Required fields are shown with yellow backgrounds and asterisks.

Page 1 of * 67

SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
Form 19b-4

File No. * SR 2022 - * 06
Amendment No. (req. for Amendments *)

Filing by Investors' Exchange LLC

Pursuant to Rule 19b-4 under the Securities Exchange Act of 1934

Initial * ☑ Amendment * ☐ Withdrawal ☐

Section 19(b)(2) * ☑ Section 19(b)(3)(A) * ☐ Section 19(b)(3)(B) * ☐

Pilot ☐

Extension of Time Period for Commission Action * ☐

Date Expires *

Rule

☐ 19b-4(f)(1) ☐ 19b-4(f)(4)
☐ 19b-4(f)(2) ☐ 19b-4(f)(5)
☐ 19b-4(f)(3) ☐ 19b-4(f)(6)

Notice of proposed change pursuant to the Payment, Clearing, and Settlement Act of 2010

Section 806(e)(1) * ☐ Section 806(e)(2) * ☐

Security-Based Swap Submission pursuant to the Securities Exchange Act of 1934
Section 3C(b)(2) * ☐

Exhibit 2 Sent As Paper Document ☐

Exhibit 3 Sent As Paper Document ☐

Description

Provide a brief description of the action (limit 250 characters, required when Initial is checked *).

Proposed Rule Change to Amend Rule 11.190(g) to Provide an Alternative Calculation for Pegged Order Types for Determining Whether a Quote Instability Condition Exists.

Contact Information

Provide the name, telephone number, and e-mail address of the person on the staff of the self-regulatory organization prepared to respond to questions and comments on the action.

First Name * Nathaniel Last Name * Kolodny

Title * Lead Regulation Counsel

E-mail * nathaniel.kolodny@iextrading.com

Telephone * (646) 343-2034 Fax

Signature

Pursuant to the requirements of the Securities Exchange of 1934, Investors' Exchange LLC has duty caused this filing to be signed on its behalf by the undersigned thereunto duty authorized.

Date 09/27/2022

By Nathaniel Kolodny
(Name *)

(Title *) Lead Regulation Counsel

NOTE: Clicking the signature block at right will initiate digitally signing the form. A digital signature is as legally binding as a physical signature, and once signed, this form cannot be changed.

Nathaniel Kolodny
Digitally signed by Nathaniel Kolodny
Date: 2022.09.27 16:40:20 -04'00'

Required fields are shown with yellow backgrounds and astericks.

SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

For complete Form 19b-4 instructions please refer to the EFFS website.

Form 19b-4 Information *

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CQI V6 pegged orders 19b-4 V14 - SE

The self-regulatory organization must provide all required information, presented in a clear and comprehensible manner, to enable the public to provide meaningful comment on the proposal and for the Commission to determine whether the proposal is consistent with the Act and applicable rules and regulations under the Act.

Exhibit 1 - Notice of Proposed Rule Change *

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CQI pegged orders Ex. 1.doc

The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

Exhibit 1A - Notice of Proposed Rule Change, Security-Based Swap Submission, or Advanced Notice by Clearing Agencies *

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The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

Exhibit 2- Notices, Written Comments, Transcripts, Other Communications

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Copies of notices, written comments, transcripts, other communications. If such documents cannot be filed electronically in accordance with Instruction F, they shall be filed in accordance with Instruction G.

☐ Exhibit Sent As Paper Document

Exhibit 3 - Form, Report, or Questionnaire

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Copies of any form, report, or questionnaire that the self-regulatory organization proposes to use to help implement or operate the proposed rule change, or that is referred to by the proposed rule change.

☐ Exhibit Sent As Paper Document

Exhibit 4 - Marked Copies

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The full text shall be marked, in any convenient manner, to indicate additions to and deletions from the immediately preceding filing. The purpose of Exhibit 4 is to permit the staff to identify immediately the changes made from the text of the rule with which it has been working.

Exhibit 5 - Proposed Rule Text

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CQI pegged orders V6 rule text - SEC

The self-regulatory organization may choose to attach as Exhibit 5 proposed changes to rule text in place of providing it in Item I and which may otherwise be more easily readable if provided separately from Form 19b-4. Exhibit 5 shall be considered part of the proposed rule change

Partial Amendment

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If the self-regulatory organization is amending only part of the text of a lengthy proposed rule change, it may, with the Commission's permission, file only those portions of the text of the proposed rule change in which changes are being made if the filing (i.e. partial amendment) is clearly understandable on its face. Such partial amendment shall be clearly identified and marked to show deletions and additions.

1. Text of Proposed Rule Change

(a) Pursuant to the provisions of Section 19(b)(1) under the Securities Exchange Act of 1934 ("Act"),[1] and Rule 19b-4 thereunder,[2] Investors Exchange LLC ("IEX" or "Exchange") is filing with the Securities and Exchange Commission ("Commission") a proposed rule change to amend Rule 11.190(g) to provide an alternative calculation for pegged order types for determining whether a quote instability condition exists.

A notice of the proposed rule change for publication in the Federal Register is attached hereto as Exhibit 1. The text of the proposed rule change is attached as Exhibit 5.

(b) The Exchange does not believe that the proposed rule change will have any direct effect, or any significant indirect effect, on any other Exchange rule in effect at the time of this filing.

(c) Not applicable.

2. Procedures of the Self-Regulatory Organization

Senior management has approved the proposed rule change pursuant to authority delegated to it by the Board of the Exchange. No further action is required under the Exchange's governing documents. Therefore, the Exchange's internal procedures with respect to the proposed rule change are complete.

The persons on the Exchange staff prepared to respond to questions and comments on the proposed rule change are:

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[1] 15 U.S.C. 78s(b)(1).
[2] 17 CFR 240.19b-4.

Claudia Crowley
Chief Regulatory Officer
Investors Exchange LLC
917-509-9001

Nathaniel Kolodny
Lead Regulation Counsel
Investors Exchange LLC
646-343-2034

3. Self-Regulatory Organization's Statement on the Purpose of, and Statutory Basis for, the Proposed Rule Change

a. Purpose

The purpose of the proposed rule change is to amend Rule 11.190(g) to provide an alternative quote calculation for pegged order types for determining whether a quote instability condition exists.

Background

Currently, as specified in Rule 11.190(g), the Exchange utilizes quoting activity of eight away exchanges' Protected Quotations[3] and a proprietary mathematical calculation to assess the probability of an imminent change to the current Protected NBB[4] to a lower price or imminent change to the current Protected NBO[5] to a higher price for a particular security. When the quoting activity meets predetermined criteria, the System[6] treats the quote as not stable ("quote instability" or a "crumbling quote") and the crumbling quote indicator ("CQI") is "on" at that price level for two milliseconds. During all other times, the quote is considered stable ("quote stability"), and the CQI is considered to be "off". The System independently assesses the stability of the Protected

[3] Each exchange's Protected Quotation is its best displayed bid or offer. See Rule 1.160(bb). Current Rule 11.190(g) uses the following eight exchanges' Protected Quotations: New York Stock Exchange LLC ("XNYS"), the Nasdaq Stock Market LLC ("XNGS"), NYSE Arca, Inc. ("ARCX"), Nasdaq BX, Inc. ("XBOS"), Cboe BYX Exchange, Inc. ("BATY"), Cboe Bats BZX Exchange, Inc. ("BATS"), Cboe EDGA Exchange, Inc. ("EDGA"), and Cboe EDGX Exchange, Inc. ("EDGX").

[4] See Rule 1.160(cc).

[5] See Rule 1.160(cc).

[6] See Rule 1.160(nn).

NBB and Protected NBO for each security.

When the CQI is on, Discretionary Peg ("D-Peg")[7] orders, primary peg ("P-Peg")[8] orders, and Corporate Discretionary Peg ("C-Peg")[9] orders do not exercise price discretion to meet the limit price of an active (i.e., taking) order. Specifically, D-Peg, P-Peg, and C-Peg orders peg to a price that is the less aggressive of one (1) minimum price variant ("MPV")[10] less aggressive than the primary quote (i.e., one MPV below (above) the NBB[11] (NBO[12]) for buy (sell) orders) or the order's limit price, if any.[13] When the CQI is on at the NBB (in the case of a buy order) or NBO (in the case of a sell order), P-Peg orders are restricted by the System from exercising price discretion to trade at the quote instability determination price level (the "CQI Price"), and D-Peg and C-Peg orders are restricted by the System from exercising price discretion to trade at the CQI Price or at more aggressive prices than the CQI Price.

The manner in which D-Peg orders operate is described in Rule 11.190(b)(10). Specifically, a D-Peg order is a non-displayed, pegged order whose price, upon entry into the System, is automatically adjusted by the System to be equal to the less aggressive of the Midpoint Price[14] or the order's limit price, if any. When unexecuted shares of such

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[7] See Rule 11.190(b)(10).
[8] See Rule 11.190(b)(8).
[9] See Rule 11.190(b)(16). Note that C-Peg orders can only be buy orders, so any discussion of D-Peg sell orders does not apply to C-Peg orders.
[10] See Rule 11.210.
[11] See Rule 1.160(u).
[12] See Rule 1.160(u).
[13] C-Peg orders are also constrained by the consolidated last sale price of the security, and therefore cannot trade, book, or exercise discretion at a price that is more aggressive than the consolidated last sale price. See Rule 11.190(b)(16).
[14] See Rule 1.160(t).

an order are posted to the Order Book,[15] the price of the order is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1) MPV less aggressive than the primary quote or the order's limit price and is automatically adjusted by the System in response to changes in the NBB (NBO) for buy (sell) orders up (down) to the order's limit price, if any. In order to meet the limit price of active orders on the Order Book, a D-Peg order will exercise the least amount of price discretion necessary from the D-Peg order's resting price to its discretionary price (defined as the less aggressive of the Midpoint Price or the D-Peg order's limit price, if any), except during periods of quote instability as defined in Rule 11.190(g).

The manner in which P-Peg orders operate is described in Rule 11.190(b)(8). Specifically, a P-Peg order is a non-displayed, pegged order whose price, upon entry and when posting to the Order Book, is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1) MPV less aggressive than the primary quote (i.e., the NBB for buy orders and the NBO for sell orders) or the order's limit price, if any. When unexecuted shares of such an order are posted to the Order Book, the order is automatically adjusted by the System in response to changes in the NBB (NBO) for buy (sell) orders up (down) to the order's limit price, if any. In order to meet the limit price of active orders on the Order Book, a P-Peg order will exercise price discretion to its discretionary price (defined as the primary quote), except during periods of quote instability as defined in Rule 11.190(g).

The manner in which C-Peg orders operate is described in Rule 11.190(b)(16). Specifically, a C-Peg order is a non-displayed, pegged buy order whose price, upon entry

[15] See Rule 1.160(p).

into the System, is automatically adjusted by the System to be equal to the less aggressive of the Midpoint Price, the consolidated last sale price, or the order's limit price, if any. When unexecuted shares of such an order are posted to the Order Book, the price of the order is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1) MPV less aggressive than the primary quote or the order's limit price and is automatically adjusted by the System in response to changes in the NBB and the consolidated last sale price up to the order's limit price, if any. In order to meet the limit price of active orders on the Order Book, a C-Peg order will exercise the least amount of price discretion necessary from the C-Peg order's resting price to its discretionary price (defined as the less aggressive of the Midpoint Price, the consolidated last sale price, or the C-Peg order's limit price, if any), except during periods of quote instability as defined in Rule 11.190(g).

IEX has consistently sought to innovate by offering order types that counter the costs of "adverse selection" that participants supplying liquidity incur when their orders are executed at worse prices as a result of certain speed-based trading strategies. Restricting resting D-Peg, P-Peg, and C-Peg orders from exercising price discretion during periods of quote instability, as described in Rule 11.190, is designed to protect such orders from unfavorable executions at prices that the Exchange's probabilistic model predicts are about to become "stale."

As proposed, Users[16] of D-Peg, P-Peg and C-Peg orders will be able to designate whether the order's price will be adjusted using the existing quote instability calculation or a new alternative quote instability calculation. The alternative calculation is designed

[16] See IEX Rule 1.160(qq).

to incrementally increase the coverage of the quote instability calculation in predicting whether a particular quote is unstable by adjusting the logic underlying the quote instability calculation and introducing enhanced functionality designed to increase the number of crumbling quotes identified, while maintaining the quote instability calculation's accuracy in predicting the direction and timing of the next price change in the NBB or NBO, as applicable.

Current Crumbling Quote Calculation

In determining whether a crumbling quote exists, the Exchange utilizes real time relative quoting activity of eight exchanges' Protected Quotations[17] and a proprietary mathematical calculation (the "quote instability calculation") to assess the probability of an imminent change to the current Protected NBB to a lower price or Protected NBO to a higher price for a particular security ("quote instability factor"). When the quoting activity meets predefined criteria and the quote instability factor calculated is greater than the Exchange's defined threshold ("quote instability threshold"), the System treats the quote as not stable ("quote instability" or a "crumbling quote"), which turns the CQI on. During all other times, the quote is considered stable ("quote stability") and the CQI is off. The System independently assesses the stability of the Protected NBB and Protected NBO for each security.

Quote instability (i.e., a crumbling quote) is an assessment that the Exchange System makes on a real-time basis, based on a pre-determined, objective set of conditions specified in Rule 11.190(g)(1) during the Regular Market Session[18]. Specifically, the

[17] See supra note 3.
[18] See IEX Rule 1.160(gg). Quote instability assessments are only made by the Exchange System

presence of a crumbling quote is determined by the System when the quote instability factor result from the quote stability calculation is greater than the defined quote instability threshold. As set forth in Rule 11.190(g)(1)(i), this calculation applies ten fixed coefficients to nine quote stability variables. The quote stability variables are measures of the status of Protected Quotations of the eight exchanges, including the number of such Protected Quotations on the near and far side of the market and the relationship and recent changes thereto. The quote instability calculation inputs these variables into a formula comprised of the ten fixed coefficients to determine the quote instability factor and whether it is greater than the defined quote instability threshold. The quote stability variables, fixed coefficients and formula were developed by the Exchange based on extensive research, analysis and validation to identify when there is a heightened probability of an imminent quote change to the NBB or NBO. The Exchange has made incremental changes to optimize and enhance the effectiveness of the quote instability calculation in determining whether a crumbling quote exists three times since Exchange launch.[19]

When the CQI is on, it remains in effect at that price level (the "CQI Price") for two milliseconds, unless a new determination is made before the CQI turns off. Only one determination may be in effect at any given time for a particular security (i.e., the System will only treat one side of the Protected NBBO as unstable in a particular security at any

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during the Regular Market Session because the order types that utilize the assessment (i.e., D-Peg, P-Peg and C-Peg orders) are only eligible to trade during the Regular Market Session

[19] See Securities Exchange Act Release 34-78510 (August 9, 2016), 81 FR 54166 (August 15, 2016) (SR-IEX-2016-11); Securities Exchange Act Release No. 80202 (March 10, 2017), 82 FR 14058 (March 16, 2017) (SR-IEX-2017-06); and Securities Exchange Act Release No. 83048 (April 13, 2018), 83 FR 17467 (April 19, 2018) (SR-IEX-2018-07).

given time and the CQI can only be on at one price level).[20] A new determination may be made after at least 200 microseconds have elapsed since the preceding determination, or a price change on either side of the best displayed bid or offer of the eight exchanges used for the current quote instability calculation occurs, whichever is first. If a new determination is made, the original determination is no longer in effect. A new determination can be on either side of the best displayed bid or offer of the eight exchanges used for the current quote instability calculation and at the same or different price level as the original determination.

Rule 11.190(g)(1)(A)(iii) provides that the Exchange reserves the right to modify the quote instability coefficients or quote instability threshold at any time, subject to a filing of a proposed rule change with the SEC. In this rule filing, the Exchange is proposing to make such changes by adding an alternative quote instability calculation approach.

Proposed Alternative Quote Instability Calculation

IEX periodically reviews the performance of the quote instability calculation in predicting imminent quote changes, and potential alternative approaches. Based on that review, IEX identified an alternative approach that is designed to achieve two related objectives. First, we sought to increase the "coverage" of the CQI, meaning the percentage of all "adverse" NBBO changes per symbol (lower for bids, higher for offers) that were predicted by the CQI (meaning the CQI was "on" at the time of the adverse NBBO change). Second, we sought to preserve the "accuracy rate" of the CQI, meaning the percentage of time that the CQI accurately predicted the direction of the next price

[20] See Rule 11.190(g)(1).

change. IEX reviewed market data from March 2022 to consider these factors.[21] The analysis indicated that the current CQI calculation predicted 43% of such adverse NBBO changes on a volume weighted basis, while the alternative CQI calculation would have predicted 62% of such adverse NBBO changes. As to the accuracy rate, the analysis indicated that the CQI had an accuracy rate of 78%, and the alternative CQI calculation would have had an accuracy rate of 79%.

Based on informal feedback from Members, IEX understands that different firms may prefer different levels of coverage, i.e., how frequently a pegged order refrains from exercising price discretion to meet the price of an incoming order in response to crumbling quote predictions. Accordingly, IEX proposes to add the alternative quote instability calculation approach for determining whether a crumbling quote exists as an option for Users of pegged orders.

As described in more detail below, the alternative approach would: expand the sources and types of market data used, utilize a more plain English rules-based approach, modify the minimum time period between quote instability determinations, and include a real-time accuracy assessment of each rule with the effect of deactivating a rule that is not meeting specified metrics. In addition, pegged orders would be restricted from exercising price discretion when the CQI is on, regardless of whether the current NBB or

[21] Data regarding the proposed alternative approach is based on comprehensive back testing. Specifically, IEX adjusts TAQ (i.e., NYSE Trade and Quote) data by fixed latency offsets per-venue to simulate market data seen by the IEX system. This simulated data is used to compute CQI models and evaluate their performance. Using this process to simulate the current CQI model confirms that performance estimates are similar to the actual IEX production system, and applying this process to the proposed model produces the back testing performance estimates described herein.

NBO (as applicable) is the same as the CQI Price.

The following describes the proposed alternative approach:

Expanded Sources and Types of Market Data

The Exchange is proposing to use the Protected Quotations of the current eight exchanges[22] in the quote instability calculation, and to add the Protected Quotations of three additional exchanges: MIAX PEARL, LLC ("EPRL"), MEMX LLC ("MEMX"), and Nasdaq PHLX LLC ("XPHL") (collectively the "Signal Exchanges"). Additionally, as detailed below, the Exchange is proposing to use quotation size data[23] from the Signal Exchanges, as well as quotation price data, which is also used in the current approach. In connection with the Exchange's analysis of market data,[24] the Exchange considered several different permutations of which exchanges to include in the model. The analysis identified that using Protected Quotations from the 11 Signal Exchanges in the aggregate, as well as adding quotation size data, enhanced the predictive power of the alternative approach for determining a crumbling quote.

Use of a Rules-Based System

As proposed, the alternative model utilizes a quote instability calculation in which nine separate rules -- each with specific conditions based on either the price, size, or price and size of the Signal Exchanges' Protected Quotations -- can trigger a quote instability

[22] Current Rule 11.190(g) uses the following eight exchanges' Protected Quotations: XNYS; XNGS; ARCX; XBOS; BATY; BATS; EDGA; and EDGX.

[23] All references to quotation size are measured in round lot multiples.

[24] IEX conducted an analysis to develop a model for predicting crumbling quotes by reviewing market data from randomly selected days in 2018, 2019, and 2020. This model was validated by testing across randomly selected days from the same time period, as well as 2021.

determination for either the NBB or the NBO of a particular security.[25] The current quote instability calculation utilizes a logistic regression model with multiple coefficients and variables that must exceed a pre-defined threshold in order for the System to treat the quote as unstable. Based upon the analysis noted above, the Exchange believes that the proposed alternative rules-based model (which incorporates and expands on the existing approach) will incrementally increase the coverage of the Exchange's probabilistic model for determining whether a crumbling quote will occur at the same level of precision. In other words, the alternative model is expected to increase the number of quote instability determinations while maintaining the same degree of accuracy in predicting the timing and direction of price changes in the NBB and NBO. The proposed quote instability rules include four categories of Protected Quotation changes (each comprised of one or more rules) that IEX has determined are predictive of whether the NBB or NBO is about to move to a less aggressive price, as follows:

- Disappearing bids (or offers) – This category includes four rules that focus on whether one or more of the Signal Exchanges is no longer disseminating a bid or offer at the Signal Best Bid[26] or Signal Best Offer[27] as applicable;[28]

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[25] The nine rules are designed to work together in determining whether a quote instability determination is triggered, so if a User selects the alternative model all nine rules would be applicable. Users cannot elect that only some of the rules would apply.

[26] "Signal Best Bid" means the highest Protected Bid of the Signal Exchanges. See proposed IEX Rule 11.190(g)(2)(B)(i).

[27] "Signal Best Offer" means the lowest Protected Offer of the Signal Exchanges. See proposed IEX Rule 11.190(g)(2)(B)(v).

[28] The proposed disappearing bid/offers rules are closely related to the current approach to the quote instability calculation, in that both approaches share the Delta quote instability variable, which is heavily weighted in the current quote instability calculation. In the current calculation, Delta is additively incorporated into the logistic formula (after scaling by its relevant coefficient) whereas in the proposed disappearing bid/offer rules, specific Delta values are explicitly required for the relevant rule to be True. See IEX Rule 11.190(g)(1)(A)(i)(b)(9) and proposed

- Recent changes in quote size – This category includes two rules that focus on whether there is an imbalance in the size of bids and offers at the Signal Best Bid or Signal Best Offer;
- Locked or crossed market – This category includes one rule that focuses on situations where the Signal Best Bid and Signal Best Offer are locked or crossed; and
- Quotation Changes – This category includes two rules that focus on changes to the Signal Best Bid or Signal Best Offer.

On a security-by-security basis, if the specified conditions of any of the quote instability rules are met, then the rule is deemed to be True for that security. As described in more detail below, each rule must be active before it can trigger a quote instability determination. When one or more quote instability rules is deemed to be True and any of such rules are active, the System will treat the quote as unstable. The following describes the proposed rules:

- Rule DB_1 (DO_1) is True if two or more exchanges among BATS, EDGX, and XNGS have fallen off the Signal Best Bid (Offer) (i.e., the exchange was at the Signal Best Bid (Offer) but is no longer at the Signal Best Bid (Offer)) within the past millisecond or within the time period since the start of the current Signal Best Bid (Offer) if shorter.[29]
- Rule DB_2 (DO_2) is True if two or more exchanges among BATS, EDGX, and XNGS have fallen off the Signal Best Bid (Offer) (i.e., the exchange was at

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IEX Rule 11.190(g)(2)(B)(x) and (xi), each of which reflect a count of the number of three specified exchanges that have moved away from the best near side Protected NBBO of the Signal exchanges, as specified. IEX expects that the overall behavior of the proposed disappearing bid/offer rules will be similar to the behavior of the current approach.

[29] Note that rule DB2 (DO2/DB4/DO4) being True logically implies that rule DB1 (DO1/DB3/DO3) is True. These rules are not redundant however, since a rule must be both True AND Active to generate a quote instability determination. It is possible for Rule DB2 (DO2/DB4/DO4) to be Active while Rule DB1 (DO1/DB3/DO3) is not Active, so these logical subset rules can add a distinct contribution to output behavior.

the Signal Best Bid (Offer) but is no longer at the Signal Best Bid (Offer)) within the past millisecond or within the time period since the start of the current Signal Best Bid (Offer) if shorter AND the total notional value of protected displayed interest at the Signal Best Bid (Offer) is less than $60,000.

- Rule DB_3 (DO_3) is True if two or more exchanges among BATS, EDGX, and XNGS have fallen off the Signal Best Bid (Offer) (i.e., the exchange was at the Signal Best Bid (Offer) but is no longer at the Signal Best Bid (Offer)) within the past millisecond or within the time period since the start of the current Signal Best Bid (Offer) if shorter AND there is only one Signal Exchange at the Signal Best Bid (Offer).
- Rule DB_4 (DO_4) is True if two or more exchanges among BATS, EDGX, and XNGS have fallen off the Signal Best Bid (Offer) (i.e., the exchange was at the Signal Best Bid (Offer) but is no longer at the Signal Best Bid (Offer))within the past millisecond or within the time period since the start of the current Signal Best Bid (Offer) if shorter AND the total notional value of protected displayed interest at the Signal Best Bid (Offer) is less than $60,000 AND there is only one Signal Exchange at the Signal Best Bid (Offer).
- Rule SB_1 (SO_1) is True if there is one Signal Exchange at the Signal Best Bid (Offer) AND the Bid (Offer) Pressure[30] is greater than or equal to Offer (Bid) Pressure AND the aggregate total shares displayed at the Signal Best Offer (Bid) is greater than the aggregate total shares displayed at the Signal Best Bid (Offer) AND Bid (Offer) Pressure is greater than two.
- Rule SB_2 (SO_2) is True if there is one Signal Exchange at the Signal Best Bid (Offer) AND Bid (Offer) Pressure is greater than or equal to Offer (Bid) Pressure AND the aggregate total shares displayed at the Signal Best Offer (Bid) is greater than the aggregate total shares displayed at the Signal Best Bid (Offer) AND Bid (Offer) Pressure is greater than one AND the spread is less than the average of the spread over the past twenty Updates[31] to either the Protected Bid or Offer of any Signal Exchange.
- Rule LB_1 (LO_1) is True if either of the following conditions are met: (A) the Signal Best Bid is greater than or equal to the Signal Best Offer AND the Signal Best Offer (Bid) is less than (greater than) the Signal Best Offer (Bid) as of the last Update; OR the Signal Best Bid is greater than or equal to the Signal Best Offer AND the aggregate total shares displayed at the Signal Best Offer (Bid) is greater than the aggregate total shares displayed at the Signal Best Offer (Bid) as of the last Update AND the aggregate total shares displayed at the Signal Best Offer (Bid) is greater than the aggregate total

[30] See proposed IEX Rules 11.190(g)(2)(B)(xii) and (xiii).

[31] "Update" means any change to either the price or size of any Signal Exchange's Protected Bid or Offer, or a change to the quote condition (e.g., when the quote becomes slow or non-firm, or the security is halted).

shares displayed at the Signal Best Bid (Offer).

- Rule FB_1 (FO_1) is True if the Signal Best Bid (Offer) is greater (less) than the Signal Best Bid (Offer) as of the last Update.
- Rule FB_2 (FO_2) is True if the Signal Best Bid (Offer) is less (greater) than the Signal Best Bid (Offer) as of the last Update.

Time and Direction Constraints on the CQI

The Exchange proposes three distinct changes for the alternative model to the time and direction constraints on the CQI in the current model. These changes are designed to provide a more dynamic methodology for quote instability determinations, thereby incrementally increasing the coverage of the formula in predicting a crumbling quote by expanding the scope of the model to additional situations where the Exchange's probabilistic model predicts that the NBB or NBO is in the process of moving to a less aggressive price and is about to become stale.

First, the quote instability calculation could turn on concurrently on both sides of the market (i.e., the NBB and NBO) and always remains on for the full two millisecond period each time it turns on. In the current model, the quote instability calculation independently assesses the stability of the Protected NBB and Protected NBO for each security, but it can only turn on for one side of the market for each security at a time. Thus, if the quote instability calculation determines that the Protected NBB is unstable, the CQI turns on for the NBB. If thereafter the quote instability calculation determines that the Protected NBO for that same security is also unstable while the CQI is still on for the NBB, the System will turn off the CQI for NBB and turn it on for the NBO. As proposed, the CQI could be on concurrently on the buy and sell side of the market and will be able to remain on for the full two millisecond period after turning on because a subsequent determination on the opposite side of the market will not turn off a prior

determination. While both sides of the market do not frequently crumble concurrently, IEX nonetheless believes that when they do, providing corresponding protection to orders on both sides of the market is appropriate.

Second, pursuant to the alternative model, when the CQI turns on it would not be constrained to a specific price level. Currently the CQI is on at a specific CQI Price, the particular price in effect at the time it turned on, and if the NBB or NBO (as applicable) changes during the time it is on, the CQI does not constrain D-Peg, P-Peg, and C-Peg orders from exercising discretion since the CQI Price is no longer set by reference to the current NBB or NBO (as applicable).[32] As proposed, pursuant to the alternative approach, the CQI will continue to turn on at a specific price, but it will restrict D-Peg, P-Peg, and C-Peg orders from exercising discretion past their resting price when the CQI is on for the same side of the market as such orders regardless of whether the price at which it turned on is currently equal to the NBB or NBO (as applicable). The Exchange also proposes conforming changes to Rules 11.190(b)(8)(K)(i) and (ii), (b)(10)(K)(i) and (ii), and (b)(16)(K) to reflect this change to D-Peg, P-Peg, and C-Peg orders' behavior if the User selects the alternative quote instability calculation. Based on IEX's analysis of market data, as described above, the Exchange has determined that continuing to restrict D-Peg, P-Peg, and C-Peg orders from exercising discretion when the CQI is on, even if the CQI Price has changed, will protect such orders from potential adverse selection at the new price level.

Third, pursuant to the alternative model, IEX proposes to change the amount of time the System waits after the CQI turns on before it can make a new quote instability

[32] See IEX Rules 11.190(b)(8)(K)(i) and (ii), (b)(10)(K)(i) and (ii), (b)(16)(K).

determination on the same side of the market from 200 microseconds to 250 microseconds (irrespective of any change in the Signal Best Bid or Offer). Because pegged orders will be constrained from exercising price discretion when the CQI is on, regardless of whether the current NBB or NBO (as applicable) is the same as the CQI price, CQI triggers in extremely rapid succession are unnecessary to continuously restrict discretion across successive NBBO changes. Moreover, increasing the 200 microsecond "cooldown" period to 250 microseconds before the System can make another quote instability determination is designed to reduce the technical processing burden on the System.

Activation Values/Activation Thresholds

As proposed, in applying the alternative approach, consistent with using a rules-based model instead of a logistic regression model for the quote instability calculation, the Exchange would maintain an activation value ("Activation Value") for each quote instability rule. Each rule's Activation Value is computed (on a security-by-security basis for the Bid and Offer side) in real time as a function of the number of times the quote moves to a less aggressive price within the two milliseconds (or the start time of the current Signal Best Bid or Signal Best Offer, as applicable, if shorter) following the time the rule was True and the total number of times the rule was True. Whenever the Activation Value for a given rule exceeds a fixed predetermined activation threshold specific to that rule ("Activation Threshold"), the rule is active (i.e., it is eligible to trigger a quote instability determination when True).

The Activation Value and Activation Threshold computations are intended to optimize the overall accuracy of the quote instability determinations by providing a

mechanism to turn off a particular rule when market conditions are such that it is relatively less accurate in predicting a crumbling quote. IEX believes that utilizing Activation Thresholds is a useful innovation because it enables the use of rules that can be highly predictive in certain market conditions but not in others. The Activation Thresholds are tailored for each rule based on the rule's expected general accuracy in predicting a crumbling quote, based on IEX's market data analysis, so that a rule that has a higher potential to be less accurate has a higher activation threshold burden to meet. The Activation Thresholds are designed to increase the coverage for the alternative quote instability calculation by enabling more frequent triggers than the current approach but with accuracy controls safeguards.

As proposed, the Activation Threshold for the DB, DO, SB and SO rules is 0.30; the Activation Threshold for Rules LB and LO is 0, and the Activation Threshold for the FB and FO rules is 0.50.[33] The Exchange would utilize an initial activation value of 0.50 for all rules at the start of the Regular Market Session, which is then modified during the course of the Regular Market Session to reflect each rule's predictive performance. Specifically, each time a rule is True[34] its existing Activation Value is multiplied by a Decay Factor of 0.94. In addition, each time the Signal Best Bid or Signal Best Offer moves to less aggressive price within two milliseconds of a rule being True at that price level, 0.06 will be added to that rule's existing Activation Threshold (i.e., (1 –decay

[33] Note that the FB/FO rules will not have activation values *strictly* above their activation thresholds of 0.5 upon the first time they are satisfied (they are initialized daily at 0.5 and multiplied by the decay factor of 0.94 when they are satisfied), therefore the first time each day that either or both of these rules is True will not trigger a quote instability determination.

[34] Excluding instances where the rule was already True at the same unchanged price level in the prior two milliseconds.

factor) + previous Activation Value as specified in IEX Rule 11.190(g)(2)(D)(ii).

When a rule is active, the System continues to evaluate if its Activation Value exceeds its Activation Threshold. If the rule's Activation Value subsequently does not exceed its Activation Threshold, the rule will not trigger the System to treat the relevant quote as unstable even if the rule is True. The System continues to track the Activation Value for rules that are inactive, and if the Activation Value subsequently exceeds the rule's Activation Threshold, the System will reactivate the rule.

Based on IEX's market data analysis, the Exchange believes that the use of Activation Thresholds, as proposed, would provide a dynamic performance evaluation methodology that will optimize the frequency and accuracy of the quote instability calculation, by enabling IEX to utilize a broader array of rules that may be predictive of a crumbling quote in certain market conditions but not others. Moreover, as proposed all aspects of the activation calculations are fully transparent in IEX rules thus enabling Members, market participants and others to perform the same calculations to determine whether a particular security is subject to a quote instability determination.

Specific Rule Changes

IEX proposes to make the following changes to Rule 11.190(g) to specify that there are two alternative proprietary mathematical calculations (Option 1 and Option 2) to assess the probability of an imminent change to the current Protected NBB to a lower price or a Protected NBO to a higher price for a particular security:

- Add new language to the introductory section of Rule 11.190(g) after the phrase "Quote Stability" at the beginning of the Rule specifying that the Exchange utilizes two User Selected alternative proprietary mathematical calculations to assess the probability of an imminent change to the current Protected NBB to a lower price or a Protected NBO to a higher price for a particular security.

- Add language immediately following the new language described in the preceding bullet and prior to the existing text stating that "[f]or Option 1, as set forth in subparagraph (1) of Rule 11.190(g),".

- Add a new paragraph after the current first paragraph providing introductory language describing Option 2 and specifying that Option 2 is set forth in subparagraph (2) of Rule 11.190(g).

- Add "Option 1" prior to "Crumbling Quote" in the heading to subparagraph (1) of Rule 11.190(g).

- Relocate and revise subparagraph (1)(A)(iii) of Rule 11.190(g) with new subparagraph (3) of Rule 11.190(g) which makes clarifying changes to the terminology in current subsection (1)(A)(iii) of Rule 11.190(g), which specifies that the Exchange reserves the right to modify the quote instability coefficients or quote instability threshold at any time, subject to a filing of a proposed rule change with the SEC. IEX proposes to revise the rule provision to reference "the proprietary mathematical calculations used to assess the probability of an imminent change to the current Protected NBB to a lower price or a Protected NBO to a higher price for a particular security" rather than existing references to "the quote instability coefficients or quote instability threshold." Current language that provides that such changes are "subject to a filing of a proposed rule change with the SEC" would be retained. In addition, IEX proposes to renumber this subsection to be subsection (3) of Rule 11.190(g).

- Add new subparagraph (2) (including subparagraphs) of Rule 11.190(g) to describe the alternative quote instability model and refer to such model as "Option 2 Crumbling Quote".

The Exchange also proposes to make conforming changes to Rules 11.190(b)(8)(K)(i) and (ii) ("P-Peg"), (b)(10)(K)(i) and (ii) ("D-Peg"), and (b)(16)(K) ("C-Peg") to reflect differences in whether the System will restrict applicable orders from exercising price discretion when the CQI is on. Specifically, if the User selected the existing quote instability model (Option 1), D-Peg, P-Peg, and C-Peg orders will be restricted from exercising discretion while the CQI is on for the same side of the market if the current NBB/NBO (as applicable) is the same as the NBB/NBO that the quote instability determination was based on. If the User selected the alternative quote

instability model (Option 2), D-Peg, P-Peg, and C-Peg orders will be restricted from exercising discretion while the CQI is on for the same side of the market, even if the current NBB/NBO (as applicable) is different than the NBB/NBO upon which the quote instability determination was based. In addition, the Exchange proposes to make a conforming change to Rule 11.190(b)(7) to reflect that only Option 1 will be applicable to Discretionary Limit orders.

Implementation

The Exchange will announce the implementation date of the proposed rule change by Trading Alert at least ten business days in advance of such implementation date and within 90 days of effectiveness of this proposed rule change.

b. Statutory Basis

IEX believes that the proposed rule change is consistent with Section 6(b)[35] of the Act in general, and furthers the objectives of Section 6(b)(5) of the Act,[36] in particular, in that it is designed to promote just and equitable principles of trade, to remove impediments to and perfect the mechanism of a free and open market and a national market system and, in general, to protect investors and the public interest. Specifically, and as discussed in the Purpose section, the proposal is designed to provide an alternative quote instability approach for pegged orders that is designed to make more frequent predictions while maintaining a similar true positive ratio as the existing approach. Based on informal feedback from Members, IEX understands that different firms prefer different levels of coverage with respect to the CQI and its impact on pegged orders

[35] 15 U.S.C. 78f.
[36] 15 U.S.C. 78f(b)(5).

exercising price discretion to meet the price of an incoming order. The alternative quote instability approach is responsive to that feedback and would provide additional coverage to Users of D-Peg, P-Peg and C-Peg orders, i.e., as discussed in the Purpose section, it would result in more frequent predictions and thereby increase the circumstances in which the order would not exercise discretion.

The Exchange believes it is consistent with the protection of investors and the public interest to provide an alternative quote instability calculation model that is designed to protect pegged orders from potential unfavorable executions during periods of quote instability when the Exchange's probabilistic model identifies that the market appears to be moving adversely to them. IEX believes that the alternative approach, in the aggregate and with respect to the specific changes proposed, is rigorously sound, supported by market data analysis, and consistent with the Act as described below.

The Exchange believes that it is consistent with the Act to expand the sources and types of market data used by the quote instability calculation. As described in the Purpose section, based on market data analysis and testing, the Exchange believes that using the market data of three additional exchanges, and using quotation size data (in addition to quotation price data) of all eleven Signal Exchanges, will result in robust predictive power and accuracy of the quote instability calculation.

The Exchange also believes that it is consistent with the Act to utilize a rules-based model to determine whether a crumbling quote will occur. As discussed in the Purpose section, based on market data analysis, the Exchange believes that the nine proposed quote instability rules -- each with specific conditions based on either the price, size, or price and size of the Signal Exchange's Protected Quotations -- will result in

robust predictive power and accuracy of the Exchange's alternative probabilistic model for determining whether a crumbling quote will occur by expanding the scope of the model to additional situations where the Exchange's probabilistic model predicts that the NBB or NBO is about to become stale. IEX believes that this proposed change will potentially enhance the protection available to market participants using pegged order types that elect to use the alternative model. Moreover, IEX believes that the alternative quote instability calculation, as a plain English rules-based system, will be more readily understood by market participants, thereby increasing the transparency of IEX's rules and removing impediments to a free and open market.

The Exchange further believes that it is consistent with the Act to restrict D-Peg, P-Peg, and C-Peg orders from exercising price discretion when the alternative quote instability calculation model is on for the same side of the market as the order regardless of the triggering price. As discussed in the Purpose section, based on market data analysis, the Exchange believes that continuing to restrict D-Peg, P-Peg, and C-Peg orders from exercising discretion when the CQI is on even if the CQI Price has changed will protect such orders from potential adverse selection at new price levels resulting from consecutive closely timed price moves as the market "settles" at a new price level.

Additionally, the Exchange believes that it is consistent with the Act to change the time and direction constraints on the alternative quote instability calculation model. As discussed in the Purpose section, these differences -- keeping the CQI on for a full two millisecond period every time it turns on and allowing the CQI to turn on concurrently on both sides of the market (i.e., the NBB and NBO) -- are designed to incrementally increase the coverage of the alternative quote instability calculation model in predicting a

crumbling quote by increasing the duration of time in which the CQI is on. Based on market data analysis, the Exchange believes these changes to the CQI's time and direction constraints will increase the coverage of quote instability determinations.

The Exchange additionally believes that it is consistent with the protection of investors and the public interest to extend by 50 microseconds the "cooldown" period before the System can make another quote instability determination (extending it from 200 microseconds to 250 microseconds). As discussed in the Purpose section, based on market data analysis, because pegged orders will be constrained from exercising price discretion when the CQI is on regardless of whether the current NBB or NBO (as applicable) is the same as the CQI price, CQI triggers in extremely rapid succession are unnecessary to continuously restrict discretion across successive NBBO changes. Moreover, increasing the "cooldown" period before the System can make another quote instability determination is designed to reduce the technical processing burden on the System thereby supporting the resiliency of the Exchange and removing impediments to and perfecting the mechanism of a free and open market and a national market system.

The Exchange also believes that using activation thresholds instead of a quote stability threshold is consistent with the Act because the activation thresholds are designed to enable broader coverage while controlling for overall accuracy of the quote instability determinations by providing a mechanism to turn off a particular rule when market conditions are such that it is relatively less accurate in predicting a crumbling quote. Based upon market data analysis, IEX believes that utilizing activation thresholds is a useful innovation because it enables the use of rules that can be highly predictive in certain market conditions but not in others. The activation thresholds are tailored for each

rule based on the rule's general accuracy in predicting a crumbling quote so that a rule that has a higher potential to be less accurate has a higher activation threshold burden to meet.

The Exchange believes that it is consistent with the protection of investors and the public interest to offer an alternative User selected quote instability calculation model for pegged orders. As discussed in the Purpose section and above, IEX understands that different market participants seek differing levels of coverage with respect to the CQI and its impact on when a pegged order exercises price discretion to meet the price of an incoming order. The proposed rule change is designed to provide a market-based approach to such differing objectives in a manner that is transparent to market participants. Moreover, IEX's market data analysis evidences that both quote instability calculations will be "on" for a small portion of the trading day while providing robust protection to pegged orders.

The Exchange believes that the proposed rule change may result in more and larger sized pegged orders being entered on IEX as a result of the ability to select the quote instability calculation alternative which, as discussed above, is designed to provide greater coverage with respect to the CQI and its impact on pegged orders exercising price discretion to meet the price of an incoming order. To the extent more orders are entered, the increased liquidity would benefit all IEX members and their customers.

Regardless of whether a User selects to use the current or proposed alternative quote instability calculation, when multiple pegged orders exercise discretion at the same

time, their relative priority is retained.[37] Thus, the Exchange notes that the proposed rule change does not raise any new or novel issues in this regard.

Furthermore, the Exchange notes that all Members are eligible to use D-Peg, P-Peg, and C-Peg orders, and therefore all Members are eligible to benefit from these order types' protections against adverse selection, and will also benefit if use of the alternative quote instability calculation bring more liquidity to the Exchange. Thus, the Exchange believes that application of the rule change is equitable and not unfairly discriminatory.

Further, the Exchange believes that the proposed changes (as described in the Purpose section) to relocate and revise subparagraph (1)(A)(iii) of Rule 11.190(g) with new subparagraph (3) of Rule 11.190(g) and to make clarifying changes to the terminology in current subsection (1)(A)(iii) of Rule 11.190(g), which specifies that the Exchange reserves the right to modify the quote instability coefficients or quote instability threshold at any time, subject to a filing of a proposed rule change with the SEC are consistent with the Act. The proposed changes merely update terms and descriptive language to describe both alternative quote instability calculations, and without changing the operative language that any future changes would continue to be subject to a filing of a proposed rule change with the SEC.

The Exchange also believes that the proposed conforming rule changes, as described in the Purpose section are consistent with the Act because the changes would promote clarity in IEX's rules.

Finally, the Exchange notes that, as proposed, both quote instability calculations will continue to be fixed formulas specified transparently in IEX's rules. The Exchange

[37] See IEX Rule 11.190(b)(8), (10) and (16).

is not proposing to add any new functionality, but merely to provide an alternative quote instability calculation for pegged orders based on market data analysis designed to increase its accuracy in predicting a crumbling quote, and as contemplated by the rule.

4. Self-Regulatory Organization's Statement on Burden on Competition

IEX does not believe that the proposed rule change will result in any burden on competition that is not necessary or appropriate in furtherance of the purposes of the Act. To the contrary, as discussed in the Statutory Basis section, the proposal is designed to enhance IEX's competitiveness by incentivizing the entry of increased liquidity.

With regard to intra-market competition, the proposed changes to the quote instability calculation will apply equally to all Members on a fair, impartial and nondiscriminatory basis without imposing any new burdens on the Members. The Commission has already considered the Exchange's D-Peg order type in connection with its grant of IEX's application for registration as a national securities exchange under Sections 6 and 19 of the Act[38] and approved the Exchange's P-Peg[39] order type. The Commission has also allowed the Exchange's C-Peg[40] order type to become effective. As discussed in the Purpose and Statutory Basis sections, the proposed rule change is designed to merely provide an optional alternative quote instability calculation; therefore, no new burdens are being proposed.

With regard to inter-market competition, other exchanges are free to adopt similar

[38] See Securities Exchange Act Release 78101 (June 17, 2016), 81 FR 41142 (June 23, 2016) (File No. 10-222).
[39] See Securities Exchange Act Release No. 80223 (March 13, 2017), 82 FR 14240 (March 17, 2017) (SR-IEX-2016-18).
[40] See Securities Exchange Act Release No. 87019 (September 19, 2019), 84 FR 50485 (September 25, 2019) (SR-IEX-2019-10).

quote instability calculations. In this regard, the Exchange notes that that NYSE American LLC has adopted a rule copying an earlier iteration of the Exchange's Discretionary Peg Order type and quote instability calculation.[41]

5. Self-Regulatory Organization's Statement on Comments on the Proposed Rule Change Received from Members, Participants, or Others

Written comments were neither solicited nor received.

6. Extension of Time Period for Commission Action

Not applicable.

7. Basis for Summary Effectiveness Pursuant to Section 19(b)(3) or for Accelerated Effectiveness Pursuant to Section 19(b)(2)

Not applicable.

8. Proposed Rule Change Based on the Rules of Another Self-Regulatory Organization or of the Commission

The proposed rule change is not based on the rules of another self-regulatory organization or of the Commission.

9. Security-Based Swap Submissions Filed Pursuant to Section 3C of the Act

Not applicable.

10. Advance Notices Filed Pursuant to Section 806(e) of the Payment, Clearing and Settlement Supervision Act

Not applicable.

11. Exhibits

Exhibit 1 – Form of Notice of the Proposed Rule Change for Publication in the Federal Register.

Exhibit 5 – Text of Proposed Rule Change.

[41] See NYSE American LLC Rule 7.31E(h)(3)(D).

EXHIBIT 1

SECURITIES AND EXCHANGE COMMISSION
(Release No. 34 -); File No. SR-IEX-2022-06)

Self-Regulatory Organizations: Investors Exchange LLC; Notice of Filing of Proposed Rule Change to Amend Rule 11.190(g) to Provide an Alternative Calculation for Pegged Order Types for Determining Whether a Quote Instability Condition Exists.

Pursuant to Section 19(b)(1)[1] of the Securities Exchange Act of 1934 (the "Act")[2] and Rule 19b-4 thereunder,[3] notice is hereby given that, on (date), the Investors Exchange LLC ("IEX" or the "Exchange") filed with the Securities and Exchange Commission (the "Commission") the proposed rule change as described in Items I, II and III below, which Items have been prepared by the self-regulatory organization. The Commission is publishing this notice to solicit comments on the proposed rule change from interested persons.

I. Self-Regulatory Organization's Statement of the Terms of Substance of the Proposed Rule Change

Pursuant to the provisions of Section 19(b)(1) under the Act,[4] and Rule 19b-4 thereunder,[5] IEX is filing with the Commission a proposed rule change to amend Rule 11.190(g) to provide an alternative calculation for pegged order types for determining whether a quote instability condition exists.

The text of the proposed rule change is available at the Exchange's website at www.iextrading.com, at the principal office of the Exchange, and at the Commission's

[1] 15 U.S.C. 78s(b)(1).
[2] 15 U.S.C. 78a.
[3] 17 CFR 240.19b-4.
[4] 15 U.S.C. 78s(b)(1).
[5] 17 CFR 240.19b-4.

Public Reference Room.

II. Self-Regulatory Organization's Statement of the Purpose of, and the Statutory Basis for, the Proposed Rule Change

In its filing with the Commission, the self-regulatory organization included statements concerning the purpose of and basis for the proposed rule change and discussed any comments it received on the proposed rule change. The text of these statements may be examined at the places specified in Item IV below. The self-regulatory organization has prepared summaries, set forth in Sections A, B, and C below, of the most significant aspects of such statements.

A. Self-Regulatory Organization's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

1. Purpose

The purpose of the proposed rule change is to amend Rule 11.190(g) to provide an alternative quote calculation for pegged order types for determining whether a quote instability condition exists.

Background

Currently, as specified in Rule 11.190(g), the Exchange utilizes quoting activity of eight away exchanges' Protected Quotations[6] and a proprietary mathematical calculation to assess the probability of an imminent change to the current Protected NBB[7] to a lower price or imminent change to the current Protected NBO[8] to a higher price for a

[6] Each exchange's Protected Quotation is its best displayed bid or offer. See Rule 1.160(bb). Current Rule 11.190(g) uses the following eight exchanges' Protected Quotations: New York Stock Exchange LLC ("XNYS"), the Nasdaq Stock Market LLC ("XNGS"), NYSE Arca, Inc. ("ARCX"), Nasdaq BX, Inc. ("XBOS"), Cboe BYX Exchange, Inc. ("BATY"), Cboe Bats BZX Exchange, Inc. ("BATS"), Cboe EDGA Exchange, Inc. ("EDGA"), and Cboe EDGX Exchange, Inc. ("EDGX").

[7] See Rule 1.160(cc).

[8] See Rule 1.160(cc).

particular security. When the quoting activity meets predetermined criteria, the System[9] treats the quote as not stable ("quote instability" or a "crumbling quote") and the crumbling quote indicator ("CQI") is "on" at that price level for two milliseconds. During all other times, the quote is considered stable ("quote stability"), and the CQI is considered to be "off". The System independently assesses the stability of the Protected NBB and Protected NBO for each security.

When the CQI is on, Discretionary Peg ("D-Peg")[10] orders, primary peg ("P-Peg")[11] orders, and Corporate Discretionary Peg ("C-Peg")[12] orders do not exercise price discretion to meet the limit price of an active (i.e., taking) order. Specifically, D-Peg, P-Peg, and C-Peg orders peg to a price that is the less aggressive of one (1) minimum price variant ("MPV")[13] less aggressive than the primary quote (i.e., one MPV below (above) the NBB[14] (NBO[15]) for buy (sell) orders) or the order's limit price, if any.[16] When the CQI is on at the NBB (in the case of a buy order) or NBO (in the case of a sell order), P-Peg orders are restricted by the System from exercising price discretion to trade at the quote instability determination price level (the "CQI Price"), and D-Peg and C-Peg orders are restricted by the System from exercising price discretion to trade at the CQI Price or at more aggressive prices than the CQI Price.

The manner in which D-Peg orders operate is described in Rule 11.190(b)(10).

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[9] See Rule 1.160(nn).
[10] See Rule 11.190(b)(10).
[11] See Rule 11.190(b)(8).
[12] See Rule 11.190(b)(16). Note that C-Peg orders can only be buy orders, so any discussion of D-Peg sell orders does not apply to C-Peg orders.
[13] See Rule 11.210.
[14] See Rule 1.160(u).
[15] See Rule 1.160(u).
[16] C-Peg orders are also constrained by the consolidated last sale price of the security, and therefore cannot trade, book, or exercise discretion at a price that is more aggressive than the consolidated last sale price. See Rule 11.190(b)(16).

Specifically, a D-Peg order is a non-displayed, pegged order whose price, upon entry into the System, is automatically adjusted by the System to be equal to the less aggressive of the Midpoint Price[17] or the order's limit price, if any. When unexecuted shares of such an order are posted to the Order Book,[18] the price of the order is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1) MPV less aggressive than the primary quote or the order's limit price and is automatically adjusted by the System in response to changes in the NBB (NBO) for buy (sell) orders up (down) to the order's limit price, if any. In order to meet the limit price of active orders on the Order Book, a D-Peg order will exercise the least amount of price discretion necessary from the D-Peg order's resting price to its discretionary price (defined as the less aggressive of the Midpoint Price or the D-Peg order's limit price, if any), except during periods of quote instability as defined in Rule 11.190(g).

The manner in which P-Peg orders operate is described in Rule 11.190(b)(8). Specifically, a P-Peg order is a non-displayed, pegged order whose price, upon entry and when posting to the Order Book, is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1) MPV less aggressive than the primary quote (i.e., the NBB for buy orders and the NBO for sell orders) or the order's limit price, if any. When unexecuted shares of such an order are posted to the Order Book, the order is automatically adjusted by the System in response to changes in the NBB (NBO) for buy (sell) orders up (down) to the order's limit price, if any. In order to meet the limit price of active orders on the Order Book, a P-Peg order will exercise price discretion to its discretionary price (defined as the primary quote), except during periods of quote

[17] See Rule 1.160(t).
[18] See Rule 1.160(p).

instability as defined in Rule 11.190(g).

The manner in which C-Peg orders operate is described in Rule 11.190(b)(16). Specifically, a C-Peg order is a non-displayed, pegged buy order whose price, upon entry into the System, is automatically adjusted by the System to be equal to the less aggressive of the Midpoint Price, the consolidated last sale price, or the order's limit price, if any. When unexecuted shares of such an order are posted to the Order Book, the price of the order is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1) MPV less aggressive than the primary quote or the order's limit price and is automatically adjusted by the System in response to changes in the NBB and the consolidated last sale price up to the order's limit price, if any. In order to meet the limit price of active orders on the Order Book, a C-Peg order will exercise the least amount of price discretion necessary from the C-Peg order's resting price to its discretionary price (defined as the less aggressive of the Midpoint Price, the consolidated last sale price, or the C-Peg order's limit price, if any), except during periods of quote instability as defined in Rule 11.190(g).

IEX has consistently sought to innovate by offering order types that counter the costs of "adverse selection" that participants supplying liquidity incur when their orders are executed at worse prices as a result of certain speed-based trading strategies. Restricting resting D-Peg, P-Peg, and C-Peg orders from exercising price discretion during periods of quote instability, as described in Rule 11.190, is designed to protect such orders from unfavorable executions at prices that the Exchange's probabilistic model predicts are about to become "stale."

As proposed, Users[19] of D-Peg, P-Peg and C-Peg orders will be able to designate whether the order's price will be adjusted using the existing quote instability calculation or a new alternative quote instability calculation. The alternative calculation is designed to incrementally increase the coverage of the quote instability calculation in predicting whether a particular quote is unstable by adjusting the logic underlying the quote instability calculation and introducing enhanced functionality designed to increase the number of crumbling quotes identified, while maintaining the quote instability calculation's accuracy in predicting the direction and timing of the next price change in the NBB or NBO, as applicable.

Current Crumbling Quote Calculation

In determining whether a crumbling quote exists, the Exchange utilizes real time relative quoting activity of eight exchanges' Protected Quotations[20] and a proprietary mathematical calculation (the "quote instability calculation") to assess the probability of an imminent change to the current Protected NBB to a lower price or Protected NBO to a higher price for a particular security ("quote instability factor"). When the quoting activity meets predefined criteria and the quote instability factor calculated is greater than the Exchange's defined threshold ("quote instability threshold"), the System treats the quote as not stable ("quote instability" or a "crumbling quote"), which turns the CQI on. During all other times, the quote is considered stable ("quote stability") and the CQI is off. The System independently assesses the stability of the Protected NBB and Protected NBO for each security.

Quote instability (i.e., a crumbling quote) is an assessment that the Exchange

[19] See IEX Rule 1.160(qq).
[20] See supra note 6.

System makes on a real-time basis, based on a pre-determined, objective set of conditions specified in Rule 11.190(g)(1) during the Regular Market Session[21]. Specifically, the presence of a crumbling quote is determined by the System when the quote instability factor result from the quote stability calculation is greater than the defined quote instability threshold. As set forth in Rule 11.190(g)(1)(i), this calculation applies ten fixed coefficients to nine quote stability variables. The quote stability variables are measures of the status of Protected Quotations of the eight exchanges, including the number of such Protected Quotations on the near and far side of the market and the relationship and recent changes thereto. The quote instability calculation inputs these variables into a formula comprised of the ten fixed coefficients to determine the quote instability factor and whether it is greater than the defined quote instability threshold. The quote stability variables, fixed coefficients and formula were developed by the Exchange based on extensive research, analysis and validation to identify when there is a heightened probability of an imminent quote change to the NBB or NBO. The Exchange has made incremental changes to optimize and enhance the effectiveness of the quote instability calculation in determining whether a crumbling quote exists three times since Exchange launch.[22]

When the CQI is on, it remains in effect at that price level (the "CQI Price") for two milliseconds, unless a new determination is made before the CQI turns off. Only one determination may be in effect at any given time for a particular security (i.e., the System

[21] See IEX Rule 1.160(gg). Quote instability assessments are only made by the Exchange System during the Regular Market Session because the order types that utilize the assessment (i.e., D-Peg, P-Peg and C-Peg orders) are only eligible to trade during the Regular Market Session

[22] See Securities Exchange Act Release 34-78510 (August 9, 2016), 81 FR 54166 (August 15, 2016) (SR-IEX-2016-11); Securities Exchange Act Release No. 80202 (March 10, 2017), 82 FR 14058 (March 16, 2017) (SR-IEX-2017-06); and Securities Exchange Act Release No. 83048 (April 13, 2018), 83 FR 17467 (April 19, 2018) (SR-IEX-2018-07).

will only treat one side of the Protected NBBO as unstable in a particular security at any given time and the CQI can only be on at one price level).[23] A new determination may be made after at least 200 microseconds have elapsed since the preceding determination, or a price change on either side of the best displayed bid or offer of the eight exchanges used for the current quote instability calculation occurs, whichever is first. If a new determination is made, the original determination is no longer in effect. A new determination can be on either side of the best displayed bid or offer of the eight exchanges used for the current quote instability calculation and at the same or different price level as the original determination.

Rule 11.190(g)(1)(A)(iii) provides that the Exchange reserves the right to modify the quote instability coefficients or quote instability threshold at any time, subject to a filing of a proposed rule change with the SEC. In this rule filing, the Exchange is proposing to make such changes by adding an alternative quote instability calculation approach.

Proposed Alternative Quote Instability Calculation

IEX periodically reviews the performance of the quote instability calculation in predicting imminent quote changes, and potential alternative approaches. Based on that review, IEX identified an alternative approach that is designed to achieve two related objectives. First, we sought to increase the "coverage" of the CQI, meaning the percentage of all "adverse" NBBO changes per symbol (lower for bids, higher for offers) that were predicted by the CQI (meaning the CQI was "on" at the time of the adverse NBBO change). Second, we sought to preserve the "accuracy rate" of the CQI, meaning

[23] See Rule 11.190(g)(1).

the percentage of time that the CQI accurately predicted the direction of the next price change. IEX reviewed market data from March 2022 to consider these factors.[24] The analysis indicated that the current CQI calculation predicted 43% of such adverse NBBO changes on a volume weighted basis, while the alternative CQI calculation would have predicted 62% of such adverse NBBO changes. As to the accuracy rate, the analysis indicated that the CQI had an accuracy rate of 78%, and the alternative CQI calculation would have had an accuracy rate of 79%.

Based on informal feedback from Members, IEX understands that different firms may prefer different levels of coverage, i.e., how frequently a pegged order refrains from exercising price discretion to meet the price of an incoming order in response to crumbling quote predictions. Accordingly, IEX proposes to add the alternative quote instability calculation approach for determining whether a crumbling quote exists as an option for Users of pegged orders.

As described in more detail below, the alternative approach would: expand the sources and types of market data used, utilize a more plain English rules-based approach, modify the minimum time period between quote instability determinations, and include a real-time accuracy assessment of each rule with the effect of deactivating a rule that is not meeting specified metrics. In addition, pegged orders would be restricted from exercising price discretion when the CQI is on, regardless of whether the current NBB or

[24] Data regarding the proposed alternative approach is based on comprehensive back testing. Specifically, IEX adjusts TAQ (i.e., NYSE Trade and Quote) data by fixed latency offsets per-venue to simulate market data seen by the IEX system. This simulated data is used to compute CQI models and evaluate their performance. Using this process to simulate the current CQI model confirms that performance estimates are similar to the actual IEX production system, and applying this process to the proposed model produces the back testing performance estimates described herein.

NBO (as applicable) is the same as the CQI Price.

The following describes the proposed alternative approach:

Expanded Sources and Types of Market Data

The Exchange is proposing to use the Protected Quotations of the current eight exchanges[25] in the quote instability calculation, and to add the Protected Quotations of three additional exchanges: MIAX PEARL, LLC ("EPRL"), MEMX LLC ("MEMX"), and Nasdaq PHLX LLC ("XPHL") (collectively the "Signal Exchanges"). Additionally, as detailed below, the Exchange is proposing to use quotation size data[26] from the Signal Exchanges, as well as quotation price data, which is also used in the current approach. In connection with the Exchange's analysis of market data,[27] the Exchange considered several different permutations of which exchanges to include in the model. The analysis identified that using Protected Quotations from the 11 Signal Exchanges in the aggregate, as well as adding quotation size data, enhanced the predictive power of the alternative approach for determining a crumbling quote.

Use of a Rules-Based System

As proposed, the alternative model utilizes a quote instability calculation in which nine separate rules -- each with specific conditions based on either the price, size, or price and size of the Signal Exchanges' Protected Quotations -- can trigger a quote instability determination for either the NBB or the NBO of a particular security.[28] The current

[25] Current Rule 11.190(g) uses the following eight exchanges' Protected Quotations: XNYS; XNGS; ARCX; XBOS; BATY; BATS; EDGA; and EDGX.
[26] All references to quotation size are measured in round lot multiples.
[27] IEX conducted an analysis to develop a model for predicting crumbling quotes by reviewing market data from randomly selected days in 2018, 2019, and 2020. This model was validated by testing across randomly selected days from the same time period, as well as 2021.
[28] The nine rules are designed to work together in determining whether a quote instability determination is triggered, so if a User selects the alternative model all nine rules would be

quote instability calculation utilizes a logistic regression model with multiple coefficients and variables that must exceed a pre-defined threshold in order for the System to treat the quote as unstable. Based upon the analysis noted above, the Exchange believes that the proposed alternative rules-based model (which incorporates and expands on the existing approach) will incrementally increase the coverage of the Exchange's probabilistic model for determining whether a crumbling quote will occur at the same level of precision. In other words, the alternative model is expected to increase the number of quote instability determinations while maintaining the same degree of accuracy in predicting the timing and direction of price changes in the NBB and NBO. The proposed quote instability rules include four categories of Protected Quotation changes (each comprised of one or more rules) that IEX has determined are predictive of whether the NBB or NBO is about to move to a less aggressive price, as follows:

- Disappearing bids (or offers) – This category includes four rules that focus on whether one or more of the Signal Exchanges is no longer disseminating a bid or offer at the Signal Best Bid[29] or Signal Best Offer[30] as applicable;[31]
- Recent changes in quote size – This category includes two rules that focus on

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applicable. Users cannot elect that only some of the rules would apply.

[29] "Signal Best Bid" means the highest Protected Bid of the Signal Exchanges. See proposed IEX Rule 11.190(g)(2)(B)(i).

[30] "Signal Best Offer" means the lowest Protected Offer of the Signal Exchanges. See proposed IEX Rule 11.190(g)(2)(B)(v).

[31] The proposed disappearing bid/offers rules are closely related to the current approach to the quote instability calculation, in that both approaches share the Delta quote instability variable, which is heavily weighted in the current quote instability calculation. In the current calculation, Delta is additively incorporated into the logistic formula (after scaling by its relevant coefficient) whereas in the proposed disappearing bid/offer rules, specific Delta values are explicitly required for the relevant rule to be True. See IEX Rule 11.190(g)(1)(A)(i)(b)(9) and proposed IEX Rule 11.190(g)(2)(B)(x) and (xi), each of which reflect a count of the number of three specified exchanges that have moved away from the best near side Protected NBBO of the Signal exchanges, as specified. IEX expects that the overall behavior of the proposed disappearing bid/offer rules will be similar to the behavior of the current approach.

whether there is an imbalance in the size of bids and offers at the Signal Best Bid or Signal Best Offer;

- Locked or crossed market – This category includes one rule that focuses on situations where the Signal Best Bid and Signal Best Offer are locked or crossed; and
- Quotation Changes – This category includes two rules that focus on changes to the Signal Best Bid or Signal Best Offer.

On a security-by-security basis, if the specified conditions of any of the quote instability rules are met, then the rule is deemed to be True for that security. As described in more detail below, each rule must be active before it can trigger a quote instability determination. When one or more quote instability rules is deemed to be True and any of such rules are active, the System will treat the quote as unstable. The following describes the proposed rules:

- Rule DB_1 (DO_1) is True if two or more exchanges among BATS, EDGX, and XNGS have fallen off the Signal Best Bid (Offer) (i.e., the exchange was at the Signal Best Bid (Offer) but is no longer at the Signal Best Bid (Offer)) within the past millisecond or within the time period since the start of the current Signal Best Bid (Offer) if shorter.[32]
- Rule DB_2 (DO_2) is True if two or more exchanges among BATS, EDGX, and XNGS have fallen off the Signal Best Bid (Offer) (i.e., the exchange was at the Signal Best Bid (Offer) but is no longer at the Signal Best Bid (Offer)) within the past millisecond or within the time period since the start of the current Signal Best Bid (Offer) if shorter AND the total notional value of protected displayed interest at the Signal Best Bid (Offer) is less than $60,000.
- Rule DB_3 (DO_3) is True if two or more exchanges among BATS, EDGX,

[32] Note that rule DB2 (DO2/DB4/DO4) being True logically implies that rule DB1 (DO1/DB3/DO3) is True. These rules are not redundant however, since a rule must be both True AND Active to generate a quote instability determination. It is possible for Rule DB2 (DO2/DB4/DO4) to be Active while Rule DB1 (DO1/DB3/DO3) is not Active, so these logical subset rules can add a distinct contribution to output behavior.

and XNGS have fallen off the Signal Best Bid (Offer) (i.e., the exchange was at the Signal Best Bid (Offer) but is no longer at the Signal Best Bid (Offer)) within the past millisecond or within the time period since the start of the current Signal Best Bid (Offer) if shorter AND there is only one Signal Exchange at the Signal Best Bid (Offer).

- Rule DB_4 (DO_4) is True if two or more exchanges among BATS, EDGX, and XNGS have fallen off the Signal Best Bid (Offer) (i.e., the exchange was at the Signal Best Bid (Offer) but is no longer at the Signal Best Bid (Offer))within the past millisecond or within the time period since the start of the current Signal Best Bid (Offer) if shorter AND the total notional value of protected displayed interest at the Signal Best Bid (Offer) is less than $60,000 AND there is only one Signal Exchange at the Signal Best Bid (Offer).
- Rule SB_1 (SO_1) is True if there is one Signal Exchange at the Signal Best Bid (Offer) AND the Bid (Offer) Pressure[33] is greater than or equal to Offer (Bid) Pressure AND the aggregate total shares displayed at the Signal Best Offer (Bid) is greater than the aggregate total shares displayed at the Signal Best Bid (Offer) AND Bid (Offer) Pressure is greater than two.
- Rule SB_2 (SO_2) is True if there is one Signal Exchange at the Signal Best Bid (Offer) AND Bid (Offer) Pressure is greater than or equal to Offer (Bid) Pressure AND the aggregate total shares displayed at the Signal Best Offer (Bid) is greater than the aggregate total shares displayed at the Signal Best Bid (Offer) AND Bid (Offer) Pressure is greater than one AND the spread is less than the average of the spread over the past twenty Updates[34] to either the Protected Bid or Offer of any Signal Exchange.
- Rule LB_1 (LO_1) is True if either of the following conditions are met: (A) the Signal Best Bid is greater than or equal to the Signal Best Offer AND the Signal Best Offer (Bid) is less than (greater than) the Signal Best Offer (Bid) as of the last Update; OR the Signal Best Bid is greater than or equal to the Signal Best Offer AND the aggregate total shares displayed at the Signal Best Offer (Bid) is greater than the aggregate total shares displayed at the Signal Best Offer (Bid) as of the last Update AND the aggregate total shares displayed at the Signal Best Offer (Bid) is greater than the aggregate total shares displayed at the Signal Best Bid (Offer).
- Rule FB_1 (FO_1) is True if the Signal Best Bid (Offer) is greater (less) than the Signal Best Bid (Offer) as of the last Update.
- Rule FB_2 (FO_2) is True if the Signal Best Bid (Offer) is less (greater) than

[33] See proposed IEX Rules 11.190(g)(2)(B)(xii) and (xiii).
[34] "Update" means any change to either the price or size of any Signal Exchange's Protected Bid or Offer, or a change to the quote condition (e.g., when the quote becomes slow or non-firm, or the security is halted).

the Signal Best Bid (Offer) as of the last Update.

Time and Direction Constraints on the CQI

The Exchange proposes three distinct changes for the alternative model to the time and direction constraints on the CQI in the current model. These changes are designed to provide a more dynamic methodology for quote instability determinations, thereby incrementally increasing the coverage of the formula in predicting a crumbling quote by expanding the scope of the model to additional situations where the Exchange's probabilistic model predicts that the NBB or NBO is in the process of moving to a less aggressive price and is about to become stale.

First, the quote instability calculation could turn on concurrently on both sides of the market (i.e., the NBB and NBO) and always remains on for the full two millisecond period each time it turns on. In the current model, the quote instability calculation independently assesses the stability of the Protected NBB and Protected NBO for each security, but it can only turn on for one side of the market for each security at a time. Thus, if the quote instability calculation determines that the Protected NBB is unstable, the CQI turns on for the NBB. If thereafter the quote instability calculation determines that the Protected NBO for that same security is also unstable while the CQI is still on for the NBB, the System will turn off the CQI for NBB and turn it on for the NBO. As proposed, the CQI could be on concurrently on the buy and sell side of the market and will be able to remain on for the full two millisecond period after turning on because a subsequent determination on the opposite side of the market will not turn off a prior determination. While both sides of the market do not frequently crumble concurrently, IEX nonetheless believes that when they do, providing corresponding protection to orders

on both sides of the market is appropriate.

Second, pursuant to the alternative model, when the CQI turns on it would not be constrained to a specific price level. Currently the CQI is on at a specific CQI Price, the particular price in effect at the time it turned on, and if the NBB or NBO (as applicable) changes during the time it is on, the CQI does not constrain D-Peg, P-Peg, and C-Peg orders from exercising discretion since the CQI Price is no longer set by reference to the current NBB or NBO (as applicable).[35] As proposed, pursuant to the alternative approach, the CQI will continue to turn on at a specific price, but it will restrict D-Peg, P-Peg, and C-Peg orders from exercising discretion past their resting price when the CQI is on for the same side of the market as such orders regardless of whether the price at which it turned on is currently equal to the NBB or NBO (as applicable). The Exchange also proposes conforming changes to Rules 11.190(b)(8)(K)(i) and (ii), (b)(10)(K)(i) and (ii), and (b)(16)(K) to reflect this change to D-Peg, P-Peg, and C-Peg orders' behavior if the User selects the alternative quote instability calculation. Based on IEX's analysis of market data, as described above, the Exchange has determined that continuing to restrict D-Peg, P-Peg, and C-Peg orders from exercising discretion when the CQI is on, even if the CQI Price has changed, will protect such orders from potential adverse selection at the new price level.

Third, pursuant to the alternative model, IEX proposes to change the amount of time the System waits after the CQI turns on before it can make a new quote instability determination on the same side of the market from 200 microseconds to 250 microseconds (irrespective of any change in the Signal Best Bid or Offer). Because

[35] See IEX Rules 11.190(b)(8)(K)(i) and (ii), (b)(10)(K)(i) and (ii), (b)(16)(K).

pegged orders will be constrained from exercising price discretion when the CQI is on, regardless of whether the current NBB or NBO (as applicable) is the same as the CQI price, CQI triggers in extremely rapid succession are unnecessary to continuously restrict discretion across successive NBBO changes. Moreover, increasing the 200 microsecond "cooldown" period to 250 microseconds before the System can make another quote instability determination is designed to reduce the technical processing burden on the System.

Activation Values/Activation Thresholds

As proposed, in applying the alternative approach, consistent with using a rules-based model instead of a logistic regression model for the quote instability calculation, the Exchange would maintain an activation value ("Activation Value") for each quote instability rule. Each rule's Activation Value is computed (on a security-by-security basis for the Bid and Offer side) in real time as a function of the number of times the quote moves to a less aggressive price within the two milliseconds (or the start time of the current Signal Best Bid or Signal Best Offer, as applicable, if shorter) following the time the rule was True and the total number of times the rule was True. Whenever the Activation Value for a given rule exceeds a fixed predetermined activation threshold specific to that rule ("Activation Threshold"), the rule is active (i.e., it is eligible to trigger a quote instability determination when True).

The Activation Value and Activation Threshold computations are intended to optimize the overall accuracy of the quote instability determinations by providing a mechanism to turn off a particular rule when market conditions are such that it is relatively less accurate in predicting a crumbling quote. IEX believes that utilizing

Activation Thresholds is a useful innovation because it enables the use of rules that can be highly predictive in certain market conditions but not in others. The Activation Thresholds are tailored for each rule based on the rule's expected general accuracy in predicting a crumbling quote, based on IEX's market data analysis, so that a rule that has a higher potential to be less accurate has a higher activation threshold burden to meet. The Activation Thresholds are designed to increase the coverage for the alternative quote instability calculation by enabling more frequent triggers than the current approach but with accuracy controls safeguards.

As proposed, the Activation Threshold for the DB, DO, SB and SO rules is 0.30; the Activation Threshold for Rules LB and LO is 0, and the Activation Threshold for the FB and FO rules is 0.50.[36] The Exchange would utilize an initial activation value of 0.50 for all rules at the start of the Regular Market Session, which is then modified during the course of the Regular Market Session to reflect each rule's predictive performance. Specifically, each time a rule is True[37] its existing Activation Value is multiplied by a Decay Factor of 0.94. In addition, each time the Signal Best Bid or Signal Best Offer moves to less aggressive price within two milliseconds of a rule being True at that price level, 0.06 will be added to that rule's existing Activation Threshold (i.e., (1 –decay factor) + previous Activation Value as specified in IEX Rule 11.190(g)(2)(D)(ii).

When a rule is active, the System continues to evaluate if its Activation Value exceeds its Activation Threshold. If the rule's Activation Value subsequently does not

[36] Note that the FB/FO rules will not have activation values *strictly* above their activation thresholds of 0.5 upon the first time they are satisfied (they are initialized daily at 0.5 and multiplied by the decay factor of 0.94 when they are satisfied), therefore the first time each day that either or both of these rules is True will not trigger a quote instability determination.
[37] Excluding instances where the rule was already True at the same unchanged price level in the prior two milliseconds.

exceed its Activation Threshold, the rule will not trigger the System to treat the relevant quote as unstable even if the rule is True. The System continues to track the Activation Value for rules that are inactive, and if the Activation Value subsequently exceeds the rule's Activation Threshold, the System will reactivate the rule.

Based on IEX's market data analysis, the Exchange believes that the use of Activation Thresholds, as proposed, would provide a dynamic performance evaluation methodology that will optimize the frequency and accuracy of the quote instability calculation, by enabling IEX to utilize a broader array of rules that may be predictive of a crumbling quote in certain market conditions but not others. Moreover, as proposed all aspects of the activation calculations are fully transparent in IEX rules thus enabling Members, market participants and others to perform the same calculations to determine whether a particular security is subject to a quote instability determination.

Specific Rule Changes

IEX proposes to make the following changes to Rule 11.190(g) to specify that there are two alternative proprietary mathematical calculations (Option 1 and Option 2) to assess the probability of an imminent change to the current Protected NBB to a lower price or a Protected NBO to a higher price for a particular security:

- Add new language to the introductory section of Rule 11.190(g) after the phrase "Quote Stability" at the beginning of the Rule specifying that the Exchange utilizes two User Selected alternative proprietary mathematical calculations to assess the probability of an imminent change to the current Protected NBB to a lower price or a Protected NBO to a higher price for a particular security.

- Add language immediately following the new language described in the preceding bullet and prior to the existing text stating that "[f]or Option 1, as set forth in subparagraph (1) of Rule 11.190(g),".

- Add a new paragraph after the current first paragraph providing

introductory language describing Option 2 and specifying that Option 2 is set forth in subparagraph (2) of Rule 11.190(g).

- Add "Option 1" prior to "Crumbling Quote" in the heading to subparagraph (1) of Rule 11.190(g).

- Relocate and revise subparagraph (1)(A)(iii) of Rule 11.190(g) with new subparagraph (3) of Rule 11.190(g) which makes clarifying changes to the terminology in current subsection (1)(A)(iii) of Rule 11.190(g), which specifies that the Exchange reserves the right to modify the quote instability coefficients or quote instability threshold at any time, subject to a filing of a proposed rule change with the SEC. IEX proposes to revise the rule provision to reference "the proprietary mathematical calculations used to assess the probability of an imminent change to the current Protected NBB to a lower price or a Protected NBO to a higher price for a particular security" rather than existing references to "the quote instability coefficients or quote instability threshold." Current language that provides that such changes are "subject to a filing of a proposed rule change with the SEC" would be retained. In addition, IEX proposes to renumber this subsection to be subsection (3) of Rule 11.190(g).

- Add new subparagraph (2) (including subparagraphs) of Rule 11.190(g) to describe the alternative quote instability model and refer to such model as "Option 2 Crumbling Quote".

The Exchange also proposes to make conforming changes to Rules 11.190(b)(8)(K)(i) and (ii) ("P-Peg"), (b)(10)(K)(i) and (ii) ("D-Peg"), and (b)(16)(K) ("C-Peg") to reflect differences in whether the System will restrict applicable orders from exercising price discretion when the CQI is on. Specifically, if the User selected the existing quote instability model (Option 1), D-Peg, P-Peg, and C-Peg orders will be restricted from exercising discretion while the CQI is on for the same side of the market if the current NBB/NBO (as applicable) is the same as the NBB/NBO that the quote instability determination was based on. If the User selected the alternative quote instability model (Option 2), D-Peg, P-Peg, and C-Peg orders will be restricted from exercising discretion while the CQI is on for the same side of the market, even if the

current NBB/NBO (as applicable) is different than the NBB/NBO upon which the quote instability determination was based. In addition, the Exchange proposes to make a conforming change to Rule 11.190(b)(7) to reflect that only Option 1 will be applicable to Discretionary Limit orders.

Implementation

The Exchange will announce the implementation date of the proposed rule change by Trading Alert at least ten business days in advance of such implementation date and within 90 days of effectiveness of this proposed rule change.

2. Statutory Basis

IEX believes that the proposed rule change is consistent with Section 6(b)[38] of the Act in general, and furthers the objectives of Section 6(b)(5) of the Act,[39] in particular, in that it is designed to promote just and equitable principles of trade, to remove impediments to and perfect the mechanism of a free and open market and a national market system and, in general, to protect investors and the public interest. Specifically, and as discussed in the Purpose section, the proposal is designed to provide an alternative quote instability approach for pegged orders that is designed to make more frequent predictions while maintaining a similar true positive ratio as the existing approach. Based on informal feedback from Members, IEX understands that different firms prefer different levels of coverage with respect to the CQI and its impact on pegged orders exercising price discretion to meet the price of an incoming order. The alternative quote instability approach is responsive to that feedback and would provide additional coverage to Users of D-Peg, P-Peg and C-Peg orders, i.e., as discussed in the Purpose section, it

[38] 15 U.S.C. 78f.
[39] 15 U.S.C. 78f(b)(5).

would result in more frequent predictions and thereby increase the circumstances in which the order would not exercise discretion.

The Exchange believes it is consistent with the protection of investors and the public interest to provide an alternative quote instability calculation model that is designed to protect pegged orders from potential unfavorable executions during periods of quote instability when the Exchange's probabilistic model identifies that the market appears to be moving adversely to them. IEX believes that the alternative approach, in the aggregate and with respect to the specific changes proposed, is rigorously sound, supported by market data analysis, and consistent with the Act as described below.

The Exchange believes that it is consistent with the Act to expand the sources and types of market data used by the quote instability calculation. As described in the Purpose section, based on market data analysis and testing, the Exchange believes that using the market data of three additional exchanges, and using quotation size data (in addition to quotation price data) of all eleven Signal Exchanges, will result in robust predictive power and accuracy of the quote instability calculation.

The Exchange also believes that it is consistent with the Act to utilize a rules-based model to determine whether a crumbling quote will occur. As discussed in the Purpose section, based on market data analysis, the Exchange believes that the nine proposed quote instability rules -- each with specific conditions based on either the price, size, or price and size of the Signal Exchange's Protected Quotations -- will result in robust predictive power and accuracy of the Exchange's alternative probabilistic model for determining whether a crumbling quote will occur by expanding the scope of the model to additional situations where the Exchange's probabilistic model predicts that the

NBB or NBO is about to become stale. IEX believes that this proposed change will potentially enhance the protection available to market participants using pegged order types that elect to use the alternative model. Moreover, IEX believes that the alternative quote instability calculation, as a plain English rules-based system, will be more readily understood by market participants, thereby increasing the transparency of IEX's rules and removing impediments to a free and open market.

The Exchange further believes that it is consistent with the Act to restrict D-Peg, P-Peg, and C-Peg orders from exercising price discretion when the alternative quote instability calculation model is on for the same side of the market as the order regardless of the triggering price. As discussed in the Purpose section, based on market data analysis, the Exchange believes that continuing to restrict D-Peg, P-Peg, and C-Peg orders from exercising discretion when the CQI is on even if the CQI Price has changed will protect such orders from potential adverse selection at new price levels resulting from consecutive closely timed price moves as the market "settles" at a new price level.

Additionally, the Exchange believes that it is consistent with the Act to change the time and direction constraints on the alternative quote instability calculation model. As discussed in the Purpose section, these differences -- keeping the CQI on for a full two millisecond period every time it turns on and allowing the CQI to turn on concurrently on both sides of the market (i.e., the NBB and NBO) -- are designed to incrementally increase the coverage of the alternative quote instability calculation model in predicting a crumbling quote by increasing the duration of time in which the CQI is on. Based on market data analysis, the Exchange believes these changes to the CQI's time and direction constraints will increase the coverage of quote instability determinations.

The Exchange additionally believes that it is consistent with the protection of investors and the public interest to extend by 50 microseconds the "cooldown" period before the System can make another quote instability determination (extending it from 200 microseconds to 250 microseconds). As discussed in the Purpose section, based on market data analysis, because pegged orders will be constrained from exercising price discretion when the CQI is on regardless of whether the current NBB or NBO (as applicable) is the same as the CQI price, CQI triggers in extremely rapid succession are unnecessary to continuously restrict discretion across successive NBBO changes. Moreover, increasing the "cooldown" period before the System can make another quote instability determination is designed to reduce the technical processing burden on the System thereby supporting the resiliency of the Exchange and removing impediments to and perfecting the mechanism of a free and open market and a national market system.

The Exchange also believes that using activation thresholds instead of a quote stability threshold is consistent with the Act because the activation thresholds are designed to enable broader coverage while controlling for overall accuracy of the quote instability determinations by providing a mechanism to turn off a particular rule when market conditions are such that it is relatively less accurate in predicting a crumbling quote. Based upon market data analysis, IEX believes that utilizing activation thresholds is a useful innovation because it enables the use of rules that can be highly predictive in certain market conditions but not in others. The activation thresholds are tailored for each rule based on the rule's general accuracy in predicting a crumbling quote so that a rule that has a higher potential to be less accurate has a higher activation threshold burden to meet.

The Exchange believes that it is consistent with the protection of investors and the public interest to offer an alternative User selected quote instability calculation model for pegged orders. As discussed in the Purpose section and above, IEX understands that different market participants seek differing levels of coverage with respect to the CQI and its impact on when a pegged order exercises price discretion to meet the price of an incoming order. The proposed rule change is designed to provide a market-based approach to such differing objectives in a manner that is transparent to market participants. Moreover, IEX's market data analysis evidences that both quote instability calculations will be "on" for a small portion of the trading day while providing robust protection to pegged orders.

The Exchange believes that the proposed rule change may result in more and larger sized pegged orders being entered on IEX as a result of the ability to select the quote instability calculation alternative which, as discussed above, is designed to provide greater coverage with respect to the CQI and its impact on pegged orders exercising price discretion to meet the price of an incoming order. To the extent more orders are entered, the increased liquidity would benefit all IEX members and their customers.

Regardless of whether a User selects to use the current or proposed alternative quote instability calculation, when multiple pegged orders exercise discretion at the same time, their relative priority is retained.[40] Thus, the Exchange notes that the proposed rule change does not raise any new or novel issues in this regard.

Furthermore, the Exchange notes that all Members are eligible to use D-Peg, P-Peg, and C-Peg orders, and therefore all Members are eligible to benefit from these order

[40] See IEX Rule 11.190(b)(8), (10) and (16).

types' protections against adverse selection, and will also benefit if use of the alternative quote instability calculation bring more liquidity to the Exchange. Thus, the Exchange believes that application of the rule change is equitable and not unfairly discriminatory.

Further, the Exchange believes that the proposed changes (as described in the Purpose section) to relocate and revise subparagraph (1)(A)(iii) of Rule 11.190(g) with new subparagraph (3) of Rule 11.190(g) and to make clarifying changes to the terminology in current subsection (1)(A)(iii) of Rule 11.190(g), which specifies that the Exchange reserves the right to modify the quote instability coefficients or quote instability threshold at any time, subject to a filing of a proposed rule change with the SEC are consistent with the Act. The proposed changes merely update terms and descriptive language to describe both alternative quote instability calculations, and without changing the operative language that any future changes would continue to be subject to a filing of a proposed rule change with the SEC.

The Exchange also believes that the proposed conforming rule changes, as described in the Purpose section are consistent with the Act because the changes would promote clarity in IEX's rules.

Finally, the Exchange notes that, as proposed, both quote instability calculations will continue to be fixed formulas specified transparently in IEX's rules. The Exchange is not proposing to add any new functionality, but merely to provide an alternative quote instability calculation for pegged orders based on market data analysis designed to increase its accuracy in predicting a crumbling quote, and as contemplated by the rule.

B. Self-Regulatory Organization's Statement on Burden on Competition

IEX does not believe that the proposed rule change will result in any burden on

competition that is not necessary or appropriate in furtherance of the purposes of the Act. To the contrary, as discussed in the Statutory Basis section, the proposal is designed to enhance IEX's competitiveness by incentivizing the entry of increased liquidity.

With regard to intra-market competition, the proposed changes to the quote instability calculation will apply equally to all Members on a fair, impartial and nondiscriminatory basis without imposing any new burdens on the Members. The Commission has already considered the Exchange's D-Peg order type in connection with its grant of IEX's application for registration as a national securities exchange under Sections 6 and 19 of the Act[41] and approved the Exchange's P-Peg[42] order type. The Commission has also allowed the Exchange's C-Peg[43] order type to become effective. As discussed in the Purpose and Statutory Basis sections, the proposed rule change is designed to merely provide an optional alternative quote instability calculation; therefore, no new burdens are being proposed.

With regard to inter-market competition, other exchanges are free to adopt similar quote instability calculations. In this regard, the Exchange notes that that NYSE American LLC has adopted a rule copying an earlier iteration of the Exchange's Discretionary Peg Order type and quote instability calculation.[44]

C. Self-Regulatory Organization's Statement on Comments on the Proposed Rule Change Received from Members, Participants, or Others

Written comments were neither solicited nor received.

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[41] See Securities Exchange Act Release 78101 (June 17, 2016), 81 FR 41142 (June 23, 2016) (File No. 10-222).
[42] See Securities Exchange Act Release No. 80223 (March 13, 2017), 82 FR 14240 (March 17, 2017) (SR-IEX-2016-18).
[43] See Securities Exchange Act Release No. 87019 (September 19, 2019), 84 FR 50485 (September 25, 2019) (SR-IEX-2019-10).
[44] See NYSE American LLC Rule 7.31E(h)(3)(D).

III. Date of Effectiveness of the Proposed Rule Change and Timing for Commission Action

Within 45 days of the date of publication of this notice in the Federal Register or within such longer period (i) as the Commission may designate up to 90 days of such date if it finds such longer period to be appropriate and publishes its reasons for so finding or (ii) as to which the Exchange consents, the Commission shall: (a) by order approve or disapprove such proposed rule change, or (b) institute proceedings to determine whether the proposed rule change should be disapproved.

IV. Solicitation of Comments

Interested persons are invited to submit written data, views and arguments concerning the foregoing, including whether the proposed rule change is consistent with the Act. Comments may be submitted by any of the following methods:

Electronic Comments:

- Use the Commission's Internet comment form (http://www.sec.gov/rules/sro.shtml); or
- Send an email to rule-comments@sec.gov. Please include File Number SR-IEX-2022-06 on the subject line.

Paper Comments:

- Send paper comments in triplicate to Vanessa Countryman, Secretary, Securities and Exchange Commission, 100 F Street, NE, Washington, DC 20549-1090.

All submissions should refer to File Number SR-IEX-2022-06. This file number should be included in the subject line if email is used. To help the Commission process and review your comments more efficiently, please use only one method. The Commission will post all comments on the Commission's Internet website

(http://www.sec.gov/rules/sro.shtml).

Copies of the submission, all subsequent amendments, all written statements with respect to the proposed rule change that are filed with the Commission, and all written communications relating to the proposed rule change between the Commission and any person, other than those that may be withheld from the public in accordance with the provisions of 5 U.S.C. 552, will be available for website viewing and printing in the Commission's Public Reference Section, 100 F Street, NE, Washington, DC 20549, on official business days between the hours of 10:00 a.m. and 3:00 p.m. Copies of the filing will also be available for inspection and copying at the IEX's principal office and on its Internet website at www.iextrading.com. All comments received will be posted without change. Persons submitting comments are cautioned that we do not redact or edit personal identifying information from comment submissions. You should submit only information that you wish to make available publicly. All submissions should refer to File Number SR-IEX-2022-06 and should be submitted on or before [insert date 21 days from publication in the Federal Register]. For the Commission, by the Division of Trading and Markets, pursuant to delegated authority.[45]

[45] 17 CFR 200.30-3(a)(12).

Exhibit 5 – Text of Proposed Rule Change

Proposed new language is underlined; proposed deletions are in brackets.

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Rule 11.190. Orders and Modifiers

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(a) No change.

(b) Order Parameters.

(1)-(6) No change.

(7) Discretionary Limit Order. A displayed, nondisplayed, or partially displayed Limit order that upon entry and when posting to the Order Book, is priced to be equal to and ranked at the order's limit price, except under the following circumstances:

(A) Upon entry during periods of quote instability, as defined in [paragraph]Rule 11.190(g)(1), if a Discretionary Limit buy order has a limit price equal to or higher than the quote instability determination price level in effect, the price of the order will be automatically adjusted by the System to one (1) MPV lower than the quote instability determination price level in effect.

(B) Upon entry during periods of quote instability, as defined in [paragraph]Rule 11.190(g)(1), if a Discretionary Limit sell order has a limit price equal to or lower than the quote instability determination price level in effect, the price of the order will be automatically adjusted by the System to one (1) MPV higher than the quote instability determination price level in effect.

(C) – (E) No change.

(8) Primary Peg Order. A pegged order that upon entry and when posting to the Order Book, the price of the order is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1) MPV less aggressive than the primary quote (i.e. the NBB for buy orders and NBO for sell orders) or the order's limit price, if any. While resting on the Order Book, the order is automatically adjusted by the System in response to the changes in the NBB (NBO) for buy (sell) orders up (down) to the order's limit price, if any. In order to meet the limit price of active orders on the Order Book, a primary peg order will exercise price discretion to its discretionary price (defined as the primary quote), except during periods of quote instability as defined by paragraph (g)(1) or (g)(2) below, as selected by the User, or where the primary peg order is resting at its limit price, if any. When exercising price discretion, a primary peg order maintains time priority at its resting price and is prioritized behind any non-displayed interest resting at the discretionary price for the duration of that book processing action. If multiple primary peg orders are exercising price discretion during the same book processing action, they maintain their relative time priority at the discretionary

price. A primary peg order:

(A)-(J) No change.

(K) Is eligible to exercise price discretion to its discretionary price, except during periods of quote instability, as specified in paragraph (g) below.

(i) If the System determines the NBB for a particular security to be an unstable quote in accordance with paragraph (g) below, it will restrict buy primary peg orders in that security from exercising price discretion to trade against interest at the NBB. If the User selected the quote instability determination set forth in paragraph (g)(1) below, the System will restrict the primary peg order from exercising such price discretion if the current NBB is the same as the NBB upon which the determination was based. If the User selected the quote instability determination set forth in paragraph (g)(2) below, the System will restrict a primary peg order from exercising such price discretion even if the current NBB is different than the price upon which the determination was based.

(ii) If the System determines the NBO for a particular security to be an unstable quote in accordance with paragraph (g) below, it will restrict sell primary peg orders in that security from exercising price discretion to trade against interest at the NBO. If the User selected the quote instability determination set forth in paragraph (g)(1) below, the System will restrict the primary peg order from exercising such price discretion if the current NBO is the same as the NBO upon which the determination was based. If the User selected the quote instability determination set forth in paragraph (g)(2) below, the System will restrict a primary peg order from exercising such price discretion even if the current NBO is different than the price upon which the determination was based.

(9) No change.

(10) Discretionary Peg Order. A pegged order that upon entry into the System, the price of the order is automatically adjusted by the System to be equal to the less aggressive of the Midpoint Price or the order's limit price, if any. When unexecuted shares of such order are posted to the Order Book, the price of the order is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1) MPV less aggressive than the primary quote (i.e., the NBB for buy orders and NBO for sell orders) or the order's limit price and is automatically adjusted by the System in response to changes in the NBB (NBO) for buy (sell) orders up (down) to the order's limit price, if any. In order to meet the limit price of active orders on the Order Book, a Discretionary Peg order will exercise the least amount of price discretion necessary from the Discretionary Peg order's resting price to its discretionary price (defined as the less aggressive of the Midpoint Price or the Discretionary Peg order's limit price, if any), except during

periods of quote instability as defined in paragraph (g)(1) or (g)(2) below, as selected by the User, when a Discretionary Peg order is only eligible to trade at its resting price. When exercising price discretion, a Discretionary Peg order maintains time priority at its resting price and is prioritized behind any non-displayed interest at the discretionary price for the duration of that book processing action. If multiple Discretionary Peg orders are exercising price discretion during the same book processing action, they maintain their relative time priority at the discretionary price. A Discretionary Peg order:

(A)-(J) No change.

(K) Is eligible to exercise price discretion to its discretionary price, except during periods of quote instability, as specified in paragraph (g) below.

(i) If the System determines the NBB for a particular security to be an unstable quote in accordance with paragraph (g), it will restrict buy Discretionary Peg orders in that security from exercising price discretion to trade against interest at or above the NBB. If the User selected the quote instability determination set forth in paragraph (g)(1) below, the System will restrict the Discretionary Peg order from exercising such price discretion if the current NBB is the same as the NBB upon which the determination was based. If the User selected the quote instability determination set forth in paragraph (g)(2) below, the System will restrict the Discretionary Peg order from exercising such price discretion even if the current NBB is different than the price upon which the determination was based.

(ii) If the System determines the NBO for a particular security to be an unstable quote in accordance with paragraph (g), it will restrict sell Discretionary Peg orders in that security from exercising price discretion to trade against interest at or below the NBO. If the User selected the quote instability determination set forth in paragraph (g)(1) below, the System will restrict the Discretionary Peg order from exercising such price discretion if the current NBO is the same as the NBO upon which the determination was based. If the User selected the quote instability determination set forth in paragraph (g)(2) below, the System will restrict the Discretionary Peg order from exercising such price discretion even if the current NBO is different than the price upon which the determination was based.

(11)-(15) No change.

(16) Corporate Discretionary Peg Order. A Discretionary Peg buy order that upon entry into the System, the price of the order is automatically adjusted by the System to be equal to the less aggressive of the Midpoint Price, the consolidated last sale price, or the order's limit price, if any. When unexecuted shares of such order are posted to the Order Book, the price of the order is automatically adjusted by the System to be equal to and ranked at the less aggressive of one (1)

MPV less than the NBB, the consolidated last sale price, or the order's limit price and is automatically adjusted by the System in response to changes in the NBB and consolidated last sale price up to the order's limit price, if any (the order's "resting price"). In order to meet the limit price of active orders on the Order Book, a Corporate Discretionary Peg order will exercise the least amount of price discretion necessary from the order's resting price to its discretionary price (defined as the less aggressive of the Midpoint Price, consolidated last sale price, or the order's limit price, if any), except during periods of quote instability as defined in paragraph (g)(1) or (g)(2) below, as selected by the User, when a Corporate Discretionary Peg order is only eligible to trade at its resting price. When exercising price discretion, a Corporate Discretionary Peg order maintains time priority at its resting price and is prioritized behind any non-displayed interest at the discretionary price for the duration of that book processing action. If multiple Corporate Discretionary Peg orders are exercising price discretion during the same book processing action, they maintain their relative time priority at the discretionary price. A Corporate Discretionary Peg order:

(A)-(J) No change.

(K) Is eligible to exercise price discretion to its discretionary price, except during periods of quote instability, as specified in paragraph (g) below. If the System determines the NBB for a particular security to be an unstable quote in accordance with paragraph (g), it will restrict Corporate Discretionary Peg orders in that security from exercising price discretion to trade against interest at or above the NBB. If the User selected the quote instability determination set forth in paragraph (g)(1) below, the System will restrict the Corporate Discretionary Peg order from exercising such price discretion if the current NBB is the same as the NBB upon which the determination was based. If the User selected the quote instability determination set forth in paragraph (g)(2) below, the System will restrict the Corporate Discretionary Peg order from exercising such price discretion even if the current NBB is different than the price upon which the determination was based.

(c)-(f) No change.

(g) Quote Stability. The Exchange utilizes two User selected alternative proprietary mathematical calculations to assess the probability of an imminent change to the current Protected NBB to a lower price or a Protected NBO to a higher price for a particular security.

For Option 1, as set forth in this subparagraph (1) of Rule 11.190(g), [T]the Exchange utilizes real time relative quoting activity of Protected Quotations and a proprietary mathematical calculation (the "quote instability calculation") to assess the probability of an imminent change to the current Protected NBB to a lower price or Protected NBO to a higher price for a particular security ("quote instability factor"). When the quoting

activity meets predefined criteria and the quote instability factor calculated is greater than the Exchange's defined threshold ("quote instability threshold"), the System treats the quote as not stable ("quote instability" or a "crumbling quote"). During all other times, the quote is considered stable ("quote stability"). The System independently assesses the stability of the Protected NBB and Protected NBO for each security. References in this Rule to "Protected Quotations", "Protected NBB", "Protected NBO" and "Protected NBBO" herein include quotations from the following exchanges: XNYS, ARCX, XNGS, XBOS, BATS, BATY, EDGX, EDGA

For Option 2, as set forth in this subparagraph (2) of Rule 11.190(g), the Exchange utilizes real time relative quoting activity of Protected Quotations from eleven exchanges (ARCX, BATY, BATS, EDGA, EDGX, EPRL, MEMX, XBOS, XNGS, XNYS, XPHL) referred to as "Signal Exchanges" and nine proprietary mathematical calculations ("the Quote Instability Rules") which each independently assess the probability of an imminent change to the current Protected NBB to a lower price or Protected NBO to a higher price for a particular security. When the quoting activity meets one or more Quote Instability Rule's predefined criteria and that Quote Instability Rule's current activation value pursuant to subparagraph (2) of this IEX Rule 11.190(g) ("Activation Value") is greater than the Exchange's defined threshold ("Activation Threshold") for that Quote Instability Rule, the System treats the quote as not stable ("quote instability" or a "crumbling quote"). For each Quote Instability Rule, the Activation Value is initialized at 0.5 at the start of the Regular Session and updated during regular market hours as described in subparagraph (2) of this IEX Rule 11.190(g). During all other times, the quote is considered stable ("quote stability").

(1) Option 1 Crumbling Quote. When the System determines that either the Protected NBB or the Protected NBO in a particular security is unstable, the determination remains in effect at that price level for two (2) milliseconds, unless a new determination is made before the end of the two (2) millisecond period. Only one determination may be in effect at any given time for a particular security. A new determination may be made after at least 200 microseconds has elapsed since a preceding determination, or a price change on either side of the Protected NBBO occurs, whichever is first. If a new determination is made, the original determination is no longer in effect. A new determination can be at either the Protected NBB or the Protected NBO and at the same or different price level as the original determination. Quote instability or a crumbling quote is determined by the System when:

(A)(i) – (ii) – No Change.

[(iii) The Exchange reserves the right to modify the quote instability coefficients or quote instability threshold at any time, subject to a filing of a proposed rule change with the SEC.]

(2) Option 2 Crumbling Quote. When the System determines that either the Protected NBB or the Protected NBO in a particular security is unstable, the determination remains in

effect for two (2) milliseconds (a "Quote Instability Determination"). Quote Instability Determinations are made separately for the Protected NBB and Protected NBO, so it is possible for zero, one or both of the Protected NBB and Protected NBO to be subject to a quote instability determination concurrently. A new Quote Instability Determination may be made after at least 250 microseconds has elapsed since a preceding Quote Instability Determination on the same side of the market in a particular security (i.e., Protected NBB or Protected NBO). If a new Quote Instability Determination is made, the Quote Instability Determination will be extended and in effect until two (2) milliseconds after the new Quote Instability Determination. Quote instability is determined by the System when:

(A) The conditions set forth in one or more of the Quote Instability Rules are met and that Quote Instability Rule's current Activation Value is greater than its Activation Threshold.

(B) Quote Stability Variables. The Exchange uses the quote stability variables defined below to calculate whether the conditions set forth in each Quote Instability Rule set forth in subparagraph (1)(C) of this IEX Rule 11.190(g) are met.

(i) "Signal Best Bid" means the highest Protected Bid of the Signal Exchanges.

(ii) "Signal Exchange's Best Bid Size" means the total shares (measured in round lot multiples) of a Signal Exchange displayed at the Signal Exchange's Protected Bid.

(iii) "Aggregate Best Bid Size" means the aggregate total shares (measured in round lot multiples) of the Signal Exchanges displayed at the Signal Best Bid.

(iv) "Bids" means the number of Signal Exchanges for which the highest Protected Bid is equal to the Signal Best Bid.

(v) "Signal Best Offer" means the lowest Protected Offer of the Signal Exchanges.

(vi) "Signal Exchange's Best Offer Size" means the total shares (measured in round lot multiples) of a Signal Exchange displayed at the Signal Exchange's Protected Offer.

(vii) "Update" means any change to either the price or size of a Signal Exchange's Protected Bid or Offer, including a change to the quote condition of a Signal Exchange's Protected Bid or Protected Offer

(viii) "Aggregate Best Offer Size" means the aggregate total shares (measured in round lot multiples) of the Signal Exchanges displayed at the Signal Best Offer.

(ix) "Offers" means the number of Signal Exchanges for which the lowest Protected Offer is equal to the Signal Best Offer.

(x) "Delta Bids" means the number of these three (3) exchanges (BATS, EDGX, and XNGS) that had a Protected Bid equal to the Signal Best Bid within the preceding one (1) millisecond (or within the time period since the start time of the current Signal Best Bid if shorter), but for which the exchange's Protected Bid is no longer equal to the Signal Best Bid.

(xi) "Delta Offers" means the number of these three (3) exchanges (BATS, EDGX, and XNGS) that had a Protected Offer equal to the Signal Best Offer within the preceding one (1) millisecond (or within the time period since the start time of the current Signal Best Offer if shorter), but for which the exchange's Protected Offer is no longer equal to the Signal Best Offer.

(xii) "Bid Pressure" means the number of Updates in the preceding two (2) millisecond period (or within the time period since the start time of the current Signal Best Bid if shorter) in which one or more of the following four events occurred at one or more of the Signal Exchanges:

(a) The Signal Exchange's Protected Bid decreased, and its prior value was greater than or equal to the Signal Best Bid minus the Signal Spread;

(b) The Signal Exchange's Protected Offer decreased, and its current value is less than or equal to the Signal Best Offer plus the Signal Spread;

(c) The Signal Exchange's Best Bid Size decreased in size without a change to the price of the Signal Exchange's Protected Bid, which is greater than or equal to the Signal Best Bid minus the Signal Spread; or

(d) The Signal Exchange's Best Offer Size increased in size without a change to the price of the Signal Exchange's Protected Offer, which is less than or equal to the Signal Best Offer plus the Signal Spread.

(xiii) "Offer Pressure" means the number of Updates in the preceding two (2) millisecond period (or within the time period since the start time of the current Signal Best Offer if shorter) in which one or more of the following four events occurred at any of the Signal Exchanges:

(a) The Signal Exchange's Protected Offer increased, and its prior value was less than or equal to the Signal Best Offer plus the Signal Spread;

(b) The Signal Exchange's Protected Bid increased, and its current value is greater than or equal to the Signal Best Bid minus the Signal Spread;

(c) The Signal Exchange's Best Offer Size decreased in size without a change to the price of the Signal Exchange's Protected Offer, which is less than or equal to the Signal Best Offer plus the Signal Spread; or

(d) The Signal Exchange's Best Bid Size increased in size without any change to the price of the Signal Exchange's Protected Bid, which is greater than or equal to the Signal Best Bid minus the Signal Spread.

(xiv) "Signal Spread" means the Signal Best Offer minus the Signal Best Bid.

(xv) "Signal Spread Bin Value" means the Signal Spread, rounded down to a full cent and restricted to a value between $0.00 and $0.04 so that values greater than $0.04 are assigned a Signal Spread Bin Value of $0.04 and values at or below $0.00 are assigned a Signal Spread Bin Value of $0.00.

(xvi) "Lookback Average Signal Spread Bin Value" means the average of the Signal Spread Bin Value over the past twenty Updates.

(xvii) "Previous Signal Best Bid" means the Signal Best Bid as of the last Update.

(xviii) "Previous Aggregate Best Bid Size" means the aggregate total shares displayed among Signal Exchanges at the Previous Signal Best Bid as of the last Update.

(xix) "Previous Signal Best Offer" means the Signal Best Offer as of the last Update.

(xx) "Previous Aggregate Best Offer Size" means the aggregate total shares displayed among Signal Exchanges at the Previous Signal Best Offer as of the last Update.

(C) Quote Instability Rules. The four (4) categories of rules designed to predict whether the Protected NBB (NBO) is unstable are set forth below. All rules are applicable to Option 2. A determination that the Protected NBB for a particular security is unstable does not impact the System's ability to determine that the Protected NBO for that same security is also unstable, and vice versa.

(i) Disappearing bids (or offers) rules:

(a) Rule DB1 (DO1) assesses whether Delta Bids (Offers) is greater than (1) one. The rule's Activation Threshold is 0.30.

(b) Rule DB2 (DO2) assesses whether Delta Bids (Offers) is greater than (1) one and the product of Signal Best Bid (Offer) and Aggregate Best Bid (Offer) Size is less than $60,000. The rule's Activation Threshold is 0.30.

(c) Rule DB3 (DO3) assesses whether Delta Bids (Offers) is greater than or equal to (1) one and Bids (Offers) is equal to (1) one. The rule's Activation Threshold is 0.30.
(d) Rule DB4 (DO4) assesses whether Delta Bids (Offers) is greater than or equal to (1) one, Bids (Offers) is equal to (1) one, and the product of Signal Best Bid (Offer) and Aggregate Best Bid (Offer) Size is less than $60,000. The rule's Activation Threshold is 0.30.

(ii) Recent changes in quote size rules:

(a) Rule SB1 (SO1) assesses whether Bids (Offers) is less than or equal to (1) one, Bid (Offer) Pressure is greater than or equal to Offer (Bid) Pressure, Aggregate Best Offer (Bid) Size is greater than Aggregate Best Bid (Offer) Size, and Bid (Offer) Pressure is greater than (2) two. The rule's Activation Threshold is 0.30.
(b) Rule SB2 (SO2) assesses whether Bids (Offers) is less than or equal to (1) one, Bid (Offer) Pressure is greater than or equal to Offer (Bid) Pressure, Aggregate Best Offer (Bid) Size is greater than Aggregate Best Bid (Offer) Size, Bid (Offer) Pressure is greater than (1) one, and Signal Spread Bin Value is less than Lookback Average Signal Spread Bin Value. The rule's Activation Threshold is 0.30.

(iii) Locked or crossed market rules:

(a) Rule LB (LO) assesses whether either of the following conditions are met: (A) Signal Best Offer (Bid) is less than (greater than) Previous Signal Best Offer (Bid) and Signal Best Bid is greater than or equal to Signal Best Offer; or (B) Aggregate Best Offer (Bid) Size is greater than Previous Aggregate Best Offer (Bid) Size, Aggregate Best Offer (Bid) Size is greater than Aggregate Best Bid (Offer) Size, and Signal Best Bid is greater than or equal to Signal Best Offer. The rule's Activation Threshold is 0.

(iv) Quotation changes rules:

(a) Rule FB1 (FO1) assesses whether Signal Best Bid (Offer) is greater than Previous Signal Best Bid (Offer). The rule's Activation Threshold is 0.50.
(b) Rule FB2 (FO2) assesses whether Signal Best Bid (Offer) is less than Previous Signal Best Bid (Offer). The rule's Activation Threshold is 0.50.

(D) Activation Value.

(i) Whenever the conditions set forth in a Quote Instability Rule are met, the Exchange's proprietary quote instability calculation determines its new

Activation Value by multiplying its current Activation Value by the decay factor. The Exchange utilizes an Activation Value of 0.5 at the start of the Regular Market Session and a constant decay factor of 0.94. If the new Activation Value is above the Activation Threshold for the applicable Quote Instability Rule, the System will generate a Quote Instability Determination in accordance with subparagraph (1)(A) of this IEX Rule 11.190(g).

(a) However, notwithstanding the foregoing, if the conditions set forth in a Quote Instability Rule as described in subparagraph (i) above are met at a time that is 2 milliseconds or less since such conditions were met for the same Quote Instability Rule, and the PBB or PBO (as applicable) is unchanged, the System will use the prior Activation Value to determine whether to generate a Quote Instability Determination and will not modify the Activation Value by the decay factor.

(ii) Irrespective of whether or not a Quote Instability Determination was generated pursuant to subparagraph (i) above, the Activation Value for each Quote Instability Rule will also be modified during the Regular Market Session if after the conditions set forth in a Quote Instability Rule were met (and within 2 milliseconds of the time such conditions were met) the next price change to the PBB or PBO (as applicable) is to a less aggressive price, a new Activation Value for that Quote Instability Rule is calculated pursuant to the following formula: (1 –decay factor) + previous Activation Value.

(3) The Exchange reserves the right to modify the proprietary mathematical calculations used to assess the probability of an imminent change to the current Protected NBB to a lower price or a Protected NBO to a higher price for a particular security, subject to a filing of a proposed rule change with the SEC.

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