



May 14, 2018

Mr. Brent J. Fields, Secretary  
**Securities and Exchange Commission**  
Email: [rule-comments@sec.gov](mailto:rule-comments@sec.gov)

Subject: **File Number S7-05-18**

Dear Mr. Fields:

On behalf of Data Boiler Technologies, I am pleased to provide the SEC with comments regarding the Transaction Fee Pilot for NMS Stocks.<sup>1</sup> As an experienced industry practitioner, and the entrepreneurial inventor of a suite of patent pending solutions for capital markets, I have no objection to the Commission running a pilot program to collect more data for fact-based analysis. Yet, our study concludes that splitting up listing/trading business from data and technology business is a better option. Please find the explanations below.

First of all, I am perplexed that market fragmentation and proliferation of complex order-type issues are not included as part of the SEC’s proposed pilot’s design. As said by the Honorable SEC Commissioner Hester Peirce during SIMFA’s market structure conference, “... fee pilot ... is a case in point ... however, it leaves unasked more challenging questions ... like the following: Is there any reason for the Commission to have any role in determining the fees exchanges can charge their members other than to counter incentives created by our own market structure rules? Do the key provisions of Regulation NMS distort the incentives of exchanges and broker-dealers in routing and executing transactions? In a world where communications technology continues to enhance the flow of information and reduce the costs of transparency, is there any justification for the Commission’s command-and-control approach to regulating how orders interact and how investors communicate in the equity markets?”<sup>2</sup>

That being said, transaction fees are merely one of the symptoms of market inefficiency and ineffectiveness. Instead of treating symptoms that may cause other unintended consequences, I advocate for a more holistic approach to discern 21<sup>st</sup> century problems and effectively pin pointing key market structure issues. The following table describes key market observations and our interpretations:

#	Market Observations	Our Interpretation
1	NMS plan intensified competition among trading venues. Exchanges’ profitability being challenged by ATS. In seeking other revenue sources, they may underinvest in SIP <sup>3</sup> technology to benefit from selling data feeds. In turn, market data costs increase <sup>4</sup> for all market participants.	Market data price increase serves no wealth creation or capital formation purpose for the overall economy. It’s a <b>rent-seeking behavior</b> <sup>5</sup> of the exchanges, and an added cost to market participants. Information that would otherwise be available to all in synchronized time is turned into proprietary data subscriptions, which <b>create inequity</b> .
2	In racing to gain the edge over each other, SROs offer different rebates (e.g. enhanced market-making discount), introduce speed bump (e.g. liquidity enhancing access delayed), proliferate order-types (e.g. midpoint extend life order), come up with new business models (e.g. market-on-close) and create other privileges (e.g. exclusive access to certain pegging orders). <sup>6</sup>	In maximizing trade flows for their own venues, SROs are stepping over each other, similar to radio <b>spectrum interference</b> <sup>7</sup> (the public suffers when rights are not clearly delineated). SROs’ rivalry and rent-seeking behaviors may <b>inadvertently compromise the public’s interests</b> (from perspectives of both price and difficulties in navigating the markets). Since SROs are quasi-regulatory authorities, their competing interests won’t be easily resolved through commercial deals or mergers and acquisitions.



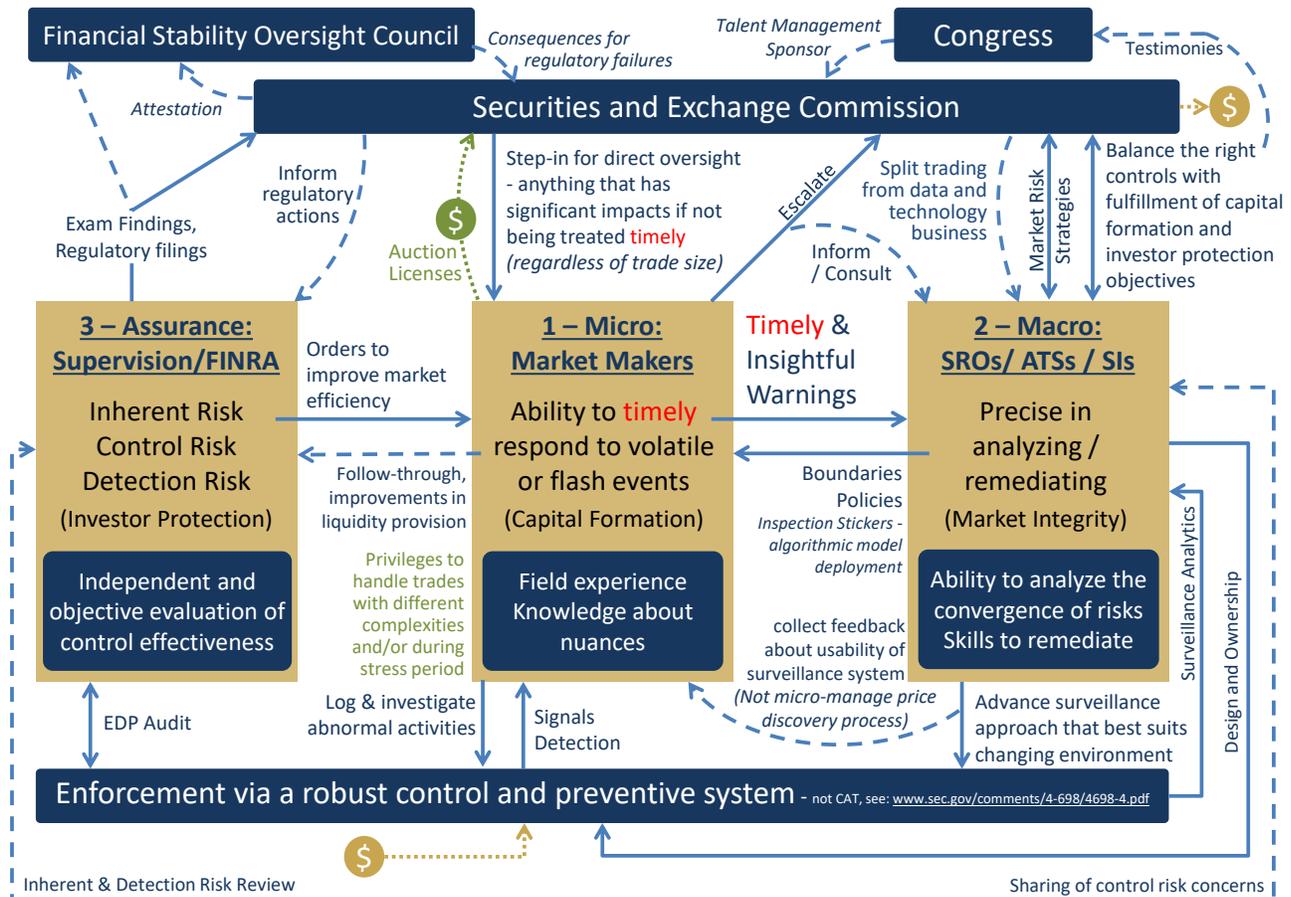
#	Market Observations	Our Interpretation
3	Because markets are so convoluted, corresponding technologies are invented. But everything has a cost to it – subscribing to proprietary data feeds, connecting to more trading venues, demonstrating best execution compliance, use of transaction cost analyzers, etc. <sup>8</sup> These combine to create barriers for certain players. Thankfully, there’s growing favor towards indexing/ passive investing. <sup>9</sup>	Some of these costs become almost a necessity for firms wanting to remain competitive. They are added transaction costs or economic <b>resources wastage</b> . Sad to see valuable resources wasted in further market-convoluting initiatives and counter measures. Such a vicious cycle may be considered as <b>rent-dissipation</b> <sup>10</sup> resulting in lose-lose situation. Indexing/ passive investing helps overcome cost barriers, but VIX itself is volatile <sup>11</sup> and not all ETPs are created equal. <sup>12</sup>
4	Equity markets are fragmented <sup>13</sup> while equity option market-making has vanished since the retreat of Interactive Brokers. Critics said exchange rules put dealers at a disadvantage against predatory investors with faster computers. <sup>14</sup> The traditional hub-and-spoke model is no match to co-location technology and HFTs' algorithms. <sup>15</sup> NBBO aims to ease worries about aggregating quotes from multiple exchange or market-makers before investors place a trade. Yet, “best-execution” has been difficult to implement.	HFT as a technology in itself is neutral. If it is predatory or not depends on specific characteristics of order flow, per FCA’s empirical study. <sup>16</sup> Capital markets are <b>brutal in eliminating the unfit</b> . The rise of HFTs indeed reflects the successful aspect of NMS to efficiently foster innovations through competition. The not as successful aspect of NMS is the insufficient coverage of how HFT interacts with the allocative function of price discovery. <sup>17</sup> Yet, NMS is most unsuccessful because of NBBO and CAT. <b>Rights aren’t appropriately delineated</b> as NBBO favors price-time priority and CAT does not curb market-timing and financial engineering abuses.
5	Multiple banks’ trade order routing practices are criticized for alleged conflict of interest. <sup>18</sup> Amid banks’ lobbying efforts to advocate for Volcker Rule market-making exemptions, their latest arguments are mostly just excuses. <sup>19</sup> The truth of the matter is that, non-HFT market-makers cannot generate sufficient profits without proprietary trading. <sup>20</sup>	Flipping the switch between “counterparties” and “clients” may be used to escape fiduciary responsibilities for clients or to bypass Volcker controls. <b>Agency problem</b> does exist as research has shown “market-makers are willing to reduce or eliminate the execution advantage to exploit or abuse the information advantage”. <sup>21</sup> Tolerance nourishes more bad behaviors and will tarnish market’s trustworthiness.
6	Many have market-making license, but nobody wants to be labeled as G-SIB or SIFI because of capital rules and the compliance burden. Some use the license for the convenience of Volcker compliance. Others feel that it’ll be less of a disadvantage to achieve trade fairness against HFTs. Amid accusations of HFT liquidity goes phantom <sup>22</sup> , FCA suggests “investment banks, not HFTs, fuel flash crashes”. <sup>23</sup> Lastly, it’s uncertain who will supply liquidity in times of stress or during the next crisis.	<b>Everybody owns, nobody owns</b> – market-making no longer perceived as a privilege. SIFI/ G-SIB designation should tie with certain <b>privileges and obligations</b> , so designated firms may be allowed to participate in more complex financial activities and earn a reasonable return from these businesses. In turn, they’ll have the obligation to up their games in advancing risk controls and will be subjected to closer regulatory scrutiny. <sup>24</sup> Further, I proposed a concept called ‘Stress RENT-D’ to address the dilemma of market-making banks only being willing to provide liquidity in good times, but not in bad times (see my comments to the Office of the Comptroller of Currency). <sup>25</sup>

The above analysis can further boil down to these conditional decision-making statements:

- i. Technology does not necessarily enhance the flow of information. It can also be used for obfuscation or delay. Indeed, it depends on how technology is employed by people who can obstruct development, create inequality through restricted access to information, and pursue rent-seeking behaviors.



- ii. Policy makers should refrain from a command-and-control approach to regulating how orders interact, but should have a better dispute resolution process that prioritizes the public’s interest. So, trade venues can better achieve equilibrium among themselves without causing unnecessary harm or hardship to the public.
- iii. The argument here is not only the added quantifiable costs, but also the economic resources wastage or opportunities lost due to the perils of bootstrapping data, information disadvantage, and non-price competition such as alleged abuses. Indexing/ passive investing is like the ‘Bed of Procrustes’ – a false comfort.
- iv. Thomas Petterffy’s handheld computers revolutionized the market in 1983; now, we must embrace the era of HFTs. CAT’s initial design does not fully anticipate today’s challenges. So, CAT needs improvements per our 2016 submitted comments.<sup>26</sup> Also, one should anticipate what’s next (e.g. quantum computing).
- v. Exploiters will find alternate ways to seek unfair advantages when the access fee cap may be recalibrated.<sup>27</sup> It’s all about minimizing information exploitation, and curbing market-timing abuses and agency problems. Avoidance of 21st century problems nourishes more bad behaviors that deter investor rights.
- vi. Privileges and obligations need appropriate alignment. Rights are better delineated through competitive bidding of licenses. Checks and balances will support the sustainable development of capital markets. See below diagram for our proposal to strengthen the equity market structure.



The balance of power and relationship between (1) market-makers, (2) SROs/ ATs/ SIs, and (3) the supervisory authorities should be like the Executive, Legislative, and Judicial branches of the government. The objective of realigning the privileges and obligations of these three groups are to enable each to excel at what they do best and



encourage collaboration. *Note: SROs, ATSSs, and SIs are all in group 2 with market integrity responsibilities. Although only exchanges are currently required to engage in market surveillance (ATSSs do not, and broker-dealers may offer to internalize an order or not at their discretion), ATSSs and SIs are core components of the 21<sup>st</sup> century capital market infrastructure. They can't be viewed in silos, and none can be excluded, when considering market integrity matters. See the 'Market Integrity' section for an elaborated discussion about their roles.*

## A. Capital Formation

Market-makers are professionals in the field. They should be respected for their nimbleness and given the necessary privileges in the price discovery process. Although SROs have sophisticated analytical powers, HFTs market-makers are better equipped to deal with certain flash events with immediacy. A good decision, made now and pursued aggressively, is substantially superior to a perfect decision made too late.

That being said, dominant market-makers should become G-SIBs/ SIFIs with certain privileges and obligations. It would be a tiered approach where designated firms will be allowed to handle more complex financial activities (such as derivatives market-making) and earn a reasonable return. They would utilize their firsthand knowledge about market nuances and possible glitches to provide liquidity in both good and bad time. Besides, they'll have the obligation to up their games in advancing risk controls. This includes firms willing to subject themselves to closer regulatory scrutiny (via non-intrusive automated mean).

Yet, market-makers' privileges aren't without boundaries. Policies should be set by group 2 to curb "misaligned incentives" of market-makers. Other responsibilities of market-makers include managing a queue of warning signals prompted by a robust surveillance system (not CAT) in real-time. So, whenever conditions set by group 2 are triggered (e.g. flash crash, potential manipulation, or other abnormal market activities), market-makers will promptly inform, consult, and escalate to the SEC and/or group 2 as appropriate.

All logged issues by market-makers and related audit trails will be retained for subsequent review by group 3, while the escalation process would allow immediacy of response by regulators during certain urgent situations. Expedited timing for suitable regulatory actions will help prevent a taxpayer bailout situation. Please see our submitted comments to the Office of the Comptroller of the Currency regarding a concept we called "Stress RENT-D" to address the dilemma of market-makers unwilling to provide liquidity during times of stress.<sup>25</sup>

By having all privileges and responsibilities clearly spelled out with implementable procedures, market-makers can engage in competitive bidding for licenses that fit their business models and specialties. Limiting numbers of licenses and having market-making licenses by tiers of trade complexity help prevent the 'everybody owns, no body owns' issue, and will ensure reasonable profits for designated market-makers.

## B. Market Integrity (Part I)

There are claims that trading venues are becoming increasingly functionally similar. Some academics suggest that, "trading platforms offering similar services using similar technologies and matching procedures shouldn't be fit into different regulatory boxes (i.e. SRO Exchanges, ATSSs, SIs)".<sup>28</sup> Others suggest curing stock-market fragmentation by "creating multiple trading venues and then limiting trading in a particular security to one of them".<sup>22</sup> I disagree with both approaches because it is not the diversity of venues that needs to be treated, but market integrity issues, amid increasing numbers of alleged information leaks and order routing abuse cases (Credit Suisse's Crossfinder, Barclays' LX, Deutsche's SuperX+).<sup>29 30</sup>



To curb conflicts of interest between broker-dealers and their customers, that may distort best execution practices, please allow me to use a 'cake sharing' analogy to explain an effective method. If there are only two parties to share a cake, the fairest way is for one person cut it and the other person to choose. If there are three or 'N' numbers of people, then the 'last diminisher method' will be used.<sup>31</sup> The first person will likely cut an outsized piece for himself/herself. Other participants have the right to trim that slice into smaller size, until no one else wants to trim that piece smaller. The last person to cut gets the piece. In short, the exercise calls for individuals to own up to their actions.

That being said, the proliferation of approaches by SROs Exchanges, ATSS, and SIs to redirect order flow (both legitimately and via alleged exploitations) is indeed a fairness issue over market division. There may not be good or bad guys in group 1 or group 2, but people jockey around trying to make money. Among them there could be formal or informal alliances, as well as possible collusion. So, whenever access fees may be recalibrated, there will be complaints about rules being skewed in favor of particular entities, as well as new way(s) to exploit or circumvent the rule.<sup>38</sup> Referencing back to point ii, now is the time to offer these trading platforms the opportunity to shape the markets and own up to the consequences of what they design.

My idea here is to **split up listing/trading business from data and technology business** for group 2. The root cause of today's market structure problems is the unclear delineation of rights, which blur the line between these businesses. If they can become separate businesses under license to operate, then interested parties can enter into competitive bids to own (mutually exclusive) pieces that they see fit with their values. Note: one doesn't have to own a particular piece of technology in order to operate a trading venue, because usage rights can be assigned at an agreeable price. Besides, conditions should be set when renewing different tiers of licenses for SROs, ATSS, and SIs, to ensure retail investors won't receive inferior prices to those available to institutions trading in the automated systems. In particular, adverse selection<sup>32</sup> and its implications for thinly traded securities should be reviewed. Although the market fragmentation trend is likely to continue<sup>33</sup>, there will be positive choices to allow orders in the public markets to interact with those in the proprietary systems.

By spinning off the data and technologies business, exchanges can focus on soliciting more listing business. In turn, it will boost capital formation for the economy. Also, venues would have plenty of opportunities to improve productivity from specialization and economy of scale perspectives. Any counter-productive order-types will subside or efficient methods will be developed to handle such order-type economically. It doesn't matter if trade platforms continue to use rebates to attract order flow, because competing on short-term incentives won't last (resources constraints due to no more subsidized revenues from selling data and technology). Innovative approach, such as Imperative Execution's time gap approach to deter possible gaming of signals<sup>34</sup> and OneChronos' artificial intelligence match basket<sup>35</sup>, will continue to evolve to ensure healthy competition of trade platforms.

Should there be overlapped sub-market segments that multiple trade platforms are competing for, they will be disinclined to engage in dissipating acts or interference that benefits no one. They will seek mutually benefiting opportunities via commercially agreeable terms to resolve their disputes (speed bump, auction process, or any special privilege). These deal terms will be transparent to the public, so it will be less likely that they will collude and harm the general investors. They will have the discretion to pursue mergers and acquisitions when cooperative agreements cannot be made. As a result, investors will no longer suffer from undue burdens caused by market-convoluting initiatives or countermeasures. Choices for trade platforms will be preserved while resources wastage will be eliminated.



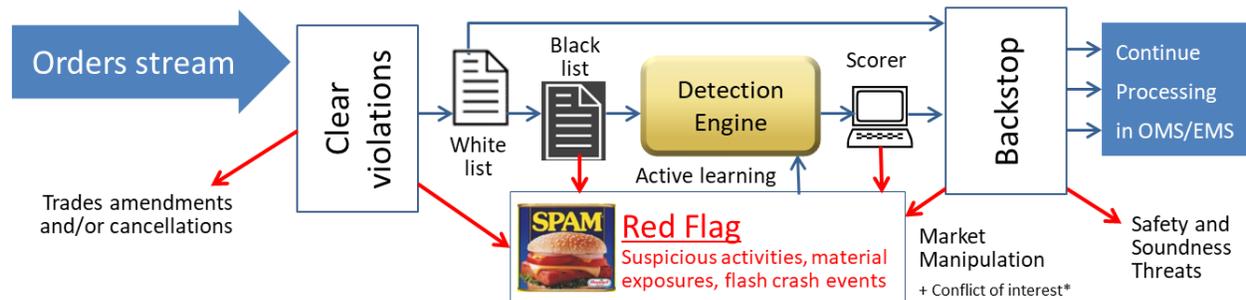
**C. Market Integrity (Part II)**

Regulators should not dictate what techniques (e.g. artificial intelligence, blockchain) the technology community can or cannot use (except to prohibit quantum computing from sending trade messages without audit trails). In reference to #4 and point v above, speed or technology in itself is not a concern, but abusive usage is. Therefore, to foster disciplined behaviors, the spun-off technology business should be given the responsibilities to design trade matching algorithms that best fit the changing environment – i.e. minimize information exploitation, curb agency problems, and prevent market timing abuses.

Some in group 2 would act like ‘vehicle inspection stations’, checking to see circuit breakers and other essential controls are available and effective in automated trading algorithms. They will make sure interactions between complex models and trading systems are appropriate before allowing their deployment. If an odd alteration of the ‘speedometer’ is detected<sup>36</sup>, they will refer to supervisory authorities in group 3 for further investigation. However, group 2 would not open up the ‘vehicle’s engine’, so the confidentiality of trade strategies would be preserved.

The separation of trading platforms from running data and technology businesses removes much of the conflict, while a little controversy might still remain in group 2 – i.e. who owns the data, should and how they will be compensated when aggregators sell market data. This is a universal problem across all industries, not just in finance.<sup>37</sup> I’ll recommend further research.

As to the privileges and obligations of this technology group, we are designers who advance the approaches to prevent market manipulations and abuses. We will be glad to build the next generation’s national surveillance system. In particular, we advocate for the use of stream analytics to conduct market surveillance in real-time. This is better than CAT because suspicious activities are red-flagged for timely review and actions. This diagram offers a quick recap of our related suggestions, submitted to the SEC in 2016.<sup>26</sup>



Policy makers should foster an environment where technologists are willing to compete, invest, and innovate. Not only are innovations essential to address modern day financial industry problems, but there is also a need for appropriate economic incentives (such as open contracts to operate the national surveillance system for a defined number of years) to reward inventors who come up with better risk controls and market monitoring mechanisms. Those who are reluctant to improve their surveillance methods would be excluded from vendor lists.

Compliance with cybersecurity standards (and the national infrastructure protection plan, as applicable) would be the obvious requirement for this group. Additional responsibilities include: periodic analysis of risk convergence in the market, identifying forces that may destabilize the markets, and communicating regularly with the SEC and Congress about macro-economic and other systemic issues. They will engage in research about market risks and debate appropriate market structure to balance the right controls with fulfillment of capital formation and investor protection objectives. They may be called upon as advisors to remediate certain market events.



#### D. Investor Protection

The SEC exam team and the Financial Industry Regulatory Authority (FINRA) are responsible for overseeing violations of securities rules, while the overarching supervisory authorities (group 3) provide assurance for market efficiency and investor protection. Yet, group 3 has a natural limitation called residual risk. It is the risk that they may fail to detect market failure despite stress testing. Besides, the current stress test process is highly subjective, including such concerns as the possible misgauging of magnitude despite accurately predicting the risks. There could also be inexplicable events, even with things being reviewed after-the-fact. So, instead of lamenting after the fact, the best way forward is to help equip group 3 with better tools to do their job.

Problems that attribute to market failure boil down to these two:

- **Lack of timely and insightful warning (flash crash in particular);**
- **Inability to respond in a timely fashion to such warning (liquidity crunch).**

We don't necessarily need to retain complete audit trails (due to a centralized vault attracting cyberattacks); a robust stream analytic system would enable group 3 to use an Electronic Data Processing (EDP) audit to efficiently and adequately review impending market warning signals in real-time. It will also minimize the subjectivity of examiners for they can objectively evaluate markets' efficiency by comparing warning signals generated by the systems to the number of the false positives or negatives. Group 3 can, based on their findings, order the market-makers to follow-through, properly carry out the liquidity provision function, and/or recommend the Federal Reserve to tweak the interest rate parameter. Market-makers should work accordingly on their corrective/continuous improvement actions, or else face consequences.

Group 3 leaders should confer regularly with group 2 about any inherent and detection risks they have observed. In particular, they should discuss who is going cry "foul" when there is a market-wide bubble of "unreasonable" trade activities. And after crying foul during a stress/crash situation, who should inject liquidity into the market? In our opinion, the Financial Stability Oversight Council voting members are in the best position collectively to determine when might be the right time to declare what we called a "Stress RENT-D" situation. This is a situation in which timely injection of liquidity into the market is essential to prevent a taxpayer bailout of the financial sector. The following describes how it would promote financial stability.

Regulators can take the inputs/parameters in the standardized RENT-D calculator to analyze actual market conditions. It will help regulators assess market dynamics in real-time (e.g. macro view of toxic asset distribution, who is standing by to provide liquidity, and who is being squeezed). Upon the declaration of "Stress RENT-D," all market-making banks would be allowed to be opportunistic in seeking proprietary gain (under a new exemption) if they "promptly" inject "sufficient" liquidity into the market. In turn, more diversified players are willing to engage and stabilize the market.

The advantage of this "Stress RENT-D" approach is its efficiency as a rescue, while the accompanying risk is that market-making banks can make hefty profits during a stress/crash situation. Therefore, the Financial Stability Oversight Council members must closely monitor the restoration of order to the marketplace and appropriately time when the "Stress RENT-D" period should end. Again, "Stress RENT-D" is a mechanism to rectify the adverse behavior of banks withdrawing liquidity in bad times. The new exemption serves as an incentive to foster a quick self-healing of the financial sector, so a distressed financial institution will not devolve into the bigger problem of a taxpayer bailout.



### Concluding Summary

- ✓ Recalibration of the access fee cap is a must if order protection, best execution rules and other NMS provisions remain as-is. The cap is in essence the maximum toleration of exploitation. Bad behaviors will still be nourished and abusers will seek alternate ways to circumvent the control.
- ✓ Regulatory intervention through recalibration would be biased. Conflicts and disputes would be better resolved through the market. By having a new rule to ban SROs, ATSS, and SIs from running data and technology businesses (make them mutually exclusive entities), then order protection and access rules might be able to roll back.
- ✓ Via better delineation of rights, this separation replaces the wickedness of a distorted economy of scope with efficiency gains (fewer fights, more cooperation, and better economy of scale). Healthy competition will be preserved, while licenses should be limited and be renewed over time to assure accountability.
- ✓ Realigned privileges and obligations are necessary to fix “everybody owns, nobody owns” behaviors. Licenses will be auctioned where designated G-SIBs/SIFIs will enjoy rights to handle complex activities that match their specialties and obligations. Leverages HFTs’ ability to respond in a timely fashion to flash warnings and liquidity crunch.
- ✓ Enables trading platforms to shape the markets and own up to the consequences of what they design. They will set boundaries for market-makers and give out ‘inspection stickers’. Yet, checking for effectiveness of controls, assuring market efficiency, and investor protection are responsibilities of supervisory authorities.
- ✓ The access fee pilot is a substantial cost to everyone in the market. If these separation and realignment suggestions can be adopted, CAT can be revised for better market surveillance using stream analytics in real-time, and the economic resources devoted to in this access fee pilot can be saved and market integrity will be revitalized!

We hope our suggestions will be helpful in resolving this regulatory reform challenge. Feel free to contact us with any questions, or if our expertise might be required. Thank you.

Sincerely,

*Kelvin To*

*MSc Banking, MGMT, BSc*

**Founder and President**

**Data Boiler Technologies, LLC**

This letter and the enclosure are also available at:

[www.DataBoiler.com/index.htm/files/DataBoiler%20FeePilot610%20Comments.pdf](http://www.DataBoiler.com/index.htm/files/DataBoiler%20FeePilot610%20Comments.pdf)



## References:

- 1 <https://www.sec.gov/rules/proposed/2018/34-82873.pdf>
- 2 <https://www.sec.gov/news/speech/speech-peirce-041818>
- 3 <https://www.marketwatch.com/story/us-exchanges-battle-over-sip-data-system-2014-02-07>
- 4 <https://www.marketsmedia.com/data-drives-exchange-revenue-growth/>
- 5 <https://www.investopedia.com/terms/r/rentseeking.asp>
- 6 [https://www.itg.com/assets/ITG\\_Americas\\_Market\\_structure\\_holdingoutforahero\\_20180405.pdf](https://www.itg.com/assets/ITG_Americas_Market_structure_holdingoutforahero_20180405.pdf)
- 7 <https://iea.org.uk/wp-content/uploads/2016/07/THE%20MYTH%20OF%20SOCIAL%20COST.pdf>
- 8 <http://www.businessinsider.com/stock-exchanges-market-data-cost-becoming-big-issue-2016-10>
- 9 <https://www.zerohedge.com/news/2017-07-05/four-major-warnings-bofa-sp-500-becomes-one-giant-etf>
- 10 [https://econpapers.repec.org/article/eeeecolet/v\\_3a141\\_3ay\\_3a2016\\_3ai\\_3ac\\_3ap\\_3a8-10.htm](https://econpapers.repec.org/article/eeeecolet/v_3a141_3ay_3a2016_3ai_3ac_3ap_3a8-10.htm)
- 11 <https://www.ft.com/content/f93085f0-1150-11e8-8cb6-b9ccc4c4dbbb>
- 12 <https://www.fa-mag.com/news/all-exchange-traded-products-are-not-created-equal-14974.html>
- 13 <https://www.marketsmedia.com/flashback-friday-centralization-vs-fragmentation/>
- 14 <https://www.barrons.com/articles/market-makers-in-equity-options-are-vanishing-1496459364>
- 15 <https://tabbforum.com/opinions/welcome-to-the-jungle-understanding-speed-in-the-capital-markets>
- 16 <https://www.fca.org.uk/publication/occasional-papers/occasional-paper-16.pdf>
- 17 [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3097723](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3097723)
- 18 <https://www.cnbc.com/2018/03/23/bank-of-america-in-42-million-settlement-for-masking-trading.html>
- 19 <http://tabbforum.com/opinions/volcker-rule-objections-are-mostly-excuses>
- 20 <http://tabbforum.com/opinions/volcker-challenges-unsolvable-or-unprofitable>
- 21 <http://sbufaculty.tcu.edu/mann/alonefeb99.pdf>
- 22 [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2776745](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2776745)
- 23 <https://www.fnlonon.com/articles/investment-banks-not-hfts-fuel-flash-crashes-fca-research-20170803>
- 24 <https://www.ftfnews.com/trump-team-challenges-sifi-designation-for-nonbanks/16992>
- 25 <https://www.regulations.gov/document?D=OCC-2017-0014-0013>
- 26 <https://www.sec.gov/comments/4-698/4698-4.pdf>
- 27 <https://www.bloomberg.com/news/articles/2018-05-02/stock-exchanges-get-warning-shot-from-sec-over-data-profits>
- 28 [http://www.law.columbia.edu/sites/default/files/microsites/capital-markets/rauterberg-\\_mahoney-\\_final\\_draft.pdf](http://www.law.columbia.edu/sites/default/files/microsites/capital-markets/rauterberg-_mahoney-_final_draft.pdf)
- 29 <http://blog.themistrading.com/2016/02/credit-suisse-and-barclays-record-settlement-with-ag-and-sec/>
- 30 <https://www.sec.gov/litigation/admin/2016/33-10272.pdf>
- 31 <https://youtu.be/gaOR82g7Py8>
- 32 <https://www.bloomberg.com/view/articles/2017-01-17/fast-trader-pulled-a-fast-one-on-some-customers>
- 33 <https://tabbforum.com/opinions/living-in-the-laboratory-understanding-the-secs-transaction-fee-pilot>
- 34 <https://www.wsj.com/articles/steven-cohen-targets-high-frequency-trading-with-dark-pool-venture-1523994344>
- 35 <https://www.bloomberg.com/news/articles/2018-04-11/ex-goldman-trader-teams-up-with-millennials-to-make-ai-dark-pool>
- 36 <https://www.marketsmedia.com/sec-stops-chx-speed-bump-implementation/>
- 37 <http://fortune.com/2016/04/06/who-owns-the-data/>
- 38 <http://tabbforum.com/opinions/sec-steers-pilot-on-equity-trading-fees-and-rebates-amid-headwinds>



**Glossary:**

ATS	Alternate Trading System
CAT	Consolidated Audit Trail
FCA	Financial Conduct Authority
G-SIB	Global Systemically Important Bank
HFT	High Frequency Trading
NBBO	National Best Bid and Offer
NMS	National Market System
RENT-D	Reasonable Expected Near-Term Demand
SEC	Securities and Exchange Commission
SI	Systematic Internalizer
SIFI	Systemically Important Financial Institution
SIP	Securities Information Processor
SRO	Self-Regulatory Organization