

October 21, 2019

Ms. Vanessa A. Countryman  
Secretary  
Securities and Exchange Commission  
100 F Street NE  
Washington, DC 20549-1090

**Re: EDGA Asymmetric Speed Bump Proposal (File No. SR-CboeEDGA-2019-012)**

Dear Ms. Countryman:

Citadel Securities<sup>1</sup> appreciates the opportunity to provide further comments to the Securities and Exchange Commission (the “Commission”) on the proposal by Cboe EDGA Exchange, Inc. (“EDGA”) to introduce an asymmetric speed bump (the “Proposal”).<sup>2</sup>

As highlighted in the Commission’s Order Instituting Proceedings (“OIP”), a large and diverse group of market participants raised detailed concerns about the Proposal.<sup>3</sup> However, to date, EDGA has failed to meaningfully respond to these concerns, even those recognized as legitimate by the few supporters of the Proposal. Instead, EDGA continues to rely almost exclusively on conclusory statements regarding purported market quality and competition benefits that it asserts will result from the Proposal. Below, we detail how:

- 1. EDGA Has Not Adequately Considered the Negative Impacts on Institutional and Retail Investors**
- 2. EDGA Has Neglected to Disclose the Primary Beneficiaries of the Proposal**
- 3. EDGA’s Claims About Improving Market Quality Are Unsupported**
- 4. EDGA’s Claims About Increasing Market Competition Are Unsupported**

We close by explaining how the Proposal is inconsistent with the Securities Exchange Act of 1934 (“Exchange Act”), and how these inconsistencies are not mitigated by treating EDGA quotes as unprotected, or even by excluding these unprotected quotes from the SIP.

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<sup>1</sup> Citadel Securities is a leading global market maker across a broad array of fixed income and equity securities. In partnering with us, our clients, including asset managers, banks, broker-dealers, hedge funds, government agencies and public pension programs, are better positioned to meet their investment goals. On an average day, Citadel Securities accounts for approximately 21 percent of U.S. listed equity volume, 23 percent of U.S. listed equity option volume, and more than 39 percent of all retail U.S. listed equity volume.

<sup>2</sup> 84 Fed. Reg. 30282 (June 26, 2019), available at: <https://www.govinfo.gov/content/pkg/FR-2019-06-26/pdf/2019-13537.pdf> (the “Proposal”).

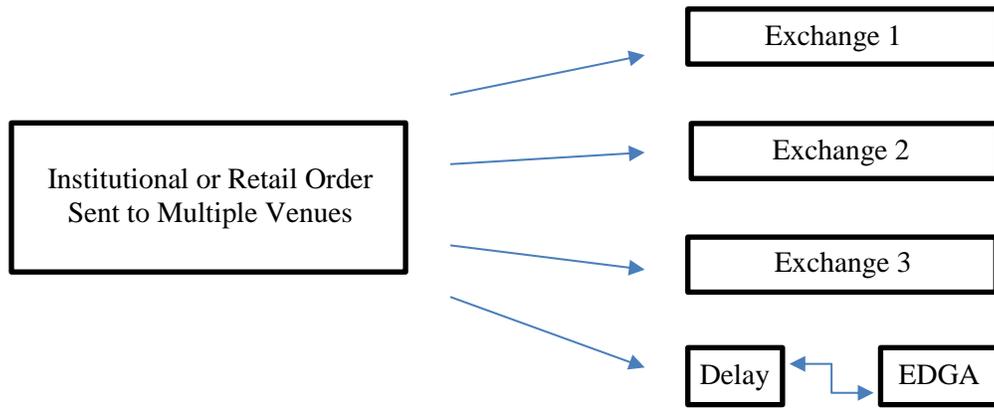
<sup>3</sup> 84 Fed. Reg. 51657 (September 30, 2019), available at: <https://www.govinfo.gov/content/pkg/FR-2019-09-30/pdf/2019-21096.pdf> (the “OIP”).

**1. EDGA Has Not Adequately Considered the Negative Impacts on Institutional and Retail Investors**

*Concerns Detailed in the Comment File*

Many commenters raised concerns regarding the impact of the Proposal on institutional and retail investors, including T. Rowe Price, BlackRock, RBC, SIFMA, MFA, and Healthy Markets Association.<sup>4</sup> Not a single institutional or retail investor has supported the Proposal.

One frequently referenced concern is the impact on institutional and retail orders that are sent to more than one venue for execution, such as intermarket sweep orders.



As the diagram above shows, liquidity providers on EDGA would be able to observe the executions on other venues and anticipate that an incoming order had also been sent to EDGA. Given the asymmetric nature of the Proposal, EDGA liquidity providers could then elect to immediately cancel their displayed quote (if advantageous to do so) prior to the incoming order exiting the delay. Therefore, the asymmetric delay will logically result in quote fading and a decline in fill rates, adversely impacting end investors.

<sup>4</sup> See <https://www.sec.gov/comments/sr-cboeedga-2019-012/srcboeedga2019012.htm>.

*Response from EDGA and the Few Supporters of the Proposal*

In response, EDGA asserts that institutional and retail investor concerns about quote fading are “unwarranted”<sup>5</sup> and that the Proposal will “not materially affect the ability of ordinary investors to access liquidity on EDGA.”<sup>6</sup>

In contrast, supporters of the Proposal admit the legitimacy of investor concerns about quote fading and fill rates. XTX Markets (“XTX”) acknowledges that “institutional investors could see a decline in fill rates”<sup>7</sup> when sending an order to more than one venue for execution. XTX also agrees that the same concern could be relevant for retail investors, but erroneously asserts that “aggressive retail orders are generally not routed to exchanges.”<sup>8</sup> Similarly, Clearpool, which offered conditional support for the Proposal, acknowledges that the asymmetric delay “will enable these liquidity providers to ‘fade away’ when the markets become unfavorable to them, leaving incoming orders from liquidity takers, often retail investors, unfilled, or filled at an adverse price.”<sup>9</sup>

XTX proposes addressing the quote fading concerns by recommending that institutional and retail investors modify their routing practices to: (1) route first to EDGA, (2) wait for 4 milliseconds (the length of the proposed EDGA delay), and (3) then route to other venues.<sup>10</sup> As detailed below, this proposal raises a number of serious concerns that must be addressed, including whether broker-dealers delaying the routing of marketable orders is consistent with best execution and other regulatory requirements.

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<sup>5</sup> Letter from Adrian Griffiths, Assistant General Counsel, Cboe Global Markets (Aug. 22, 2019) at page 5, available at: <https://www.sec.gov/comments/sr-cboeedga-2019-012/srcboeedga2019012-6009676-190812.pdf> (“EDGA Response Letter”). Instead of acknowledging the concerns in the comment file, EDGA elects to repeat the phrase “latency arbitrage” 14 times in its response letter. Ironically, EDGA has still failed to clearly define what it means by “latency arbitrage,” and whether market activity such as hedging by ETF or options market makers could fall within EDGA’s definition of “latency arbitrage.” In addition, EDGA has failed to explain why the Proposal is being introduced on an inverted venue, rather than EDGX for example, when research has shown that “inverted venues tend to provide liquidity providers with lower adverse selection and higher realized spreads” (see Haoming Chen et al., “The value of a Millisecond: Harnessing Information in Fast, Fragmented Markets” (Nov. 18, 2017) at page 29, available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2860359](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2860359) (the “Chen Study”).

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

<sup>7</sup> Letter from Eric Swanson, CEO, XTX Markets LLC (Americas) (July 31, 2019) at page 3, available at: <https://www.sec.gov/comments/sr-cboeedga-2019-012/srcboeedga2019012-5898688-188828.pdf> (“XTX Response Letter”).

<sup>8</sup> XTX Response Letter at pages 5-6. As an example, Citadel Securities routes a material percentage of marketable retail orders to external venues for execution, including exchanges.

<sup>9</sup> Letter from Ray Ross, Chief Technology Officer, Clearpool Group (July 17, 2019) at page 2, available at: <https://www.sec.gov/comments/sr-cboeedga-2019-012/srcboeedga2019012-5824692-187510.pdf>.

<sup>10</sup> XTX Response Letter at page 4.

### Inadequacy of the EDGA Response

EDGA must address the significant discrepancies between its position and the comments by supporters of the Proposal regarding whether institutional and retail investors should be concerned about quote fading and fill rates.

Evidence from the “reasonably comparable”<sup>11</sup> asymmetric speed bump implemented on TSX Alpha in Canada clearly shows the legitimacy of institutional and retail investor concerns. There are three main studies of the TSX Alpha asymmetric speed bump: (1) the Chen study,<sup>12</sup> (2) the IIROC/Bank of Canada study,<sup>13</sup> and (3) the Ontario Securities Commission review.<sup>14</sup> The Chen study found that quote fading increased by 46% on average after implementation of the asymmetric speed bump, enabling “fast liquidity suppliers to ‘fade’ away from orders which consume liquidity across multiple venues.”<sup>15</sup> Neither the IIROC/Bank of Canada study nor the OSC review disputed this conclusion, with the OSC review noting that the IIROC/Bank of Canada study assumed “quote fade should be expected on Alpha, given that its model enables providers of liquidity to cancel their orders in response to order book changes on Alpha and/or other marketplaces.”<sup>16</sup> The OSC review also noted that market participants reported “fill rates on Alpha have decreased, often for orders that are expected to go through multiple price levels or need to be split and sent to multiple marketplaces simultaneously (e.g. institutional orders).”<sup>17</sup>

To supplement these studies, we used Canadian exchange data to conduct our own analysis of quote fading on TSX Alpha, focusing on price-level depleting trade clusters where orders are sent to multiple venues for execution. Consistent with the Chen study, we found that for price-level depleting trade clusters:

- Quote fading on TSX Alpha immediately and significantly increased following the implementation of the asymmetric speed bump in September 2015 (see Appendix, Diagram 1);
- These extremely elevated quote fading rates persist, as data over the last 12 months shows that approximately 70-80% of the quoted volume on TSX Alpha is being cancelled without executing (see Appendix, Diagram 2); and

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<sup>11</sup> *Id.* at page 8.

<sup>12</sup> *Supra* note 5.

<sup>13</sup> Lisa Anderson et al., “Speed Segmentation on Exchanges: Competition for Slow Flow” (January 2018), available at: <https://www.bankofcanada.ca/wp-content/uploads/2018/01/swp2018-3.pdf>.

<sup>14</sup> OSC Staff Notice 21-712, “Review of Market Quality Impact of Alpha Exchange Order Processing Delay” (Feb. 2, 2018), available at: [https://www.osc.gov.on.ca/documents/en/Securities-Category2/20180202\\_21-712\\_sn-alpha-impact.pdf](https://www.osc.gov.on.ca/documents/en/Securities-Category2/20180202_21-712_sn-alpha-impact.pdf) (“OSC Review”).

<sup>15</sup> Chen Study at pages 5, 17 and 62 (Figure 1, Panel A).

<sup>16</sup> OSC Review at page 3.

<sup>17</sup> *Id.* at page 4.

- This sharply contrasts with quote fading rates of approximately 30% on other inverted venues and approximately 20% on maker-taker venues (see Appendix, Diagram 2).

We also compared TSX Alpha's market share of displayed and executed liquidity for price-level depleting trades with other inverted Canadian exchanges. Data over the last 12 months shows that, with respect to price-level depleting trades, although TSX Alpha accounts for approximately 70% of the displayed liquidity on inverted exchanges, it accounts for less than 50% of the executed liquidity (see Appendix, Diagram 3). This metric also demonstrates the impact of the significantly higher quote fading rates on TSX Alpha, as displayed liquidity is much less accessible.

EDGA's conclusory statements on the Proposal's impact on institutional and retail investors are clearly inadequate in light of the evidence documented above. We urge EDGA to reconsider its current position that institutional and retail investor concerns are "unwarranted."<sup>18</sup> In addition, EDGA must respond to the XTX recommendation that, in order to address quote fading concerns, institutional and retail orders sent to more than one venue for execution should be routed first to EDGA before being routed to other venues. Such a proposal raises a number of serious concerns that must be addressed, including:

- (a) whether broker-dealers delaying the routing of marketable orders is consistent with best execution and other regulatory requirements;
- (b) whether broker-dealers should be comfortable delaying the routing of marketable orders given the risk of the market moving in the interim;
- (c) what are the costs associated with market participants updating their routing methodologies in this manner;
- (d) what would be the impact if market participants do not update their routing methodologies in this manner;
- (e) what are the risks of unnecessarily increasing the complexity of order routing systems, including during periods of market volatility; and
- (f) what would happen if other exchanges implemented asymmetric speed bumps, perhaps with differing durations.

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<sup>18</sup> *Supra* note 5.

## 2. EDGA Has Neglected to Disclose the Primary Beneficiaries of the Proposal

### *Concerns Detailed in the Comment File*

Many commenters identified that certain proprietary traders are the primary beneficiaries of the Proposal. The asymmetric speed bump provides these liquidity providers with the ability to back away from displayed quotations after quickly processing and evaluating the latest market data. This advantage is the economic equivalent of a “last look.” For this reason, it is unsurprising that the only two market participants that have expressed unconditional support for the Proposal are proprietary traders: XTX<sup>19</sup> and the Chicago Trading Company (“CTC”).

### *Response from EDGA and the Few Supporters of the Proposal*

In response, EDGA asserts that the Proposal would “promote the interests of both liquidity makers and liquidity takers”<sup>20</sup> and attract “a wider range of participants that can compete on factors other than speed.”<sup>21</sup>

In contrast, supporters of the Proposal recognize the advantage being given to certain proprietary traders. For example, the theoretical model formulated by two academics in support of the Proposal acknowledges that “the immediate beneficiaries of the asymmetric speed bump will primarily be high-frequency liquidity providers.”<sup>22</sup>

### *Inadequacy of the EDGA Response*

EDGA has failed to accurately describe the advantage being granted to liquidity providers and the capabilities needed to utilize that advantage. The Proposal provides liquidity providers with a 4 millisecond window of time to process and evaluate the latest market data in order to determine whether to honor a bid or offer or choose to back away from a displayed quotation. As we detailed in our first comment letter, this is the *economic equivalent* of a “last look” – while a liquidity provider is not notified on an order-by-order basis of incoming orders under the Proposal, the liquidity provider is largely able to achieve the same result by using market data to anticipate when there are likely to be incoming orders that are being delayed by the speed bump. It is notable that, while EDGA unsuccessfully attempts to distinguish the Proposal from “last look” practices in other

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<sup>19</sup> It has been reported that XTX does not employ a single human trader. See “A London trading firm is offering a cash prize and a job for aspiring data scientists who can pass its online test,” Markets Insider (July 3, 2019), available at: <https://markets.businessinsider.com/news/stocks/xtx-markets-online-contest-100000-prize-to-find-best-quants-2019-7-1028328502>.

<sup>20</sup> EDGA Response Letter at page 7.

<sup>21</sup> *Id.* at page 9.

<sup>22</sup> Letter from Joshua Mollner, Assistant Professor, Northwestern University, and Markus Baldauf, Assistant Professor, University of British Columbia (Sept. 12, 2019) at page 2, available at: <https://www.sec.gov/comments/sr-cboeedga-2019-012/srcboeedga2019012-6114674-192088.pdf>.

markets,<sup>23</sup> XTX has embraced the notion of providing liquidity providers with a “last look,” curiously asserting that “*the practice of ‘Last Look’ is not unique to electronic trading nor even FX markets; it is an accepted practice, based on legal contractual formation, applicable to any situation where a person or entity is selling a product.*”<sup>24</sup> The apparent suggestion that “last look” practices already underpin activity in the U.S. equities market is absurd – but the Proposal would certainly open the door to their use.

Once the advantage being granted to liquidity providers is accurately described, it becomes clear that only a select group of proprietary traders actually have the capabilities necessary to meaningfully exploit it. Despite EDGA’s unsupported claims to the contrary,<sup>25</sup> substantially all commercially available algorithms are unable to process and respond to cross-asset and cross-market signals within 4 milliseconds the way XTX and CTC can. The advantage is thus being conferred directly at the expense of retail and institutional investors.

Evidence from TSX Alpha clearly shows that the primary beneficiaries are a select group of proprietary traders. The Chen study found that the asymmetric speed bump significantly increases profits for proprietary traders.<sup>26</sup> Neither the IIROC/Bank of Canada study nor the OSC review disputed this finding. In addition, the proportion of passive liquidity supplied by proprietary traders increases, with market participants understanding that one such firm alone has more than 50% market share on TSX Alpha in terms of passive value traded.

In light of this documented evidence and the comments by supporters of the Proposal noted above, EDGA must be required to more accurately describe (a) the advantages being granted to liquidity providers under the Proposal, (b) the capabilities required to utilize such an advantage, (c) the number of market participants who possess such capabilities, (d) the anticipated impact on liquidity provider profitability, and (e) and the associated costs that will be borne by institutional and retail investors.

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<sup>23</sup> EDGA Response Letter at page 15.

<sup>24</sup> XTX Markets Response to the Global Foreign Exchange Committee on the GFXC Request for Feedback on Last Look practices in the Foreign Exchange Market (Aug. 7, 2017) at page 87, available at: [https://www.globalfxc.org/docs/gfxc\\_last\\_look\\_request\\_for\\_feedback.pdf](https://www.globalfxc.org/docs/gfxc_last_look_request_for_feedback.pdf). XTX further asserts that “last look” is a natural feature of all commerce, suggesting that it is “*no different to purchasing goods in an online or physical shop. Display of goods for sale at specific prices is an invitation to enter into a contract. A customer clicking to purchase an item or taking a product to the cashier is an offer to enter into a contract. The seller of goods then has the final opportunity whether to accept the sale or not.*” We suspect consumers would strongly disagree.

<sup>25</sup> EDGA Response Letter at page 10.

<sup>26</sup> Chen Study at pages 1 and 4.

### 3. EDGA’s Claims About Improving Market Quality Are Unsupported

EDGA claims that the Proposal will lead to “an increase in market quality” and “more aggressive prices.”<sup>27</sup> Not only are these claims unsupported, but they display a lack of understanding regarding how the asymmetric speed bump will be used in practice.

The advantage being granted to liquidity providers is a 4 millisecond window of time to process and evaluate the latest market data in order to determine whether to honor or back away from a displayed quotation. This advantage loses much of its value, however, if EDGA is alone at the NBBO and therefore routed to first, as this reduces the ability to first observe executions on other venues. As a result, liquidity providers on EDGA should not generally be expected to narrow prevailing market-wide spreads if the asymmetric speed bump is adopted; instead, we would expect EDGA liquidity providers to often post prices equal to (or behind) the NBBO set by liquidity providers on other exchanges.<sup>28</sup>

Indeed, this is exactly what the data from TSX Alpha shows. The Chen study found that liquidity providers on TSX Alpha were almost never alone at the NBBO.<sup>29</sup> Our analysis of data from Canadian exchanges over the last 12 months confirms this finding (see Appendix, Diagram 4). While the asymmetric speed bump reduced adverse selection, this advantage accrued to the TSX Alpha liquidity providers in the form of increased profits and not to the broader market in the form of narrower bid-ask spreads.<sup>30</sup> Neither the IIROC/Bank of Canada study nor the OSC review disputed these findings. Importantly, none of the three studies of TSX Alpha identified any statistically significant improvement in market quality as a result of the asymmetric speed bump.<sup>31</sup>

### 4. EDGA’s Claims About Increasing Market Competition Are Unsupported

EDGA claims that the Proposal will “increase competition among liquidity providers by attracting a wider range of participants that can compete on factors other than speed.”<sup>32</sup> However, as detailed above in Section 2, experience with TSX Alpha demonstrates that a select group of proprietary traders are the primary beneficiaries of the asymmetric speed bump. This select group

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<sup>27</sup> EDGA Response Letter at pages 4 and 8.

<sup>28</sup> Since EDGA is an inverted venue, matching the NBBO may also result in being routed to first in light of the rebate provided to the liquidity taker.

<sup>29</sup> Chen Study at pages 15 and 65 (Figure 4). We note that TSX Alpha also switched to an inverted venue at the same time as it implemented the asymmetric speed bump, but the value of the asymmetric speed bump to the liquidity provider appears to be greater than the fee paid by the liquidity provider to post.

<sup>30</sup> *Id.* at pages 4-5.

<sup>31</sup> Indeed, the Chen Study found that overall market quality deteriorated (see page 6). These studies of the real-world effects of an asymmetric speed bump are more consistent with the theoretical model advanced by Brolley and Cimon (“Order Flow Segmentation, Liquidity and Price Discovery: The Role of Latency Delays,” (April 2018), available at: <https://www.bankofcanada.ca/wp-content/uploads/2018/04/swp2018-16.pdf>) than the theoretical model advanced by Mollner and Baldauf (see *supra* note 22).

<sup>32</sup> EDGA Response Letter at page 9.

is advantaged over (a) liquidity takers, leading to increased profitability, and (b) liquidity providers on other exchanges, as EDGA liquidity providers can free-ride on their pricing heuristics and risk taking capabilities by posting prices equal to the NBBO and observing away executions to inform whether to honor or back away from a displayed quotation. Such free-riding discourages innovation and undermines the competitive dynamics that have dramatically reduced spreads and transaction costs for all market participants over the past decade.

While CBOE again attempts to quickly dismiss any concerns,<sup>33</sup> XTX acknowledges both of these anti-competitive effects of an asymmetric speed bump. In particular, XTX raises the prospect that the Proposal could allow “market makers to earn outsized returns”<sup>34</sup> and agrees “the potential for someone to free-ride on another liquidity provider’s quotes exists,”<sup>35</sup> but argues that liquidity providers concerned about free-riding should just set the NBBO on EDGA.<sup>36</sup>

This response underscores how an asymmetric speed bump significantly impacts market competition. If one exchange provides its liquidity providers with a significant advantage that facilitates free-riding on quotes provided on other exchanges, then there will be significant pressure for other exchanges to adopt a similar mechanism. EDGA has failed to adequately consider the competitive impacts of the Proposal, including the potential costs of discouraging innovation and competition by facilitating free-riding and the commercial impact of granting a material advantage to a select group of liquidity providers. In addition, EDGA has failed to adequately consider the consequences of additional exchanges implementing asymmetric speed bumps. Among others, concerns around the resiliency of liquidity, particularly during periods of market volatility, will only be amplified to the extent that multiple exchanges adopt mechanisms that allow systematic quote fading.

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In summary, the expected consequences of introducing an asymmetric speed bump are:

- There will be increased quote fading by EDGA liquidity providers (making displayed quotes less accessible to institutional and retail investors);
- A select group of proprietary traders will increase their share of passive liquidity provision on EDGA and significantly improve their own profitability at the expense of institutional and retail investors;

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<sup>33</sup> See *id.* at page 8.

<sup>34</sup> XTX Response Letter at page 2. XTX argues that competitive forces should be expected to “normalize” these returns. However, this argument assumes that all liquidity providers are equally capable of taking advantage of the asymmetric speed bump, which is not the case.

<sup>35</sup> XTX Response Letter at page 8.

<sup>36</sup> *Id.* XTX also argues that the inverted nature of the venue removes free-riding concerns, but this is untrue if the value of the asymmetric speed bump to the liquidity provider (which is essentially an opaque rebate) is greater than the fee paid by the liquidity provider to post.

- There will not be improvements in market-wide spreads or overall market quality; and
- Other exchanges will feel significant pressure to provide similar advantages to their own liquidity providers, further increasing the negative impacts for institutional and retail investors, discouraging competition and innovation by encouraging free-riding, and creating unintended adverse consequences for market resiliency.

As detailed in our first comment letter, this Proposal is easily distinguished from the speed bumps implemented by IEX and NYSE American and can even be distinguished from the asymmetric speed bump proposed by CHX several years ago. As further evidence of these significant differences, consider IEX's comments regarding a similar asymmetric speed bump proposed by Nasdaq OMX PSX in 2012: "PSX's proposal was rightfully withdrawn because its 'speed bump' was applied only to a subset of orders and actually may have harmed the accessibility of its quotations."<sup>37</sup>

The Proposal is inconsistent with several sections of the Exchange Act, including:

- Section 6(b)(5), as a select group of proprietary traders are given an unfair advantage over liquidity takers, and liquidity providers on other exchanges;
- Section 6(b)(5), as the Proposal does not protect investors and the public interest, does not improve overall market quality, and instead encourages quote fading by liquidity providers. This will introduce "last look" practices into the U.S. equities market, making displayed quotes less accessible to institutional and retail investors, particularly for orders that are sent to more than one venue for execution;
- Section 6(b)(8), as the resulting burdens on competition lead to EDGA liquidity providers significantly increasing their profitability at the expense of other market participants;
- Section 11A, as the unfair advantages given to EDGA liquidity providers allow them to free-ride on the price discovery and formation occurring on other exchanges. The negative consequences of such free-riding are widespread, including discouraging the innovation and undermining the competitive dynamics that have dramatically improved our markets. It is also notable that several of the solutions proposed by supporters of the Proposal in response to concerns raised involve routing more business to EDGA as opposed to other exchanges (such as liquidity takers routing first to EDGA to mitigate quote fading and liquidity providers setting the NBBO on EDGA to prevent free-riding). It is curious at best that an exchange seeks to grant itself such a special status. These competition concerns involve far more than "a commercial issue among

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<sup>37</sup> Letter from IEX on Investors' Exchange LLC Form 1 Application (Nov. 23, 2015) at page 5, available at: <https://www.sec.gov/comments/10-222/10222-26.pdf>.

the exchanges,”<sup>38</sup> as a discriminatory advantage is proposed to be provided to a select group of market participants with significant implications for overall market competition, both among brokers and dealers, and among exchanges.

We note that the inconsistencies with the Exchange Act are not mitigated by treating EDGA quotes as unprotected, or even by excluding these unprotected quotes from the SIP.<sup>39</sup> The suggestion that market participants could simply ignore or completely avoid interacting with EDGA is overly simplistic and inconsistent with existing best execution obligations. In addition, supporters of the Proposal acknowledge that liquidity takers may need to modify routing methodologies to route to EDGA first in order to mitigate quote fading and liquidity providers may need to quote on EDGA in order to prevent free-riding, both of which further highlight the impact that EDGA’s unprotected quotes would have on market competition and investor behavior. These competitive impacts will also lead to other exchanges feeling significant pressure to provide a similar advantage to their own liquidity providers.

Ultimately, introducing an unprecedented asymmetric speed bump into the U.S. equities market should require a much more thorough analysis of the impact on investors, competition, market quality, and resiliency. EDGA has clearly failed to satisfy this initial threshold, instead dismissing concerns that even the few supporters of the Proposal recognize as legitimate and securing support from only two proprietary trading firms that stand to commercially benefit at the expense of all other market participants, including retail and institutional investors, market makers, and other exchanges. The Proposal clearly lacks sufficient support given the significant potential ramifications for U.S. equity markets. We urge the Commission to disapprove this Proposal.

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We appreciate the opportunity to provide comments on the Proposal. Please feel free to call the undersigned at (██████████) with any questions regarding these comments.

Respectfully,  
/s/ Stephen John Berger  
Managing Director  
Global Head of Government & Regulatory Policy

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<sup>38</sup> XTX Response Letter at page 8.

<sup>39</sup> We note that including these unprotected quotes in the SIP, as proposed by EDGA, raises a host of additional issues, as detailed in our first comment letter.

## Appendix – TSX Alpha Data Analysis

### A. Quote Fading

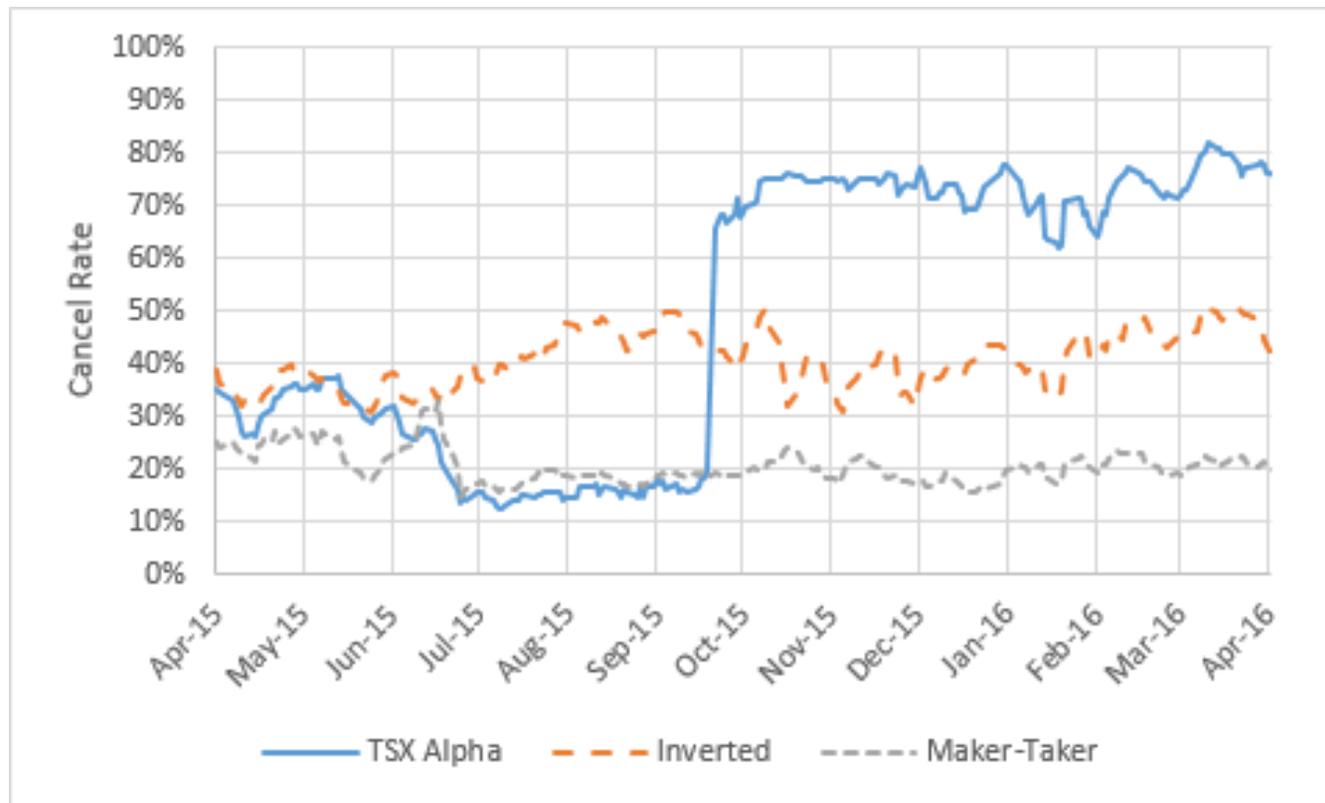
We use Canadian exchange data to examine quote fading on TSX Alpha.

Similarly to Chen et al., we focus on clusters of trades that are associated with market-wide price changes, as would be expected for larger orders seeking liquidity across multiple venues. These trade clusters are identified by (a) looking for trades between 9:45–15:45 without any other trades occurring in the prior 20 milliseconds, and (b) associating all future trades with the cluster until there is more than a 20 millisecond gap between trades. We filter for cases where the market is stable for at least 10 milliseconds before the initial trade, and we focus on trading in the same direction as the initial trade, at or inside its price level, until 10 milliseconds after the initial trade. Approximately 70% of overall market volume is associated with these directional trade clusters, and for approximately 50% of clusters, the initial price level is depleted across all markets within 10 milliseconds.

The two charts below show, for a given price-level depleting trade cluster, how much of the quoted volume is cancelled without executing.

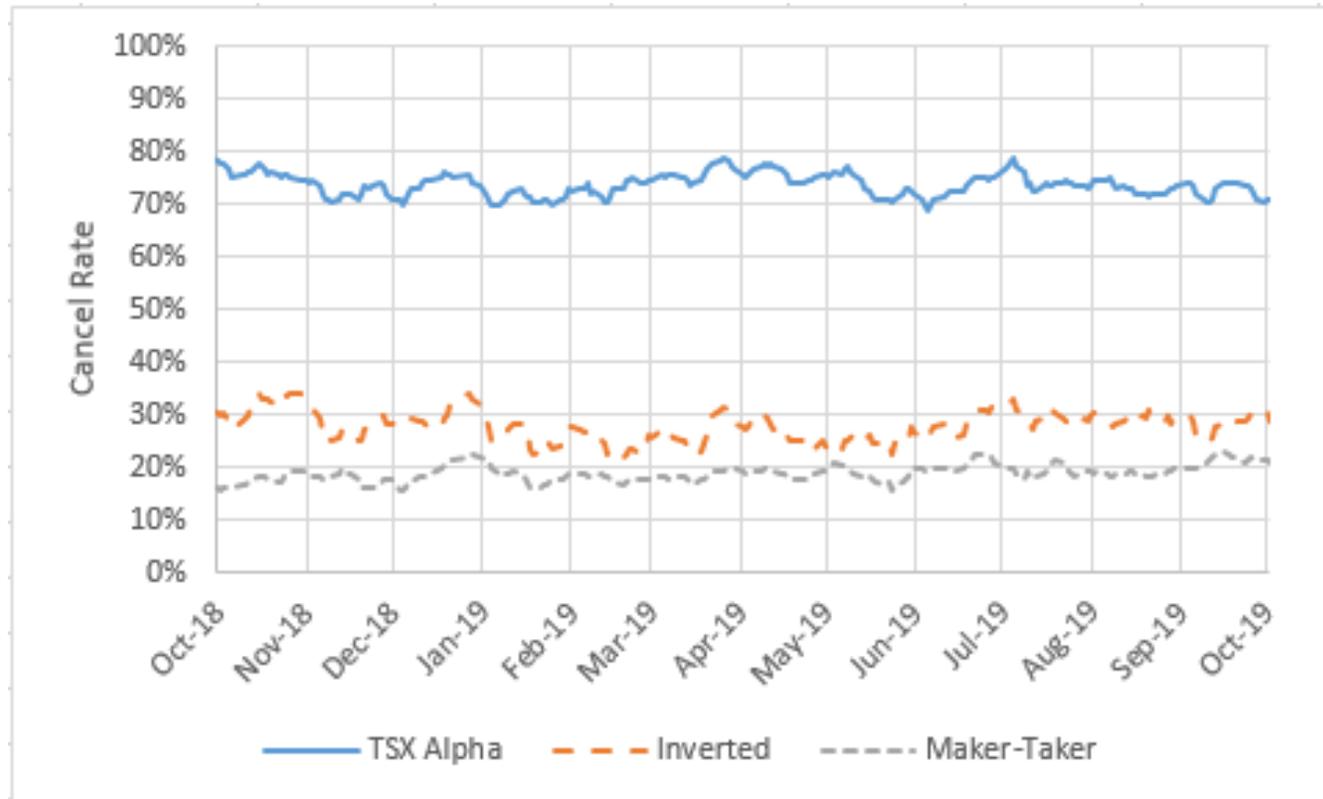
This chart shows the immediate and significant increase in quote fading on TSX Alpha for price-level depleting trade clusters following the implementation of the asymmetric speed bump in September 2015. While quote fading rates on maker-taker and other inverted venues remained relatively constant, quote fading rates on TSX Alpha more than doubled, with between 70-80% of the quoted volume on TSX Alpha being cancelled without executing.

Diagram 1



This chart shows data from the last 12 months. For price-level depleting trade clusters, the elevated quote fading rates on TSX Alpha have remained constant, with between 70-80% of the quoted volume being cancelled without executing. In contrast, quote fading rates are approximately 30% on other inverted venues and approximately 20% on maker-taker venues.

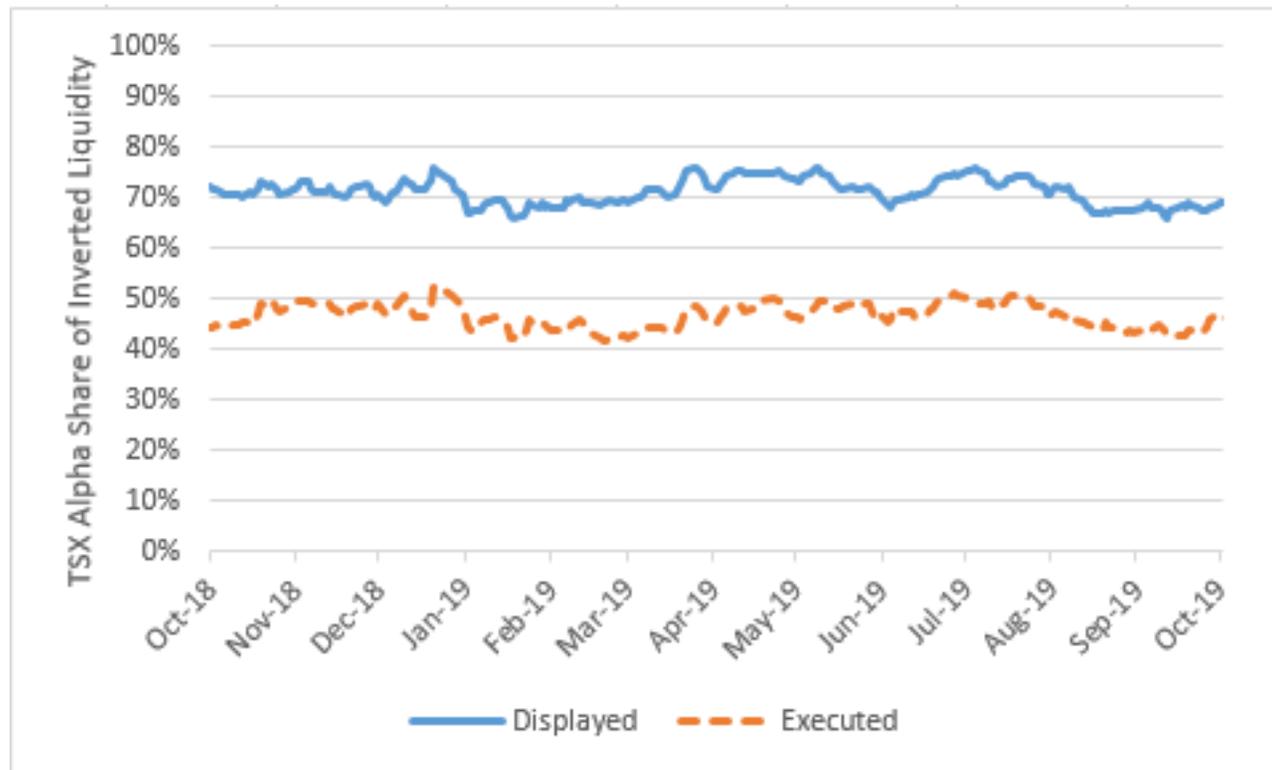
Diagram 2



**B. Market Share of Displayed and Executed Liquidity on Inverted Venues**

Another method of examining quote fading on TSX Alpha is to compare its market share of displayed and executed liquidity for price-level depleting trades (i.e. the price level is gone after 10 milliseconds) with other inverted Canadian exchanges. This chart shows data from the last 12 months with respect to price-level depleting trades. Although TSX Alpha accounts for approximately 70% of the displayed liquidity on inverted exchanges, it accounts for less than 50% of the executed liquidity for price-level depleting trades.

Diagram 3



**C. Quoting Behavior**

Finally, we examine quoting behavior on TSX Alpha following the implementation of the asymmetric speed bump, with quotes time-weighted during the day, equal-weighted across stocks, and averaged between bid and ask quotes. This chart shows data from the last 12 months. Despite the advantages conferred by the asymmetric speed bump, liquidity providers on TSX Alpha are almost never alone at the NBBO.

Diagram 4

