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Securities and Exchange Commission  
100 F St. NW  
Washington, DC 20549-9303  
[Rule-comments@sec.gov](mailto:Rule-comments@sec.gov)

Re: File 4-657

Joint Industry Plan; BATS Exchange, Inc., BATS Y-Exchange, Inc., Chicago Stock Exchange, Inc., EDGA Exchange, Inc., EDGX Exchange, Inc., Financial Industry Regulatory Authority, Inc., NASDAQ OMX BX, Inc., NASDAQ OMX PHLX LLC, The Nasdaq Stock Market LLC, New York Stock Exchange LLC, NYSE MKT LLC, and NYSE Arca, Inc.;

Notice of Filing of Proposed National Market System Plan to Implement a Tick Size Pilot Program on a One-Year Pilot Basis

Dear SEC:

I strongly support evidence-based rulemaking. Rulemaking based on scientifically gathered evidence is far better than rulemaking based on intuition and speculation. Although our capital markets are of historically high quality, we should always be open for carefully tested ways to

improve them. Since one tick size is not optimal for all stocks, a carefully designed pilot program will help to gather data on the impact of different tick sizes.

As I will explain in more detail below, the public policy question is who should determine the tick size for a particular security. Corporate issuers have the proper incentive to pick the tick size that is optimal for their issues and should be permitted to pick their own tick sizes from a menu of possibilities.

In summary:

- The optimal tick size is not zero or infinity, but somewhere in between.
- The optimal tick size is not the same for every company.
- Issuers should have the flexibility, within reason, to pick their own ticks.
- Spread / transaction costs are not the supreme measure of market quality.
- Transaction costs provide incentives to produce valuable information.
- There are short and long-term effects of tick size. Short-term effects will be visible immediately, but it will take years to determine the long-term impacts.
- Trade-at is really a debate over secondary priority rules. Although I have serious concerns about trade-at, a pilot will gather useful information.
- Tick size is not the only controversy in market structure. Maker-taker and trade-through are controversies that would benefit from carefully gathered evidence.
- All pilot data should be made available to the public.
- The pilot should also assess additional metrics beyond those proposed in the release, including analyst coverage, institutional transaction costs, visibility in traditional and social media, and surveys of issuer satisfaction.
- IPOs should be included on an optional basis.

### **Background: A brief history of U.S. tick size**

Prior to 1915, the NYSE quoted equities in the same manner as bonds are quoted today, as a percentage of par value. The NYSE then switched to quoting in dollars with a minimum price variation (tick size) of \$.125. The Toronto Stock Exchange adopted decimal prices in 1996 with a nickel tick size, leading to calls for decimalization in the U.S. In 1997, Congressional pressure led the industry to agree to a reduction in the tick size, which occurred in stages between 1997 and 2001.<sup>1</sup> The SEC order mandating decimalization envisioned a pilot program that experimented with different tick sizes, but alas, no pilot occurred and the U.S. went to a “one

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<sup>1</sup> For example, see the proposed but never enacted Common Cents Stock Pricing Act of 1997, HR 1053.

tick fits all” regime of one penny per share for all stocks priced over \$1.00.<sup>2</sup> Bid-ask spreads fell instantly, and trading volume soared in the 2000s.

Now, once again under Congressional pressure, the SEC has ordered the SROs to come up with a pilot plan to investigate the impact of different tick sizes.<sup>3</sup>

### **Economic role of the tick**

Tick size has a number of effects on the trading of securities:

- The tick provides protection for time priority for limit orders in a limit order book market. When two investors are willing to pay different prices for a stock, the higher bidder clearly takes priority of execution against the next incoming market order. When two investors are willing to pay the same price, a variety of tie-breaking, or priority rules, may be used. Time priority is a common tie-breaking rule used in many platforms. An investor who wants to jump ahead of the queue has to be willing to pay one tick more than the best order already in the book.
- The tick simplifies the trading environment by providing fewer points on the pricing grid. This simplification makes it easier for liquidity to meet liquidity as there is less chance of orders missing by a small amount (e.g. A buy order for \$10.00000 would not execute against a sell order at \$10.00001, but a buy order at \$10.00 would execute against a sell order at \$10.00.)
- A simpler pricing grid is easier and faster for humans to understand and thus easier to avoid mistakes. Even though computers are involved in the execution of most trades, humans are still involved in many important trading decisions. Simpler pricing grids reduce the time (and thus opportunity cost) for humans working with stock price data.

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<sup>2</sup> In the Commission’s original order mandating decimalization, it stated:

“The Commission also believes that the securities industry should study the impact of quoting and trading in increments smaller than a nickel on trading patterns and capacity. ... Therefore, in the event that the Participants adopt a phase-in plan using a minimum increment greater than a penny, the Participants should also concurrently establish a pilot program that provides for selected securities (equities and options on those equities) to be traded in penny increments. The pilot should allow the Participants and the Commission to evaluate the effect of smaller trading increments on capacity and trading behavior. The pilot should run concurrently with the phase-in period and should be considered part of the Decimals Implementation Plan.”

See the <http://www.sec.gov/divisions/marketreg/34-42360.htm>.

<sup>3</sup> See, for example, the proposals for the Small Cap Liquidity Reform Act of 2014 (HR3448) and the Spread Pricing Liquidity Act of 2014 (HR1952) in the 113<sup>th</sup> Congress.

- The tick provides a floor on the quoted bid-ask spread. This increases the cost of impatient liquidity-demanding trading and at the same time increases the desirability of liquidity-providing patient trading as well as market making.

**The optimal tick size is neither zero nor infinity.**

Clearly, a minimum price variation, or tick, rule provides benefits for the trading of securities as seen above, so the optimal tick is greater than zero. As a larger tick size may increase the cost of trading to liquidity demanding investors, the optimal tick size is less than infinity. The optimal tick is thus somewhere between zero and infinity.

A wider tick benefits patient traders such as those who trade with limit orders. As a wider tick provides more potential profit to a liquidity provider, a wider tick will, ceteris paribus, result in more displayed liquidity in a market. A narrow tick benefits those who demand liquidity in small sizes, such as small retail investors.

**The optimal tick size is NOT the same for all stocks.**

The optimal tick size for a given security represents a tradeoff between the benefits to some investors and the costs to others. There is no reason to believe that the optimal tradeoff is the same for all companies. Small companies in particular suffer from illiquidity, and may benefit from a larger relative tick that would provide more incentives for liquidity providers in the stock.

Many years ago I developed a theoretical model of the optimal tick size.<sup>4</sup> Among other factors, the size of the firm and the idiosyncratic risk of the firm are important factors in determining the optimal tick size.

It is thus quite clear that the optimal tick size is different for different companies, and the pilot experiment will provide important information for helping to craft better tick rules for U.S. stocks.

**Issuers should be able to pick their tick from a menu of choices.**

The public policy questions at issue here are “What should the tick rules be?” and “Who decides the tick for a particular stock?” Note once again that the optimal tick represents a tradeoff between the benefits to patient traders and the costs to impatient traders. Clearly, market

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<sup>4</sup> See my article “Tick Size, Share Prices, and Stock Splits,” *Journal of Finance* 52, 655-681, June 1997.

participants who fall into different groups will prefer a different tick size. Clearly, one tick does not fit all, so a “one-tick-fits-all” rule such as the current SEC Rule 612 is not optimal.

If left up to the SEC or the listing SRO, the likely result is a mechanical formula based on stock price, as is the case in many markets around the world. This is an improvement on “one-tick-fits-all,” but still far from optimal. For example, Bank of America (BAC: \$17) and Bancorp of New Jersey (BKJ: \$11) are both bank stocks that trade in the teens. Yet BAC averages 79 million shares per day while BKJ averages 5,289 shares per day. I suspect that BAC would be quite liquid even with a half-penny tick, while BKJ would trade much better with a five cent tick.

Corporate issuers have the incentive to optimize the trading in their own shares. I believe that corporate issuers should be able to set the trading increment for their stock from a simple menu of choices (1/2, 1, 5, 10, and 25 cents). Given the freedom to choose, they can experiment with different tick sizes and see what works best for their particular stock. If a particular tick does not work well, then they can choose another.

Some would argue that corporate issuers lack the sophistication to choose their own tick size. This is nonsense. Issuers make complicated operational, legal, and financial decisions every day. They have the resources to acquire whatever financial expertise they require.

Some would argue (as I have in the past) that corporations already have the ability to affect their relative tick size (tick relative to stock price) by splitting or reverse splitting their stock. There is some truth to this, but there are practical realities that limit the ability of issuers to do this. For one thing, there are the real costs of splitting stocks, ranging from accounting and legal fees to SRO listing fees. Furthermore, there are good operational reasons that dissuade companies from splitting to low prices, even if that would provide a beneficial relative tick size. Companies rightly do not want to risk the bad things that happen to stocks with low share prices. If the market price drops below five dollars, marginability declines. A price below one dollar leads to delisting.

### **Transactions costs are often misunderstood. The optimal price of immediacy is not zero.**

One objection to a larger tick size is that it would increase the minimum bid-ask spread, and thus the minimum transaction cost to some liquidity demanding traders. It is a common fallacy to view all transactions costs as an unmitigated evil that should be minimized or eliminated at all costs. Transactions costs such as the bid-ask spread represent the cost of immediacy. To pretend that the socially optimal cost of a service such as immediacy should be zero is as absurd as pretending that the socially optimal cost of bread should be zero. It might be nice to have free bread, but who would produce it at that price?

Academics such as myself often do a disservice to the world in our explanations of the market when we pretend that buyer and seller arrive at the same instant. In real life, the buyer and seller rarely arrive at the same instant, and one of them will have to wait, perhaps a long time, for the other party to arrive at a mutually agreeable price.

Investors who want immediacy have the choice of paying for it, and patient investors who don't want to pay for immediacy can benefit from the impatience of others by trading passively. Liquidity providers who sell immediacy to the world are essentially providing free options to the rest of the world to trade immediately rather than wait to find a counterparty.

### **Transactions costs produce a valuable information externality.**

Trading also produces an externality of information that benefits the rest of the market. The price and volume of trade provide important price signals to the rest of the world about the value of the security. In their pursuit of trading revenues for themselves (transactions costs to the rest of us), the financial industry produces large quantities of important information ("research") in order to attract trading. Although some of this research is puffery, a large part of it is quite useful and important to investors.

Small companies in particular suffer from a lack of attention from the investment community. There are approximately 4,000 U.S. domestic companies listed on our exchanges (down from around 8,000 15 years ago). Small issuers have a difficult time getting investors to pay attention to their companies. While issuers can put out press releases, information disseminated by third parties with reputations at stake is far more credible and thus useful to the markets. Indeed, the SEC and FINRA have gone to great lengths to enhance the credibility and independence of industry research.<sup>5</sup>

It is well known in economics that when buyers and sellers do not internalize all the costs of a product, resulting in an externality, then the resulting price and quantity produced by the market are not optimal. The information produced by the trading process, including the research produced to promote trading, is a positive externality that benefits the entire market place. Providing a floor on the bid-ask spread is one means of correcting the imbalance and providing more of an incentive to produce valuable information.

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<sup>5</sup> For a quick overview, see <https://www.sec.gov/info/smallbus/acsec/acsec020111presentation-research-analyst-regulation.pdf>

### **Short-term effects will be observed quickly.**

A change in tick size will have both short-term and long-term effects. The short-term effects will be clear within days of the start of the pilot. From previous studies of tick sizes, we can be confident that quoted bid-ask spreads will increase. Indeed, this is a certainty for those stocks whose average spread was less than the new minimum tick. Also from previous studies, it is likely that quoted depth will increase as well. Thus, decision makers will still have to deal with the tradeoff between spread and depth.

### **It will take several years to observe long-term effects.**

Other effects will take years to develop, and it will be hard to separate the effects of tick size from other confounding events, such as overall economic conditions. One of the major arguments for increasing the tick size for small companies is that a larger tick will make it more profitable for the financial services industry to trade smaller companies. This will provide more financial incentives for the industry to produce information and nurture smaller companies. However, the decision to invest in information production does not occur instantly and will take time to build up.

Another longer-term effect will be the impact on institutional ownership. Large institutions traditionally shy away from smaller companies because of the market impact of trading small stocks in institutional size is too high. If a larger tick incentivizes intermediaries to provide more liquidity, this may reduce market impact to the point that institutions will be willing to invest in smaller companies. However, it will likely take several years for more institutional managers to feel comfortable enough with the liquidity in the small cap sector that they will feel confident investing in such companies.

Many important factors affect the number of new listings that come to market. These include not only market structure, but also overall economic conditions and market trends, other legal and compliance costs, and litigation exposure. It will be difficult, but not impossible, to separate these other factors from market structure effects. However, it will take several years and at least one complete economic cycle to determine the impact on capital formation. Therefore, it may take years to determine definitively the effects of these market structure changes.

Accordingly, I suggest that the length of the pilot should be determined based on the preliminary results. The pilot should last at least a year and possibly at least one economic cycle of recession and recovery. Major analysis of the short-term effects should be done in the first year. After the first year, interim studies should be done while the pilot is still in operation. If the results show a positive impact, then revised tick rules can be rolled out without the need to wait for a longer

pilot to finish. If they show a strong negative impact, the pilot can be halted. If the results are inconclusive, then the pilot should be continued.

### **More data needs to be gathered**

The data proposed in appendices A, B, and C are mostly identifying data, Rule 605 style data, and market maker profitability data. These are all useful for analyzing the pilot, but they miss some of the most important aspects of the effect of tick size on market quality.

Data gathered should also include information about:

- Research coverage of pilot versus non pilot stocks. One of the narratives supporting an increase in tick size is that by increasing the profitability of trading, the industry will produce more research. Thus, analysis of the pilot should examine research coverage for pilot and control stocks in terms of numbers of analysts and quality of forecasts.
- Visibility of companies in traditional and social media. The narrative that increasing trading revenues will result in increased attention paid to stocks can be tested by examining media coverage in traditional media as well as social media and Google searches.
- Impact on institutional transaction costs. The bid-ask spread is easy to observe, but is relevant as a measure of transaction costs mainly for retail investors, who comprise a small fraction of trading activity. The pilot should also examine institutional trading costs, which can be examined with data such as the Ancerno data.
- Institutional ownership.
- Surveys of issuers to determine their satisfaction with the market for their stocks. Questions would examine their satisfaction with transactions costs, liquidity, volatility, and research coverage.
- Surveys of institutional traders on the impact of the pilot.

### **All data should be readily available to researchers for free and without delay.**

The appendices specify that much of the data will be provided to the SEC but it is not clear what data will be made public and when. Most of the data are similar to existing Rule 605 data, and there should be no harm in making that data immediately available to the public on the web. While the profitability of individual market makers is proprietary and should not be made public, the aggregate data from all market makers can and should be made public on a stock by stock basis without delay.

### **“Trade-at” is really about priority rules used to break ties.**

The pilot proposal contains a third category of pilot stocks that would be subject to a “trade-at” provision. “Trade-at” attempts to prohibit market participants (mostly off exchange) from matching the prices quoted on exchanges.

This debate is really about the priority rules used to break ties when multiple market participants are willing to trade at the same price. Time is but one of the many possible ways for breaking a tie. It is a simple and seemingly fair rule: First come, first serve. However, no real market that I am aware of has ever operated on pure 100% time priority. Even markets that claim to use time priority as their tie-breaking rule usually have numerous exceptions.

These exceptions or other methods of breaking ties include:

- Display. Displayed orders usually take priority over undisplayed orders.
- Customer category. In some markets, like the old NYSE, customer orders took precedence over the specialist’s quote, even if the specialist posted the quote before the customer order arrived. In other markets, like the old Toronto, the registered trader had priority over a customer order.
- Venue. Trade-at gives priority to “protected” orders posted on exchanges.
- Size. In order to attract liquidity, a market can give priority to larger orders. Odd-lots have often been treated differently from round lots.
- Pro-rata. Incoming market orders may be shared among all market participants quoting at given price.
- Broker priority. The broker who gets the order has priority.
- Random. Orders may be randomly allocated.

Given the plethora of different tie-breaking priority rules, it is not at all clear which rule or rules are the best, especially in a market as complex as our competitive national market system. As with tick size, different market participants will prefer a different set of rules. The exchanges naturally prefer a rule that makes it harder for competitors and vice versa.

A strong argument can be made for broker priority for small stocks. By giving the broker that generates an order the option to internalize, it increases the profitability of generating orders to the broker. This gives the broker more incentives to produce information such as research that brings in order flow. Indeed, the old NASDAQ system operated pretty much in this way as brokers could easily internalize order flow.

Trade-at imposes a type of loose time priority to certain displayed orders while providing a shared equal priority to all “protected quotations” on exchanges. It is really a form of exchange

priority. The rationale is that this will promote more displayed liquidity. Whether this will result in improved market quality is another matter.

I have never been a big fan of “trade-at” for many of the same reasons expressed in the other comment letters. I think it is a separate issue from tick size and not really needed to test the impact of different tick sizes. I am not convinced that pure time priority (or the loose time/shared priority of the proposal) is the best tie-breaking rule. Much valuable liquidity is conditional, in that liquidity providers are willing to provide it to people they know (such as their own retail customers) even though they are not willing to provide it to others they don’t know, such as unknown high-frequency traders lurking in an anonymous limit order book. A trade-at rule may push a lot of this useful liquidity out of the market, leading to less liquidity overall. Similarly, institutional trading costs may increase as the utility of controlled display markets (a/k/a “dark pools”) is reduced.

I am skeptical that the added complexity of the trade-at rule as proposed is worth the benefits, if any.

I am also highly confident that market participants who wish to match the NBBO without effectively displaying at the NBBO will quickly find ways that match the letter but not the spirit of the trade-at rule. For example, back in the bad old days of Rule 390, which generally blocked off-exchange trading of certain NYSE-listed stocks, brokerage firms that wanted to internalize order flow established market making operations on the regional exchanges. They then merely routed the orders to themselves on the regional exchanges. It is likely that similar arrangements will occur under trade-at.

Market participants are extremely clever at finding ways to make money in ways that are totally unexpected and undesired by the rule writers. I predict that trade-at will lead to many new and interesting business models to the consternation of regulators and the existing exchanges. As the rule seems to give equal priority to all exchanges over everything else, we may see far more fragmentation in the exchange industry. The smaller and nearly moribund exchanges will rebound as market participants seek ways around the rule through the smaller exchanges, who will be desperately eager to help out those seeking to subvert the intent of trade at. We may even see a wave of entry into the exchange space, leading to even more intense competition among the exchanges as new entrants with new business models find ways of providing effective internalization with an exchange imprimatur.

However, even though I am skeptical of the benefits of a trade-at rule, I am definitely in favor of gathering hard evidence upon which to make public policy. I believe that the pilot will gather very useful information. My basic sentiment is that government should only intervene in people’s freedom to trade as they desire when there is an overwhelming public purpose. The

burden of proof for those seeking to inhibit trading freedom falls upon those calling for restrictions to prove that such restrictions are indeed in the public, not just their own, interest. A pilot will gather hard evidence to help make the case one way or the other whether trade-at is a good idea.

As trade-at is really about priority rules, a well-designed pilot would test several different versions of priority rules, including different flavors of trade-at and broker priority.

### **We should also pilot maker-taker and trade-through.**

As the proposing release asks:

“Accordingly, the Commission generally requests comment on whether there are other market structure initiatives that the Commission should consider to address concerns about the market structure for small capitalization stocks in addition to, or instead of, the proposed Tick Size Pilot Program.”

Tick size and trade at are not the only controversies in market structure. There has been much criticism of the “maker-taker” and “taker-maker” pricing models. The rebates involved in these pricing models distort the market in several ways. Typically, an exchange charges a 30 cents per 100 share “take fee” to market orders and rebates around 28 cents per 100 shares to the resting limit order that “made” liquidity. The 30 cents stems from the price cap on access fees set by the Commission. The ability to charge such access fees leads to a race to the bottom where most maker-taker exchanges charge at or near the full 30 cents. That the majority of the take fee gets rebated shows that the Commission has set the 30 cent cap way too high.

The Commission should next pilot changes to the maker-taker fee structure. Such a pilot should explore reducing the price cap to 15 cents, 10 cents, 5 cents and zero. The pilot should also explore a “no rebate” model in which an exchange could charge either the maker, the taker, or both, but with no rebates permitted at all.

Similarly, the trade-through rule is another well-meaning but controversial rule. I have long thought (and written) that such a rule was totally unnecessary and adds unnecessary complexity to the markets.<sup>6</sup> In today’s world of high speed data feeds and smart routers, investors themselves can see where the best prices are. If an investor chooses to ignore a particular venue that is posting a “better” price for whatever reasons, it should be the right of an investor to do

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<sup>6</sup> See, for example, my 2005 comment letter to the Commission on Regulation NMS.  
<http://www.sec.gov/rules/proposed/s71004/jjangel012505.pdf>

that. Investors may rationally bypass one market for another that may provide size or price improvement, or that provides faster or more certain execution.

The trading system problem has not been solved. There is still room for much innovation in trading systems. Attempting to pin down market structure by imposing extremely detailed rules such as trade-through and trade-at risks locking down market structure and precluding useful innovation that could improve market quality.

**IPOs should be included in the pilot on an optional basis.**

As one of the motivations of the pilot is to make the equity market once again attractive to smaller companies through IPOs, I see no reason not to include IPOs in the pilot on an optional basis. New IPOs should be given the choice of whether to be in the pilot groups or not. Their decisions will be valuable input into how issuers view the ongoing experiment.

Respectfully submitted,

James J. Angel