Tick Constrained Securities

Why GE's basis point spread was four times higher before its reverse split

—and what we should do about it

Adrian Griffiths
Head of Market Structure, MEMX

August 2021

Our recent paper on expediting round lot reform, *Why We Should Change Round Lots Now*, illustrated how the standard 100-share round lot creates artificially wide spreads in high-priced "lot constrained" securities, potentially costing investors billions of dollars in transaction costs. Yet a soaring stock price is not the only way that securities prices can negatively impact spreads and cost investors money. Reviewing spreads in low-priced "tick constrained" securities exposes another casualty of our "one-size-fits-all" market structure, where securities with different trading characteristics are shoehorned into a regulatory scheme that does not account for these differences.

There are almost one thousand securities that are consistently traded with a penny spread for virtually the entire trading day. Many of these securities are actively traded by retail and other investors, and in aggregate they make up about half of all volume and a quarter of trades and notional value executed on a daily basis in the U.S. equity markets. We've analyzed the data around how these securities trade today, and they are often subject to artificially wide basis point spreads due to the limitations of Rule 612 of Regulation NMS (the "Sub-Penny Rule"). The time has come to update the rules that govern how these securities trade to eliminate this inefficiency. That's why we're recommending that the U.S. Securities and Exchange Commission ("SEC"):

1. Establish a minimum increment of half of one cent ($0.005) in tick constrained securities that trade with an average quoted spread of 1.1 cents or less[1]; and
2. Reduce the access fee cap pursuant to Rule 610(c) to $0.0015 for tick constrained securities trading with a $0.005 minimum increment.

1 Today, orders are also permitted to be priced at the midpoint of the national best bid and offer ("NBBO"). We recommend that midpoint orders be permitted in an increment of $0.0025 for any tick constrained security that is quoted in a $0.005 increment.

When it adopted Regulation NMS, the SEC acknowledged that an exemption from the requirements of the Sub-Penny Rule pursuant to Rule 612(c) of Regulation NMS might be appropriate if, among other relevant factors, a security "always trades with a penny spread and there is tremendous liquidity available on both sides of the market." Our data clearly shows that a significant segment of the U.S. equity market always trades with a penny spread, and liquidity at the quote in these securities is much higher, ranging from around 5x to 8x higher for tick constrained corporate securities and around 9x to 59x higher for tick constrained exchange traded products ("ETPs"),[2] as market participants are prevented from posting at more aggressive prices. In addition, coupling our recommended tick size changes with a targeted reduction in the access fee cap from $0.0030 to $0.0015 would both prevent potential market distortions that could occur when fees exceed half the minimum increment and reduce industry take fee costs by an estimated ~$879 million per year. MEMX is therefore submitting a request for exemptive relief pursuant to Rule 612(c) requesting that the SEC permit market participants, including exchanges, alternative trading systems, and other trading venues to operate consistent with the above recommendations. Ultimately, we believe that such changes are needed and would facilitate both the needs of investors and the continued health of the U.S. equity markets.

2 Based on comparing notional at the NBBO for tick constrained securities vs. securities trading with a spread of between $0.02 to $0.03 across various liquidity categories.

I. The Tick Size Problem: Why One Size Doesn't Fit All

Rule 612 of Regulation NMS, known as the "Sub-Penny Rule," prohibits market participants from displaying, ranking, or accepting quotations in NMS stocks that are priced in an increment of less than $0.01, unless the price of the quotation is less than $1.00. The Sub-Penny Rule was designed to address the possibility of stepping ahead of displayed limit orders by economically insignificant amounts. While this is a laudable goal, it rests on an implicit assumption that what constitutes an "economically insignificant amount" is the same for all securities priced above $1.00. But is this really a fair assumption? The data suggests no.

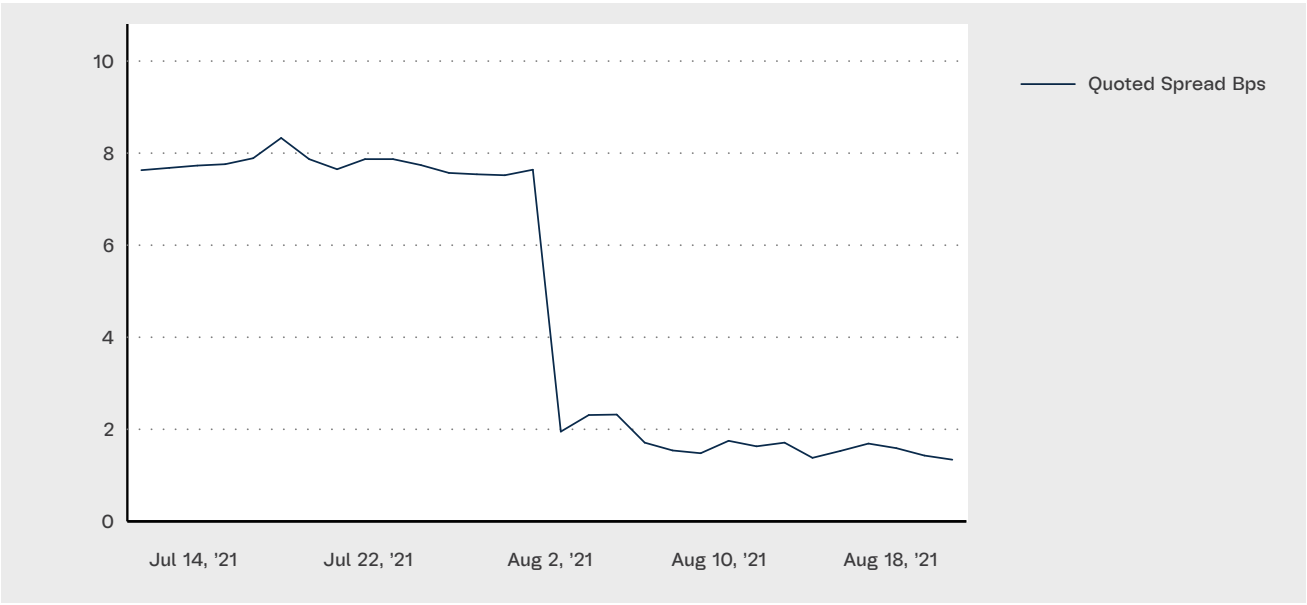
GE recently effectuated a 1-for-8 reverse stock spilt, a rare event for stocks in the S&P 500 Index and a perfect opportunity for us to re-evaluate whether our market structure is facilitating the needs of investors. The reverse stock split reduced the number of GE shares outstanding and consequently increased the price of each share from $12.95 at the close on July 30, 2021 to $104.48 at the open on August 2, 2021. But that's not all that it did. It also dramatically reduced spreads and improved market quality in GE, which like many other, often low-priced, U.S. equity securities, had traded inefficiently under a regulatory structure that applies the same tick size to virtually all symbols regardless of how they trade. And, while the reverse split improved trading in GE, it raises important questions about the costs of our current one-size-fits-all market structure as the tick size constraints that hindered trading in GE persist in many other U.S. equity securities.

The U.S. equity market is composed of thousands of equity securities with different trading characteristics that are nonetheless subject to the same regulatory structure. Good regulation should not be overly complex, but at the same time it needs to account properly for differences in the products and services being regulated. The SEC clearly recognized this when it chose to include round lot reform in its recent rulemaking on market data infrastructure, and that's exactly the approach that we need to address the current tick size problem. The data on spreads is clear. Both high- and low-priced securities are subject to wider spreads due to

outdated rules that govern how these securities trade. Providing market participants with relief from the requirements of the Sub-Penny Rule to allow a minimum increment of half a cent for "tick constrained" securities that almost always trade with a penny spread could reduce quoted spreads and improve trading outcomes for investors across a number of actively traded U.S. equity securities. And, as we discuss later, such a change should also be coupled with a targeted change to the access fee cap pursuant to Rule 610(c) of Regulation NMS, further reducing costs in these securities.

What's the relationship between low security prices and quoted spreads? The answer is simple math. A one cent spread represents a larger proportion of the cost of a share traded in a low-priced security, but due to the Sub-Penny Rule exchanges cannot offer finer pricing increments and liquidity providers cannot compete spreads down further even when that may be the optimal economic outcome. Let's look again at the example of GE. GE is a liquid, blue-chip stock that trades in the region of $1 billion notional each day. As shown in Chart A below, the average quoted spread in GE on July 30, 2021, immediately prior to its reverse stock split, was 7.64 bps, significantly higher than other similarly liquid stocks. On August 2, 2021, after the reverse stock split was effectuated, quoted spreads in GE fell to 1.95 bps. Why was the quoted spread in GE four times higher immediately before its reverse split? In short, it's the tick size. Before its reverse split, GE traded with a one cent spread, the minimum possible under the current tick regime, virtually all day. However, since GE traded around $12.95 at that time, that one cent minimum increment translated to a 7.64 bps spread. Quoting in GE was therefore artificially "constrained" by the tick size before the reverse stock split increased the price of the security.

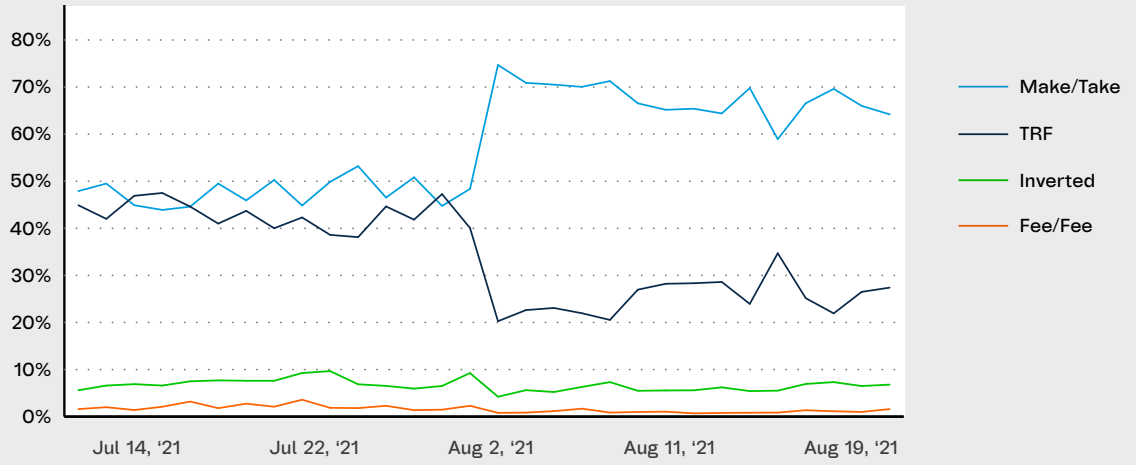
Chart A: Average Quoted Spread in Basis Points in GE



This has a real impact on transaction costs for investors. When investors trade, the spread is an important transaction cost that they must pay to enter into or close out a position. On July 30, 2021, GE traded with an average trade size of 454 shares, equivalent to a notional value of $5,879. With a quoted spread of 7.64 bps, it would have cost an investor that bought on the offer and sold at the bid about $4.49 in spread to enter and exit a position of this size. The very next trading day, with the quoted spread tightening to 1.95, it would instead cost $1.45 to trade an equivalent amount of GE stock. An investor looking to invest in GE would therefore have paid almost four times as much to invest a set dollar amount in GE before its reverse split. This has nothing to do with the company's financials or market conditions and everything to do with tick size restrictions that do not account for a stock's trading characteristics in determining the minimum increment.

It may also be a factor in other broader market structure trends, particularly around where securities trade. As shown in Chart B below, GE's reverse stock split appears to have contributed to a dramatic shift of volume from the TRF to exchange venues, suggesting that tick constraints resulting from the Sub-Penny Rule may also have a significant impact on venue competition.

Chart B: Market Share by Venue Type in GE



And similar inefficiencies continue to be seen across a wide swath of U.S. equity securities that do not trade well under the current one-size-fits-all tick size regime. Chart C below shows how the tick size requirements imposed by the Sub-Penny Rule translate to artificially wide spreads in a number of other U.S. equity securities, particularly in low-priced securities where the current penny increment is more meaningful in relation to the price of the security.

Chart C: Price and Quoted Spreads Bps by Symbol (8/3/2021)

II. Déjà vu Strikes Sixteen Years After the Adoption of Regulation NMS

Interestingly, the SEC seems to have anticipated the possibility that the Sub-Penny Rule could create these kinds of inefficiencies. The Regulation NMS adopting release discusses a comment contending that the tick size may be too wide if a security "always trades with a penny spread and there is tremendous liquidity available on both sides of the market." In response, the SEC stated that this would be a "reasonable consideration" in determining whether to grant an exemption to the Sub-Penny Rule and went on to list several other relevant factors, including: (1) "[w]hether the NMS stock is an ETF or other derivative that can readily be converted into its underlying securities or vice versa, in which case the true value of the security as derived from its underlying components might be at a sub-penny increment;" (2) "[l]arge volume of sub-penny executions in that security due to price improvement;" and (3) "[l]ow price of the security." We've reviewed the data on tick constraints and many of these factors are at play today.[3]

Tick Constraints are Particularly Problematic in Low-Priced Securities & ETPs

A significant portion of the U.S. equity market trades with a consistent penny spread throughout most of the trading day. In fact, during the Q1 – Q2 2021 period that we studied for this tick size analysis, almost one thousand securities trading at or above $1 were "tick constrained," which we define as trading with an average quoted spread of 1.1 cents or less.[4] Unsurprisingly, these include a number of actively traded securities, with tick constrained securities as a group accounting for 47% of volume, 28% of trades, and 25% of notional value executed. Quoted spreads in these securities are limited not by supply and demand, but rather by outdated regulatory constraints that apply the same tick size regime to securities

3 We do not analyze the volume of sub-penny executions as trades in sub-penny increments are likely to be indicative of retail internalization as opposed to market participants seeking to trade within a tick constrained spread.

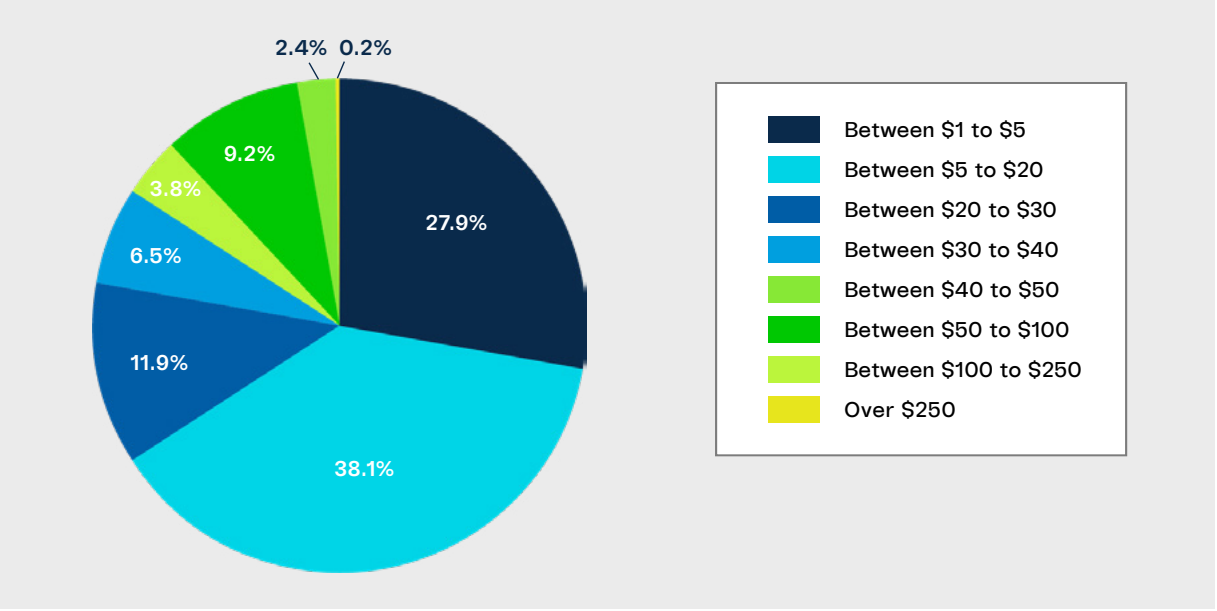
4 There were an average of 998 tick constrained securities during this period.

with different trading characteristics. And as we've seen in the GE example, the unfortunate result is wider spreads and increased transaction costs for investors. It is difficult to estimate the exact cost of tick constraints as some tick constrained securities would naturally trade with a penny spread even if a smaller tick size was permitted. However, given the amount of trading that takes place in these securities, the total cost to investors is likely to be sizeable. But where do tick constraints pose the largest burden to the market? Our analysis shows that the considerations listed by the SEC were prescient as low-priced securities and exchange traded products ("ETPs") are more likely to suffer from tick constraints.

Tick Constraints by Stock Price

First, let's take a quick look at the distribution of tick constrained securities across different price buckets. Our analysis shows that tick constraints are a big problem in low-priced securities where the one cent minimum increment is more "economically significant" relative to the price of a share of stock. In fact, as shown in Chart D, two-thirds (66%) of all tick constrained securities trade in the two lowest price buckets we examined, which include NMS stocks that trade between $1 and $20 per share. As we saw in the GE example, a one cent spread becomes more significant the lower the price of the security. Thus, low-priced securities are more likely to be tick constrained, and the impact of that tick constraint in terms

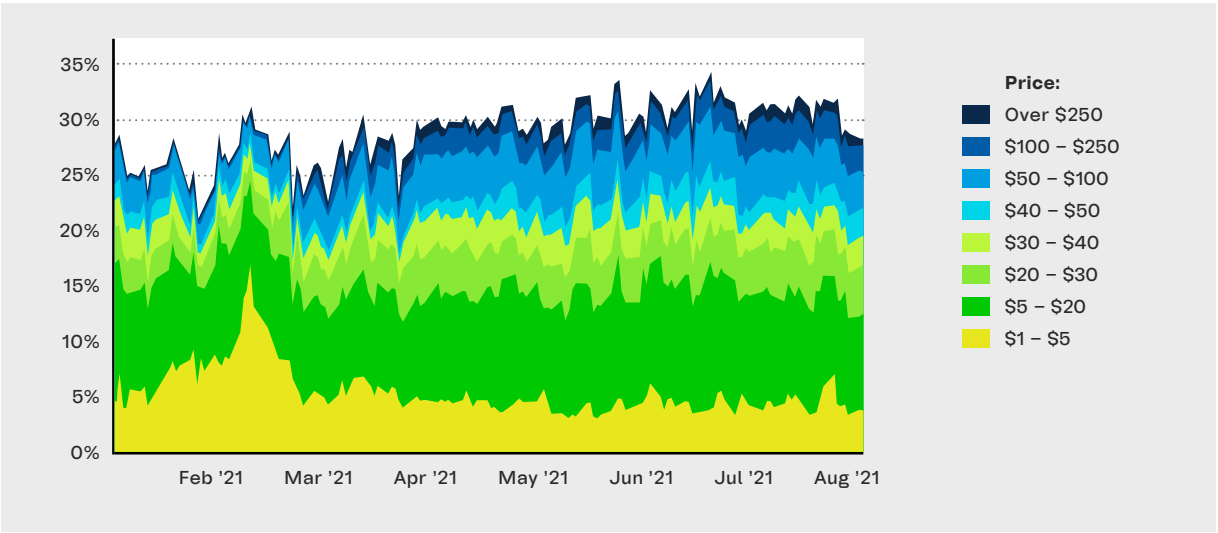
Chart D: Percent of Tick Constrained NMS Stocks



of the basis point spread, which is relevant when measuring the cost of entering into a transaction, is also largest in these securities.[5]

That said, there are tick constrained securities across the price spectrum, including notable examples of high-priced, actively-traded, securities that are also tick constrained, particularly in the case of liquid ETPs, many of which are tick constrained even at much higher prices.[6] In fact, if we look at trading activity in tick constrained securities as a proportion of the overall U.S. equity market, we see that tick constrained securities in the two lowest price buckets account for roughly half of trades and volume (see Charts E and F below). However, on a notional basis a larger proportion of trading actually occurs in tick constrained securities in the higher price buckets (see Chart G below). Thus, while there is a need to address tick constraints in low-priced securities, both due to the number of securities impacted and the larger impact of those tick constraints on spreads,[7] it's important that any regulatory solution to this problem address the full range of NMS stocks, including more actively-traded, high-priced securities that are also tick constrained.

Chart E: Percent of Trades



5 See Chart C *supra*. As shown in Chart C, quoted spreads for tick constrained NMS stocks increase as price decreases since the spread (bps) is a function of the one cent minimum increment divided by the price of the security.

6 The following section shows that daily notional traded and the type of underlying are good predictors of whether an ETP is likely to be tick constrained.

7 Id.

Chart F: Percent of Volume

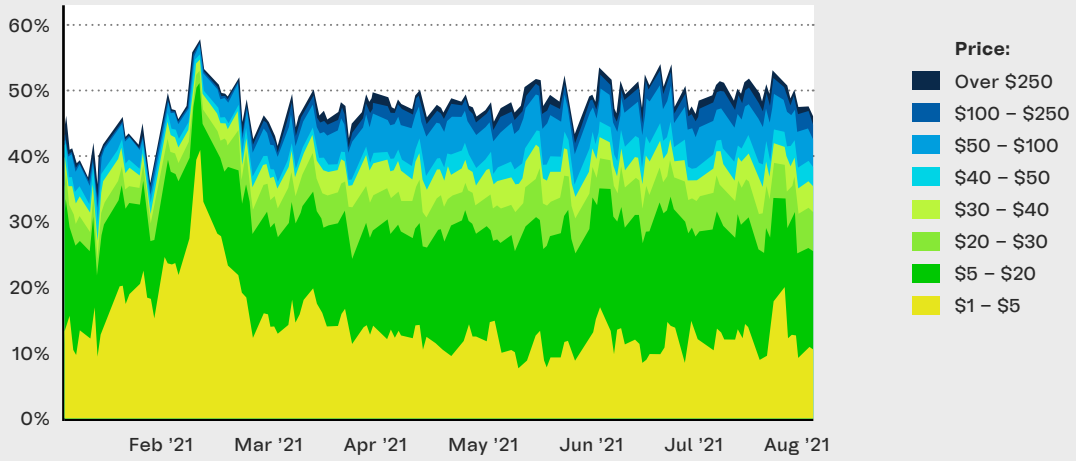
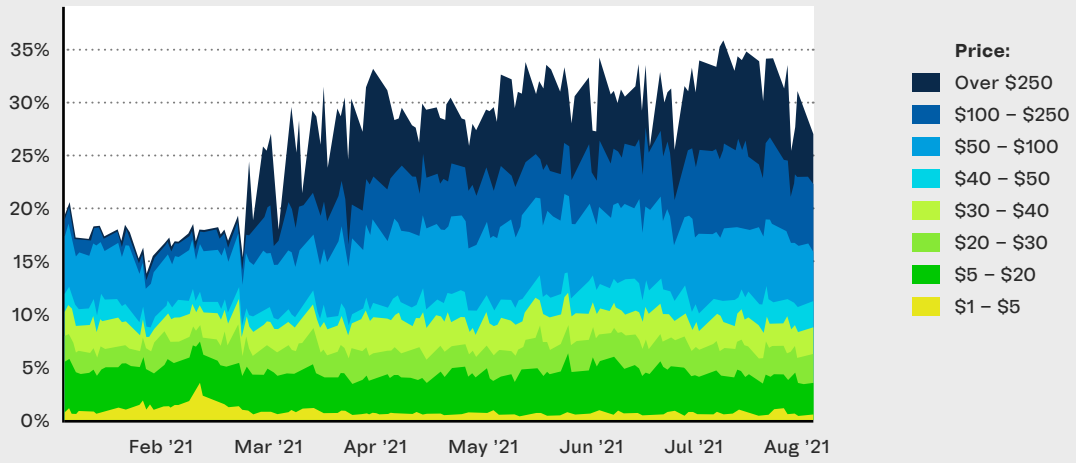


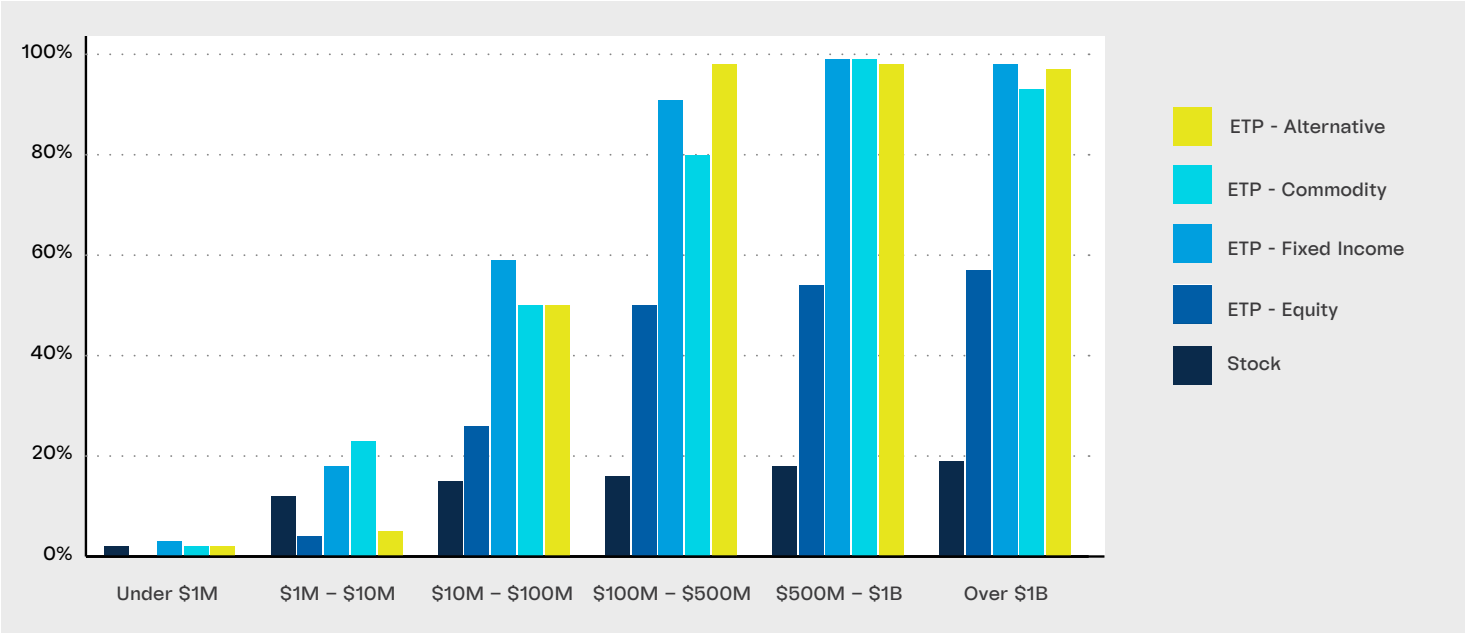
Chart G: Percent of Dollar Volume



Tick Constraints: Corporate Securities vs. ETPs

Second, let's briefly review the prevalence of tick constraints across corporate securities and ETPs. Although tick constraints impact a relatively smaller proportion of both corporate securities and ETPs that are less liquid,[8] when looking at liquid securities trading at least 100 million notional each day, we see a substantially higher percentage of tick constrained ETPs. In fact, as shown in Chart H below, among this group of more liquid U.S. equity securities, more than half of equity ETPs and the vast majority of fixed income, commodity, and other ETPs are tick constrained. By contrast, corporate securities are much less likely to be subject to tick constraints regardless of liquidity, with less than 20% of even the most liquid corporate securities trading over $1 billion in notional daily being subject to tick constraints. This means that actively traded ETPs often suffer from tick constraints that keep spreads artificially wide despite the fact that ETPs can be priced more efficiently due to the ability to accurately derive ETP prices and an effective arbitrage mechanism that keeps ETP prices in line with those of its underlying securities.

Chart H: Percent Tick Constrained by Daily Notional Traded

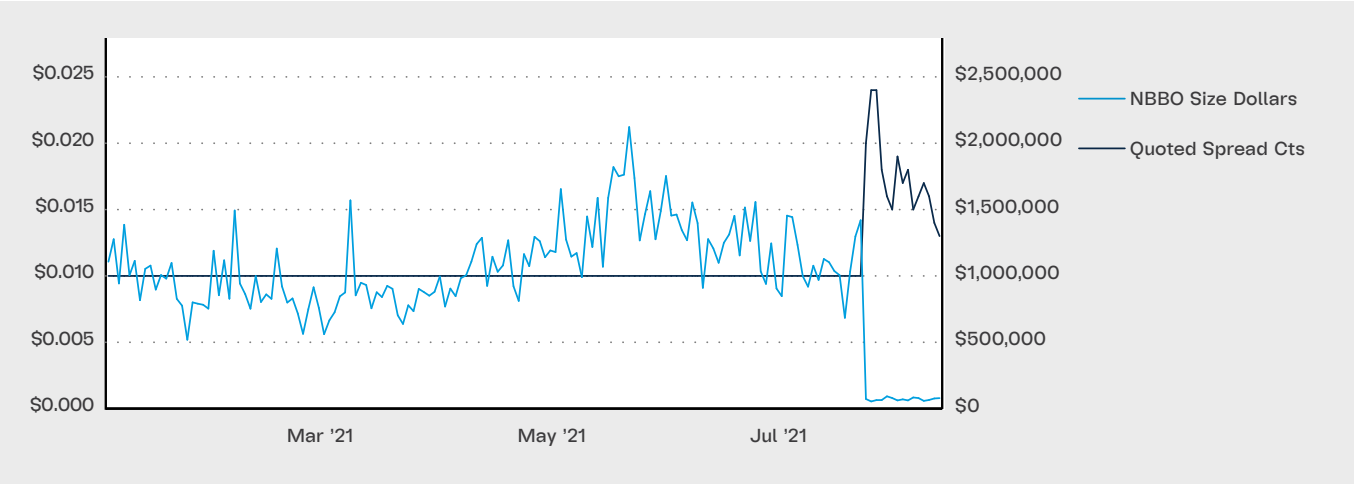


8 Spreads are generally wider in less liquid securities and therefore such securities are less likely to be tick constrained compared to more actively traded securities.

The NBBO is "Crowded" in Tick Constrained Securities

Our analysis also shows that tick constrained securities generally have outsized interest at the NBBO as available liquidity that may naturally want to trade at finer increments is instead forced to cluster at the single price point permitted by regulation. Let's look once again at the example of GE. On July 30, 2021, the last day of trading before its reverse stock split was effectuated, GE traded with $1,422,156 notional available at the NBBO, which ranks it above nine of the ten most actively traded symbols that day by notional value executed despite the fact that GE traded only a fraction of the trading activity seen in those much more active names.[9] This is a tremendous amount of notional at the NBBO and reflects trading interest that is effectively pushed back to the only prices available under the Sub-Penny Rule instead of being spread across multiple better prices as would ordinarily take place if the tick size was optimized for the price of the security. That's why, as shown in Chart I below, notional at the NBBO in GE fell to a much more normal $75,048 on August 2, 2021 after tick constraints were removed due to the reverse split.

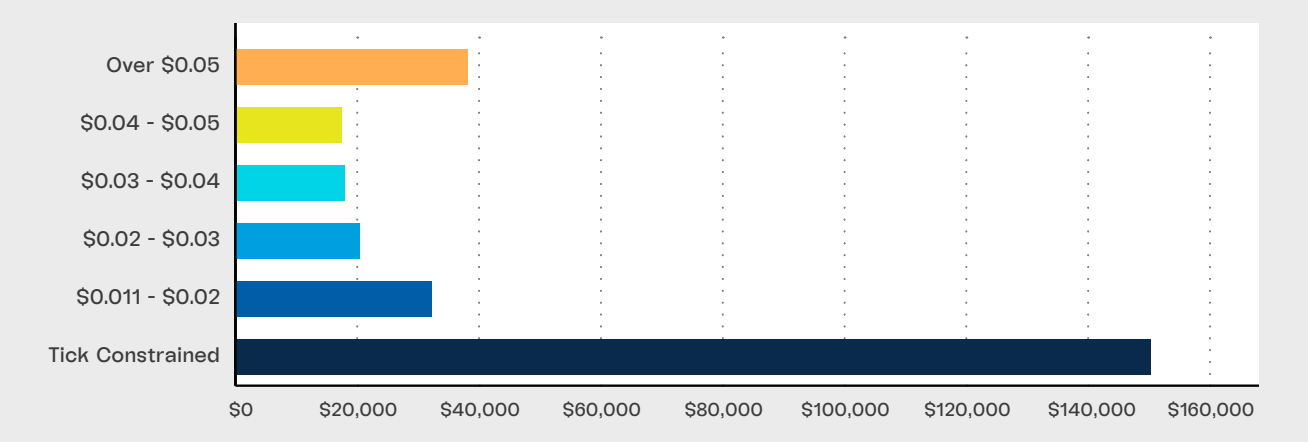
Chart I: Quoted Spread and NBBO Dollar Size in GE



9 QQQ was the only top ten name with more notional available at the NBBO ($1,450,989) and this number is itself likely inflated due to the impact of round lot constraints. The notional available at the NBBO in GE dwarfs many of the other top ten names, particularly those that do not themselves suffer from either lot or tick constraints. For example, AMD, which was the most actively traded security that is not subject to either lot or tick constraints traded with a much smaller $159,604 notional at the NBBO.

This trend is also seen in other tick constrained securities, even when accounting for other relevant factors. Notional at the NBBO is correlated with a handful of security characteristics, such as daily notional traded, as more actively traded securities are often quoted with greater notional at the NBBO, or price, as higher notional values are required to set the NBBO in high-priced securities given today's standard 100-share round lot. To get a sense of whether there is liquidity in tick constrained securities that may otherwise trade at finer increments, we examined the relationship between spreads and notional at the NBBO for both corporate securities and ETPs. If tick constraints are causing liquidity to converge at the limited price points allowed by the Sub-Penny Rule, then we would expect to see more liquidity at the NBBO in those securities, since the size available at that price would reflect trading interest that would otherwise be spread around multiple price levels.[10] This is consistent with what we see in our data. Chart J below shows that quoted spreads have a relatively small correlation with size at the NBBO in corporate securities, with one important and very noticeable exception—*i.e.*, tick constrained securities. Despite the relatively consistent results we found for notional at the NBBO for corporate securities within different ranges of quoted spreads, tick constrained securities had outsized notional at the NBBO, on the order of several times the notional we found for all other spread ranges.

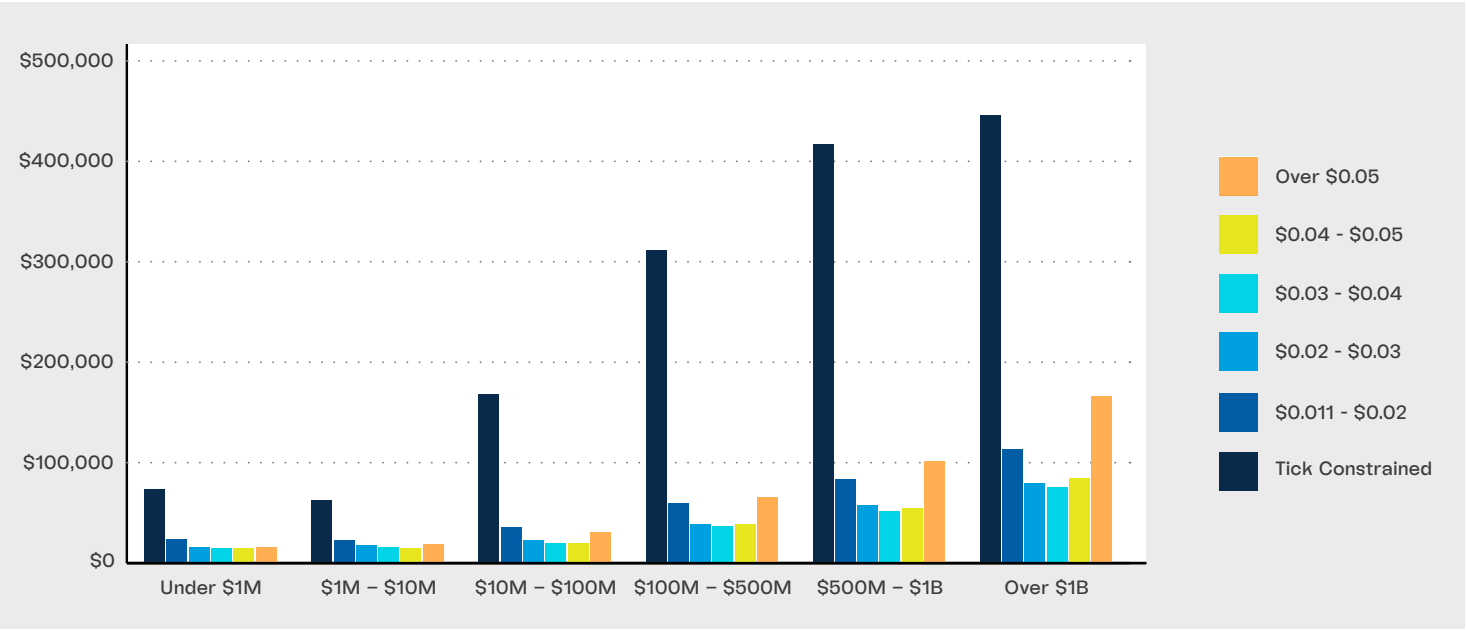
Chart J: Average Notional at the NBBO (Corporate Securities)



10 Similar results were seen with the Tick Size Pilot, which was found to have caused a "clustering of more displayed trading interest at the fewer available price points" as wider minimum increments increased spreads and pushed liquidity to less aggressive prices. See Assessment of the Plan to Implement a Tick Size Pilot Program, *available at* https:// www.sec.gov/files/TICK%20PILOT%20ASSESSMENT%20FINAL%20Aug%202.pdf.

And these results hold across liquidity categories, with tick constrained corporate securities showing a consistently higher notional at the NBBO regardless of notional value traded. As illustrated in Chart K below, more active corporate securities generally trade with greater notional at the NBBO due to increased trading interest looking to participate in the market. However, even with increased interest across the board in those securities, tick constrained corporate securities consistently trade with more notional at the NBBO than securities that are not tick constrained. In fact, all but the most illiquid groupings of tick constrained corporate securities that traded less than $10 million notional daily had more size at the NBBO than even the most liquid grouping of corporate securities that are not tick constrained, despite the difference in overall trading activity. This strongly suggests that the greater notional at the NBBO in tick constrained corporate securities is due to liquidity that is forced to consolidate at the minimum allowed increment.

Chart K: Average Notional at the NBBO by Daily Notional Traded (non-ETP)



We also see similar trends when we examine quoting activity in ETPs. As shown in Chart L below, ETPs trade with more notional at the NBBO than corporate securities.[11] However, like corporate securities, ETPs also tend

11 Notional at the NBBO for ETPs also varies depending on the type of underlying, with fixed income ETPs in particular showing the largest size at the NBBO.

to have relatively stable notional at the NBBO, with a very significant jump in notional at the NBBO for tick constrained ETPs. And, as shown in Chart M, these results similarly hold across liquidity categories, with even the most illiquid grouping of tick constrained ETPs trading with more liquidity at the NBBO than the most liquid non-tick constrained products.[12] Once again, higher notional at the NBBO for tick constrained ETPs seems to indicate that liquidity may be consolidating at the single price point permitted by regulation.

Chart L: Average Notional at the NBBO (ETP)

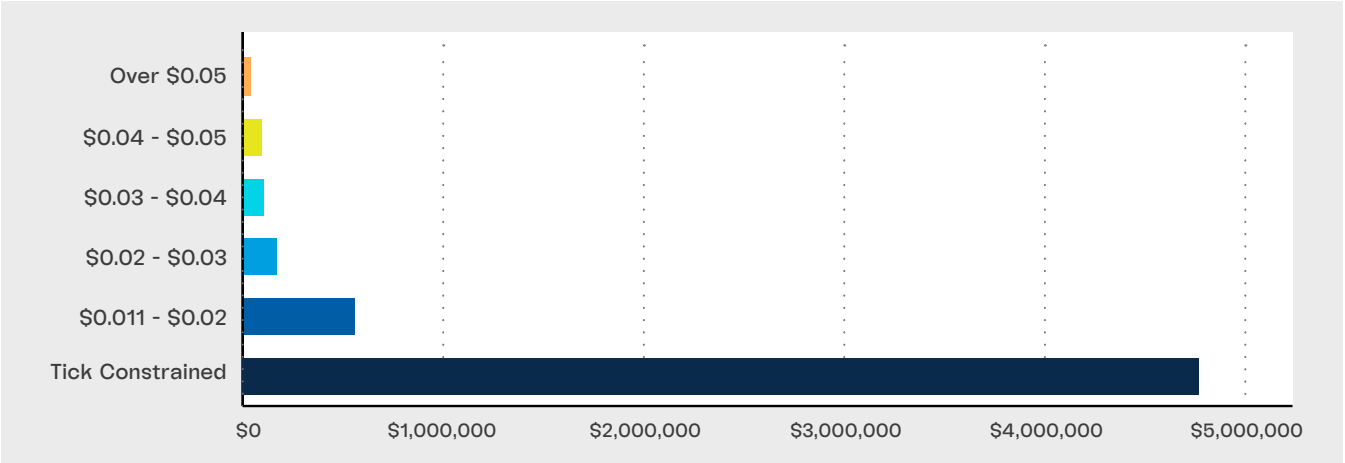
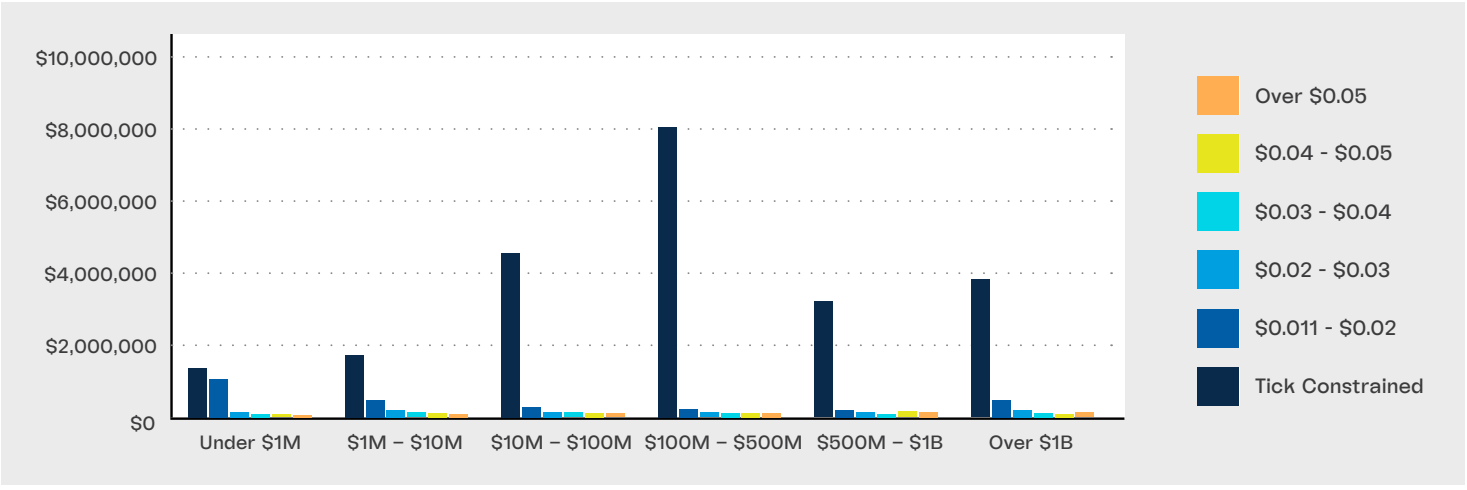


Chart M: Average Notional at the NBBO by Daily Notional (ETP)

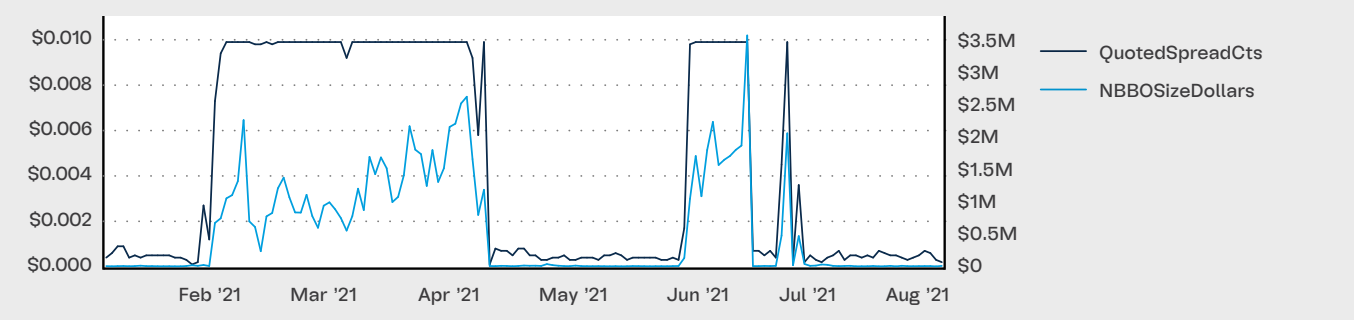


12 Size at the NBBO peaks for ETPs at $100 million to $500 million daily notional traded. This is likely due to the impact of fixed income ETPs in this category, which account for many of the securities with the highest observed notional at the NBBO.

III. Popular Meme Stock Exposes Cracks in Our Market Structure

Our observations are further confirmed by looking at the way that securities trade when their prices fluctuate around $1.00 per share. As discussed, the Sub-Penny Rule establishes a minimum increment of $0.01 for securities trading at or above $1.00. However, securities that trade below $1.00 ("subdollar securities") are allowed to trade with a minimum increment of $0.0001 as this amount is considered to be "economically significant" for securities trading below $1.00, but somewhat confusingly not for securities priced at or just above this price. Similar to our observations in GE, if the higher spreads and notional at the NBBO in tick constrained securities are due to tick constraints, then we'd expect to those numbers to be higher when a security is tick constrained and lower when it is not. This is consistent with our observations looking at securities that trade near the threshold for subdollar securities. Consider the "meme stock" SNDL. SNDL often trades at a price around $1.00 per share. On June 24, 2021, SNDL closed at a price of $1.00. On that day, it had a quoted spread of $0.0099 (99 bps) and traded with about $2,055,523 (2,055,523 shares) at the NBBO. What happened the next day when SNDL closed at $0.97? On June 25, 2021, SNDL was permitted to trade in four decimal places and its quoted spread and notional at the NBBO collapsed to $0.0003 (3.1 bps) and $21,425 (22,088 shares) respectively. Chart N below illustrates how the size at the NBBO in SNDL changes as it moves in and out of the tick constrained bucket due to its price crossing below the $1 threshold where four decimal places are permitted pursuant to the Sub-Penny Rule and then back over again. As clearly shown, size at the NBBO drops precipitously whenever quoting is permitted in a smaller increment.

Chart N: Quoted Spread and NBBO Dollar Size in SNDL



IV. MEMX's Recommendation for Tick Size Reform

The SEC's stated concerns about "stepping ahead" that animated the Sub-Penny Rule simply do not apply to tick constrained securities where the tick size and not market forces currently dictates the spread and market participants that are willing to provide more competitive prices are unable to do so. But how do we go about actually solving the tick size problem? Allowing half penny ticks in securities that are currently tick constrained is a good place to start.[13] Similar to the way the SEC chose to implement round lot reform in the infrastructure rule, it could implement a process whereby securities are evaluated on a monthly basis to determine the applicable tick size, assigning a half cent tick to any securities that traded with an average quoted spread of 1.1 cents or less during the previous calendar month. This would ensure that securities can move in and out of the reduced tick size buckets on a regular basis, while avoiding more frequent changes that could cause workflow issues for market participants and investors.

Rule 612(c) already gives the SEC authority to grant exemptions from the requirements of the Sub-Penny Rule if doing so is the public interest and consistent with the protection of investors. When the SEC adopted the Sub-Penny Rule back in 2005, it acknowledged the possibility that the "balance of costs and benefits" that animated this regulation "could shift in a limited number of cases or as the markets continues to evolve." The data now shows that the balance of costs and benefits has indeed shifted as it relates to tick constrained securities. Granting an exemption that allows half penny increments in tick constrained symbols would facilitate a fair, orderly, and efficient market in U.S. equity securities that are of significant interest to retail and other investors, and that currently suffer from artificially wide spreads. There's a growing consensus within

13 As previously mentioned, MEMX believes that midpoint orders should continue to be permitted at half of the minimum increment, i.e., $0.0025 for tick constrained securities that are permitted to be quoted with a $0.005 minimum increment.

the industry that we should do something about tick sizes and that consensus is backed by our data. Perhaps the time is now ripe for the SEC to consider changes to its tick size regime.

Any reduction to tick sizes in tick constrained securities should also be coupled with a similar reduction to the access fee cap pursuant to Rule 610(c) of Regulation NMS. Today, Rule 610(c) establishes a uniform access fee cap of $0.0030 for securities priced above $1.00, which works to curtail excessive fees for accessing displayed quotations including those that are protected under Rule 611 (the "Order Protection Rule"). However, a lower access fee cap may be necessary if the SEC permits trading in smaller tick sizes as any fee charged for accessing displayed liquidity would make up a commensurately larger proportion of the spread in those securities. MEMX therefore recommends that the SEC limit access fees to $0.0015 for tick constrained securities trading with a half penny minimum increment as a condition of any exemptive relief granted pursuant to Rule 612(c). This would serve dual purposes of: (1) preventing market distortions that may occur in situations where access fees are allowed to exceed half of the minimum trading increment—*i.e.*, by limiting situations where an exchange quoting at the best price may not actually provide the best "all-in" economics when accounting for both fees paid and rebates provided by different venues;[14] and (2) further reducing transaction costs for investors in securities that are likely to be quoted efficiently without additional economic incentives for adding liquidity.[15]

14 Although the access fee cap pursuant to Rule 610(c) does not explicitly limit rebates provided by trading centers, it imposes a practical limitation on rebates as the amount that can be recouped by the trading center is limited by the access fee that it can charge.

15 Based on our estimate of average take fees charged by different exchanges, potential savings may be as much as $879 million annually if each exchange with a take fee of more than $0.0015 were to reduce the take fee to this level in tick constrained securities.

MEMX's Recommendation for Tick Size Reform (continued)

Chair Gensler has indicated a willingness to "freshen up" the SEC's rules to better account for current trading realities. Getting tick sizes right will make trading more efficient in a large number of actively traded securities that currently trade with artificially wide spreads. Along with round lot reform, tick size reform has the opportunity to greatly decrease trading costs for investors and facilitate fair and orderly markets. Granting a targeted exemption from the Sub-Penny Rule pursuant to Rule 612(c) is a practical solution that the SEC itself suggested may be an appropriate means of addressing tick size concerns. And the factors that the SEC indicated may be relevant to its analysis certainly weigh in favor of granting such relief. That's why we're advocating for tick size reform as the SEC undertakes its upcoming review of equities market structure. We look forward to working with both the SEC and the industry on this important issue.