June 21, 2024

Ms. Vanessa Countryman
Secretary
U.S. Securities and Exchange Commission
100 F Street, N.E.
Washington D.C. 20549

RE: Proposed Rules: Order Competition Rule, File No. S7-31-22, 88 Fed. Reg. 128 (Jan. 3, 2023) (to be codified at 17 C.F.R. Parts 240 and 242); Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders, File No. S7-30-22, 87 Fed. Reg. 80266 (Dec. 29, 2022) (to be codified at 17 C.F.R. Part 242); Regulation Best Execution, File No. S7-32-22, 88 Fed. Reg. 5440 (Jan. 27, 2023) (to be codified at 17 C.F.R. Parts 240 and 242)

Dear Ms. Countryman:

Virtu Financial, Inc. ("Virtu")[1] respectfully submits this comment letter to request, in light of the recent publication of the proposed Rule 605 Amendments[2], that the U.S. Securities and Exchange Commission (the "Commission") refrain from proceeding with the rule-making process related to the three market structure rule proposals from December 14, 2022[3] (the "Market Structure Rule Proposals" or the "Proposals"). Instead, Virtu proposes that a more reasonable and appropriate course for the Commission would be to wait for a period of one year after the Rule

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1 Virtu is a leading financial firm that leverages cutting-edge technology to deliver liquidity to the global markets and innovative, transparent trading solutions to its clients. Virtu operates as a market maker across numerous exchanges in the U.S. and is a member of all U.S.-registered stock exchanges. Virtu's market structure expertise, broad diversification, and execution technology enable it to provide competitive bids and offers in over 25,000 securities, at over 235 venues, in 36 countries worldwide. Virtu broadly supports innovation and enhancements to transparency and fairness that increase liquidity and promote competition to the benefit of all marketplace participants.

2 Proposed Rule: Disclosure of Order Execution Information, 88 Fed. Reg. 3786 (Jan. 20, 2023) (to be codified at 17 C.F.R. Part 242). Citations to the Proposed Rule are to the SEC's Securities Exchange Act Release No. 34-96493; File No. S7-29-22 (Dec. 14, 2022) ("605 Rule Release"), *available at* https://www.sec.gov/rules/proposed/2022/34-96493.pdf.

3 Proposed Rule: Order Competition Rule, 88 Fed. Reg. 128 (Jan. 3, 2023) (to be codified at 17 C.F.R. Parts 240 and 242) (the "OCR Proposal"), *available at* https://www.sec.gov/rules/proposed/2022/34-96495.pdf; Proposed Rule: Regulation Best Execution, 88 Fed. Reg. 5440 (Jan. 27, 2023) (to be codified at 17 C.F.R. Parts 240 and 242), Securities Exchange Act Release No. 34-96496; File No. S7-32-22 (Dec. 14, 2022) ("Best Ex Rule Proposal"), *available at* https://www.sec.gov/rules/proposed/2022/34-96496.pdf; Proposed Rule: Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders, 87 Fed. Reg. 80266 (Dec. 29, 2022) (to be codified at 17 C.F.R. Part 242); Securities Exchange Act Release No. 34-96494; File No. S7-30-22 (Dec. 14, 2022) ("Tick Size Rule Proposal"), *available at* https://www.sec.gov/rules/proposed/2022/34-96494.pdf.

605 Amendments have been in place—thereby allowing the Commission to gather sufficient data on the effect of the Rule 605 Amendments on other aspects of market competition—before going ahead with the Market Structure Rule Proposals (in their current form, or in some other form). In the alternative, Virtu respectfully requests that the Commission reopen the comment period for the remaining Market Structure Rule Proposals to allow comment on the need for those rules in light of the adoption of the Rule 605 Amendments. A failure to consider the Proposals in light of the recent Rule 605 Amendments, including by conducting an economic analysis of those Proposals that takes into consideration the Rule 605 Amendments, would be arbitrary, capricious, and contrary to law.

Indeed, Virtu is concerned that the Commission intends for the Rule 605 Amendments to be adopted or implemented at the same time as the Market Structure Rule Proposals that each individually represent a substantial and fundamental change to the structure of the equity market. As Commissioner Uyeda recently observed, the Rule 605 Amendments "were proposed along with three other rules impacting equity market structure, but with little regard as to their interaction with each other."[4] However, the cumulative effects of multiple, major changes to the market structure clearly need to be carefully analyzed together for rational decision-making to take place.

The purported costs, benefits, operational risks, and effects of any one of the Market Structure Rule Proposals are certain to change as a result of the Rule 605 Amendments. That is also true if one or more of the other Proposals are adopted at the same time. Yet, the Commission appears prepared to consider each Proposal independently—as if it were the only rule being proposed—using the current market structure as the baseline for each one,[5] and ignoring the possibility that the Rule 605 Amendments (or any of the other Proposals) may alter that baseline or otherwise address any concerns that formed the impetus for the Proposals.[6] That approach is arbitrary and capricious and based on a fundamentally flawed economic analysis.

Significantly, the Commission has provided no meaningful analysis as to how the Proposals relate to, or would operate with, each other and the anticipated cumulative effects if more than one Proposal is adopted. While the Commission has found that the Proposals are "not expected" to have a significant effect on the costs and benefits of the Rule 605 Amendments,[7] the converse is not true. The Rule 605 Amendments will necessarily have an impact on the other Proposals. As Commissioner Peirce recently noted, "[t]his rule not only seems likely to affect the

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4 Mark T. Uyeda, Commissioner, Statement on Rule Amendments Regarding Disclosure of Order Execution Information, *available at* https://www.sec.gov/news/statement/uyeda-statement-order-execution-quality-030624.

5 The Commission repurposes portions of the same baseline and economic analysis in both proposals. *Compare*, *e.g.*, Order Competition Rule at 248–253 with Proposed Rule at 206–214.

6 *See* Securities and Exchange Commission, Open Meeting Part 01 at 1:08:25 – 1:09:00 (Dec. 14, 2022), https://www.youtube.com/watch?v=s9gdfxCoIq4 (Commission Division of Trading and Markets Director Zhu states that Commission believes each rule stands on its own and delivers its own benefit, in response to question whether staff has considered how best execution rule is likely to affect other rules being considered).

7 *See* Disclosure of Order Execution Information; Final Rule ("Adopting Release"), Rel. No. 34-99679 (Mar. 6, 2024) at 504; *see also* Hester M. Peirce, Commissioner, Keeping Up with the Markets: Statement on Rule 605 Adoption ("Peirce Rule 605 Adoption Statement"), *available at* https://www.sec.gov/news/statement/peirce-statement-order-execution-quality-030624#_ftn12.

baseline of other proposed rules, but itself will produce the data that will help us understand whether these other rules, if adopted, will generate the hoped for benefits."[8]

Two groups of major institutions—all occupying different but interrelated roles in our national market system—recognized this when the Commission first released the Proposals, and previously advocated for an iterative approach, including in the event that Rule 605 Amendments were adopted first. On March 24, 2023, Virtu submitted a joint statement with Cboe Global Markets, State Street Global Advisors, T. Rowe Price, and UBS Securities LLC urging the Commission to consider such a phased approach to enhancing retail investor execution quality.[9] Virtu also supported the joint letter submitted by the NYSE, Charles Schwab, and Citadel Securities on March 6, 2023, which expressed similar concerns about the simultaneous implementation of four far-reaching proposals.[10] All of these entities were unequivocal in their request that, instead of implementing the Rule 605 Amendments and the other Proposals all at once, the Commission take a methodical approach that would enable responsible iteration for the Market Structure Rule Proposals with objectively measurable outcomes *after* the Commission's review and analysis of sufficient data generated in the wake of a proposed rule's implementation.[11] That these major institutions have all advocated for such a process, and continue to do so, strongly suggests that the Commission's current approach and method of analysis is fundamentally flawed.

Separately, re-proposal or re-opening of the comment periods for the Proposals is also appropriate because the Commission conducted a biased and lopsided rulemaking process for the Rule 605 Amendments and Market Structure Proposals. In particular, the SEC communicated extensively with exchanges and academics aligned with exchanges, soliciting their ideas and proposals for reform while engaging significantly less with market participants with extensive knowledge, expertise, and for whom any rule changes would have an equally significant impact. *See, e.g.*, Exhibit A.[12] In this respect, the Commission's approach deprived other market participants of the opportunity for their views to be sufficiently considered.

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8 Peirce Rule 605 Adoption Statement, *supra* note 7.

9 Joint Letter of Cboe Global Markets, State Street Global Advisors, T. Rowe Price, UBS Securities LLC, and Virtu (Mar. 24, 2023), *available at* https://www.sec.gov/comments/s7-32-22/s73222-20161714-330556.pdf.

10 Joint Letter of NYSE Group, Inc., Charles Schwab & Co., and Citadel Securities to the Securities and Exchange Commission (Mar. 6, 2023), *available at* https://www.ice.com/publicdocs/nyse/Joint_Consensus_Position_Letter_to_the_SEC.pdf.

11 The American Consumer and Investor Institute (ACII) also recently submitted a comment letter expressing these same concerns and making the same request, namely that "the Commission should withdraw the Proposed Rules and evaluate, after the amendments to Rule 605 have gone into effect, whether additional reforms are necessary at all." ACII Comment Letter Re: Order Competition Rule; Regulation Best Execution; Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders; Conflicts of Interest Associated with the Use of Predictive Data Analytics by Broker-Dealers and Investment Advisers (May 20, 2024), *available at https://www.sec.gov/comments/s7-32-22/s73222-474911-1361474.pdf*.

12 Ex. A, Excerpt of Dec. 6, 2023 SEC Freedom of Information Act (FOIA) Production, 5 U.S.C. § 552 Request No. 22-02323-FOIA (emails between the Commission and Nasdaq representatives in which the Commission solicits further information on Nasdaq's "intelligent tick proposal" and a Nasdaq representative shares a series of Nasdaq papers and findings related to "pennying," explaining that a "one size fits all approach" is not the best solution, and it would instead be better to focus on tick constrained stocks rather than implementing the same new ticks across the board).

The Commission's partiality—or at the very least, the appearance of it—towards exchanges is especially concerning because it appears to reach the highest levels of the Commission. Indeed, Chair Gensler had repeated and extensive interactions with national stock exchanges from April 2021 to March 2022, as demonstrated by entries in his public calendar.[13] In December 2021, Chair Gensler hired Dr. Haoxiang Zhu as the SEC Director of Division and Trading and Markets—who commented to Chair Gensler when he was a candidate for his current position that he believed he was "in the right place on the political spectrum" for Chair Gensler to hire him.[14] The Division of Trading and Markets, led by Dr. Zhu, then spearheaded the proposal of market structure rules, releasing them one year after Dr. Zhu was hired following an insufficient and distorted review process. Given these and other inequities in the prior rule proposal process, re-proposal and re-opening of the comment periods would be an appropriate remedy for the Commission to undertake.

* * *

The Commission has a long history of engaging in thoughtful, deliberate, and data-driven regulation. Consistent with that approach, the Commission should embrace the careful, more responsible and logical regulatory approach proposed here by gathering and analyzing data on the impact of the Rule 605 Amendments, and then, *only if needed*, re-proposing the remaining Market Structure Rule Proposals or re-opening the comment periods.

Respectfully submitted,

Thomas H. Merritt
Deputy General Counsel

cc: The Honorable Gary Gensler, Chair
The Honorable Hester M. Peirce, Commissioner
The Honorable Caroline A. Crenshaw, Commissioner
The Honorable Mark T. Uyeda, Commissioner
The Honorable Jaime E. Lizarraga, Commissioner
Dr. Haoxiang Zhu, Director, Division of Trading and Markets

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[13] *See* Ex. B, a list of meetings with national stock exchanges and related constituencies on Chair Gensler's publicly available calendar from April 19, 2021 through March 31, 2022.

[14] *See* Ex. C, Excerpt of March 14, 2024 SEC FOIA Production, 5 U.S.C. § 552 Request No. 22-02323-FOIA (May 18, 2021 email in which Dr. Zhu writes, "I believe I'm in the right place on the political spectrum, and I'm happy to provide as many details as needed so you feel comfortable.")

EXHIBIT A

To: Henderson, Jill[redacted]@sec.gov]
Cc: Rao, Sai[redacted]@SEC.GOV]; Nimmo, Joshua[[redacted]@SEC.GOV]; Phil Mackintosh[redacted]@nasdaq.com]
From: Sally Nabulsi
Sent: Fri 5/6/2022 8:37:52 AM
Subject: RE: Question about Tick Sizes and Pennying
Received: Fri 5/6/2022 8:38:14 AM

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Jill,
May 17th @2pm work for our team.
On the call will be:
John Zecca
Tal Cohen
Chuck Mack
Jeff Davis
Phil Mackintosh.
Thank you,
Sally
Sally Nabulsi
Executive Assistant to John Zecca
EVP, Chief Legal and Regulatory Officer

Nasdaq

Cell [redacted]
Email [redacted]@nasdaq.com

rewritetomorrow.com

From: Henderson, Jill <[redacted]@sec.gov>
Sent: Wednesday, May 4, 2022 4:11 PM
To: Phil Mackintosh <[redacted]@nasdaq.com>; Sally Nabulsi <[redacted]@nasdaq.com>
Cc: Rao, Sai <[redacted]@SEC.GOV>; Nimmo, Joshua <[redacted]@SEC.GOV>
Subject: RE: Question about Tick Sizes and Pennying

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Phil,
Would one of the following dates/times work for you?

- May 13 at 3:00
- May 17 at 2:00
- May 19 at 11:00

Regards,
Jill
Jill S. Henderson
Senior Counsel to the Director and Chief Economist
Division of Economic and Risk Analysis
U.S. Securities and Exchange Commission
100 F St. NE | Washington DC 20549
[redacted] | [redacted]@sec.gov

From: Rao, Sai <[redacted]@SEC.GOV>
Sent: Wednesday, May 04, 2022 2:57 PM

To: Phil Mackintosh (b)(6) [redacted]@nasdaq.com>; Sally Nabulsi <(b)(6) [redacted]@nasdaq.com>
Cc: Zhu, Haoxiang <(b)(6) [redacted]@SEC.GOV>; John Zecca <(b)(6) [redacted]@nasdaq.com>; Jeffrey S. Davis <(b)(6) [redacted]@nasdaq.com>; Tal Cohen <(b)(6) [redacted]@nasdaq.com>; Wachter, Jessica <(b)(6) [redacted]@SEC.GOV>; Nimmo, Joshua (b)(6) [redacted]@SEC.GOV>; Henderson, Jill <(b)(6) [redacted]@sec.gov>
Subject: RE: Question about Tick Sizes and Pennying

Hi Phil,

Thank you very much for this. It's quite a lot to digest! I'm looking forward to talking more about it. It's an interesting tradeoff between simplicity and optimality. I've included Jessica, Josh, and Jill (lots of J's!). Josh and Jill, could you please help look for a time that works for the team?

-Sai

From: Phil Mackintosh <(b)(6) [redacted]@nasdaq.com>
Sent: Monday, May 02, 2022 4:20 PM
To: Rao, Sai <(b)(6) [redacted]@SEC.GOV>
Cc: Zhu, Haoxiang (b)(6) [redacted]@SEC.GOV>; John Zecca (b)(6) [redacted]@nasdaq.com>; Jeffrey S. Davis <(b)(6) [redacted]@nasdaq.com>; Phil Mackintosh (b)(6) [redacted]@nasdaq.com>; Tal Cohen <(b)(6) [redacted]@nasdaq.com>; Phil Mackintosh (b)(6) [redacted]@nasdaq.com>
Subject: FW: Question about Tick Sizes and Pennying

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Sai,

Sorry for the delay on this – your email arrived while I was on vacation.

I also understand there was already one meeting on the topic too, and there were some specific follow ups you had (which I've addressed, first, in blue below).

As background, I'm sure you know we are proponents of a more intelligent tick size structure in the US Equities markets. Our proposal used dynamics in the market to determine what tick bucket a given security fits into. The main dynamics are stock price, average spread, and liquidity/$volume.

We do not think a one-size-fits-all approach is the best solution and also recognize incremental change can still be beneficial. To that end we believe it would be better to focus on the tick constrained names (some detail below but look at below $30) rather than implementing the same new tick across the board (that's kind of what we have now and it is problematic).

1. **Thoughts on the tick size pilot and related references**

   The tick pilot found that

   - where spreads were forced wider (stocks with 1 cent spreads put into the 5c groups) it cost investors money (shortfall increased, so did fragmentation and hidden trading). We had a **principle that "no stock was harmed"**. Which is hard (impossible) to do with price based cut-offs. That lead us to the "market derived spread" solution.
   - Where spreads were forced wider, depth increased proportionally (supply and demand formed the same "V-shape" regardless of ticks). We use that to show that if you remove round lots, **ticks can be used to ensure depth accumulates** to "actionable $$" by setting spreads just wide enough.
   - Also, the pilot found that for stocks that had **a spread >$0.10 prior** to the pilot actually saw a **decrease in their spread on average. Depth also increased**. See tables on pages 19 and 20: https://www.sec.gov/files/TICK%20PILOT%20ASSESSMENT%20FINAL%20Aug%202.pdf. This speaks to the pennying questions you asked below too.

2. **More information on the split studies we used for the intelligent ticks paper.**

   The summary is here: https://www.nasdaq.com/articles/splitting-stocks-changes-them-fundamentally-2020-09-24. Essentially what we saw is that ....

   - Spreads have a U-shaped pattern
     - Price too low (and Tick constrained): Queues are longer and fragmentation (into inverted or dark) is higher
     - Price too high: There is more odd lots and hidden order usage. Quotes change much more.
   - Market quality improves after a split – liquidity improves, spreads fall, intraday volatility falls. We even saw that when AAPL and TSLA split see chart 6 in https://www.nasdaq.com/articles/what-options-tell-us-about-stock-splits-2020-11-05.

- Importantly, we saw that reverse splitting *closer to the perfect stock price* helped those stocks too: https://www.nasdaq.com/articles/the-impact-of-reverse-splits-on-low-priced-stocks-2021-10-28

3. **There are a lot of papers on tick sizes being too small/big. There are also a couple studies that talk about how "liquidity" and "tradability" impact companies' Weighted Average Cost of Capital (WACC)**

Research showing there are "Optimal" spreads (too many ticks is not good either)

However there ARE some academic studies that support an "optimal" tick – generally where it is around half the actual (markets natural level) spread.

- **EU MIFIDII analysis** of their own tick regime included benefits to message traffic, quote flickering and more stable price formation https://www.amf-france.org/en/news-publications/publications/reports-research-and-analysis/mifid-ii-impact-new-tick-size-regime-after-several-months-implementation importantly they found "For *small caps*, implementing *appropriate* tick sizes resulted in a more dynamic order book and, above all, a sharp increase in traded volumes. https://www.amf-france.org/en/news-publications/publications/reports-research-and-analysis/mifid-ii-impact-new-tick-size-regime where "regulators agreed an appropriate tick such that the corresponding spread is between 1.5 ticks and 2 ticks for liquid securities and between 1.5 ticks and 5 ticks for less liquid securities"
- **This study by Charles Albert Lahalle** using Japans tick changes found a "suitable tick" is when the **bid-ask spread is close to one tick**...where costs are close to zero for market orders. In that case, the market is efficient and **market makers do not take advantage of the tick** value to the **detriment of final investors** acting mainly as liquidity taker https://arxiv.org/pdf/1507.07052.pdf
- **This new study by Mao Ye** discussed the marginal contribution (trade-off between cost and depth) and finds that stock splits improve liquidity when they move the bid–ask spread towards **two ticks; otherwise, they reduce liquidity**: https://microstructure.exchange/papers/mao.pdf. Importantly, this paper notes that Optimal pricing affects valuations too "increase the median U.S. stock value by 69 bps and total U.S. market capitalization by $54.9 billion". Other papers do that too – but mostly looking at liquidity as the driver.
- This study by Julius Bonart: also finds an **"optimal" tick** (for large cap) and finds "fears expressed by regulation agencies about **excessively small tick sizes** seem therefore to be justified" https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2869883
- We also found that when stocks **"reverse spit" too much** (they made their 1-cent spread too small) it **harms tradability**. Especially compared to when they got close to their "perfect" or optimal stock price: https://www.nasdaq.com/articles/the-impact-of-reverse-splits-on-low-priced-stocks-2021-10-28

Papers that talk about "liquidity" and "tradability" being important to reduce WACC

- **This study** found that liquidity improvements following stock splits reduced average cost of equity capital by 17.3%, or 2.4 percentage-points per-annum.
- **Does Financial Market Structure Impact the Cost of Raising Capital** finds direct links to the cost of raising capital, with a market structure that helps investors directly interact with each other, lowered the cost of raising capital on equity offerings by one to two percentage points.

4. **We have not done a deep dive on stocks that trade around $1 and that go back and forth between tick sizes.** What we do know is what the chart below shows:

- Not all stocks are tick constrained (light blue dots)
- But those that are (orange dots) see their spread increase
- Until they pass below $1, where many (but not all, there are still blue dots on the far left) see their spreads fall (orange dots that fall below the diagonal).

5. **A one size fits all tick does have some short comings.** You can definitely have a tick that is "too small". Trading is a trade-off. But we want to make markets work for investors. One of the biggest problems investors have on lit markets is (minimizing) signaling and (keeping) queue priority. Too many ticks can hurt both.

On your email question: is there research on pennying?

I think Haoxiang is right. Specific research on Pennying seems light.

In theory, too many ticks helps momentum/signal traders at the expense of slower natural investors (they can jump in-front of investors for de-minimis costs. That likely helps *traders* capture more spreads (better queue priority at ~90% spread capture), and investors pay more (cross more spreads or waiting longer even as you modify limits to re-peg to BBO). Most of the HFT research looks at all stocks equally and thinks "tighter spreads" are a "good result".

But there is more research showing stocks can have too many, or too few ticks. And that there is a "perfect" level – where economics of trading benefit investors and not predatory (signal) traders:

- Spread capture benefits the passive investor (waiting on the NBBO, without missing too many fills)
- Costs of the active investor are low (crossing spreads to build a position doesn't cost too much)
- **Don't help signal traders (ensure tick-costs are high enough that they can't jump in-front of investors for de-minimis costs and capture spreads first)**
- Note that signaling costs also force investors into dark pools where they signal less, harming the NBBO.

I've tried to summarize most of it below:

The market knows best

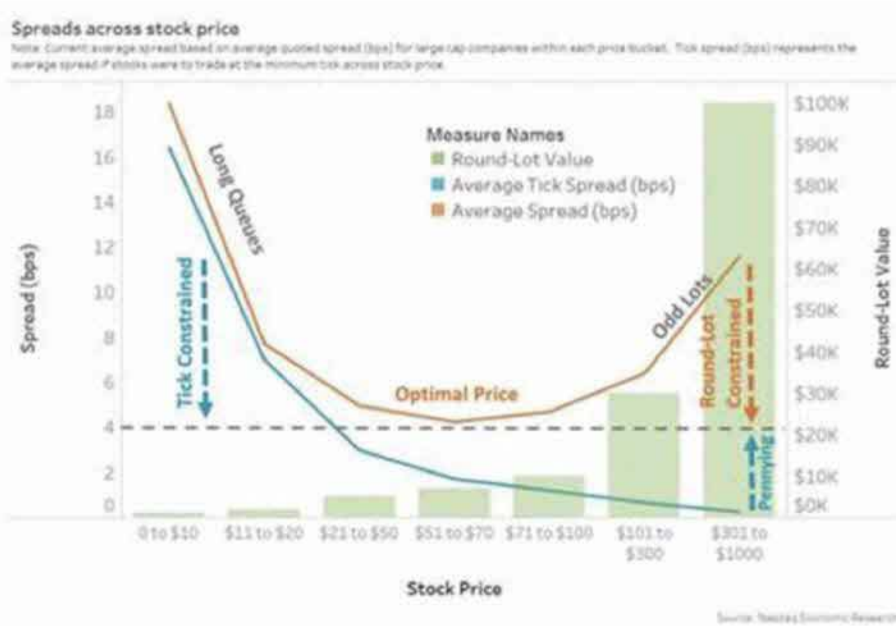
In our own intelligent ticks, we were guided by what the market was telling us. You can see below that a lot of stocks that trade **wider than 10c spread** (even with a 1c tick). And that increases as price goes up.

You may have also seen our study looking at tick constrained stocks. Almost all are below $30. https://www.nasdaq.com/articles/the-tick-constrained-stock-problem. Above $100, odd lots and "too many ticks/pennying" are a bigger problem.

Costs are measured in Percent (just like returns)

Part of the reason is economics.

- 1-cent on a $3 is worth capturing (in fact queues can be too long) = 0.33%
- 1-cent on a $3000 stock isn't = 0.0003% (compared to average daily moves of ~2.0%)
- Plus, 100 shares NBBO on a $3000 stock is a LOT of supply or demand – and the tick pilot showed more liquidity needs a wider spread. As we see now, ODD LOTS penny the NBBO and the market uses more hidden orders. This is the other reason to set wider ticks on higher priced stocks – as **spread in % can help ensure the NBBO include all lots equally, and still has adequate depth to trade**



Most other countries with modern tick regimes reset the tick size as price rises…so that the *economic* spread is the same. I think the MIFID regime, although complicated on paper, shows that most clearly the **economics are the same**:

- Hyper Liquid stocks (light blue) are in a channel of **1-1/2 basis-point spread cost** (that's consistent with our own hyper liquid stocks)
- Moderate liquidity stocks (green) are in a channel of **5-10 basis-point spread cost** (that's consistent with our own mid-cap stocks)
- illiquid stocks (yellow) are in a channel of **50-100 basis-point spread cost** (that's consistent with our own illiquid stocks)

This guy has a similar proposal that's not as complicated as Europes. He also makes the point that "one size fits all" doesn't really fit anything well. At least not when you're talking about ticks where the "cost" = tick/price...and price changes so much.

From: Rao, Sai <(b)(6) [redacted]@SEC.GOV>
Sent: Wednesday, April 20, 2022 8:36 AM
To: John Zecca <(b)(6) [redacted]@nasdaq.com>; Jeffrey S. Davis <(b)(6) [redacted]@nasdaq.com>; Phil Mackintosh <(b)(6) [redacted]@nasdaq.com>; Tal Cohen <(b)(6) [redacted]@nasdaq.com>
Cc: Zhu, Haoxiang <(b)(6) [redacted]@SEC.GOV>
Subject: Question about Tick Sizes and Pennying

WARNING - External email; exercise caution.

Hi y'all,

I hope you're doing well. Angelica and Keo will be scheduling a follow-up meeting with Chair Gensler on equity market structure. On a related note, Haoxiang and I were talking about tick sizes. He can correct me if I'm getting this wrong, but I believe there's little academic evidence about the negative impacts of pennying. This made me wonder – since your intelligent tick proposal advocates for larger ticks for some high priced stocks because of the negative effects on liquidity due to pennying, you must have some data showing its existence, no? I would think you could see it for high price stocks whose spreads in terms of bps are small enough that it's relatively cheap for someone to jump the queue.

Thanks,

Sai

EXHIBIT B

<u>SELECT ENTRIES FROM CHAIR GARY GENSLER'S CALENDAR</u>[1]

Date	Organization Met/Spoke With	Individuals Listed
3/29/22	Investors Exchange (IEX); FTX	Brad Katsuyama, Chief Executive Officer, IEX; John Ramsay, Chief Market Policy Officer, IEX; Rachel Barnett, General Counsel, IEX; Florian Seifferer, Chief Operating Officer, IEX; Sam Bankman-Fried, Chief Executive Officer, FTX; Brett Harrison, President, FTX; Ryne Miller, General Counsel, FTX; Mark Wetjen, Head of Policy and Regulatory Strategy, FTX
3/28/22	Healthy Markets Association (HMA)	Tyler Gellasch, Executive Director, HMA; Christopher Nagy, Director, HMA; Joseph Engelhard, Board Member, HMA; Michael Canning, Principal, LXR Group; James Andrus, Interim Managing Investment Director, Board Governance & Sustainability, California Public Employees' Retirement System (CalPERS); Gregory Babyak, Global Head of Regulatory Affairs, Bloomberg; David Brooks, Director of Trading, The London Company of VA; Katherine

[1] This chart reflects certain of Chair Gensler's calendar entries from April 19, 2021 through March 31, 2022, as made available on https://www.sec.gov/foia/docs/sec-chair-calendar.

Date	Organization Met/Spoke With	Individuals Listed
		Comly, Legal Association, MIAX; Brendan Hart, Director of Legal, OMERS; Vlad Khandros, Head of Corporate Development, Trumid; Eric Stockland, Managing Director, BMO Capital Markets; Geoff Bernard, Head of Electronic Trading, Keybanc; Josh Bezonsky, Vice President of Legal and Compliance, OMERS; Michael Ledwith, Head of Algorithmic Trading, Quantitative Investment Management; Eric Perlish, Global Head of Trading, Sands Capital Management; John Ramsay, Chief Market Policy Officer, IEX; Peter Sparby, Corporate Counsel, MGEX; Adam Goldberg, Regional Operations, S&P Global Market Intelligence
3/17/22	Investors Exchange (IEX)	Brad Katsuyama, Chief Executive Officer; Ronan Ryan, President; Stan Feldman, Chief Operating Officer; John Ramsay, Chief Market Policy Officer
2/11/22	Intercontinental Exchange (ICE); NYSE Group	Jeffrey Sprecher, Chief Executive Officer (ICE); Elizabeth King, Chief Regulatory Officer (ICE); Michael Blaugrund, Chief Operating Officer, NYSE Group; Lynn Martin, President, NYSE Group; Hope

Date	Organization Met/Spoke With	Individuals Listed
		Jarkowski, General Counsel, NYSE Group
2/7/22	NYSE Group	Lynn Martin, President; Hope Jarkowski, General Counsel
1/19/22	Numerous Organizations	Mark Wendland, Chief Operating Officer, DRW Holdings, LLC; Graham Harper, Head of Public Policy and Market Structure, DRW Holdings, LLC; Jonah Platt, US Head of Government & Regulatory Policy, Citadel Securities, LLC; Adam Nunes, Head of Business Development, Hudson River Trading (HRT); Joanna Mallers, Secretary, FIA Principal Traders Group; Jim Newsome, Partner, Delta Strategy Group; Scott Parsons, Managing Partner, Delta Strategy Group
12/20/21	Nasdaq, Inc.	Adena Friedman, Chief Executive Officer; John Zecca, Chief Legal and Regulatory Officer; Tal Cohen, Head of North American Markets; Phillip Mackintosh, Chief Economist; Jeffrey Davis, North American Markets
12/17/21	MIAX Exchange Group	Thomas Gallagher, Chairman and Chief Executive Officer; Shelly Brown,

Date	Organization Met/Spoke With	Individuals Listed
		Executive Vice President of Strategic Planning and Business Development; Barbara Comly, General Counsel and Corporate Secretary; Edward Deitzel, Chief Regulatory Officer and Chief Compliance Officer; Lance Emmons, Chief Financial Officer; Douglas Schafer Jr., Chief Information Officer; Joseph Ferraro III, Deputy General Counsel
12/10/21	Managed Funds Association (MFA)	Bryan Corbett, President and Chief Executive Officer, Managed Funds Association (MFA); Jennifer Han, Executive Vice President, Chief Counsel, and Head of Regulatory Affairs, MFA; Sarah Arnold, Manager, MFA; Tasha Ashby, Executive Assistant, MFA; Fahmi Quaidir, Founder and Chief Investment Officer, Safkhet Capital; Jim Rowen, Chief Operating Officer, Renaissance Technologies; Ricardo Marano, Chief Operating Officer, King Street Capital Management LP; Stephen Berger, Managing Director of Government and Regulatory Policy, Citadel LLC; Jeffrey Wechselblatt, General Counsel, Lone Pine Capital

Date	Organization Met/Spoke With	Individuals Listed
12/6/21	Intercontinental Exchange (ICE); New York Stock Exchange (NYSE)	Jeffrey Sprecher, Chief Executive Officer, ICE; Elizabeth King, President, ESG and Chief Regulatory Officer, ICE; Michael Blaugrund, Chief Operating Officer, NYSE; Hope Jarkowski, General Counsel, NYSE
12/3/21	Intercontinental Exchange (ICE)	Jeffrey Sprecher, Chief Executive Officer
11/17/21	Nasdaq, Inc.	Adena Friedman, Chief Executive Officer; John Zecca, Chief Legal and Regulatory Officer; Tal Cohen, Head of North American Markets
10/29/21	Investors Exchange (IEX)	Brad Katsuyama, Chief Executive Officer; Rachel Barnett, Chief Legal Officer; Claudia Crowley, Chief Regulatory Officer
10/8/21	Intercontinental Exchange (ICE); NYSE Group	Jeffrey Sprecher, Chief Executive Officer, ICE; Michael Blaugrund, Chief Operating Officer, NYSE Group; Elizabeth King, General Counsel, NYSE Group
9/28/21	Robinhood	Vladimir Tenev, Chief Executive Officer; James Swartwout, President and Chief Operating Officer; Daniel Gallagher, Chief Legal Officer; Lucas Moskowitz, Deputy General Counsel; John Markle,

Date	Organization Met/Spoke With	Individuals Listed
		Deputy General Counsel; Aparna Chennapragada, Chief Product Officer; Benjamin Brown, Principal, Blue Ridge Law & Policy
9/23/21	Chicago Board Options Exchange (CBOE)	Edward Tilly, Chairman, President and Chief Executive Officer
9/21/21	Virtu	Doug Cifu, Chief Executive Officer; Matthew Levine, Chief Compliance Officer; Justin Waldie, General Counsel; Thomas Merritt, Deputy General Counsel, Global Business Development, Corporate Strategy, and Communications; Alan Sobba, Advisor
9/3/21	Futures Industry Association Principal Traders Group (FIA PTG)	Joanna Mallers, Vice President, FIA, Inc.; Nancy Stern, Chief Executive Officer and Board Member, Allston Holdings LLC; Philip Pinc, General Counsel, Allston Holdings LLC; Kevin Devlin, Chief Financial Officer, Allston Holdings LLC; Jonah Platt, U.S. Head of Government & Regulatory Policy, Citadel Securities; W. Graham Harper, Head of Public Policy and Market Structure, DRW Holdings, LLC; Mark Wendland, Chief Operating Officer, DRW Holdings, LLC; Adam Nunes, Head of Business Development,

Date	Organization Met/Spoke With	Individuals Listed
		Hudson River Trading; Scott McClure, Business Operations Manager, Hudson River Trading; Steve Waldron, Head of Global Clearing, Jump Trading LLC; Max Joubert, Compliance Analyst, Jump Trading LLC; Philip Reinckens, Business Development, Optiver; Liam Smith, Head of Corporate Strategy, Optiver; Matthew Haraburda, President, XR Trading LLC; Scott Parsons, Managing Partner, Delta Strategy Group; James Newsome, Partner, Delta Strategy Group; James Overdahl, Partner, Delta Strategy Group; Kevin Batteh, Partner, Delta Strategy Group; Daniel Austin, Counsel, Delta Strategy Group; Edmund Perry, Policy Analyst, Delta Strategy Group
8/9/21	Intercontinental Exchange (ICE)	Jeffrey Sprecher, Chief Executive Officer
8/4/21	Chicago Board Options Exchange (CBOE)	Edward Tilly, Chairman, President and Chief Executive Officer; Patrick Sexton, Secretary, Executive Vice President and General Counsel
7/23/21	Chicago Board Options Exchange (CBOE)	Edward Tilly, Chairman, President and Chief Executive Officer
6/27/21	Office of Senator Elizabeth Warren	Senator Elizabeth Warren

EXHIBIT C

To: Gensler, Gary[(b)(6) [redacted]@SEC.GOV]
From: Haoxiang Zhu
Sent: Tue 5/18/2021 8:07:36 PM
Subject: follow up on writings and articles
Received: Tue 5/18/2021 8:10:13 PM
Candidate Questions Zhu.docx

Hi Gary
Thanks a lot for the call today and the deep dive into my work! I'm definitely with you in terms of increasing transparency, increasing competition, reducing market power and reducing concentration. I believe I'm in the right place on the political spectrum, and I'm happy provide as many details as needed so you feel comfortable.
I'm attaching a document that I'll send to the Office of Human Resources tonight; they sent me the questionnaire yesterday and asked me to fill up. This doc has a detailed list of my publications and opinion pieces in case you need a reference. I may send a separate document later to Human Resources that contains media quotes of me or my work.
To follow up on the substantive points we covered on the call:

(b)(5)
[redacted]

I have an online seminar 9-10:30pm tonight—it's late because the host is in Australia! I can chat 10:30pm if it's too late for you. Or I can also chat tomorrow (Wednesday) morning anytime. Thanks!
Best,
Haoxiang