

Required fields are shown with yellow backgrounds and asterisks.

Filing by NASDAQ BX, Inc.
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) *
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			Rule		
Pilot	Extension of Time Period for Commission Action *	Date Expires *	<input type="checkbox"/> 19b-4(f)(1)	<input type="checkbox"/> 19b-4(f)(4)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/> 19b-4(f)(2)	<input type="checkbox"/> 19b-4(f)(5)	
			<input type="checkbox"/> 19b-4(f)(3)	<input type="checkbox"/> 19b-4(f)(6)	

Notice of proposed change pursuant to the Payment, Clearing, and Settlement Act of 2010	Security-Based Swap Submission pursuant to the Securities Exchange Act of 1934
Section 806(e)(1) *	Section 806(e)(2) *
<input type="checkbox"/>	<input type="checkbox"/>
	Section 3C(b)(2) *
	<input type="checkbox"/>

Exhibit 2 Sent As Paper Document	Exhibit 3 Sent As Paper Document
<input type="checkbox"/>	<input type="checkbox"/>

Description

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

Proposal to make permanent the pilot program for the Exchanges Retail Price Improvement Program

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 *	Jonathan	Last Name *	Cayne
Title *	Principal Associate General Counsel		
E-mail *	jonathan.cayne@nasdaq.com		
Telephone *	(301) 978-8493	Fax	

Signature

Pursuant to the requirements of the Securities Exchange Act of 1934,

has duly caused this filing to be signed on its behalf by the undersigned thereunto duly authorized.

(Title *)

Date	04/26/2019	Global Chief Legal and Policy Officer
By	Edward S. Knight	
	(Name *)	

edward.knight@nasdaq.com

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

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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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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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 Advance 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, security-based swap submission, or advance notice 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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Exhibit Sent As Paper Document

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 3 - Form, Report, or Questionnaire

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Exhibit Sent As Paper Document

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 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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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 the Proposed Rule Change

(a) Pursuant to the provisions of Section 19(b)(1) of the Securities Exchange Act of 1934 (“Act”),¹ and Rule 19b-4 thereunder,² Nasdaq BX, Inc. (“BX” or “Exchange”), is filing with the Securities and Exchange Commission (“SEC” or “Commission”) a proposal to make permanent the pilot program for the Exchange’s Retail Price Improvement (“RPI”) Program (the “Program” or “BX RPI Program”), which is set to expire the earlier of approval of the filing to make this rule permanent or June 30, 2019.

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

(b) Not applicable.

(c) Not applicable.

2. Procedures of the Self-Regulatory Organization

The Board of Directors of the Exchange approved the submission of this proposed rule change on August 9, 2014. No other action by the Exchange is necessary for the filing of the rule change.

Questions and comments on the proposed rule change may be directed to:

Jonathan F. Cayne
Principal Associate General Counsel
Nasdaq, Inc.
(301) 978-8493

¹ 15 U.S.C. 78s(b)(1).

² 17 CFR 240.19b-4.

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

a. Purpose

The Exchange proposes to make permanent the Exchange’s pilot RPI Program,³ currently scheduled to expire the earlier of approval of the filing to make this rule permanent or June 30, 2019.

Background

In November 2014, the Commission approved the RPI Program on a pilot basis.⁴ The Program is designed to attract retail order flow to the Exchange, and allow such order flow to receive potential price improvement. The Program is currently limited to trades occurring at prices equal to or greater than \$1.00 per share. Under the Program, a class of market participant called a Retail Member Organization (“RMO”) is eligible to submit certain retail order flow (“Retail Orders”)⁵ to the Exchange. BX members

³ Securities Exchange Act Release No. 73702 (November 28, 2014), 79 FR 72049 (December 4, 2014) (SR-BX-2014-048) (“RPI Approval Order”). In addition to approving the RPI Program on a pilot basis, the Commission granted the Exchange’s request for exemptive relief from Rule 612 of Regulation NMS, 17 CFR 242.612 (“Sub-Penny Rule”), which among other things prohibits a national securities exchange from accepting or ranking orders priced greater than \$1.00 per share in an increment smaller than \$0.01. See id. As part of this filing, and pursuant to the Exchange’s separate written request, the Exchange also requests that the exemptive relief from the Sub-Penny Rule be made permanent. See Letter from Jeffrey S. Davis, Vice President and Deputy General Counsel, Nasdaq BX, Inc. to Eduardo A. Aleman, Deputy Secretary, Securities and Exchange Commission dated April 26, 2019.

⁴ See id.

⁵ A “Retail Order” is defined in BX Rule 4780(a)(2) by referencing BX Rule 4702, and BX Rule 4702(b)(6) says it is an order type with a non-display order attribute submitted to the Exchange by an RMO. A Retail Order must be an agency order, or riskless principal order that satisfies the criteria of FINRA Rule 5320.03. The Retail Order must reflect trading interest of a natural person with no change made to the terms of the underlying order of the natural person with respect to price

(“Members”) are permitted to provide potential price improvement for Retail Orders in the form of non-displayed interest that is priced more aggressively than the Protected National Best Bid or Offer (“Protected NBBO”).⁶

The Program was approved by the Commission on a pilot basis running one-year from the date of implementation.⁷ The Commission approved the Program on November 28, 2014.⁸ The Exchange implemented the Program on December 1, 2014 and the pilot has since been extended for a one-year period twice, as well as for a six-month period twice, with it now scheduled to expire the earlier of approval of the filing to make this rule permanent or June 30, 2019.⁹

(except in the case of a market order that is changed to a marketable limit order) or side of market and that does not originate from a trading algorithm or any other computerized methodology.

⁶ The term Protected Quotation is defined in Chapter XII, Sec. 1(19) and has the same meaning as is set forth in Regulation NMS Rule 600(b)(58). The Protected NBBO is the best-priced protected bid and offer. Generally, the Protected NBBO and the national best bid and offer (“NBBO”) will be the same. However, a market center is not required to route to the NBBO if that market center is subject to an exception under Regulation NMS Rule 611(b)(1) or if such NBBO is otherwise not available for an automatic execution. In such case, the Protected NBBO would be the best-priced protected bid or offer to which a market center must route interest pursuant to Regulation NMS Rule 611.

⁷ See RPI Approval Order, supra note 3 at 72053.

⁸ Id. at 72049.

⁹ See Securities Exchange Act Release No. 76490 (November 20, 2015), 80 FR 74165 (November 27, 2015) (SR-BX-2015-073); Securities Exchange Act Release No. 79446 (December 1, 2016), 81 FR 88290 (December 7, 2016) (SR-BX-2016-065); Securities Exchange Act Release No. 82192 (December 1, 2017), 82 FR 57809 (December 7, 2017) (SR-BX-2017-055); Securities Exchange Act Release No. 83539 (June 28, 2018), 83 FR 31203 (July 3, 2018) (SR-BX-2018-026); and Securities Exchange Act Release No. 84847 (Dec. 18, 2018), 83 FR 66326 (Dec. 26, 2018) (SR-BX-2018-063).

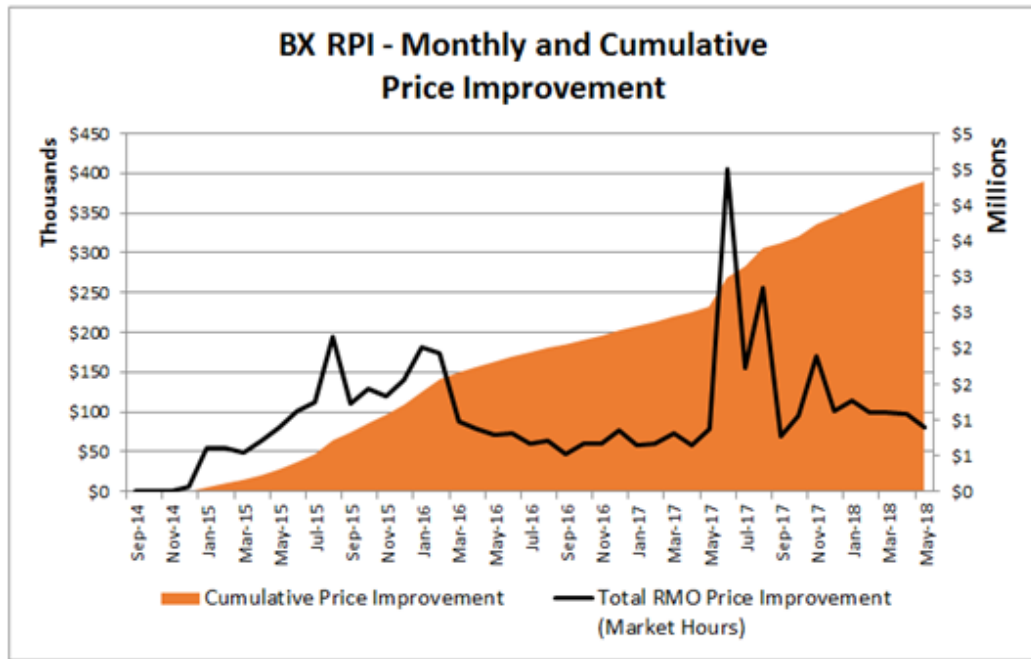
Specifically, BX Rule 4780 will be amended to delete 4780(h) that says the Program is a pilot and that it is scheduled to expire the earlier of approval of the filing to make this rule permanent or June 30, 2019. BX Rule 4780(g) will be amended to include at the end of the subsection that the Program will be limited to securities whose Bid Price on the Exchange is greater than or equal to \$1.00 per share.

The SEC approved the Program pilot, in part, because it concluded, “the Program is reasonably designed to benefit retail investors by providing price improvement to retail order flow.”¹⁰ The Commission also found that “while the Program would treat retail order flow differently from order flow submitted by other market participants, such segmentation would not be inconsistent with Section 6(b)(5) of the Act, which requires that the rules of an exchange are not designed to permit unfair discrimination.”¹¹ As the SEC acknowledged, the retail order segmentation was designed to create greater retail order flow competition and thereby increase the amount of this flow to transparent and well-regulated exchanges. This would help to ensure that retail investors benefit from competitive price improvement that exchange-based liquidity providers provide.

As discussed below, the Exchange believes that the Program supports these conclusions. The Program does not harm retail investors. In fact, so far it has provided price improvement of more than \$4 million since inception to retail investors that they may not otherwise have received. As a result, the Exchange believes that it is therefore appropriate to make the pilot Program permanent.

¹⁰ See RPI Approval Order, supra note 3 at 72051.

¹¹ Id.



Definitions

The Exchange adopted the following definitions under BX Rule 4780. First, the term “Retail Member Organization” (or “RMO”) is defined as a Member (or a division thereof) that has been approved by the Exchange to submit Retail Orders.

Second, the term “Retail Order” is defined by BX Rule 4702(b)(6)(A) as an order type with a non-display order attribute submitted to the Exchange by an RMO. A Retail Order must be an agency Order, or riskless principal Order that satisfies the criteria of FINRA Rule 5320.03. The Retail Order must reflect trading interest of a natural person with no change made to the terms of the underlying order of the natural person with respect to price (except in the case of a market order that is changed to a marketable limit order) or side of market and that does not originate from a trading algorithm or any other computerized methodology.¹²

¹²

See supra note 5.

The criteria set forth in FINRA Rule 5320.03 adds additional precision to the definition of “Retail Order” by clarifying that an RMO may enter Retail Orders on a riskless principal basis, provided that (i) the entry of such riskless principal orders meet the requirements of FINRA Rule 5320.03, including that the RMO maintains supervisory systems to reconstruct, in a time-sequenced manner, all Retail Orders that are entered on a riskless principal basis; and (ii) the RMO submits a report, contemporaneously with the execution of the facilitated order, that identifies the trade as riskless principal.

The term “Retail Price Improving Order” or “RPI Order” or collectively “RPI interest” is defined as an Order Type with a Non- Display Order Attribute that is held on the Exchange Book in order to provide liquidity at a price at least \$0.001 better than the NBBO through a special execution process described in Rule 4780. An RPI Order may be entered in price increments of \$0.001. An RPI Order will be posted to the Exchange Book regardless of its price, but an RPI Order may execute only against a Retail Order, and only if its price is at least \$0.001 better than the NBBO.¹³ RPI orders can be priced either as an explicitly priced limit order or implicitly priced as relative to the NBBO with an offset of at least \$0.001.

The price of an RPI Order with an offset is determined by a Member’s entry of the following into the Exchange: (1) RPI buy or sell interest; (2) an offset from the

¹³ Exchange systems prevent Retail Orders from interacting with RPI Orders if the RPI Order is not priced at least \$0.001 better than the Protected NBBO. The Exchange notes, however, that price improvement of \$0.001 would be a minimum requirement and Members can enter RPI Orders that better the Protected NBBO by more than \$0.001. Exchange systems accept RPI Orders without a minimum price improvement value; however, such interest execute at its floor or ceiling price only if such floor or ceiling price is better than the Protected NBBO by \$0.001 or more.

Protected NBBO, if any; and (3) a ceiling or floor price. RPI Orders submitted with an offset are similar to other peg orders available to Members in that the order is tied or “pegged” to a certain price, and would have its price automatically set and adjusted upon changes in the Protected NBBO, both upon entry and any time thereafter. RPI sell or buy interest typically are entered to track the Protected NBBO, that is, RPI Orders typically are submitted with an offset. The offset is a predetermined amount by which the Member is willing to improve the Protected NBBO, subject to a ceiling or floor price. The ceiling or floor price is the amount above or below which the Member does not wish to trade. RPI Orders in their entirety (the buy or sell interest, the offset, and the ceiling or floor) will remain non-displayed. The Exchange also allows Members to enter RPI Orders that establish the exact limit price, which is similar to a non-displayed limit order currently accepted by the Exchange except the Exchange accepts sub-penny limit prices on RPI Orders in increments of \$0.001. The Exchange monitors whether RPI buy or sell interest, adjusted by any offset and subject to the ceiling or floor price, is eligible to interact with incoming Retail Orders.

Members and RMOs may enter odd lots, round lots or mixed lots as RPI Orders and as Retail Orders respectively. As discussed below, RPI Orders are ranked and allocated according to price and time of entry into the BX trading system (“System”) consistent with BX Rule 4757 and therefore without regard to whether the size entered is an odd lot, round lot or mixed lot amount. Similarly, Retail Orders interact with RPI Orders and other price-improving orders available on the Exchange (*e.g.*, non-displayed

liquidity priced more aggressively than the NBBO)¹⁴ according to the Priority and Allocation rules of the Program and without regard to whether they are odd lots, round lots or mixed lots. Finally, Retail Orders are designated as Type 1 or Type 2 without regard to the size of the order.

RPI Orders interact with Retail Orders as follows. Assume a Member enters RPI sell interest with an offset of \$0.001 and a floor of \$10.10 while the Protected NBO is \$10.11. The RPI Order could interact with an incoming buy Retail Order at \$10.109. If, however, the Protected NBO was \$10.10, the RPI Order could not interact with the Retail Order because the price required to deliver the minimum \$0.001 price improvement (\$10.099) would violate the Member's floor of \$10.10. If a Member otherwise enters an offset greater than the minimum required price improvement and the offset would produce a price that would violate the Member's floor, the offset would be applied only to the extent that it respects the Member's floor. By way of illustration, assume RPI buy interest is entered with an offset of \$0.005 and a ceiling of \$10.112 while the Protected NBBO is at \$10.11. The RPI Order could interact with an incoming sell Retail Order at \$10.112, because it would produce the required price improvement without violating the Member's ceiling, but it could not interact above the \$10.112 ceiling. Finally, if a Member enters an RPI Order without an offset (*i.e.*, an explicitly priced limit order), the

¹⁴ Other price improving liquidity may include, but is not limited to: booked non-displayed orders with a limit price that is more aggressive than the then-current NBBO; midpoint-pegged orders (which are by definition non-displayed and priced more aggressively than the NBBO); non-displayed orders pegged to the NBBO with an aggressive offset, as defined in BX Rule 4780(a)(4) as Other Price Improving Contra-Side Interest. Orders that do not constitute other price improving liquidity include, but are not limited to: orders with a time-in-force instruction of IOC; displayed orders; limit orders priced less aggressively than the NBBO.

RPI Order will interact with Retail Orders at the level of the Member's limit price as long as the minimum required price improvement is produced. Accordingly, if RPI sell interest is entered with a limit price of \$10.098 and no offset while the Protected NBBO is \$10.11, the RPI Order could interact with the Retail Order at \$10.098, producing \$0.012 of price improvement. The System will not cancel RPI interest when it is not eligible to interact with incoming Retail Orders; such RPI interest will remain in the System and may become eligible again to interact with Retail Orders depending on the Protected NBBO. RPI Orders are not accepted during halts.

RMO Qualifications and Approval Process

Under BX Rule 4780(b), any Member may qualify as an RMO if it conducts a retail business or routes retail orders on behalf of another broker-dealer. For purposes of BX Rule 4780, conducting a retail business shall include carrying retail customer accounts on a fully disclosed basis. Any Member that wishes to obtain RMO status is required to submit: (i) an application form; (ii) supporting documentation sufficient to demonstrate the retail nature and characteristics of the applicant's order flow¹⁵ and (iii) an attestation, in a form prescribed by the Exchange, that substantially all orders submitted by the Member as a Retail Order would meet the qualifications for such orders under proposed BX Rule 4780(b). The Exchange shall notify the applicant of its decision in writing.

¹⁵ For example, a prospective RMO could be required to provide sample marketing literature, website screenshots, other publicly disclosed materials describing the retail nature of their order flow, and such other documentation and information as the Exchange may require to obtain reasonable assurance that the applicant's order flow would meet the requirements of the Retail Order definition.

An RMO is required to have written policies and procedures reasonably designed to assure that it will only designate orders as Retail Orders if all requirements of a Retail Order are met. Such written policies and procedures must require the Member to (i) exercise due diligence before entering a Retail Order to assure that entry as a Retail Order is in compliance with the requirements of this rule, and (ii) monitor whether orders entered as Retail Orders meet the applicable requirements. If the RMO represents Retail Orders from another broker-dealer customer, the RMO's supervisory procedures must be reasonably designed to assure that the orders it receives from such broker-dealer customer that it designates as Retail Orders meet the definition of a Retail Order. The RMO must (i) obtain an annual written representation, in a form acceptable to the Exchange, from each broker-dealer customer that sends it orders to be designated as Retail Orders that entry of such orders as Retail Orders will be in compliance with the requirements of this rule, and (ii) monitor whether its broker-dealer customers' Retail Order flow continues to meet the applicable requirements.¹⁶

If the Exchange disapproves the application, the Exchange provides a written notice to the Member. The disapproved applicant could appeal the disapproval by the Exchange as provided in proposed BX Rule 4780(d), and/or reapply for RMO status 90 days after the disapproval notice is issued by the Exchange. An RMO also could voluntarily withdraw from such status at any time by giving written notice to the Exchange.

¹⁶ The Exchange or another self-regulatory organization on behalf of the Exchange will review an RMO's compliance with these requirements through an exam based review of the RMO's internal controls.

Failure of RMO to Abide by Retail Order Requirements

BX Rule 4780(c) addresses an RMO's failure to abide by Retail Order requirements. If an RMO designates orders submitted to the Exchange as Retail Orders and the Exchange determines, in its sole discretion, that those orders fail to meet any of the requirements of Retail Orders, the Exchange may disqualify a Member from its status as an RMO. When disqualification determinations are made, the Exchange provides a written disqualification notice to the Member. A disqualified RMO may appeal the disqualification as provided in proposed BX Rule 4780(d) and/or reapply for RMO status 90 days after the disqualification notice is issued by the Exchange.

Appeal of Disapproval or Disqualification

BX Rule 4780(d) provides appeal rights to Members. If a Member disputes the Exchange's decision to disapprove it as an RMO under BX Rule 4780(b) or disqualify it under BX Rule 4780(c), such Member ("appellant") may request, within five business days after notice of the decision is issued by the Exchange, that the Retail Price Improvement Program Panel ("RPI Panel") review the decision to determine if it was correct.

The RPI Panel consists of the Exchange's Chief Regulatory Officer ("CRO"), or a designee of the CRO, and two officers of the Exchange designated by the Chief Executive Officer of BX. The RPI Panel reviews the facts and render a decision within the time frame prescribed by the Exchange. The RPI Panel may overturn or modify an action taken by the Exchange and all determinations by the RPI Panel constitute final action by the Exchange on the matter at issue.

Retail Liquidity Identifier

Under BX Rule 4780(e), the Exchange disseminates an identifier when RPI

interest priced at least \$0.001 better than the Exchange's Protected Bid or Protected Offer for a particular security is available in the System ("Retail Liquidity Identifier"). The Retail Liquidity Identifier is disseminated through consolidated data streams (*i.e.*, pursuant to the Consolidated Tape Association Plan/Consolidated Quotation System, or CTA/CQS, for Tape A and Tape B securities, and The Nasdaq Stock Market, LLC ("Nasdaq") UTP Plan for Tape C securities) as well as through proprietary Exchange data feeds.¹⁷ The Retail Liquidity Identifier reflects the symbol and the side (buy or sell) of the RPI interest, but does not include the price or size of the RPI interest. In particular, CQS and UTP quoting outputs include a field for codes related to the Retail Liquidity Identifier. The codes indicate RPI interest that is priced better than the Exchange's Protected Bid or Protected Offer by at least the minimum level of price improvement as required by the Program.

Retail Order Designations

Under BX Rule 4780(f), an RMO can designate how a Retail Order interacts with available contra-side interest as provided in Rule 4702.

A Type 1-designated Retail Order will attempt to execute against RPI Orders and any other orders on the Exchange Book with a price that is (i) equal to or better than the price of the Type-1 Retail Order and (ii) at least \$0.001 better than the NBBO. A Type-1 Retail Order is not routable and will thereafter be cancelled.

¹⁷ The Exchange notes that the Retail Liquidity Identifier for Tape A and Tape B securities are disseminated pursuant to the CTA/CQS Plan. The identifier is also available through the consolidated public market data stream for Tape C securities. The processor for the Nasdaq UTP quotation stream disseminates the Retail Liquidity Identifier and analogous identifiers from other market centers that operate programs similar to the RPI Program.

A Type 2-designated Retail Order will first attempt to execute against RPI Orders and any other orders on the Exchange Book with a price that is (i) equal to or better than the price of the Type-2 Retail Order and (ii) at least \$0.001 better than the NBBO and will then attempt to execute against any other order on the Exchange Book with a price that is equal to or better than the price of the Type-2 Retail Order, unless such executions would trade through a Protected Quotation. A Type-2 Retail Order may be designated as routable.

Priority and Order Allocation

Under BX Rule 4780(g), competing RPI Orders in the same security are ranked and allocated according to price then time of entry into the System. Executions occur in price/time priority in accordance with BX Rule 4757. Any remaining unexecuted RPI interest remain available to interact with other incoming Retail Orders if such interest is at an eligible price. Any remaining unexecuted portion of the Retail Order will cancel or execute in accordance with BX Rule 4780(f). The following example illustrates this method:

- Protected NBBO for security ABC is \$10.00 — \$10.05
- Member 1 enters an RPI Order to buy ABC at \$10.015 for 500
- Member 2 then enters an RPI Order to buy ABC at \$10.02 for 500
- Member 3 then enters an RPI Order to buy ABC at \$10.035 for 500

An incoming Retail Order to sell 1,000 shares of ABC for \$10.00 executes first against Member 3's bid for 500 at \$10.035, because it is the best-priced bid, then against Member 2's bid for 500 at \$10.02, because it is the next best-priced bid. Member 1 is not filled because the entire size of the Retail Order to sell 1,000 is depleted. The Retail Order executes against RPI Orders in price/time priority.

However, assume the same facts above, except that Member 2's RPI Order to buy

ABC at \$10.02 is for 100. The incoming Retail Order to sell 1,000 executes first against Member 3's bid for 500 at \$10.035, because it is the best-priced bid, then against Member 2's bid for 100 at \$10.02, because it is the next best-priced bid. Member 1 then receives an execution for 400 of its bid for 500 at \$10.015, at which point the entire size of the Retail Order to sell 1,000 is depleted.

As a final example, assume the same facts as above, except that Member 3's order was not an RPI Order to buy ABC at \$10.035, but rather, a non-displayed order to buy ABC at \$10.03. The result would be similar to the result immediately above, in that the incoming Retail Order to sell 1,000 executes first against Member 3's bid for 500 at \$10.03, because it is the best-priced bid, then against Member 2's bid for 100 at \$10.02, because it is the next best priced bid. Member 1 then receives an execution for 400 of its bid for 500 at \$10.015, at which point the entire size of the Retail Order to sell 1,000 is depleted.

All Regulation NMS securities traded on the Exchange are eligible for inclusion in the RPI Program. The Exchange limits the Program to trades occurring at prices equal to or greater than \$1.00 per share. Toward that end, Exchange trade validation systems prevent the interaction of RPI buy or sell interest (adjusted by any offset) and Retail Orders at a price below \$1.00 per share.¹⁸ For example, if there is RPI buy interest tracking the Protected NBB at \$0.99 with an offset of \$0.001 and a ceiling of \$1.02, Exchange trade validation systems would prevent the execution of the RPI Order at \$0.991 with a sell Retail Order with a limit of \$0.99. However, if the Retail Order was

¹⁸ As discussed above, the price of an RPI is determined by a Member's entry of buy or sell interest, an offset (if any) and a ceiling or floor price. RPI sell or buy interest typically tracks the Protected NBBO.

Type 2 as defined the Program,¹⁹ it would be able to interact at \$0.99 with liquidity outside the Program in the Exchange's order book. In addition to facilitating an orderly²⁰ and operationally intuitive program, the Exchange believes that limiting the Program to trades equal to or greater than \$1.00 per share enabled it better to focus its efforts to monitor price competition and to assess any indications that data disseminated under the Program is potentially disadvantaging retail orders. As part of that review, the Exchange produced data throughout the pilot, which included statistics about participation, the frequency and level of price improvement provided by the Program, and any effects on the broader market structure.

Rationale for Making the Program Pilot Permanent

The Exchange established the RPI Program in an attempt to attract retail order flow to the Exchange by providing an opportunity price improvement to such order flow. The Exchange believes that the Program promotes transparent competition for retail order flow by allowing Exchange members to submit RPI Orders²¹ to interact with Retail

¹⁹ Type 2 Retail Orders are treated as IOC orders that execute against displayed and non-displayed liquidity in the Exchange's order book where there is no available liquidity in the Program. Type 2 Retail Orders can either be designated as eligible for routing or as non-routable, as described above.

²⁰ Given the proposed limitation, the Program would have no impact on the minimum pricing increment for orders priced less than \$1.00 and therefore no effect on the potential of markets executing those orders to lock or cross. In addition, the non-displayed nature of the liquidity in the Program simply has no potential to disrupt displayed, protected quotes. In any event, the Program would do nothing to change the obligation of exchanges to avoid and reconcile locked and crossed markets under NMS Rule 610(d).

²¹ A Retail Price Improvement Order is defined in BX Rule 4780(a)(3) by referencing BX Rule 4702 and BX Rule 4702(b)(5) says that it is as an order type with a non-display order attribute that is held on the Exchange Book in order to

Orders. BX also believes that such competition promotes efficiency by facilitating the price discovery process and generating additional investor interest in trading securities, thereby promoting capital formation and retail investment opportunities. The Program will continue to be limited to trades occurring at prices equal to or greater than \$1.00 per share.

The Exchange believes, in accordance with its filing establishing the pilot Program, which BX did “produce data throughout the pilot, which will include statistics about participation, the frequency and level of price improvement provided by the Program, and any effects on the broader market structure.”²² The Exchange has fulfilled this obligation through the reports and assessments it has submitted to the Commission since the implementation of the pilot Program.

The SEC stated in the RPI Approval Order that the Program could promote competition for retail order flow among execution venues, and that this could benefit retail investors by creating additional well-regulated and transparent price improvement opportunities for marketable retail order flow, most of which is currently executed in the Over-the-Counter (“OTC”) markets without ever reaching a public exchange.²³ The Exchange believes that the Program does not harm retail investors and so far has provided price improvement of more than \$4 million since inception to retail investors that they may not otherwise have received. The data demonstrates that the Program has

provide liquidity at a price at least \$0.001 better than the NBBO through a special execution process described in Rule 4780.

²² See Securities Exchange Act Release No. 73410 (October 23, 2014), 79 FR 64447 at 64450 (SR-BX-2014-048).

²³ RPI Approval Order, 79 FR at 72053.

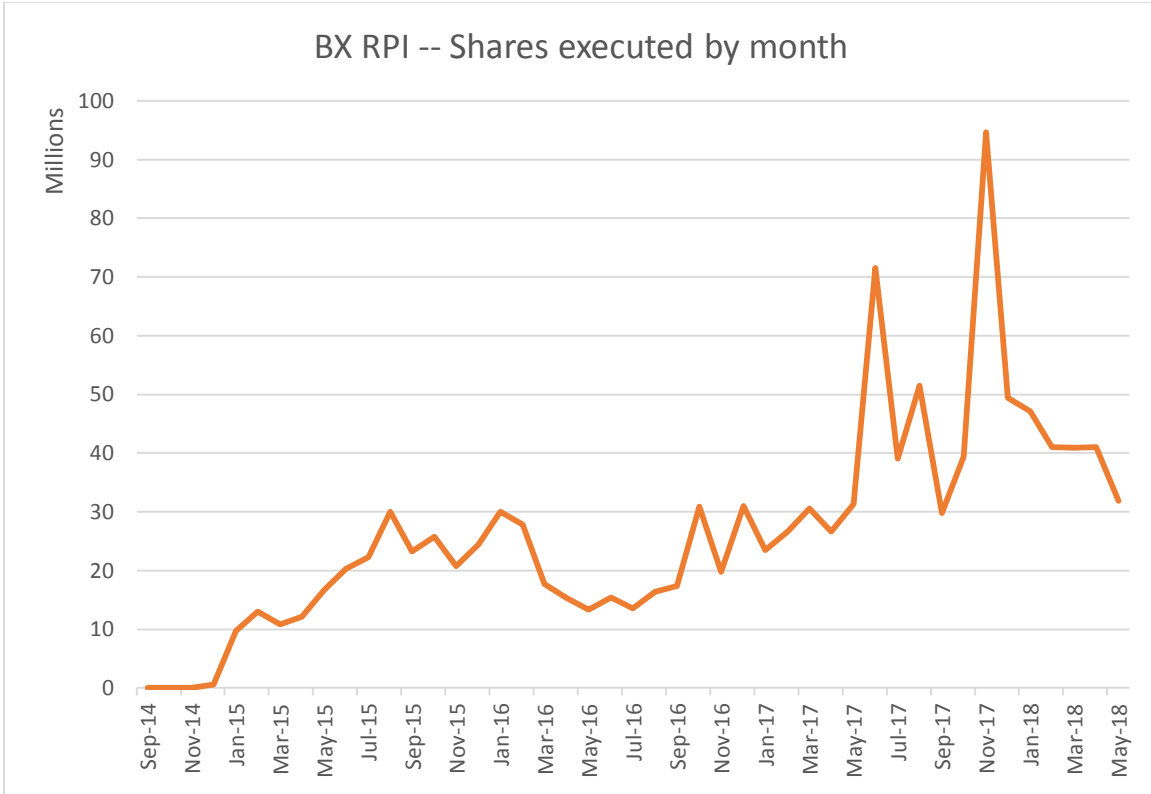
continued to grow over time and the Exchange has not detected any negative impact to market quality. The Exchange also has not received any complaints or negative feedback concerning the Program.

As seen in the table below, RMO orders and shares executed have continued to rise since the introduction of the Program in December 2014. RMO executed share volume on BX accounted for 0.05% of total consolidated volume in eligible U.S. listed securities in Q4 2017. Despite its size relative to total consolidated trading, however, the Program has continued to provide some price improvement to RMO orders each month with total price improvement during market hours from the start of the Program through May 2018 totaling over \$4.3 million.

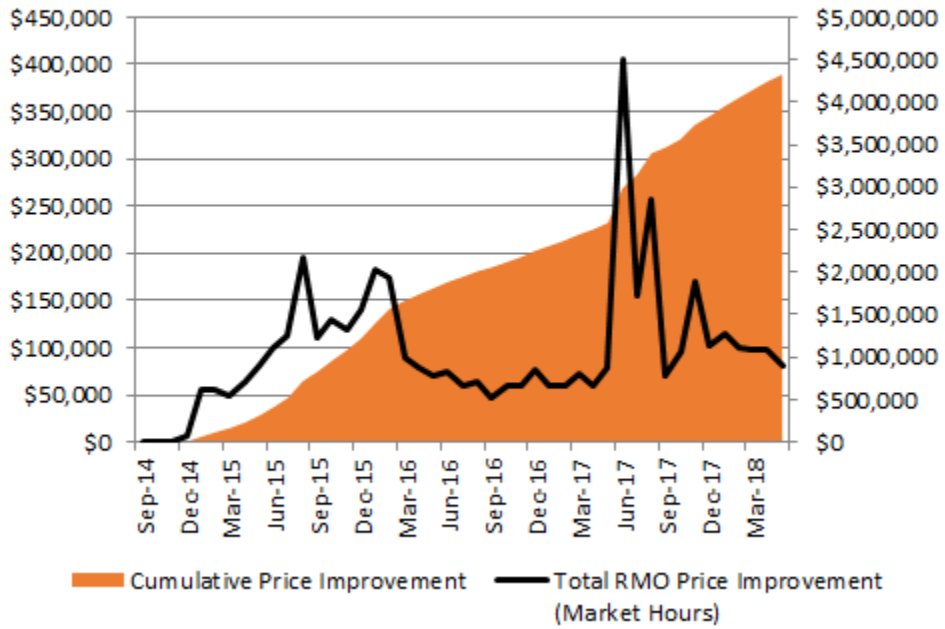
Retail orders are routed by sophisticated brokers using systems that seek the highest fill rates and amounts of price improvement. These brokers have many choices of execution venues for retail orders. When they choose to route to the Program, they have determined that it is the best opportunity for fill rate and price improvement at that time.

Month	Total RMO Orders (Market Hours)	RMO Shares Executed (Market Hours)	Total RMO Price Improvement (Market Hours)
Sep-14	0	0	\$0
Oct-14	0	0	\$0
Nov-14	0	0	\$0
Dec-14	4,003	521,587	\$6,572
Jan-15	66,903	9,723,791	\$55,480
Feb-15	71,204	12,948,664	\$54,769
Mar-15	62,216	10,818,042	\$49,232
Apr-15	75,558	12,121,577	\$63,247
May-15	98,859	16,723,281	\$81,268
Jun-15	116,570	20,341,305	\$100,520
Jul-15	133,917	22,310,364	\$111,657
Aug-15	192,546	30,011,636	\$194,706

Month	Total RMO Orders (Market Hours)	RMO Shares Executed (Market Hours)	Total RMO Price Improvement (Market Hours)
Sep-15	141,496	23,199,937	\$110,415
Oct-15	148,414	25,745,772	\$128,838
Nov-15	123,267	20,788,967	\$120,037
Dec-15	145,022	24,414,783	\$140,444
Jan-16	162,025	30,010,815	\$181,781
Feb-16	135,409	27,794,644	\$173,988
Mar-16	93,729	17,688,230	\$88,900
Apr-16	82,819	15,269,513	\$78,241
May-16	70,192	13,336,738	\$71,145
Jun-16	76,092	15,356,152	\$74,035
Jul-16	65,121	13,532,803	\$59,305
Aug-16	78,611	16,412,113	\$64,231
Sep-16	84,240	17,368,907	\$46,792
Oct-16	146,207	30,827,361	\$60,624
Nov-16	103,046	19,744,407	\$60,391
Dec-16	168,638	31,003,843	\$76,025
Jan-17	140,203	23,474,999	\$58,887
Feb-17	139,447	26,643,083	\$59,372
Mar-17	161,154	30,595,963	\$73,250
Apr-17	126,665	26,587,486	\$59,141
May-17	143,927	31,368,371	\$78,979
Jun-17	332,266	71,569,426	\$405,933
Jul-17	210,309	39,061,892	\$155,669
Aug-17	266,762	51,442,492	\$255,999
Sep-17	154,846	29,831,646	\$69,634
Oct-17	205,399	39,409,251	\$95,051
Nov-17	370,064	94,703,209	\$169,738
Dec-17	219,528	49,424,240	\$102,082
Jan-18	248,419	47,080,453	\$113,956
Feb-18	263,576	40,979,066	\$100,148
Mar-18	597,460	40,896,277	\$98,779
Apr-18	1,095,396	41,067,806	\$97,015
May-18	1,031,527	31,843,167	\$81,199
Total	8,353,052	1,193,994,059	\$4,327,477



Monthly and Cumulative Price Improvement



The table below shows that between April 2017 and May 2018, roughly 50% of RMO orders were for 100 shares or less and around 70% of orders were for 300 shares or less. Larger orders of 7,500 shares or more accounted for approximately 2%, ranging from 0.62% to 3.09%. Although large order were a small percentage of total orders, they make up a significant portion of total shares ordered, ranging from 21.11% to 46.22%. Orders of 300 shares or less, which accounted for the vast majority of total RMO orders, accounted for only between 4.81% and 15.38% of total shares ordered.

Distribution of RMO Orders by Order Size									
Month	<=100	101-300	301-500	501-1,000	1,001-2,000	2,001-4,000	4,001-7,500	7,500-15,000	>15,000
Apr-17	49.50%	18.53%	8.67%	9.47%	5.69%	3.84%	2.24%	1.38%	0.69%
May-17	46.55%	23.79%	8.25%	8.42%	5.26%	3.71%	2.12%	1.29%	0.62%
Jun-17	59.60%	13.26%	6.62%	7.91%	4.75%	3.48%	2.36%	1.52%	0.51%
Jul-17	57.30%	14.61%	7.32%	8.50%	5.17%	3.28%	2.00%	1.19%	0.65%
Aug-17	56.38%	15.19%	7.54%	8.49%	5.23%	3.41%	1.91%	1.22%	0.63%
Sep-17	53.16%	16.29%	7.69%	8.79%	5.71%	4.05%	2.22%	1.38%	0.70%
Oct-17	54.28%	16.00%	7.46%	8.65%	5.64%	3.84%	2.15%	1.33%	0.66%
Nov-17	47.76%	15.30%	8.19%	10.23%	7.38%	5.10%	2.95%	2.04%	1.06%
Dec-17	48.66%	15.30%	8.27%	10.34%	6.99%	4.82%	2.79%	1.87%	0.98%
Jan-18	53.60%	14.93%	7.73%	9.20%	5.98%	4.04%	2.28%	1.53%	0.71%
Feb-18	58.44%	14.58%	7.14%	8.02%	4.93%	3.29%	1.91%	1.14%	0.55%
Mar-18	55.29%	17.97%	8.63%	8.38%	5.12%	2.64%	1.07%	0.61%	0.28%
Apr-18	54.52%	19.12%	9.04%	8.31%	5.02%	2.50%	0.87%	0.42%	0.19%
May-18	50.44%	20.21%	9.89%	9.10%	5.77%	2.88%	0.96%	0.50%	0.26%

Distribution of RMO Shares Ordered by Order Size									
Month	<=100	101-300	301-500	501-1,000	1,001-2,000	2,001-4,000	4,001-7,500	7,500-15,000	>15,000
Apr-17	3.04%	4.63%	4.42%	8.78%	10.06%	12.89%	13.89%	16.06%	26.23%
May-17	3.28%	6.49%	4.49%	8.34%	9.98%	13.38%	14.28%	16.05%	23.71%
Jun-17	2.47%	3.78%	3.95%	8.89%	10.15%	13.74%	17.06%	20.07%	19.88%
Jul-17	2.82%	4.20%	4.36%	9.31%	10.78%	12.94%	14.44%	16.47%	24.67%
Aug-17	2.80%	4.28%	4.42%	9.21%	10.84%	13.21%	13.55%	16.63%	25.08%
Sep-17	2.88%	4.16%	3.98%	8.36%	10.50%	14.04%	14.17%	16.78%	25.14%

Distribution of RMO Shares Ordered by Order Size									
Month	<=100	101-300	301-500	501-1,000	1,001-2,000	2,001-4,000	4,001-7,500	7,500-15,000	>15,000
Oct-17	2.89%	4.31%	4.09%	8.73%	11.02%	14.04%	14.49%	17.11%	23.32%
Nov-17	1.80%	3.01%	3.26%	7.48%	10.45%	13.51%	14.27%	18.89%	27.33%
Dec-17	2.00%	3.17%	3.48%	8.02%	10.45%	13.46%	14.18%	18.35%	26.91%
Jan-18	2.50%	3.78%	4.01%	8.82%	11.05%	13.94%	14.30%	18.35%	23.26%
Feb-18	3.25%	4.52%	4.52%	9.34%	11.08%	13.87%	14.53%	16.86%	22.02%
Mar-18	5.73%	6.96%	6.80%	12.44%	14.90%	14.65%	11.00%	12.34%	15.17%
Apr-18	7.27%	8.11%	7.84%	13.68%	16.23%	15.46%	10.29%	9.51%	11.61%
May-18	6.31%	7.54%	7.50%	13.09%	16.40%	15.66%	10.00%	9.80%	13.70%

Distribution of RMO Shares Executed by Order Size									
Month	<=100	101-300	301-500	501-1,000	1,001-2,000	2,001-4,000	4,001-7,500	7,500-15,000	>15,000
Apr-17	11.39%	15.32%	11.28%	16.25%	12.77%	10.87%	9.27%	9.25%	3.61%
May-17	10.86%	20.10%	10.47%	13.77%	11.37%	10.58%	8.96%	9.44%	4.45%
Jun-17	7.65%	10.05%	8.48%	14.31%	11.28%	11.85%	12.00%	18.69%	5.68%
Jul-17	10.07%	12.67%	10.18%	15.57%	12.94%	11.79%	9.97%	10.27%	6.56%
Aug-17	9.93%	12.98%	10.89%	17.05%	14.16%	11.94%	9.38%	8.23%	5.45%
Sep-17	11.36%	13.46%	10.12%	16.01%	13.80%	13.07%	8.60%	8.61%	4.97%
Oct-17	10.83%	13.37%	10.07%	16.40%	14.46%	12.48%	9.47%	7.96%	4.96%
Nov-17	7.04%	10.64%	10.14%	19.81%	18.19%	13.96%	9.04%	7.10%	4.09%
Dec-17	8.25%	11.27%	10.37%	19.49%	17.05%	13.33%	8.82%	7.13%	4.28%
Jan-18	9.93%	12.43%	10.92%	19.37%	16.07%	12.66%	8.49%	6.49%	3.64%
Feb-18	12.63%	14.31%	11.81%	19.45%	15.07%	11.22%	6.81%	5.55%	3.16%
Mar-18	13.92%	15.35%	11.92%	19.14%	14.77%	10.05%	6.35%	5.49%	3.00%
Apr-18	14.81%	15.76%	11.86%	18.35%	13.47%	10.21%	6.75%	5.41%	3.39%
May-18	13.65%	15.78%	12.38%	18.77%	13.92%	10.57%	6.25%	5.27%	3.40%

The table below shows the average and median sizes of RMO removing orders.

Average and Median RMO Sizes		
Year	RMO Taking Order Size	
	Avg	Median
Apr-17	863	111
May-17	802	180
Jun-17	743	82

Average and Median RMO Sizes		
Year	RMO Taking Order Size	
	Avg	Median
Jul-17	739	100
Aug-17	753	100
Sep-17	841	100
Oct-17	793	100
Nov-17	1,103	150
Dec-17	1,044	132
Jan-18	844	100
Feb-18	690	100
Mar-18	512	100
Apr-18	454	100
May-18	517	100

The data provided by the Exchange describes a valuable service that delivers some price improvement in a transparent and well-regulated environment. The Program represents just a fraction of retail orders, most of which are executed off-exchange by a wide range of order handling services that have considerably more market share and which operate pursuant to different rules and regulatory requirements. BX found no data or received any customer feedback that indicated any negative impact of the Program on overall market quality or for retail investors.

As discussed herein, the Program is a minor participant in the overall market to price improve marketable retail order flow. As the Exchange has noted, although participation was low, retail investors that participated in the Program received price improvement on their orders, which was one of the stated goals of the Program. The Exchange, therefore, believes that this pilot data supports making the Program permanent.

As discussed more fully below, the reports and assessments provided by the

Exchange to the SEC have covered (i) the economic impact of the Program on the entire market; (ii) the economic impact of the Program on execution quality; (iii) whether only eligible participants are accessing Program liquidity; (iv) whether the Program is attracting retail participants; (v) the net benefits of the Program on participants; (vi) the overall success in achieving intended benefits; and (vii) whether the Program can be improved.

1. Economic Impact of the RPI Program on the Entire Market

The following table illustrates the level of volume done through the Program relative to consolidated volume. The columns labeled ‘Daily Results’ show the distribution of the percentage of RPI to consolidated volume for all stock/date combinations during 2017 – 2018. Only stock/date combinations with positive consolidated volume are represented. The table shows that the overwhelming number of stock/date combinations are those in which BX RPI volume was less than 0.01% of consolidated volume. In most of these cases, BX RPI volume was zero. In only a comparative handful of cases does the percentage amount to a substantial portion of the security’s volume.

The columns labeled ‘Two-Year Aggregate’ present results for stocks summed over the entire two-year period (sum of RPI Program volume to sum of consolidated volume). Only stocks listed during the entire two years are represented. Virtually all stocks have RPI volume less than 0.5% of consolidated volume.

Distribution	Daily Results		Two-Year Aggregate	
	Count	Percentage	Count	Percentage
> 50%	22	0.0005%	0	0.0000%
25%-50%	44	0.0011%	0	0.0000%
10% – 25%	368	0.0090%	0	0.0000%

Distribution	Daily Results		Two-Year Aggregate	
	Count	Percentage	Count	Percentage
5% – 10%	1,444	0.0355%	0	0.0000%
1% - 5%	25,730	0.6321%	0	0.0000%
0.75% - 1%	11,835	0.2907%	4	0.0542%
0.50% - 0.75%	22,413	0.5506%	10	0.1354%
0.25% - 0.50%	56,130	1.3789%	91	1.2321%
0.10% – 0.25%	111,937	2.7499%	559	7.5684%
0.05% – 0.10%	105,651	2.5955%	951	12.8757%
0.01% – 0.05%	220,649	5.4206%	3,181	43.0680%
< 0.01%	3,514,320	86.3354%	2,590	35.0663%

Difference in Difference Analysis

The aim of this analysis was to compare the values of a set of general market metrics prior to the December 2014 introduction of the Program to those prevailing after. The Exchange follows what is commonly termed the ‘difference-in-difference’ approach (“DnD”). A DnD analysis involves identifying a group of subjects (stocks in this case) that receive a given ‘treatment.’ In this case, the ‘treatment’ is the introduction of the BX RPI Program. The Exchange would then observe the change (difference) in a set of empirical indicia of market quality, before and after Program introduction. The analysis is enhanced by observing the intertemporal change in the same indicia for a set of stocks that *did not* receive the treatment. The non-treated stocks would serve as ‘controls.’ The impact of the Program could therefore be assessed by comparing the pre/post changes in the treated stocks with those from the control stocks, hence the difference in differences. Observed changes in the control stocks would account for environmental effects, such as

changes in general market volatility, that are unrelated to the introduction of the BX RPI Program.

The RPI introduction in December 2014 applied to all stocks traded on BX. Thus, control stocks in the strict sense are not available. The Exchange applies therefore a fallback approach, in which it identifies stocks with relatively high levels of RPI participation and use these as the ‘treatment’ stocks. Those for which Program participation was light serve as the ‘control’ stocks. The approach suffers from the limitation that Program participation is a determined by endogenous choice. It is possible that stocks with high levels of participation are systematically different from those with low participation. That is, the controls may be different from the treated stocks in important ways. With this caveat in mind, it is nevertheless of interest to see differences in outcomes between the two groups of stocks.

While the treatment and control stocks differ substantially in terms of RPI participation, the validity of the DnD analysis is enhanced to the extent that the two groups are otherwise as similar to each other as possible. To achieve this objective, the Exchange first breaks its analysis into two parts: one dealing with active securities, the other with less active securities. The Exchange’s set of active securities are those with consolidated average daily volume (“CADV”) of 500,000 shares or more both before and after Program introduction. The less active group have CADV between 50,000 and 500,000 shares both before and after Program introduction. Then, within each volume grouping, the Exchange conducts a ‘matched pairs’ process to identify a smaller set of treatment and control groups that are as close to each other as possible across three dimensions: consolidated average daily share volume, average price, and average time-

weighted quoted NBBO dollar spread. The values of these variables prior to Program introduction were used.

Data from the pre-treatment period was obtained from trading during the three months of September through November 2014. The Exchange looks at two post-treatment periods. The first is based on trading from January through December 2015. The second is based on trading from the two years from January 2017 through December 2018. Note that December 2014, the month of Program introduction, is not used. Further, the Exchange excluded data from trading days when the Exchange closed early (such as the day after Thanksgiving) from the analysis.

The overall set of four DnD analyses can be represented and hereafter labeled as follows:

CADV	Post-Period Dates	
	2015	2017-2018
500,000 or more	I	III
Between 50,000 and 500,000	II	IV

For each of the four DnD analyses, the specific matched-pairs process employed the following steps:

1. Daily averages for a set of variables are computed for each stock (excluding preferred stocks and warrants) listed on Nasdaq or NYSE for the appropriate pre/post time frames. For the 2017-2018 post-period, stocks trading with a nickel tick size pursuant to the Tick Size Pilot were excluded.
2. The initial universe of stocks are identified as having, in the post period, the appropriate CADV, an average share price greater than \$2, positive average daily BX share volume, and being listed during at least 80% of the designated time frame. To exclude stocks that may have experienced stock splits or other extreme price

movement, stocks with the 95th and 5th percentile of daily price within the period differed by more than a factor of two were excluded.

3. These stocks are ranked on the percentage of consolidated volume that was done in the Program (in the post period). Selection of the treatment stocks starts with the top 100 stocks in terms of post-introduction RPI Program volume as percentage of consolidated volume for the stock.
4. Pre-period data for the provisional treatment stocks is obtained. During the pre-period, the treatment stocks must also have the appropriate CADV level, an average price greater than \$2, positive BX share volume, listed during the entire pre-period, and not have experienced extreme price movement (measured as described in condition 2 above). This process will generally result in fewer than 100 remaining treatment candidates.
5. The candidate control stocks are selected from those with low RPI Program volume as a percentage of consolidated volume. For the two high-volume analyses (I. and III.), the control stocks were selected from stocks whose RPI volume percentage was less than one-tenth that of the lowest RPI percentage from the treatment stocks. For the lower-volume analyses (II. and IV.), the control stocks were selected from stocks whose RPI volume percentage was less than one-fifth that of the lowest RPI percentage from the treatment stocks. This change was made to ensure a sufficient number of control stocks.
6. The control stocks must also have similar restrictions to the treatment stocks in both pre- and post-periods: CADV in the appropriate range, price greater than \$2, positive BX volume, sufficient presence, and no extreme price movements during the period.

7. Each treatment stock was compared with each candidate control stock. Using pre-period data, a discrepancy score was computed as:

$$Score = Abs\left(\log\left(\frac{CADV_{Tr}}{CADV_{Cn}}\right)\right) + Abs\left(\log\left(\frac{Price_{Tr}}{Price_{Cn}}\right)\right) + Abs\left(\log\left(\frac{Sprd_{Tr}}{Sprd_{Cn}}\right)\right),$$

where the subscripts *Tr* and *Cn* refer to Treatment and Control values of the indicated variable. In words, the score is the sum of the absolute value of the percentage differences in the indicated values. The lower the score, the closer the match.

8. Each treatment stock was paired with the best possible match, subject to the constraint that a given control stock could be used only once (often termed ‘sampling without replacement’).
9. Finally, only stock pairs with reasonable discrepancy scores were retained, recognizing the trade-off between quality of the matches and the resulting sample size. For the high-volume/2015 analysis (I.) the discrepancy scores were 1.2 or lower. For the low-volume/2015 analysis (II.), the larger set of control stocks led to an upper bound of 0.6 for the discrepancy score. For both analyses with 2017-18 as the post period (III. and IV.) an upper bound of 2.0 was used, due to a smaller set of potential control stocks.

Once a set of matched pairs was determined for a given analysis, the Exchange computed the DnD result using a standard linear regression framework. A DnD regression model can be expressed as:

$$y_{it} = \alpha + \beta_1 D_{Grp} + \beta_2 D_{Period} + \beta_3 D_{Grp} \times D_{Prd} + \epsilon_{it}$$

where y_{it} represents the metric of interest for stock i in time period t (pre or post). The ‘dummy’ variables D_{Grp} and D_{Prd} are constructed such that $D_{Grp} = 1$ when stock i is

a treatment stock, and zero otherwise. Variable D_{prd} has value = 1 when the observation is from the post period, zero otherwise. The coefficient β_3 of the interaction term represents the DnD result. Standard regression software provides both the estimated coefficient as well as its standard error and t-statistic. The level of statistical significance can be assessed using the t-statistic.

The Exchange considered eight metrics of interest, all of which were computed during standard 9:30 a.m. – 4:00 p.m. (Eastern time) trading hours:

- The time-weighted NBBO quoted spread, measured in dollars;
- The time-weighted NBBO relative (to the bid-ask midpoint) quoted spread, measured in basis points;
- The trade-weighted effective spread of all trades done on BX, measured in dollars;
- The trade-weighted relative effective spread of all trades done on BX, measured in basis points;
- As a measure of short-term volatility, the average high/low range of consolidated trade prices during 5-minute windows. The daily high/low range measure is divided by the VWAP each day to yield a metric measured in percent;
- As another measure of short-term volatility, the average absolute change in consolidated trade-to-trade price changes. The trade-to-trade measure is divided by the VWAP each day to yield a metric measured in percent;
- The average share volume market share of TRF volume, including auctions and all trading hours; and

- The average share volume market share of BX volume, including auctions and all trading hours.

In assessing the results of the DnD analysis, two caveats are worth bearing in mind. As shown above, BX RPI volume represents a very small fraction of consolidated volume. Further, the Program was introduced at a time when similar exchange-based retail programs were already in place. Among those programs was Nasdaq's retail program, which was discontinued at the time the BX RPI Program was introduced. To a large extent, the BX RPI volume replaced that of Nasdaq.

It is also important to recognize that much, if not most, marketable retail order flow is routed to off-exchange market makers. For example, the Exchange examined Rule 606 disclosures from four prominent retail brokerages: E-Trade, TD Ameritrade, Charles Schwab, and Fidelity. For securities listed on the New York Stock Exchange LLC ("NTSE") in the fourth quarter of 2018, only Fidelity reported routing any market orders to exchanges, and its total exchange percentage was only 2.1%. This practice of routing retail marketable orders to off-exchange venues has been in place for a long time, both before and after the introduction of the Program.

Combining the smallness of the Program, the concurrent discontinuation of the Nasdaq retail program, and the continuing prevalence of off-exchange trading of retail orders, the incremental impact of the Program on market quality generally would not be expected to be large.

A second caveat stems from the way that the treatment and control groups are created. The Exchange observes that some types of stocks have higher BX RPI Program usage than others. For example, consider Nasdaq- and NYSE-listed securities trading in

2015 with CADV greater than 500,000 shares (a sample of 1,737 stocks, used in analysis I.). The Exchange found the following concerning the percentage of BX RPI volume relative to consolidated volume:

Avg CADV of Stock	RPI/Consol. Pct
500,000 – 1,000,000	0.026%
1,000,000 – 10,000,000	0.015%
10,000,000+	0.010%

Avg Price Level	RPI/Consol. Pct
Less than \$100	0.017%
\$100 - \$200	0.032%
\$200 - \$500	0.074%
\$500+	0.127%

This sample shows higher Program percentages for less-active stocks, and much higher percentages for higher-priced stocks. This suggests that RPI usage across stocks does not randomly vary, but is driven by certain stock characteristics, some of which may not be directly observable.

As noted above, Rule 606 disclosures show that the majority of retail market orders are routed off-exchange for execution. BX RPI activity is therefore itself somewhat anomalous in the first place. Why some retail flow reaches exchanges via the Program (or that of similar exchange programs), and why it varies across stocks is not clear.

Since treatment and control stocks are determined on the basis of observed RPI usage—resulting from participant choice—they may be different in important ways. The

DnD study attempts to take into account differences in average share volume, price, and spread in the pre-period. If, however, the two groups of stocks are nevertheless still not properly fully matched, it is possible that results drawn from the DnD may be spurious. ‘Spurious’ in this context means a result that is robust statistically, but nevertheless does not indicate the impact of the intended factor. In other words, a spurious result is caused by some extraneous factor.

Matching Summary

The full set of matched pairs data for each of the four analyses will be provided below, but the following table provides summary information. Shown are the number of matched pairs, and sample averages for the three matching variables. Also shown is the average of the discrepancy score used in the matching process.

Matched Pairs Averages										
		Treatment				Control				
Analysis	N	RMO Pct	ADV	Price	Spread	RMO Pct	ADV	Price	Spread	Score
I	44	0.0763%	1,478,796	\$50.79	\$0.039	0.0033%	1,464,376	\$48.28	\$0.031	0.492
II	71	0.1534%	156,902	\$26.92	\$0.062	0.0123%	157,105	\$27.22	\$0.064	0.264
III	41	0.0531%	4,325,804	\$35.51	\$0.029	0.0023%	3,329,018	\$38.94	\$0.019	0.812
IV	49	0.0889%	166,435	\$19.37	\$0.051	0.0082%	179,551	\$23.95	\$0.046	0.684

The table again illustrates the low level of Program participation, even for the treatment stocks. The RMO percentages are especially low for the higher volume samples (I and III). As intended, the RMO percentages for the control stocks are much lower still, averaging at least an order of magnitude lower than the treatment stocks.

Other than these differences, the pairs exhibit strong average similarity in terms of the values of the pre-period matching variables. It can be seen that the average quality of matches is lower for the samples using 2017-18 as the post period (III and IV). As noted

above, the maximum allowable discrepancy score was increased for these samples, needed to provide for a sample size similar to those of samples I and II.

Regression Results

The following table provides the estimated coefficients for the DnD regressions for the indicated market indicator and sample. In addition to the estimated coefficient, the t-statistic is provided. This statistic can be used to gauge the statistical significance of the coefficient—the confidence that the true value of the coefficient is different than zero. The t-statistics are accompanied, as appropriate, with a set of asterisks indicating the associated level of significance: * = 10%, ** = 5%, and *** = 1%.

It is useful to compare the results across the four samples to assess their consistency.

	Analysis Sample							
	I.		II.		III.		IV.	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
NBBO Spreads								
Dollar	\$0.018	3.16***	\$0.011	0.93	-\$0.003	-0.31	-\$0.030	-1.91*
bps	1.52	0.89	4.38	0.99	1.66	0.73	7.27	0.97
BX Effective Spreads								
Dollar	\$0.014	4.31***	\$0.008	1.32	-\$0.001	-0.32	-\$0.008	-1.45
bps	1.84	1.65	3.65	1.06	1.78	0.99	8.75	1.79*
Volatility								
Hi-Lo Range	-0.001%	-0.02	0.008%	0.38	-0.014%	-0.41	-0.022%	-0.78
Trade-to-Trade	0.003%	0.99	0.009%	1.03	0.004%	1.19	0.023%	1.49
Market Share Change								
TRF	2.86%	1.36	0.58%	0.24	3.13%	1.87*	1.75%	0.50
BX	0.31%	2.23**	0.42%	2.02**	-0.56%	-2.7***	-0.16%	-0.56

Spreads

Four spread measures are analyzed: NBBO quoted spreads and BX effective spreads, expressed in dollar and bps terms. The table above shows substantial consistency between the NBBO quoted and BX effective spread results across all samples.

Sample I. indicates increases in dollar quoted and effective spreads of about 1½ cents. The results are statistically significant. Relative (bps) spreads also increased about 1½ basis points. The bps spread results do not meet the standards of statistical significance, however. Compared to Sample I, Sample II shows increases in dollar spreads of about the same amount and increases in bps spreads of a higher amount, likely due to the fact that the Sample II stocks tend to have lower share prices. None of the Sample II spread increases meet the standard of statistical significance, however. Both samples III and IV show small decreases in dollar spreads and increases in relative spreads. None of the results from sample III are statistically significant. From sample IV, one of the dollar spread decreases and one of the relative spread increases indicate marginal statistical significance.

Overall, the Exchange does not see sufficient consistency across the four samples to conclude that the introduction of the Program caused spreads to widen.

Volatility

Compared to the spread results, results on short-term volatility are easier to characterize. Across the two metrics and four samples, there is no evidence of a systematic increase or decrease in volatility, some estimates are positive, some negative, and none meet the standards of statistical significance.

Market Share

The market share coefficients are expressed in market share points. For example, a value of 1% means that market share increased by one point (e.g., 30% to 31%). The nearer-term samples I and II suggest statistically significant increases in BX market share of about one-third of a point. This increase may be partially reflective of the transfer of Nasdaq's retail program to BX. The more distant-term samples III and IV show, however, declines in BX share. The regressions on TRF share all produce positive coefficients, though only one has any level of statistical significance. Collectively, it can be safely stated that the introduction of the BX RPI program did not work towards decreasing TRF share. More likely what the results tell us is that the treatment stocks with relatively high RMO volume also had high levels of retail interest generally. As noted above, most retail flow is executed off exchange, hence the increase in TRF share.

I. Active Stocks (CADV > 500,000) and Post-Period = 2015

For this sample, there were 44 matched pairs that emerged from this process. The pairs, along with values of selected variables, pre- and post-Program introduction, are shown as follows:

Table 1A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
ACAD	1,301,549	\$26.71	\$0.035	13.20	RSPP	1,006,435	\$25.41	\$0.042	16.44
AFSI	963,827	\$45.37	\$0.058	12.53	CNW	1,035,534	\$47.10	\$0.027	5.85
ALK	1,421,387	\$48.80	\$0.025	5.26	AER	1,420,894	\$42.73	\$0.025	5.80
AVGO	2,296,967	\$84.93	\$0.042	4.94	DLPH	2,274,323	\$67.10	\$0.022	3.28
BDX	1,544,016	\$122.52	\$0.039	3.22	SIAL	1,139,858	\$128.25	\$0.034	2.81
CAMP	712,958	\$18.53	\$0.027	14.71	MIK	633,004	\$18.48	\$0.032	17.24
CELG	4,941,261	\$98.16	\$0.034	3.52	LYB	5,063,747	\$98.75	\$0.028	2.90
CI	1,621,670	\$95.17	\$0.033	3.45	MJN	1,416,148	\$98.05	\$0.033	3.41
CLX	1,176,737	\$96.35	\$0.027	2.77	DTE	1,145,735	\$78.91	\$0.024	3.04
COST	2,068,993	\$130.14	\$0.031	2.38	ITW	1,952,683	\$88.27	\$0.018	2.10

Table 1A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
CRZO	1,162,062	\$51.73	\$0.069	13.56	JAH	1,115,067	\$61.48	\$0.032	5.17
DXCM	639,488	\$44.44	\$0.052	11.72	KMT	650,995	\$40.82	\$0.029	7.10
ENLK	737,216	\$30.01	\$0.050	16.82	MYGN	756,758	\$36.29	\$0.054	14.74
FSC	1,199,762	\$9.10	\$0.010	11.20	EXG	1,043,356	\$9.97	\$0.010	10.18
FSLR	2,507,147	\$59.85	\$0.040	6.73	CAM	2,841,939	\$62.83	\$0.025	4.05
IBKR	507,360	\$25.51	\$0.024	9.42	WERN	542,473	\$26.12	\$0.022	8.38
ICLR	582,300	\$54.93	\$0.051	9.34	SLH	582,309	\$55.54	\$0.042	7.47
ISIS	2,304,953	\$42.90	\$0.050	11.87	DO	2,028,802	\$37.29	\$0.026	6.93
JACK	550,619	\$67.89	\$0.057	8.37	REG	509,779	\$57.69	\$0.031	5.39
LAZ	704,069	\$50.59	\$0.045	9.02	HDB	834,887	\$49.84	\$0.025	5.12
MANH	512,845	\$35.01	\$0.037	10.67	MR	610,957	\$30.32	\$0.030	9.83
MHK	737,514	\$139.12	\$0.084	6.08	SLG	788,370	\$109.07	\$0.057	5.28
MNST	1,194,231	\$96.92	\$0.051	5.33	EQT	1,625,380	\$91.54	\$0.059	6.48
NXPI	4,256,770	\$68.85	\$0.031	4.48	CCI	3,275,501	\$80.56	\$0.024	2.93
NYMT	1,596,486	\$7.76	\$0.010	12.98	PMCS	1,483,102	\$7.49	\$0.011	14.09
OLED	709,659	\$31.24	\$0.045	14.50	FET	713,162	\$28.85	\$0.033	11.66
PSEC	3,891,913	\$9.79	\$0.010	10.25	SLM	4,532,083	\$9.17	\$0.010	11.09
Q	739,497	\$56.41	\$0.039	6.96	OIS	913,560	\$59.56	\$0.048	7.97
RMTI	677,364	\$9.70	\$0.031	32.18	COUP	770,002	\$14.10	\$0.031	22.28
SINA	1,550,979	\$41.43	\$0.036	8.79	YPF	1,668,599	\$33.94	\$0.031	9.11
SKYW	558,570	\$9.63	\$0.018	19.30	BEL	504,230	\$11.61	\$0.018	15.88
SMCI	520,354	\$28.97	\$0.044	15.62	SERV	594,059	\$24.05	\$0.038	15.87
SNCR	615,801	\$45.95	\$0.068	14.76	LTRPA	688,159	\$30.63	\$0.069	22.17
SPLK	2,740,926	\$60.05	\$0.054	9.13	FTI	2,360,200	\$54.47	\$0.024	4.39
SWKS	4,301,104	\$56.96	\$0.024	4.33	NOV	4,357,777	\$75.03	\$0.023	3.04
TASR	3,094,977	\$17.08	\$0.017	9.88	LPI	3,200,381	\$19.98	\$0.016	8.34
TGTX	509,492	\$11.16	\$0.036	32.33	MEG	592,554	\$14.46	\$0.028	19.67
TSCO	1,270,325	\$66.28	\$0.031	4.66	FLS	1,201,366	\$68.85	\$0.033	4.74
TUP	527,236	\$68.49	\$0.044	6.47	KRC	535,203	\$63.70	\$0.037	5.78
UA	2,678,432	\$67.54	\$0.032	4.80	NBL	2,781,689	\$61.96	\$0.025	4.08
UBNT	1,115,056	\$36.37	\$0.051	14.34	ERJ	1,106,399	\$37.84	\$0.021	5.52
VDSI	851,633	\$21.13	\$0.035	17.03	LQ	827,960	\$19.86	\$0.025	12.65
YRCW	750,968	\$20.65	\$0.036	17.55	STAY	627,766	\$21.90	\$0.029	13.44
ZLTQ	720,533	\$24.55	\$0.041	16.88	CTLT	679,346	\$24.50	\$0.045	18.20
Avg	1,478,796	\$50.79	\$0.039	10.76	Avg	1,464,376	\$48.28	\$0.031	8.91

Table 1B: Retail Program Matched Sample CADV >500,000 (2015)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
ACAD	3.07%	0.06%	1,448,310	\$37.47	\$0.050	13.46	RSPP	0.04%	0.00%	1,491,504	\$26.31	\$0.037	14.38
AFSI	2.13%	0.06%	563,733	\$60.48	\$0.061	10.07	CNW	0.22%	0.00%	1,314,088	\$42.22	\$0.025	6.04
ALK	3.21%	0.07%	1,387,460	\$71.24	\$0.047	6.49	AER	0.28%	0.00%	2,093,683	\$43.92	\$0.022	4.96
AVGO	2.24%	0.06%	3,166,689	\$125.32	\$0.077	6.18	DLPH	0.20%	0.00%	2,148,818	\$80.26	\$0.033	4.11
BDX	3.08%	0.08%	1,115,839	\$143.84	\$0.065	4.51	SIAL	0.10%	0.00%	1,009,690	\$138.89	\$0.015	1.10
CAMP	3.90%	0.07%	511,751	\$18.28	\$0.028	15.24	MIK	0.17%	0.00%	769,285	\$25.40	\$0.030	11.79
CELG	3.98%	0.08%	5,171,549	\$118.39	\$0.059	4.96	LYB	0.25%	0.00%	3,973,998	\$91.43	\$0.037	4.11
CI	3.06%	0.08%	2,008,125	\$134.28	\$0.073	5.40	MJN	0.21%	0.00%	1,810,637	\$89.46	\$0.038	4.21
CLX	3.17%	0.08%	891,999	\$113.19	\$0.048	4.24	DTE	0.27%	0.01%	1,090,860	\$80.57	\$0.030	3.67
COST	2.32%	0.05%	2,150,134	\$147.70	\$0.051	3.44	ITW	0.16%	0.00%	1,750,442	\$92.38	\$0.025	2.76
CRZO	2.40%	0.06%	1,330,366	\$42.86	\$0.055	13.12	JAH	0.35%	0.01%	2,179,212	\$51.58	\$0.021	4.17
DXCM	2.90%	0.08%	843,867	\$75.80	\$0.094	12.13	KMT	0.29%	0.00%	940,811	\$31.32	\$0.026	8.52
ENLK	2.54%	0.06%	771,866	\$21.79	\$0.047	22.55	MYGN	0.15%	0.00%	830,603	\$36.81	\$0.052	13.95
FSC	2.17%	0.06%	1,166,959	\$6.75	\$0.010	15.32	EXG	0.22%	0.00%	798,806	\$9.47	\$0.010	10.76
FSLR	4.17%	0.06%	2,388,265	\$52.34	\$0.034	6.49	CAM	0.17%	0.00%	3,147,765	\$54.73	\$0.021	3.96
IBKR	4.22%	0.09%	565,525	\$37.70	\$0.037	9.90	WERN	0.31%	0.01%	706,866	\$28.13	\$0.023	8.33
ICLR	2.14%	0.08%	504,514	\$69.04	\$0.108	15.63	SLH	0.23%	0.00%	1,070,428	\$50.40	\$0.034	7.00
ISIS	3.14%	0.06%	2,342,444	\$59.10	\$0.065	11.39	DO	0.29%	0.00%	2,342,540	\$26.18	\$0.023	8.44
JACK	2.34%	0.07%	633,677	\$85.40	\$0.092	10.94	REG	0.10%	0.00%	580,153	\$64.77	\$0.039	6.05
LAZ	3.93%	0.10%	859,575	\$50.54	\$0.053	10.52	HDB	0.29%	0.01%	914,212	\$59.33	\$0.034	5.74
MANH	3.77%	0.10%	539,552	\$59.23	\$0.077	12.82	MR	0.21%	0.00%	623,598	\$27.00	\$0.025	9.47
MHK	3.17%	0.09%	689,602	\$187.12	\$0.182	9.68	SLG	0.12%	0.00%	702,818	\$118.81	\$0.088	7.49
MNST	2.37%	0.07%	1,228,688	\$136.21	\$0.105	7.65	EQT	0.18%	0.00%	1,556,329	\$75.25	\$0.055	7.45
NXPI	2.55%	0.06%	3,865,611	\$91.55	\$0.052	5.71	CCI	0.30%	0.01%	2,336,521	\$83.67	\$0.025	2.97
NYMT	3.82%	0.07%	1,196,276	\$7.05	\$0.010	14.71	PMCS	0.13%	0.00%	3,442,623	\$9.05	\$0.010	12.01
OLED	6.59%	0.14%	658,991	\$42.93	\$0.063	14.81	FET	0.17%	0.00%	1,113,426	\$17.10	\$0.022	13.33
PSEC	3.80%	0.07%	2,747,484	\$7.81	\$0.010	12.96	SLM	0.06%	0.00%	3,593,895	\$8.77	\$0.010	12.01
Q	3.25%	0.08%	746,869	\$68.71	\$0.048	6.98	OIS	0.07%	0.00%	1,109,903	\$35.88	\$0.037	10.89
RMTI	4.62%	0.07%	726,795	\$11.47	\$0.031	27.33	COUP	0.05%	0.00%	689,630	\$11.56	\$0.024	20.81
SINA	3.74%	0.06%	1,351,205	\$42.49	\$0.041	9.53	YPF	0.28%	0.00%	1,301,107	\$23.91	\$0.024	10.05
SKYW	4.56%	0.08%	540,128	\$16.11	\$0.027	17.05	BEL	0.05%	0.00%	520,858	\$11.45	\$0.015	13.50

Table 1B: Retail Program Matched Sample CADV >500,000 (2015)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
SMCI	4.34%	0.10%	623,673	\$30.57	\$0.044	14.48	SERV	0.09%	0.00%	1,084,056	\$34.47	\$0.027	7.96
SNCR	3.23%	0.08%	531,811	\$42.90	\$0.066	15.60	LTRPA	0.04%	0.00%	570,674	\$29.05	\$0.034	11.75
SPLK	3.13%	0.07%	1,908,069	\$62.58	\$0.053	8.53	FTI	0.08%	0.00%	3,385,051	\$36.74	\$0.016	4.52
SWKS	7.33%	0.13%	4,040,788	\$89.48	\$0.047	5.24	NOV	0.26%	0.00%	5,929,343	\$45.85	\$0.015	3.23
TASR	4.96%	0.06%	2,066,379	\$25.79	\$0.022	8.55	LPI	0.34%	0.00%	3,845,352	\$11.60	\$0.013	11.79
TGTX	7.27%	0.12%	597,807	\$14.62	\$0.042	29.22	MEG	0.26%	0.00%	1,314,175	\$15.20	\$0.017	11.22
TSCO	4.01%	0.10%	942,912	\$87.47	\$0.063	7.18	FLS	0.33%	0.00%	1,488,778	\$50.86	\$0.025	4.96
TUP	3.09%	0.07%	583,728	\$61.66	\$0.054	8.90	KRC	0.16%	0.00%	567,612	\$69.92	\$0.051	7.33
UA	5.23%	0.09%	2,652,795	\$85.27	\$0.038	4.39	NBL	0.21%	0.00%	4,862,641	\$40.75	\$0.017	4.21
UBNT	3.42%	0.06%	664,805	\$31.72	\$0.048	14.89	ERJ	0.13%	0.00%	979,065	\$30.32	\$0.017	5.58
VDSI	5.87%	0.08%	1,258,250	\$22.45	\$0.037	17.11	LQ	0.09%	0.00%	1,511,426	\$20.36	\$0.014	6.87
YRCW	3.30%	0.06%	640,874	\$16.21	\$0.028	17.65	STAY	0.31%	0.01%	520,061	\$18.89	\$0.028	14.43
ZLTQ	2.71%	0.06%	598,245	\$31.73	\$0.055	17.10	CTLT	0.18%	0.00%	718,026	\$28.92	\$0.040	14.02
Avg	3.64%	0.08%	1,391,454	\$62.38	\$0.054	11.59	Avg	0.19%	0.00%	1,698,440	\$44.98	\$0.028	8.22

II. Less Active Stocks (CADV between 50,000 and 500,000) and Post-Period = 2015

For this sample, there were 71 matched pairs that emerged from the process. The pairs, along with values of the matching variables (pre-period), are shown as follows:

Table 2A: Retail Program Matched Sample >50,000 and <500,000 (Sep - Nov 2014)										
Treatment Stocks					Control Stocks					
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	
AB	257,695	\$26.20	\$0.052	19.81	TBI	218,856	\$25.33	\$0.047	18.60	
ACET	201,593	\$20.49	\$0.053	26.13	DFRG	213,718	\$21.87	\$0.052	23.95	
ADC	65,799	\$29.22	\$0.072	24.58	ORA	66,867	\$27.55	\$0.069	25.05	
AFOP	354,650	\$13.00	\$0.027	20.64	LQDT	343,166	\$12.97	\$0.025	18.91	
ALDW	190,282	\$18.43	\$0.050	27.26	NEWP	171,264	\$17.79	\$0.044	24.54	
APU	310,097	\$45.68	\$0.046	10.16	WST	306,905	\$46.65	\$0.050	10.72	
ARII	258,499	\$70.06	\$0.171	24.73	AXE	240,764	\$85.14	\$0.162	19.11	
AVAV	259,080	\$29.89	\$0.052	17.50	MBFI	282,952	\$29.29	\$0.047	16.12	

Table 2A: Retail Program Matched Sample >50,000 and <500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
BEAT	222,665	\$7.49	\$0.025	34.28	SPWH	227,710	\$6.86	\$0.025	35.76
BIP	218,853	\$39.85	\$0.051	12.70	ALE	229,126	\$48.74	\$0.049	10.09
BOI	103,890	\$16.93	\$0.030	17.74	MMD	101,908	\$17.98	\$0.034	18.95
BSTC	51,863	\$36.16	\$0.264	73.16	OPB	51,453	\$29.37	\$0.201	67.86
BTO	57,833	\$22.56	\$0.038	17.08	EMF	59,607	\$17.77	\$0.041	23.11
CLFD	75,466	\$13.16	\$0.069	52.54	ZPIN	91,340	\$13.90	\$0.089	64.59
CLMS	110,782	\$12.66	\$0.037	28.97	MHG	111,804	\$13.89	\$0.033	23.75
CLMT	313,715	\$27.57	\$0.063	23.09	MRKT	401,812	\$23.98	\$0.059	24.76
CMP	259,246	\$86.79	\$0.108	12.46	SPB	235,834	\$88.42	\$0.106	12.00
CODI	217,722	\$17.82	\$0.036	20.41	HZO	176,311	\$17.93	\$0.036	20.33
CSCD	110,524	\$10.99	\$0.056	51.94	UNTD	127,615	\$11.83	\$0.046	38.70
CTT	223,611	\$11.18	\$0.022	19.48	FLY	205,417	\$12.99	\$0.022	17.28
CUI	78,138	\$7.18	\$0.045	63.45	CRCM	98,265	\$8.40	\$0.047	56.22
CVTI	219,409	\$18.92	\$0.076	41.35	KANG	277,438	\$18.93	\$0.074	39.12
DBL	78,900	\$23.75	\$0.044	18.48	KIO	74,822	\$17.56	\$0.043	24.31
EDF	65,045	\$18.69	\$0.053	28.45	BCA	71,870	\$19.26	\$0.055	28.43
EPAM	395,347	\$43.65	\$0.063	14.35	HIBB	415,031	\$44.48	\$0.062	13.90
ETB	60,457	\$15.78	\$0.023	14.75	ZF	53,909	\$15.10	\$0.022	14.95
EZCH	158,140	\$22.41	\$0.058	25.94	CMRE	173,076	\$21.06	\$0.057	23.49
FDUS	68,041	\$17.12	\$0.061	35.44	OKSB	58,803	\$16.97	\$0.066	38.50
FGP	160,267	\$27.28	\$0.060	22.18	IBOC	172,092	\$26.03	\$0.060	23.28
FNHC	271,398	\$27.32	\$0.079	28.80	WMS	260,316	\$21.05	\$0.066	31.32
GLAD	128,184	\$9.02	\$0.026	28.43	IRR	101,145	\$9.95	\$0.026	25.71
GLRE	136,838	\$32.52	\$0.059	18.18	STC	120,951	\$32.12	\$0.061	19.03
GNCMA	193,608	\$11.39	\$0.026	22.57	PGI	204,861	\$11.66	\$0.025	21.87
GOOD	112,763	\$17.57	\$0.031	17.67	CPF	114,830	\$18.46	\$0.031	16.70
GSIG	72,335	\$12.22	\$0.049	40.42	XOXO	67,052	\$12.46	\$0.049	40.03
GSL	66,072	\$3.78	\$0.031	85.13	CO	68,003	\$4.99	\$0.030	59.74
GSVC	139,253	\$10.14	\$0.034	33.84	ICD	135,638	\$9.33	\$0.038	43.28
HII	283,916	\$103.19	\$0.102	9.93	TFX	243,588	\$110.37	\$0.132	12.05
HIIQ	96,520	\$10.25	\$0.090	88.44	EDN	94,386	\$11.67	\$0.104	89.69
HQH	162,147	\$29.19	\$0.042	14.44	COLB	204,528	\$26.38	\$0.045	17.12
HQL	103,968	\$22.85	\$0.040	17.48	CTY	93,639	\$23.60	\$0.036	15.29
IGOV	69,992	\$99.56	\$0.179	17.99	KOF	62,191	\$102.39	\$0.183	17.93
IXYS	141,164	\$11.00	\$0.036	32.65	BPI	133,490	\$11.62	\$0.027	23.09
LDP	70,450	\$24.46	\$0.048	19.73	DFP	64,754	\$22.87	\$0.048	20.82
MAIN	202,931	\$31.39	\$0.039	12.33	MLI	201,430	\$30.24	\$0.039	13.07
NDP	93,945	\$24.11	\$0.067	28.08	ABCB	105,401	\$23.68	\$0.070	29.89
NNBR	157,009	\$24.33	\$0.074	30.40	CVT	193,466	\$25.67	\$0.069	26.96

Table 2A: Retail Program Matched Sample >50,000 and <500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
NTWK	78,357	\$3.40	\$0.028	84.86	FCSC	68,500	\$2.82	\$0.035	122.37
ORBK	134,253	\$15.36	\$0.034	22.01	AHP	142,241	\$16.22	\$0.034	20.99
OXLC	80,719	\$15.90	\$0.045	28.60	CTS	82,703	\$17.22	\$0.044	25.67
PATK	65,356	\$42.36	\$0.198	46.71	VRTV	64,527	\$46.69	\$0.243	52.21
PEO	103,616	\$27.93	\$0.050	18.13	LADR	97,465	\$18.89	\$0.057	30.07
PGP	131,368	\$23.08	\$0.086	37.58	EXLS	133,974	\$26.59	\$0.078	29.49
PICO	71,762	\$20.61	\$0.069	33.51	VVI	79,994	\$22.39	\$0.065	28.97
PLOW	205,124	\$20.54	\$0.035	17.05	CSU	217,750	\$22.23	\$0.035	15.69
RDI	69,021	\$9.43	\$0.045	48.22	CNCO	75,311	\$8.59	\$0.050	59.16
RM	193,431	\$16.19	\$0.048	29.46	DL	202,788	\$14.91	\$0.053	36.12
RNST	67,326	\$28.53	\$0.100	35.11	FBRC	65,432	\$26.48	\$0.125	47.49
SIGI	144,844	\$24.23	\$0.046	19.12	CCU	144,842	\$21.38	\$0.044	20.58
SOCL	122,280	\$19.37	\$0.029	15.22	PCN	121,440	\$16.22	\$0.027	16.49
SPH	166,532	\$44.68	\$0.092	20.53	CCMP	152,708	\$44.34	\$0.100	22.72
STON	153,931	\$25.88	\$0.054	21.03	FTGC	169,252	\$29.57	\$0.057	19.47
TCP	344,465	\$64.50	\$0.174	26.97	REX	278,567	\$76.26	\$0.216	29.37
TSYS	221,965	\$2.90	\$0.015	50.11	NWY	195,275	\$3.00	\$0.014	47.97
TYG	139,676	\$46.69	\$0.068	14.62	RLI	127,939	\$46.15	\$0.073	15.77
TZOO	69,120	\$14.37	\$0.053	36.99	TRNO	82,554	\$20.20	\$0.053	26.35
USAC	112,111	\$23.46	\$0.086	36.95	FCB	112,509	\$22.70	\$0.068	30.05
VCIT	350,756	\$86.24	\$0.050	5.74	IT	378,372	\$77.79	\$0.057	7.36
VICR	102,170	\$10.56	\$0.047	46.34	MODN	101,103	\$9.77	\$0.040	41.39
VNQI	180,925	\$55.63	\$0.065	11.80	TTC	172,945	\$60.46	\$0.069	11.38
WLDN	180,819	\$13.99	\$0.061	43.65	CTRE	156,847	\$15.28	\$0.076	49.33
Avg	156,902	\$26.92	\$0.062	29.52	Avg	157,105	\$27.22	\$0.064	29.67

Table 2B: Retail Program Matched Sample CADV >50,000 and <500,000 (2015)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AB	4.85%	0.10%	283,950	\$27.72	\$0.057	20.57	TBI	0.99%	0.018%	327,753	\$25.81	\$0.043	16.70
ACET	3.36%	0.10%	194,984	\$24.10	\$0.070	29.08	DFRG	0.89%	0.020%	297,903	\$17.26	\$0.040	23.26
ADC	4.02%	0.12%	111,520	\$31.60	\$0.069	21.85	ORA	0.36%	0.010%	155,890	\$35.60	\$0.069	19.55
AFOP	4.21%	0.12%	187,767	\$17.48	\$0.047	26.62	LQDT	0.66%	0.018%	295,434	\$8.67	\$0.023	26.90
ALDW	6.34%	0.14%	211,968	\$21.16	\$0.083	39.15	NEWP	0.70%	0.020%	166,386	\$17.51	\$0.043	24.82

Table 2B: Retail Program Matched Sample CADV >50,000 and <500,000 (2015)

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
APU	9.81%	0.22%	241,899	\$45.41	\$0.088	19.29	WST	0.47%	0.011%	326,681	\$56.83	\$0.078	13.72
ARII	3.00%	0.11%	237,155	\$48.93	\$0.159	32.51	AXE	0.34%	0.012%	209,412	\$68.79	\$0.144	21.14
AVAV	4.46%	0.13%	168,446	\$25.36	\$0.058	22.75	MBFI	0.47%	0.010%	325,804	\$32.33	\$0.042	13.17
BEAT	7.55%	0.17%	296,257	\$11.21	\$0.033	29.78	SPWH	0.44%	0.008%	267,713	\$10.37	\$0.028	27.50
BIP	5.15%	0.14%	267,495	\$42.32	\$0.052	12.31	ALE	0.78%	0.017%	270,205	\$50.93	\$0.061	12.01
BOI	11.17%	0.11%	67,209	\$15.57	\$0.035	22.31	MMD	1.60%	0.010%	75,235	\$18.12	\$0.033	18.56
BSTC	3.99%	0.16%	62,235	\$46.54	\$0.384	84.03	OPB	0.42%	0.010%	105,939	\$33.95	\$0.148	45.12
BTO	11.38%	0.13%	63,715	\$25.43	\$0.067	25.78	EMF	1.71%	0.009%	64,025	\$13.71	\$0.039	29.43
CLFD	4.73%	0.12%	62,636	\$14.74	\$0.073	49.97	ZPIN	0.00%	0.000%	115,886	\$14.97	\$0.092	60.98
CLMS	4.28%	0.12%	88,411	\$11.46	\$0.037	32.81	MHG	0.23%	0.007%	92,686	\$12.50	\$0.030	23.96
CLMT	11.61%	0.27%	382,050	\$25.64	\$0.068	26.69	MRKT	0.48%	0.009%	489,213	\$27.57	\$0.034	12.38
CMP	3.54%	0.13%	261,808	\$85.71	\$0.117	13.76	SPB	0.59%	0.018%	305,016	\$95.53	\$0.125	13.39
CODI	6.63%	0.11%	136,610	\$16.50	\$0.036	21.86	HZO	0.55%	0.014%	292,698	\$20.59	\$0.046	23.22
CSCD	4.29%	0.10%	55,917	\$14.67	\$0.072	49.56	UNTD	0.68%	0.020%	139,792	\$13.95	\$0.051	37.41
CTT	9.67%	0.19%	146,655	\$11.28	\$0.026	23.10	FLY	0.83%	0.015%	272,441	\$14.23	\$0.026	18.44
CUI	11.61%	0.14%	89,869	\$5.88	\$0.033	55.75	CRCM	0.89%	0.013%	110,412	\$6.56	\$0.033	50.20
CVTI	3.22%	0.11%	228,099	\$25.99	\$0.086	33.45	KANG	0.75%	0.020%	487,020	\$17.09	\$0.077	23.08
DBL	14.29%	0.16%	80,224	\$24.61	\$0.054	22.03	KIO	0.09%	0.001%	50,652	\$15.54	\$0.045	24.89
EDF	8.88%	0.13%	75,205	\$14.49	\$0.046	31.99	BCA	0.19%	0.003%	69,946	\$15.52	\$0.053	35.07
EPAM	4.16%	0.12%	406,072	\$68.22	\$0.118	17.42	HIBB	0.60%	0.015%	436,936	\$42.95	\$0.064	14.94
ETB	17.61%	0.16%	67,536	\$15.99	\$0.036	22.28	ZF	3.71%	0.013%	51,579	\$14.40	\$0.022	15.40
EZCH	4.09%	0.11%	211,056	\$20.50	\$0.045	22.80	CMRE	0.44%	0.014%	155,171	\$16.42	\$0.053	32.86
FDUS	22.17%	0.58%	55,373	\$15.15	\$0.081	53.87	OKSB	0.66%	0.018%	50,424	\$17.27	\$0.083	48.02
FGP	6.51%	0.11%	308,815	\$21.93	\$0.056	25.44	IBOC	0.68%	0.018%	198,814	\$26.18	\$0.066	25.39
FNHC	3.85%	0.13%	112,184	\$27.04	\$0.106	39.41	WMS	0.48%	0.010%	367,087	\$28.23	\$0.056	19.77
GLAD	14.23%	0.13%	123,421	\$8.40	\$0.026	30.82	IRR	1.22%	0.004%	84,619	\$7.47	\$0.028	36.62
GLRE	8.05%	0.16%	161,813	\$27.53	\$0.051	18.79	STC	0.49%	0.018%	99,664	\$39.07	\$0.105	27.08
GNCMA	5.95%	0.23%	209,254	\$17.12	\$0.047	27.32	PGI	0.72%	0.016%	367,369	\$11.00	\$0.025	21.53
GOOD	7.01%	0.13%	111,685	\$16.47	\$0.036	22.37	CPF	0.88%	0.018%	279,459	\$22.42	\$0.036	15.91
GSIG	7.36%	0.19%	66,110	\$13.76	\$0.063	45.96	XOXO	0.64%	0.018%	96,502	\$16.14	\$0.052	32.59

Table 2B: Retail Program Matched Sample CADV >50,000 and <500,000 (2015)

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
GSL	13.49%	0.12%	77,050	\$4.97	\$0.039	78.15	CO	1.17%	0.012%	214,376	\$5.90	\$0.025	44.07
GSVC	5.92%	0.13%	106,508	\$9.66	\$0.037	38.66	ICD	0.79%	0.015%	59,744	\$6.65	\$0.069	105.07
HII	3.59%	0.12%	320,027	\$122.86	\$0.181	14.90	TFX	0.29%	0.008%	274,659	\$126.57	\$0.161	12.63
HIQ	9.88%	0.13%	54,023	\$5.90	\$0.062	107.65	EDN	0.01%	0.000%	71,865	\$14.27	\$0.138	97.30
HQH	5.60%	0.11%	131,438	\$33.75	\$0.071	21.24	COLB	0.72%	0.017%	252,185	\$30.71	\$0.053	17.17
HQL	7.91%	0.11%	72,120	\$26.93	\$0.063	23.67	CTY	0.07%	0.000%	104,496	\$24.76	\$0.036	14.70
IGOV	9.75%	0.15%	64,028	\$91.31	\$0.228	24.92	KOF	0.27%	0.011%	77,285	\$78.17	\$0.152	19.49
IXYS	4.77%	0.12%	158,931	\$12.29	\$0.037	30.67	BPI	1.00%	0.014%	104,923	\$9.01	\$0.033	37.18
LDP	12.69%	0.18%	90,233	\$23.32	\$0.041	17.84	DFP	0.53%	0.005%	58,638	\$22.84	\$0.057	24.84
MAIN	11.52%	0.18%	250,344	\$30.21	\$0.039	13.05	MLI	0.76%	0.020%	169,670	\$32.97	\$0.060	18.41
NDP	16.50%	0.20%	80,808	\$17.27	\$0.073	42.22	ABCB	0.72%	0.019%	174,169	\$27.51	\$0.062	23.20
NNBR	4.31%	0.11%	278,757	\$22.38	\$0.066	29.71	CVT	0.55%	0.015%	201,431	\$29.61	\$0.074	24.99
NTWK	31.44%	0.18%	59,023	\$5.45	\$0.054	100.56	FCSC	0.55%	0.009%	225,454	\$4.86	\$0.032	69.06
ORBK	4.99%	0.12%	200,734	\$17.83	\$0.036	20.44	AHP	0.55%	0.011%	187,416	\$15.38	\$0.033	21.60
OXLC	7.91%	0.14%	94,543	\$13.68	\$0.062	46.48	CTS	0.69%	0.017%	91,415	\$18.20	\$0.055	29.86
PATK	3.49%	0.11%	103,595	\$46.14	\$0.195	42.49	VRTV	0.03%	0.001%	74,483	\$41.62	\$0.212	50.66
PEO	8.37%	0.12%	83,844	\$21.78	\$0.060	27.53	LADR	0.40%	0.008%	148,102	\$16.48	\$0.040	24.34
PGP	7.64%	0.11%	59,681	\$19.06	\$0.103	54.99	EXLS	0.36%	0.012%	166,403	\$37.01	\$0.100	27.04
PICO	8.54%	0.24%	106,325	\$14.10	\$0.052	37.85	VVI	0.58%	0.019%	88,074	\$28.13	\$0.073	26.07
PLOW	3.71%	0.11%	129,709	\$21.61	\$0.056	25.71	CSU	0.42%	0.011%	211,558	\$23.61	\$0.047	20.09
RDI	8.49%	0.24%	56,701	\$13.43	\$0.062	45.66	CNCO	0.46%	0.003%	83,811	\$6.80	\$0.041	61.30
RM	4.55%	0.12%	91,913	\$16.20	\$0.067	39.49	DL	0.28%	0.009%	126,155	\$15.56	\$0.073	47.88
RNST	5.29%	0.13%	148,755	\$31.50	\$0.067	21.21	FBRC	0.33%	0.009%	50,866	\$22.22	\$0.130	59.07
SIGI	4.57%	0.12%	212,634	\$30.13	\$0.053	17.68	CCU	0.34%	0.007%	138,285	\$21.45	\$0.048	22.78
SOCL	10.32%	0.24%	88,315	\$19.22	\$0.051	26.48	PCN	3.92%	0.018%	108,881	\$14.36	\$0.022	15.23
SPH	6.54%	0.15%	208,257	\$38.56	\$0.099	25.93	CCMP	0.52%	0.018%	145,234	\$45.64	\$0.111	24.49
STON	4.23%	0.13%	160,946	\$28.62	\$0.092	32.56	FTGC	0.23%	0.003%	134,541	\$23.49	\$0.053	22.65
TCP	4.12%	0.14%	171,426	\$58.19	\$0.292	52.28	REX	0.40%	0.014%	162,351	\$57.40	\$0.192	33.82
TSYS	3.48%	0.11%	375,242	\$3.64	\$0.014	40.50	NWY	1.34%	0.009%	94,970	\$2.45	\$0.017	71.30
TYG	8.09%	0.17%	279,394	\$36.74	\$0.075	21.32	RLI	0.55%	0.020%	139,447	\$53.38	\$0.113	21.01

Table 2B: Retail Program Matched Sample CADV >50,000 and <500,000 (2015)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
TZOO	5.83%	0.15%	124,874	\$10.07	\$0.042	42.08	TRNO	0.37%	0.010%	178,560	\$21.55	\$0.048	22.62
USAC	9.30%	0.20%	130,583	\$18.40	\$0.106	57.48	FCB	0.77%	0.019%	217,494	\$30.48	\$0.061	20.50
VCIT	4.89%	0.12%	451,992	\$85.91	\$0.053	6.15	IT	0.61%	0.016%	406,922	\$85.95	\$0.081	9.42
VICR	7.09%	0.18%	56,688	\$11.89	\$0.070	62.03	MODN	1.11%	0.019%	91,268	\$11.19	\$0.041	36.74
VNQI	13.04%	0.33%	374,913	\$54.84	\$0.055	10.17	TTC	0.63%	0.019%	265,760	\$69.75	\$0.082	11.78
WLDN	9.82%	0.23%	77,911	\$12.01	\$0.064	54.70	CTRE	0.12%	0.003%	227,593	\$12.27	\$0.042	34.08
Avg	7.81%	0.15%	160,108	\$26.98	\$0.075	34.20	Avg	0.68%	0.01%	183,525	\$27.80	\$0.066	29.96

III. Active Stocks (CADV > 500,000) and Post-Period = 2017 - 2018

For this sample, there were 41 matched pairs that emerged from the process. The pairs, along with values of the matching variables (pre-period), are shown as follows:

Table 3A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)										
Treatment Stocks					Control Stocks					
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	
AA	19,848,728	\$16.29	\$0.010	6.17	ITUB	15,391,611	\$15.06	\$0.010	6.70	
AG	1,868,134	\$7.10	\$0.010	15.21	CUZ	1,707,347	\$12.49	\$0.010	8.27	
AINV	1,804,765	\$8.30	\$0.010	12.24	BVN	1,783,634	\$11.21	\$0.011	10.10	
AMBA	2,103,392	\$42.35	\$0.062	14.79	PLD	2,692,357	\$39.81	\$0.011	2.90	
APO	1,356,506	\$23.15	\$0.021	9.23	BRX	1,278,575	\$23.37	\$0.017	7.12	
AXAS	2,961,152	\$4.58	\$0.010	22.80	CIG	5,661,208	\$6.35	\$0.010	16.10	
BCRX	1,244,583	\$11.27	\$0.021	18.89	CLI	899,677	\$19.58	\$0.016	8.08	
BUD	1,367,716	\$110.28	\$0.030	2.76	TOT	1,409,344	\$60.36	\$0.023	3.83	
BX	4,891,093	\$31.38	\$0.014	4.46	COG	6,157,960	\$32.25	\$0.012	3.76	
CLNE	1,664,000	\$7.39	\$0.012	16.09	DRH	1,577,838	\$13.54	\$0.010	7.59	
CMCM	892,660	\$20.49	\$0.057	27.49	MDU	1,080,599	\$27.56	\$0.019	6.71	
CSIQ	3,978,563	\$32.55	\$0.034	10.54	CNQ	4,352,711	\$37.08	\$0.012	3.35	
DO	2,028,802	\$37.29	\$0.026	6.93	HCP	2,538,605	\$42.25	\$0.012	2.73	
DSX	726,289	\$8.85	\$0.012	14.11	FNB	879,836	\$12.44	\$0.010	8.36	

Table 3A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
F	34,678,316	\$15.13	\$0.010	6.65	FOXA	13,032,567	\$34.41	\$0.010	2.95
FEYE	8,234,032	\$31.44	\$0.022	7.22	HST	6,716,845	\$22.14	\$0.010	4.62
FNSR	2,320,485	\$16.88	\$0.012	7.33	TPH	2,159,710	\$13.94	\$0.012	8.68
GME	2,808,482	\$41.86	\$0.018	4.25	SNY	2,182,012	\$51.81	\$0.018	3.45
GNW	9,907,097	\$12.24	\$0.010	8.49	SAN	10,583,634	\$9.09	\$0.010	11.05
GRPN	16,296,242	\$6.85	\$0.010	14.75	SLM	4,532,083	\$9.17	\$0.010	11.09
HAIN	566,626	\$103.28	\$0.083	8.09	SLG	788,370	\$109.07	\$0.057	5.28
HALO	1,250,394	\$9.12	\$0.011	12.49	HTA	1,419,408	\$12.29	\$0.010	8.48
IRBT	712,902	\$33.02	\$0.045	13.54	LHO	859,601	\$36.72	\$0.018	5.05
JWN	1,472,964	\$70.84	\$0.025	3.49	ETR	1,607,873	\$79.55	\$0.025	3.10
LSCC	1,168,221	\$6.88	\$0.011	15.53	RPAI	1,047,067	\$15.36	\$0.011	6.95
LYG	3,517,062	\$4.88	\$0.010	20.51	GGB	7,013,600	\$4.81	\$0.010	21.01
MMP	839,403	\$82.37	\$0.094	11.51	AVB	926,288	\$150.78	\$0.072	4.79
NOK	18,264,234	\$8.24	\$0.010	12.15	BBD	11,667,774	\$15.32	\$0.010	6.59
O	2,027,017	\$44.15	\$0.014	3.16	NI	2,220,002	\$40.72	\$0.013	3.30
OHI	1,490,422	\$36.76	\$0.013	3.43	AIV	1,214,436	\$34.32	\$0.013	3.71
RCII	819,241	\$30.46	\$0.024	7.91	RLJ	735,277	\$30.37	\$0.016	5.38
SINA	1,550,979	\$41.43	\$0.036	8.79	IBN	1,251,526	\$54.07	\$0.024	4.51
SNE	3,075,849	\$18.86	\$0.010	5.40	DRE	2,595,753	\$18.25	\$0.010	5.62
SPWR	2,347,451	\$32.45	\$0.025	7.78	FTI	2,360,200	\$54.47	\$0.024	4.39
STX	2,989,069	\$59.38	\$0.022	3.76	NBL	2,781,689	\$61.96	\$0.025	4.08
SYNA	1,066,414	\$71.57	\$0.092	12.64	CPT	642,738	\$72.84	\$0.031	4.31
TERP	626,425	\$28.72	\$0.080	27.81	HR	601,104	\$25.09	\$0.015	6.18
UA	2,678,432	\$67.54	\$0.032	4.80	EQR	2,303,635	\$66.21	\$0.018	2.77
ULTA	1,061,441	\$116.53	\$0.092	7.86	BXP	890,862	\$121.67	\$0.066	5.45
WPC	525,756	\$66.30	\$0.034	5.07	KRC	535,203	\$63.70	\$0.037	5.78
X	8,326,606	\$37.65	\$0.015	4.14	EXC	6,409,198	\$34.91	\$0.011	3.02
Avg	4,325,804	\$35.51	\$0.029	10.49	Avg	3,329,018	\$38.94	\$0.019	6.27

Table 3B: Retail Program Matched Sample CADV >500,000 (2017 - 2018)

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AA	1.30%	0.04%	4,075,295	\$41.33	\$0.022	5.27	ITUB	0.04%	0.001%	12,139,536	\$12.55	\$0.010	8.11
AG	1.71%	0.04%	3,361,556	\$7.04	\$0.010	14.70	CUZ	0.02%	0.001%	3,842,736	\$8.86	\$0.010	11.51
AINV	1.93%	0.06%	865,116	\$6.18	\$0.011	17.22	BVN	0.02%	0.001%	1,343,091	\$13.68	\$0.012	8.61
AMBA	3.68%	0.10%	1,006,023	\$48.50	\$0.062	12.93	PLD	0.09%	0.004%	2,672,000	\$61.33	\$0.018	2.88
APO	1.38%	0.04%	1,098,761	\$29.62	\$0.030	9.93	BRX	0.07%	0.003%	3,076,634	\$18.10	\$0.011	5.96
AXAS	1.33%	0.04%	1,492,938	\$2.15	\$0.010	48.85	CIG	0.11%	0.003%	4,402,939	\$2.48	\$0.010	41.72
BCRX	1.86%	0.06%	1,176,068	\$6.02	\$0.013	21.42	CLI	0.07%	0.003%	593,039	\$22.59	\$0.019	8.24
BUD	1.22%	0.04%	1,764,121	\$105.16	\$0.032	3.12	TOT	0.09%	0.002%	1,764,192	\$55.96	\$0.012	2.08
BX	2.61%	0.05%	4,550,664	\$32.76	\$0.013	3.94	COG	0.10%	0.003%	6,100,394	\$24.46	\$0.011	4.34
CLNE	1.31%	0.04%	1,346,149	\$2.36	\$0.010	45.01	DRH	0.01%	0.000%	2,300,351	\$11.21	\$0.010	9.17
CMCM	1.85%	0.05%	1,059,402	\$10.70	\$0.023	21.69	MDU	0.06%	0.003%	842,527	\$27.03	\$0.014	5.05
CSIQ	4.27%	0.13%	1,025,349	\$14.98	\$0.021	13.76	CNQ	0.11%	0.003%	2,808,082	\$32.12	\$0.010	3.28
DO	1.05%	0.04%	2,326,499	\$15.80	\$0.013	8.14	HCP	0.08%	0.003%	3,666,607	\$27.46	\$0.011	3.94
DSX	2.44%	0.06%	589,433	\$4.02	\$0.012	29.70	FNB	0.09%	0.004%	2,706,799	\$13.63	\$0.010	7.60
F	1.77%	0.05%	40,375,950	\$11.11	\$0.010	9.11	FOXA	0.13%	0.003%	10,396,614	\$35.77	\$0.010	3.02
FEYE	1.96%	0.05%	4,768,737	\$15.54	\$0.010	6.81	HST	0.03%	0.001%	6,942,056	\$19.29	\$0.010	5.28
FNSR	2.49%	0.06%	3,459,073	\$21.85	\$0.015	6.74	TPH	0.08%	0.003%	1,937,468	\$14.46	\$0.011	7.61
GME	1.35%	0.04%	3,433,058	\$18.21	\$0.011	6.34	SNY	0.05%	0.001%	1,609,403	\$44.08	\$0.011	2.51
GNW	1.76%	0.04%	4,516,565	\$3.75	\$0.010	27.39	SAN	0.10%	0.002%	6,841,859	\$6.04	\$0.010	16.83
GRPN	1.16%	0.04%	8,719,062	\$4.22	\$0.010	24.46	SLM	0.08%	0.003%	3,172,237	\$11.18	\$0.010	9.37
HAIN	1.33%	0.04%	1,583,844	\$33.81	\$0.023	6.98	SLG	0.05%	0.002%	803,572	\$100.37	\$0.074	7.37
HALO	1.60%	0.05%	1,125,888	\$16.21	\$0.021	12.87	HTA	0.06%	0.003%	1,542,950	\$28.57	\$0.013	4.41
IRBT	2.76%	0.07%	906,753	\$79.44	\$0.114	14.03	LHO	0.07%	0.003%	1,633,753	\$30.43	\$0.015	5.08
JWN	1.13%	0.04%	2,630,160	\$49.12	\$0.029	5.96	ETR	0.08%	0.003%	1,375,231	\$79.52	\$0.032	3.97
LSCC	1.27%	0.04%	983,954	\$6.48	\$0.011	16.82	RPAI	0.05%	0.002%	1,794,420	\$12.83	\$0.010	8.10
LYG	1.86%	0.06%	6,256,365	\$3.44	\$0.010	29.36	GGB	0.09%	0.002%	9,702,367	\$3.88	\$0.010	26.36
MMP	1.37%	0.05%	830,180	\$69.21	\$0.060	8.74	AVB	0.08%	0.003%	680,029	\$178.52	\$0.138	7.73
NOK	3.01%	0.08%	14,759,305	\$5.62	\$0.010	17.95	BBD	0.03%	0.001%	11,438,559	\$9.63	\$0.010	10.66
O	1.09%	0.04%	1,910,582	\$56.53	\$0.021	3.69	NI	0.08%	0.003%	3,013,746	\$25.14	\$0.011	4.20
OHI	1.17%	0.04%	2,090,596	\$30.98	\$0.012	3.77	AIV	0.04%	0.002%	1,089,725	\$43.30	\$0.021	4.90

Table 3B: Retail Program Matched Sample CADV >500,000 (2017 - 2018)

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
RCII	1.90%	0.07%	1,785,282	\$11.67	\$0.012	10.61	RLJ	0.04%	0.002%	1,419,592	\$21.45	\$0.012	5.44
SINA	2.01%	0.07%	980,389	\$88.41	\$0.105	11.94	IBN	0.07%	0.002%	7,497,988	\$9.05	\$0.010	11.20
SNE	1.21%	0.04%	983,669	\$44.35	\$0.016	3.55	DRE	0.02%	0.001%	2,533,025	\$27.60	\$0.011	3.89
SPWR	3.72%	0.10%	2,639,031	\$7.70	\$0.011	13.99	FTI	0.11%	0.003%	3,833,234	\$29.62	\$0.010	3.52
STX	1.33%	0.04%	4,569,307	\$45.84	\$0.017	3.69	NBL	0.10%	0.003%	5,080,490	\$30.49	\$0.011	3.66
SYNA	1.26%	0.04%	798,985	\$45.96	\$0.064	14.12	CPT	0.07%	0.003%	589,346	\$87.99	\$0.068	7.76
TERP	0.92%	0.04%	582,896	\$11.83	\$0.015	12.75	HR	0.05%	0.002%	835,377	\$30.63	\$0.017	5.58
UA	2.66%	0.06%	4,079,322	\$17.47	\$0.011	6.29	EQR	0.05%	0.002%	1,868,111	\$64.58	\$0.023	3.62
ULTA	1.29%	0.04%	1,064,638	\$251.09	\$0.229	9.18	BXP	0.06%	0.003%	731,983	\$124.60	\$0.097	7.86
WPC	1.41%	0.05%	521,446	\$65.49	\$0.049	7.57	KRC	0.04%	0.002%	552,027	\$72.00	\$0.060	8.31
X	2.61%	0.04%	13,020,309	\$30.64	\$0.012	4.06	EXC	0.05%	0.002%	5,496,241	\$39.40	\$0.010	2.66
Avg	1.84%	0.05%	3,783,237	\$33.48	\$0.029	13.52	Avg	0.07%	0.00%	3,479,764	\$36.88	\$0.022	7.64

IV. Less Active Stocks (CADV between 50,000 and 500,000) and Post-Period = 2017 - 2018

For this sample, there were 49 matched pairs that emerged from the process. The pairs, along with values of the matching variables (pre-period), are shown as follows:

Table 4A: Retail Program Matched Sample >50,000 and <500,000 CADV (Sep - Nov 2014)

Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AI	380,780	\$26.88	\$0.020	7.45	DSL	361,600	\$21.43	\$0.022	10.36
ANIK	240,282	\$39.38	\$0.089	22.92	WABC	223,670	\$48.09	\$0.083	17.22
APU	310,097	\$45.68	\$0.046	10.16	WST	306,905	\$46.65	\$0.050	10.72
AUDC	153,063	\$4.91	\$0.022	45.54	RVT	191,392	\$14.93	\$0.020	13.56
BLX	130,799	\$32.10	\$0.060	18.85	STC	120,951	\$32.12	\$0.061	19.03
COHU	104,702	\$11.53	\$0.044	38.27	CSGS	157,547	\$26.18	\$0.047	18.17
DBL	78,900	\$23.75	\$0.044	18.48	TRNO	82,554	\$20.20	\$0.053	26.35
DMB	55,155	\$11.99	\$0.023	19.20	CHT	77,541	\$30.23	\$0.032	10.48
DSM	126,484	\$8.06	\$0.014	16.91	FRA	131,349	\$13.84	\$0.013	9.68

Table 4A: Retail Program Matched Sample >50,000 and <500,000 CADV (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
FDUS	68,041	\$17.12	\$0.061	35.44	LION	76,072	\$14.50	\$0.082	57.41
FRSH	132,657	\$9.45	\$0.068	71.68	CBU	127,820	\$35.74	\$0.063	17.62
GAIN	110,718	\$7.34	\$0.015	20.05	EOS	144,318	\$13.72	\$0.015	11.22
GASS	155,935	\$8.44	\$0.028	33.44	CENTA	144,524	\$8.25	\$0.032	39.17
GBDC	188,201	\$16.89	\$0.029	16.92	NCI	176,055	\$14.60	\$0.028	19.24
GLAD	128,184	\$9.02	\$0.026	28.43	TI	159,450	\$11.04	\$0.020	17.79
GMLP	163,282	\$35.15	\$0.146	41.52	UMBF	157,424	\$56.89	\$0.146	25.85
GOOD	112,763	\$17.57	\$0.031	17.67	CPF	114,830	\$18.46	\$0.031	16.70
GSVC	139,253	\$10.14	\$0.034	33.84	NBHC	160,159	\$19.39	\$0.035	18.25
HTGC	341,319	\$15.10	\$0.019	12.93	NFBK	271,599	\$13.78	\$0.019	13.77
IEP	129,299	\$105.09	\$0.255	24.34	LANC	127,008	\$88.16	\$0.207	23.53
KCAP	302,537	\$7.93	\$0.016	19.82	ETJ	306,544	\$11.54	\$0.015	13.14
LRAD	234,963	\$2.87	\$0.020	71.58	MFG	335,904	\$3.60	\$0.010	28.25
MAGS	352,530	\$4.58	\$0.052	114.83	RTRX	445,328	\$10.54	\$0.043	40.96
MAIN	202,931	\$31.39	\$0.039	12.33	MLI	201,430	\$30.24	\$0.039	13.07
MUA	52,623	\$13.29	\$0.023	17.06	GHY	173,681	\$16.48	\$0.020	12.16
MUE	65,631	\$13.24	\$0.017	13.04	ISF	67,500	\$25.39	\$0.019	7.65
NANO	111,903	\$14.88	\$0.051	34.61	MG	120,243	\$18.37	\$0.049	26.63
NDP	93,945	\$24.11	\$0.067	28.08	THR	115,353	\$24.59	\$0.057	23.42
NEP	188,649	\$34.86	\$0.185	53.54	PLXS	171,711	\$38.76	\$0.084	21.71
OIA	93,055	\$6.77	\$0.013	19.36	AWP	257,107	\$6.89	\$0.011	15.68
PBT	145,410	\$12.85	\$0.030	23.84	DAKT	171,820	\$12.89	\$0.031	24.21
PCK	59,924	\$9.45	\$0.024	25.50	ETV	207,431	\$14.89	\$0.019	12.73
PFLT	67,807	\$14.02	\$0.045	31.98	DGRW	66,466	\$29.59	\$0.043	14.58
PFMT	311,460	\$8.16	\$0.025	30.92	FSS	280,570	\$14.16	\$0.024	16.88
PGP	131,368	\$23.08	\$0.086	37.58	EXLS	133,974	\$26.59	\$0.078	29.49
PMF	58,501	\$14.07	\$0.025	17.56	SKYY	66,651	\$27.35	\$0.035	12.85
PMX	73,074	\$10.85	\$0.020	18.60	CII	136,940	\$14.78	\$0.016	11.17
SDLP	456,457	\$28.00	\$0.075	26.78	FUL	468,387	\$42.02	\$0.049	11.58
SHLO	50,103	\$16.93	\$0.107	63.20	UFCS	56,599	\$29.25	\$0.125	42.48
SJT	96,558	\$18.27	\$0.062	34.17	GRAM	92,291	\$14.22	\$0.057	40.66
SLRC	214,437	\$18.95	\$0.025	13.39	PFS	201,034	\$17.16	\$0.023	13.22
SPH	166,532	\$44.68	\$0.092	20.53	CNMD	162,637	\$40.04	\$0.086	21.35
TCPC	332,634	\$16.60	\$0.028	16.75	NFJ	271,825	\$17.73	\$0.027	15.41
TOUR	318,343	\$17.36	\$0.073	42.30	SYKE	253,700	\$21.34	\$0.040	18.74
TS LX	138,306	\$16.95	\$0.043	25.68	FBC	136,538	\$16.29	\$0.038	23.25
VOC	132,226	\$11.27	\$0.041	38.08	CCU	144,842	\$21.38	\$0.044	20.58
WBK	174,452	\$29.49	\$0.034	11.61	IFGL	147,189	\$30.54	\$0.034	11.29

Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
WLDN	180,819	\$13.99	\$0.061	43.65	FTGC	169,252	\$29.57	\$0.057	19.47
WSR	98,234	\$14.57	\$0.031	21.33	SOCL	122,280	\$19.37	\$0.029	15.22
Avg	166,435	\$19.37	\$0.051	29.83	Avg	179,551	\$23.95	\$0.046	19.88

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AI	2.45%	0.06%	458,637	\$11.93	\$0.012	9.87	DSL	0.85%	0.011%	373,997	\$20.14	\$0.015	7.60
ANIK	2.03%	0.06%	123,465	\$46.77	\$0.191	40.89	WABC	0.33%	0.010%	100,762	\$57.73	\$0.231	40.12
APU	3.36%	0.08%	237,312	\$42.89	\$0.077	17.90	WST	0.29%	0.010%	367,026	\$96.31	\$0.129	13.20
AUDC	1.72%	0.06%	117,591	\$7.79	\$0.032	42.65	RVT	0.55%	0.008%	288,150	\$15.18	\$0.017	11.22
BLX	2.13%	0.08%	130,009	\$26.09	\$0.056	21.57	STC	0.16%	0.006%	157,476	\$42.53	\$0.090	21.17
COHU	2.33%	0.09%	284,253	\$20.78	\$0.049	24.11	CSGS	0.10%	0.004%	197,396	\$40.89	\$0.083	20.47
DBL	4.52%	0.07%	74,432	\$22.32	\$0.049	21.63	TRNO	0.11%	0.005%	345,017	\$34.66	\$0.034	10.00
DMB	9.72%	0.07%	58,671	\$12.71	\$0.021	16.46	CHT	0.15%	0.007%	148,554	\$35.08	\$0.025	7.01
DSM	5.07%	0.07%	113,155	\$7.98	\$0.013	16.39	FRA	0.54%	0.010%	163,372	\$14.05	\$0.013	9.26
FDUS	3.45%	0.09%	97,448	\$15.30	\$0.044	28.40	LION	0.26%	0.011%	109,864	\$23.17	\$0.074	32.01
FRSH	3.36%	0.08%	110,611	\$5.09	\$0.044	86.28	CBU	0.23%	0.007%	243,704	\$57.33	\$0.103	18.12
GAIN	3.01%	0.08%	172,450	\$10.23	\$0.019	18.48	EOS	0.66%	0.009%	131,800	\$15.50	\$0.022	14.38
GASS	4.18%	0.06%	57,778	\$3.70	\$0.035	94.13	CENTA	0.16%	0.007%	234,333	\$34.78	\$0.075	21.63
GBDC	3.77%	0.10%	211,753	\$18.77	\$0.023	12.44	NCI	0.22%	0.009%	296,999	\$21.09	\$0.027	13.06
GLAD	2.68%	0.07%	134,680	\$9.33	\$0.020	21.33	TI	0.18%	0.003%	149,165	\$8.43	\$0.020	23.55
GMLP	2.77%	0.08%	357,537	\$19.24	\$0.039	20.40	UMBF	0.32%	0.009%	222,813	\$73.14	\$0.177	24.31
GOOD	2.19%	0.09%	152,848	\$19.98	\$0.037	18.77	CPF	0.21%	0.008%	139,636	\$29.65	\$0.060	20.33
GSVC	6.04%	0.15%	137,911	\$6.04	\$0.030	51.88	NBHC	0.13%	0.005%	139,900	\$34.36	\$0.070	20.52
HTGC	3.95%	0.10%	476,844	\$13.11	\$0.012	9.55	NFBK	0.20%	0.008%	99,333	\$16.56	\$0.047	28.86
IEP	8.34%	0.13%	100,497	\$59.83	\$0.232	38.77	LANC	0.33%	0.010%	105,903	\$134.53	\$0.506	37.19
KCAP	11.65%	0.18%	117,403	\$3.41	\$0.017	49.08	ETJ	0.43%	0.008%	276,325	\$9.37	\$0.013	13.59
LRAD	11.15%	0.13%	60,046	\$2.17	\$0.032	152.85	MFG	0.13%	0.005%	367,028	\$3.57	\$0.010	28.38

Table 4B: Retail Program Matched Sample CADV >50,000 and <500,000 (2017-2018)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
MAGS	6.89%	0.12%	59,713	\$5.48	\$0.055	103.25	RTRX	0.13%	0.005%	334,303	\$23.33	\$0.066	28.37
MAIN	4.44%	0.13%	245,561	\$38.49	\$0.032	8.32	MLI	0.29%	0.010%	207,388	\$31.27	\$0.053	17.02
MUA	12.42%	0.07%	55,118	\$14.03	\$0.027	19.28	GHY	0.50%	0.011%	169,952	\$14.32	\$0.013	9.08
MUE	5.46%	0.06%	63,559	\$12.96	\$0.020	15.65	ISF	1.87%	0.011%	60,764	\$25.70	\$0.024	9.32
NANO	3.12%	0.11%	251,457	\$29.99	\$0.067	22.73	MG	0.12%	0.006%	71,628	\$20.70	\$0.082	40.44
NDP	4.23%	0.07%	75,449	\$13.12	\$0.051	39.75	THR	0.17%	0.008%	123,398	\$21.67	\$0.057	25.99
NEP	3.02%	0.09%	255,681	\$40.17	\$0.093	23.05	PLXS	0.30%	0.010%	174,481	\$57.60	\$0.125	21.74
OIA	16.93%	0.10%	73,578	\$7.67	\$0.017	22.76	AWP	0.69%	0.012%	402,327	\$6.15	\$0.011	17.48
PBT	4.83%	0.10%	100,106	\$8.91	\$0.033	37.49	DAKT	0.20%	0.010%	173,399	\$9.13	\$0.023	25.10
PCK	18.47%	0.07%	71,701	\$9.15	\$0.021	23.21	ETV	0.49%	0.008%	205,388	\$15.31	\$0.016	10.33
PFLT	3.58%	0.11%	197,419	\$13.65	\$0.020	14.98	DGRW	0.09%	0.002%	226,271	\$39.48	\$0.016	3.99
PFMT	8.21%	0.07%	68,953	\$2.11	\$0.054	265.29	FSS	0.24%	0.008%	271,757	\$20.34	\$0.032	15.75
PGP	6.66%	0.07%	65,178	\$15.61	\$0.071	46.24	EXLS	0.26%	0.009%	149,278	\$56.40	\$0.142	24.91
PMF	8.46%	0.07%	79,512	\$13.26	\$0.024	18.20	SKYY	0.42%	0.008%	219,272	\$46.15	\$0.032	7.24
PMX	14.86%	0.06%	65,449	\$11.50	\$0.019	16.19	CII	0.61%	0.010%	130,256	\$15.59	\$0.018	11.60
SDLP	6.34%	0.09%	377,760	\$3.42	\$0.017	50.24	FUL	0.31%	0.012%	362,459	\$51.90	\$0.062	12.11
SHLO	1.77%	0.06%	135,927	\$9.68	\$0.058	60.99	UFCS	0.36%	0.012%	76,492	\$47.53	\$0.233	48.58
SJT	5.54%	0.10%	186,679	\$6.96	\$0.028	40.45	GRAM	0.41%	0.008%	236,863	\$3.44	\$0.044	134.58
SLRC	2.38%	0.09%	103,705	\$21.28	\$0.040	18.90	PFS	0.18%	0.007%	184,245	\$25.94	\$0.043	16.64
SPH	5.60%	0.15%	279,196	\$24.42	\$0.046	18.83	CNMD	0.36%	0.012%	154,890	\$58.57	\$0.184	31.64
TCPC	4.35%	0.11%	227,052	\$15.54	\$0.019	11.89	NFJ	0.46%	0.007%	264,566	\$12.95	\$0.014	10.78
TOUR	1.30%	0.07%	200,307	\$7.59	\$0.031	43.03	SYKE	0.17%	0.007%	155,555	\$29.58	\$0.075	25.34
TSLX	2.64%	0.08%	244,727	\$19.71	\$0.022	11.23	FBC	0.23%	0.008%	249,281	\$32.55	\$0.052	16.08
VOC	12.82%	0.11%	56,733	\$4.58	\$0.042	92.38	CCU	0.17%	0.008%	182,729	\$26.46	\$0.053	19.89
WBK	1.96%	0.07%	265,250	\$23.11	\$0.017	7.36	IFGL	0.04%	0.001%	110,807	\$28.91	\$0.028	9.67
WLDN	3.13%	0.10%	91,458	\$29.62	\$0.155	52.79	FTGC	0.35%	0.007%	92,367	\$20.22	\$0.031	15.42
WSR	1.66%	0.07%	363,836	\$12.96	\$0.019	15.03	SOCL	0.55%	0.011%	63,186	\$31.00	\$0.075	24.28
Avg	5.53%	0.09%	164,212	\$16.33	\$0.045	39.05	Avg	0.34%	0.008%	198,201	\$32.45	\$0.070	21.82

2. Economic Impact of the BX RPI Program on Execution Quality

To assess the execution quality of the Program, BX focused on symbol-day combinations when during market hours: (i) an RMO execution occurred on BX, (ii) a non-RMO execution occurred on BX, and (iii) a tape-eligible trade occurred on BX. Symbol day combinations are aggregated to overall daily statistics by either a simple average or by volume weighting by RMO executed volume during market hours.²⁴ This results in the number and identity of symbols captured in each daily average changing from day to day. Using this data, the Exchange examined whether the economic outcomes for RMO trades differs from non-RMO trades and/or all trades.

When comparing average price improvement for RMO and non-RMO executions for a subset of 100 stocks with the largest number of RMO shares executed, the price improvement seen in RMO and non-RMO trades is comparable over the life of the Program. When volume weighting the average price improvement by RMO volume to emphasize those stock/day combinations with the highest volume traded in RMO, average price improvement on BX for both RMO and non-RMO trades appear generally comparable over time, with RMO price improvement generally beating non-RMO. Note that this price improvement measure does not take rebates into account.

In the subset of active RMO symbols, RMO volume-weighted effective and realized spreads for RMO and all executions, which includes RMO executions, are generally comparable throughout the duration of the Program.

Similar to regular, liquidity-taking orders on BX, the Program offers inverted

²⁴ Both RMO and non-RMO execution quality values are weighted by RMO volume and a very small number of extreme outlier symbol-day stats have been removed from the analysis.

pricing where RMO orders receive a rebate (on top of the price improvement they receive) when executing against RPI liquidity, while there is a fee associated with RPI orders which post non-displayed, price-improving liquidity. RPI orders are charged \$0.0025 per share. Retail Orders currently receive a rebate of \$0.0021 per share when executing against RPI liquidity, a rebate of \$0.0000 per share when executing against other hidden, price-improving liquidity, and a rebate of \$0.0017 per share when executing against other displayed liquidity on the BX book.

3. Are only Eligible Participants Accessing Program Liquidity

Only RMOs that have been approved by BX can enter RMO orders that access the Program liquidity, and the System does not allow non-RMO orders to access RPI providing orders. The System does not allow non-RMO orders to access RPI providing orders. BX Rule 4780(c) enables BX at its sole discretion to disqualify RMO members that submit orders that fail to meet any of the requirements of the rule.

4. Is the Program Attracting Retail Participation

The Program has attracted some retail orders to the Exchange and participation in the Program has continued to increase over time. The Exchange believes that the Program provided tangible price improvement and transparency to retail investors through a competitive pricing process.

Brokers route retail orders to a wide range of different trading systems. The Program offers a transparent and well-regulated option providing competition and price improvement. BX believes that it has achieved its goal of attracting retail order flow to BX and, as stated above, it has resulted in a significant price improvement to retail investors through a competitive pricing process. The Exchange also has not detected any negative impact to market quality or to retail investors as the Program has continued to

grow over time.

On average, an RMO execution continues to get more price improvement than the minimum \$0.001 price improvement required of an RPI liquidity-providing order in the Program, and over time the price improvement seen on BX in non-RMO orders does not appear to be negatively impacted by the introduction of the Program.

5. Net Benefits of the Program on Participants

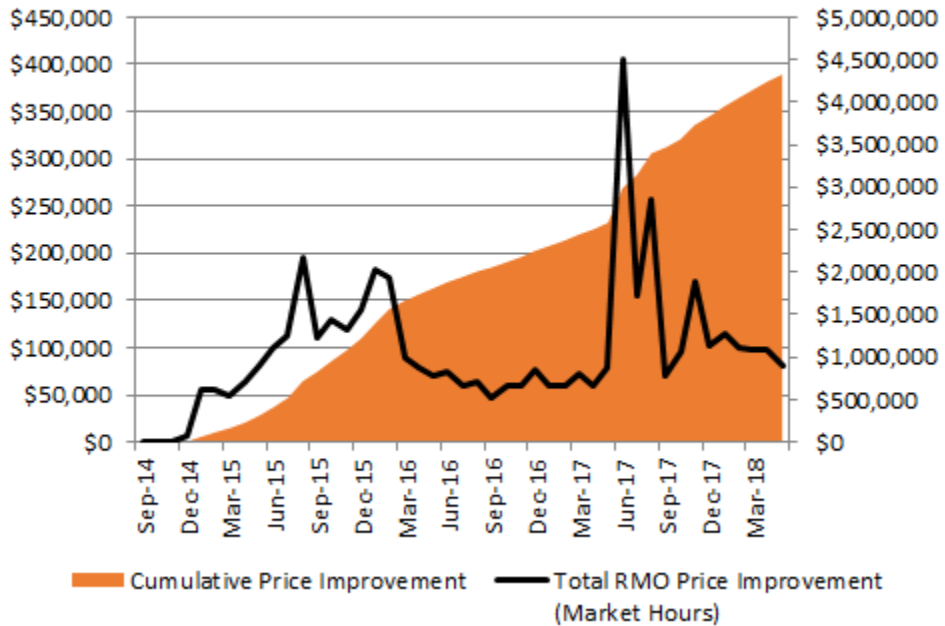
The Exchange believes that the Program through retail order segmentation does create greater retail order flow competition and thereby increases the amount of this flow to BX. This helps to ensure that retail investors benefit from the price improvement that liquidity providers are willing to provide. The Program promotes competition for retail order flow by allowing Exchange members to submit RPI Orders to interact with Retail Orders. Such competition promotes efficiency by facilitating the price discovery process and generating additional investor interest in trading securities, thereby promoting capital formation.

The Program also promotes competition for retail order flow among execution venues, and this benefits retail investors by creating additional price improvement opportunities for marketable retail order flow, most of which is currently executed in the OTC markets without ever reaching a public exchange. The Exchange believes that it has achieved its goal of attracting retail order flow to BX, and has resulted in price improvement to retail investors through a competitive pricing process. The data also demonstrates that the Program has continued to grow over time and the Exchange has not detected any negative impact to market quality or to retail investors.

The price improvement chart below demonstrates retail firms have received price improvement through their use of the Program that they otherwise may not have received.

This is a net benefit to the retail firms as well as the firms who are able to compete to interact with the retail firms.

Monthly and Cumulative Price Improvement



6. Overall Success in Achieving Intended Benefits

The Program has demonstrated the effectiveness of a transparent, on-exchange retail order price improvement functionality, and while small relative to total consolidated volume, has achieved its goals of attracting retail order flow and providing those orders with price improvement totaling tens of thousands of dollars each month.

The Program provides additional competition to the handling of retail orders. The added opportunity for price improvement provides pressure on other more established venues to increase the price improvement that they provide. By doing this, the Exchange believes that the Program may have a greater positive effect than the market share would directly indicate.

Can the Program be Improved

The Program provides a transparent, well-regulated, and competitive venue for retail orders to receive price improvement. The size of the Program is somewhat limited by the rules that prevent BX from matching features offered by non-exchange trading venues. Nonetheless, the Exchange believes the Program is worthwhile and it will continue to look for ways to further innovate and improve the Program. The Exchange believes that making the pilot permanent is appropriate and through this filing seeks to make permanent the current operation of the Program.

Conclusion

In conclusion, the Exchange notes the Program provided opportunities for retail investors to get significant price improvement on an exchange where they otherwise would not have had the opportunity to do so. The Exchange believes the Program did not have a negative impact on the market quality as evidenced by the lack of consistent statistical evidence of an impact and the small size of the Program.

Accordingly, the Exchange believes that the pilot Program's rules, as amended, should be made permanent. Additionally, the Exchange notes that the proposed change is not otherwise intended to address any other issues and the Exchange is not aware of any problems that member organizations would have in complying with the proposed rule change.

b. Statutory Basis

The Exchange believes that the proposed rule change is consistent with the

provisions of Section 6 of the Act,²⁵ in general, and with Section 6(b)(5) of the Act,²⁶ 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 and not to permit unfair discrimination between customers, issuers, brokers, or dealers.

The Exchange believes that making the pilot Program permanent is consistent with these principles because the Program is reasonably designed to attract retail order flow to the exchange environment, while helping to ensure that retail investors benefit from the better price that liquidity providers are willing to give their orders. During the pilot period, BX has provided data and analysis to the Commission, and this data and analysis, as well as the further analysis in this filing, shows that the Program has operated as intended and is consistent with the Act. The data and analysis provided to the Commission staff demonstrates that the Program provided tangible price improvement to retail investors through a competitive pricing process unavailable in non-exchange venues and otherwise had an insignificant impact on the marketplace. Making the Program permanent would encourage the additional utilization of, and interaction with, the Exchange and provide retail customers with an additional venue for price discovery, liquidity, competitive quotes, and price improvement.

Additionally, the Exchange believes the proposed rule change is designed to facilitate transactions in securities and to remove impediments to, and perfect the mechanisms of, a free and open market and a national market system because the

²⁵ 15 U.S.C. 78f.

²⁶ 15 U.S.C. 78f(b)(5).

competition promoted by the Program facilitates the price discovery process and potentially generate additional investor interest in trading securities. Making the pilot Program permanent will allow the Exchange to continue to provide the Program's benefits to retail investors on a permanent basis and maintain the improvements to public price discovery and the broader market structure. The data provided by BX to the SEC staff demonstrates that the Program provided tangible price improvement and transparency to retail investors through a competitive pricing process.

For the reasons stated above, the Exchange believes that making the Program permanent would promote just and equitable principles of trade and remove impediments to and perfect the mechanism of a free and open market.

As described below in BX's statement regarding the burden on competition, the Exchange also believes that it is subject to significant competitive forces and it would increase competition among execution venues, encourage additional liquidity, and offer the potential for price improvement to retail investors.

For all of these reasons, the Exchange believes that the proposal is consistent with the Act.

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

The Exchange 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, as amended. BX believes that making the Program permanent would continue to enhance competition for retail order flow among execution venues and contribute to the public price discovery process.

The Exchange believes that the data supplied to the Commission and experience gained over the life of the pilot have demonstrated that the Program creates price

improvement opportunities for retail orders that are equal to what would be provided under OTC internalization arrangements, thereby benefiting retail investors and increasing competition between execution venues. BX also believes that making the Program permanent will promote competition between execution venues operating their own retail liquidity programs. Such competition will lead to innovation within the market, thereby increasing the quality of the national market system.

Additionally, the Exchange notes that it operates in a highly competitive market in which market participants can easily direct their orders to competing venues, including off-exchange venues. In such an environment, the Exchange must continually review, and consider adjusting the services it offers and the requirements, it imposes to remain competitive with other U.S. equity exchanges.

For the reasons described above, BX believes that the proposed rule change reflects this competitive environment.

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

No written comments were either solicited or received.

6. Extension of Time Period for Commission Action

The Exchange does not consent to an extension of the time period for Commission action

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 Rules of Another Self-Regulatory Organization or of the Commission

Not applicable.

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

1. Notice of proposed rule for publication in the Federal Register.

5. Text of Proposed Rule Change.

EXHIBIT 1

SECURITIES AND EXCHANGE COMMISSION
(Release No. _____ ; File No. SR-BX-2019-011)

April __, 2019

Self-Regulatory Organizations; Nasdaq BX, Inc.; Notice of Filing of Proposed Rule Change to Make Permanent the Pilot Program for the Exchanges Retail Price Improvement Program

Pursuant to Section 19(b)(1) of the Securities Exchange Act of 1934 (“Act”)¹, and Rule 19b-4 thereunder,² notice is hereby given that on April 26, 2019, Nasdaq BX, Inc. (“BX” or “Exchange”) filed with the Securities and Exchange Commission (“SEC” or “Commission”) the proposed rule change as described in Items I, II, and III, below, which Items have been prepared by the Exchange. 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

The Exchange proposes to make permanent the pilot program for the Exchange’s Retail Price Improvement (“RPI”) Program (the “Program” or “BX RPI Program”), which is set to expire the earlier of approval of the filing to make this rule permanent or June 30, 2019

The text of the proposed rule change is available on the Exchange’s Website at <http://nasdaqbx.cchwallstreet.com/>, at the principal office of the Exchange, and at the Commission’s Public Reference Room.

¹ 15 U.S.C. 78s(b)(1).

² 17 CFR 240.19b-4.

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

In its filing with the Commission, the Exchange 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 Exchange 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 Exchange proposes to make permanent the Exchange's pilot RPI Program,³ currently scheduled to expire the earlier of approval of the filing to make this rule permanent or June 30, 2019.

Background

In November 2014, the Commission approved the RPI Program on a pilot basis.⁴ The Program is designed to attract retail order flow to the Exchange, and allow such order flow to receive potential price improvement. The Program is currently limited to

³ Securities Exchange Act Release No. 73702 (November 28, 2014), 79 FR 72049 (December 4, 2014) (SR-BX-2014-048) ("RPI Approval Order"). In addition to approving the RPI Program on a pilot basis, the Commission granted the Exchange's request for exemptive relief from Rule 612 of Regulation NMS, 17 CFR 242.612 ("Sub-Penny Rule"), which among other things prohibits a national securities exchange from accepting or ranking orders priced greater than \$1.00 per share in an increment smaller than \$0.01. See id. As part of this filing, and pursuant to the Exchange's separate written request, the Exchange also requests that the exemptive relief from the Sub-Penny Rule be made permanent. See Letter from Jeffrey S. Davis, Vice President and Deputy General Counsel, Nasdaq BX, Inc. to Eduardo A. Aleman, Deputy Secretary, Securities and Exchange Commission dated April 26, 2019.

⁴ See id.

trades occurring at prices equal to or greater than \$1.00 per share. Under the Program, a class of market participant called a Retail Member Organization (“RMO”) is eligible to submit certain retail order flow (“Retail Orders”)⁵ to the Exchange. BX members (“Members”) are permitted to provide potential price improvement for Retail Orders in the form of non-displayed interest that is priced more aggressively than the Protected National Best Bid or Offer (“Protected NBBO”).⁶

The Program was approved by the Commission on a pilot basis running one-year from the date of implementation.⁷ The Commission approved the Program on November 28, 2014.⁸ The Exchange implemented the Program on December 1, 2014 and the pilot has since been extended for a one-year period twice, as well as for a six-month period twice, with it now scheduled to expire the earlier of approval of the filing to make this

⁵ A “Retail Order” is defined in BX Rule 4780(a)(2) by referencing BX Rule 4702, and BX Rule 4702(b)(6) says it is an order type with a non-display order attribute submitted to the Exchange by an RMO. A Retail Order must be an agency order, or riskless principal order that satisfies the criteria of FINRA Rule 5320.03. The Retail Order must reflect trading interest of a natural person with no change made to the terms of the underlying order of the natural person with respect to price (except in the case of a market order that is changed to a marketable limit order) or side of market and that does not originate from a trading algorithm or any other computerized methodology.

⁶ The term Protected Quotation is defined in Chapter XII, Sec. 1(19) and has the same meaning as is set forth in Regulation NMS Rule 600(b)(58). The Protected NBBO is the best-priced protected bid and offer. Generally, the Protected NBBO and the national best bid and offer (“NBBO”) will be the same. However, a market center is not required to route to the NBBO if that market center is subject to an exception under Regulation NMS Rule 611(b)(1) or if such NBBO is otherwise not available for an automatic execution. In such case, the Protected NBBO would be the best-priced protected bid or offer to which a market center must route interest pursuant to Regulation NMS Rule 611.

⁷ See RPI Approval Order, supra note 3 at 72053.

⁸ Id. at 72049.

rule permanent or June 30, 2019.⁹

Specifically, BX Rule 4780 will be amended to delete 4780(h) that says the Program is a pilot and that it is scheduled to expire the earlier of approval of the filing to make this rule permanent or June 30, 2019. BX Rule 4780(g) will be amended to include at the end of the subsection that the Program will be limited to securities whose Bid Price on the Exchange is greater than or equal to \$1.00 per share.

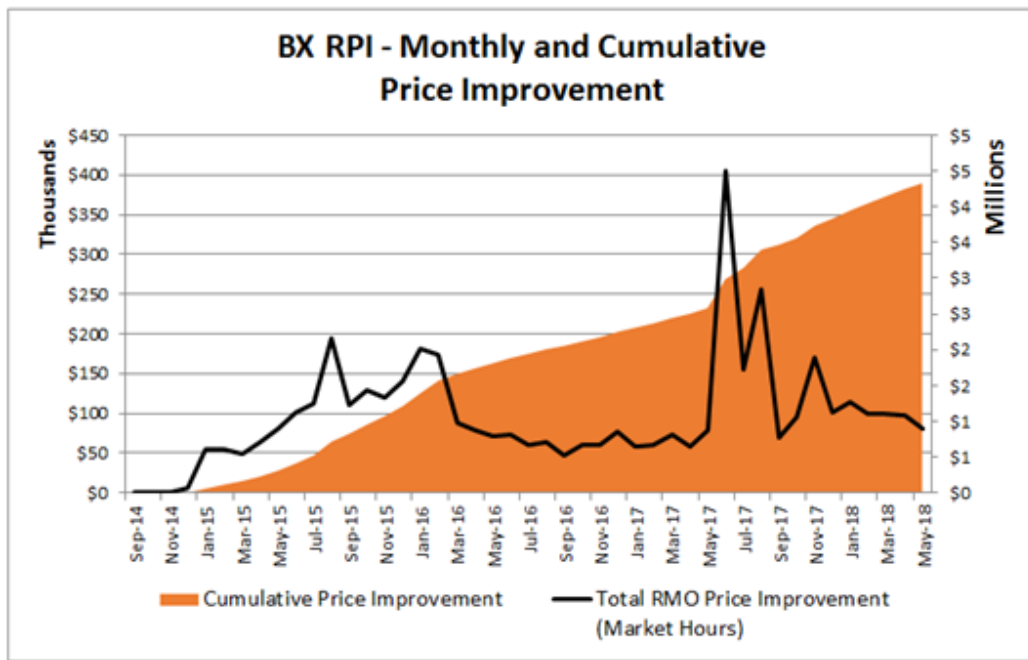
The SEC approved the Program pilot, in part, because it concluded, “the Program is reasonably designed to benefit retail investors by providing price improvement to retail order flow.”¹⁰ The Commission also found that “while the Program would treat retail order flow differently from order flow submitted by other market participants, such segmentation would not be inconsistent with Section 6(b)(5) of the Act, which requires that the rules of an exchange are not designed to permit unfair discrimination.”¹¹ As the SEC acknowledged, the retail order segmentation was designed to create greater retail order flow competition and thereby increase the amount of this flow to transparent and well-regulated exchanges. This would help to ensure that retail investors benefit from competitive price improvement that exchange-based liquidity providers provide.

⁹ See Securities Exchange Act Release No. 76490 (November 20, 2015), 80 FR 74165 (November 27, 2015) (SR-BX-2015-073); Securities Exchange Act Release No. 79446 (December 1, 2016), 81 FR 88290 (December 7, 2016) (SR-BX-2016-065); Securities Exchange Act Release No. 82192 (December 1, 2017), 82 FR 57809 (December 7, 2017) (SR-BX-2017-055); Securities Exchange Act Release No. 83539 (June 28, 2018), 83 FR 31203 (July 3, 2018) (SR-BX-2018-026); and Securities Exchange Act Release No. 84847 (Dec. 18, 2018), 83 FR 66326 (Dec. 26, 2018) (SR-BX-2018-063).

¹⁰ See RPI Approval Order, supra note 3 at 72051.

¹¹ Id.

As discussed below, the Exchange believes that the Program supports these conclusions. The Program does not harm retail investors. In fact, so far it has provided price improvement of more than \$4 million since inception to retail investors that they may not otherwise have received. As a result, the Exchange believes that it is therefore appropriate to make the pilot Program permanent.



Definitions

The Exchange adopted the following definitions under BX Rule 4780. First, the term “Retail Member Organization” (or “RMO”) is defined as a Member (or a division thereof) that has been approved by the Exchange to submit Retail Orders.

Second, the term “Retail Order” is defined by BX Rule 4702(b)(6)(A) as an order type with a non-display order attribute submitted to the Exchange by an RMO. A Retail Order must be an agency Order, or riskless principal Order that satisfies the criteria of FINRA Rule 5320.03. The Retail Order must reflect trading interest of a natural person

with no change made to the terms of the underlying order of the natural person with respect to price (except in the case of a market order that is changed to a marketable limit order) or side of market and that does not originate from a trading algorithm or any other computerized methodology.¹²

The criteria set forth in FINRA Rule 5320.03 adds additional precision to the definition of “Retail Order” by clarifying that an RMO may enter Retail Orders on a riskless principal basis, provided that (i) the entry of such riskless principal orders meet the requirements of FINRA Rule 5320.03, including that the RMO maintains supervisory systems to reconstruct, in a time-sequenced manner, all Retail Orders that are entered on a riskless principal basis; and (ii) the RMO submits a report, contemporaneously with the execution of the facilitated order, that identifies the trade as riskless principal.

The term “Retail Price Improving Order” or “RPI Order” or collectively “RPI interest” is defined as an Order Type with a Non- Display Order Attribute that is held on the Exchange Book in order to provide liquidity at a price at least \$0.001 better than the NBBO through a special execution process described in Rule 4780. An RPI Order may be entered in price increments of \$0.001. An RPI Order will be posted to the Exchange Book regardless of its price, but an RPI Order may execute only against a Retail Order, and only if its price is at least \$0.001 better than the NBBO.¹³ RPI orders can be priced

¹² See supra note 5.

¹³ Exchange systems prevent Retail Orders from interacting with RPI Orders if the RPI Order is not priced at least \$0.001 better than the Protected NBBO. The Exchange notes, however, that price improvement of \$0.001 would be a minimum requirement and Members can enter RPI Orders that better the Protected NBBO by more than \$0.001. Exchange systems accept RPI Orders without a minimum price improvement value; however, such interest execute at its floor or ceiling price only if such floor or ceiling price is better than the Protected NBBO by \$0.001 or more.

either as an explicitly priced limit order or implicitly priced as relative to the NBBO with an offset of at least \$0.001.

The price of an RPI Order with an offset is determined by a Member's entry of the following into the Exchange: (1) RPI buy or sell interest; (2) an offset from the Protected NBBO, if any; and (3) a ceiling or floor price. RPI Orders submitted with an offset are similar to other peg orders available to Members in that the order is tied or "pegged" to a certain price, and would have its price automatically set and adjusted upon changes in the Protected NBBO, both upon entry and any time thereafter. RPI sell or buy interest typically are entered to track the Protected NBBO, that is, RPI Orders typically are submitted with an offset. The offset is a predetermined amount by which the Member is willing to improve the Protected NBBO, subject to a ceiling or floor price. The ceiling or floor price is the amount above or below which the Member does not wish to trade. RPI Orders in their entirety (the buy or sell interest, the offset, and the ceiling or floor) will remain non-displayed. The Exchange also allows Members to enter RPI Orders that establish the exact limit price, which is similar to a non-displayed limit order currently accepted by the Exchange except the Exchange accepts sub-penny limit prices on RPI Orders in increments of \$0.001. The Exchange monitors whether RPI buy or sell interest, adjusted by any offset and subject to the ceiling or floor price, is eligible to interact with incoming Retail Orders.

Members and RMOs may enter odd lots, round lots or mixed lots as RPI Orders and as Retail Orders respectively. As discussed below, RPI Orders are ranked and allocated according to price and time of entry into the BX trading system ("System") consistent with BX Rule 4757 and therefore without regard to whether the size entered is

an odd lot, round lot or mixed lot amount. Similarly, Retail Orders interact with RPI Orders and other price-improving orders available on the Exchange (*e.g.*, non-displayed liquidity priced more aggressively than the NBBO)¹⁴ according to the Priority and Allocation rules of the Program and without regard to whether they are odd lots, round lots or mixed lots. Finally, Retail Orders are designated as Type 1 or Type 2 without regard to the size of the order.

RPI Orders interact with Retail Orders as follows. Assume a Member enters RPI sell interest with an offset of \$0.001 and a floor of \$10.10 while the Protected NBO is \$10.11. The RPI Order could interact with an incoming buy Retail Order at \$10.109. If, however, the Protected NBO was \$10.10, the RPI Order could not interact with the Retail Order because the price required to deliver the minimum \$0.001 price improvement (\$10.099) would violate the Member's floor of \$10.10. If a Member otherwise enters an offset greater than the minimum required price improvement and the offset would produce a price that would violate the Member's floor, the offset would be applied only to the extent that it respects the Member's floor. By way of illustration, assume RPI buy interest is entered with an offset of \$0.005 and a ceiling of \$10.112 while the Protected NBBO is at \$10.11. The RPI Order could interact with an incoming sell Retail Order at \$10.112, because it would produce the required price improvement without violating the

¹⁴ Other price improving liquidity may include, but is not limited to: booked non-displayed orders with a limit price that is more aggressive than the then-current NBBO; midpoint-pegged orders (which are by definition non-displayed and priced more aggressively than the NBBO); non-displayed orders pegged to the NBBO with an aggressive offset, as defined in BX Rule 4780(a)(4) as Other Price Improving Contra-Side Interest. Orders that do not constitute other price improving liquidity include, but are not limited to: orders with a time-in-force instruction of IOC; displayed orders; limit orders priced less aggressively than the NBBO.

Member's ceiling, but it could not interact above the \$10.112 ceiling. Finally, if a Member enters an RPI Order without an offset (*i.e.*, an explicitly priced limit order), the RPI Order will interact with Retail Orders at the level of the Member's limit price as long as the minimum required price improvement is produced. Accordingly, if RPI sell interest is entered with a limit price of \$10.098 and no offset while the Protected NBBO is \$10.11, the RPI Order could interact with the Retail Order at \$10.098, producing \$0.012 of price improvement. The System will not cancel RPI interest when it is not eligible to interact with incoming Retail Orders; such RPI interest will remain in the System and may become eligible again to interact with Retail Orders depending on the Protected NBBO. RPI Orders are not accepted during halts.

RMO Qualifications and Approval Process

Under BX Rule 4780(b), any Member may qualify as an RMO if it conducts a retail business or routes retail orders on behalf of another broker-dealer. For purposes of BX Rule 4780, conducting a retail business shall include carrying retail customer accounts on a fully disclosed basis. Any Member that wishes to obtain RMO status is required to submit: (i) an application form; (ii) supporting documentation sufficient to demonstrate the retail nature and characteristics of the applicant's order flow¹⁵ and (iii) an attestation, in a form prescribed by the Exchange, that substantially all orders submitted by the Member as a Retail Order would meet the qualifications for such orders under proposed BX Rule 4780(b). The Exchange shall notify the applicant of its decision in

¹⁵ For example, a prospective RMO could be required to provide sample marketing literature, website screenshots, other publicly disclosed materials describing the retail nature of their order flow, and such other documentation and information as the Exchange may require to obtain reasonable assurance that the applicant's order flow would meet the requirements of the Retail Order definition.

writing.

An RMO is required to have written policies and procedures reasonably designed to assure that it will only designate orders as Retail Orders if all requirements of a Retail Order are met. Such written policies and procedures must require the Member to (i) exercise due diligence before entering a Retail Order to assure that entry as a Retail Order is in compliance with the requirements of this rule, and (ii) monitor whether orders entered as Retail Orders meet the applicable requirements. If the RMO represents Retail Orders from another broker-dealer customer, the RMO's supervisory procedures must be reasonably designed to assure that the orders it receives from such broker-dealer customer that it designates as Retail Orders meet the definition of a Retail Order. The RMO must (i) obtain an annual written representation, in a form acceptable to the Exchange, from each broker-dealer customer that sends it orders to be designated as Retail Orders that entry of such orders as Retail Orders will be in compliance with the requirements of this rule, and (ii) monitor whether its broker-dealer customers' Retail Order flow continues to meet the applicable requirements.¹⁶

If the Exchange disapproves the application, the Exchange provides a written notice to the Member. The disapproved applicant could appeal the disapproval by the Exchange as provided in proposed BX Rule 4780(d), and/or reapply for RMO status 90 days after the disapproval notice is issued by the Exchange. An RMO also could voluntarily withdraw from such status at any time by giving written notice to the Exchange.

¹⁶ The Exchange or another self-regulatory organization on behalf of the Exchange will review an RMO's compliance with these requirements through an exam based review of the RMO's internal controls.

Failure of RMO to Abide by Retail Order Requirements

BX Rule 4780(c) addresses an RMO's failure to abide by Retail Order requirements. If an RMO designates orders submitted to the Exchange as Retail Orders and the Exchange determines, in its sole discretion, that those orders fail to meet any of the requirements of Retail Orders, the Exchange may disqualify a Member from its status as an RMO. When disqualification determinations are made, the Exchange provides a written disqualification notice to the Member. A disqualified RMO may appeal the disqualification as provided in proposed BX Rule 4780(d) and/or reapply for RMO status 90 days after the disqualification notice is issued by the Exchange.

Appeal of Disapproval or Disqualification

BX Rule 4780(d) provides appeal rights to Members. If a Member disputes the Exchange's decision to disapprove it as an RMO under BX Rule 4780(b) or disqualify it under BX Rule 4780(c), such Member ("appellant") may request, within five business days after notice of the decision is issued by the Exchange, that the Retail Price Improvement Program Panel ("RPI Panel") review the decision to determine if it was correct.

The RPI Panel consists of the Exchange's Chief Regulatory Officer ("CRO"), or a designee of the CRO, and two officers of the Exchange designated by the Chief Executive Officer of BX. The RPI Panel reviews the facts and render a decision within the time frame prescribed by the Exchange. The RPI Panel may overturn or modify an action taken by the Exchange and all determinations by the RPI Panel constitute final action by the Exchange on the matter at issue.

Retail Liquidity Identifier

Under BX Rule 4780(e), the Exchange disseminates an identifier when RPI

interest priced at least \$0.001 better than the Exchange's Protected Bid or Protected Offer for a particular security is available in the System ("Retail Liquidity Identifier"). The Retail Liquidity Identifier is disseminated through consolidated data streams (*i.e.*, pursuant to the Consolidated Tape Association Plan/Consolidated Quotation System, or CTA/CQS, for Tape A and Tape B securities, and The Nasdaq Stock Market, LLC ("Nasdaq") UTP Plan for Tape C securities) as well as through proprietary Exchange data feeds.¹⁷ The Retail Liquidity Identifier reflects the symbol and the side (buy or sell) of the RPI interest, but does not include the price or size of the RPI interest. In particular, CQS and UTP quoting outputs include a field for codes related to the Retail Liquidity Identifier. The codes indicate RPI interest that is priced better than the Exchange's Protected Bid or Protected Offer by at least the minimum level of price improvement as required by the Program.

Retail Order Designations

Under BX Rule 4780(f), an RMO can designate how a Retail Order interacts with available contra-side interest as provided in Rule 4702.

A Type 1-designated Retail Order will attempt to execute against RPI Orders and any other orders on the Exchange Book with a price that is (i) equal to or better than the price of the Type-1 Retail Order and (ii) at least \$0.001 better than the NBBO. A Type-1 Retail Order is not routable and will thereafter be cancelled.

A Type 2-designated Retail Order will first attempt to execute against RPI Orders

¹⁷ The Exchange notes that the Retail Liquidity Identifier for Tape A and Tape B securities are disseminated pursuant to the CTA/CQS Plan. The identifier is also available through the consolidated public market data stream for Tape C securities. The processor for the Nasdaq UTP quotation stream disseminates the Retail Liquidity Identifier and analogous identifiers from other market centers that operate programs similar to the RPI Program.

and any other orders on the Exchange Book with a price that is (i) equal to or better than the price of the Type-2 Retail Order and (ii) at least \$0.001 better than the NBBO and will then attempt to execute against any other order on the Exchange Book with a price that is equal to or better than the price of the Type-2 Retail Order, unless such executions would trade through a Protected Quotation. A Type-2 Retail Order may be designated as routable.

Priority and Order Allocation

Under BX Rule 4780(g), competing RPI Orders in the same security are ranked and allocated according to price then time of entry into the System. Executions occur in price/time priority in accordance with BX Rule 4757. Any remaining unexecuted RPI interest remain available to interact with other incoming Retail Orders if such interest is at an eligible price. Any remaining unexecuted portion of the Retail Order will cancel or execute in accordance with BX Rule 4780(f). The following example illustrates this method:

- Protected NBBO for security ABC is \$10.00 — \$10.05
- Member 1 enters an RPI Order to buy ABC at \$10.015 for 500
- Member 2 then enters an RPI Order to buy ABC at \$10.02 for 500
- Member 3 then enters an RPI Order to buy ABC at \$10.035 for 500

An incoming Retail Order to sell 1,000 shares of ABC for \$10.00 executes first against Member 3's bid for 500 at \$10.035, because it is the best-priced bid, then against Member 2's bid for 500 at \$10.02, because it is the next best-priced bid. Member 1 is not filled because the entire size of the Retail Order to sell 1,000 is depleted. The Retail Order executes against RPI Orders in price/time priority.

However, assume the same facts above, except that Member 2's RPI Order to buy ABC at \$10.02 is for 100. The incoming Retail Order to sell 1,000 executes first against

Member 3's bid for 500 at \$10.035, because it is the best-priced bid, then against Member 2's bid for 100 at \$10.02, because it is the next best-priced bid. Member 1 then receives an execution for 400 of its bid for 500 at \$10.015, at which point the entire size of the Retail Order to sell 1,000 is depleted.

As a final example, assume the same facts as above, except that Member 3's order was not an RPI Order to buy ABC at \$10.035, but rather, a non-displayed order to buy ABC at \$10.03. The result would be similar to the result immediately above, in that the incoming Retail Order to sell 1,000 executes first against Member 3's bid for 500 at \$10.03, because it is the best-priced bid, then against Member 2's bid for 100 at \$10.02, because it is the next best priced bid. Member 1 then receives an execution for 400 of its bid for 500 at \$10.015, at which point the entire size of the Retail Order to sell 1,000 is depleted.

All Regulation NMS securities traded on the Exchange are eligible for inclusion in the RPI Program. The Exchange limits the Program to trades occurring at prices equal to or greater than \$1.00 per share. Toward that end, Exchange trade validation systems prevent the interaction of RPI buy or sell interest (adjusted by any offset) and Retail Orders at a price below \$1.00 per share.¹⁸ For example, if there is RPI buy interest tracking the Protected NBB at \$0.99 with an offset of \$0.001 and a ceiling of \$1.02, Exchange trade validation systems would prevent the execution of the RPI Order at \$0.991 with a sell Retail Order with a limit of \$0.99. However, if the Retail Order was

¹⁸ As discussed above, the price of an RPI is determined by a Member's entry of buy or sell interest, an offset (if any) and a ceiling or floor price. RPI sell or buy interest typically tracks the Protected NBBO.

Type 2 as defined the Program,¹⁹ it would be able to interact at \$0.99 with liquidity outside the Program in the Exchange's order book. In addition to facilitating an orderly²⁰ and operationally intuitive program, the Exchange believes that limiting the Program to trades equal to or greater than \$1.00 per share enabled it better to focus its efforts to monitor price competition and to assess any indications that data disseminated under the Program is potentially disadvantaging retail orders. As part of that review, the Exchange produced data throughout the pilot, which included statistics about participation, the frequency and level of price improvement provided by the Program, and any effects on the broader market structure.

Rationale for Making the Program Pilot Permanent

The Exchange established the RPI Program in an attempt to attract retail order flow to the Exchange by providing an opportunity price improvement to such order flow. The Exchange believes that the Program promotes transparent competition for retail order flow by allowing Exchange members to submit RPI Orders²¹ to interact with Retail

¹⁹ Type 2 Retail Orders are treated as IOC orders that execute against displayed and non-displayed liquidity in the Exchange's order book where there is no available liquidity in the Program. Type 2 Retail Orders can either be designated as eligible for routing or as non-routable, as described above.

²⁰ Given the proposed limitation, the Program would have no impact on the minimum pricing increment for orders priced less than \$1.00 and therefore no effect on the potential of markets executing those orders to lock or cross. In addition, the non-displayed nature of the liquidity in the Program simply has no potential to disrupt displayed, protected quotes. In any event, the Program would do nothing to change the obligation of exchanges to avoid and reconcile locked and crossed markets under NMS Rule 610(d).

²¹ A Retail Price Improvement Order is defined in BX Rule 4780(a)(3) by referencing BX Rule 4702 and BX Rule 4702(b)(5) says that it is as an order type with a non-display order attribute that is held on the Exchange Book in order to provide liquidity at a price at least \$0.001 better than the NBBO through a special execution process described in Rule 4780.

Orders. BX also believes that such competition promotes efficiency by facilitating the price discovery process and generating additional investor interest in trading securities, thereby promoting capital formation and retail investment opportunities. The Program will continue to be limited to trades occurring at prices equal to or greater than \$1.00 per share.

The Exchange believes, in accordance with its filing establishing the pilot Program, which BX did “produce data throughout the pilot, which will include statistics about participation, the frequency and level of price improvement provided by the Program, and any effects on the broader market structure.”²² The Exchange has fulfilled this obligation through the reports and assessments it has submitted to the Commission since the implementation of the pilot Program.

The SEC stated in the RPI Approval Order that the Program could promote competition for retail order flow among execution venues, and that this could benefit retail investors by creating additional well-regulated and transparent price improvement opportunities for marketable retail order flow, most of which is currently executed in the Over-the-Counter (“OTC”) markets without ever reaching a public exchange.²³ The Exchange believes that the Program does not harm retail investors and so far has provided price improvement of more than \$4 million since inception to retail investors that they may not otherwise have received. The data demonstrates that the Program has continued to grow over time and the Exchange has not detected any negative impact to market quality. The Exchange also has not received any complaints or negative feedback

²² See Securities Exchange Act Release No. 73410 (October 23, 2014), 79 FR 64447 at 64450 (SR-BX-2014-048).

²³ RPI Approval Order, 79 FR at 72053.

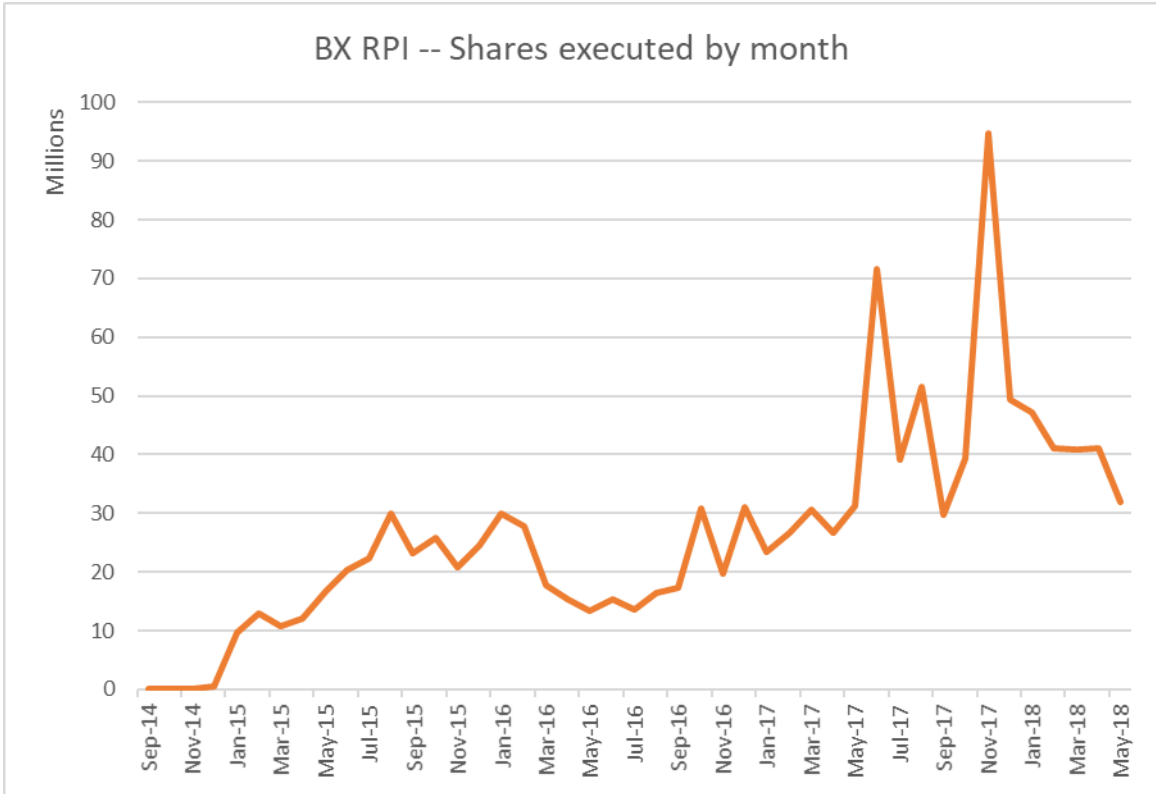
concerning the Program.

As seen in the table below, RMO orders and shares executed have continued to rise since the introduction of the Program in December 2014. RMO executed share volume on BX accounted for 0.05% of total consolidated volume in eligible U.S. listed securities in Q4 2017. Despite its size relative to total consolidated trading, however, the Program has continued to provide some price improvement to RMO orders each month with total price improvement during market hours from the start of the Program through May 2018 totaling over \$4.3 million.

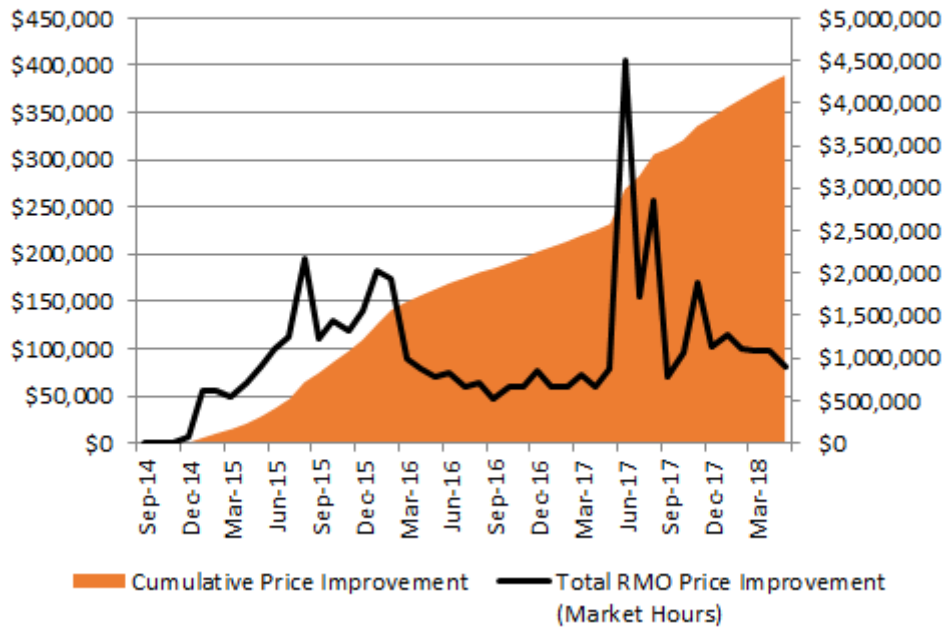
Retail orders are routed by sophisticated brokers using systems that seek the highest fill rates and amounts of price improvement. These brokers have many choices of execution venues for retail orders. When they choose to route to the Program, they have determined that it is the best opportunity for fill rate and price improvement at that time.

Month	Total RMO Orders (Market Hours)	RMO Shares Executed (Market Hours)	Total RMO Price Improvement (Market Hours)
Sep-14	0	0	\$0
Oct-14	0	0	\$0
Nov-14	0	0	\$0
Dec-14	4,003	521,587	\$6,572
Jan-15	66,903	9,723,791	\$55,480
Feb-15	71,204	12,948,664	\$54,769
Mar-15	62,216	10,818,042	\$49,232
Apr-15	75,558	12,121,577	\$63,247
May-15	98,859	16,723,281	\$81,268
Jun-15	116,570	20,341,305	\$100,520
Jul-15	133,917	22,310,364	\$111,657
Aug-15	192,546	30,011,636	\$194,706
Sep-15	141,496	23,199,937	\$110,415
Oct-15	148,414	25,745,772	\$128,838
Nov-15	123,267	20,788,967	\$120,037
Dec-15	145,022	24,414,783	\$140,444

Month	Total RMO Orders (Market Hours)	RMO Shares Executed (Market Hours)	Total RMO Price Improvement (Market Hours)
Jan-16	162,025	30,010,815	\$181,781
Feb-16	135,409	27,794,644	\$173,988
Mar-16	93,729	17,688,230	\$88,900
Apr-16	82,819	15,269,513	\$78,241
May-16	70,192	13,336,738	\$71,145
Jun-16	76,092	15,356,152	\$74,035
Jul-16	65,121	13,532,803	\$59,305
Aug-16	78,611	16,412,113	\$64,231
Sep-16	84,240	17,368,907	\$46,792
Oct-16	146,207	30,827,361	\$60,624
Nov-16	103,046	19,744,407	\$60,391
Dec-16	168,638	31,003,843	\$76,025
Jan-17	140,203	23,474,999	\$58,887
Feb-17	139,447	26,643,083	\$59,372
Mar-17	161,154	30,595,963	\$73,250
Apr-17	126,665	26,587,486	\$59,141
May-17	143,927	31,368,371	\$78,979
Jun-17	332,266	71,569,426	\$405,933
Jul-17	210,309	39,061,892	\$155,669
Aug-17	266,762	51,442,492	\$255,999
Sep-17	154,846	29,831,646	\$69,634
Oct-17	205,399	39,409,251	\$95,051
Nov-17	370,064	94,703,209	\$169,738
Dec-17	219,528	49,424,240	\$102,082
Jan-18	248,419	47,080,453	\$113,956
Feb-18	263,576	40,979,066	\$100,148
Mar-18	597,460	40,896,277	\$98,779
Apr-18	1,095,396	41,067,806	\$97,015
May-18	1,031,527	31,843,167	\$81,199
Total	8,353,052	1,193,994,059	\$4,327,477



Monthly and Cumulative Price Improvement



The table below shows that between April 2017 and May 2018, roughly 50% of RMO orders were for 100 shares or less and around 70% of orders were for 300 shares or less. Larger orders of 7,500 shares or more accounted for approximately 2%, ranging from 0.62% to 3.09%. Although large order were a small percentage of total orders, they make up a significant portion of total shares ordered, ranging from 21.11% to 46.22%. Orders of 300 shares or less, which accounted for the vast majority of total RMO orders, accounted for only between 4.81% and 15.38% of total shares ordered.

Distribution of RMO Orders by Order Size									
Month	<=100	101-300	301-500	501-1,000	1,001-2,000	2,001-4,000	4,001-7,500	7,500-15,000	>15,000
Apr-17	49.50%	18.53%	8.67%	9.47%	5.69%	3.84%	2.24%	1.38%	0.69%
May-17	46.55%	23.79%	8.25%	8.42%	5.26%	3.71%	2.12%	1.29%	0.62%
Jun-17	59.60%	13.26%	6.62%	7.91%	4.75%	3.48%	2.36%	1.52%	0.51%
Jul-17	57.30%	14.61%	7.32%	8.50%	5.17%	3.28%	2.00%	1.19%	0.65%
Aug-17	56.38%	15.19%	7.54%	8.49%	5.23%	3.41%	1.91%	1.22%	0.63%
Sep-17	53.16%	16.29%	7.69%	8.79%	5.71%	4.05%	2.22%	1.38%	0.70%
Oct-17	54.28%	16.00%	7.46%	8.65%	5.64%	3.84%	2.15%	1.33%	0.66%
Nov-17	47.76%	15.30%	8.19%	10.23%	7.38%	5.10%	2.95%	2.04%	1.06%
Dec-17	48.66%	15.30%	8.27%	10.34%	6.99%	4.82%	2.79%	1.87%	0.98%
Jan-18	53.60%	14.93%	7.73%	9.20%	5.98%	4.04%	2.28%	1.53%	0.71%
Feb-18	58.44%	14.58%	7.14%	8.02%	4.93%	3.29%	1.91%	1.14%	0.55%
Mar-18	55.29%	17.97%	8.63%	8.38%	5.12%	2.64%	1.07%	0.61%	0.28%
Apr-18	54.52%	19.12%	9.04%	8.31%	5.02%	2.50%	0.87%	0.42%	0.19%
May-18	50.44%	20.21%	9.89%	9.10%	5.77%	2.88%	0.96%	0.50%	0.26%

Distribution of RMO Shares Ordered by Order Size									
Month	<=100	101-300	301-500	501-1,000	1,001-2,000	2,001-4,000	4,001-7,500	7,500-15,000	>15,000
Apr-17	3.04%	4.63%	4.42%	8.78%	10.06%	12.89%	13.89%	16.06%	26.23%
May-17	3.28%	6.49%	4.49%	8.34%	9.98%	13.38%	14.28%	16.05%	23.71%
Jun-17	2.47%	3.78%	3.95%	8.89%	10.15%	13.74%	17.06%	20.07%	19.88%
Jul-17	2.82%	4.20%	4.36%	9.31%	10.78%	12.94%	14.44%	16.47%	24.67%
Aug-17	2.80%	4.28%	4.42%	9.21%	10.84%	13.21%	13.55%	16.63%	25.08%
Sep-17	2.88%	4.16%	3.98%	8.36%	10.50%	14.04%	14.17%	16.78%	25.14%

Distribution of RMO Shares Ordered by Order Size									
Month	<=100	101-300	301-500	501-1,000	1,001-2,000	2,001-4,000	4,001-7,500	7,500-15,000	>15,000
Oct-17	2.89%	4.31%	4.09%	8.73%	11.02%	14.04%	14.49%	17.11%	23.32%
Nov-17	1.80%	3.01%	3.26%	7.48%	10.45%	13.51%	14.27%	18.89%	27.33%
Dec-17	2.00%	3.17%	3.48%	8.02%	10.45%	13.46%	14.18%	18.35%	26.91%
Jan-18	2.50%	3.78%	4.01%	8.82%	11.05%	13.94%	14.30%	18.35%	23.26%
Feb-18	3.25%	4.52%	4.52%	9.34%	11.08%	13.87%	14.53%	16.86%	22.02%
Mar-18	5.73%	6.96%	6.80%	12.44%	14.90%	14.65%	11.00%	12.34%	15.17%
Apr-18	7.27%	8.11%	7.84%	13.68%	16.23%	15.46%	10.29%	9.51%	11.61%
May-18	6.31%	7.54%	7.50%	13.09%	16.40%	15.66%	10.00%	9.80%	13.70%

Distribution of RMO Shares Executed by Order Size									
Month	<=100	101-300	301-500	501-1,000	1,001-2,000	2,001-4,000	4,001-7,500	7,500-15,000	>15,000
Apr-17	11.39%	15.32%	11.28%	16.25%	12.77%	10.87%	9.27%	9.25%	3.61%
May-17	10.86%	20.10%	10.47%	13.77%	11.37%	10.58%	8.96%	9.44%	4.45%
Jun-17	7.65%	10.05%	8.48%	14.31%	11.28%	11.85%	12.00%	18.69%	5.68%
Jul-17	10.07%	12.67%	10.18%	15.57%	12.94%	11.79%	9.97%	10.27%	6.56%
Aug-17	9.93%	12.98%	10.89%	17.05%	14.16%	11.94%	9.38%	8.23%	5.45%
Sep-17	11.36%	13.46%	10.12%	16.01%	13.80%	13.07%	8.60%	8.61%	4.97%
Oct-17	10.83%	13.37%	10.07%	16.40%	14.46%	12.48%	9.47%	7.96%	4.96%
Nov-17	7.04%	10.64%	10.14%	19.81%	18.19%	13.96%	9.04%	7.10%	4.09%
Dec-17	8.25%	11.27%	10.37%	19.49%	17.05%	13.33%	8.82%	7.13%	4.28%
Jan-18	9.93%	12.43%	10.92%	19.37%	16.07%	12.66%	8.49%	6.49%	3.64%
Feb-18	12.63%	14.31%	11.81%	19.45%	15.07%	11.22%	6.81%	5.55%	3.16%
Mar-18	13.92%	15.35%	11.92%	19.14%	14.77%	10.05%	6.35%	5.49%	3.00%
Apr-18	14.81%	15.76%	11.86%	18.35%	13.47%	10.21%	6.75%	5.41%	3.39%
May-18	13.65%	15.78%	12.38%	18.77%	13.92%	10.57%	6.25%	5.27%	3.40%

The table below shows the average and median sizes of RMO removing orders.

Average and Median RMO Sizes		
Year	RMO Taking Order Size	
	Avg	Median
Apr-17	863	111
May-17	802	180
Jun-17	743	82

Average and Median RMO Sizes		
Year	RMO Taking Order Size	
	Avg	Median
Jul-17	739	100
Aug-17	753	100
Sep-17	841	100
Oct-17	793	100
Nov-17	1,103	150
Dec-17	1,044	132
Jan-18	844	100
Feb-18	690	100
Mar-18	512	100
Apr-18	454	100
May-18	517	100

The data provided by the Exchange describes a valuable service that delivers some price improvement in a transparent and well-regulated environment. The Program represents just a fraction of retail orders, most of which are executed off-exchange by a wide range of order handling services that have considerably more market share and which operate pursuant to different rules and regulatory requirements. BX found no data or received any customer feedback that indicated any negative impact of the Program on overall market quality or for retail investors.

As discussed herein, the Program is a minor participant in the overall market to price improve marketable retail order flow. As the Exchange has noted, although participation was low, retail investors that participated in the Program received price improvement on their orders, which was one of the stated goals of the Program. The Exchange, therefore, believes that this pilot data supports making the Program permanent.

As discussed more fully below, the reports and assessments provided by the

Exchange to the SEC have covered (i) the economic impact of the Program on the entire market; (ii) the economic impact of the Program on execution quality; (iii) whether only eligible participants are accessing Program liquidity; (iv) whether the Program is attracting retail participants; (v) the net benefits of the Program on participants; (vi) the overall success in achieving intended benefits; and (vii) whether the Program can be improved.

1. Economic Impact of the RPI Program on the Entire Market

The following table illustrates the level of volume done through the Program relative to consolidated volume. The columns labeled ‘Daily Results’ show the distribution of the percentage of RPI to consolidated volume for all stock/date combinations during 2017 – 2018. Only stock/date combinations with positive consolidated volume are represented. The table shows that the overwhelming number of stock/date combinations are those in which BX RPI volume was less than 0.01% of consolidated volume. In most of these cases, BX RPI volume was zero. In only a comparative handful of cases does the percentage amount to a substantial portion of the security’s volume.

The columns labeled ‘Two-Year Aggregate’ present results for stocks summed over the entire two-year period (sum of RPI Program volume to sum of consolidated volume). Only stocks listed during the entire two years are represented. Virtually all stocks have RPI volume less than 0.5% of consolidated volume.

Distribution	Daily Results		Two-Year Aggregate	
	Count	Percentage	Count	Percentage
> 50%	22	0.0005%	0	0.0000%
25%-50%	44	0.0011%	0	0.0000%
10% – 25%	368	0.0090%	0	0.0000%

Distribution	Daily Results		Two-Year Aggregate	
	Count	Percentage	Count	Percentage
5% – 10%	1,444	0.0355%	0	0.0000%
1% - 5%	25,730	0.6321%	0	0.0000%
0.75% - 1%	11,835	0.2907%	4	0.0542%
0.50% - 0.75%	22,413	0.5506%	10	0.1354%
0.25% - 0.50%	56,130	1.3789%	91	1.2321%
0.10% – 0.25%	111,937	2.7499%	559	7.5684%
0.05% – 0.10%	105,651	2.5955%	951	12.8757%
0.01% – 0.05%	220,649	5.4206%	3,181	43.0680%
< 0.01%	3,514,320	86.3354%	2,590	35.0663%

Difference in Difference Analysis

The aim of this analysis was to compare the values of a set of general market metrics prior to the December 2014 introduction of the Program to those prevailing after. The Exchange follows what is commonly termed the ‘difference-in-difference’ approach (“DnD”). A DnD analysis involves identifying a group of subjects (stocks in this case) that receive a given ‘treatment.’ In this case, the ‘treatment’ is the introduction of the BX RPI Program. The Exchange would then observe the change (difference) in a set of empirical indicia of market quality, before and after Program introduction. The analysis is enhanced by observing the intertemporal change in the same indicia for a set of stocks that *did not* receive the treatment. The non-treated stocks would serve as ‘controls.’ The impact of the Program could therefore be assessed by comparing the pre/post changes in the treated stocks with those from the control stocks, hence the difference in differences. Observed changes in the control stocks would account for environmental effects, such as

changes in general market volatility, that are unrelated to the introduction of the BX RPI Program.

The RPI introduction in December 2014 applied to all stocks traded on BX. Thus, control stocks in the strict sense are not available. The Exchange applies therefore a fallback approach, in which it identifies stocks with relatively high levels of RPI participation and use these as the ‘treatment’ stocks. Those for which Program participation was light serve as the ‘control’ stocks. The approach suffers from the limitation that Program participation is a determined by endogenous choice. It is possible that stocks with high levels of participation are systematically different from those with low participation. That is, the controls may be different from the treated stocks in important ways. With this caveat in mind, it is nevertheless of interest to see differences in outcomes between the two groups of stocks.

While the treatment and control stocks differ substantially in terms of RPI participation, the validity of the DnD analysis is enhanced to the extent that the two groups are otherwise as similar to each other as possible. To achieve this objective, the Exchange first breaks its analysis into two parts: one dealing with active securities, the other with less active securities. The Exchange’s set of active securities are those with consolidated average daily volume (“CADV”) of 500,000 shares or more both before and after Program introduction. The less active group have CADV between 50,000 and 500,000 shares both before and after Program introduction. Then, within each volume grouping, the Exchange conducts a ‘matched pairs’ process to identify a smaller set of treatment and control groups that are as close to each other as possible across three dimensions: consolidated average daily share volume, average price, and average time-

weighted quoted NBBO dollar spread. The values of these variables prior to Program introduction were used.

Data from the pre-treatment period was obtained from trading during the three months of September through November 2014. The Exchange looks at two post-treatment periods. The first is based on trading from January through December 2015. The second is based on trading from the two years from January 2017 through December 2018. Note that December 2014, the month of Program introduction, is not used. Further, the Exchange excluded data from trading days when the Exchange closed early (such as the day after Thanksgiving) from the analysis.

The overall set of four DnD analyses can be represented and hereafter labeled as follows:

CADV	Post-Period Dates	
	2015	2017-2018
500,000 or more	I	III
Between 50,000 and 500,000	II	IV

For each of the four DnD analyses, the specific matched-pairs process employed the following steps:

1. Daily averages for a set of variables are computed for each stock (excluding preferred stocks and warrants) listed on Nasdaq or NYSE for the appropriate pre/post time frames. For the 2017-2018 post-period, stocks trading with a nickel tick size pursuant to the Tick Size Pilot were excluded.
2. The initial universe of stocks are identified as having, in the post period, the appropriate CADV, an average share price greater than \$2, positive average daily BX share volume, and being listed during at least 80% of the designated time frame. To exclude stocks that may have experienced stock splits or other extreme price

movement, stocks with the 95th and 5th percentile of daily price within the period differed by more than a factor of two were excluded.

3. These stocks are ranked on the percentage of consolidated volume that was done in the Program (in the post period). Selection of the treatment stocks starts with the top 100 stocks in terms of post-introduction RPI Program volume as percentage of consolidated volume for the stock.
4. Pre-period data for the provisional treatment stocks is obtained. During the pre-period, the treatment stocks must also have the appropriate CADV level, an average price greater than \$2, positive BX share volume, listed during the entire pre-period, and not have experienced extreme price movement (measured as described in condition 2 above). This process will generally result in fewer than 100 remaining treatment candidates.
5. The candidate control stocks are selected from those with low RPI Program volume as a percentage of consolidated volume. For the two high-volume analyses (I. and III.), the control stocks were selected from stocks whose RPI volume percentage was less than one-tenth that of the lowest RPI percentage from the treatment stocks. For the lower-volume analyses (II. and IV.), the control stocks were selected from stocks whose RPI volume percentage was less than one-fifth that of the lowest RPI percentage from the treatment stocks. This change was made to ensure a sufficient number of control stocks.
6. The control stocks must also have similar restrictions to the treatment stocks in both pre- and post-periods: CADV in the appropriate range, price greater than \$2, positive BX volume, sufficient presence, and no extreme price movements during the period.

7. Each treatment stock was compared with each candidate control stock. Using pre-period data, a discrepancy score was computed as:

$$Score = Abs\left(\log\left(\frac{CADV_{Tr}}{CADV_{Cn}}\right)\right) + Abs\left(\log\left(\frac{Price_{Tr}}{Price_{Cn}}\right)\right) + Abs\left(\log\left(\frac{Sprd_{Tr}}{Sprd_{Cn}}\right)\right),$$

where the subscripts *Tr* and *Cn* refer to Treatment and Control values of the indicated variable. In words, the score is the sum of the absolute value of the percentage differences in the indicated values. The lower the score, the closer the match.

8. Each treatment stock was paired with the best possible match, subject to the constraint that a given control stock could be used only once (often termed ‘sampling without replacement’).
9. Finally, only stock pairs with reasonable discrepancy scores were retained, recognizing the trade-off between quality of the matches and the resulting sample size. For the high-volume/2015 analysis (I.) the discrepancy scores were 1.2 or lower. For the low-volume/2015 analysis (II.), the larger set of control stocks led to an upper bound of 0.6 for the discrepancy score. For both analyses with 2017-18 as the post period (III. and IV.) an upper bound of 2.0 was used, due to a smaller set of potential control stocks.

Once a set of matched pairs was determined for a given analysis, the Exchange computed the DnD result using a standard linear regression framework. A DnD regression model can be expressed as:

$$y_{it} = \alpha + \beta_1 D_{Grp} + \beta_2 D_{Period} + \beta_3 D_{Grp} \times D_{Prd} + \epsilon_{it}$$

where y_{it} represents the metric of interest for stock i in time period t (pre or post). The ‘dummy’ variables D_{Grp} and D_{Prd} are constructed such that $D_{Grp} = 1$ when stock i is a treatment stock, and zero otherwise. Variable D_{prd} has value = 1 when the observation is from the post period, zero otherwise. The coefficient β_3 of the interaction term represents the DnD result. Standard regression software provides both the estimated coefficient as well as its standard error and t-statistic. The level of statistical significance can be assessed using the t-statistic.

The Exchange considered eight metrics of interest, all of which were computed during standard 9:30 a.m. – 4:00 p.m. (Eastern time) trading hours:

- The time-weighted NBBO quoted spread, measured in dollars;
- The time-weighted NBBO relative (to the bid-ask midpoint) quoted spread, measured in basis points;
- The trade-weighted effective spread of all trades done on BX, measured in dollars;
- The trade-weighted relative effective spread of all trades done on BX, measured in basis points;
- As a measure of short-term volatility, the average high/low range of consolidated trade prices during 5-minute windows. The daily high/low range measure is divided by the VWAP each day to yield a metric measured in percent;
- As another measure of short-term volatility, the average absolute change in consolidated trade-to-trade price changes. The trade-to-trade measure is divided by the VWAP each day to yield a metric measured in percent;

- The average share volume market share of TRF volume, including auctions and all trading hours; and
- The average share volume market share of BX volume, including auctions and all trading hours.

In assessing the results of the DnD analysis, two caveats are worth bearing in mind. As shown above, BX RPI volume represents a very small fraction of consolidated volume. Further, the Program was introduced at a time when similar exchange-based retail programs were already in place. Among those programs was Nasdaq's retail program, which was discontinued at the time the BX RPI Program was introduced. To a large extent, the BX RPI volume replaced that of Nasdaq.

It is also important to recognize that much, if not most, marketable retail order flow is routed to off-exchange market makers. For example, the Exchange examined Rule 606 disclosures from four prominent retail brokerages: E-Trade, TD Ameritrade, Charles Schwab, and Fidelity. For securities listed on the New York Stock Exchange LLC ("NTSE") in the fourth quarter of 2018, only Fidelity reported routing any market orders to exchanges, and its total exchange percentage was only 2.1%. This practice of routing retail marketable orders to off-exchange venues has been in place for a long time, both before and after the introduction of the Program.

Combining the smallness of the Program, the concurrent discontinuation of the Nasdaq retail program, and the continuing prevalence of off-exchange trading of retail orders, the incremental impact of the Program on market quality generally would not be expected to be large.

A second caveat stems from the way that the treatment and control groups are created. The Exchange observes that some types of stocks have higher BX RPI Program usage than others. For example, consider Nasdaq- and NYSE-listed securities trading in 2015 with CADV greater than 500,000 shares (a sample of 1,737 stocks, used in analysis I.). The Exchange found the following concerning the percentage of BX RPI volume relative to consolidated volume:

Avg CADV of Stock	RPI/Consol. Pct
500,000 – 1,000,000	0.026%
1,000,000 – 10,000,000	0.015%
10,000,000+	0.010%

Avg Price Level	RPI/Consol. Pct
Less than \$100	0.017%
\$100 - \$200	0.032%
\$200 - \$500	0.074%
\$500+	0.127%

This sample shows higher Program percentages for less-active stocks, and much higher percentages for higher-priced stocks. This suggests that RPI usage across stocks does not randomly vary, but is driven by certain stock characteristics, some of which may not be directly observable.

As noted above, Rule 606 disclosures show that the majority of retail market orders are routed off-exchange for execution. BX RPI activity is therefore itself somewhat anomalous in the first place. Why some retail flow reaches exchanges via the

Program (or that of similar exchange programs), and why it varies across stocks is not clear.

Since treatment and control stocks are determined on the basis of observed RPI usage—resulting from participant choice—they may be different in important ways. The DnD study attempts to take into account differences in average share volume, price, and spread in the pre-period. If, however, the two groups of stocks are nevertheless still not properly fully matched, it is possible that results drawn from the DnD may be spurious. ‘Spurious’ in this context means a result that is robust statistically, but nevertheless does not indicate the impact of the intended factor. In other words, a spurious result is caused by some extraneous factor.

Matching Summary

The full set of matched pairs data for each of the four analyses will be provided below, but the following table provides summary information. Shown are the number of matched pairs, and sample averages for the three matching variables. Also shown is the average of the discrepancy score used in the matching process.

Matched Pairs Averages										
		Treatment				Control				
Analysis	N	RMO Pct	ADV	Price	Spread	RMO Pct	ADV	Price	Spread	Score
I	44	0.0763%	1,478,796	\$50.79	\$0.039	0.0033%	1,464,376	\$48.28	\$0.031	0.492
II	71	0.1534%	156,902	\$26.92	\$0.062	0.0123%	157,105	\$27.22	\$0.064	0.264
III	41	0.0531%	4,325,804	\$35.51	\$0.029	0.0023%	3,329,018	\$38.94	\$0.019	0.812
IV	49	0.0889%	166,435	\$19.37	\$0.051	0.0082%	179,551	\$23.95	\$0.046	0.684

The table again illustrates the low level of Program participation, even for the treatment stocks. The RMO percentages are especially low for the higher volume samples (I and III). As intended, the RMO percentages for the control stocks are much lower still, averaging at least an order of magnitude lower than the treatment stocks.

Other than these differences, the pairs exhibit strong average similarity in terms of the values of the pre-period matching variables. It can be seen that the average quality of matches is lower for the samples using 2017-18 as the post period (III and IV). As noted above, the maximum allowable discrepancy score was increased for these samples, needed to provide for a sample size similar to those of samples I and II.

Regression Results

The following table provides the estimated coefficients for the DnD regressions for the indicated market indicator and sample. In addition to the estimated coefficient, the t-statistic is provided. This statistic can be used to gauge the statistical significance of the coefficient—the confidence that the true value of the coefficient is different than zero. The t-statistics are accompanied, as appropriate, with a set of asterisks indicating the associated level of significance: * = 10%, ** = 5%, and *** = 1%.

It is useful to compare the results across the four samples to assess their consistency.

	Analysis Sample							
	I.		II.		III.		IV.	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
NBBO Spreads								
Dollar	\$0.018	3.16***	\$0.011	0.93	-\$0.003	-0.31	-\$0.030	-1.91*
bps	1.52	0.89	4.38	0.99	1.66	0.73	7.27	0.97
BX Effective Spreads								
Dollar	\$0.014	4.31***	\$0.008	1.32	-\$0.001	-0.32	-\$0.008	-1.45
bps	1.84	1.65	3.65	1.06	1.78	0.99	8.75	1.79*
Volatility								
Hi-Lo Range	-0.001%	-0.02	0.008%	0.38	-0.014%	-0.41	-0.022%	-0.78
Trade-to-Trade	0.003%	0.99	0.009%	1.03	0.004%	1.19	0.023%	1.49
Market Share Change								
TRF	2.86%	1.36	0.58%	0.24	3.13%	1.87*	1.75%	0.50
BX	0.31%	2.23**	0.42%	2.02**	-0.56%	-2.7***	-0.16%	-0.56

Spreads

Four spread measures are analyzed: NBBO quoted spreads and BX effective spreads, expressed in dollar and bps terms. The table above shows substantial consistency between the NBBO quoted and BX effective spread results across all samples.

Sample I. indicates increases in dollar quoted and effective spreads of about 1½ cents. The results are statistically significant. Relative (bps) spreads also increased about 1½ basis points. The bps spread results do not meet the standards of statistical significance, however. Compared to Sample I, Sample II shows increases in dollar spreads of about the same amount and increases in bps spreads of a higher amount, likely due to the fact that the Sample II stocks tend to have lower share prices. None of the Sample II spread increases meet the standard of statistical significance, however. Both

samples III and IV show small decreases in dollar spreads and increases in relative spreads. None of the results from sample III are statistically significant. From sample IV, one of the dollar spread decreases and one of the relative spread increases indicate marginal statistical significance.

Overall, the Exchange does not see sufficient consistency across the four samples to conclude that the introduction of the Program caused spreads to widen.

Volatility

Compared to the spread results, results on short-term volatility are easier to characterize. Across the two metrics and four samples, there is no evidence of a systematic increase or decrease in volatility, some estimates are positive, some negative, and none meet the standards of statistical significance.

Market Share

The market share coefficients are expressed in market share points. For example, a value of 1% means that market share increased by one point (e.g., 30% to 31%). The nearer-term samples I and II suggest statistically significant increases in BX market share of about one-third of a point. This increase may be partially reflective of the transfer of Nasdaq's retail program to BX. The more distant-term samples III and IV show, however, declines in BX share. The regressions on TRF share all produce positive coefficients, though only one has any level of statistical significance. Collectively, it can be safely stated that the introduction of the BX RPI program did not work towards decreasing TRF share. More likely what the results tell us is that the treatment stocks with relatively high RMO volume also had high levels of retail interest generally. As noted above, most retail flow is executed off exchange, hence the increase in TRF share.

I. Active Stocks (CADV > 500,000) and Post-Period = 2015

For this sample, there were 44 matched pairs that emerged from this process. The pairs, along with values of selected variables, pre- and post-Program introduction, are shown as follows:

Table 1A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
ACAD	1,301,549	\$26.71	\$0.035	13.20	RSPP	1,006,435	\$25.41	\$0.042	16.44
AFSI	963,827	\$45.37	\$0.058	12.53	CNW	1,035,534	\$47.10	\$0.027	5.85
ALK	1,421,387	\$48.80	\$0.025	5.26	AER	1,420,894	\$42.73	\$0.025	5.80
AVGO	2,296,967	\$84.93	\$0.042	4.94	DLPH	2,274,323	\$67.10	\$0.022	3.28
BDX	1,544,016	\$122.52	\$0.039	3.22	SIAL	1,139,858	\$128.25	\$0.034	2.81
CAMP	712,958	\$18.53	\$0.027	14.71	MIK	633,004	\$18.48	\$0.032	17.24
CELG	4,941,261	\$98.16	\$0.034	3.52	LYB	5,063,747	\$98.75	\$0.028	2.90
CI	1,621,670	\$95.17	\$0.033	3.45	MJN	1,416,148	\$98.05	\$0.033	3.41
CLX	1,176,737	\$96.35	\$0.027	2.77	DTE	1,145,735	\$78.91	\$0.024	3.04
COST	2,068,993	\$130.14	\$0.031	2.38	ITW	1,952,683	\$88.27	\$0.018	2.10
CRZO	1,162,062	\$51.73	\$0.069	13.56	JAH	1,115,067	\$61.48	\$0.032	5.17
DXCM	639,488	\$44.44	\$0.052	11.72	KMT	650,995	\$40.82	\$0.029	7.10
ENLK	737,216	\$30.01	\$0.050	16.82	MYGN	756,758	\$36.29	\$0.054	14.74
FSC	1,199,762	\$9.10	\$0.010	11.20	EXG	1,043,356	\$9.97	\$0.010	10.18
FSLR	2,507,147	\$59.85	\$0.040	6.73	CAM	2,841,939	\$62.83	\$0.025	4.05
IBKR	507,360	\$25.51	\$0.024	9.42	WERN	542,473	\$26.12	\$0.022	8.38
ICLR	582,300	\$54.93	\$0.051	9.34	SLH	582,309	\$55.54	\$0.042	7.47
ISIS	2,304,953	\$42.90	\$0.050	11.87	DO	2,028,802	\$37.29	\$0.026	6.93
JACK	550,619	\$67.89	\$0.057	8.37	REG	509,779	\$57.69	\$0.031	5.39
LAZ	704,069	\$50.59	\$0.045	9.02	HDB	834,887	\$49.84	\$0.025	5.12
MANH	512,845	\$35.01	\$0.037	10.67	MR	610,957	\$30.32	\$0.030	9.83
MHK	737,514	\$139.12	\$0.084	6.08	SLG	788,370	\$109.07	\$0.057	5.28
MNST	1,194,231	\$96.92	\$0.051	5.33	EQT	1,625,380	\$91.54	\$0.059	6.48
NXPI	4,256,770	\$68.85	\$0.031	4.48	CCI	3,275,501	\$80.56	\$0.024	2.93
NYMT	1,596,486	\$7.76	\$0.010	12.98	PMCS	1,483,102	\$7.49	\$0.011	14.09
OLED	709,659	\$31.24	\$0.045	14.50	FET	713,162	\$28.85	\$0.033	11.66
PSEC	3,891,913	\$9.79	\$0.010	10.25	SLM	4,532,083	\$9.17	\$0.010	11.09
Q	739,497	\$56.41	\$0.039	6.96	OIS	913,560	\$59.56	\$0.048	7.97
RMTI	677,364	\$9.70	\$0.031	32.18	COUP	770,002	\$14.10	\$0.031	22.28
SINA	1,550,979	\$41.43	\$0.036	8.79	YPF	1,668,599	\$33.94	\$0.031	9.11
SKYW	558,570	\$9.63	\$0.018	19.30	BEL	504,230	\$11.61	\$0.018	15.88
SMCI	520,354	\$28.97	\$0.044	15.62	SERV	594,059	\$24.05	\$0.038	15.87

Table 1A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
SNCR	615,801	\$45.95	\$0.068	14.76	LTRPA	688,159	\$30.63	\$0.069	22.17
SPLK	2,740,926	\$60.05	\$0.054	9.13	FTI	2,360,200	\$54.47	\$0.024	4.39
SWKS	4,301,104	\$56.96	\$0.024	4.33	NOV	4,357,777	\$75.03	\$0.023	3.04
TASR	3,094,977	\$17.08	\$0.017	9.88	LPI	3,200,381	\$19.98	\$0.016	8.34
TGTX	509,492	\$11.16	\$0.036	32.33	MEG	592,554	\$14.46	\$0.028	19.67
TSCO	1,270,325	\$66.28	\$0.031	4.66	FLS	1,201,366	\$68.85	\$0.033	4.74
TUP	527,236	\$68.49	\$0.044	6.47	KRC	535,203	\$63.70	\$0.037	5.78
UA	2,678,432	\$67.54	\$0.032	4.80	NBL	2,781,689	\$61.96	\$0.025	4.08
UBNT	1,115,056	\$36.37	\$0.051	14.34	ERJ	1,106,399	\$37.84	\$0.021	5.52
VDSI	851,633	\$21.13	\$0.035	17.03	LQ	827,960	\$19.86	\$0.025	12.65
YRCW	750,968	\$20.65	\$0.036	17.55	STAY	627,766	\$21.90	\$0.029	13.44
ZLTQ	720,533	\$24.55	\$0.041	16.88	CTLT	679,346	\$24.50	\$0.045	18.20
Avg	1,478,796	\$50.79	\$0.039	10.76	Avg	1,464,376	\$48.28	\$0.031	8.91

Table 1B: Retail Program Matched Sample CADV >500,000 (2015)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
ACAD	3.07%	0.06%	1,448,310	\$37.47	\$0.050	13.46	RSPP	0.04%	0.00%	1,491,504	\$26.31	\$0.037	14.38
AFSI	2.13%	0.06%	563,733	\$60.48	\$0.061	10.07	CNW	0.22%	0.00%	1,314,088	\$42.22	\$0.025	6.04
ALK	3.21%	0.07%	1,387,460	\$71.24	\$0.047	6.49	AER	0.28%	0.00%	2,093,683	\$43.92	\$0.022	4.96
AVGO	2.24%	0.06%	3,166,689	\$125.32	\$0.077	6.18	DLPH	0.20%	0.00%	2,148,818	\$80.26	\$0.033	4.11
BDX	3.08%	0.08%	1,115,839	\$143.84	\$0.065	4.51	SIAL	0.10%	0.00%	1,009,690	\$138.89	\$0.015	1.10
CAMP	3.90%	0.07%	511,751	\$18.28	\$0.028	15.24	MIK	0.17%	0.00%	769,285	\$25.40	\$0.030	11.79
CELG	3.98%	0.08%	5,171,549	\$118.39	\$0.059	4.96	LYB	0.25%	0.00%	3,973,998	\$91.43	\$0.037	4.11
CI	3.06%	0.08%	2,008,125	\$134.28	\$0.073	5.40	MJN	0.21%	0.00%	1,810,637	\$89.46	\$0.038	4.21
CLX	3.17%	0.08%	891,999	\$113.19	\$0.048	4.24	DTE	0.27%	0.01%	1,090,860	\$80.57	\$0.030	3.67
COST	2.32%	0.05%	2,150,134	\$147.70	\$0.051	3.44	ITW	0.16%	0.00%	1,750,442	\$92.38	\$0.025	2.76
CRZO	2.40%	0.06%	1,330,366	\$42.86	\$0.055	13.12	JAH	0.35%	0.01%	2,179,212	\$51.58	\$0.021	4.17
DXCM	2.90%	0.08%	843,867	\$75.80	\$0.094	12.13	KMT	0.29%	0.00%	940,811	\$31.32	\$0.026	8.52
ENLK	2.54%	0.06%	771,866	\$21.79	\$0.047	22.55	MYGN	0.15%	0.00%	830,603	\$36.81	\$0.052	13.95
FSC	2.17%	0.06%	1,166,959	\$6.75	\$0.010	15.32	EXG	0.22%	0.00%	798,806	\$9.47	\$0.010	10.76
FSLR	4.17%	0.06%	2,388,265	\$52.34	\$0.034	6.49	CAM	0.17%	0.00%	3,147,765	\$54.73	\$0.021	3.96
IBKR	4.22%	0.09%		\$37.70	\$0.037	9.90	WERN	0.31%	0.01%		\$28.13	\$0.023	8.33

Table 1B: Retail Program Matched Sample CADV >500,000 (2015)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
			565,525							706,866			
ICLR	2.14%	0.08%	504,514	\$69.04	\$0.108	15.63	SLH	0.23%	0.00%	1,070,428	\$50.40	\$0.034	7.00
ISIS	3.14%	0.06%	2,342,444	\$59.10	\$0.065	11.39	DO	0.29%	0.00%	2,342,540	\$26.18	\$0.023	8.44
JACK	2.34%	0.07%	633,677	\$85.40	\$0.092	10.94	REG	0.10%	0.00%	580,153	\$64.77	\$0.039	6.05
LAZ	3.93%	0.10%	859,575	\$50.54	\$0.053	10.52	HDB	0.29%	0.01%	914,212	\$59.33	\$0.034	5.74
MANH	3.77%	0.10%	539,552	\$59.23	\$0.077	12.82	MR	0.21%	0.00%	623,598	\$27.00	\$0.025	9.47
MHK	3.17%	0.09%	689,602	\$187.12	\$0.182	9.68	SLG	0.12%	0.00%	702,818	\$118.81	\$0.088	7.49
MNST	2.37%	0.07%	1,228,688	\$136.21	\$0.105	7.65	EQT	0.18%	0.00%	1,556,329	\$75.25	\$0.055	7.45
NXPI	2.55%	0.06%	3,865,611	\$91.55	\$0.052	5.71	CCI	0.30%	0.01%	2,336,521	\$83.67	\$0.025	2.97
NYMT	3.82%	0.07%	1,196,276	\$7.05	\$0.010	14.71	PMCS	0.13%	0.00%	3,442,623	\$9.05	\$0.010	12.01
OLED	6.59%	0.14%	658,991	\$42.93	\$0.063	14.81	FET	0.17%	0.00%	1,113,426	\$17.10	\$0.022	13.33
PSEC	3.80%	0.07%	2,747,484	\$7.81	\$0.010	12.96	SLM	0.06%	0.00%	3,593,895	\$8.77	\$0.010	12.01
Q	3.25%	0.08%	746,869	\$68.71	\$0.048	6.98	OIS	0.07%	0.00%	1,109,903	\$35.88	\$0.037	10.89
RMTI	4.62%	0.07%	726,795	\$11.47	\$0.031	27.33	COUP	0.05%	0.00%	689,630	\$11.56	\$0.024	20.81
SINA	3.74%	0.06%	1,351,205	\$42.49	\$0.041	9.53	YPF	0.28%	0.00%	1,301,107	\$23.91	\$0.024	10.05
SKYW	4.56%	0.08%	540,128	\$16.11	\$0.027	17.05	BEL	0.05%	0.00%	520,858	\$11.45	\$0.015	13.50
SMCI	4.34%	0.10%	623,673	\$30.57	\$0.044	14.48	SERV	0.09%	0.00%	1,084,056	\$34.47	\$0.027	7.96
SNCR	3.23%	0.08%	531,811	\$42.90	\$0.066	15.60	LTRPA	0.04%	0.00%	570,674	\$29.05	\$0.034	11.75
SPLK	3.13%	0.07%	1,908,069	\$62.58	\$0.053	8.53	FTI	0.08%	0.00%	3,385,051	\$36.74	\$0.016	4.52
SWKS	7.33%	0.13%	4,040,788	\$89.48	\$0.047	5.24	NOV	0.26%	0.00%	5,929,343	\$45.85	\$0.015	3.23
TASR	4.96%	0.06%	2,066,379	\$25.79	\$0.022	8.55	LPI	0.34%	0.00%	3,845,352	\$11.60	\$0.013	11.79
TGTX	7.27%	0.12%	597,807	\$14.62	\$0.042	29.22	MEG	0.26%	0.00%	1,314,175	\$15.20	\$0.017	11.22
TSCO	4.01%	0.10%	942,912	\$87.47	\$0.063	7.18	FLS	0.33%	0.00%	1,488,778	\$50.86	\$0.025	4.96
TUP	3.09%	0.07%	583,728	\$61.66	\$0.054	8.90	KRC	0.16%	0.00%	567,612	\$69.92	\$0.051	7.33
UA	5.23%	0.09%	2,652,795	\$85.27	\$0.038	4.39	NBL	0.21%	0.00%	4,862,641	\$40.75	\$0.017	4.21
UBNT	3.42%	0.06%	664,805	\$31.72	\$0.048	14.89	ERJ	0.13%	0.00%	979,065	\$30.32	\$0.017	5.58
VDSI	5.87%	0.08%	1,258,250	\$22.45	\$0.037	17.11	LQ	0.09%	0.00%	1,511,426	\$20.36	\$0.014	6.87
YRCW	3.30%	0.06%	640,874	\$16.21	\$0.028	17.65	STAY	0.31%	0.01%	520,061	\$18.89	\$0.028	14.43
ZLTQ	2.71%	0.06%	598,245	\$31.73	\$0.055	17.10	CTLT	0.18%	0.00%	718,026	\$28.92	\$0.040	14.02
Avg	3.64%	0.08%	1,391,454	\$62.38	\$0.054	11.59	Avg	0.19%	0.00%	1,698,440	\$44.98	\$0.028	8.22

II. Less Active Stocks (CADV between 50,000 and 500,000) and Post-Period = 2015

For this sample, there were 71 matched pairs that emerged from the process. The pairs, along with values of the matching variables (pre-period), are shown as follows:

Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AB	257,695	\$26.20	\$0.052	19.81	TBI	218,856	\$25.33	\$0.047	18.60
ACET	201,593	\$20.49	\$0.053	26.13	DFRG	213,718	\$21.87	\$0.052	23.95
ADC	65,799	\$29.22	\$0.072	24.58	ORA	66,867	\$27.55	\$0.069	25.05
AFOP	354,650	\$13.00	\$0.027	20.64	LQDT	343,166	\$12.97	\$0.025	18.91
ALDW	190,282	\$18.43	\$0.050	27.26	NEWP	171,264	\$17.79	\$0.044	24.54
APU	310,097	\$45.68	\$0.046	10.16	WST	306,905	\$46.65	\$0.050	10.72
ARII	258,499	\$70.06	\$0.171	24.73	AXE	240,764	\$85.14	\$0.162	19.11
AVAV	259,080	\$29.89	\$0.052	17.50	MBFI	282,952	\$29.29	\$0.047	16.12
BEAT	222,665	\$7.49	\$0.025	34.28	SPWH	227,710	\$6.86	\$0.025	35.76
BIP	218,853	\$39.85	\$0.051	12.70	ALE	229,126	\$48.74	\$0.049	10.09
BOI	103,890	\$16.93	\$0.030	17.74	MMD	101,908	\$17.98	\$0.034	18.95
BSTC	51,863	\$36.16	\$0.264	73.16	OPB	51,453	\$29.37	\$0.201	67.86
BTO	57,833	\$22.56	\$0.038	17.08	EMF	59,607	\$17.77	\$0.041	23.11
CLFD	75,466	\$13.16	\$0.069	52.54	ZPIN	91,340	\$13.90	\$0.089	64.59
CLMS	110,782	\$12.66	\$0.037	28.97	MHG	111,804	\$13.89	\$0.033	23.75
CLMT	313,715	\$27.57	\$0.063	23.09	MRKT	401,812	\$23.98	\$0.059	24.76
CMP	259,246	\$86.79	\$0.108	12.46	SPB	235,834	\$88.42	\$0.106	12.00
CODI	217,722	\$17.82	\$0.036	20.41	HZO	176,311	\$17.93	\$0.036	20.33
CSCD	110,524	\$10.99	\$0.056	51.94	UNTD	127,615	\$11.83	\$0.046	38.70
CTT	223,611	\$11.18	\$0.022	19.48	FLY	205,417	\$12.99	\$0.022	17.28
CUI	78,138	\$7.18	\$0.045	63.45	CRCM	98,265	\$8.40	\$0.047	56.22
CVTI	219,409	\$18.92	\$0.076	41.35	KANG	277,438	\$18.93	\$0.074	39.12
DBL	78,900	\$23.75	\$0.044	18.48	KIO	74,822	\$17.56	\$0.043	24.31
EDF	65,045	\$18.69	\$0.053	28.45	BCA	71,870	\$19.26	\$0.055	28.43
EPAM	395,347	\$43.65	\$0.063	14.35	HIBB	415,031	\$44.48	\$0.062	13.90
ETB	60,457	\$15.78	\$0.023	14.75	ZF	53,909	\$15.10	\$0.022	14.95
EZCH	158,140	\$22.41	\$0.058	25.94	CMRE	173,076	\$21.06	\$0.057	23.49
FDUS	68,041	\$17.12	\$0.061	35.44	OKSB	58,803	\$16.97	\$0.066	38.50
FGP	160,267	\$27.28	\$0.060	22.18	IBOC	172,092	\$26.03	\$0.060	23.28
FNHC	271,398	\$27.32	\$0.079	28.80	WMS	260,316	\$21.05	\$0.066	31.32
GLAD	128,184	\$9.02	\$0.026	28.43	IRR	101,145	\$9.95	\$0.026	25.71

Table 2A: Retail Program Matched Sample >50,000 and <500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
GLRE	136,838	\$32.52	\$0.059	18.18	STC	120,951	\$32.12	\$0.061	19.03
GNCMA	193,608	\$11.39	\$0.026	22.57	PGI	204,861	\$11.66	\$0.025	21.87
GOOD	112,763	\$17.57	\$0.031	17.67	CPF	114,830	\$18.46	\$0.031	16.70
GSIG	72,335	\$12.22	\$0.049	40.42	XOXO	67,052	\$12.46	\$0.049	40.03
GSL	66,072	\$3.78	\$0.031	85.13	CO	68,003	\$4.99	\$0.030	59.74
GSVC	139,253	\$10.14	\$0.034	33.84	ICD	135,638	\$9.33	\$0.038	43.28
HII	283,916	\$103.19	\$0.102	9.93	TFX	243,588	\$110.37	\$0.132	12.05
HIHQ	96,520	\$10.25	\$0.090	88.44	EDN	94,386	\$11.67	\$0.104	89.69
HQH	162,147	\$29.19	\$0.042	14.44	COLB	204,528	\$26.38	\$0.045	17.12
HQL	103,968	\$22.85	\$0.040	17.48	CTY	93,639	\$23.60	\$0.036	15.29
IGOV	69,992	\$99.56	\$0.179	17.99	KOF	62,191	\$102.39	\$0.183	17.93
IXYS	141,164	\$11.00	\$0.036	32.65	BPI	133,490	\$11.62	\$0.027	23.09
LDP	70,450	\$24.46	\$0.048	19.73	DFP	64,754	\$22.87	\$0.048	20.82
MAIN	202,931	\$31.39	\$0.039	12.33	MLI	201,430	\$30.24	\$0.039	13.07
NDP	93,945	\$24.11	\$0.067	28.08	ABCB	105,401	\$23.68	\$0.070	29.89
NNBR	157,009	\$24.33	\$0.074	30.40	CVT	193,466	\$25.67	\$0.069	26.96
NTWK	78,357	\$3.40	\$0.028	84.86	FCSC	68,500	\$2.82	\$0.035	122.37
ORBK	134,253	\$15.36	\$0.034	22.01	AHP	142,241	\$16.22	\$0.034	20.99
OXLC	80,719	\$15.90	\$0.045	28.60	CTS	82,703	\$17.22	\$0.044	25.67
PATK	65,356	\$42.36	\$0.198	46.71	VRTV	64,527	\$46.69	\$0.243	52.21
PEO	103,616	\$27.93	\$0.050	18.13	LADR	97,465	\$18.89	\$0.057	30.07
PGP	131,368	\$23.08	\$0.086	37.58	EXLS	133,974	\$26.59	\$0.078	29.49
PICO	71,762	\$20.61	\$0.069	33.51	VVI	79,994	\$22.39	\$0.065	28.97
PLOW	205,124	\$20.54	\$0.035	17.05	CSU	217,750	\$22.23	\$0.035	15.69
RDI	69,021	\$9.43	\$0.045	48.22	CNCO	75,311	\$8.59	\$0.050	59.16
RM	193,431	\$16.19	\$0.048	29.46	DL	202,788	\$14.91	\$0.053	36.12
RNST	67,326	\$28.53	\$0.100	35.11	FBRC	65,432	\$26.48	\$0.125	47.49
SIGI	144,844	\$24.23	\$0.046	19.12	CCU	144,842	\$21.38	\$0.044	20.58
SOCL	122,280	\$19.37	\$0.029	15.22	PCN	121,440	\$16.22	\$0.027	16.49
SPH	166,532	\$44.68	\$0.092	20.53	CCMP	152,708	\$44.34	\$0.100	22.72
STON	153,931	\$25.88	\$0.054	21.03	FTGC	169,252	\$29.57	\$0.057	19.47
TCP	344,465	\$64.50	\$0.174	26.97	REX	278,567	\$76.26	\$0.216	29.37
TSYS	221,965	\$2.90	\$0.015	50.11	NWY	195,275	\$3.00	\$0.014	47.97
TYG	139,676	\$46.69	\$0.068	14.62	RLI	127,939	\$46.15	\$0.073	15.77
TZOO	69,120	\$14.37	\$0.053	36.99	TRNO	82,554	\$20.20	\$0.053	26.35
USAC	112,111	\$23.46	\$0.086	36.95	FCB	112,509	\$22.70	\$0.068	30.05
VCIT	350,756	\$86.24	\$0.050	5.74	IT	378,372	\$77.79	\$0.057	7.36
VICR	102,170	\$10.56	\$0.047	46.34	MODN	101,103	\$9.77	\$0.040	41.39
VNQI	180,925	\$55.63	\$0.065	11.80	TTC	172,945	\$60.46	\$0.069	11.38

Table 2A: Retail Program Matched Sample >50,000 and <500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
WLDN	180,819	\$13.99	\$0.061	43.65	CTRE	156,847	\$15.28	\$0.076	49.33
Avg	156,902	\$26.92	\$0.062	29.52	Avg	157,105	\$27.22	\$0.064	29.67

Table 2B: Retail Program Matched Sample CADV >50,000 and <500,000 (2015)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AB	4.85%	0.10%	283,950	\$27.72	\$0.057	20.57	TBI	0.99%	0.018%	327,753	\$25.81	\$0.043	16.70
ACET	3.36%	0.10%	194,984	\$24.10	\$0.070	29.08	DFRG	0.89%	0.020%	297,903	\$17.26	\$0.040	23.26
ADC	4.02%	0.12%	111,520	\$31.60	\$0.069	21.85	ORA	0.36%	0.010%	155,890	\$35.60	\$0.069	19.55
AFOP	4.21%	0.12%	187,767	\$17.48	\$0.047	26.62	LQDT	0.66%	0.018%	295,434	\$8.67	\$0.023	26.90
ALDW	6.34%	0.14%	211,968	\$21.16	\$0.083	39.15	NEWP	0.70%	0.020%	166,386	\$17.51	\$0.043	24.82
APU	9.81%	0.22%	241,899	\$45.41	\$0.088	19.29	WST	0.47%	0.011%	326,681	\$56.83	\$0.078	13.72
ARII	3.00%	0.11%	237,155	\$48.93	\$0.159	32.51	AXE	0.34%	0.012%	209,412	\$68.79	\$0.144	21.14
AVAV	4.46%	0.13%	168,446	\$25.36	\$0.058	22.75	MBFI	0.47%	0.010%	325,804	\$32.33	\$0.042	13.17
BEAT	7.55%	0.17%	296,257	\$11.21	\$0.033	29.78	SPWH	0.44%	0.008%	267,713	\$10.37	\$0.028	27.50
BIP	5.15%	0.14%	267,495	\$42.32	\$0.052	12.31	ALE	0.78%	0.017%	270,205	\$50.93	\$0.061	12.01
BOI	11.17%	0.11%	67,209	\$15.57	\$0.035	22.31	MMD	1.60%	0.010%	75,235	\$18.12	\$0.033	18.56
BSTC	3.99%	0.16%	62,235	\$46.54	\$0.384	84.03	OPB	0.42%	0.010%	105,939	\$33.95	\$0.148	45.12
BTO	11.38%	0.13%	63,715	\$25.43	\$0.067	25.78	EMF	1.71%	0.009%	64,025	\$13.71	\$0.039	29.43
CLFD	4.73%	0.12%	62,636	\$14.74	\$0.073	49.97	ZPIN	0.00%	0.000%	115,886	\$14.97	\$0.092	60.98
CLMS	4.28%	0.12%	88,411	\$11.46	\$0.037	32.81	MHG	0.23%	0.007%	92,686	\$12.50	\$0.030	23.96
CLMT	11.61%	0.27%	382,050	\$25.64	\$0.068	26.69	MRKT	0.48%	0.009%	489,213	\$27.57	\$0.034	12.38
CMP	3.54%	0.13%	261,808	\$85.71	\$0.117	13.76	SPB	0.59%	0.018%	305,016	\$95.53	\$0.125	13.39
CODI	6.63%	0.11%	136,610	\$16.50	\$0.036	21.86	HZO	0.55%	0.014%	292,698	\$20.59	\$0.046	23.22
CSCD	4.29%	0.10%	55,917	\$14.67	\$0.072	49.56	UNTD	0.68%	0.020%	139,792	\$13.95	\$0.051	37.41
CTT	9.67%	0.19%	146,655	\$11.28	\$0.026	23.10	FLY	0.83%	0.015%	272,441	\$14.23	\$0.026	18.44
CUI	11.61%	0.14%	89,869	\$5.88	\$0.033	55.75	CRCM	0.89%	0.013%	110,412	\$6.56	\$0.033	50.20
CVTI	3.22%	0.11%	228,099	\$25.99	\$0.086	33.45	KANG	0.75%	0.020%	487,020	\$17.09	\$0.077	23.08
DBL	14.29%	0.16%	80,224	\$24.61	\$0.054	22.03	KIO	0.09%	0.001%	50,652	\$15.54	\$0.045	24.89
EDF	8.88%	0.13%	75,205	\$14.49	\$0.046	31.99	BCA	0.19%	0.003%	69,946	\$15.52	\$0.053	35.07

Table 2B: Retail Program Matched Sample CADV >50,000 and <500,000 (2015)

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
EPAM	4.16%	0.12%	406,072	\$68.22	\$0.118	17.42	HIBB	0.60%	0.015%	436,936	\$42.95	\$0.064	14.94
ETB	17.61%	0.16%	67,536	\$15.99	\$0.036	22.28	ZF	3.71%	0.013%	51,579	\$14.40	\$0.022	15.40
EZCH	4.09%	0.11%	211,056	\$20.50	\$0.045	22.80	CMRE	0.44%	0.014%	155,171	\$16.42	\$0.053	32.86
FDUS	22.17%	0.58%	55,373	\$15.15	\$0.081	53.87	OKSB	0.66%	0.018%	50,424	\$17.27	\$0.083	48.02
FGP	6.51%	0.11%	308,815	\$21.93	\$0.056	25.44	IBOC	0.68%	0.018%	198,814	\$26.18	\$0.066	25.39
FNHC	3.85%	0.13%	112,184	\$27.04	\$0.106	39.41	WMS	0.48%	0.010%	367,087	\$28.23	\$0.056	19.77
GLAD	14.23%	0.13%	123,421	\$8.40	\$0.026	30.82	IRR	1.22%	0.004%	84,619	\$7.47	\$0.028	36.62
GLRE	8.05%	0.16%	161,813	\$27.53	\$0.051	18.79	STC	0.49%	0.018%	99,664	\$39.07	\$0.105	27.08
GNCMA	5.95%	0.23%	209,254	\$17.12	\$0.047	27.32	PGI	0.72%	0.016%	367,369	\$11.00	\$0.025	21.53
GOOD	7.01%	0.13%	111,685	\$16.47	\$0.036	22.37	CPF	0.88%	0.018%	279,459	\$22.42	\$0.036	15.91
GSIG	7.36%	0.19%	66,110	\$13.76	\$0.063	45.96	XOXO	0.64%	0.018%	96,502	\$16.14	\$0.052	32.59
GSL	13.49%	0.12%	77,050	\$4.97	\$0.039	78.15	CO	1.17%	0.012%	214,376	\$5.90	\$0.025	44.07
GSVC	5.92%	0.13%	106,508	\$9.66	\$0.037	38.66	ICD	0.79%	0.015%	59,744	\$6.65	\$0.069	105.07
HII	3.59%	0.12%	320,027	\$122.86	\$0.181	14.90	TFX	0.29%	0.008%	274,659	\$126.57	\$0.161	12.63
HIQ	9.88%	0.13%	54,023	\$5.90	\$0.062	107.65	EDN	0.01%	0.000%	71,865	\$14.27	\$0.138	97.30
HQH	5.60%	0.11%	131,438	\$33.75	\$0.071	21.24	COLB	0.72%	0.017%	252,185	\$30.71	\$0.053	17.17
HQL	7.91%	0.11%	72,120	\$26.93	\$0.063	23.67	CTY	0.07%	0.000%	104,496	\$24.76	\$0.036	14.70
IGOV	9.75%	0.15%	64,028	\$91.31	\$0.228	24.92	KOF	0.27%	0.011%	77,285	\$78.17	\$0.152	19.49
IXYS	4.77%	0.12%	158,931	\$12.29	\$0.037	30.67	BPI	1.00%	0.014%	104,923	\$9.01	\$0.033	37.18
LDP	12.69%	0.18%	90,233	\$23.32	\$0.041	17.84	DFP	0.53%	0.005%	58,638	\$22.84	\$0.057	24.84
MAIN	11.52%	0.18%	250,344	\$30.21	\$0.039	13.05	MLI	0.76%	0.020%	169,670	\$32.97	\$0.060	18.41
NDP	16.50%	0.20%	80,808	\$17.27	\$0.073	42.22	ABCB	0.72%	0.019%	174,169	\$27.51	\$0.062	23.20
NNBR	4.31%	0.11%	278,757	\$22.38	\$0.066	29.71	CVT	0.55%	0.015%	201,431	\$29.61	\$0.074	24.99
NTWK	31.44%	0.18%	59,023	\$5.45	\$0.054	100.56	FCSC	0.55%	0.009%	225,454	\$4.86	\$0.032	69.06
ORBK	4.99%	0.12%	200,734	\$17.83	\$0.036	20.44	AHP	0.55%	0.011%	187,416	\$15.38	\$0.033	21.60
OXLC	7.91%	0.14%	94,543	\$13.68	\$0.062	46.48	CTS	0.69%	0.017%	91,415	\$18.20	\$0.055	29.86
PATK	3.49%	0.11%	103,595	\$46.14	\$0.195	42.49	VRTV	0.03%	0.001%	74,483	\$41.62	\$0.212	50.66
PEO	8.37%	0.12%	83,844	\$21.78	\$0.060	27.53	LADR	0.40%	0.008%	148,102	\$16.48	\$0.040	24.34
PGP	7.64%	0.11%	59,681	\$19.06	\$0.103	54.99	EXLS	0.36%	0.012%	166,403	\$37.01	\$0.100	27.04
PICO	8.54%	0.24%	106,325	\$14.10	\$0.052	37.85	VVI	0.58%	0.019%	88,074	\$28.13	\$0.073	26.07
PLOW	3.71%	0.11%		\$21.61	\$0.056	25.71	CSU	0.42%	0.011%		\$23.61	\$0.047	20.09

Table 2B: Retail Program Matched Sample CADV >50,000 and <500,000 (2015)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
			129,709							211,558			
RDI	8.49%	0.24%	56,701	\$13.43	\$0.062	45.66	CNCO	0.46%	0.003%	83,811	\$6.80	\$0.041	61.30
RM	4.55%	0.12%	91,913	\$16.20	\$0.067	39.49	DL	0.28%	0.009%	126,155	\$15.56	\$0.073	47.88
RNST	5.29%	0.13%	148,755	\$31.50	\$0.067	21.21	FBRC	0.33%	0.009%	50,866	\$22.22	\$0.130	59.07
SIGI	4.57%	0.12%	212,634	\$30.13	\$0.053	17.68	CCU	0.34%	0.007%	138,285	\$21.45	\$0.048	22.78
SOCL	10.32%	0.24%	88,315	\$19.22	\$0.051	26.48	PCN	3.92%	0.018%	108,881	\$14.36	\$0.022	15.23
SPH	6.54%	0.15%	208,257	\$38.56	\$0.099	25.93	CCMP	0.52%	0.018%	145,234	\$45.64	\$0.111	24.49
STON	4.23%	0.13%	160,946	\$28.62	\$0.092	32.56	FTGC	0.23%	0.003%	134,541	\$23.49	\$0.053	22.65
TCP	4.12%	0.14%	171,426	\$58.19	\$0.292	52.28	REX	0.40%	0.014%	162,351	\$57.40	\$0.192	33.82
TSYS	3.48%	0.11%	375,242	\$3.64	\$0.014	40.50	NWY	1.34%	0.009%	94,970	\$2.45	\$0.017	71.30
TYG	8.09%	0.17%	279,394	\$36.74	\$0.075	21.32	RLI	0.55%	0.020%	139,447	\$53.38	\$0.113	21.01
TZOO	5.83%	0.15%	124,874	\$10.07	\$0.042	42.08	TRNO	0.37%	0.010%	178,560	\$21.55	\$0.048	22.62
USAC	9.30%	0.20%	130,583	\$18.40	\$0.106	57.48	FCB	0.77%	0.019%	217,494	\$30.48	\$0.061	20.50
VCIT	4.89%	0.12%	451,992	\$85.91	\$0.053	6.15	IT	0.61%	0.016%	406,922	\$85.95	\$0.081	9.42
VICR	7.09%	0.18%	56,688	\$11.89	\$0.070	62.03	MODN	1.11%	0.019%	91,268	\$11.19	\$0.041	36.74
VNQI	13.04%	0.33%	374,913	\$54.84	\$0.055	10.17	TTC	0.63%	0.019%	265,760	\$69.75	\$0.082	11.78
WLDN	9.82%	0.23%	77,911	\$12.01	\$0.064	54.70	CTRE	0.12%	0.003%	227,593	\$12.27	\$0.042	34.08
Avg	7.81%	0.15%	160,108	\$26.98	\$0.075	34.20	Avg	0.68%	0.01%	183,525	\$27.80	\$0.066	29.96

III. Active Stocks (CADV > 500,000) and Post-Period = 2017 - 2018

For this sample, there were 41 matched pairs that emerged from the process. The pairs, along with values of the matching variables (pre-period), are shown as follows:

Table 3A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)									
Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AA	19,848,728	\$16.29	\$0.010	6.17	ITUB	15,391,611	\$15.06	\$0.010	6.70
AG	1,868,134	\$7.10	\$0.010	15.21	CUZ	1,707,347	\$12.49	\$0.010	8.27
AINV	1,804,765	\$8.30	\$0.010	12.24	BVN	1,783,634	\$11.21	\$0.011	10.10

Table 3A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)

Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AMBA	2,103,392	\$42.35	\$0.062	14.79	PLD	2,692,357	\$39.81	\$0.011	2.90
APO	1,356,506	\$23.15	\$0.021	9.23	BRX	1,278,575	\$23.37	\$0.017	7.12
AXAS	2,961,152	\$4.58	\$0.010	22.80	CIG	5,661,208	\$6.35	\$0.010	16.10
BCRX	1,244,583	\$11.27	\$0.021	18.89	CLI	899,677	\$19.58	\$0.016	8.08
BUD	1,367,716	\$110.28	\$0.030	2.76	TOT	1,409,344	\$60.36	\$0.023	3.83
BX	4,891,093	\$31.38	\$0.014	4.46	COG	6,157,960	\$32.25	\$0.012	3.76
CLNE	1,664,000	\$7.39	\$0.012	16.09	DRH	1,577,838	\$13.54	\$0.010	7.59
CMCM	892,660	\$20.49	\$0.057	27.49	MDU	1,080,599	\$27.56	\$0.019	6.71
CSIQ	3,978,563	\$32.55	\$0.034	10.54	CNQ	4,352,711	\$37.08	\$0.012	3.35
DO	2,028,802	\$37.29	\$0.026	6.93	HCP	2,538,605	\$42.25	\$0.012	2.73
DSX	726,289	\$8.85	\$0.012	14.11	FNB	879,836	\$12.44	\$0.010	8.36
F	34,678,316	\$15.13	\$0.010	6.65	FOXA	13,032,567	\$34.41	\$0.010	2.95
FEYE	8,234,032	\$31.44	\$0.022	7.22	HST	6,716,845	\$22.14	\$0.010	4.62
FNSR	2,320,485	\$16.88	\$0.012	7.33	TPH	2,159,710	\$13.94	\$0.012	8.68
GME	2,808,482	\$41.86	\$0.018	4.25	SNY	2,182,012	\$51.81	\$0.018	3.45
GNW	9,907,097	\$12.24	\$0.010	8.49	SAN	10,583,634	\$9.09	\$0.010	11.05
GRPN	16,296,242	\$6.85	\$0.010	14.75	SLM	4,532,083	\$9.17	\$0.010	11.09
HAIN	566,626	\$103.28	\$0.083	8.09	SLG	788,370	\$109.07	\$0.057	5.28
HALO	1,250,394	\$9.12	\$0.011	12.49	HTA	1,419,408	\$12.29	\$0.010	8.48
IRBT	712,902	\$33.02	\$0.045	13.54	LHO	859,601	\$36.72	\$0.018	5.05
JWN	1,472,964	\$70.84	\$0.025	3.49	ETR	1,607,873	\$79.55	\$0.025	3.10
LSCC	1,168,221	\$6.88	\$0.011	15.53	RPAI	1,047,067	\$15.36	\$0.011	6.95
LYG	3,517,062	\$4.88	\$0.010	20.51	GGB	7,013,600	\$4.81	\$0.010	21.01
MMP	839,403	\$82.37	\$0.094	11.51	AVB	926,288	\$150.78	\$0.072	4.79
NOK	18,264,234	\$8.24	\$0.010	12.15	BBD	11,667,774	\$15.32	\$0.010	6.59
O	2,027,017	\$44.15	\$0.014	3.16	NI	2,220,002	\$40.72	\$0.013	3.30
OHI	1,490,422	\$36.76	\$0.013	3.43	AIV	1,214,436	\$34.32	\$0.013	3.71
RCII	819,241	\$30.46	\$0.024	7.91	RLJ	735,277	\$30.37	\$0.016	5.38
SINA	1,550,979	\$41.43	\$0.036	8.79	IBN	1,251,526	\$54.07	\$0.024	4.51
SNE	3,075,849	\$18.86	\$0.010	5.40	DRE	2,595,753	\$18.25	\$0.010	5.62

Table 3A: Retail Program Matched Sample CADV >500,000 (Sep - Nov 2014)

Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
SPWR	2,347,451	\$32.45	\$0.025	7.78	FTI	2,360,200	\$54.47	\$0.024	4.39
STX	2,989,069	\$59.38	\$0.022	3.76	NBL	2,781,689	\$61.96	\$0.025	4.08
SYNA	1,066,414	\$71.57	\$0.092	12.64	CPT	642,738	\$72.84	\$0.031	4.31
TERP	626,425	\$28.72	\$0.080	27.81	HR	601,104	\$25.09	\$0.015	6.18
UA	2,678,432	\$67.54	\$0.032	4.80	EQR	2,303,635	\$66.21	\$0.018	2.77
ULTA	1,061,441	\$116.53	\$0.092	7.86	BXP	890,862	\$121.67	\$0.066	5.45
WPC	525,756	\$66.30	\$0.034	5.07	KRC	535,203	\$63.70	\$0.037	5.78
X	8,326,606	\$37.65	\$0.015	4.14	EXC	6,409,198	\$34.91	\$0.011	3.02
Avg	4,325,804	\$35.51	\$0.029	10.49	Avg	3,329,018	\$38.94	\$0.019	6.27

Table 3B: Retail Program Matched Sample CADV >500,000 (2017 - 2018)

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AA	1.30%	0.04%	4,075,295	\$41.33	\$0.022	5.27	ITUB	0.04%	0.001%	12,139,536	\$12.55	\$0.010	8.11
AG	1.71%	0.04%	3,361,556	\$7.04	\$0.010	14.70	CUZ	0.02%	0.001%	3,842,736	\$8.86	\$0.010	11.51
AINV	1.93%	0.06%	865,116	\$6.18	\$0.011	17.22	BVN	0.02%	0.001%	1,343,091	\$13.68	\$0.012	8.61
AMBA	3.68%	0.10%	1,006,023	\$48.50	\$0.062	12.93	PLD	0.09%	0.004%	2,672,000	\$61.33	\$0.018	2.88
APO	1.38%	0.04%	1,098,761	\$29.62	\$0.030	9.93	BRX	0.07%	0.003%	3,076,634	\$18.10	\$0.011	5.96
AXAS	1.33%	0.04%	1,492,938	\$2.15	\$0.010	48.85	CIG	0.11%	0.003%	4,402,939	\$2.48	\$0.010	41.72
BCRX	1.86%	0.06%	1,176,068	\$6.02	\$0.013	21.42	CLI	0.07%	0.003%	593,039	\$22.59	\$0.019	8.24
BUD	1.22%	0.04%	1,764,121	\$105.16	\$0.032	3.12	TOT	0.09%	0.002%	1,764,192	\$55.96	\$0.012	2.08
BX	2.61%	0.05%	4,550,664	\$32.76	\$0.013	3.94	COG	0.10%	0.003%	6,100,394	\$24.46	\$0.011	4.34
CLNE	1.31%	0.04%	1,346,149	\$2.36	\$0.010	45.01	DRH	0.01%	0.000%	2,300,351	\$11.21	\$0.010	9.17
CMCM	1.85%	0.05%	1,059,402	\$10.70	\$0.023	21.69	MDU	0.06%	0.003%	842,527	\$27.03	\$0.014	5.05
CSIQ	4.27%	0.13%	1,025,349	\$14.98	\$0.021	13.76	CNQ	0.11%	0.003%	2,808,082	\$32.12	\$0.010	3.28
DO	1.05%	0.04%	2,326,499	\$15.80	\$0.013	8.14	HCP	0.08%	0.003%	3,666,607	\$27.46	\$0.011	3.94
DSX	2.44%	0.06%	589,433	\$4.02	\$0.012	29.70	FNB	0.09%	0.004%	2,706,799	\$13.63	\$0.010	7.60
F	1.77%	0.05%	40,375,950	\$11.11	\$0.010	9.11	FOXA	0.13%	0.003%	10,396,614	\$35.77	\$0.010	3.02

Table 3B: Retail Program Matched Sample CADV >500,000 (2017 - 2018)

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
FEYE	1.96%	0.05%	4,768,737	\$15.54	\$0.010	6.81	HST	0.03%	0.001%	6,942,056	\$19.29	\$0.010	5.28
FNSR	2.49%	0.06%	3,459,073	\$21.85	\$0.015	6.74	TPH	0.08%	0.003%	1,937,468	\$14.46	\$0.011	7.61
GME	1.35%	0.04%	3,433,058	\$18.21	\$0.011	6.34	SNY	0.05%	0.001%	1,609,403	\$44.08	\$0.011	2.51
GNW	1.76%	0.04%	4,516,565	\$3.75	\$0.010	27.39	SAN	0.10%	0.002%	6,841,859	\$6.04	\$0.010	16.83
GRPN	1.16%	0.04%	8,719,062	\$4.22	\$0.010	24.46	SLM	0.08%	0.003%	3,172,237	\$11.18	\$0.010	9.37
HAIN	1.33%	0.04%	1,583,844	\$33.81	\$0.023	6.98	SLG	0.05%	0.002%	803,572	\$100.37	\$0.074	7.37
HALO	1.60%	0.05%	1,125,888	\$16.21	\$0.021	12.87	HTA	0.06%	0.003%	1,542,950	\$28.57	\$0.013	4.41
IRBT	2.76%	0.07%	906,753	\$79.44	\$0.114	14.03	LHO	0.07%	0.003%	1,633,753	\$30.43	\$0.015	5.08
JWN	1.13%	0.04%	2,630,160	\$49.12	\$0.029	5.96	ETR	0.08%	0.003%	1,375,231	\$79.52	\$0.032	3.97
LSCC	1.27%	0.04%	983,954	\$6.48	\$0.011	16.82	RPAI	0.05%	0.002%	1,794,420	\$12.83	\$0.010	8.10
LYG	1.86%	0.06%	6,256,365	\$3.44	\$0.010	29.36	GGB	0.09%	0.002%	9,702,367	\$3.88	\$0.010	26.36
MMP	1.37%	0.05%	830,180	\$69.21	\$0.060	8.74	AVB	0.08%	0.003%	680,029	\$178.52	\$0.138	7.73
NOK	3.01%	0.08%	14,759,305	\$5.62	\$0.010	17.95	BBD	0.03%	0.001%	11,438,559	\$9.63	\$0.010	10.66
O	1.09%	0.04%	1,910,582	\$56.53	\$0.021	3.69	NI	0.08%	0.003%	3,013,746	\$25.14	\$0.011	4.20
OHI	1.17%	0.04%	2,090,596	\$30.98	\$0.012	3.77	AIV	0.04%	0.002%	1,089,725	\$43.30	\$0.021	4.90
RCII	1.90%	0.07%	1,785,282	\$11.67	\$0.012	10.61	RLJ	0.04%	0.002%	1,419,592	\$21.45	\$0.012	5.44
SINA	2.01%	0.07%	980,389	\$88.41	\$0.105	11.94	IBN	0.07%	0.002%	7,497,988	\$9.05	\$0.010	11.20
SNE	1.21%	0.04%	983,669	\$44.35	\$0.016	3.55	DRE	0.02%	0.001%	2,533,025	\$27.60	\$0.011	3.89
SPWR	3.72%	0.10%	2,639,031	\$7.70	\$0.011	13.99	FTI	0.11%	0.003%	3,833,234	\$29.62	\$0.010	3.52
STX	1.33%	0.04%	4,569,307	\$45.84	\$0.017	3.69	NBL	0.10%	0.003%	5,080,490	\$30.49	\$0.011	3.66
SYNA	1.26%	0.04%	798,985	\$45.96	\$0.064	14.12	CPT	0.07%	0.003%	589,346	\$87.99	\$0.068	7.76
TERP	0.92%	0.04%	582,896	\$11.83	\$0.015	12.75	HR	0.05%	0.002%	835,377	\$30.63	\$0.017	5.58
UA	2.66%	0.06%	4,079,322	\$17.47	\$0.011	6.29	EQR	0.05%	0.002%	1,868,111	\$64.58	\$0.023	3.62
ULTA	1.29%	0.04%	1,064,638	\$251.09	\$0.229	9.18	BXP	0.06%	0.003%	731,983	\$124.60	\$0.097	7.86
WPC	1.41%	0.05%	521,446	\$65.49	\$0.049	7.57	KRC	0.04%	0.002%	552,027	\$72.00	\$0.060	8.31
X	2.61%	0.04%	13,020,309	\$30.64	\$0.012	4.06	EXC	0.05%	0.002%	5,496,241	\$39.40	\$0.010	2.66
Avg	1.84%	0.05%	3,783,237	\$33.48	\$0.029	13.52	Avg	0.07%	0.00%	3,479,764	\$36.88	\$0.022	7.64

IV. Less Active Stocks (CADV between 50,000 and 500,000) and Post-Period = 2017 - 2018

For this sample, there were 49 matched pairs that emerged from the process. The pairs, along with values of the matching variables (pre-period), are shown as follows:

Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AI	380,780	\$26.88	\$0.020	7.45	DSL	361,600	\$21.43	\$0.022	10.36
ANIK	240,282	\$39.38	\$0.089	22.92	WABC	223,670	\$48.09	\$0.083	17.22
APU	310,097	\$45.68	\$0.046	10.16	WST	306,905	\$46.65	\$0.050	10.72
AUDC	153,063	\$4.91	\$0.022	45.54	RVT	191,392	\$14.93	\$0.020	13.56
BLX	130,799	\$32.10	\$0.060	18.85	STC	120,951	\$32.12	\$0.061	19.03
COHU	104,702	\$11.53	\$0.044	38.27	CSGS	157,547	\$26.18	\$0.047	18.17
DBL	78,900	\$23.75	\$0.044	18.48	TRNO	82,554	\$20.20	\$0.053	26.35
DMB	55,155	\$11.99	\$0.023	19.20	CHT	77,541	\$30.23	\$0.032	10.48
DSM	126,484	\$8.06	\$0.014	16.91	FRA	131,349	\$13.84	\$0.013	9.68
FDUS	68,041	\$17.12	\$0.061	35.44	LION	76,072	\$14.50	\$0.082	57.41
FRSH	132,657	\$9.45	\$0.068	71.68	CBU	127,820	\$35.74	\$0.063	17.62
GAIN	110,718	\$7.34	\$0.015	20.05	EOS	144,318	\$13.72	\$0.015	11.22
GASS	155,935	\$8.44	\$0.028	33.44	CENTA	144,524	\$8.25	\$0.032	39.17
GBDC	188,201	\$16.89	\$0.029	16.92	NCI	176,055	\$14.60	\$0.028	19.24
GLAD	128,184	\$9.02	\$0.026	28.43	TI	159,450	\$11.04	\$0.020	17.79
GMLP	163,282	\$35.15	\$0.146	41.52	UMBF	157,424	\$56.89	\$0.146	25.85
GOOD	112,763	\$17.57	\$0.031	17.67	CPF	114,830	\$18.46	\$0.031	16.70
GSVC	139,253	\$10.14	\$0.034	33.84	NBHC	160,159	\$19.39	\$0.035	18.25
HTGC	341,319	\$15.10	\$0.019	12.93	NFBK	271,599	\$13.78	\$0.019	13.77
IEP	129,299	\$105.09	\$0.255	24.34	LANC	127,008	\$88.16	\$0.207	23.53
KCAP	302,537	\$7.93	\$0.016	19.82	ETJ	306,544	\$11.54	\$0.015	13.14
LRAD	234,963	\$2.87	\$0.020	71.58	MFG	335,904	\$3.60	\$0.010	28.25
MAGS	352,530	\$4.58	\$0.052	114.83	RTRX	445,328	\$10.54	\$0.043	40.96
MAIN	202,931	\$31.39	\$0.039	12.33	MLI	201,430	\$30.24	\$0.039	13.07
MUA	52,623	\$13.29	\$0.023	17.06	GHY	173,681	\$16.48	\$0.020	12.16
MUE	65,631	\$13.24	\$0.017	13.04	ISF	67,500	\$25.39	\$0.019	7.65
NANO	111,903	\$14.88	\$0.051	34.61	MG	120,243	\$18.37	\$0.049	26.63
NDP	93,945	\$24.11	\$0.067	28.08	THR	115,353	\$24.59	\$0.057	23.42
NEP	188,649	\$34.86	\$0.185	53.54	PLXS	171,711	\$38.76	\$0.084	21.71
OIA	93,055	\$6.77	\$0.013	19.36	AWP	257,107	\$6.89	\$0.011	15.68

Treatment Stocks					Control Stocks				
Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
PBT	145,410	\$12.85	\$0.030	23.84	DAKT	171,820	\$12.89	\$0.031	24.21
PCK	59,924	\$9.45	\$0.024	25.50	ETV	207,431	\$14.89	\$0.019	12.73
PFLT	67,807	\$14.02	\$0.045	31.98	DGRW	66,466	\$29.59	\$0.043	14.58
PFMT	311,460	\$8.16	\$0.025	30.92	FSS	280,570	\$14.16	\$0.024	16.88
PGP	131,368	\$23.08	\$0.086	37.58	EXLS	133,974	\$26.59	\$0.078	29.49
PMF	58,501	\$14.07	\$0.025	17.56	SKYY	66,651	\$27.35	\$0.035	12.85
PMX	73,074	\$10.85	\$0.020	18.60	CII	136,940	\$14.78	\$0.016	11.17
SDLP	456,457	\$28.00	\$0.075	26.78	FUL	468,387	\$42.02	\$0.049	11.58
SHLO	50,103	\$16.93	\$0.107	63.20	UFCS	56,599	\$29.25	\$0.125	42.48
SJT	96,558	\$18.27	\$0.062	34.17	GRAM	92,291	\$14.22	\$0.057	40.66
SLRC	214,437	\$18.95	\$0.025	13.39	PFS	201,034	\$17.16	\$0.023	13.22
SPH	166,532	\$44.68	\$0.092	20.53	CNMD	162,637	\$40.04	\$0.086	21.35
TCPC	332,634	\$16.60	\$0.028	16.75	NFJ	271,825	\$17.73	\$0.027	15.41
TOUR	318,343	\$17.36	\$0.073	42.30	SYKE	253,700	\$21.34	\$0.040	18.74
TSLX	138,306	\$16.95	\$0.043	25.68	FBC	136,538	\$16.29	\$0.038	23.25
VOC	132,226	\$11.27	\$0.041	38.08	CCU	144,842	\$21.38	\$0.044	20.58
WBK	174,452	\$29.49	\$0.034	11.61	IFGL	147,189	\$30.54	\$0.034	11.29
WLDN	180,819	\$13.99	\$0.061	43.65	FTGC	169,252	\$29.57	\$0.057	19.47
WSR	98,234	\$14.57	\$0.031	21.33	SOCL	122,280	\$19.37	\$0.029	15.22
Avg	166,435	\$19.37	\$0.051	29.83	Avg	179,551	\$23.95	\$0.046	19.88

Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
AI	2.45%	0.06%	458,637	\$11.93	\$0.012	9.87	DSL	0.85%	0.011%	373,997	\$20.14	\$0.015	7.60
ANIK	2.03%	0.06%	123,465	\$46.77	\$0.191	40.89	WABC	0.33%	0.010%	100,762	\$57.73	\$0.231	40.12
APU	3.36%	0.08%	237,312	\$42.89	\$0.077	17.90	WST	0.29%	0.010%	367,026	\$96.31	\$0.129	13.20
AUDC	1.72%	0.06%	117,591	\$7.79	\$0.032	42.65	RVT	0.55%	0.008%	288,150	\$15.18	\$0.017	11.22
BLX	2.13%	0.08%	130,009	\$26.09	\$0.056	21.57	STC	0.16%	0.006%	157,476	\$42.53	\$0.090	21.17
COHU	2.33%	0.09%	284,253	\$20.78	\$0.049	24.11	CSGS	0.10%	0.004%	197,396	\$40.89	\$0.083	20.47
DBL	4.52%	0.07%	74,432	\$22.32	\$0.049	21.63	TRNO	0.11%	0.005%	345,017	\$34.66	\$0.034	10.00
DMB	9.72%	0.07%	58,671	\$12.71	\$0.021	16.46	CHT	0.15%	0.007%	148,554	\$35.08	\$0.025	7.01
DSM	5.07%	0.07%	113,155	\$7.98	\$0.013	16.39	FRA	0.54%	0.010%	163,372	\$14.05	\$0.013	9.26

Table 4B: Retail Program Matched Sample CADV >50,000 and <500,000 (2017-2018)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
FDUS	3.45%	0.09%	97,448	\$15.30	\$0.044	28.40	LION	0.26%	0.011%	109,864	\$23.17	\$0.074	32.01
FRSH	3.36%	0.08%	110,611	\$5.09	\$0.044	86.28	CBU	0.23%	0.007%	243,704	\$57.33	\$0.103	18.12
GAIN	3.01%	0.08%	172,450	\$10.23	\$0.019	18.48	EOS	0.66%	0.009%	131,800	\$15.50	\$0.022	14.38
GASS	4.18%	0.06%	57,778	\$3.70	\$0.035	94.13	CENTA	0.16%	0.007%	234,333	\$34.78	\$0.075	21.63
GBDC	3.77%	0.10%	211,753	\$18.77	\$0.023	12.44	NCI	0.22%	0.009%	296,999	\$21.09	\$0.027	13.06
GLAD	2.68%	0.07%	134,680	\$9.33	\$0.020	21.33	TI	0.18%	0.003%	149,165	\$8.43	\$0.020	23.55
GMLP	2.77%	0.08%	357,537	\$19.24	\$0.039	20.40	UMBF	0.32%	0.009%	222,813	\$73.14	\$0.177	24.31
GOOD	2.19%	0.09%	152,848	\$19.98	\$0.037	18.77	CPF	0.21%	0.008%	139,636	\$29.65	\$0.060	20.33
GSVC	6.04%	0.15%	137,911	\$6.04	\$0.030	51.88	NBHC	0.13%	0.005%	139,900	\$34.36	\$0.070	20.52
HTGC	3.95%	0.10%	476,844	\$13.11	\$0.012	9.55	NFBK	0.20%	0.008%	99,333	\$16.56	\$0.047	28.86
IEP	8.34%	0.13%	100,497	\$59.83	\$0.232	38.77	LANC	0.33%	0.010%	105,903	\$134.53	\$0.506	37.19
KCAP	11.65%	0.18%	117,403	\$3.41	\$0.017	49.08	ETJ	0.43%	0.008%	276,325	\$9.37	\$0.013	13.59
LRAD	11.15%	0.13%	60,046	\$2.17	\$0.032	152.85	MFG	0.13%	0.005%	367,028	\$3.57	\$0.010	28.38
MAGS	6.89%	0.12%	59,713	\$5.48	\$0.055	103.25	RTRX	0.13%	0.005%	334,303	\$23.33	\$0.066	28.37
MAIN	4.44%	0.13%	245,561	\$38.49	\$0.032	8.32	MLI	0.29%	0.010%	207,388	\$31.27	\$0.053	17.02
MUA	12.42%	0.07%	55,118	\$14.03	\$0.027	19.28	GHY	0.50%	0.011%	169,952	\$14.32	\$0.013	9.08
MUE	5.46%	0.06%	63,559	\$12.96	\$0.020	15.65	ISF	1.87%	0.011%	60,764	\$25.70	\$0.024	9.32
NANO	3.12%	0.11%	251,457	\$29.99	\$0.067	22.73	MG	0.12%	0.006%	71,628	\$20.70	\$0.082	40.44
NDP	4.23%	0.07%	75,449	\$13.12	\$0.051	39.75	THR	0.17%	0.008%	123,398	\$21.67	\$0.057	25.99
NEP	3.02%	0.09%	255,681	\$40.17	\$0.093	23.05	PLXS	0.30%	0.010%	174,481	\$57.60	\$0.125	21.74
OIA	16.93%	0.10%	73,578	\$7.67	\$0.017	22.76	AWP	0.69%	0.012%	402,327	\$6.15	\$0.011	17.48
PBT	4.83%	0.10%	100,106	\$8.91	\$0.033	37.49	DAKT	0.20%	0.010%	173,399	\$9.13	\$0.023	25.10
PCK	18.47%	0.07%	71,701	\$9.15	\$0.021	23.21	ETV	0.49%	0.008%	205,388	\$15.31	\$0.016	10.33
PFLT	3.58%	0.11%	197,419	\$13.65	\$0.020	14.98	DGRW	0.09%	0.002%	226,271	\$39.48	\$0.016	3.99
PFMT	8.21%	0.07%	68,953	\$2.11	\$0.054	265.29	FSS	0.24%	0.008%	271,757	\$20.34	\$0.032	15.75
PGP	6.66%	0.07%	65,178	\$15.61	\$0.071	46.24	EXLS	0.26%	0.009%	149,278	\$56.40	\$0.142	24.91
PMF	8.46%	0.07%	79,512	\$13.26	\$0.024	18.20	SKYY	0.42%	0.008%	219,272	\$46.15	\$0.032	7.24
PMX	14.86%	0.06%	65,449	\$11.50	\$0.019	16.19	CII	0.61%	0.010%	130,256	\$15.59	\$0.018	11.60
SDLP	6.34%	0.09%	377,760	\$3.42	\$0.017	50.24	FUL	0.31%	0.012%	362,459	\$51.90	\$0.062	12.11
SHLO	1.77%	0.06%	135,927	\$9.68	\$0.058	60.99	UFCS	0.36%	0.012%	76,492	\$47.53	\$0.233	48.58
SJT	5.54%	0.10%	186,679	\$6.96	\$0.028	40.45	GRAM	0.41%	0.008%	236,863	\$3.44	\$0.044	134.58

Table 4B: Retail Program Matched Sample CADV >50,000 and <500,000 (2017-2018)													
Treatment Stocks							Control Stocks						
Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)	Symbol	RMO % BX	RMO % Ind	ADV	Avg Price	Avg Sprd (\$)	Avg Sprd (bps)
SLRC	2.38%	0.09%	103,705	\$21.28	\$0.040	18.90	PFS	0.18%	0.007%	184,245	\$25.94	\$0.043	16.64
SPH	5.60%	0.15%	279,196	\$24.42	\$0.046	18.83	CNMD	0.36%	0.012%	154,890	\$58.57	\$0.184	31.64
TCPC	4.35%	0.11%	227,052	\$15.54	\$0.019	11.89	NFJ	0.46%	0.007%	264,566	\$12.95	\$0.014	10.78
TOUR	1.30%	0.07%	200,307	\$7.59	\$0.031	43.03	SYKE	0.17%	0.007%	155,555	\$29.58	\$0.075	25.34
TSLX	2.64%	0.08%	244,727	\$19.71	\$0.022	11.23	FBC	0.23%	0.008%	249,281	\$32.55	\$0.052	16.08
VOC	12.82%	0.11%	56,733	\$4.58	\$0.042	92.38	CCU	0.17%	0.008%	182,729	\$26.46	\$0.053	19.89
WBK	1.96%	0.07%	265,250	\$23.11	\$0.017	7.36	IFGL	0.04%	0.001%	110,807	\$28.91	\$0.028	9.67
WLDN	3.13%	0.10%	91,458	\$29.62	\$0.155	52.79	FTGC	0.35%	0.007%	92,367	\$20.22	\$0.031	15.42
WSR	1.66%	0.07%	363,836	\$12.96	\$0.019	15.03	SOCL	0.55%	0.011%	63,186	\$31.00	\$0.075	24.28
Avg	5.53%	0.09%	164,212	\$16.33	\$0.045	39.05	Avg	0.34%	0.008%	198,201	\$32.45	\$0.070	21.82

2. Economic Impact of the BX RPI Program on Execution Quality

To assess the execution quality of the Program, BX focused on symbol-day combinations when during market hours: (i) an RMO execution occurred on BX, (ii) a non-RMO execution occurred on BX, and (iii) a tape-eligible trade occurred on BX. Symbol day combinations are aggregated to overall daily statistics by either a simple average or by volume weighting by RMO executed volume during market hours.²⁴ This results in the number and identity of symbols captured in each daily average changing from day to day. Using this data, the Exchange examined whether the economic outcomes for RMO trades differs from non-RMO trades and/or all trades.

When comparing average price improvement for RMO and non-RMO executions for a subset of 100 stocks with the largest number of RMO shares executed, the price

²⁴ Both RMO and non-RMO execution quality values are weighted by RMO volume and a very small number of extreme outlier symbol-day stats have been removed from the analysis.

improvement seen in RMO and non-RMO trades is comparable over the life of the Program. When volume weighting the average price improvement by RMO volume to emphasize those stock/day combinations with the highest volume traded in RMO, average price improvement on BX for both RMO and non-RMO trades appear generally comparable over time, with RMO price improvement generally beating non-RMO. Note that this price improvement measure does not take rebates into account.

In the subset of active RMO symbols, RMO volume-weighted effective and realized spreads for RMO and all executions, which includes RMO executions, are generally comparable throughout the duration of the Program.

Similar to regular, liquidity-taking orders on BX, the Program offers inverted pricing where RMO orders receive a rebate (on top of the price improvement they receive) when executing against RPI liquidity, while there is a fee associated with RPI orders which post non-displayed, price-improving liquidity. RPI orders are charged \$0.0025 per share. Retail Orders currently receive a rebate of \$0.0021 per share when executing against RPI liquidity, a rebate of \$0.0000 per share when executing against other hidden, price-improving liquidity, and a rebate of \$0.0017 per share when executing against other displayed liquidity on the BX book.

3. Are only Eligible Participants Accessing Program Liquidity

Only RMOs that have been approved by BX can enter RMO orders that access the Program liquidity, and the System does not allow non-RMO orders to access RPI providing orders. The System does not allow non-RMO orders to access RPI providing orders. BX Rule 4780(c) enables BX at its sole discretion to disqualify RMO members that submit orders that fail to meet any of the requirements of the rule.

4. Is the Program Attracting Retail Participation

The Program has attracted some retail orders to the Exchange and participation in the Program has continued to increase over time. The Exchange believes that the Program provided tangible price improvement and transparency to retail investors through a competitive pricing process.

Brokers route retail orders to a wide range of different trading systems. The Program offers a transparent and well-regulated option providing competition and price improvement. BX believes that it has achieved its goal of attracting retail order flow to BX and, as stated above, it has resulted in a significant price improvement to retail investors through a competitive pricing process. The Exchange also has not detected any negative impact to market quality or to retail investors as the Program has continued to grow over time.

On average, an RMO execution continues to get more price improvement than the minimum \$0.001 price improvement required of an RPI liquidity-providing order in the Program, and over time the price improvement seen on BX in non-RMO orders does not appear to be negatively impacted by the introduction of the Program.

5. Net Benefits of the Program on Participants

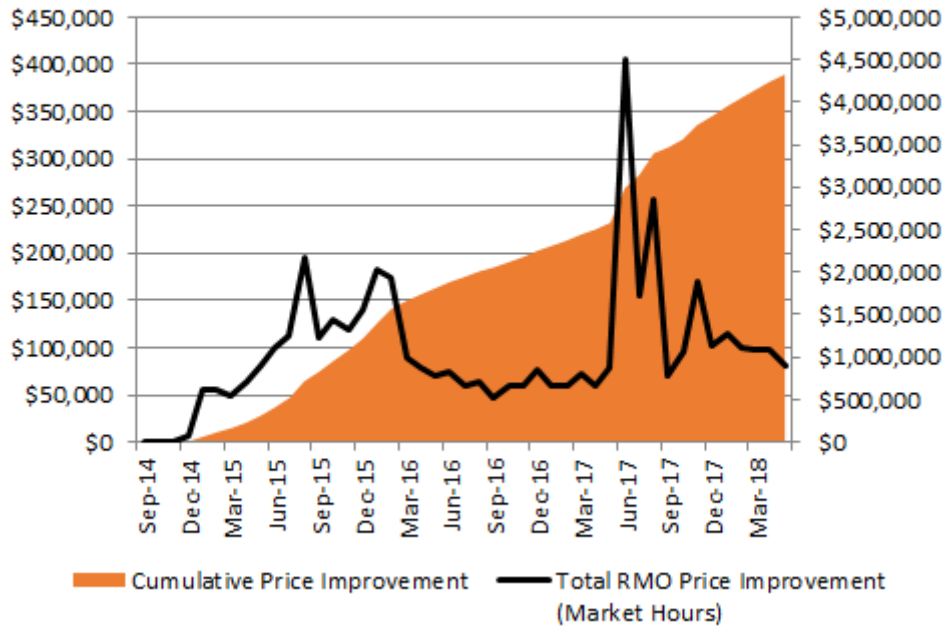
The Exchange believes that the Program through retail order segmentation does create greater retail order flow competition and thereby increases the amount of this flow to BX. This helps to ensure that retail investors benefit from the price improvement that liquidity providers are willing to provide. The Program promotes competition for retail order flow by allowing Exchange members to submit RPI Orders to interact with Retail Orders. Such competition promotes efficiency by facilitating the price discovery process

and generating additional investor interest in trading securities, thereby promoting capital formation.

The Program also promotes competition for retail order flow among execution venues, and this benefits retail investors by creating additional price improvement opportunities for marketable retail order flow, most of which is currently executed in the OTC markets without ever reaching a public exchange. The Exchange believes that it has achieved its goal of attracting retail order flow to BX, and has resulted in price improvement to retail investors through a competitive pricing process. The data also demonstrates that the Program has continued to grow over time and the Exchange has not detected any negative impact to market quality or to retail investors.

The price improvement chart below demonstrates retail firms have received price improvement through their use of the Program that they otherwise may not have received. This is a net benefit to the retail firms as well as the firms who are able to compete to interact with the retail firms.

Monthly and Cumulative Price Improvement



6. Overall Success in Achieving Intended Benefits

The Program has demonstrated the effectiveness of a transparent, on-exchange retail order price improvement functionality, and while small relative to total consolidated volume, has achieved its goals of attracting retail order flow and providing those orders with price improvement totaling tens of thousands of dollars each month.

The Program provides additional competition to the handling of retail orders. The added opportunity for price improvement provides pressure on other more established venues to increase the price improvement that they provide. By doing this, the Exchange believes that the Program may have a greater positive effect than the market share would directly indicate.

Can the Program be Improved

The Program provides a transparent, well-regulated, and competitive venue for retail orders to receive price improvement. The size of the Program is somewhat limited by the rules that prevent BX from matching features offered by non-exchange trading venues. Nonetheless, the Exchange believes the Program is worthwhile and it will continue to look for ways to further innovate and improve the Program. The Exchange believes that making the pilot permanent is appropriate and through this filing seeks to make permanent the current operation of the Program.

Conclusion

In conclusion, the Exchange notes the Program provided opportunities for retail investors to get significant price improvement on an exchange where they otherwise would not have had the opportunity to do so. The Exchange believes the Program did not have a negative impact on the market quality as evidenced by the lack of consistent statistical evidence of an impact and the small size of the Program.

Accordingly, the Exchange believes that the pilot Program's rules, as amended, should be made permanent. Additionally, the Exchange notes that the proposed change is not otherwise intended to address any other issues and the Exchange is not aware of any problems that member organizations would have in complying with the proposed rule change.

2. Statutory Basis

The Exchange believes that the proposed rule change is consistent with the provisions of Section 6 of the Act,²⁵ in general, and with Section 6(b)(5) of the Act,²⁶ in

²⁵ 15 U.S.C. 78f.

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 and not to permit unfair discrimination between customers, issuers, brokers, or dealers.

The Exchange believes that making the pilot Program permanent is consistent with these principles because the Program is reasonably designed to attract retail order flow to the exchange environment, while helping to ensure that retail investors benefit from the better price that liquidity providers are willing to give their orders. During the pilot period, BX has provided data and analysis to the Commission, and this data and analysis, as well as the further analysis in this filing, shows that the Program has operated as intended and is consistent with the Act. The data and analysis provided to the Commission staff demonstrates that the Program provided tangible price improvement to retail investors through a competitive pricing process unavailable in non-exchange venues and otherwise had an insignificant impact on the marketplace. Making the Program permanent would encourage the additional utilization of, and interaction with, the Exchange and provide retail customers with an additional venue for price discovery, liquidity, competitive quotes, and price improvement.

Additionally, the Exchange believes the proposed rule change is designed to facilitate transactions in securities and to remove impediments to, and perfect the mechanisms of, a free and open market and a national market system because the competition promoted by the Program facilitates the price discovery process and potentially generate additional investor interest in trading securities. Making the pilot

Program permanent will allow the Exchange to continue to provide the Program's benefits to retail investors on a permanent basis and maintain the improvements to public price discovery and the broader market structure. The data provided by BX to the SEC staff demonstrates that the Program provided tangible price improvement and transparency to retail investors through a competitive pricing process.

For the reasons stated above, the Exchange believes that making the Program permanent would promote just and equitable principles of trade and remove impediments to and perfect the mechanism of a free and open market.

As described below in BX's statement regarding the burden on competition, the Exchange also believes that it is subject to significant competitive forces and it would increase competition among execution venues, encourage additional liquidity, and offer the potential for price improvement to retail investors.

For all of these reasons, the Exchange believes that the proposal is consistent with the Act.

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

The Exchange 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, as amended. BX believes that making the Program permanent would continue to enhance competition for retail order flow among execution venues and contribute to the public price discovery process.

The Exchange believes that the data supplied to the Commission and experience gained over the life of the pilot have demonstrated that the Program creates price improvement opportunities for retail orders that are equal to what would be provided under OTC internalization arrangements, thereby benefiting retail investors and

increasing competition between execution venues. BX also believes that making the Program permanent will promote competition between execution venues operating their own retail liquidity programs. Such competition will lead to innovation within the market, thereby increasing the quality of the national market system.

Additionally, the Exchange notes that it operates in a highly competitive market in which market participants can easily direct their orders to competing venues, including off-exchange venues. In such an environment, the Exchange must continually review, and consider adjusting the services it offers and the requirements, it imposes to remain competitive with other U.S. equity exchanges.

For the reasons described above, BX believes that the proposed rule change reflects this competitive environment.

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

No written comments were either solicited or received.

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 e-mail to rule-comments@sec.gov. Please include File Number SR-BX-2019-011 on the subject line.

Paper comments:

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

All submissions should refer to File Number SR-BX-2019-011. This file number should be included on the subject line if e-mail 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 Web site (<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 Room, 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

also will be available for inspection and copying at the principal office of the Exchange. All comments received will be posted without change; the Commission does not edit personal identifying information from submissions. You should submit only information that you wish to make available publicly.

All submissions should refer to File Number SR-BX-2019-011 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.²⁷

Eduardo A. Aleman
Assistant Secretary

²⁷ 17 CFR 200.30-3(a)(12).

EXHIBIT 5

The text of the proposed rule change is below. Proposed new language is underlined; proposed deletions are in brackets.

Rules of Nasdaq BX

Equity Rules

* * * * *

4780. Retail Price Improvement Program

(a) – (g) No change.

(h) [Rule Pilot Program. The Program shall expire the earlier of approval of the filing to make this rule permanent or June 30, 2019. During the pilot period, t]The Program will be limited to securities whose Bid Price on the Exchange is greater than or equal to \$1.00 per share.

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