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Brent Fields
Secretary
Securities and Exchange Commission
100 F. Street N.E.
Washington, D.C. 20549-1090

RE: File No. 10-222, Investors' Exchange, LLC ("IEX") exchange application

Dear Mr. Fields:

Thank you for the opportunity to comment on IEX's pending application to become a national securities exchange. I am a financial economist who does research on securities market structure, and I appreciate the Commission's close attention to this matter, because I firmly believe that one of the SEC's more important tasks is to nurture a National Market System that maximizes liquidity for the benefit of all investors.

To summarize my comments below:

- Due to its design, IEX's quotes will always be stale by at least 350 microseconds. However, at least to market participants located in New Jersey or New York, IEX's quotes will be considerably less stale than quotes emanating from the more distant Chicago Stock Exchange. While the Commission is right to worry about stale quotes and phantom liquidity, and while Regulation NMS can be interpreted to prohibit all intentional delays, the proposed IEX latency is well within the bounds of the existing geographically dispersed national market system and by itself should not substantially worsen this problem.

- However, the IEX 350-microsecond delay is applied in a discriminatory fashion. It provides advantages to undisplayed orders on IEX, thereby disadvantaging IEX displayed orders and orders placed at other exchanges. The Commission should think twice before approving a national securities exchange application with these anti-competitive features. Furthermore, an exchange application that so structurally favors dark liquidity would seem to run counter to the pre-trade transparency tenets that implicitly underlie the National Market System.

- By analyzing recent order flow data at other exchanges, I find that this speed bump is far from de minimis. It would come into play around 15% of the time. When it does come into play, the delay provides an average discriminatory impact of 1.67 cents per share, or 4.3 basis points, which is economically large relative to average bid-ask spreads.

An important and valuable feature of the National Market System is that it encourages competition among national securities exchanges. Naturally, this competition should take place on a level playing field. When the Commission adopted Regulation NMS in 2005, it was

particularly concerned about forcing market participants to interact with stale quotes from a slow market center. Such phantom liquidity, where previously displayed shares are no longer available by the time income orders arrive to interact with them, was viewed as undesirable and inconsistent with a true national market system. At the time, that slow market center was the manual, floor-based New York Stock Exchange, and the Commission was rightly concerned that the NYSE might be able to use "sand in the gears" to maintain its dominant market share and limit competition from other venues.

While the time scale at issue is now one-third of a millisecond vs. one-third of a minute ten years ago, qualitative issues such as stale quotes and phantom liquidity remain the same with IEX's speed bump. If IEX's stale quotes are protected under Reg NMS, other market participants will indeed be disadvantaged by being forced to route orders to IEX, where they must bear additional execution risk due to the delays, in addition to the cost of waiting while they find out the execution result. However, at least for market participants on the East Coast of the US, quotes from the Chicago Stock Exchange are already stale by several milliseconds, a much longer latency than IEX is proposing. Thus, leaving aside the legal discussion of whether Reg NMS prohibits any intentional delay, from an economic point of view the 350-microsecond delay per se should not be a particular cause for concern, as it is well within the bounds of the existing, geographically dispersed National Market System, and does not seem likely to contribute substantially to a phantom liquidity problem.

The main problem is that IEX's proposed market structure applies this speed bump selectively. This provides advantages to certain types of market participants at the expense of others. As I describe below, displayed orders on IEX are disadvantaged by this market structure. In addition, the speed bump gives undisplayed pegged orders on IEX an advantage over similar orders at other exchanges. To blunt the IEX advantage, other exchanges may be forced to introduce similar delays of their own. The Commission will have to decide if this kind of discriminatory market structure is consistent with the National Market System, and one of the main purposes in writing this letter is to help quantify the magnitude and economic importance of these discriminatory features of the IEX market structure. I believe it is important for the Commission to take these effects into account as it weighs the costs and benefits to the United States equity markets of granting the IEX application.

IEX is designed so that all incoming orders are subject to a 350 microsecond delay before reaching the IEX matching engine. However, once orders are received, they are then treated differently depending on their type. Modifications or cancellations of displayed, priced orders are subject to IEX's delay. However, pegged orders on IEX are automatically modified without any delay to reflect the IEX matching engine's real-time view of the national best bid-offer ("NBBO"). There are several different types of pegged orders on IEX, but I will focus on primary peg orders, which are pegged to the national best bid ("NBB") for buys and the national best offer ("NBO") for sells, because these orders best highlight the difference in IEX handling.

This real-time updating of pegged orders is designed to protect the pegged order submitter from trading against an incoming order when the NBBO is about to change. However, no such protection is provided to a displayed limit order submitter on IEX. This disparate treatment

favors undisplayed orders over displayed orders on IEX, and it clearly tilts the venue toward dark trading. For example, less than 10% of current IEX volume involves a displayed order, and this mix seems likely to continue if IEX's current exchange application is approved. Among other problems, this would seem to run counter to the pre-trade transparency tenets that implicitly underlie the National Market System.

In the academic literature, there is both theoretical and empirical evidence that too much dark interest may be bad for overall market liquidity. In fact, Terry Hendershott and I found that market liquidity worsened considerably in 2002 when the dominant trading venue – the Island ECN – went dark in the three most active ETFs.[1] Based on that evidence, the SEC should think twice before approving a market structure for a national securities exchange that provides extra advantages to undisplayed order types.

By delaying inbound order flow, IEX pegged orders also get a 350-microsecond advantage over pegged orders at other exchanges. IEX is effectively using the discriminatory delay to tilt the playing field, artificially attracting pegged orders from other venues. This may force other exchanges to introduce similar disparities to avoid losing pegged orders to IEX. The Commission should not encourage such a race, which will result in more dark liquidity and less timely price discovery market-wide. More generally, the SEC should encourage genuine competition among exchanges rather than the artificial sort proposed by IEX.

Because all other inbound orders to IEX are delayed by the speed bump, a primary pegged order at IEX in some sense gets to look 350 microseconds into the future and adjust its pricing if necessary to avoid an adverse change in the NBBO. To quantify the value of this IEX feature to the pegged order submitter, which is equal to the cost of this IEX feature to the liquidity demander, I use actual recent data. Specifically, I examine all transactions at a representative trading venue – Nasdaq – to (a) measure how often the NBBO changes adversely to the passive side of the trade within 350 microseconds of the transaction, and (b) when this occurs, measure the losses that would be avoided by not trading at the soon-to-change NBBO. If IEX marketable order flow and pegged order liquidity supply match the observed Nasdaq liquidity demand and supply, my approach would measure the advantage that accrues to pegged orders (and conversely the disadvantage to liquidity demanders and limit order submitters) under IEX's proposed market structure.

The sample consists of the all stocks in the Russell 3000 and/or in the S&P500 during the week of November 2, 2015. I examine all 28,274,491 executions on the Nasdaq continuous market during regular trading hours during that week, and I measure the NBBO using direct exchange feeds collected at Nasdaq's point-of-presence. To measure avoided losses, I simply look at the adverse change in quote midpoints based on the NBBO during the 350-microsecond interval following a reported transaction. For example, if a marketable sell order interacts with a resting buy order at Nasdaq, the losses avoided by the IEX pegged order are calculated as the decline in the real-time NBBO midpoint from its immediate post-trade level to its level 350 microseconds after the transaction report. An analogous calculation is performed if a marketable buy order

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[1] Terrence Hendershott and Charles M. Jones (2005) "Island goes dark: transparency, fragmentation, and regulation," Review of Financial Studies 18(3):743-793.

interacts with a resting sell order. I do not consider fees or rebates, and all results are averaged across all sample stocks on a trade-weighted basis.

Over the sample period, within 350 microseconds after a transaction, the NBBO moves adversely 15.07% of the time (with a standard error of 0.40% associated with this mean estimate).[2] This means that pegged order repricing would potentially come into play for 15.07% of transactions if IEX marketable order flow ends up being similar to existing Nasdaq order flow. When the NBBO fades during this 350-microsecond interval, the average NBBO change is 1.67 cents (with a standard error of 0.01 cents). Thus, when repricing comes into play, the 350-microsecond advantage that a pegged order enjoys on IEX is worth an average of 1.67 cents per share. This is also the disadvantage faced by IEX liquidity demanders and limit-order submitters, who are both subject to the speed bump.

How big are these effects in dollar terms? If IEX's application were approved, the total dollar amount of these effects would ultimately depend on IEX's market share. In this sample, the average trade size during this period was 113 shares, and there are 28 million Nasdaq transactions during this week, so if IEX transaction volume and market share were similar to Nasdaq's and IEX's order flow were similar to Nasdaq's current order flow, this would result in 28 million transactions * 113 shares/transaction * 15.07% * 1.67 cents/share = $8 million per week of advantage to one class of market participants at the expense of another class. An exchange market structure that provides an annual subsidy of over $400 million to its dark liquidity providers will materially impact all other market participants and exchanges.

Overall, these results show that the selectively applied IEX speed bump is not a de minimis delay. It would often come into play, and it results in economically important advantages and disadvantages to different order types that are much bigger in magnitude than, say, liquidity rebates. To emphasize: the IEX design substantially helps pegged order submitters and significantly all liquidity demanders and limit-order submitters on IEX, and it hurts pegged order submitters at other exchanges.

There are important caveats to the empirical analysis. The main one is that I can only measure partial equilibrium effects. In reality, market participants may change their order submission behavior to substantially blunt IEX's pegged order repricing scheme. In particular, an investor who wants to sweep all liquidity at every venue might adjust its order spray timing so that all the orders are acted upon by various matching engines at virtually the same instant. This would mean sending the order to IEX so that it arrives 350 microseconds earlier than it arrives at other venues. Another general equilibrium effect is that pegged order liquidity supply might be greater on IEX because it is being subsidized in this way. In addition, IEX's fee structure differs from Nasdaq, and that could also have an impact. Yet another caveat is that displayed orders have priority over pegged orders at IEX. My analysis essentially assumes that every transaction

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[2] Standard errors are calculated based on the daily time series over the sample period.

involves a primary pegged order, when in reality pegged orders are likely to account for less than 100% of IEX trading volume.[3] Still, it seems likely that my measurements of the transfers from IEX liquidity demanders and limit order submitters to pegged order suppliers are of the right order of magnitude.

I strongly believe in the merits of competition among exchanges. The comment process has already led to modifications of IEX's proposed market structure, notably the elimination of a similar 350-microsecond advantage for IEX's affiliated order-router. Other commenters have proposed other changes to IEX's market structure that would obviate some of the remaining negative externalities. I hope it will be possible to continue to work with IEX so that its entry as a national securities exchange will indeed provide beneficial competition that improves the national market system.

I hope you find this analysis helpful to your deliberations, and I would be happy to discuss these findings further with the Commission or its staff if it were useful.

Sincerely yours,

Charles M. Jones

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[3] However, as discussed I strongly suspect that the IEX displayed order book will be relatively empty, because the IEX speed bump disadvantages these orders relative to pegged orders. As a result, undisplayed pegged orders are likely to continue to account for the vast majority of IEX volume.