single source that remains supreme. The Commission feared that creating a model in which the different providers of market data sold their data separately would not result in a more efficient market, as investors would be required to purchase all of the different data streams to gain a complete understanding of the best quotes and trade information.<sup>121</sup> Because the providers of the trade data would know that investors needed to purchase all of the different data streams, there would be no competitive market forces to bring costs down for investors.<sup>122</sup>

---

<sup>118</sup> See, e.g., Selective Disclosure and Insider Trading, Securities and Exchange Commission, Release Nos. 33-7881, 34-43154, IC-24599, 17 CFR 240, 243, and 249 (August 15, 2000) <http://1.usa.gov/1s54YrP>. ("The inevitable effect of selective disclosure...is that individual investors lose confidence in the integrity of the markets because they perceive that certain market participants have an unfair advantage...we agree with the common sense view -- expressed by both the Supreme Court and the Congress -- that investors will lose confidence in a market that they believe is unfairly rigged against them.")

<sup>119</sup> H.R. Rep. No. 94-229, 94th Cong., 1st Sess. 93 (1975).

<sup>120</sup> Concept Release, *supra* note 7.

<sup>121</sup> Reg. NMS at 32-33, *supra* note 49.

<sup>122</sup> *Id.*

The Commission decided that under Rule 603(b) of Regulation National Market System (Reg. NMS), exchanges should be required to send their respective best-priced bid (buy) and offer (sell) quotes and trade reports to a common network processor, which aggregates the quotes and trade data across all market centers, and then disseminates to the public a national best bid and offer (NBBO).<sup>123</sup> Pursuant to Rule 603(a) of Reg. NMS, exchanges are required to provide the data on terms that are “fair and reasonable” and “not unreasonably discriminatory.”<sup>124</sup> Thus, Rule 603(a) was intended to prohibit an exchange from releasing market data to certain market participants in advance of other market participants.

However, Rule 603(a), as currently implemented and enforced, is not fulfilling the consolidated market data objectives that Congress sought to achieve through the Exchange Act and that the Commission has repeatedly expressed are essential for a well-functioning market. That is because exchanges have structured their data transmission systems such that they circumvent the consolidated market channel, in purpose and effect. Aside from sending market data to a common network processor, known as the Securities Information Processor (SIP), to be consolidated and distributed to the public, exchanges also distribute customized market data directly to certain preferred customers. Those customers, by and large high frequency traders, are able to receive and make valuable trade decisions based on that data faster than the public receives the SIP feed, which renders the public data stale. As a result, the consolidated data is provided to the public in a manner that is by definition unfair and unreasonably discriminatory.

### **Disparities Between Data Access**

Exchanges purportedly send market data to the SIP and to direct feed subscribers at the same time. However, even if it is sent at the same time, the information is received well in advance by direct feed subscribers. First, that is because direct data feeds offer higher-speed bandwidth (40 gigabits per second vs. 1 gigabit per second),<sup>125</sup> and implement internet protocols with fewer redundancies and faster transfers of messages than those that are used to send to the SIP (User Datagram Protocol or UDP vs. Transmission Control Protocol or TCP).<sup>126</sup> In addition, colocation services are provided in conjunction with direct feeds, allowing subscribers to connect in close proximity to an exchange’s matching engine, and, as a result, to receive data faster than if it had to travel greater distances. It is estimated that it takes 1 microsecond (one-thousandth of a millisecond) for an exchange to send data directly to a direct feed subscriber, compared with approximately 1,500 microseconds (1.5 milliseconds) for an exchange to send data to the network processor.<sup>127</sup> SIP subscribers recently sued the exchanges for providing market data to direct feed subscribers before providing it to SIP subscribers.<sup>128</sup>

Second, information is received well in advance by direct feed subscribers because it takes additional time for the data to be aggregated and consolidated by the SIP before it is sent to the market. The Commission has acknowledged that, due to the consolidation process, information

---

<sup>123</sup> *Id.*

<sup>124</sup> *Id.*

<sup>125</sup> Direct vs SIP Data Feed, Nanex Research, April 4, 2014, <http://www.nanex.net/aqck2/4599.html>

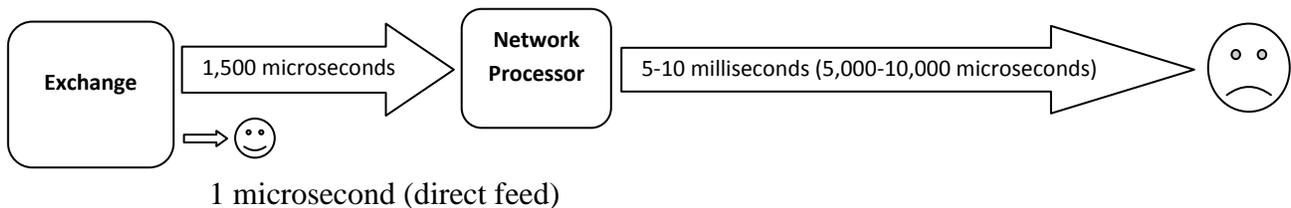
<sup>126</sup> TCP vs. UDP, Diffen, <http://bit.ly/1AOPCgW>.

<sup>127</sup> See, e.g., Shengwei Ding, John Hanna, and Terrence Hendershott, *How Slow is the NBBO: A Comparison with Direct Exchange Feeds*, May 2014, <http://bit.ly/1nkllvf>; See also *Compl.*, Lanier v. Exchanges, S.D.N.Y. Case 1:14-cv-03745-KBF, May 23, 2014, <http://bit.ly/1lsDng5>.

<sup>128</sup> See *Id.*

from the SIP generally reaches the public later than information reaches direct feed subscribers. According to the Commission’s own data,<sup>129</sup> the average time it takes from when the SIP receives information from the exchanges until the time it distributes consolidated information to the public is between 5 and 10 milliseconds approximately.<sup>130</sup> While that time lag may not sound like much, it is enough time for direct feed subscribers to use that information to trade ahead of the public and thereby generate significant profits. To analogize, if one sends two identical letters in the mail at the same time, one via overnight to the adjacent city, and one via standard mail to a state on the other coast of the country, the letter that travels through a faster network that has a shorter distance to travel will arrive sooner; and, the recipient of that letter will be able to react faster based on what’s presented in the letter. The recipient on the other coast will therefore be at a disadvantage.

**Timing Lag: Direct vs. Consolidated Feeds**



**Maximizing the Value of Early Access**

The value of early access to vital trading information -- or “lower latency,” as exchanges market it -- is evidenced by the significant monthly prices that exchanges charge subscribers, and that subscribers are willing to pay, for direct data feeds. For example, initial connection charges can be as high as \$20,000, and monthly connections can range from \$20,000 to \$77,500, depending on the plan.<sup>131</sup> In comparison, a retail customer can receive the SIP feed for \$1 per month.<sup>132</sup> Indeed, the exchanges have a strong financial incentive to provide the same data at different speeds to different market participants to ensure that direct feed subscribers are receiving data that makes their subscriptions worth it, especially when, for example, approximately 80 percent of NYSE’s trading volume is attributable to proprietary market data subscribers.<sup>133</sup> Ironically, exchanges do apparently understand in certain circumstances the significance of providing market data on a basis that is “fair and reasonable” and “not unreasonably discriminatory.” For example, they go to great lengths to

<sup>129</sup> In the Matter of New York Stock Exchange LLC and NYSE Euronext, Release No. 67857 (September 14, 2012) <http://1.usa.gov/1khTvWB> (“The Commission has recognized that, due to the consolidation process (i.e., the time from the receipt by the Network Processor of the information from exchanges to the time it distributes consolidated information to the public), information from a Network Processor generally reaches market participants later than information from exchanges’ proprietary feeds. See Concept Release, 75 Fed. Reg. at 3601 (citing an average consolidation time of approximately 5-10 milliseconds).”

<sup>130</sup> We recognize that it is likely that the SIP’s transmission time has improved somewhat since the Release was published in 2010 and the Commission’s enforcement action against the NYSE in 2012. However, the SIP’s distribution scheme has not been changed significantly since then. As a result, it is likely that there remains a significant time lag between SIP and direct feed.

<sup>131</sup> Self-Regulatory Organizations; NYSE MKT LLC; Notice of Filing and Immediate Effectiveness of Proposed Rule Change to Amend the NYSE MKT Equities Price List and NYSE Amex Options Fee Schedule to Provide for Fees for a 40 Gigabit Liquidity Center Network Connection in the Exchange Data Center, Release No. 34-70285 (August 29, 2013) <http://1.usa.gov/1o6qcY3>.

<sup>132</sup> CTA & NYSE PDP Market Data Pricing, July 2014, <http://bit.ly/1qUfHce>.

<sup>133</sup> In the Matter of New York Stock Exchange LLC and NYSE Euronext, *supra* note 129.

assure their direct feed subscribers that colocate next to their exchange matching engines that each subscriber will be connected with an identical length of cable, regardless of where each is specifically located in the facility, so that any one firm does not receive an unfair advantage.<sup>134</sup>

Moreover, the exchanges have the ability to maintain a meaningful differential between the times at which critical trading information can be accessed by different market participants. The same exchanges that provide direct feeds to subscribers also comprise the voting members of the Consolidated Tape Association (CTA), a committee that governs and operates the SIP.<sup>135</sup> This apparent conflict of interest might explain why the SIP is widely considered unnecessarily slow, antiquated, and prone to chronic outages, including most notably on August 22, 2013, when a SIP outage resulted in a three-hour halt in trading of NASDAQ-listed securities.<sup>136</sup> It might also explain why the amount of resources that exchanges dedicate toward modernizing the consolidated feeds to improve their technology and strengthen their operational integrity appears to be grossly insufficient to improve the SIP's performance. According to a recent *Wall Street Journal* article, exchanges bring in between \$400 million and \$600 million a year for their provision of SIP feeds but only about \$20 million a year is spent on those feeds' administrative and technology expenses.<sup>137</sup> Jeffrey Brown, a senior vice president at the retail brokerage Charles Schwab, has said, "There is no question they have underinvested" in the SIP.<sup>138</sup> Despite the fact that the system is "flawed and degrades the data" that Schwab provides to its clients, which puts Schwab's clients at a disadvantage, Brown said Schwab can't afford to buy the proprietary feeds for all of its clients.<sup>139</sup>

Selling access to the same market data at different speeds makes the faster data much more valuable, which in turn, generates greater profits for the exchanges. According to Reuters, for example, NASDAQ's U.S. sales of proprietary market data brought in \$150 million in 2012, which was a two-thirds increase from 2007.<sup>140</sup> That is in addition to the revenue that NASDAQ received from operating its SIP, which the company said was \$123 million in 2013.<sup>141</sup> Owning, controlling, and disseminating access to market data also raises a larger concern that only recently came to exist and affects exchanges' governance. Exchanges historically operated as not-for-profit organizations, which were charged with enforcing market rules to protect investors and which, at least in theory, functioned in a way so as to minimize conflicts of interest. When this was the case, it was less of a concern that they owned and controlled market data. However, beginning in the early-2000s, all of the pre-existing exchanges converted to for-profit companies, and every new exchange that was

---

<sup>134</sup> See, e.g. NYSE Data Center Colocation Services, NYSE, <http://bit.ly/1pz8mLz>. ("Colocation at any of the NYSE Liquidity Centers provides a level playing field for firms wishing to host near NYSE exchanges but is not a requirement for trading on NYSE markets.")

<sup>135</sup> Christopher Nagy, *Commentary: An old SIP in a Modern Market*, KOR GROUP LLC, September 2013, <http://bit.ly/1s55mq6>.

<sup>136</sup> Bradley Hope, *U.S. Exchanges Near Deal for Infrastructure Upgrade*, WALL STREET JOURNAL, December 15, 2013, <http://on.wsj.com/1o6qi1N>; Bradley Hope, *NASDAQ to Stop Operating Securities Information Processor – Update*, WALL STREET JOURNAL, January 14, 2014, <http://on.wsj.com/WWtp14>.

<sup>137</sup> Scott Patterson, Andrew Ackerman, and Jenny Strasburg, *NASDAQ Shutdown Bares Stock Exchange Flaws*, WALL STREET JOURNAL, August 24, 2013, <http://on.wsj.com/UNc0q0>.

<sup>138</sup> Dave Michaels, Sam Mamudi and Matthew Philips, *Market Outages Highlight Exchanges' Conflicts Over Data Streams*, BLOOMBERG, September 26, 2013, <http://bloom.bg/1smNJUQ>.

<sup>139</sup> *Id.*

<sup>140</sup> Herbert Lash, *Court rules for NYSE, NASDAQ in market data-pricing case*, REUTERS, April 30, 2013, <http://reut.rs/UWC7e2>.

<sup>141</sup> Bradley Hope, *U.S. exchanges battle over SIP data system*, MARKET WATCH, February 7, 2014, <http://on.mktw.net/1IsDLvb>.

created also operated according to a for-profit business model.<sup>142</sup> Currently, every stock exchange in the United States is a for-profit entity. The exchanges' ownership and control over the market information has created new conflicts of interest that did not exist at the time Congress created the regulatory framework for our national market system in 1975. Academics have recognized the fundamental transformation in the way exchanges operate, observing that, "The traditional model of self-regulation for the exchanges found its justification in the alignment of interests between the investing public and member firms," but their business model is "now oriented toward maximizing profits for their shareholders."<sup>143</sup> And, a federal district court recently commented, "As exchanges have evolved into for-profit enterprises, an irreconcilable conflict has arisen, rendering independence unattainable in the context of an exchange regulating its own, for-profit business conduct."<sup>144</sup> With exchanges now ultimately being accountable to their shareholders' economic interests, their incentives to exploit their ownership and control of market data may no longer serve to protect investors. Appropriate safeguards are essential to minimizing and appropriately managing those conflicts so that investors are not disadvantaged at the exchanges' benefit.

To its credit, the Commission has demonstrated a willingness to institute enforcement proceedings against an exchange in the most extreme cases when an exchange sends core trading information to direct feed subscribers before it sends it to the SIP.<sup>145</sup> For example, in 2012 the Commission fined the New York Stock Exchange (NYSE) \$5 million for, over an extended period, sending proprietary market data through two direct feeds to its subscribers before NYSE sent the data to the SIP.<sup>146</sup> According to the Commission's findings, the disparities ranged from single-digit milliseconds to, on occasion, multiple seconds.<sup>147</sup> However, rooting out the most egregious violations does not address the situation that the Commission seems to have accepted—that certain, favored market participants will still gain advance access to market data via direct feeds before the public receives the SIP data.

### **How Investors are Harmed by a Two-Tiered Market**

The significance of certain market participants' receiving market data ahead of the public cannot be overstated. First, any perception that exchanges are operating a two-tiered market based on a market participant's ability to pay for favored access -- and that the Commission has effectively consented to that arrangement -- can harm investor confidence and tarnish market integrity. Second, beyond perception, investors are tangibly being harmed as a result of certain market participants' receiving, and trading on, advance information. Investors who are trading based on stale data may not be able to execute their trades at the displayed prices because the prices may change between the time they are displayed and the time at which the orders reach the market. The price change can be the result of another trader, who has newer information, affecting the price and quantity of the stock that the investor is attempting to trade. In addition, without the most current data, investors are effectively trading in the dark, based on reduced transparency relative to other traders, who do have the most current data. This is occurring regardless of the fact that quotes are being displayed.

---

<sup>142</sup> See Ramos, *supra* note 14.

<sup>143</sup> Stavros Gadinis & Howell Jackson, *Markets as Regulators: A Survey*, 80 So. Cal. L. Rev. 1239, 1258 (Sept. 2007).

<sup>144</sup> *Facebook, Inc., IPO Secs. and Derivative Litig.*, MDL No. 12-2389, 2013 WL 6621024 at \*16 (S.D.N.Y. Dec. 12, 2013).

<sup>145</sup> See Reg. NMS at 271, *supra* note 49 ("independently distributed data could not be made available on a more timely basis than core data is made available to a Network process. Stated another way, adopted Rule 603(a) prohibits an SRO or broker-dealer from transmitting data to a vendor or user any sooner than it transmits the data to a Network processor.")

<sup>146</sup> In the Matter of New York Stock Exchange LLC and NYSE Euronext, *supra* note 129.

<sup>147</sup> *Id.*

Investors who own shares through institutional funds, whether they are mutual funds or pension funds, likely have their shares bought and sold in a dark pool. Many dark pools price transactions with reference to the NBBO, based on the SIP, which is as described above, necessarily stale relative to the direct feeds.<sup>148</sup> This means that traders who have direct feeds can see where the market is before institutional investors, and trade before them, at which point institutional investors' bids and offers may not be able to be filled at those prices. They may then be forced to buy at higher prices and sell at lower prices to complete their orders.<sup>149</sup> Those increased costs ostensibly are passed on to the investors. It appears that institutional investors are willing to accept this hidden cost of trading in dark pools because it is outweighed by other benefits, including anonymity through the use of hidden orders, and the potential to avoid being preyed upon by certain high frequency traders<sup>150</sup> that typically trade on exchanges.<sup>151</sup> The hidden cost of trading in dark pools may also be outweighed by the benefit of not having to pay for direct market feeds and exchange access fees.

A recent empirical study by Ding, Hanna, and Hendershott, *How Slow is the NBBO?*,<sup>152</sup> provides evidence of the benefits of receiving market data directly from the exchanges compared with through the consolidation process. Analyzing the prices displayed by the various exchanges' direct feeds, the authors were able to construct their own "synthetic NBBO" faster than the NBBO displayed by the NASDAQ SIP. As a case study, the authors examined what the difference in latency meant for Apple stock, an actively traded security. They found that price dislocations between the direct feed "synthetic NBBO" and the NASDAQ SIP NBBO occurred multiple times per second. On one trading day, May 9, 2013, for example, price dislocations occurred 25,000 times at the bid, and nearly 30,000 times at the ask (offer). There are 23,400 seconds during the 9:30am to 4:00pm trading day, meaning that price dislocations occurred more than twice per second. The median price dislocation was \$0.01, however many price dislocations were greater than \$0.10. As a result, the mean price dislocation was \$0.034 (3.4 cents). If an investor routes orders based on the stale SIP NBBO, then the investor can lose this amount on each share. Another trader, who is routing orders based on the "synthetic NBBO," can pocket that difference.

The fact that price dislocations typically lasted one to two milliseconds (less than one percent of the time) suggested to the authors that the price dislocations may not impose meaningful costs on investors who trade infrequently. However, they nevertheless surmised that investors that are continuously in the market can be "substantially disadvantaged." One example that they provide involves engaging in arbitrage trading in dark pools that reference the SIP NBBO. If a trader monitors the "synthetic NBBO" and SIP NBBO, the trader can enter a buy order when the synthetic NBBO is above the SIP NBBO, initiating the position at the SIP price and exiting the position at the

---

<sup>148</sup> Sal Arnuk and Joseph Saluzzi, *Broken Markets: How High Frequency Trading and Predatory Practices on Wall Street Are Destroying Investor Confidence and Your Portfolio* at 134 (1<sup>st</sup> ed 2012) FT Press.

<sup>149</sup> See, e.g. Richard Finger, High Frequency Trading: Is It A Dark Force Against Ordinary Human Traders And Investors?, September 30, 2013, <http://onforb.es/1AOPTk1>.

<sup>150</sup> Some dark pools advertise to their customers that they protect them from predatory traders. According to NY AG, Barclays allegedly made such advertisements, but did not protect its traders from predatory traders. See, e.g., *Compl., The People of the State of New York v. Barclays Capital, Inc., and Barclays PLC*, June 25, 2014, <http://on.ny.gov/WWtzFM>.

<sup>151</sup> See Letter from Karrie McMillan at 12-13, *supra* note 31; See also US Equity Market Structure: An Investor Perspective, *supra* note 29.

<sup>152</sup> Shengwei Ding, et al., *supra* note 127.

midpoint of the synthetic NBBO, realizing a guaranteed profit of half the price dislocation. According to the authors, that profit comes at the expense of the investor who had an order resting in the dark pool. Increasing their sample set to reflect a broad cross section of characteristics, the authors found that higher security price and high trading volume and volatility are associated with dislocations.<sup>153</sup>

### **Policy Recommendations to Level the Playing Field Regarding How Data is Provided**

Guaranteeing a level playing field for all market participants, with no favored access, must be a top priority for any market structure reform effort. The Commission should seek to ensure that exchanges are generating the most up-to-date, accurate, and reliable market data to the public. Yet, the Commission is not delivering according to this objective. The Commission appears to interpret 603(a) as prohibiting an exchange from allowing a direct feed subscriber to receive data before data is received by the SIP.<sup>154</sup> If this is the case, the Commission is not enforcing its rule against all of the exchanges; it should. And even if this is how the Commission is interpreting 603(a), that does not address the delay in consolidation and transmission time that the SIP experiences after it receives market data but before that data is published to the general public.<sup>155</sup> To cure these issues, the Commission should revise Rule 603(a) to make clear that a direct, proprietary feed cannot be received by any market participant before the SIP is published. Changing the terminology so that the key point in time is when the information is published (received by investors rather than the SIP) should cure any issues that arise from differentials that currently exist due to varying transmission and consolidation times between direct feeds and the SIP.

Additionally, given the exchanges' conflicts of interest related to owning and controlling market data, substantial revisions must be made to the CTA's governance and transparency, so as to ensure that the SIP operates for the public benefit rather than for exchanges' profit motives. Toward this end, governance should include equal representation and voting rights by all stakeholders, including institutional and retail investors and the public interest. There seems to be broad support for such a conversation, including from prominent industry groups such as SIFMA, which has advocated including direct representatives from the industry (both broker-dealers and asset managers) and the public.<sup>156</sup> Upon establishment, the governing body should require the exchanges to publicly disclose information relating to their market data operations and technology, including latency statistics on their different data feeds, their budgets and investment plans for technological upgrades, and costs and revenues for their different data feeds. In addition, the governing body should periodically review the exchanges' trade and quote data to monitor and assess the quality of the data feeds to make sure they are not being published faster than the consolidated feeds.

---

<sup>153</sup> *Id.*

<sup>154</sup> *See, e.g.,* Regulation NMS, *supra* note 49 ("independently distributed data could not be made available on a more timely basis than core data is made available to a Network processor. Stated another way, adopted Rule 603(a) prohibits an SRO or broker-dealer from transmitting data to a vendor or user any sooner than it transmits the data to a Network processor.")

<sup>155</sup> *Id.* ("Instinet, for example, requested that the Commission clarify that the proposal would not require a market center to artificially slow the independent delivery of its data in order to synchronize its delivery with the data disseminated by the Network. Reproposed Rule 603(a) would not require a market center to synchronize the delivery of its data to end-users with delivery of data by a Network processor to end-users.")

<sup>156</sup> SIFMA Submits Comments to the SEC on Securities Information Processors and Operational Resiliency, December 5, 2013, <http://bit.ly/1fCLia9>.

**IV. High frequency trading (HFT) firms engage in certain practices that are harmful to other market participants, market quality, integrity, and stability. Those practices should be rooted out. High frequency traders also engage in certain practices that are beneficial to market quality, and those practices should be rewarded.**

With the increase in automated trading and improvements in technological innovation, our markets have become faster, to the point that trades occur in the span of microseconds. The chief drivers and beneficiaries of this increase in speed are professional HFT firms, such as Citadel, Hudson River Trading, and Virtu Financial, which use low latency hardware, including colocation and direct feeds, to gain trading information as fast as possible. Then they interpret and react to that information via sophisticated computer programs to execute profitable trades.<sup>157</sup> HFT activity can be characterized by high speed, high volume trading, in which a tiny margin profit on each trade adds up to substantial profits overall.<sup>158</sup> HFT firms often take on trading positions based on very short time frames and end each day flat, with no exposure to the market.<sup>159</sup> In addition, their activities are characterized by a high degree of cancellations.<sup>160</sup> It is estimated that HFT firms represent approximately 2 percent of the nearly 20,000 trading firms operating in the U.S. markets,<sup>161</sup> but contribute to more than 50 percent of the market's daily trading volume.<sup>162</sup>

While the technological sophistication that HFT firms use and the dominant role that they play in the market does not by itself suggest harm to investors or the market, HFT firms can, and indeed do, deploy their technological advantages and dominant role in ways that are unproductive and harmful to investors and to the market. As we discussed in our market data section, HFT firms often pay exchanges to receive market data ahead of the public. Using that data combined with their technological prowess, they send quotes faster than, and execute profitable trades ahead of, others. Additionally, HFT firms engage in trading activities that are in some cases intentionally predatory and manipulative. In other cases, they engage in trading activities that are not intentionally predatory and manipulative, but that nonetheless disadvantage other traders and adversely affect market quality (as discussed in greater detail below). As a result, HFT has become perhaps the single greatest driver of the perception that there is a two-tiered market that is not serving the interests of long-term investors. In addition, because of their commanding role in the market, when HFT firms' technologies experience failures, those failures can expose the financial system to excessive risk.

### **Order Cancellations**

A prime example of an HFT activity that is widely considered harmful to market participants and to market quality is the excessive amount of order cancellations that HFT firms engage in. HFT firms

---

<sup>157</sup> The fact that HFT firms have been able to earn profits for sustained periods of time has raised questions about the extent of risk they take on. For example, Virtu acknowledge in its IPO filing: "As a result of our successful real-time risk management strategy, we have had only one losing trading day since January 1, 2008." Virtu Financial, Inc. Form S-1, Registration Statement Under the Securities Act of 1933, As filed with the Securities and Exchange Commission on March 10, 2014, <http://1.usa.gov/1ne7ttk>.

<sup>158</sup> Concept Release, *supra* note 7.

<sup>159</sup> *Id.*

<sup>160</sup> *Id.*

<sup>161</sup> David Easley, Marcos M. Lopez de Prado, and Maureen O'Hara, *Flow Toxicity and Liquidity in a High Frequency World*, Feb 2012, <http://bit.ly/1o6qCgX>.

<sup>162</sup> Easley and O'Hara estimate that HFT has at times accounted for over 70% of the volume in U.S. equity markets. *Id.*

appear to perform the vast majority of their cancellations through their market making roles.<sup>163</sup> Market making is a useful activity, as it ensures that temporary imbalances between supply and demand and buyers and sellers are smoothed out. HFT engage in market making by submitting non-marketable limit orders to buy and sell the same securities, capturing the bid-offer (also known as bid-ask) spread.<sup>164</sup> In addition to capturing the spread, they may also collect a liquidity rebate, provided that the exchange they are trading on operates under the original maker-taker pricing model.<sup>165</sup> HFT firms continuously cancel and update their orders so as to limit their exposure to the risk of adverse selection, i.e., the risk that their order might be executed at a price that is no longer financially advantageous for them. This might explain these statistics:

- More than 95 percent of quotes, on average, are ultimately cancelled;<sup>166</sup>
- Approximately 40 percent of all quotes are cancelled in less than half a second;<sup>167</sup> and
- Approximately 23 percent of all cancellations occur within 50 milliseconds.<sup>168</sup>

Some exchanges have higher cancel-to-trade ratios than others, with inverted pricing structures having higher cancel-to-trade ratios than traditional pricing structures:

- EdgeX, which operates under the original maker-taker pricing model<sup>169</sup> recently had a cancel-to-trade ratio as high as about 15-to-1;<sup>170</sup>
- EdgeA, which operates an inverted pricing structure,<sup>171</sup> recently had a cancel-to-trade ratio as high as 32-to-1;<sup>172</sup>
- BATS' exchange, BZX, which operates according to a traditional pricing structure<sup>173</sup> recently had a cancel-to-trade ratio as high as about 25-to-1;<sup>174</sup> and
- BYX, BATS' exchange with inverted pricing<sup>175</sup> recently had a cancel-to-trade ratio of as high as 44-1.<sup>176</sup>

Several exchanges have implemented fees for excessive messages. However, given the persistently high rates of cancellations,<sup>177</sup> it does not appear that those fees have achieved their intended goal of reducing the number of cancellations.

---

<sup>163</sup> Market making is a useful activity, as it ensures that temporary imbalances between supply and demand and buyers and sellers are smoothed out. However, the benefits of market making as performed by HFT are questionable. Because they are known to make markets in what are already the most liquid, stable stocks, they may not add to market quality, and because they have no affirmative or obligatory market making duties, they may pull back at the first hint of market instability, which can lead to liquidity crises.

<sup>164</sup> Concept Release, *supra* note 7.

<sup>165</sup> *Id.*

<sup>166</sup> Equity Market Speed Relative to Order Placement, U.S. Securities and Exchange Commission, March 19, 2014, <http://1.usa.gov/1osuOX1>.

<sup>167</sup> Gregg E. Berman, Associate Director, Office of Analytics and Research, Division of Trading and Markets, U.S. Securities and Exchange Commission, "What Drives the Complexity and Speed of our Markets?" North American Trading Architecture Summit, New York, April 15, 2014, <http://1.usa.gov/1qUfTs7>.

<sup>168</sup> *Id.*

<sup>169</sup> Fee Schedule, EDGX Exchange Fee Schedule - Effective August 1, 2014, DirectEdge, <http://bit.ly/1o6rFN4>.

<sup>170</sup> U.S. Exchanges Cancel to Trade Ratio, Securities and Exchange Commission, <http://1.usa.gov/1sIV326>.

<sup>171</sup> Fee Schedule, EDGA Exchange Fee Schedule - Effective August 1, 2014, DirectEdge, <http://bit.ly/1sIV4D8>.

<sup>172</sup> U.S. Exchanges Cancel to Trade Ratio, *supra* note 170.

<sup>173</sup> BATS BZX Exchange Fee Schedule, Effective July 1, 2014, <http://bit.ly/1s56BFN>.

<sup>174</sup> U.S. Exchanges Cancel to Trade Ratio, *supra* note 170.

<sup>175</sup> BATS BYX Exchange Fee Schedule, Effective July 1, 2014, <http://bit.ly/1qMf2or>.

<sup>176</sup> U.S. Exchanges Cancel to Trade Ratio, *supra* note 170.

<sup>177</sup> Equity Trading Alert #2012 – 13, Updated: NASDAQ, BX, and PSD Introduce Excessive Messaging Policy, March 22, 2013, <http://bit.ly/1AOQeTG>.

HFT firms may use cancellations in predatory or manipulative ways, outside of the market making context. That can take a variety of forms, including quote stuffing, spoofing, and layering. Quote stuffing consists of submitting an excessive amount of orders and then rapidly cancelling them so as to congest an exchange's network.<sup>178</sup> Congesting an exchange's network delays the information that other traders receive and allows the trader engaging in quote stuffing to gain superior queue priority in the order book.<sup>179</sup> Additionally, a quote stuffer can exacerbate and exploit structural vulnerabilities in the market by slowing down one exchange to capitalize on price dislocations between other exchanges.<sup>180</sup> Spoofing and layering involve submitting a series of quotes that are designed to send false signals to other market participants about changing demand or market depth for a particular stock. The purpose of sending these false signals is to induce other market participants to trade in ways that are against their interests, which the HFT firm can capitalize on.<sup>181</sup> After an HFT firm that engages in these types of predatory tactics achieves its mission and is able to profit from others' trading responses, the HFT firm cancels the false orders.<sup>182</sup> As former chief economist for the Commodity Futures Trading Commission (CFTC) Andrei Kirilenko and MIT professor Andrew Lo have said, "The difference between these scams and the more traditional 'pump-and-dump' schemes is the speed and electronic means with which they are conducted."<sup>183</sup>

Studies suggest that these manipulative practices are both frequent and pervasive. For example, Egginton, Van Ness and Van Ness recently found that "quote stuffing is pervasive with several hundred events occurring each trading day and that over 74% of U.S. listed equity securities experience at least one episode during 2010."<sup>184</sup> Credit Suisse has offered additional evidence that deceptive trading tactics occur on a regular basis. According to Credit Suisse, each stock on average experiences high frequency quote stuffing 18.6 times a day, with more than 42 percent of stocks averaging 10+ events a day.<sup>185</sup> Furthermore, Credit Suisse has opined that deceptive trading is easy to spot.<sup>186</sup> However, the Commission has brought only a few cases for the predatory and manipulative use of cancellations, which suggests the Commission is not using its investigative and enforcement authorities to their full extent to rein in these practices.<sup>187</sup>

Even where a high degree of cancellations is not associated with predatory or manipulative practices, it nonetheless can be taxing on the market. Exchanges can face clogs in their networks' capacity due to the large portions of bandwidth that are consumed by order cancellations.<sup>188</sup> This, in

---

<sup>178</sup> Egginton, Van Ness and Van Ness, *Quote Stuffing*, March 22, 2014, <http://bit.ly/UNcLPR>.

<sup>179</sup> *Id.*

<sup>180</sup> *Id.*

<sup>181</sup> *Id.*

<sup>182</sup> Press Release, Securities and Exchange Commission, "SEC Charges Owner of N.J.-Based Brokerage Firm With Manipulative Trading," April 4, 2014, <http://1.usa.gov/1kzhJMw>.

<sup>183</sup> Kirilenko and Lo, *supra* note 53.

<sup>184</sup> Egginton, et al., *supra* note 178.

<sup>185</sup> High Frequency Trading – Measurement, Detection and Response, Credit Suisse, December 6, 2012, <http://bit.ly/1osvA6l>.

<sup>186</sup> *Id.*

<sup>187</sup> *See, e.g.*, Press Release, Securities and Exchange Commission, "SEC Charges N.Y.-Based Brokerage Firm with Layering," September 25, 2012, <http://1.usa.gov/1khUgPr>; *See also* Press Release, Securities and Exchange Commission, "SEC Charges Owner of N.J.-Based Brokerage Firm With Manipulative Trading," April 4, 2014, <http://1.usa.gov/1p4PHIy>.

<sup>188</sup> Irene Aldridge, *Market Microstructure and the Risks of High frequency Trading*, August 19, 2013, <http://bit.ly/OKYFLGv>.

turn, can delay information from being transmitted for others' quotes and orders. Thus, increased message traffic can effectively act as informational waste on the system. Also, excessive message traffic can be harmful to market conditions in other ways. In their study, Egginton, Van Ness and Van Ness examined the market impact of spikes in quoting activity. Their findings suggest that "in periods of intense quoting activity, stocks experience decreased liquidity, higher trading costs and increased short term volatility."<sup>189</sup> Thus, at least with respect to periods of intense quoting activity, which may or may not be the result of predatory or manipulative strategies, Egginton, Van Ness and Van Ness' findings would seem to contradict claims made by HFT defenders that HFT increases liquidity, lowers transaction costs, and decreases volatility.

### **Minimum Quote Life as a Way to Address Excessive Order Cancellations**

In order to address the problem of excessive cancellations, several commentators have expressed support for a minimum quote life, i.e., a minimum amount of time for which an order is exposed. According to these proposals, an order would not be able to be cancelled for a specific amount of time, such as 50 milliseconds.<sup>190</sup> While such a proposal would likely root out a considerable amount of wasteful and predatory trading practices, it would have to be designed carefully so as not to have an asymmetric impact on liquidity providers and liquidity demanders. If a trader's nonmarketable limit order must sit for 50 milliseconds, then another trader has 50 milliseconds to immediately execute the contra-side of that order. In essence, that would give the trader executing on that order a free option, based on how the market moves for those 50 milliseconds. Such a proposal may, inadvertently, result in HFT firms gaining an undue benefit, as they may be in the best position to quickly assess and react to changing market dynamics to pick off "sitting duck" quotes. That could in turn result in a precipitous decrease in the extent to which traders are willing to provide liquidity in the form of posting nonmarketable limit orders. Alternatively, that could result in the widening of spreads to reflect the cost to the trader who provides that extended option.

One possible way of designing a minimum quote life so that it would not have an asymmetric effect on liquidity providers and liquidity demanders would be to randomize every trade's quote life, regardless of what type of order it is, between say 50 and 100 milliseconds. Designing a minimum order life with a randomized, minimal delay could accomplish the intended goals of cutting down on the number of cancellations and providing longer-lasting liquidity, while also ensuring that any one trading strategy is not preferenced structurally over others. Such a policy could also minimize any structural advantages that certain traders have relative to other traders. For example, a trader in California would receive equal access and treatment as a firm that is colocated and has a direct feed to an exchange in New Jersey, which would help to level the playing field in the market. Such an idea deserves further consideration.

### **Other Predatory and Manipulative Practices Employed by HFT firms**

HFT firms also engage in predatory tactics that are not largely cancellation-driven, including abusive liquidity detection and order anticipation. With abusive liquidity detection and order anticipation, an HFT submits "pinging" orders, using pattern recognition software to identify the existence of a large buyer or seller who is trying to disguise a large order by breaking it up into

---

<sup>189</sup> Egginton et al., *supra* note 178.

<sup>190</sup> See Concept Release at 47, *supra* note 7.

smaller orders.<sup>191</sup> After spotting the large trader's intent, an HFT firm can trade ahead of that buyer or seller, first buying up the available inventory and then selling to that buyer or seller at a higher price.<sup>192</sup> Both of these practices are likely to have a negative effect on institutional investors, such as mutual funds and pension funds, which often invest on behalf of long-term investors.<sup>193</sup> It is not clear to what extent these manipulative practices are occurring, however we are not aware of any enforcement proceedings the Commission has brought for engaging in them.

Institutional investors have raised concerns about HFT firms' practices.<sup>194</sup> Because they use trading algorithms that are easy for HFT firms to spot and trade around, they find it difficult to execute large orders fairly and efficiently. As a consequence of these concerns, many have migrated to dark pools so as not to show their trading intentions.<sup>195</sup> Their concerns are supported by a recent study by Tong, *A Blessing or a Curse? The Impact of High Frequency Trading on Institutional Investors*,<sup>196</sup> which finds that HFT increases the trading costs of traditional institutional investors, and specifically that one standard deviation increase in the intensity of HFT activities increases institutional execution shortfall costs by a third. For an institution with a daily trading volume of \$20.5 million, which was the average trading volume in Tong's sample, a one-third increase in execution shortfall cost would amount to additional daily transaction costs of more than \$10,000, according to Tong.

As we discussed in our displayed liquidity section, while it may behoove any one trader to redirect his or her trades from a lit venue to a dark venue, market quality as a whole suffers as undisplayed trading increases. It should therefore be discouraged. However, to do this, adequate safeguards

---

<sup>191</sup> See Concept Release, *supra* note 7; See also High Frequency Traders are Stealing from You, West Coast Asset Management, October 2010, <http://bit.ly/S3zldO>; See also Wallace C. Turbeville, *Cracks in the Pipeline Part 2: High Frequency Trading*, March 8, 2013, <http://bit.ly/11Bkk5H>.

<sup>192</sup> *Id.*

<sup>193</sup> Institutional investors such as mutual funds, pensions, insurance firms, and hedge funds account for over 50% of the public equity ownership in the U.S. (French, 2008) How institutional investors view market integrity and respond to market practices are useful indicators of how the market is functioning and areas in which it can be improved. The fact that institutional investors do not trade on exchanges because of their concerns, which has contributed to the growth in undisplayed liquidity, suggests this is an area that needs remediation.

<sup>194</sup> See, e.g., Testimony of Andrew M. Brooks, Vice President of Equity Trading, T. Rowe Price Associates Inc., Before the Committee on Banking, Housing, and Urban Affairs, Subcommittee on Securities, Insurance, and Investment, United States Senate on "High Frequency Trading's Impact on the Economy," June 18, 2014, <http://1.usa.gov/1pg8NsG> ("Disruptive HFT strategies are akin to a tax loophole that has been exploited and needs to be closed. Market participants utilizing such strategies are essentially making a riskless bet on the market, like a gambler who places a bet on a race that's already been run and for which he knows the outcome."); See also Testimony of Andrew M. Brooks, Vice President of Equity Trading, T. Rowe Price Associates Inc., Before the Committee on Banking, Housing, and Urban Affairs, Subcommittee on Securities, Insurance, and Investment, United States Senate on "Computerized Trading: What Should the Rules of the Road Be?" September 20, 2012, <http://1.usa.gov/UNdOKL> ("It also seems many high frequency trading ("HFT") strategies are designed to initiate an order to simply gauge the market's reaction and then quickly react and transact faster than other investors can. This seems inherently wrong. Our understanding is that the continued push for speed is not producing any marginal benefit to investors and in fact may be detrimental."); See also Southeastern Asset Management Inc., "Southeastern's Perspective on Market Structure and High frequency Trading," April 11, 2014, <http://bit.ly/1mfpYbj> ("Unfortunately, some of the strategies and tactics they employ detract from the ultimate goal of the capital markets – to reduce friction between those with capital to invest and those in need of capital....By seeing trades and price changes in the market before investors and ensuring they are first to react, HFTs are greatly advantaged at the investors' expense.")

<sup>195</sup> See Letter from Karrie McMillan, at 12-13, *supra* note 31.

<sup>196</sup> Lin Tong, *A Blessing or a Curse? The Impact of High Frequency Trading on Institutional Investors*, Nov 2013, <http://bit.ly/1p4QeKs>.

must be put in place so that institutional traders can trade in lit venues without being preyed upon. A randomized minimum quote life, discussed above, could mitigate the predatory practices that HFT firms engage in against institutional investors by taking away their speed advantage as well as their advantage to detect institutional investors' trading activities.

### **Batching as a Way to Address HFT More Generally**

One idea that has garnered support to address the HFT arms race and the deleterious effects that come with it is requiring orders to be processed in batches.<sup>197</sup> Under this proposal, frequent batch auctions at discrete time intervals, such as every second, would replace continuous limit order books. A recent study by Budish et al.<sup>198</sup> provides evidence that the continuous limit order book market design does not function well at a millisecond level. According to their research, market correlations completely break down at high frequency time horizons. For example, securities indexes and individual securities that are nearly perfectly correlated over the course of the trading day, the hour, and the minute, have essentially zero correlation at the millisecond level. This correlation breakdown creates arbitrage opportunities for HFT activities and leads to trades being “sniped,” with the profits going to whichever trader can execute the fastest. This in turn induces an arms race in speed.

According to Budish et al., frequent batch auctions would reduce, if not eliminate, the value of a tiny speed advantage. It would also change the nature of competition when there are multiple fast traders so that they compete on price rather than speed. Promoting competition on price rather than speed alone would lead to narrower spreads, deeper markets, and increased social welfare. Under the approach outlined in their paper, in each batch auction, traders would submit bids and offers, which would not be visible to the rest of the market. This would prevent gaming. Traders could still cancel their orders before the batch interval is complete, but would only have a financial incentive to do so based on changing market dynamics rather than to affect others' activities. And because orders would not be visible to others, the submission of predatory orders would not affect the market. At the conclusion of each batch interval, the venue would collate all of the received orders and match supply with demand. Any remaining balance would carry over to the next batch.

The proposal that Budish et al. have outlined is thought-provoking, but raises some issues. For it to work as intended, it requires a certain degree of undisplayed liquidity, meaning that if venues were to adopt this approach, they would effectively operate as quasi-dark pools, receiving and matching orders with little transparency until the batch interval is complete. It also raises questions about whether discrete batches would turn the market into a series of opens and closes, which could create operational hazards. The proposal also must be considered in relation to what other venues are doing and how the interaction between venues affects the market structure. For example, if some venues move to batch auction systems while others maintain continuous auction systems, what will the impact on the market be?

---

<sup>197</sup> See, e.g., Editorial, *Slowing Down the Stock Market*, BLOOMBERG VIEW, June 18, 2014, <http://bv.ms/1mdi71O>; See also Barry Burr, *Academics tackle high frequency trading problem*, PENSIONS AND INVESTMENTS, June 9, 2014, <http://bit.ly/1uc60Sy>.

<sup>198</sup> Eric Budish, Peter Cramton, and John Shim, *The High frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response*, December 23, 2013, <http://bit.ly/1qUgn1c>.

## Order Types

Another way HFT firms reap benefits at others' expense is through the use of complex, nontransparent, and predatory order types. HFT activities are not only facilitated by exchanges that provide them favored access through advance access to market data, exchanges also enable HFT activities by sanctioning their use of order types that guarantee that they will execute their orders as they desire.<sup>199</sup> Order types are commands that instruct a venue how to execute orders. Until recently, limit and market orders predominated. However, with the growing number of exchanges competing for business and a desire to attract high volume traders, exchanges began allowing HFT firms an ever increasing menu of order types, designed to limit HFT firms' risk and increase their likelihood of securing a beneficial execution.<sup>200</sup> According to one employee of Archipelago,<sup>201</sup> "We created all these different order types to accommodate how [some market participants] wanted to trade...A lot of the unique orders were created at the request of a customer, typically a high frequency customer."<sup>202</sup> Haim Bodek, a former high frequency trader who helped to expose the order type issue, has argued that the nexus between order type and profits is extremely close, saying, "HFT was and is all about these HFT-oriented order types, as well as other even more sophisticated derivatives of such order types. In fact, modern HFT would cease to be profitable without HFT-oriented order types."<sup>203</sup> Moreover, it is often difficult to decipher the purpose and effect of many order types. According to Bodek, "not even the most sophisticated user would have been able to determine how top HFT firms employed special order types by scrutinizing exchange [application programming interface] manuals and regulatory filings. The most important details (e.g. intended usage cases, intended order interaction sequences, order precedence rules, etc.) are not documented in any adequate manner."

The proliferation of order types has drawn broad criticism. Critics include John M. Donahue, senior president and head of equity at Fidelity Capital Markets, who said "It's hard for me to understand the need for 2,000 order types."<sup>204</sup> Jennifer Setzenfand, chairman of the Security Traders Association, has also expressed concern over certain order types that disadvantage certain investors, saying, "there are predatory order types that some may argue also add liquidity, but get in the way of institutional orders."<sup>205</sup> While the Commission should be commended for increasing its scrutiny of "how requests for order types are enacted, vetted and approved at each exchange before they get to the Commission,"<sup>206</sup> it's not enough for the Commission to allow current order types to continue unquestioned. Instead, the Commission should undertake an exhaustive investigation of the current order types, requiring exchanges and all ATSS, including dark pools, to disclose in easily understandable terms what their purpose is, how they are used in practice, who is using them, and

---

<sup>199</sup> Stanislav Dolgoplov, *HFT, Order Types, and the Evolution of the Securities Market Structure: One Whistleblower's Consequences for Securities Regulation*, May 8, 2014, <http://bit.ly/1jqjdq1>.

<sup>200</sup> *Id.* (According to Bodek: "Exchanges struggled to differentiate themselves in a manner where they could establish a compelling product that would retain and grow the volume of their most sought-after and favored high-volume clients.") See also Tom Steinert-Threlkeld, *Out of Order*, TRADERS MAGAZINE, January 2013, <http://bit.ly/UNdtfZ>.

<sup>201</sup> Archipelago was an ECN that, after merging with the NYSE, ultimately became NYSE Arca.

<sup>202</sup> Patterson, *Dark Pools* at 205, *supra* note 51.

<sup>203</sup> Dolgoplov, *HFT, Order Types, and the Evolution of the Securities Market Structure*, (citing Haim Bodek's, *The Problem of HFT: Collected Writings on High Frequency Trading & Stock Market Structure Reform* (2013), *supra* note 189.

<sup>204</sup> Tom Steinert-Threlkeld, *Out of Order*, TRADERS MAGAZINE, January 2013, <http://bit.ly/UNdtfZ>.

<sup>205</sup> *Id.*

<sup>206</sup> Scott Patterson and Jean Eaglesham, *WSJ Exchanges get closer examination*, WALL STREET JOURNAL, Nov 19, 2012 <http://on.wsj.com/1pTEtD1>.

why they are not discriminatory or resulting in undue benefit or harm to any traders. If an exchange cannot sufficiently provide this information for an order type, then that order type should be banned.

### **HFT Exposes Market to Broader Systemic Risks**

In addition to engaging in certain predatory practices that directly harm investors, HFT can also expose the market to broader systemic risks. While much of the empirical evidence to date suggests that HFT may improve liquidity, reduce trading costs, and decrease volatility under certain circumstances, those benefits to market quality can be reversed at a moment's notice, often when we need them the most. Seemingly, any catalyst -- either internal via a computer or software malfunction, or external via another market participant's activities -- can set off a chain reaction that causes instability for HFT firms, and in turn, the overall market. When such events happen, market liquidity evaporates and volatility skyrockets.

### **The Flash Crash**

The May 6, 2010 Flash Crash is a prime example of how HFT exposes the financial system to sudden and severe risks. During that event, the Dow Jones Industrial Average experienced an almost 1,000 point drop, the largest intraday decline in its history. The Flash Crash occurred when a non-HFT firm's trading algorithm executed a large sale worth about \$4.1 billion of stock index futures contracts (S&P 500 E-mini) in a short period of time, which created supply and demand imbalances in the market.<sup>207</sup> HFT firms first bought the E-minis for a few minutes, but then soon unwound their positions when their programs could not interpret the trading dynamics that were occurring because they didn't fit into their pattern recognition software. This resulted in HFT firms selling "quickly and aggressively at a key moment when liquidity was sparse, adding to the downward pressure."<sup>208</sup> Then, HFT firms rapidly passed contracts back and forth, engaging in a game of "hot potato," which drove up volatility.<sup>209</sup> Many HFT firms exited from the market altogether. Dave Lauer, a former high frequency trader, has described his experience sitting on a trading floor watching the flash crash transpire:

"As I watched the market crash, I witnessed something unthinkable: the market simply disappeared. For what felt like an eternity, but was more likely 30 seconds to a minute, there were no bids or offers displayed in the market for major stocks and ETF's such as SPY (the S&P 500 Index ETF).

...

Immediately before the market disappeared, our firm, like other high frequency trading firms, withdrew our orders from the market because we did not understand what was happening, did not trust our data feeds and had no obligation to remain active in the market. Anybody who seeks to minimize the role that high frequency trading had in the Flash Crash either was not on a trading floor that day or has an interest in maintaining the current unregulated status quo."<sup>210</sup>

---

<sup>207</sup> Kirilenko and Lo, *supra* note 53.

<sup>208</sup> *Id.*

<sup>209</sup> *Id.*

<sup>210</sup> Testimony of David Lauer, "Computerized Trading: What Should the Rules of the Road Be?" Before the Committee on Banking, Housing, and Urban Affairs Subcommittee on Securities, Insurance and Investment, September 20, 2012, <http://1.usa.gov/1uf9TI4>.

During the course of the crash, which from beginning until end lasted just over a half-hour, several stocks experienced wide price swings. According to the joint Commodity Futures Trading Commission (CFTC)-Securities and Exchange Commission (SEC) report on the May 2010 flash crash, “Over 20,000 trades across more than 300 securities were executed at prices more than 60% away from their values just moments before. Moreover, many of these trades were executed at prices of a penny or less, or as high as \$100,000 before prices of those securities returned to their ‘pre-crash’ levels.”<sup>211</sup>

### **Mini Flash Crashes Occur Regularly**

While the Flash Crash has been labeled “The Perfect Financial Storm,”<sup>212</sup> the effects on liquidity and volatility that result from HFT activities do not only happen sporadically. Rather, mini flash crashes occur on a regular basis, as HFT firms interact with one another and the broader market and lead to rapid withdrawals of liquidity from the market, creating significant price dislocations.<sup>213</sup> A recent paper by Cespa and Foucault, “Illiquidity Contagion,”<sup>214</sup> discusses how the market can suddenly and inexplicably turn a small loss in liquidity in one asset into a large loss in liquidity in other assets. According to the authors, because liquidity providers’ activities are interconnected, any loss in liquidity is reinforced by other liquidity providers, effectively becoming a positive feedback loop in which liquidity is withdrawn en masse, leading to “liquidity crashes,” or “market-wide evaporations of liquidity, in the absence of noticeable changes in the economic environment or asset prices.” The liquidity only returns when the traders reach a new equilibrium. Put more simply, a small amount of uncertainty for one stock or by one market participant can cause mass panic in the entire market until the uncertainty disappears.

Several commentators have raised concerns that the Flash Crash as well as the mini flash crashes that occur on a regular basis are a symptom of a larger problem, namely that the liquidity that HFT firms provide is illusory and unreliable.<sup>215</sup> While it is true that HFT firms often hold themselves out as the market’s liquidity providers and, in fact do provide liquidity to the markets at times, they do not ensure sufficiently liquidity in the markets at *all* times.<sup>216</sup> Because HFT firms do not have affirmative obligations to provide liquidity, they are able to cancel their orders and withdraw from the market when conditions do not suit them or when there is uncertainty.<sup>217</sup> Paradoxically, that is typically when the market needs their liquidity the most.<sup>218</sup>

---

<sup>211</sup> *Findings Regarding the Market Events of May 6, 2010*, REPORT OF THE STAFFS OF THE CFTC AND SEC TO THE JOINT ADVISORY ON EMERGING REGULATORY ISSUES, September 30, 2010, <http://1.usa.gov/cF6GSJ>.

<sup>212</sup> Kirilenko and Lo, *supra* note 53.

<sup>213</sup> See, e.g., Maureen Farrell, *Mini flash crashes: A dozen a day*, CNN MONEY, March 20, 2013, <http://cnmmon.ie/1uf9Uvx>; Steven Russolillo, *Google Suffers ‘Mini Flash Crash,’ Then Recovers*, WALL STREET JOURNAL, April 22, 2013, <http://on.wsj.com/1tOdXS9>; Victor Reklaitis, *P&G mini flash-crash trades will stand, company says*, MARKET WATCH, August 30, 2013, <http://on.mktw.net/1o6S6JJ>; Ronald D. Orol, *Mini flash crashes strike again*, MARKET WATCH, June 11, 2013, <http://on.mktw.net/1mfJC7e>.

<sup>214</sup> Giovanni Cespa and Thierry Foucault, *Illiquidity Contagion and Liquidity Crashes*, January 2014, <http://bit.ly/UWOR4k>.

<sup>215</sup> See Jennifer Victoria Christine Dean, *Paradigm Shifts & Unintended Consequences: The Death of the Specialist, the Rise of High Frequency Trading, & the Problem of Duty-Free Liquidity in Equity Markets*, May 2013, <http://bit.ly/1nl1ywR>.

<sup>216</sup> *Id.*

<sup>217</sup> *Id.*

<sup>218</sup> *Id.*

### **The Market's De-Facto Liquidity Providers**

This liquidity provision dynamic is quite different from how the market worked previously, when bona fide market makers were tasked with maintaining a fair, orderly, and efficient market by providing meaningful liquidity in both good and bad times. At the NYSE, those traders were called “specialists” and at NASDAQ, they were called “market makers.”<sup>219</sup> However, with the widespread adoption of electronic, automated trading, exchanges no longer viewed specialists’ role as essential.<sup>220</sup> In 2008, NYSE eliminated the specialist system and HFT firms became the de-facto liquidity providers by virtue of the frequency and volume of their trading activities. However, they do not have the responsibilities that specialists had to maintain fair and orderly markets by directing order flow in a continuous and predictable manner.<sup>221</sup> Now, a small handful of HFT firms contribute the lion’s share of trading volume to the market.<sup>222</sup> Because they can withdraw from the market at any time, however, their liquidity is not dependable, which leaves the market susceptible to liquidity voids that make the system more fragile. Ironically, the goal of the NMS to decentralize the market has been achieved with regard to the trading venues, but NMS has had the opposite effect on the market’s traders. With the growth of HFT, the number of traders who contribute the majority of the market’s trading volume and liquidity has in fact become more concentrated, which compounds the deleterious effects those traders can have on market quality when they decide not to participate.<sup>223</sup>

### **Policy Proposal to Require and Reward HFT’s Liquidity Provision**

If the Commission accepts the premise that HFT firms are the market’s de-facto liquidity providers and HFT firms continue to hold themselves out as such, the Commission must subject these firms to liquidity providing obligations. This means requiring them to continuously provide meaningful quotes to the market so as to smooth over any imbalances in supply and demand, regardless of whether market conditions suit them. Re-establishing this critical market making role and holding HFT firms accountable for their actions will improve day-to-day market quality and promote long-term market stability.

There is considerable empirical research to support the proposition that the existence of liquidity obligations by market makers enhances market quality.<sup>224</sup> Furthermore, there is diverse support for imposing such obligations on market participants, including even Virtu’s Chris Concannon, who recently testified: “I fundamentally believe that we need to increase obligated liquidity in our markets. Flash crashes, mini-flash crashes and other market disruptions demonstrate the need for

---

<sup>219</sup> *Id.* While these liquidity providers were not perfect, and there are many instances in which they engaged in conflicts of interest or shirked their duties, they were ultimately held accountable for their actions, either by the exchange with which they were associated or by regulators and law enforcement.

<sup>220</sup> Self-Regulatory Organizations; New York Stock Exchange LLC; Notice of Filing of Amendment Nos. 2 and 3 and Order Granting Accelerated Approval to a Proposed Rule Change, as Modified by Amendment Nos. 1, 2, and 3, to Create a New NYSE Market Model, with Certain Components to Operate as a One-Year Pilot, That Would Alter NYSE’s Priority and Parity Rules, Phase Out Specialists by Creating a Designated Market Maker, and Provide Market Participants with Additional Abilities to Post Hidden Liquidity, Securities and Exchange Commission, Release No. 34-58845, October 24, 2008, <http://1.usa.gov/1AP1gbH>.

<sup>221</sup> See Jennifer Victoria Christine Dean, *Paradigm Shifts & Unintended Consequences*, *supra* note 215.

<sup>222</sup> *Id.*

<sup>223</sup> *Id.* (“This new concentration of activity violates the national market system idea...Now the equity markets are faced with a similar concentration of activity, but without any of the rigorous rules and restrictions that existed under the NYSE/NASDAQ duopoly...”)

<sup>224</sup> See, e.g., Gideon Saar, *Specialist Markets*, <http://bit.ly/1osWLOR>; Amber Anand, Carsten Tanggaard, and Daniel G. Weaver, *Paying for Market Quality*, *Journal of Financial and Quantitative Analysis*, December 2009, <http://bit.ly/1qMJ9w4>.

additional obligated liquidity in our market.”<sup>225</sup> Sen. Charles Schumer<sup>226</sup> and FINRA’s Rick Ketchum have also voiced support for affirmative liquidity obligations. Ketchum has said: “I don’t begin to suggest that market maker obligations eliminate risk. But they do provide greater continuity. Market maker obligations do lessen the risk of errors, and there is value in them.”<sup>227</sup>

The questions then are which market participants should be obligated to provide liquidity and how those obligations should be imposed. In answering these questions, the Commission must update its definition of “bona fide market maker.” This definition hasn’t been updated since 1993,<sup>228</sup> before our market structure underwent a significant transformation, specialists disappeared, and HFT firms informally replaced them. One approach would be to define a “bona fide market maker” as a market participant that holds itself out to the market as being willing to buy and sell a security for its own account on a regular or continuous basis, or provides the appearance of liquidity by virtue of the fact that it trades a significant amount of a stock’s volume.<sup>229</sup> A “bona fide market maker” then should be required to register with the Commission and provide liquidity when others in the market are not providing liquidity so as to smooth over any imbalances in supply and demand. Operationally, this should not be unduly burdensome, as HFT programs are already built to recognize changes in liquidity. The programs would just need to be reconfigured so they react differently to those same stimuli.

“Bona fide market making” is a public good and should be compensated by the venues on which market makers trade. Compensation rates should be prescribed by regulators so that the venues can’t manipulate the benefits in an effort to draw in business to compete with each other, as they do in the maker-taker context. Compensation can take the form of rebates or reduced trading fees, but they should only be dispensed after FINRA and the Commission have analyzed their previous trading and confirmed that they have fulfilled their obligations. If FINRA and the Commission find that a “bona fide market maker” has not fulfilled its obligations, specifically with an eye toward when liquidity is needed most, reimbursement should be withheld. If FINRA and the Commission find that certain firms persistently are not honoring their duties over an extended period of time, then FINRA or the Commission should levy penalties against the firm. Importantly, bona fide market makers must only be able to trade for their own account and not on a client’s behalf so that the same types of broker routing conflicts that exist in the maker-taker pricing context do not arise in this context.

---

<sup>225</sup> Testimony of Chris Concannon, Executive Vice President, Virtu Financial, LLC, “Computerized Trading: What Should the Rules of the Road Be?” Before the United States Senate Committee on Banking, Housing, and Urban Affairs Subcommittee on Securities, Insurance, and Investment, SEPTEMBER 20, 2012, <http://1.usa.gov/1osWScU>.

<sup>226</sup> Press Release, Sen. Charles Schumer, “Schumer to SEC: Impose Tougher Rules on High frequency Traders to Curb Stock Price Volatility and Prevent Another Flash Crash,” August 11, 2010, <http://1.usa.gov/1ki9UKH>.

<sup>227</sup> Stanislav Dolgoplov, *supra* note 53 (Quoting Richard Ketchum, Closing Remarks, in “The Quality of our Financial Markets: Taking Stock of Where We Stand,” 83, 87 (Robert A. Schwartz et al. eds., 2013)).

<sup>228</sup> 15 USCA 78c (38) (1993); The definition even defines market maker with reference to the specialist system. Rule 203(c)(1) provides that the term “market maker” has the same meaning as in Section 3(a)(38) of the Exchange Act, which defines “market maker” as “any specialist permitted to act as a dealer, any dealer acting in the capacity of a block positioner, and any dealer that, with respect to a security, holds itself out (by entering quotations in an inter-dealer communications system or otherwise) as being willing to buy and sell such security for its own account on a regular or continuous basis.”

<sup>229</sup> A modern electronic market maker can trade as much as 15 percent of the daily volume in a large-cap stock. Testimony of Erik R. Sirri, *supra* note 47; See also Jennifer Victoria Christine Dean, *Paradigm Shifts & Unintended Consequences*, *supra* note 215.

## Technological “Glitches”

In addition to trading failures, technological “glitches” that risk spilling over into the market are also possible. The BATS Exchange IPO in March 2012 and the Facebook IPO in May 2012 are recent examples. BATS, the third largest stock exchange, launched its own IPO, but due to a software bug, several ticker symbols including BATS became inaccessible on the BATS system. As a result, BATS fell to \$0.02 from an opening of \$15.25 before the exchange halted trading, then cancelled the IPO altogether.<sup>230</sup> Two months later, NASDAQ’s system to match IPO buy and sell orders caused disruptions to Facebook’s IPO, delaying Facebook’s opening by 30 minutes.<sup>231</sup> The delay left more than 30,000 Facebook orders stuck in NASDAQ’s system for more than two hours when they should have been promptly executed or canceled, according to the Commission, which later levied a \$10 million fine for securities laws violations resulting from NASDAQ’s “poor systems and decision-making.”<sup>232</sup>

In August 2012, Knight Capital, an electronic market making firm, experienced a software glitch that caused dramatic stock price fluctuations and brought the firm to its knees. The glitch was apparently caused by the firm’s rushing to install new trading software to help Knight compete with the NYSE’s new Retail Liquidity Program.<sup>233</sup> Because of the programming error, Knight sent erroneous orders into the market and rapidly accumulated positions that were “unrestricted by volume caps.” As a result, almost 150 stocks suffered drastic price fluctuations, including Nokia (9.12 percent change), Harley Davidson (10.47 percent change), RadioShack (20.27 percent change), Pandora Media (9.11 percent change), and Allergan (9.07 percent change).<sup>234</sup> Knight suffered losses of approximately \$460 million, ultimately depleting the firm’s capital.<sup>235</sup> The Knight trading debacle illustrates the dangerous fallout that can result from the intense competition that characterizes our market, competition that can lead market participants to put their business interests ahead of any interests in promoting their own or others’ financial stability. It also illustrates the dangerous effects poorly designed and tested software can have on the system, and the relative ease (in mere minutes) with which a market participant can suffer a capital depletion and be brought to its knees.

These risks are well described in Virtu’s IPO disclosures. The disclosures underscore the varied risks, internal and external, that could affect an HFT firm and that could then spread throughout the rest of the market. Here are just a few of Virtu’s disclosures toward this effect:

---

<sup>230</sup> Dan Beucke, *Bats: The Epic Fail of the Worst IPO Ever*, BLOOMBERG BUSINESSWEEK, March 23, 2012, <http://buswk.co/1om4Q2T>.

<sup>231</sup> *NASDAQ to Pay \$10 Million to Settle SEC Charges Over Facebook IPO*, CNBC, May 29, 2013, <http://cnb.cx/1o6Sz7z>.

<sup>232</sup> *Id.*

<sup>233</sup> On August 2, 2012, in an interview on Bloomberg TV, Knight’s CEO Tom Joyce stated, “We put in a new bit of software the night before because we were getting ready to trade the NYSEs Retail Liquidity Program. This has nothing to do with the stock exchange. It had to do with our readiness to trade it. Unfortunately, the software had a fairly major bug in it. It sent into the market a ton of orders, all erroneous, so we ended up with a large error position which we had to sort through the balance of the day. It was a software bug, except it happened to be a very large software bug....” <http://bloom.bg/1o6EU10>.

<sup>234</sup> *Nightmare on Wall Street*, List of affected symbols showing #Trades, Volume, and High, Low, Last data, NANEX, August 1, 2012, <http://bit.ly/T13OrT>.

<sup>235</sup> Ultimately, the firm was able to secure short-term financing before ultimately being acquired by Getco, another electronic market making and HFT firm.

*“Our reliance on our computer systems and software could expose us to great financial harm if any of our computer systems or software were subject to any material disruption or corruption.*

Our computer systems and software may fail or be subject to bugs or other errors, resulting in service interruptions or other unintended consequences. If any of these risks materialize, they could have a material adverse effect on our business, financial condition and results of operations.

*Capacity constraints, systems failures, malfunctions and delays could harm our business.*

Our systems and operations are vulnerable to damage or interruption from human error, software bugs and errors, electronic and physical security breaches, natural disasters, power loss, utility or internet outages, computer viruses, intentional acts of vandalism, terrorism and other similar events. Extraordinary trading volumes or other events could cause our computer systems to operate in ways that we did not intend, at an unacceptably low speed or even fail...Any disruption for any reason in the proper functioning or any corruption of our software or erroneous or corrupted data may cause us to make erroneous trades or suspend our services and could have a material adverse effect on our business, financial condition and results of operations.

Since the timing and impact of disasters and disruptions are unpredictable, we may not be able to respond to actual events as they occur.

*Failure or poor performance of third-party software, infrastructure or systems on which we rely could adversely affect our business.*

We depend on third parties to provide and maintain certain infrastructure that is critical to our business. For example, we rely on third parties to provide software, data center services and dedicated fiber optic, microwave, wireline and wireless communication infrastructure. This infrastructure may malfunction or fail due to events outside of our control, which could disrupt our operations and have a material adverse effect on our business, financial condition and results of operations.<sup>236</sup>

### **Reg. SCI as a Way to Address Technological Glitches**

In an effort to mitigate some of the risks that technological systems can create, in March 2013 the Commission proposed Reg. SCI (Systems, Compliance and Integrity). Reg. SCI would eliminate the current voluntary technological compliance system and instead require that certain market participants have comprehensive policies and procedures in place to insulate the markets from vulnerabilities posed by their technological systems.<sup>237</sup> While the proposed rules are a step in the right direction, they are not likely to meet the Commission’s stated goals because they defer to the regulated entities to make sure that their policies and procedures are meeting the goals of the rules.

---

<sup>236</sup> Virtu Financial, Inc. Form S-1, Registration Statement, *supra* note 157.

<sup>237</sup> Proposed Rule, Regulation Systems Compliance and Integrity, Release No. 34-69077, 17 CFR 242 and 249, March 8, 2013, <http://1.usa.gov/1kia2Ka>.

Instead, the Commission must set forth specific minimum standards to which regulated entities will be held in order to minimize technological vulnerabilities and their effects on the market.<sup>238</sup>

---

<sup>238</sup> See Commissioner Luis A. Aguilar, “Developing Solutions to Ensure that the Automated Systems of Our Marketplace are Secure, Robust, and Reliable,” Washington, D.C., March 7, 2013, <http://1.usa.gov/XxZIDH>.

**Conclusion**

While we have in many ways achieved the Exchange Act's goal of having multiple competing venues linked through technology, a myopic focus on competition and technology, without proper safeguards and properly designed incentives, can lead to race-to-the-bottom practices that are detrimental to investors and to market quality. The Commission must therefore structure its policies so that market participants are engaging in healthy competition that serves the interests of investors rather than results in practices that serve specific industry actors. It must also structure its policies so that market participants are using technology in productive rather than destructive ways. In addition, the Commission must take a more active role in overseeing all aspects of the market and bringing enforcement actions when they arise.

It is also important to keep perspective on how our markets are actually functioning. As we've detailed, there are significant ways in which our markets are not delivering on the objectives that Congress intended when it directed the Commission to establish an NMS. However, those shortcomings do not mean that our equity markets are "rigged" such that they require a wholesale overhaul. Indeed, meaningful changes to improve our equity market structure are required but they are not beyond our reach.