



Municipal Securities Rulemaking Board

Figure 3. Summary Statistics for Request-for-Quote Data

	Phase I Period: 2/2015-5/2015		Phase II Period: 6/2018-11/2018	
	Total	Average Per Day	Total	Average Per Day
Number of RFQs	697,844	8,408	1,195,408	9,405
Percentage of Bids Wanted	99.7%		99.7%	
Number of RFQ Responses	2,713,207		6,357,431	50,056
Average Number of Responses Per RFQ	3.9		5.6	
Median Number of Responses Per RFQ	3.0		5.0	
Percentage of RFQs with No Response	10.9%		5.7%	
Number of Trades Resulting From RFQs	173,751		1,902	255,365
Trade-to-Request Ratio	24.9%		2.093	21.4%
Percentage of Retained Trades	91.2%		4,369	91.0%
Number of RFQs Resulting in No Trades	63,144		63,144	7,396
Percentage of Total RFQs with No Trades	9.1%		5.3%	7.8%
CUSIP Numbers Represented Per Day		5,694		6,375

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Municipal Securities Pre-Trade Market Activity: What Has Changed Since 2015?

²³ On ATS 1, three RFQ requesting firms typically received responses from themselves, essentially resulting in no response. The 2018 MSRB Report did not include these firms' RFQs. The 2018 MSRB Report did not include these firms' RFQs, and the results are entirely comparable to the results presented in this analysis.

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Abstract¹

Since releasing a research report on pre-trade market activity in October 2018 (based on data from 2015), the Municipal Securities Rulemaking Board (MSRB) has obtained more recent quote data from the same two alternative trading systems (ATSs) with a significant presence in the municipal securities market and conducted an in-depth analysis for the period from June 1, 2018 through November 30, 2018.² The analysis indicates that there was a significant increase in the amount of responses to Request for Quotes (RFQs, also known as “bid-wanted”) and live quotes³ in the three-and-a-half-year timespan between 2015 and 2018. For RFQs, the preliminary analysis confirms the results from the prior analysis that the execution rate on an ATS platform was higher when more responses were received. For live offer quotes, the analysis indicates that live quotes increasingly provided a valuable pricing indicator to the market, even though a majority of live quotes only represented one (offer) side of the market and 22% of all trades (and 58% of inter-dealer trades) were executed on an ATS platform. Quoted offer prices may have become more visible to market participants, and more informative to execution prices for inter-dealer, customer buy and customer sell trades, as a result of increased quote provision and offer price competition.

The authors welcome feedback and suggestions on this report as well as recommendations on additional data and analysis that could be helpful to municipal market stakeholders. Please contact Simon Wu, MSRB Chief Economist, at swu@msrb.org or 202-838-1500.

¹ The views expressed in this research paper are those of the authors and do not necessarily reflect the views and positions of the MSRB.

² ATSs are sometimes referred to as electronic platforms or electronic venues.

³ Live quotes typically are unsolicited and reside on an ATS platform until they are executed, canceled or time expired.

Introduction and Background

In October 2018, the MSRB published a research study (the 2018 MSRB Report) on pre-trade market activity for municipal securities.⁴ Utilizing RFQ and live quote data provided by two predominant municipal securities electronic ATS platforms, in conjunction with trade data from MSRB's Real Time Trade Reporting System (RTRS), the 2018 MSRB Report conducted an in-depth analysis covering a four-month period from February 1, 2015 through May 31, 2015 ("Phase I Period"). The main contribution of the 2018 MSRB Report to the existing literature was in analyzing whether the currently non-publicly available pre-trade information has implications for the broader market's price discovery process.⁵

Given the ever-changing dynamics in the municipal securities trading world, it is prudent to analyze newer data to provide further insights into the informativeness of ATS quotation data, as well as the latest composition of the market. For example, some of the existing ATS platforms appear to receive significantly more responses to RFQs and have significantly more offerings (CUSIP numbers⁶) for live quotes than a few years ago. Furthermore, proprietary trading firms and algorithmic trading firms have become frequent users of ATSs in recent years. As a result, the MSRB obtained newer ATS data for the six-month period from June 1, 2018 through November 30, 2018 ("Phase II Period") from the same two ATS platforms ("ATS 1" and "ATS 2") prominent in the municipal securities trading market.⁷ This updated report seeks to assess how the pre-trade market changed over the three-and-a-half-year period, and to determine whether quote information on ATS platforms continues to be valuable for price discovery purposes and provides value for investors and market participants.

⁴ See Wu, Simon Z., John Bagley and Marcelo Vieira, "Analysis of Municipal Securities Pre-Trade Data from Alternative Trading Systems," Research Paper, Municipal Securities Rulemaking Board, October 2018 (<http://www.msrb.org/Market-Topics/~media/28D243F1ECC040BB81BA1DC8FD869454.ashx?>).

⁵ The authors of the 2018 MSRB Report presented the findings to the SEC's sponsored Fixed Income Market Structure Advisory Committee (FIMSAC) meeting on October 29, 2018.

⁶ CUSIP[®] is a registered trademark of the American Bankers Association.

⁷ For confidentiality purposes, this report anonymizes the name of an ATS when describing detailed results. The MSRB also obtained data from a third ATS platform ("ATS 3") for the period from June 1, 2018 through December 31, 2018, from which the MSRB did not request data in 2015. ATS 3 is reputedly the third largest ATS for municipal bonds but is considerably smaller than the other two ATS platforms; for example, there are more than five times as many RFQs and live quotes on ATS 1 and on ATS 2 as on ATS 3. For the consistency reasons, the analysis in this report focused on the comparison of the pre-trade activity between 2015 and 2018 for the same two ATS platforms, and the findings from ATS 3 are therefore excluded. In any case, the results from ATS 3 were mostly similar to those of ATS 1 and ATS 2.

Brief History of Pre-Trade Transparency

Pre-trade information broadly includes quote data (bid-side and offer-side) signaling trading interests available on electronic platforms or through non-electronic means, new issue pricing scales, yield curves and indices, evaluated prices, trading in similar securities and other material disclosure information. For purposes of this report however, pre-trade information specifically refers to the narrower definition, which is the indication of size and price of prospective trading interest in specific securities. This includes responses to RFQs and live firm quotes of a specified size—that is, a commitment to buy or sell a specific quantity of a municipal security at a stated price.

Municipal Securities Market Structure and Electronic Trading

The municipal securities market provides investment and trading opportunities for investors—both retail and institutional—and other market participants. It largely functions as an over-the-counter market, where investors place their orders with brokers, dealers and municipal securities dealers (collectively, “dealers”) directly. By purchasing municipal securities, investors are looking for a promise of income from interest payments—usually semi-annually—and the eventual return of the original investment, or principal. Other market participants, such as dealers seek trading profits by making a market for municipal securities and charging a spread (the difference between the bid and the ask for a security) and/or a commission on trades with investors or other market participants. For example, after receiving a customer order to trade a municipal bond, dealers either execute the order by committing dealer capital (principal trades) or by searching for an intermediary in the market to facilitate the transactions (riskless principal trades⁸ or agency trades).

As discussed in the 2018 MSRB Report, the advent of fixed income electronic trading venues changed the trading landscape of the last decade.⁹ The main functions of an electronic trading venue such as an ATS or some broker’s brokers are: 1) posting live quotes and soliciting RFQs electronically, 2) aggregating and consolidating quotes by price/yield and size and 3) electronic execution of a trade against posted quotes. Electronic trading may facilitate the management of dealer inventory and reduce counterparty search costs.¹⁰ ATS platforms also offer anonymity to participants that post quotes. As a result, market participants such as dealers, proprietary trading firms and institutional investors may prefer

⁸ To the extent a dealer executes a simultaneous or near-simultaneous principal transaction offsetting a customer order, this is sometimes referred to as a riskless principal trade.

⁹ See Wu, Bagley and Vieira, “Analysis of Municipal Securities Pre-Trade Data from Alternative Trading Systems,” October 2018.

¹⁰ Staff of the Division of Economic and Risk Analysis of the SEC, “Report to Congress: Access to Capital and Market Liquidity,” Page 178, August 2017. <https://www.sec.gov/files/access-to-capital-and-market-liquidity-study-dera-2017.pdf>.

using an ATS to find counterparties for trading without broadcasting their trading position to the market.¹¹

For a detailed description of the municipal securities market structure, electronic trading venues and broker's broker platforms, please refer to the 2018 MSRB Report.

Pre-Trade Information

The MSRB currently publishes certain pre-trade pricing-related information to the public, such as yield curves, municipal market indices and new issue pricing scales on its free [Electronic Municipal Market Access \(EMMA®\) website](#), in addition to collecting and disseminating post-trade municipal securities data since 1995 through RTRS and its predecessor, the Transaction Reporting System (TRS). The MSRB, however, neither collects nor disseminates pre-trade information,¹² such as quote data about the price and size of quotes for municipal securities signaling trading interests before a trade is executed. In addition, there is currently no central facility in the municipal market through which such pricing information is made broadly available to the public in a comprehensive manner (*i.e.*, no national best bid and offer indicators as in the equity securities market). To the extent that pre-trade pricing information is available, it typically is provided by proprietary electronic networks but only to data subscribers, such as those operated by ATS platforms and some broker's brokers, and occasionally through non-electronic venues.

As discussed in the 2018 MSRB Report, most electronic platforms do not share pre-trade information (bids, offers, requests for quotes of a security or responses to a request) with the broader market, and this information is available only to ATS participants engaging directly with such venues or other proprietary data subscribers, who are predominantly financial professionals.¹³ In fact, not only is access to pre-trade pricing information limited to ATS data subscribers, information may be further restricted to a few market participants involved in some of those potential transactions, such as during the RFQ process. The level of live quote information disseminated could also be limited depending on each market participant's willingness to share the information on some or all the bids and offers entered for a potential transaction.¹⁴

¹¹ Traditionally, broker's brokers also performed similar functions to those provided by the modern-day ATS, such as aggregating liquidity and acting as agent or riskless principal in the purchase or sale of securities for dealers, institutions and other sophisticated market participants. Many broker's broker platforms have also evolved from a pure voice brokerage (*i.e.*, via the usage of a telephone) historically to a hybrid usage of telephone negotiation and electronic systems. See SIFMA, "The Role of Municipal Securities Broker's Brokers in the Municipal Markets," 2017.

¹² This is not unique to the municipal securities market, as the corporate bond market does not provide universally available pre-trade information either.

¹³ See Wu, Bagley and Vieira, "Analysis of Municipal Securities Pre-Trade Data from Alternative Trading Systems," October 2018.

¹⁴ For example, responses to RFQs are only visible to market participants who request for bids but are not other ATS participants. Also, market participants who post live quotes have an option to prohibit certain subscribers from viewing their quotes.

Potentially, this pre-trade information could provide investors, researchers, securities regulators and all other market participants with important bond pricing information currently only accessible to select market participants. Thus, the availability of this information could improve pricing efficiency, investor confidence and market liquidity in the municipal market. Since January 2012, there have been several regulatory developments on pre-trade transparency in the municipal securities market, both at the U.S. Securities and Exchange Commission (SEC) and at the MSRB. However, as of early 2020, there was no formal recommendation or rule proposal put forward by any regulatory agency that would make such pre-trade information available to the public at no cost.

For a detailed description of the recent regulatory developments in pre-trade disclosure and the academic research performed in the area of pre-trade information transparency, please refer to the 2018 MSRB Report.

Pre-Trade Analysis Data and Methodology

As previously mentioned, to provide an apples-to-apples comparison, all Phase II Period results presented are limited to the same two ATS platforms captured in the 2018 MSRB Report for the Phase I Period, which are the two largest ATS platforms for municipal securities trading. Both ATS platforms voluntarily provided the MSRB with pre-trade and post-trade data, including RFQ (bids and offers wanted), response to RFQ, live quote and associated transaction data for a six-month Phase II Period.¹⁵ The MSRB performed an in-depth analysis of ATS quote and trade data from the RTRS, comparing the results from the Phase II Period with the results from the Phase I Period. For the purposes of this research report, only secondary market trades in municipal securities are included in the analysis.

The RFQ data includes quantity and price information for each RFQ, RFQ responses and associated trades, if any, with nearly 1.2 million total requests and 6.4 million total responses during the six-month Phase II Period. The live quote data contain bidding and offering amount, bidding and offering price, and bidding and offering yield information, with nearly 240 million quote updates from the two platforms in the Phase II Period.

It is important to note that pre-trade quote data could also be available from other ATS platforms, venues designed for institutional investors, broker's brokers, dealers and third-party vendors. Dealers may have multiple offerings for an individual bond depending on where the quote is shown (*i.e.*, an offer quote on an ATS versus an offer quote to a client).¹⁶ In particular, institutional investors may prefer other electronic platforms that tailor toward large block-size traders. The MSRB requested ATS data from specific ATS platforms in both 2015 and 2018 because of the significant amount of "retail-sized" trades (\$100,00 par value or less) on those platforms, their prominent market shares during both timeframes, and their ability and willingness to voluntarily deliver a large amount of data quickly and efficiently.

¹⁵ The MSRB removed duplicated quotes for each dealer on each platform for this analysis based on CUSIP numbers, date and general timeframe of the quotes.

¹⁶ In addition to MSRB's registered dealers, other market participants, such as institutional investors, can have access to an ATS to post and solicit quotes. For the purposes of this report, dealers henceforth refer to all market participants who are subscribed to one or both ATS platforms.

Findings of Pre-Trade Data Analysis

With the advantage of having the prior findings from the 2018 MSRB Report, the empirical analysis in this report focuses on the changes in pre-trade market activities over the course of the Phase I Period and Phase II Period, a three-and-half-year time span.

Market Share of Inter-Dealer and ATS Trades

Before analyzing the ATS data, this section first compares the market share of different types of ATS trades in the Phase II Period to those in the Phase I Period. Table 1 presents the market share by number of trades and par value for customer purchase, customer sell and inter-dealer trades. The percentage breakdown by trade count did not change substantially from the Phase I Period to the Phase II Period. However, the breakdown by par value traded did change between the two periods, as the customer buy par value (and to a lesser extent, customer sell par value) gained at the expense of inter-dealer par value. This could be explained partially by an increase in published trades of commercial paper as a result of the reengineering of the MSRB's RTRS starting on May 29, 2018. The reengineered RTRS allows a small percentage of previously non-published trades to be publicly disseminated, which are predominantly large-sized commercial paper trades. Since a vast majority of commercial paper trades are extremely large customer purchases by institutional investors,¹⁷ there has been an upward shift in the market share of customer buy par value after May 2018 as a result of the RTRS upgrade.

Table 1. Market Share of Trade Types

Trade Type	Phase I Period: 2/2015–5/2015		Phase II Period: 6/2018–11/2018	
	Trades	Par Value	Trades	Par Value
Customer Buy	39.8%	40.9%	38.3%	46.0%
Customer Sell	22.2%	33.3%	23.7%	35.9%
Inter-Dealer	37.9%	25.8%	38.0%	18.1%

Source: MSRB analysis with data obtained from MSRB's RTRS.

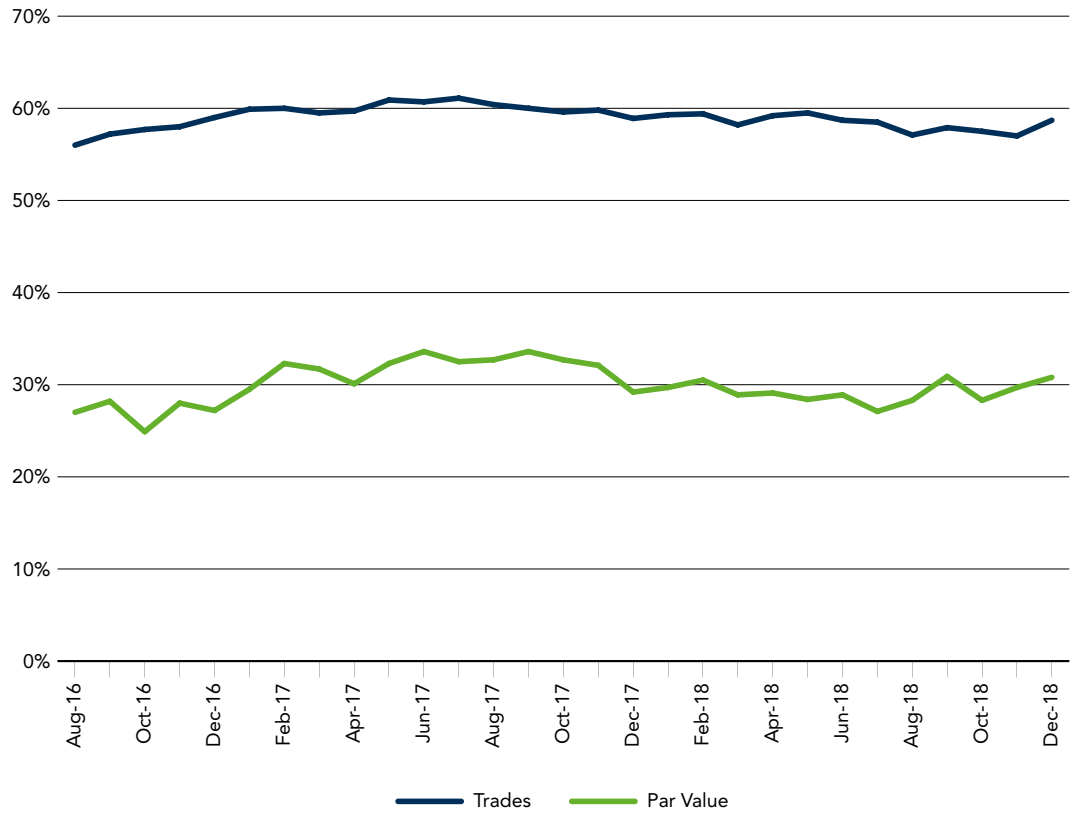
Since many investors, especially retail investors,¹⁸ do not have access to ATS platforms, a vast majority of reported trades executed on ATS platforms are trades between dealers. Chart 1 examines the percentage of inter-dealer trades executed via an ATS and finds, overall, between 56% and 61% of inter-dealer trades were executed on all ATS platforms for every month from August 2016 through December 2018, including the Phase I and Phase II periods. On the other hand, the percentage of executions by par value fluctuated between 25% and 34%, suggesting that the average inter-dealer trade size on ATS platforms was

¹⁷ For example, in the Phase II Period, the average trade size for commercial paper was around \$10 million par value, compared to the trade size of \$275,000 par value for all trades.

¹⁸ For purposes of this analysis, retail investors refer to individual non-professional investors who buy and sell securities for their own personal accounts and often trade in relatively small amounts, such as a par value of \$100,000 or less when trading municipal securities.

smaller than the average inter-dealer trade size executed elsewhere. Chart 1 confirms that ATS participation in the overall inter-dealer market remained significant and steady through the end of 2018.

Chart 1. Market Share of ATS Trades Among Inter-Dealer Transactions
(August 2016–December 2018)



Source: MSRB analysis with data obtained from MSRB's RTRS.

Volume of ATS Quote Data

Since 2015, the volume of quote data on the two ATS platforms rose substantially. Table 2 compares the size of the pre-trade data between the Phase I and Phase II periods. While the monthly average number of trades on ATS 1 and ATS 2 in the Phase II Period was noticeably lower than the number of trades in the Phase I Period, with a 28% decline, the quote volume had risen substantially. The monthly average number of RFQs went up to 199,000 from 174,000, a 14% increase, and the growth rate for responses to RFQs was even higher, at 56%. Similarly, the number of live quotes also rose drastically, from 27.7 million live quotes per month in the Phase I Period to 39.3 million live quotes in the Phase II Period, a 42% rise.

Overall, the quote data size dwarfs the size of the reported trades through the RTRS, as the live quote data from a single ATS platform (ATS 1) during a six-month period in 2018 had more data points (nearly 162 million live quotes) than the number of reported trades in the MSRB RTRS database for its entire 15-year period in existence from January 2005 through December 2019 (144 million reported trades). In addition, there were a total of 4.9 million secondary market trades during the comparable Phase II Period, significantly less than the amount of live quote volume on ATS 1 and ATS 2.

Table 2. Quote and Trade Data Volume on ATS 1 and ATS 2

	RFQs	Responses	Live Quotes	Trades on ATS Platforms	All Secondary Market Trades	All Reported Trades (January 2005–December 2019)
Phase I Period: 2/2015–5/2015						
Total	697,844	2,713,207	110,682,912	840,871	3,055,351	
Average Per Month	174,461	678,302	27,670,728	210,218	763,838	
Phase II Period: 6/2018–11/2018						
ATS 1	621,587	2,970,950	161,664,641	588,148		
ATS 2	573,821	3,386,483	73,881,567	323,460		
Total	1,195,408	6,357,433	235,546,208	911,608	4,859,592	144,038,987
Average Per Month	199,235	1,059,572	39,257,701	151,935	809,932	
Percentage Increase—Average Per Month	14.2%	56.2%	41.9%	-27.7%		

Source: MSRB analysis with data obtained from MSRB’s RTRS and from two alternative trading systems (see footnote 7).

Request-for-Quote Data

As indicated in the 2018 MSRB Report, there is an information imbalance for quote data in the municipal securities market, as a vast majority of RFQs were solicited for bids while most live quotes were offer quotes. The imbalances still existed during the Phase II Period, where most of the RFQ data from the two ATSs were requests for bids, with only 0.3% of the data representing offers wanted (see Table 3), the same percentage as in the Phase I Period. This is not surprising as investors, especially retail investors tend not to liquidate their acquired municipal securities positions before maturity, resulting in significantly less live bid quotes posted by market participants on the platforms in comparison to live offer quotes, and therefore more RFQs soliciting bids whenever an investors does want to sell a position. On average, there were 9,400 RFQs per day across the two platforms during the Phase II Period, compared to 8,400 RFQs per day in the Phase I Period, a 12% increase.¹⁹

¹⁹ The increase in RFQs may partially be explained by the implementation of MSRB’s best execution rule in March 2016. The adoption of this rule may have had the effect of impacting some dealers’ decision to solicit RFQs on multiple platforms simultaneously in an effort to solicit the best bid. See <http://www.msrb.org/~media/Files/Regulatory-Notices/RFCs/2018-22.ashx??n=1>.

By comparison, there was an average of 5.6 responses per each RFQ across the two platforms in the Phase II Period, with a median of five responses. The average and median number of responses were considerably higher than those during the Phase I Period, where the average was 3.9 responses and the median was three responses. *The increase in the response rate is in line with the information gathered anecdotally from electronic platform operators, suggesting that more market participants are increasingly involved in the RFQ process.* In addition, 5.7% of RFQs on the two platforms received no responses at all in the Phase II Period, a noticeable decline from 10.9% during the Phase I Period. The 2018 MSRB Report highlights that RFQ response information is not available to all market participants, unlike RFQ and live quote data, which are generally available to most of the subscribers on a platform. In some instances, an RFQ-requesting dealer or a dealer who provides a live quote may not allow all market participants on a platform to see the request or the live quote.

Table 3 also shows that, overall, there were about 255,000 trades on the ATS platforms associated with the 1,195,000 RFQs during the Phase II Period, which represents an aggregate trade-to-request ratio (number of trades divided by number of RFQs) of 21.4% on each requesting ATS platform. Therefore, the remaining 78.6% of all RFQs, or 940,000 RFQs, with an average of nearly 7,400 RFQs per trading day, did not result in a trade on the requesting platform. In the Phase I Period, the trade-to-request ratio was 24.9%, slightly higher than in the Phase II Period. This indicates that, despite the higher number of responses received for each RFQ, the execution rate on the platforms decreased in the Phase II Period as a higher number of RFQs and a much higher number of responses corresponded to a nearly equal number of trades (see the daily average numbers in Table 3). The decrease in trade-to-request ratio could be explained by some dealers choosing to disseminate RFQs for the same bond using multiple platforms simultaneously after the implementation of MSRB's best execution rule in March 2016.²⁰ As a result, the execution rate on a particular ATS platform could decline even though the real execution rate for a bond being solicited may not have changed.²¹ In addition, it should be noted that an RFQ could still result in a trade but not necessarily through the requesting ATS platform(s), as a portion of the "non-executed" RFQs could also be internalized by the RFQ-requesting dealer or be executed elsewhere.²²

The vast majority of these trades resulting from an RFQ process, or 91%, were still retail-sized—100 bonds or fewer—during the Phase II Period, similar to the 91.2% in the Phase I Period.

²⁰ The best-execution rule requires dealers to use reasonable diligence to ascertain the best market for the subject security so that the resultant price to the customer is as favorable as possible under prevailing market conditions. Subsequent MSRB guidance published on February 7, 2019, after the Phase II Period, clarifies that a dealer is not required to put out a bid-wanted with multiple fixed income ATSs or broker's brokers to meet its best-execution obligations (though this may be warranted in some cases) or subscribe to every ATS.

²¹ For example, if a dealer requests quotes for the same bond on two different ATS platforms, even if the bond is traded on one platform with the best response, the trade-to-request ratio would only be 50% even though the real execution rate based on the dealer's intention should be 100%.

²² The MSRB is analyzing the total execution rate, including the percentage of internalized executions of RFQs as well as trades executed elsewhere, in a separate study.

Table 3. Summary Statistics for Request-for-Quote Data

	Phase I Period: 2/2015–5/2015			Phase II Period: 6/2018–11/2018		
	Total	Average Per Day	CUSIP Numbers Represented Per Day	Total	Average Per Day	CUSIP Numbers Represented Per Day
Number of RFQs	697,844	8,408	5,694	1,195,408	9,405	6,375
Percentage of Bids Wanted	99.7%			99.7%		
Number of RFQ Responses	2,713,207	32,689	5,242	6,357,431	50,056	6,102
Average Number of Responses Per RFQ	3.9			5.6		
Median Number of Responses Per RFQ	3.0			5.0		
Percentage of RFQs with No Response	10.9%			5.7%		
Number of Trades Resulting From RFQs	173,751	2,093	1,902	255,365	2,010	1,841
Trade-to-Request Ratio	24.9%			21.4%		
Percentage of Retail Sized Trades	91.2%			91.0%		
Number of RFQs Resulting in No Trades	524,093	6,314	4,369	940,043	7,396	5,100
Percentage of Total RFQs	75.1%			78.6%		

Source: MSRB analysis with data obtained from two alternative trading systems (see footnote 7).

Table 4 shows that for the vast majority of RFQs receiving at least one response on the two platforms during the Phase II Period, the trade-to-request ratio was 22.7%. Further, as an RFQ received more responses, it became more likely to result in a trade, with the trade-to-request ratio going up uniformly along with the number of responses received. The trade-to-request ratio ranged from 7.5% when an RFQ received only one response, to 56.7% when an RFQ received 20 responses and to 73.2% when an RFQ received more than 20 responses. The correlation between the trade-to-request ratio and the number of responses received is similar to what the 2018 MSRB Report found, though the 2018 MSRB Report included the results for only one of the ATS platforms.²³

²³ On ATS 1, three RFQ requesting firms typically provided the only response to their own RFQs and then traded with themselves, essentially internalizing the trades. Those three firms' RFQs were excluded in this analysis when those RFQs only received one (self) response. The 2018 MSRB Report did not attempt to filter out those firms' RFQs but instead captured the results for ATS 2 only, therefore the results in that report were not entirely comparable to the results presented in Table 4 and thus were omitted.

Table 4. Relationship Between Number of Responses and Trade-to-Request Ratio (Phase II Period)

Number of Respondents	Number of RFQs	Number of Trades	Trade-to-Request Ratio
1	59,341	4,461	7.5%
2	101,467	12,454	12.3%
3	131,665	19,175	14.6%
4	146,505	24,098	16.4%
5	145,254	27,246	18.8%
6	131,553	27,437	20.9%
7	111,068	25,161	22.7%
8	86,583	22,361	25.8%
9	63,445	18,542	29.2%
10	42,879	13,987	32.6%
15	2,766	1,385	50.1%
20	60	34	56.7%
>= 20	82	60	73.2%
All RFQs with Responses	1,126,784	255,365	22.7%
All RFQs	1,195,408	255,365	21.4%

Source: MSRB analysis with data obtained from two alternative trading systems (see footnote 7).

Table 5 shows that of all the trades during the Phase II Period (on trades that had at least one response to a bid-wanted RFQ in the same CUSIP number on the same trading day), nearly 40% of those trades were customer sell trades, more than twice as many as customer buy trades. This ratio was the reverse of a normal day during the same period, where there were nearly twice as many customer buy trades as customer sell trades (see Table 1 above), suggesting that, as expected, there is a strong connection between bid-wanted RFQ activities and customer selling activities. The results in the Phase II Period were similar to the prior Phase I Period.

Table 5. Market Share of Trade Types When Matched with Same-Day Responses to an RFQ

	Inter-dealer	Customer Buy	Customer Sell
Phase I Period: 2/2015–5/2015	39.7%	21.2%	39.1%
Phase II Period: 6/2018–11/2018	42.4%	17.8%	39.8%

Source: MSRB analysis with data obtained from MSRB’s RTRS and from two alternative trading systems (see footnote 7).

For those customer sell trades with the same-day responses to RFQs, Table 6 compares the highest bid response with the customer sell trade price and shows that the median difference (highest bid price – customer sell trade price) was zero in the Phase II Period, a 12-basis-point decline from the median in the Phase I Period. In addition, the dispersion of customer sell prices relative to the highest bid response noticeably tightened between the Phase I Period and the Phase II Period across nearly all percentile ranges. This implies that

bid responses may provide a more useful pricing indicator for all customer sell trades as the number of bids received increased.

While the decline in the median difference between the highest bid response and customer sell price was in line with the declining customer transaction spread found in other recent MSRB studies,²⁴ the fact that the median difference was zero would seem to be surprising though it is not entirely impossible and is likely explained by the following factors. First, some of the customer sell trades may be initiated by separately managed accounts (SMAs) affiliated with a dealer firm that typically charges a fee for managing the accounts based on the size of assets under management rather than a per-transaction markup. Second, it should be noted that while the market-wide customer sell trades were executed on the same day for the same CUSIP numbers as the responses to the RFQs, these trades might not be directly tied to the RFQ process. As mentioned previously, live quotes are visible to nearly all market participants who have access to ATS quotes, while responses to RFQs are only visible to requesting dealers but not to other market participants. Third, it is possible that the RFQ requesting dealers might have solicited additional responses from other ATS or broker's broker platforms, and the actual best bid response received could have been higher than the best bid response from the two ATS platforms in this analysis. If this is true, the median difference between the actual best bid response and customer sell trade price (markdown) would have been higher than zero. Fourth, it is also possible that the requesting dealer might have considered that the best bid response price was too low based on other bond valuation criteria. In that case, the dealer could have internalized the order by buying the bond at a price that is higher than the best bid received by some amount, which may have resulted in the customer sell price being at or near the best bid response price. Lastly, when comparing the amount of markdown to the amount of markup, past research has indicated that the markdown amount for customer sell trades tends to be significantly lower than the markup amount for customer buy trades in municipal securities.²⁵

²⁴ See Wu, Simon Z., "Transaction costs for Customer Trades in the Municipal Bond Market: What is Driving the Decline?" Research Paper, Municipal Securities Rulemaking Board, July 17, 2018 (<http://www.msrb.org/~media/Files/Resources/Transaction-Costs-for-Customer-Trades-in-the-Municipal-Bond-Market.ashx>); and Wu, Simon Z. and Marcelo Vieira, "Mark-up Disclosure and Trading in the Municipal Bond Market," Research Paper, Municipal Securities Rulemaking Board, July 2019 (<http://www.msrb.org/Market-Topics/~media/2FF38FE31AA043749F98145BD77F53E7.ashx?>).

²⁵ For example, using a slightly different methodology based on 2014 data, the 2018 SEC study found the markdown for customer sell trades averaged 7.8 basis points, with a median of 23.2 basis points, while the markup for customer buy trades averaged 78.5 basis points, with a median of 75.7 basis points, during the period from August 2014–November 2014. See Craig, Louis, Abby Kim and Seung Won Woo. "Pre-Trade Information in the Municipal Bond Market." Division of Economic and Risk Analysis of the SEC. July 2018.

Table 6. Difference Between Best Bid Response and Customer Sell Trade Price

	Phase I Period: 2/2015–5/2015	Phase II Period: 6/2018–11/2018
Number of Customer Sell Trades with Same-Day Responses to RFQs	318,529	952,665
Percentile		
5th	-2.47	-1.70
10th	-1.44	-1.00
20th	-0.56	-0.44
30th	-0.12	-0.19
40th	0.00	-0.04
50th	0.12	0.00
60th	0.39	0.06
70th	0.63	0.22
80th	0.83	0.49
90th	1.10	0.77
95th	1.50	1.03

Source: MSRB analysis with data obtained from MSRB’s RTRS and from two alternative trading systems (see footnote 7).

Live Quote Data

As mentioned in the 2018 MSRB Report, the fragmented nature of the municipal securities market²⁶ and the difficulty in shorting tax-exempt municipal securities²⁷ are unique characteristics that present significant market challenges, such as discouraging dealer quotations in most municipal securities, as there is less economic incentive to provide quotes in securities that are infrequently traded. Dealers may believe that dealer capital is therefore better concentrated in a few highly traded municipal securities to maximize the market-making opportunity.²⁸

Unlike the RFQ data, Table 7 shows that more than 89.7% of all live quotes submitted were offer quotes and only 5.3% of all live quotes were bid quotes in the Phase II Period, with the rest of live quotes (5%, all on ATS 1) containing both bids and offers.²⁹ By comparison, 97.7% of all live quotes were offer quotes and only 2.1% of live quotes were bid quotes in the

²⁶ With a large number of municipal bonds in the market, fewer than one percent of the outstanding bonds trade on any given day. As a result, providing live quotes for infrequently traded municipal bonds is usually fruitless.

²⁷ Shorting tax-exempt municipal bonds is frequently cost-prohibitive. Therefore, dealers typically cannot offer a competitive quote unless they own the bond or have immediate access to it.

²⁸ Dealers also often commit their capital when a customer is selling a municipal bond, even if the bond is rarely traded.

²⁹ It is possible that some of the recent automated trading firms submit and update bid and offer live quotes simultaneously on the platforms using a computer algorithm.

Phase I Period, with a negligible 0.1% of live quotes being both bid and offer quotes. The continued imbalance in live quote submission for municipal securities, albeit less imbalanced in the Phase II Period than in the Phase I Period, likely is the consequence of investors, especially retail investors, executing a “buy-and-hold” strategy for municipal securities.³⁰ Dealers may see less of a necessity to post a live bid quote when investors generally do not sell off their accumulated positions. This is further exacerbated by the sheer number of municipal CUSIP numbers outstanding and how unlikely an aged bond is to trade on any given day.

The number of CUSIP numbers quoted at the 10 a.m. snapshot went up from 47,300 on an average day during the Phase I Period to 77,700 during the Phase II Period, a 64.4% increase. Regardless, at any given moment, less than 8% of municipal securities had live quotes during the Phase II period out of approximately one million municipal securities outstanding.³¹

Table 7. Summary Statistics for Live Quote Data³²

	Phase I Period: 2/2015–5/2015		Phase II Period: 6/2018–11/2018	
	Total	Average Per Day	Total	Average Per Day
Number of Live Quotes	110,682,912	1,333,529	232,133,064	1,827,819
Number of Live Offers	108,168,069	1,303,230	208,150,637	1,638,981
Number of Live Bids	2,361,285	28,449	12,290,834	96,778
Number of Live Bids and Offers	153,558	1,850	11,691,593	92,060
Percentage of Live Offers	97.7%		89.7%	
Total CUSIP Numbers Quoted	194,317		302,202	
Average CUSIP Numbers Quoted at 10 AM Snapshot		47,286		77,739

Source: MSRB analysis with data obtained from two alternative trading systems (see footnote 7).

³⁰ Selling by investors also tends to concentrate in a newly issued municipal bond, such as within the first 30 days of its issuance. Selling in a bond after the first 30 days is relatively rare. See Wu, Bagley and Vieira, “Analysis of Municipal Securities Pre-Trade Data from Alternative Trading Systems,” October 2018.

³¹ This is in stark contrast to the corporate bond market, where over 54% of corporate bonds have at least one quote across the top two ATs. See the SEC’s “Report to Congress: Access Capital and Market Liquidity” study published in August 2017, Table 18 on Page 200 (<https://www.sec.gov/files/access-to-capital-and-market-liquidity-study-dera-2017.pdf>). The corporate bond quotation data collected by the SEC came from KCG (“Knight”) and TMC for the period from August 1, 2014 through November 28, 2014.

³² There were around 3.4 million live quotes on one ATS which did not classify the bid or offer status. Those live quotes were excluded from this table.

Even for the municipal securities with live quotes, most of these securities only had one or two dealers offering at any given time.³³ Similar to the 2018 MSRB Report, a snapshot was taken at 10 a.m. every trading day during the Phase II Period for both ATS platforms to derive the number of offering quotes at a given time. Table 8 shows:

- 78.5% of CUSIP numbers with live quotes on ATS 1 had only one dealer offering a quote;
- 94.2% of CUSIP numbers on ATS 1 had two or fewer dealers offering a quote;
- Likewise, 82.6% of CUSIP numbers on ATS 2 had only one dealer offering a quote; and
- 96% of CUSIP numbers on ATS 2 had two or fewer dealers offering a quote.

Compared to the percentages of CUSIP numbers with one or two dealers offering quotes on each ATS in the Phase I Period, the percentages in the Phase II Period did not change dramatically for ATS 1, with only a slight decrease across the board. However, for ATS 2, the percentage of CUSIP numbers with a single dealer quoting declined to 82.6% from 94.4%, with a near corresponding rise in the percentage of CUSIP numbers with two dealers quoting, to 13.4% from 5%. That said, having around 95% of all CUSIP numbers with only one or two dealer quotes on each ATS platform as recently as in late 2018 is unique to the municipal securities market,³⁴ especially when compared with the active securities markets such as the equity market. As elaborated above, because of the vast number of securities in the municipal market and the relative high cost of shorting tax-exempt municipal securities, it is highly unlikely that dealers would offer live quotes for a majority of individual bonds. Dealers prefer offering bonds they own or have immediate access to buying.

Table 8. Percentage of Municipal Securities with One or Two Dealers Quoting at 10 AM

Number of Quoting Dealers Per CUSIP	Phase I Period: 2/2015–5/2015		Phase II Period: 6/2018–11/2018	
	ATS 1	ATS 2	ATS 1	ATS 2
One	79.4%	94.4%	78.5%	82.6%
Two	16.0%	5.0%	15.7%	13.4%
One or Two	95.4%	99.4%	94.2%	96.0%

Source: MSRB analysis with data obtained from two alternative trading systems (see footnote 7).

³³ The number of dealers bidding at any given time would likely be even lower as only 10.3% of all submitted live quotes were either bids only or bids and offers.

³⁴ Some dealers are offering duplicated live quotes across multiple platforms; therefore, the actual number of non-duplicated quoting dealers at a given time on a given ATS is likely even lower than indicated. We attempted to eliminate duplicated quotes for one known dealer across both platforms in Table 8 based on the dealer identity, CUSIP numbers, date and general timeframe of the quotes, and then analyzed the aggregate number of live quotes without that dealer’s duplicated quotes across the two platforms. In addition, even when combining the live quotes on both ATSs, 80% of CUSIP numbers had two or fewer dealers offering a quote across the two platforms during the Phase II Period.

Table 9 shows the median live quote size on the two ATSs was 20 bonds or \$20,000 par value in the Phase II Period, which was exactly the same as the median live quote size in the Phase I Period. When isolating to live offer quotes at the time of a trade, the median offer size was \$50,000 in the Phase II Period, compared to \$35,000 in the Phase I Period, a noticeable increase. In comparison, the median trade size on the platforms was 25 bonds or \$25,000 par value, while the average trade size was 52 bonds or \$52,400 par value in the Phase II Period. The average and median trade size in the Phase II Period was comparable to the average and median trade size in the Phase I Period, though slightly more trades were considered retail-sized in the Phase II Period than in the Phase I Period (92% vs. 88.7%). In addition, the average trade size on the ATS platforms was much smaller than the average trade size for all municipal securities, which was about \$274,000 par value during the Phase II Period, though it was in the range of a typical municipal bond retail-size trade, which is 100 bonds or less (or \$100,000 par value or less).³⁵

Table 9. Summary Statistics for Trades Executed Against Live Offer Quotes

	Phase I Period: 2/2015–5/2015		Phase II Period: 6/2018–11/2018	
	Total	Average Per Day	Total	Average Per Day
Number of Trades	667,120	8,038	656,243	5,165
Percentage of Retail-Sized Trades	88.7%		92.0%	
Median Live Quote Size	\$20,000		\$20,000	
Median Offer Size at Time of Trade	\$35,000		\$50,000	
Average Trade Size	\$53,000		\$52,400	
Median Trade Size	\$25,000		\$25,000	

Source: MSRB analysis with data obtained from two alternative trading systems (see footnote 7).

Finally, to examine whether live offer quotes provide any indicative value to trade price regardless of whether a trade was executed on an ATS platform, market-wide trades were matched with live offer quotes at the time of a trade.³⁶ Essentially, this analysis attempted to simulate what a dealer observed on the two ATS platforms at the time of a trade.³⁷ Two methods of live offer quote snapshot analysis were used for the Phase II data:

- The first method (Method 1) allows live offer quotes on both ATS platforms to be carried over from previous trading days unless an offer quote was explicitly canceled; and

³⁵ A trade size of 100 bonds or less is frequently used as a proxy for retail-sized trades; however, it is possible that some of these executions were from institutions.

³⁶ Since live bid quotes represented only 5% of all quotes, they were excluded from this analysis.

³⁷ Dealers would also see live offer quotes from other ATS platforms and/or broker’s broker networks.

- The second method (Method 2) allows only ATS 1's live offer quotes to be carried over from previous trading days unless a quote was explicitly canceled, while for ATS 2 only the same-day live offer quotes are incorporated and quotes submitted on prior days are assumed to be canceled or expired.³⁸

Previously, only Method 1 was used for the analysis of the Phase I Period. Therefore, Method 1 allows a direct comparison between the two periods, while Method 2 attempts to simulate a more accurate picture of the Phase II Period based on the differences in operations between the two ATS platforms. Depending on the method used, between 73% and 81% of all secondary market trades during the Phase II Period had a live offer quote on at least one of the two platforms at the time of execution, even though many of these trades were not executed on ATS platforms. By comparison, using Method 1 only, nearly 70% of all secondary market trades during the Phase I Period had a live offer quote at the time of execution. The increase in the percentage between the two periods was consistent with the substantial rise in the amount of live quotes.

For trades with at least one live offer quote at the time of execution, the median price difference between inter-dealer trades and best offer quotes (lowest offered price) residing on the two ATSs at the time of a trade was zero during both the Phase I and Phase II periods, regardless of the method used for filtering live offer quotes, as shown in Table 10.³⁹ In addition, about half of all inter-dealer trades were executed within 25 basis points (0.25%, or \$2.50 per bond) of a best offer quote in the Phase II Period when using Method 1. Furthermore, trade prices were also more clustered around the best offer quotes in the Phase II Period than in the Phase I Period, implying a further decline in the dispersion of trade prices for inter-dealer trades.⁴⁰ For example, the spread between the 30th and 70th percentile range was 29 basis points in the Phase II Period compared to 44 basis points in the Phase I Period when using Method 1. When using Method 2 for the Phase II Period, which attempted to filter out potentially canceled or expired live offer quotes, the spread between the 30th and 70th percentile range was only 20 basis points. The shrinking price dispersion also exhibited in other percentile ranges, e.g., between the 20th and 80th percentile range and between the 10th and 90th percentiles. The fact that inter-dealer trades prices became more clustered around the best offer quote over the three-and-half year period suggests that live offer quotes may have become more visible to market participants and also more informative to market participants executing all inter-dealer trades, even if the trades themselves might not have been executed on the ATS platform offering the best

³⁸ The MSRB recently learned that one of the ATS platforms allows live quotes to be carried over from one trading day to another, though if a quote is 30 days old, it may be expunged by the platform. On the other hand, the other ATS platform automatically cancels all live quotes at the end of a trading day.

³⁹ For the Phase II Period, the same calculation was also conducted for the difference between the inter-dealer trade yield (as opposed to the inter-dealer trade price) and the best offer yield (as opposed to the best offer price), since bonds can be quoted in both price and yield. Table 10 shows the median difference in yield was 0%.

⁴⁰ While customer trades tend to pay a higher spread due to dealers providing services to execute the trades, inter-dealer trades, in theory, should also have a spread as one side typically initiates a trade as a liquidity taker, albeit a much narrower spread than what a customer trade would have. Therefore, it is not surprising that half of inter-dealer trades were executed at more than 25 basis points away from the best offer quotes.

quote as a result of increased quote provision and offer price competition.⁴¹ That live offer quotes provide a useful indicator for all inter-dealer trades can be further supported by the fact that over 90% of all inter-dealer trades were executed at no more than 55 basis points higher than the best offer quote (Method 2), including the 40% to 45% of inter-dealer trades that were not executed on an ATS platform.

Table 10. Difference in Trade Price and Best Offer Quotes—Inter-Dealer Trades

	Method 1		Method 2
	Phase I Period: 2/2015–5/2015	Phase II Period: 6/2018–11/2018	Phase II Period: 6/2018–11/2018
Number of Trades	851,415	1,579,531	1,463,107
Percent of Total Trades	41.0%	40.2%	41.1%
Price Difference Percentile			
5th	-2.19	-1.66	-1.93
10th	-1.36	-1.02	-1.19
20th	-0.57	-0.41	-0.48
30th	-0.25	-0.17	-0.20
40th	-0.06	-0.06	-0.08
50th	0.00	0.00	0.00
60th	0.00	0.00	0.00
70th	0.19	0.12	0.00
80th	0.51	0.37	0.14
90th	1.09	0.86	0.54
95th	1.76	1.45	1.02
Yield Difference—Median	0.00%	0.00%	0.00%

Source: MSRB analysis with data obtained from MSRB’s RTRS and from two alternative trading systems (see footnote 7).

⁴¹ Other factors, such as interest rates and volatility, could also impact the trade price dispersion around the best offer quote, as a lower-interest-rate environment and a lower-volatility environment may reduce the likelihood that trade prices would scatter. However, interest rates were higher in the Phase II Period than in the Phase I Period and the volatility were low in both periods.

Table 11 illustrates the difference in trade prices and best offer quotes ranked in percentiles for customer trades in both the Phase I and Phase II periods. For those trades with at least one live offer quote at the time of execution, when using Method 1 for the Phase II Period, the median price difference between the customer buy trade and the best offer quote was 48 basis points,⁴² while the median price difference between the best offer quote and the customer sell trade was 54 basis points.⁴³ Compared to the Phase I Period, where the median difference in price between the customer buy trade and the best offer quote was 75 basis points and the median difference in price between the best offer quote and the customer sell was 73 basis points, the median spread between customer buy and sell price in the Phase II Period narrowed significantly to 102 basis points from 148 basis points.⁴⁴ This finding is in line with MSRB's recent research showing a steady decline of the spread between customer buy and customer sell trades in recent years.⁴⁵

When using Method 1, there seemed to be a near symmetry in price differentials between the best offer quotes and customer buy and sell trade prices at the median in both periods,⁴⁶ though the customer sell price was slightly further away from the best offer quote than the customer buy price (54 basis points below vs 48 basis points above) in the Phase II Period. On the other hand, when using Method 2, which attempted to exclude live offer quotes submitted from prior days that were possibly canceled or expired, the near symmetry disappears at the median, with the customer buy price at 38 basis points above the best offer quote and the customer sell price further away at 68 basis points below the best offer quote. This is supported by the findings in Table 5 and Table 6 in the previous section where customer sell trades were found to be related to the bid responses from an RFQ process.

⁴² Trade price was 0.48% higher than the best offer quote.

⁴³ Trade price was 0.54% lower than the best offer quote.

⁴⁴ The median spread was 106 basis points when using Method 2 for the Phase II Period.

⁴⁵ See Wu, "Transaction costs for Customer Trades in the Municipal Bond Market: What is Driving the Decline?" July 17, 2018; and Wu and Vieira, "Mark-up Disclosure and Trading in the Municipal Bond Market," July 2019.

⁴⁶ The median distance between the customer buy trades and the best offer quotes was nearly identical to the median distance between the best offer quotes and the customer sell trades with Method 1. As a further illustration, the percentile spread of the price distance between customer buy trades and best offer quotes resembled the percentile spread of the price distance between customer sell trades and best offer quotes in both the Phase I and Phase II Periods.

Table 11. Difference in Trade Price and Best Offer Quotes – Customer Buy and Sell Trades⁴⁷

	Method 1				Method 2	
	Phase I Period: 2/2015–5/2015		Phase II Period: 6/2018–11/2018		Phase II Period: 6/2018–11/2018	
	Customer Buy	Customer Sell	Customer Buy	Customer Sell	Customer Buy	Customer Sell
Number of Trades	801,153	438,808	1,555,349	790,569	1,422,287	674,276
Percent of Total Trades	38.0%	21.0%	39.6%	20.1%	40.0%	18.9%
Price Difference Percentile						
5th	-0.81	-3.71	-0.73	-3.03	-1.04	-3.41
10th	-0.29	-2.87	-0.27	-2.26	-0.39	-2.56
20th	0.00	-2.00	-0.04	-1.51	-0.05	-1.76
30th	0.10	-1.47	0.01	-1.09	0.00	-1.30
40th	0.32	-1.07	0.15	-0.79	0.10	-0.96
50th	0.75	-0.73	0.48	-0.54	0.38	-0.68
60th	1.13	-0.43	0.91	-0.33	0.84	-0.44
70th	1.57	-0.19	1.35	-0.16	1.25	-0.23
80th	2.00	0.00	1.80	0.00	1.71	-0.10
90th	2.54	0.59	2.25	0.52	2.07	0.24
95th	3.14	1.32	2.71	1.32	2.43	0.87
Yield Difference—Median			-0.10%	0.12%	-0.08%	0.15%

Source: MSRB analysis with data obtained from MSRB’s RTRS and from two alternative trading systems (see footnote 7).

Similar to the results from the RFQ analysis and the inter-dealer analysis, Table 12 shows that the dispersion in price difference between customer trade prices and best offer quotes narrowed between the two periods, regardless of whether Method 1 or Method 2 was used. For example, in the range between the 10th and 90th percentiles, Table 12 illustrates that the dispersion of price differences declined from 282 basis points for customer buy trades and 346 basis points for customer sell trades in the Phase I Period to 252 basis points and 278 basis points, respectively, in the Phase II Period using Method 1, and to 246 basis points and 280 basis points, respectively, using Method 2. Other percentile ranges also exhibited an analogous pattern of decline in the dispersion of price differences between customer trades and best offer quotes. This result is consistent with the proliferation of live quotes between the two periods, which led to increased quote provision and offer price competition. It implies that live offer quotes may have become more visible to market participants, and also more informative to market participants executing customer buy and sell trades, even if the trades themselves might not have been executed on the ATS

⁴⁷ For the Phase II Period, the same calculation was also conducted for the difference between the customer buy trade yield and the best offer yield, as well as the difference between the customer sell trade yield and the best offer yield. Table 11 shows the median of yield difference for both customer buy and customer sell trades.

platform offering the best quote.⁴⁸ Despite the unique feature of the municipal securities market where most quoted municipal securities only had a one-sided offer quote that was live and visible in both the Phase I Period and the Phase II Period, live quotes seem to have strengthened their indicative pricing value to the market.

Table 12. Dispersion in Price Difference Between Customer Trades and Best Offer Quotes

	Method 1				Method 2	
	Phase I Period: 2/2015–5/2015		Phase II Period: 6/2018–11/2018		Phase II Period: 6/2018–11/2018	
	Customer Buy	Customer Sell	Customer Buy	Customer Sell	Customer Buy	Customer Sell
Dispersion by Percentile Range						
5th to 95th Percentile	3.95	5.03	3.44	4.35	3.47	4.29
10th to 90th Percentile	2.82	3.46	2.52	2.78	2.46	2.80
20th to 80th Percentile	2.00	2.00	1.84	1.51	1.76	1.66
30th to 70th Percentile	1.48	1.29	1.35	0.93	1.25	1.07
40th to 60th Percentile	0.81	0.64	0.77	0.46	0.74	0.53

Source: MSRB analysis with data obtained from MSRB’s RTRS and from two alternative trading systems (see footnote 7).

⁴⁸ As mentioned previously, other factors, such as interest rates and volatility, could also impact the trade price dispersion around the best offer quote, as a lower-interest-rate environment and a lower-volatility environment may reduce the likelihood that trade prices would spread out. However, interest rates were higher in the Phase II Period than in the Phase I Period and the volatility were low in both periods.

Potential Future Research

There has been a noticeable increase in the percentage of live quotes that were either bids only or bids and offers, from 2.3% in the Phase I Period to 11.3% in the Phase II Period. While the number of live bids still are greatly outnumbered by the number of live offers, it would be prudent to compare the market-wide trade price with the aggregate best bid responses to RFQs and best live bid quotes at the time of a trade in the future, assuming the market share of live bids continues to grow.

Furthermore, it is possible a few additional ATS platforms and/or other trading venues may continue to grow their market share and become more prominent in the municipal securities market in upcoming years. Given the ever-changing market landscape and a continuing interest in pre-trade-related market structure issues, it may be prudent to solicit newer data from major market participants and monitor the trends in the pre-trade market in the future.

Finally, since the two ATS platforms are predominantly used for retail-sized trades, the findings in this report may not represent the trading and quoting behavior on other venues with mainly institutional-sized pre-trade information. It would be beneficial to examine data from an electronic platform primarily servicing institutional investors for comparison.

Conclusions

In summary, the analysis of the Phase II ATS quote data indicates a significant increase in the amount of responses to RFQs and live quotes during the three-and-a-half years between the Phase I Period and the Phase II Period. For RFQs, the preliminary analysis confirms the results from the prior analysis that the execution rate on an ATS platform was higher when more responses were received. Similar to responses to the RFQs, live offer quotes may have increasingly provided a valuable pricing indicator to the market, whether a bond was traded on an ATS or elsewhere. Even though a majority of live quotes represented only one (offer) side of the market and less than 22% of all trades were executed on an ATS platform, quoted offer prices may have become more visible to market participants, and also more informative to execution prices for inter-dealer, customer buy and customer sell trades in the market, as a result of increased quote provision and offer price competition by market participants.

We caution that the analyses in this report reflect market dynamics where only subscribers to an ATS platform could access pre-trade information. If some or all of the pre-trade information had been available to a wider market, the quoting and trading patterns observed in this report may not hold due to possible behavioral adjustments by market participants and changes in market structure and liquidity in reaction to broader quote dissemination. In addition, while the pre-trade quote data from the two ATS platforms represent a large portion of the market, it should be noted that there exists additional pre-trade information available on other venues, which is not captured in this report. This is particularly true for pre-trade information tailored toward institutional investors on other electronic platforms, as well as additional liquidity provision that may not be visible on any electronic platform. Finally, the Phase II Period in this analysis preceded the spring of 2020, a period of extreme market volatility as a result of the COVID-19 pandemic; the results captured in this report therefore may not represent what would be observed during a period of market stress.

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Appendix A—About the Authors

Simon Wu, Ph.D., Chief Economist—Mr. Wu is the Chief Economist for the Municipal Securities Rulemaking Board (MSRB). With nearly two decades of experience applying economic expertise to securities policymaking and regulation, Mr. Wu oversees economic analysis of MSRB rulemaking and municipal market transparency initiatives, and leads related statistical, econometric and financial economic analysis. Before joining the MSRB's Market Structure department, Mr. Wu served as a financial economic expert on securities trading, market structure, best execution, investment management and financial institution risk management at several economic consulting firms. Mr. Wu also served as Chief Economist at the Federal Housing Finance Agency (FHFA), Office of Inspector General, where he was involved in regulatory oversight on mortgage-backed securities issuance and trading, capital market risk management and unsecured lending by banks. He began his career as senior economist at the Financial Industry Regulatory Authority (FINRA) where he led economic studies in support of securities rule proposals and policy impact analysis. Mr. Wu has a doctorate and master's degree in economics from Vanderbilt University and a bachelor's degree in economics from Belmont University

John Bagley, Chief Market Structure Officer—John A. Bagley is the Chief Market Structure Officer for the Municipal Securities Rulemaking Board (MSRB). In April 2020, Mr. Bagley temporarily joined the Federal Reserve Bank of New York on secondment to help operationalize the Municipal Liquidity Facility in response to the COVID-19 pandemic. In his role at the MSRB, he leads the Market Structure department, which is responsible for the organization's activities and functions related to market leadership, market structure, market transparency, economic analysis, research and industry operations. Mr. Bagley also oversees the Product Solutions and Operations department, which is responsible for the MSRB's market transparency products and data subscription services. Mr. Bagley most recently served as president of BondDesk Trading LLC, where he was responsible for its broker-dealer and related trading platform activity. Previously, Mr. Bagley served in sales and trading roles at divisions of UBS and its predecessor, PaineWebber, for nearly three decades. Mr. Bagley served as a non-voting member of the Securities and Exchange Commission's (SEC) Fixed Income Market Structure Advisory Committee (FIMSAC) and is currently on secondment to the Federal Reserve Bank of New York. Mr. Bagley received his bachelor's degree from Boston University and has a Master of Business Administration from Columbia University.

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ABOUT THE MSRB

The Municipal Securities Rulemaking Board (MSRB) protects investors, state and local governments and other municipal entities and the public interest by promoting a fair and efficient municipal securities market. The MSRB fulfills this mission by regulating the municipal securities firms, banks and municipal advisors that engage in municipal securities and advisory activities. To further protect market participants, the MSRB provides market transparency through its free Electronic Municipal Market Access (EMMA®) website, the official repository for information on virtually all municipal bonds. The MSRB also serves as an objective resource on the municipal market, conducts extensive education and outreach to market stakeholders, and provides market leadership on key issues. The MSRB is a Congressionally created, self-regulatory organization governed by a board of directors that has a majority of public members in addition to representatives of regulated entities. The MSRB is subject to oversight by the Securities and Exchange Commission.



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