December 11, 2013

Ms. Melissa Jurgens
Secretary
Commodity Futures Trading Commission
Three Lafayette Center
1155 21st Street, N.W.
Washington DC 20581

Re: Concept Release on Risk Controls and System Safeguards for Automated Trading Environments (RIN 3038-AD52)

Dear Ms. Jurgens:

Better Markets Inc.[1] appreciates the opportunity to comment on the above-captioned concept release regarding risk controls and system safeguards for automated trading environments ("Release", "Concept Release"), issued by the Commodity Futures Trading Commission ("CFTC," "Commission").

INTRODUCTION

The shift to a primarily electronic trading world has caused major changes in the way markets operate. While some benefits have undoubtedly resulted, there has also been a disturbing proliferation of major market disruptions as well as systematic exploitation of retail and other investors as a direct consequence of the new electronic age. Exchanges and their most powerful customers have often found their interests aligned against those of the rest of the market, and all too frequently short-term profit has been prioritized over the long-term stability and fairness of the financial markets.

The Commission's decision to issue the Concept Release is an important step towards modernizing regulation to account for these developments. Nevertheless, unless it is followed up with decisive action that protects our markets and investors, it will count for very little.

As the Technology Advisory Committee ("TAC") has demonstrated, drawn out discussions purportedly aimed at defining terms are a black hole that can allow the status quo to persist unchecked, unexplored, and unregulated indefinitely. Also, while industry

[1] Better Markets, Inc. is a nonprofit organization that promotes the public interest in the capital and commodity markets, including in particular the rulemaking process associated with the Dodd-Frank Act.

input and consensus are important, they cannot become barriers to sensible, modest, and long-overdue regulation. Those market participants who benefit enormously from the "wild west" nature of our fragmented and fragile markets must not be allowed to continue to block common sense reforms that will benefit the vast majority of market participants.

The CFTC focus must be shifted towards putting an end to clearly abusive practices that are all too common and growing in the electronic markets[2]. It doesn't take a definition of high frequency trading ("HFT") to know that strategies which count as illegal manipulation when performed over the course of minutes or hours should also not be permitted when they take place within milliseconds. Moreover, practices that are clearly illegal if done by human beings should be equally illegal if done by computers.

In the discussion that follows, we illustrate some of the more damaging HFT practices and elucidate the following points:

- The CFTC must implement corrective measures to reduce the most egregious practices, increase volumes, and restore trust and confidence in the markets;
- Most HFT is not market making;
- HFT has caused innumerable market disruptions: the flash crash was not an isolated incident;
- The academic literature on HFT demonstrates its harmful effects; and
- The CFTC must define HFT from the ground up.

DISCUSSION

As the Release understatedly notes:

> Traditional risk controls and safeguards that relied on human judgment and speeds, and which were appropriate to manual and/or floor-based trading environments, must be reevaluated in light of new market structures.[3]

While this is indisputable, the high-tech age of markets should not be allowed to mislead regulators or blind them to common sense. The same principles that have always applied to the efficient functioning of markets still apply, and always will: fairness, open access, transparency, and protection against fraud, manipulation, and other similar predatory behaviors. These have always been mainstays of healthy markets. The move to an electronic marketplace changes this no more than did the move from bespoke agreements to standardized futures contracts on the CBOT in 1865, or the switch from candles to electric lighting for the trading floor in 1895.[4]

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2 While there are of course algorithmic trading strategies that are not considered manipulative or disruptive of their given markets, for the purposes of this comment letter "high frequency trading" and "HFT" refer to those disruptive high-frequency automated trading strategies as described herein.

3 Fed. Reg. 56542.

4 *See* Timeline of CME Achievements http://www.cmegroup.com/company/history/timeline-of-achievements.html.

There is an overabundance of evidence that various HFT strategies are nothing more than millisecond-speed market manipulation. Better Markets has enumerated some of these strategies in other comment letters to the Commission.[5] The typical structure, however, is described below.

Exploiting a Large Quantity or Block Trade

Suppose a high frequency trader has detected an institutional investor seeking to transact a large position in small increments. The HFT can discover this by pinging the market with small test orders at various price levels, immediately cancelling those orders that are not instantly filled. This technique is akin to using sonar to locate a whale underwater in order to harpoon it. Having established the presence of such a large trader, the HFT can position itself ahead of the trade, taking a small loss at first (to wipe out existing liquidity) before then making a big profit by flipping its position to the institutional investor. It is clear from the Panther Energy Trading case earlier this year that such behavior is common in the futures markets.[6]

For example, suppose an institutional investor uses an algorithm that is set to progressively increase in size if it gets filled, or move to a higher (or lower) price if it does not. Indeed, this is a common design for institutional execution algorithms. Once the HFT detects this, it can jump in before the algorithm returns and bid the price up (or down) by placing orders and clearing the available liquidity before turning around and offering "liquidity" at a new, less attractive price. The institutional investor's algorithm, finding no liquidity at the price point where a moment ago it would have been filled, now moves to the next price point, where the HFT is waiting. The net effect is that the HFT makes a small profit at the institutional investor's expense. Repeated over time, this leads to a large transfer of wealth from investors to HFTs. Paradoxically, HFTs may be rewarded with liquidity rebates for this "service" they provide to the market.[7]

Note that this is a clear analog to traditional concepts of front-running. The HFT is able to determine a large order coming – information that is not available to the rest of the market because it can only be determined by high-speed pinging. The HFT can therefore move the market in anticipation of that position, before trading against it at the new, advantageous price. In the past, front-running was often enabled by insider tip-offs about order flow. The difference here is that the HFT gathers the information by poking and pinging the market to determine the trading intent of the large investor rather than getting a tip from a broker or other market participant. The results are the same, however:

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5 *See* Better Markets Comment Letters "Antidisruptive Practices Authority Contained in the Dodd-Frank Wall Street Reform and Consumer Protection Act" (Jan. 3, 2011), *available at* http://comments.cftc.gov/PublicComments/ViewComment.aspx?id=26928&SearchText=; and "Regulation Systems Compliance and Integrity" (Jul. 8, 2013), *available at* http://www.sec.gov/comments/s7-01-13/s70113-38.pdf.

6 "CFTC Orders Panther Energy Trading LLC and its Principal Michael J. Coscia to Pay $2.8 Million and Bans Them from Trading for One Year, for Spoofing in Numerous Commodity Futures Contracts", CFTC (Jul. 22, 2013), *available at* http://www.cftc.gov/PressRoom/PressReleases/pr6649-13.

7 *See*, e.g. Greonfeldt, T., "High Frequency Traders and Curent market Structures Penalize Investors", Forbes (Jan. 16, 2013), *available at* http://www.forbes.com/sites/tomgroenfeldt/2013/01/16/high-frequency-traders-and-current-market-structures-penalize-investors/.

predatory actions resulting in worse prices for institutional and retail investors, and, ultimately, a consequent loss of faith in the markets.

A popular objection among HFTs is that their behavior is not **in fact** front-running, and is therefore not illegal. Their trading strategies, they claim, are based on publicly available information, and are therefore categorically different from the actions of brokers who trade ahead of their own clients based on privileged information about order flows. Some even go so far as to argue that HFT represents an improvement on the old scalper model of market making precisely because algorithms do not exhibit the law-breaking impulses that human market makers have succumbed to in the past.

However, this objection overlooks the crucial fact that traditional front-running was a concept developed during a period when HFT did not exist and could not even be imagined. If HFTs can in fact garner an unfair informational advantage that enables them to anticipate order flow with an extremely high degree of certainty, it is immaterial whether this "insider information" derives from tip-offs and customer order flow, as in the traditional cases, or from other, more modern means, such as faster data feeds and the ability to use special order types to gather information about other traders' likely behavior. Clamping down on HFT activity that takes advantage of foreknowledge of investor orders is merely an updating of the concept of front-running for a modern marketplace.[8]

Another crucial point to note here is that this type of modern front-running behavior could not be caught by looking at trade data alone. Bids, offers, and – crucially – order cancellations would all be required to reconstruct the manipulative behavior. Moreover, it couldn't be found unless the regulator knew what to look for. Hence, **it is crucial that regulators have access to HFT algorithm source code, rather than facing the impossible task of reconstructing manipulative algorithms from market data alone.**

Finally, it must also be highlighted that this behavior might look like a liquidity provision, when in fact it is a form of liquidity taking. Bid-ask spreads look narrower, because the HFT cleans out the thinner portion of the order book and then positions itself at the head of the newly reduced order queue (in place of the orders it just filled). But for the actual investor, the spread has widened. He receives a lower price for his sell orders and a higher price for his buy orders than would otherwise be the case. Thus, regulators and academics looking solely at observed bid-ask spreads might draw the exact opposite conclusion from what the reality entails.

Predatory HFT strategies of this sort only **appear** to tighten spreads. In reality, they increase transaction costs for investors by methodically moving the market away from

[8] Moreover, given that many of the most active HFTs are likely broker-dealers who do in fact have privileged access to customer order flow, it is not inconceivable that a degree of classic front-running does actually take place via HFT activity. This cannot be known for certain until regulators drill down into the actual details of how these algorithms are designed, implemented, and modified over time. Ironically, many of the studies that attempt to gauge the effects of HFT exclude broker-dealers from the data set, on the grounds that it is too hard to determine which trades are HFT and which are not. Conclusions drawn from a data set missing this essential component must be viewed as unreliable.

them. It is all very well for an institutional investor to feel satisfied that they received the Volume Weighted Average Price ("VWAP"), but if that VWAP is itself based on artificially inflated prices, then the investor has been taken for a ride without realizing it.

The CFTC Must Implement Corrective Measures to Reduce the Most Egregious Practices, Increase Volumes, and Restore Trust and Confidence in the Markets

The Release states "The Commission is interested in better understanding HFT and whether it should receive different regulatory attention than ATSs in general."[9] Given the destructive nature of the strategies outlined above, the answer must certainly be "yes." There are two simple regulatory measures that can be implemented market-wide that would not single out HFTs, but would prevent the most destructive of their practices.

1. **The CFTC must stipulate that all orders placed on registered platforms must be valid for at least one second.** This is a wholly appropriate standard, independent of any abusive HFT practices. For instance, it prevents spoofing and greatly reduces the likelihood of flash crash-style cascades, in which prices can suffer massive swings almost instantaneously before automatic circuit breakers can kick in. At the same time, a one second floor would curtail the ability of HFTs to ping the order book to gain an informational advantage over other traders. It would end the privileged status afforded to HFTs, who are permitted "immediate or cancel" orders unlike other market participants.

2. **The CFTC must stipulate that liquidity rebates are only provided to genuine liquidity providers.** To attract volume, exchanges offer liquidity rebates (around ¼ penny per share in equity markets; CME fees and rebates follow a much more complex schedule).[10] However, this has led to trading strategies solely designed to capture liquidity rebates, pushing up transaction costs for investors in the process. For instance, once an HFT has discovered an institutional order placed in slices via an algorithm, it can insert itself between slices, offering "liquidity" at a price attractive to one side of the market (taking a small loss that is offset by the liquidity rebate), before immediately turning around and offering "liquidity" to the returning algorithm (again, capturing a rebate), all in the space of milliseconds. When succesful, strategies of this sort will cause worse prices for the institutional investor, even though they may reduce observed spreads.[11]

While these two common-sense measures are crucial for limiting harmful market manipulation, there are other possible initiatives that the CFTC ought to consider. For

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9 Fed. Reg. 56545.

10 *See* CME Fee Schedule (Sept. 23, 2013), *available at* http://www.cmegroup.com/company/files/CME_Fee_Schedule.pdf.

11 Currently, it is common for HFTs to receive liquidity provider privileges by meeting such low bars as consistently placing bids and offers within 8 percent of the NBBO. While the charge can legitimately be leveled at traditional market makers that they sometimes abused their privileges, at least they had to earn them and could be prosecuted for breaking the rules. HFTs should only be permitted to receive liquidity provider benefits if they are subject to similar obligations, such as maintaining a two-sided market during distressed periods, and if they are subject to penalties for abusing their privileges.

instance, imposing a small fee for order cancellations by HFTs, or a *de minimis* per-transaction user fee, which would make predatory HFT strategies less profitable while preserving liquidity from real-time traders.

Note that while these initiatives may appear likely to cause volume to decrease in the short-term, over the long-term, the opposite effect is likely to happen. Exchanges, which derive income from volume and compensate others to provide such volume, will no doubt complain and resist, but they will only be losing the artificial "volume" that they have incentivized the HFT firms to create. It is not unlike the subprime housing "volume" banks created because of the fee income they immediately pocketed regardless of the reality or quality of the "loan." That artificial "demand" (or "volume") for such loans (or trades) disappeared once the housing bubble burst and the incentives that created the artificial demand were gone.

That is what could very well happen if abusive HFT practices are allowed to continue unabated until they scare real end users and investors away from the markets. On the other hand, by curtailing reckless HFT practices, the CFTC has the ability to create a fairer market place. This will incentivize institutions to trade, which will in turn attract new liquidity providers, which may not sustain the same exaggerated trade volumes as HFT "market makers," but will nevertheless sustain a more efficient and therefore economical marketplace.

That is why it is imperative to understand that **volume and liquidity are not synonymous**. Sufficient liquidity is essential for healthy markets, but much HFT-created "volume" actually subtracts liquidity, as in the case illustrated above where the predatory behavior of the HFT merely appears to narrow spreads while in fact increasing costs for investors. Indeed, it is reasonable to expect that restoring a level playing field by taking away the unfair advantages enjoyed by HFTs would lead to far more liquidity provisions by traditional market makers who could once again stake their own capital without being exposed to predatory HFT tactics. Put another way, the volume on dark pools, internalizers, and other alternate trading venues created by the constant attempt to find trading venues where genuine traders can avoid being ripped off by HFTs might return to the exchanges if investors' confidence and faith in those exchanges were restored.

Indeed, academic research has established that despite the large "volumes" apparently generated by HFT (some estimates have as many as two-thirds of all equity trades over recent years classed as HFT[12]), it can actually impair liquidity and lead to a Pareto-inefficient dead-weight loss in equity markets – a conclusion that would logically extend to markets under the CFTC's jurisdiction.[13] This is particularly inappropriate as it

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12 *See* Philips, M., "How the Robots Lost: High-Frequency Trading's Rise and Fall", Bloomberg Businessweek (Jun. 6, 2013), *available at* http://www.businessweek.com/articles/2013-06-06/how-the-robots-lost-high-frequency-tradings-rise-and-fall.

13 *See* Wah, E. and Wellman, M., "Latency Arbitrage, Market Fragmentation, and Efficiency: A Two-Market Model", University of Michigan (Jun. 2013) *available at* http://web.eecs.umich.edu/srg/wp-content/uploads/2013/02/ec38-wah.pdf. Of course, on the flip side, a single firm, Knight Capital (which at one point accounted for 17 percent of all NYSE volume[13]) was able to lose almost half a billion dollars in a few hours as a consequence of a single computer program running amuck, uncontrolled and

suggests that not only are predatory HFT strategies like so-called "latency arbitrage" taking money out of the pockets of investors, but they are actually destroying wealth and not merely redistributing it.

That's why Andrew Haldane at the Bank of England refers to it as the "mirage of liquidity."[14] Like a thirsty traveler in the desert who hallucinates a soothing oasis, the investor sees a market that is ostensibly liquid and able to provide fair pricing for the trades he must place. But that liquidity, like the illusory oasis, is merely a trick – in this case generated by the HFT's constantly shifting orders rather than the traveler's imagination. The CFTC must not be fooled by the false appearance of price-shifting volume masquerading as genuine transactable liquidity.

Most HFT is Not Market Making

Based on very limited information, it has been estimated that the HFT industry has recorded profits of around $5 billion in a single year.[15] Such significant profits would seem in stark contrast to conventional market making, which is a low risk, low reward service industry. Although it would be naïve to imagine that traditional market makers never engaged in manipulative or otherwise illegal conduct, market making was nevertheless historically a mundane activity.

Market makers made profit by capturing bid-ask spreads, and would risk their own capital to support the market when two-way liquidity waned. In contrast, modern HFT practices – even those (mis)labeled as "market making" – make profit beyond spreads, and flee the market during times of major dislocation. This is the precise opposite of conventional market making; rather than providing a service to the market during good times and bad, these modern HFT practices are parasitic upon it during good times and absent or even implicated during bad. As Andrew Haldane observed, HFT "add[s] liquidity during a monsoon and absorb[s] it during a drought."[16]

Clearly then, HFT is no ordinary market-making operation. It is a high stakes, dangerous game which in the best case scenario merely drains wealth slowly from the stock market fractions of pennies at a time, and in the worst case threatens to crash the entire market, making the "flash crash" look mild by comparison.

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uncontrollable; *see* Strasburg, J. and Bunge, J., "Loss Swamps Trading Firm", The Wall Street Journal (Aug. 2, 2012), *available at* http://online.wsj.com/news/articles/SB10000872396390443866404577564772083961412.

14 *See* Haldane, A., "Financial Arms Races", Bank of England (Apr. 14, 2012), *available at* http://www.bankofengland.co.uk/publications/Documents/speeches/2012/speech565.pdf.

15 *Id.*

16 *See* Haldane, A., "The race to zero", Bank of England, (Jul. 8, 2011), *available at* http://www.bankofengland.co.uk/publications/Pages/news/2011/068.aspx.

HFT Has Caused Innumerable Market Disruptions: The Flash Crash Was Not an Isolated Incident

Every trading day, the market is on a knife edge with market participants wondering if this is the day a computer takes the entire market down. That's what HFT's extensive track record of causing severe market disruptions really signals:

- The Flash Crash in May 2010 was set off by a single large trade estimated at $4.1 billion in the S&P 500 E-Mini Futures Market. The cascade led to 20 minutes of extreme volatility, wiping out nearly $1 trillion of market cap before quickly and inexplicably recovering. The total economic cost of this event is unmeasured, but certainly huge.

    - Importantly, this didn't happen near the market close - had the U.S. market closed before it recovered, the result could have been total economic disaster as money could have hemorrhaged out of the stock markets overnight, as preset computer algorithms mechanistically executed orders cascading around the globe.

- In August 2011, the stock market swung up and down by over 4.4 percent on four consecutive days, alternating up and down days. It was wild, unprecedented volatility, matched only by the tumultuous crash of 2008 and the great crash of 1929 that ushered in the Great Depression. While the European crisis was becoming a more important issue at the time, it is notable that this volatility was not caused by major economic changes or historic macroeconomic events. This was computer-driven volatility.

- "Mini flash crashes" occur on a near-daily basis in individual stocks. Nanex has documented almost 2,000 instances of individual irregularities in stocks since August 2011.[17] Single-stock circuit breakers have failed to stem the tide of these incidents.

- IPOs, such as Facebook and BATS (itself an Exchange), have gone horribly wrong due to technological malfunctions, which have exacerbated the drag on the already languid market for IPOs and costing untold numbers of jobs as companies cannot raise the capital they need to expand and hire.

- Few realize how lucky we were on Tuesday, July 30, 2012. An order to sell nearly $4.1 billion in the S&P 500 E-Mini Futures Market, the same size as what precipitated the Flash Crash, was executed three seconds before the market closed.[18] There simply was not enough time for the waterfall of May 6, 2010 to repeat itself. What happens the next time when that same order is sent in a couple of minutes sooner?

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17 *See* http://www.nanex.net/aqck/aqckIndex.html.

18 *See* http://www.nanex.net/aqck2/3521.html. *See also* Durden, T., "Visualizing Today's Déjà vu Last Second 60,000 E-Mini contract Wipe Out", Zero Hedge (Jul. 31, 2012), *available at* http://www.zerohedge.com/news/visualizing-todays-last-second-60000-e-mini-contract-wipe-out.

- On Wednesday, July 31, 2012, Knight Capital Group – one of the largest market making firms, and one of only four official Designated Market Makers on the NYSE – had a software program run uncontrollably according to their CEO.[19] The result? A loss for them estimated at $440 million, untold economic losses for retail investors with stop-loss orders in one of the almost 140 stocks that were affected, and further erosion in investor confidence.

- In April of this year, high speed algorithmic trading was implicated in the 145-point market sell-off triggered by a fake post on the Associated Press Twitter feed.[20]

- In May 2013, the *Wall Street Journal* revealed that HFTs were essentially front-running other customers on the CME and thereby distorting prices. The article also cited a study by the Tabb Group which found HFT now comprises "about 61 percent of all futures market volume, up from 47 percent in 2008."[21]

This demonstrates beyond all doubt that HFT has the capacity and tendency to cause severe market dislocations. Even if HFT were providing a useful service to the markets most of the time which, as was shown above, it is not, these catastrophic HFT-induced events would be sufficient to outweigh any benefits. As it stands, HFT does not even provide sustained benefits during normal conditions. Yet it causes huge costs and damages when things go wrong.

The Academic Literature on HFT Demonstrates its Harmful Effects

The CFTC's own former Chief Economist, Andrei Kirilenko, has examined the breakdown of HFT trades and profits, in conjunction with economists from Princeton and University of Washington. They concluded that the most profitable HFT firms are liquidity takers, and that only a small minority of HFT firms are genuine liquidity providers in the traditional market making sense.[22]

Mr. Kirilenko also published a report on the Flash Crash in collaboration with other regulators and academics while he was at the CFTC in 2011.[23] That report concluded that,

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19 *See* Strasburg, J. and Bunge, J., "Loss Swamps Trading Firm", The Wall Street Journal (Aug. 2, 2012), *available at* http://online.wsj.com/news/articles/SB10000872396390443866404577564772083961412.

20 *See* Bunge, J., "High-Speed Traders Pulled Back, Not Out, After Fake Tweet", The Wall Street Journal (Apr. 24, 2013), *available at* http://online.wsj.com/news/articles/SB10001424127887324474004578443132709463640.

21 *See* Patterson, S., Strasburg, J., and Pleven, L., "High-Speed Traders Exploit Loophole", The Wall Street Journal (May 1, 2013), *available at* http://online.wsj.com/news/articles/SB10001424127887323798104578455032466082920.

22 *See* Baron, M., Brogaard, J., and Kirilenko, A., "The Trading Profits of High Frequency Traders", (Nov. 2012), *available at* http://faculty.chicagobooth.edu/john.cochrane/teaching/35150_advanced_investments/Baron_Brogaard_Kirilenko.pdf.

23 *See* Kirilenko, A. et al., "The Flash Crash: The Impact of High Frequency Trading on an Electronic Market", (May 26, 2011), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1686004.

while HFT did not trigger the flash crash, it did exacerbate the problems and lead to higher volatility.

The joint report by the SEC and CFTC into the causes of the flash crash remains one of the most thorough investigations into HFT practices, and is a testament to both the harmful effects of HFT when it is not properly regulated, and the need for inter-agency cooperation during the investigation of such complex, data-intensive, and cross-market trading disasters.[24]

Other academic research backs this up:

- Researchers at Wharton, NBER, and the Swiss Finance Institute have found that HFT on ETFs can propagate liquidity shocks across different markets and "increase non-fundamental volatility."[25]

- A Bank of England working paper has found that HFTs contribute more noise to prices than non-HFTs.[26]

- The Bank for International Settlements has found that while HFT in the FX market may have had a beneficial impact on **observed** spreads (as opposed to executable spreads), it may have "reduced the resiliency of the market during times of stress."[27]

- Researchers at Emory University and Florida International University have demonstrated that "controlling for other factors, there is a reliable and economically substantial positive relation between volume of trading and stock volatility. The conclusion is that [high frequency] stock trading produces its own volatility above and beyond that based on fundamentals."[28]

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[24] *See* "Preliminary Findings Regarding the Market Events of May 6, 2010", CFTC and SEC (May 18, 2010), *available at* http://www.cftc.gov/ucm/groups/public/@otherif/documents/ifdocs/opa-jointreport-sec-051810.pdf. Given that many HFT strategies involve latency arbitrage between equity basket futures and their component equities, they are able to cross-cut jurisdictions. It is of paramount importance that the agencies work together to avoid the scenario in which traders are able to get away with abusive and disruptive trading practices simply because there is uncertainty as to who is actually supposed to be regulating their actions. This could be solved in part by mandatory registration of all HFTs active in CFTC-regulated markets *as HFTs*, and ensuring they are all subject to special oversight tailored to their HFT status.

[25] *See* Ben-David, I., Franzoni, F., and Moussawi, R., "ETFs, Arbitrage, and Shock Propagation", (Sept. 10, 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1967599.

[26] *See* Benos, E. and Sagade, S., "High-Frequency Trading Behaviour and Its Impact on Market Quality: Evidence from the UK Equity Market", (Oct. 11, 2013), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2184302.

[27] *See* "High-frequency trading in the foreign exchange market", Bank for International Settlements (Sept. 2011), *available at* http://www.bis.org/publ/mktc05.pdf.

[28] *See* Dichev, I., Huang, K., and Zhou D., "The Dark Side of Trading", (Jan. 4, 2011), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1754215.

- UNCTAD has attributed increased correlations between commodity futures and equity prices at one-second intervals to the rise of HFT "arbitrage" strategies between these two markets, suggesting that HFT may push prices away from fundamental value.[29]

- Researchers at Louisiana Tech University and University of Mississippi have 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."[30] Moreover, they also find that "during periods of intense quoting activity stocks experience decreased liquidity, higher trading costs, and increased short term volatility."[31]

- A study from Universidad Carlos II de Madrid describes the interaction of high-frequency and algorithmic trading in the marketplace.[32] The study observes that high frequency trading intermediates between market makers and liquidity traders. It increases the price paid by liquidity traders when they buy and decreases the price received when they sell.

- ESMA, the European Securities Market Authority, has found that during times of volatility, HFTs "increase their demand for liquidity while reducing their supply of liquidity."[33]

On the other hand, various academics have argued that HFT provides liquidity by narrowing bid-ask spreads.[34] However, the methodology behind these studies is universally flawed. Leaving aside the fact that many of the pro-HFT studies are industry funded, their primary failing lies in the fact that they are unable to distinguish between observed spreads and executable spreads, as discussed earlier. The true effect of HFT must be measured in terms of transaction costs not observed spreads, and a 2011 Oxera study found that per value transaction costs have actually increased by 14 percent in recent years even while headline transaction costs have dropped by as much as 60 percent.[35]

Similarly, Andrew Haldane has observed that while bid-ask spreads have dropped

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29 *See* Bicchetti, D. and Maystre, N., "The synchronized and long-lasting structural change on commodity markets: evidence from high frequency data" (Mar. 20, 2012), *available at* http://mpra.ub.uni-muenchen.de/37486/1/MPRA_paper_37486.pdf.

30 *See* Eggington, J., Van Ness, B., and Van Ness, R., "Quote Stuffing" (Jun. 1, 2013), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1958281.

31 *Id.*

32 Cartea, A. and Penalva, J., ""Where is the Value in High Frequency Trading," Universidad Carlos II de Madrid, November 2, 2010).

33 "Securities and Markets Stakeholder Group", ESMA (Oct. 26, 2011), *available at* http://www.esma.europa.eu/system/files/2011_SMSG_12.pdf.

34 For a pro-HFT survey, *see* Jones, C., "What Do We Know About High-Frequency Trading?" (Mar. 20, 2013) *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2236201.

35 *See* "Monitoring prices, costs and volumes of trading and post-trading services", Oxera (May 2011), *available at* http://ec.europa.eu/internal_market/financial-markets/docs/clearing/2011_oxera_study_en.pdf.

by an order of magnitude over the past decade, this has been offset by higher volatility, especially in markets with high levels of HFT, and particularly over short time periods where prices are largely determined by HFT.[36] In other words, as Finance Watch has observed, "While automation of trading (or anything else) obviously brings costs down, strategies designed primarily to take advantage of technological or speed advantages actually push costs up for the entire trading community."[37] Furthermore, Haldane adds that "HFT liquidity, evident in sharply lower peacetime bid-ask spreads, may be illusory. In wartime, it disappears."[38]

The lesson is clear: in normal market conditions, HFT only **appears** to provide liquidity.[39] However, through predatory practices they cause prices to move away from investors, increasing their overall costs. In times of market dislocation, HFTs can turn a blip into a catastrophe by precipitously withdrawing liquidity from the market.

The CFTC Must Define HFT from the Ground Up

The CFTC's Technology Advisory Committee working group on HFT came up with a working definition. According to the TAC, HFT displays the following characteristics:

(a) Algorithms for decision making, order initiation, generation, routing, or execution, for each individual transaction without human direction;
(b) low-latency technology that is designed to minimize response times, including proximity and co-location services;
(c) high speed connections to markets for order entry; and
(d) recurring high message rates (orders, quotes or cancellations) determined using one or more objective forms of measurement, including (i) cancel-to-fill ratios; (ii) participant-to-market message ratios; or (iii) participant-to-market trade volume ratios.[40]

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36 *See* "The race to zero", Bank of England (Jul. 8, 2011), *available at* http://www.bankofengland.co.uk/publications/Documents/speeches/2011/speech509.pdf.

37 *See* Statement by Finance Watch at Public Hearing on the High-Frequency Trading Act (Jan. 11, 2013), *available at* http://www.bundestag.de/bundestag/ausschuesse17/a07/anhoerungen/2013/123/Stellungnahmen/11-Finance_Watch__Benoit_Lallemand.pdf.

38 *Id.*

39 Though, as Kirilenko et al. have shown, a small minority of such traders seem to consistently provide genuine liquidity. *See* Kirilenko, A. et al, "The Flash Crash: The Impact of High Frequency Trading on an Electronic Market" (May 26, 2011), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1686004.

40 TAC Subcommittee on Automated and High Frequency Trading, Working Group 1, Presentation to the TAC (Oct. 30, 2012), *available at* http://www.cftc.gov/ucm/groups/public/@newsroom/documents/file/tac103012wg1.pdf.

Other than the last prong, however, this does not do nearly enough to differentiate HFT from other, more benign forms of algorithmic and electronic trading. Instead, the CFTC should begin by looking at the firms widely recognized as HFTs by market participants and seek to characterize their behavior. When defining HFT in this way, from the ground up, several characteristics become apparent.

> High frequency trading is characterized by **automated trading,** involving **high order/quote rates**, with **high turnover** and **little or no inventory at the end of each trading day**.

This is supported by various academic sources and market participants:

- "High frequency traders submit and cancel a massive number of orders and execute a large number of trades, trade in and out of positions very quickly, and finish each trading day without a significant open position."[41]

- "Indeed, the typical high frequency market maker turns over his or her inventory 5 or more times a day, explaining how high frequency firms have come to have such a high share of trading volume. These market makers also seek to hold very small or even zero inventory positions at the end of the session." [42]

Crucially, then, the TAC definition must at the very least be amended to include a turnover component and end-of-day inventory component. This would dramatically improve the definition. But developing a definition of HFT, no matter how accurate, is pointless unless it is used for something. And in this instance, the very least the CFTC must do is require mandatory registration and data reporting by HFTs along the lines of the Large Trader Reporting System.

Whether or not the Commission agrees with the exact definition above, failing to adequately monitor HFT would contradict its expressed goals and commitments. For this reason, all HFTs – under some workable definition – ought to be required to register and seek authorization from the CFTC. This registration requirement should be applied to all HFT "market makers" as well as other highly active HFTs to ensure that the most significant high frequency traders are registered, authorized, and monitored. This would not be particularly burdensome for the firms in question. Even the lowliest HFT requires sophisticated technology to operate. These are not small "mom and pop" operations without the institutional capacity to register and submit comprehensive records to regulators. Therefore, the Commission should require them to do so in the name of transparency and orderly markets.

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41 *See* Cvitanic, J. and Kirilenko, A., "High Frequency Traders and Asset Prices", (Mar. 11, 2010), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1569067.

42 *See* Easley, D., Lopez de Prado, M., and O'Hara, M., "The Microstructure of the 'Flash Crash'" (Oct. 22, 2010), *available at* http://www.learningace.com/doc/6502814/870a2fa1586094b2c074cdd04a40ca2b/the-microstructure-of-the-flash-crash_jpm-version.

Moreover, beyond the basic requirement for authorization, high frequency traders as well as other algorithmic and automated traders ought to be required to submit both technical and non-technical descriptions of their algorithms to the CFTC. These should be updated frequently and monitored for potentially disruptive features. By proceeding in this way, the CFTC would not face the Sisyphean task of deciphering algorithms from a standing start after a disaster has happened. Instead, the firms themselves would be required to translate the algorithms into plain language, on the understanding they would face severe penalties for misrepresenting the design and operation of the algorithms.

In that way and at that point, the CFTC can make informed, data-driven decisions about appropriate regulation without having to rely on self-interested markets participants talking their book or without an adequate data set. Our markets and investors deserve no less. And, they deserve it before the next computer driven market calamity.

CONCLUSION

We hope these comments are helpful.

Sincerely,

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