June 15, 2017

Brent J. Fields, Secretary
Securities and Exchange Commission
100 F Street, NE
Washington DC

Re: Release No. 34-80041, File No. SR-CHX-2017-04, Chicago Stock Exchange, Inc., Notice of Filing of Proposed Rule Change to Adopt the CHX Liquidity Enhancing Access Delay ("Filing"); Release No. 34-80740, File No. SR-CHX-2017-04, Chicago Stock Exchange, Inc., Order Instituting Proceedings to Determine Whether to Approve or Disapprove a Proposed Rule Change to Adopt the CHX Liquidity Enhancing Access Delay ("Order")

Dear Mr. Fields:

In its first proposal to lavish market makers with new regulatory subsidies,[1] among other mistakes the Chicago Stock Exchange ("CHX") would have enabled intra-exchange latency arbitrage, a baffling use of an exchange's regulatory power. CHX stumbles again with its latest filing. Its proposal will undermine decades of pro-investor reforms by resurrecting stock exchange specialists in all but name, and will undermine the most central policy objectives of Reg NMS. Under the Filing CHX gives specialists a new name but restores their most valuable and often-abused privileges - an exclusive first look at price discovery, and what the SEC has in the past quite correctly called "'maybe' quotations"[2] - and proposes these privileges without meaningful checks on their anti-competitive power and predatory utility.

I've suggested three reasons to reject speed bump proposals:[3]

> *The SEC should reject speed bumps implemented in software because of the indeterminacies inherent in software-imposed speed bumps.*
>
> *The SEC should reject speed bumps explicitly or implicitly favoring any particular class of participants.*
>
> *The SEC should reject speed bumps left to an exchange's discretion to implement or withdraw on a security-by-security basis.*

Several other commenters made one or more of these points.[4] CHX's October 28, 2016 response to comments on its earlier proposal conceded at least one of these points, though it disputed two others.[5] CHX's March 24, 2017 response also disputed two of these points.[6]

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[1]Release No. 34-78860; File No. SR-CHX-2016-16; Chicago Stock Exchange, Inc.; Notice of Filing of Proposed Rule Change to Adopt the CHX Liquidity Taking Access Delay ("Original Filing").
[2]Exchange Act Release No. 34-51808, June 9, 2005 ("Reg NMS Adopting Release"), page 119.
[3]Letter to Brent J. Fields, Secretary, SEC, from R. T. Leuchtkafer, September 29, 2016 ("Leuchtkafer Letter 1"); letter to Brent J. Fields, Secretary, SEC, from R. T. Leuchtkafer, December 14, 2016 ("Leuchtkafer Letter 2"); Letter to Brent J. Fields, Secretary, SEC, from R.T. Leuchtkafer, March 14, 2017, ("Leuchtkafer Letter 3").
[4]Letter to Brent J. Fields, Secretary, SEC, from Adam Nunes, Hudson River Trading; letter to Brent J. Fields, Secretary, SEC, from John L. Thorton, Hal S. Scott, R. Glenn Hubbard, Committee on Capital Markets Regulation, October 13, 2016; letter to Brent J. Fields, Secretary, SEC, from Adam C. Cooper, Citadel, October 13, 2016; letter to Brent J. Fields, Secretary, SEC, from Tyler Gellasch, Healthy Markets Association, October 13, 2016; letter to Brent J. Fields, Secretary, SEC, from Elizabeth S. King, New York Stock Exchange, October 14, 2016; and letter to Brent J. Fields, Secretary, SEC, from Eric Swanson, Bats Global Markets, October 25, 2016.
[5]Letter to Brent J. Fields, Secretary, SEC, from James Ongena, Executive Vice President and General Counsel, CHX, October 28, 2016 ("CHX Response 1").
[6]Letter to Eduardo A. Aleman, Assistant Secretary, SEC, from James Ongena, Executive Vice President and General Counsel, CHX, March 24, 2017 ("CHX Response 2").

The SEC should reject speed bumps implemented in software because of the indeterminacies inherent in software-imposed speed bumps.

Speed bump indeterminacies are categorically unacceptable, especially when the speed bump is designed to give a subset of professional traders an advantage and disadvantage every other participant. This is the first exchange proposal I can think of in more than a decade explicitly designed to privilege a certain class of professional trader while it disadvantages everyone else, including institutions representing the public and the public itself. It is one of a kind in modern memory and deserves the strictest scrutiny. It's not enough to build a facility like this using reasonable or even best efforts. The indeterminacies inherent in a speed bump implemented in software are significant enough to all but rule out any software-based speed bump, especially a discriminatory speed bump. This is especially important when the exchange proposing the facility argues little more than "What, me worry?" on these points.

CHX says that its "software-based delay will not provide LEAD MMs with an impermissible advantage" because every market suffers from delays and queuing and CHX will, at least in certain circumstances, maintain the sequential integrity of all messages for securities experiencing delays.[7] CHX writes, "any message received after the expiration of the Fixed LEAD Period for a delayed message (i.e., the 350 microsecond period after initial timestamp of a delayed message) will be processed after the delayed message has been released and processed." But that isn't the concern. The concern is that a delayed message might well be delayed for 351 microseconds, 500 microseconds, thousands of microseconds, or even until next Tuesday while the participant submitting that message waits for its message's disposition. The concern is that these delays happen while the LEAD MM has enjoyed the advantage of seeing its non-delayable messages - assuming its non-delayable messages are sent within the 350 microsecond Fixed LEAD Period - processed and confirmed immediately.

As I understand the Filing, CHX's proposal can result in serious participant inequalities because of the way its asymmetric speed bump will operate. For example, suppose market moving news breaks at 10:00:00.000.000 CHX participants, including LEAD MMs, submit a flurry of cancels and marketable and non-marketable orders to CHX from 10:00:00.000.011 to 10:00:00.000.360, swamping CHX's LEAD queues and causing system processing delays that last 10 microseconds for a delayable message received at 10:00:00.000.050, grow to 1,000 microseconds for a delayable message received at 10:00:00.000.150, grow again to 2,000 microseconds for a delayable message received at 10:00:00.000.300, grow to 3,000 microseconds for any delayable message received from 10:00:00.000.330 to 10:00:00.000.350, and grow to next Tuesday for any delayable message received from 10:00:00.000.351 to 10:00:00.000.360. As I understand the Filing, any LEAD MM non-delayable messages received from 10:00:00.000.011 to 10:00:000.360 will jump the LEAD queue and be processed and confirmed back to the LEAD MM immediately, all while a large and growing backlog of delayable messages accumulates for the affected security. In this example, the LEAD MM knows its position in the market instantaneously while other participants won't know their position for as long as 3,000 microseconds (or even until next Tuesday). The following table is an illustration.

[7] CHX Response 2, page 9.

Time of initial receipt	Delayable message?	LEAD queue processing delay (microseconds)*	Total msg delay (microseconds)**
10:00:00.000.011	Y	0	350
10:00:00.000.011	N	Bypass	0
(Thousands more delayable messages continue to flood the LEAD queue...)			
10:00:00.000.050	Y	50	350
10:00:00.000.050	N	Bypass	0
(Thousands more delayable messages continue to flood the LEAD queue...)			
10:00:00.000.150	Y	1,000	1,000
10:00:00.000.150	N	Bypass	0
(Thousands more delayable messages continue to flood the LEAD queue...)			
10:00:00.000.300	Y	2,000	2,000
10:00:00.000.300	N	Bypass	0
(Thousands more delayable messages continue to flood the LEAD queue...)			
10:00:00.000.330	Y	3,000	3,000
10:00:00.000.330	N	Bypass	0
(Thousands more delayable messages continue to flood the LEAD queue...)			
10:00:00.000.360	Y	Next Tuesday	Next Tuesday
10:00:00.000.360	N	0	0
10:00:00.000.361	First Fixed LEAD Period expires and the logjam of queued delayable messages older than 350 microseconds begins to be released (and possibly floods the matching engine complex downstream).		

350 microsecond Fixed LEAD Period

*An unintentional slowdown associated solely with the software component which maintains the LEAD queue of delayable messages. LEAD MM non-delayable messages are assumed to materially or completely bypass this component.
**If the LEAD queue processing delay is less than 350 microseconds, the total delay is 350 microseconds. If the LEAD queue processing delay is greater than 350 microseconds, it's equal to the LEAD queue delay.

The concerns with this speed bump design don't stop with unpredictable and discriminatory delays at the LEAD queue. They continue downstream in the matching engine complex beginning at 10:00:00.000.361 when the first Fixed LEAD Period expires and any logjam of delayable messages starts to be released. If the LEAD queue has experienced a slowdown such that at any given point there is a significant backlog of qualifying messages to be released,[8] a variety of unpredictable factors could combine to subject downstream matching engine components to a sudden flood of messages. That would inevitably aggravate overall system delays for already disadvantaged participants, including institutions, the public, and any professional trader unwilling or unable to become a CHX LEAD MM. In sharp contrast to IEX's

[8]CHX discusses "system processing delays" similar to this in its Filing beginning at page 22 of the Filing.

speed bump implementation, while CHX's speed bump might maintain *sequential integrity* among delayable messages, it does not appear to maintain *relative time integrity*, an inescapable flaw of software-based speed bumps.

At 10:00:00.000.361 the LEAD queue will presumably release all delayable messages received at 10:00:00.000.011. Even in the best circumstances the queue will, in a few nanoseconds, release a full microsecond's worth of message traffic.[9] Under load, however, and depending on how it's designed, this component might struggle to maintain the LEAD queue, checking for delayable and releasable messages, processing new book snapshots, inserting or appending new messages, and performing other housekeeping functions.[10] If for any reason it can't check for qualifying messages at 10:00:00.000.361 until, for example, 10:00:00.000.366, it will presumably release all delayable messages received from 10:00:00.000.011 to 10:00:00.000.015 in just a few nanoseconds. Lather, rinse, repeat. Under stress, it's entirely possible the LEAD queue component would send many microseconds worth of releasable messages downstream in one update, with the risk of overwhelming downstream components.

In contrast, and so far as I know, the architecture of IEX's universal, hardware-implemented speed bump completely avoids these inequalities by maintaining not just sequential integrity but time integrity among messages. If a message is sent down IEX's speed bump coil at 10:00:00.000.011.000 it will exit the coil at 10:00:00.000.361.000 every single time. If a thousand messages are sent down the coil distributed between 10:00:00.000.011.000 and 10:00:00.000.011.999 (one each nanosecond, in other words), the first message will exit the coil to be processed by IEX's matching engine 350.000 microseconds later and the last message will exit the coil to be processed 350.999 microseconds later, every single time. In contrast to any software-based speed bump, IEX's speed bump is designed to maintain sequential *and* relative time integrity among messages.

The problems here are also aggravated by the likelihood that CHX will have multiple software-implemented speed bump queues, distributed by security or by ranges of securities, each with its own potential for LEAD queue delays of unpredictable length. The problem is further aggravated by the likelihood that highly correlated securities will almost certainly be distributed among multiple software-implemented speed bump queues, so the possibility of intra-exchange latency arbitrage moves front-and-center once again.

About all this, CHX just shrugs. It says, "This is an inherent consequence of queuing which results from processing messages for a given security serially. Because such delays and queuing are a function of finite network and processing resources, and consequently exist in every market, the Exchange does not believe they are relevant to the present question,"[11] or, as I noted earlier, "What, me worry?" Imagine if a surgeon refused to wash his or her hands before operating, excusing it because, hey, there's always a risk of infection. As IEX's implementation shows, these questions are *not* an inescapable consequence of processing messages serially, though they may well be an inescapable consequence of CHX's method of processing messages serially, which is why it should be rejected.

Alfred E. Neuman

CHX simply doesn't adequately address all the problems its proposal for an asymmetric, software-implemented speed bump raise, and not just the problem of temporal integrity:

> Even if ... for some reason IEX's coil introduced delays longer than 350 microseconds, that delay would apply universally to every message sent down the coil to its market. No one will

[9]This assumes the LEAD queue will attempt to check for releasable messages on microsecond cycles. So far as I can tell CHX hasn't said how often it will check the LEAD queue for releasable messages anywhere in its filing, a significant omission. This concern might be mitigated if CHX somehow guarantees it will check the LEAD queue on, say, nano- or picosecond cycles and guarantees it will monitor its LEAD queues for processing delays.

[10]Somewhat analogous to what happened during the Facebook IPO.

[11]CHX Response 2, page 9.

> get an advantage on IEX if there's a delay. IEX doesn't sort inbound messages into or away from a speed bumping software queue based on the state of its book or the market, states which might be stale when an inbound message is examined, all depending on how these functions are designed and implemented. The more logic an exchange imposes on its speed bump, the deeper a speed bump is embedded within an exchange system, the more opportunities there are for delays and queuing to result as a "function of finite network and processing resources" (or even software bugs). We don't have any technical specifications for the Filing, so we can't assess just how many new opportunities there are for these delays, but it's obvious there could be many more opportunities than however few - or none at all - there might be in sending a message down a simple coil of fiber.
>
> So far as I know, when exchange networks today experience delays and queuing, for the most part every similarly situated message on its way to an exchange matching engine suffers equally regardless of whether the affected order is marketable or not. Depending on technical implementation details for the [Original] Filing, it may well be that there are one or more ways in which *only* the messages for aggressively priced orders under the [CHX proposal] suffer delays and queuing while messages for non-marketable or resting orders speed along, giving CHX's market makers an even bigger time advantage than 350 microseconds. We don't have any details on how - or whether - CHX will even monitor for these conditions, and if it will monitor for them what steps CHX will take to fix a problem or how quickly, and what notice and compensation, if any, it will give participants incorrectly denied an execution.
>
> For all these reasons any exchange proposal for a speed bump implemented in software should, at minimum, see the strictest regulatory and technical scrutiny, should include detailed implementation specifications, should outline precisely how and when the exchange will surveil its speed bump and remediate and notice any failure, and the SEC should always encourage the exchange to solve its problems through universally applied hardware-based speed bumps or other means, if at all possible. It's true that "delays and queuing ... exist in every market" but that's no reason for an exchange to add even more ways its systems can queue and delay, especially when asymmetric queuing and delays will only benefit an already privileged class of market participants.[12]

And as I wrote in March 2017:[13]

> CHX tells us that, like IEX's speed bump, its 350 microsecond delay is a *de minimis* delay which doesn't frustrate Reg NMS.[14] But while IEX's speed bump is implemented in hardware, with high confidence the fiber coil itself can only ever introduce a 350 microsecond delay on every message sent down the coil, CHX's software-based speed bump will be implemented in its own proprietary software, software which could introduce as yet unspecified and unknown queues and delays every day, even many times a day. And if CHX deploys more than one instance of its speed bump within its matching engine complex, different stocks could easily see different delays depending on load or deployment details like server characteristics, system architecture, or other factors. We could see IBM cruise along with a 350 microsecond speed bump while HPQ suffers from a 375 microsecond speed bump. With news, earnings, or even a tweet from the President, PFE could suffer from a 750 microsecond speed bump while BMY has only a 400 microsecond speed bump. No one knows. No one *can* know. And CHX doesn't tell us at what point it believes delays in its proprietary software speed bump *will* frustrate Reg NMS. Is it 351 microseconds, or 400, or 1,000, or more?

[12]Leuchtkafer Letter 2, pages 2-3.
[13]Leuchtkafer Letter 3, pages 3-4.
[14]Filing, Section 3(b).

While participants have a remedy under Reg NMS for end-to-end delays over 1,000,000 microseconds (self-help), CHX apparently doesn't plan to give participants any notice of, or remedy for, its speed bump delays, though we can imagine CHX agrees speed bump delays longer than 350 microseconds might frustrate Reg NMS. So far as I can tell CHX doesn't promise to surveil for speed bump delays, either in real-time or at end-of-day (CHX tests its systems continuously in real-time to make sure its quotes still qualify as protected quotes, but that's a different matter). Since every incremental microsecond delay beyond 350 microseconds inherently gets us closer to frustrating Reg NMS, and since every incremental microsecond delay beyond 350 microseconds gives CHX's LEAD market makers a bigger regulatory subsidy than the Filing intends to give them, CHX should address these issues.

CHX claims that "While LEAD is long enough to neutralize microsecond speed advantages exploited by latency arbitrageurs, it is too short to provide any actionable incremental advantage to LEAD MMs in reacting to information not already it [*sic*] their possession."[15] CHX also says "LEAD is also too short to introduce any incremental risk of manipulative practices, which is supported by the fact that the Commission has recognized that a 350-microsecond delay would not materially increase the likelihood of certain manipulative practices such as 'spoofing' or 'marking-the-close' due to the practical difficulties of executing such strategies within such a short time frame."[16]

Presumably then at some point a delay *does* become long enough to provide "actionable incremental advantage to LEAD MMs," and long enough to increase "incremental risk of manipulative practices," and long enough to increase the likelihood of spoofing or marking-the-close. Here again, will CHX at least tell us what that threshold is, and tell us what it will do to ensure its proprietary software doesn't cause those delays without appropriate real-time notice and remedies? If the SEC approves the Filing, will the SEC allow participants who in good faith detect CHX speed bump delays greater than 350 microseconds declare self-help against CHX, so that their own orders can't be abused by CHX's LEAD market makers or subject to spoofing or marking-the-close antics in the CHX market?

CHX could have reassured the public with detailed plans to monitor queue delays, and it could have committed to allocate resources to minimize queue delays. It could have also assured the public of its capacity planning capabilities or somehow demonstrated an earnestness to get in front of an issue it has explicitly acknowledged. Instead, it channeled Alfred E. Neuman and moved on.

This is the first exchange proposal in modern times to implement an asymmetric delay and privilege a narrow, professional participant class with a first look at, and chance to respond to, price discovery in the marketplace, and this after the SEC was clear it would subject any proposed asymmetric delays to heightened scrutiny.[17] CHX concedes its delay is indeterminate and then shrugs it off, reason enough to disapprove. The SEC shouldn't reward perfunctory responses to these concerns with approval.

The SEC should reject speed bumps explicitly or implicitly favoring any particular class of participants.

A number of questions in the Order directly and indirectly address the discriminatory impact of the Filing. As I have argued before, the effect of the Filing is to give a valuable regulatory subsidy to a narrow class of professional intermediaries at the expense of other participants.[18]

[15]Filing, page 66.
[16]Filing, page 66.
[17]Release 34-78102, Commission Interpretation Regarding Automated Quotations Under Regulation NMS, June 17, 2016, page 27.
[18]Leuchtkafer Letter 1; Leuchtkafer Letter 2; Leuchtkafer Letter 3.

Historically, intermediaries have been given regulatory subsidies to encourage them to maintain continuous, aggressive quotes in all market conditions, and to compensate them for adverse selection when they do. The Filing's pernicious novelty is that it grants a regulatory subsidy to help these intermediaries avoid adverse selection altogether, affecting market quality, volatility, transaction costs, and competition.

A central policy objective of the SEC's market reforms in the last two decades - and in particular, of Reg NMS - has been to *eliminate* asymmetric delays favoring market intermediaries,[19] and we can all agree that market quality has steadily and materially improved since the 1990s, though some exchanges suffered along the way. For example, NYSE saw its market share in its own listed stocks drop from 80% to 20%. CHX saw its overall market share more than decimated. Other markets were created and grew, though, by leveraging regulatory subsidies like Reg ATS, the Order Handling Rules, and in particular Reg NMS (and to a limited extent ITS plan trade-through prohibitions before Reg NMS was implemented), and, on the whole, market quality improvements from the late 1990s to today are dramatic and undeniable. Eliminating asymmetric delays vastly improved quote and market center competition, safeguarded against monopolies, and significantly lowered often insurmountable barriers to entry for market participants and market centers alike.

In the Filing, CHX argues that it needs to reinstate asymmetric delays favoring market intermediaries to improve its market quality. That argument contradicts long-held public policy, defies the experience of the last 20 years, and defies recent empirical research on market behavior.[20]

Larry gets socked

The Order includes a number of questions that go to the heart of the matter. The Order asks:[21]

> *1. Would the proposed minimum performance standards for LEAD MMs enhance market quality? Why or why not? What metrics would help determine any enhancement to market quality? How should enhancements to market quality be measured with the delay in effect?*
>
> No. Given CHX's small footprint in the market and the laxness of its proposed performance standards, any effect here on overall market quality will go entirely unnoticed whether it suffers or improves. And since CHX points to the relevant price discovery mechanism for its market being at the CME, it is difficult to see how the CHX tail wags the CME dog to improve market quality.
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> *2. How would the proposal affect price volatility during stressed trading conditions?*
>
> Volatility will increase in stressed trading conditions.[22] That's the entire point of the Filing, to allow LEAD MMs to withdraw their quotes ahead of other market participants - intuitively, something they're most likely to do in stressed trading conditions - which will inevitably increase volatility. It is an unfortunate fact for market intermediaries but true: adverse selection dampens price volatility. That fact is the entire purpose of regulatory subsidies for the industry, to compensate intermediaries for dampening volatility when they intentionally (or unintentionally) adversely stand at a price. From generous capital rules to Reg SHO

[19]For example, the manual handling of orders by exchange specialists was little more than an asymmetric delay favoring market intermediaries. When it created protected quotes, Reg NMS removed that asymmetry. By reinstating an asymmetric delay, CHX's proposal attempts to undermine that central policy objective of Reg NMS to benefit exchange intermediaries.
[20]For discussions of how extremely rapid quote withdrawals by intermediaries can negatively affect market quality in stressed market conditions, see data-driven research summarized in Leuchtkafer, "High Frequency Trading: A Bibliography" (2016) available at blog.themistrading.com/wp-content/uploads/2016/03/HFTBibliography2016.pdf.
[21]Order, pages 17-18.
[22]See note 20.

exemptions to preferred pricing, intermediaries receive fistfuls of regulatory subsidies to reward them for making markets in stressed trading conditions. Bizarrely, CHX proposes to give already privileged intermediaries an exclusive tool to flee stressed markets yet keep all their other subsidies, entirely upending the public policy objectives of those subsidies in the first place. The proposal will exacerbate volatility *by design.*

And by enabling its privileged intermediaries to flee adverse selection, the proposal shifts the costs of adverse selection onto every other participant foolish enough to leave resting orders on CHX's book. LEAD MMs can flee price volatility while institutions, retail customers, and non-LEAD MM professionals stay exposed, and are then disproportionately adversely selected. CHX's proposal doesn't cure latency arbitrage, real or imagined, it merely shuffles who suffers from it, and ironically the victims here will be all the market participants who *don't* receive regulatory subsidies. As a principle, asymmetric delays favoring market intermediaries will increase the value of all their other regulatory subsidies while they shift costs to, extracting rents from, unsubsidized market participants.

3. How would the proposal affect transaction costs for retail and institutional investors?

Transaction costs for retail and institutional customers will increase. See the discussion for question 2, above. Most important, asymmetric delays which favor market intermediaries disadvantage retail and institutional investors, further exposing them to adverse selection and inevitably discouraging them from posting limit orders altogether.

4. How would the proposal affect an institutional investor's experience providing liquidity and removing liquidity on CHX?

As in the discussions for questions 2 and 3 above, the proposal will further expose any unprivileged liquidity provider to adverse selection by enabling LEAD MMs to withdraw more quickly than other participants. Every investor demanding liquidity, including institutions, will always be at risk of chasing a "maybe quote" because LEAD MMs can advantageously withdraw in front of them.

5. Would the proposal provide an unfair advantage to LEAD MMs providing liquidity vis-à-vis other liquidity providers and in particular when the price of a security moves?

Yes, by design. The proposal lets LEAD MMs avoid adverse selection while disproportionately exposing all other participants to it. It also enables them to be first at a price while other participants suffer inferior order book queue position. In this way the proposal shifts costs to other participant classes in unfavorable conditions and restrains competition by enabling LEAD MMs to capture more revenue when conditions are favorable to liquidity providers.

6. Do commenters agree with the Exchange's assertion that the proposed rule change would increase displayed liquidity on the Exchange?

At best, it might increase displayed liquidity only in calm markets, and then only for a short time after implementation. As in the preceding discussions, non-LEAD MMs will suffer from increased adverse selection and poor order book positioning, and will inevitably fall away, leaving behind only LEAD MMs as willing and able to quote.

7. Do the obligations for LEAD MMs to comply with the proposed minimum performance standards justify the LEAD MMs' speed advantage?

No. There is no justification for reinstating time advantages for market intermediaries. We took that voyage already, and one of the signature achievements of SEC market reform in the last generation has been the elimination of asymmetric delays favoring intermediaries, with profound benefits to competition and market quality.

8. According to several commenters, liquidity provided by LEAD MMs would be "fleeting" because they could update their quotations while incoming orders are delayed. Do commenters agree? If so, what are commenters' views on how significant "fleeting" liquidity would be in comparison to the overall liquidity provided on the Exchange?

As above, LEAD MMs will have a material time advantage over every other participant class, restoring "maybe quotes" to the National Market System, enabling LEAD MMs to stand in calm markets and flee in volatile markets. On average calm markets prevail, but liquidity is needed most during volatile markets, and it is in volatile markets LEAD MM "maybe quotes" will be the most obvious and costly to non-LEAD MM participants.

9. How would the proposal affect the national market system if exchanges with a larger percentage of overall trading volume were to adopt a similar proposal? In particular, how would the proposal affect market quality?

By shifting adverse selection costs to non-LEAD MM participants and by enabling LEAD MMs to get superior order book queue position, the proposal will warp transaction costs and industry economics enough to discourage resting limit orders and fend off non-LEAD MM competition. The combined effect of that will be to accelerate any consolidation we already see among liquidity providers and to accelerate institutional migration to dark trading venues. The combined effect of *that* will be to substantially reduce market quality over time as quote competition declines, displayed limit orders evaporate, and market volatility increases.

10. One of the stated goals of the proposal is to minimize the effectiveness of latency arbitrage strategies. What metrics would help determine if latency arbitrage is currently a problem on CHX? Is 350 microsecond necessary to minimize the effectiveness of latency arbitrage strategies? Should the delay be shorter or longer to accomplish this goal? Is the 350 microsecond delay appropriate for trading at both CHX's Chicago data center and its East Coast data center? Why or why not?

As above, the proposal doesn't minimize latency arbitrage, it merely changes who suffers. Speed bumps should at least pass a simple Three Stooges test: If Moe throws a punch at Curly, Curly ducks, and Moe hits Larry on the follow-through, Curly is spared but Larry gets socked. Since asymmetric speed bumps like this only change who gets socked, they fail the test.

11. Does the proposal's protection against latency arbitrage strategies for LEAD MMs warrant the benefits of the delay?

No, because, as discussed above, it will increase costs for other participant classes, discourage resting limit orders, and inhibit liquidity provider competition.

12. Is the delay short enough that it would not harm liquidity takers or providers other than those engaging in latency arbitrage?

As discussed above, the proposal will harm non-LEAD MM market participants of all kinds. *Any* asymmetric delay harms non-LEAD MM participants.

13. What are commenters' views on how the proposal would affect liquidity providers on CHX other than LEAD Market Makers as well as liquidity providers on other markets?

The proposal will concentrate latency arbitrage costs on non-LEAD MM participants of all kinds, including retail, institutional, and professional participants. Funny enough, CHX stipulates to this, writing, "By minimizing the effectiveness of latency arbitrage, LEAD will reduce the cost of providing liquidity to the LEAD MM..."[23] A logical conclusion, holding latency arbitrage strategies constant, is that it will simultaneously *increase* the cost of providing liquidity to non-LEAD MMs. At the same time, the proposal will even further inhibit liquidity provider competition on CHX because LEAD MMs can use their time advantage to obtain superior order book queue position when they want it, depriving non-LEAD MM competitors of revenue and raising barriers to entry even higher. This flaw might be addressed, at least in part, by giving LEAD MM orders lowest priority at a price, but CHX doesn't plan to do any such thing.

The SEC should reject speed bumps left to an exchange's discretion to implement or withdraw on a security-by-security basis.

The Original Filing contemplated speed bumps on marketable orders and implemented on a security-by-security basis, at CHX's discretion. That would have enabled intra-exchange latency arbitrage if CHX speed bumped some instruments but didn't speed bump correlated instruments. CHX then offered to pilot a speed bump on every instrument traded on the exchange. Now CHX plans to speed bump every instrument but exempt nonmarketable orders originating from its LEAD MMs in their registered securities.

Because CHX doesn't impose negative obligations on its LEAD MMs and doesn't impose information barriers to segregate LEAD market making from all other proprietary trading, in its latest proposal CHX's plans still enable intra-exchange latency arbitrage for its LEAD MMs.

Suppose a LEAD MM is registered in the SPY ETF. When it sees new pricing emerge at CME, it can use its speed advantage to cancel its own SPY quotes and then separately try to pick off stale SPY quotes. Under the Filing the LEAD MM's aggressive orders will be speed bumped, but so what? The firm is no worse situated than any other firm, but because of the speed bump subsidy its risk of adverse selection has been sharply reduced in SPY. CHX might even count the LEAD MM's aggressive trades in SPY toward the market maker's performance requirements.[24] Or the firm can presumably use any of its other proprietary trading accounts to pick off stale quotes in SPY - or in any correlated name - with match trade prevention in place to help make sure the firm doesn't trade with itself.

As I have noted above, market makers already get lots of regulatory subsidies. There's only one policy reason to justify these privileges. Regulatory subsidies like rule exemptions, favorable capital requirements over other market participants, favorable pricing, exclusive order types, and more, compensate them for adverse selection. If market makers never suffered from adverse selection they wouldn't be entitled to any of them. Instead, to encourage market makers to maintain two-sided quotes in all market conditions, regulators hand out subsidies. The theory is that whatever market makers lose to adverse selection is offset by all the regulatory handouts they fill their pockets with. The Filing's novelty is that it compensates market makers for adverse selection by helping them avoid it altogether, which flipflops any justification for their special status and privileges. As a public policy matter the government can't subsidize middlemen to provide orderly markets in difficult conditions and then approve a fast lane

[23] CHX Response 2, page 4.

[24] And if a LEAD market maker successfully picks off a stale quote in SPY, who is it being picked off? It likely won't be another professional. It likely will be a retail or institutional order. So the LEAD market maker can use its speed bump privileges to avoid adverse selection, and then if it successfully picks off the public in a latency arbitrage trade CHX might well credit the market maker against its performance requirements.

to run from them. CHX will not only open a fast lane for its LEAD MMs to avoid adverse selection, it might even count their aggressive trading - which may well be the same latency arbitrage trades CHX laments - toward market maker performance requirements.

Other ways to solve the problem

As I noted on the Original Filing, there are likely other ways to confront latency arbitrage CHX could explore: CHX could try moving its servers closer to or alongside CME's servers, or move them to New Jersey; CHX could speed bump all traffic coming from the CME's data centers; CHX could implement a random, varying speed bump for everyone, as former SEC Chief Economist Larry Harris has proposed[25]; CHX could implement near-continuous auctions.[26] Though no doubt inconvenient, CHX could also simply prohibit latency arbitrage by rule and enforce the rule by examination.[27]

Instead CHX points to IEX's far more nuanced and equitable proposal than its own to justify its Filing,[28] and says we should answer informal participant asymmetries in the marketplace with formal participant asymmetries favoring a narrow professional class, this time with an exchange's regulatory power and subsidy behind them. One of the greatest market reform achievements of the last generation has been to reduce or entirely eliminate time preferences for market intermediaries. In doing so the SEC improved quote and market center competition with profound market quality benefits. None of that seems to occur to CHX.

Triggered by scandal and with the SEC's blessings, from the 1990s to today stock markets transformed themselves from dealer-driven to order-driven platforms. The whole point was to eliminate time, place, information, and regulatory asymmetries that gave privileged intermediaries fat advantages over other market participants and the public. As proposed, the Filing is a fearsome step back, a regulatory subsidy intermediaries can and will use how they like, with very little asked of them in return. If approved, it will establish the toxic precedent that exchanges can respond to real or imagined marketplace asymmetries with more asymmetry, and exchanges will reinstate the same formal time, place, information, and regulatory preferences to their middlemen firms the exchanges stripped away when they promised the SEC they would open their markets to competition and become more fair. Of course along the way the exchanges will pick and choose who benefits and try to skip the limited protections we once had for the public, step-by-step undoing decades of market reforms, or worse.

If the SEC will allow the reintroduction of explicit time and information preferences like this for market intermediaries, regulatory subsidies it was once the SEC's ambition to reduce or eliminate, we should have a much broader discussion about the topic than we can in the confines of a small exchange's rule filing. In the meantime, please say no.

Sincerely,

R. T. Leuchtkafer

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[25]Harris, "What to Do about High Frequency Trading?" (2013)
[26]Budish, Cramton, Shim, "The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response" (2015)
[27]If in its view CHX can define latency arbitrage well enough to justify a major rule filing like this, it can define latency arbitrage well enough to prohibit it as a disruptive or unfair practice.
[28]Unless I missed it all, CHX doesn't show IEX's rigor justifying its specific speed bump threshold, or IEX's technical care implementing it, or IEX's diligence monitoring it.