



Municipal Securities Rulemaking Board



JULY 2019

Mark-up Disclosure and Trading in the Municipal Bond Market

Table 2. Daily Average Number of Retail-Sized Customer Trades (May 12, 2017 – May 13, 2019)

Period	Retail-Sized Customer Trades
2017 (May 12–December)	30,296
2018 Pre-Mark-up Period	33,539
Mark-up Period	31,716
Post-Mark-up Period	30,732

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Abstract¹

The analysis in this paper sets out to measure whether there were any unintended consequences on municipal bond market trading activities from regulations put in place by the Municipal Securities Rulemaking Board (MSRB) with the goal of providing transparency, improving trading execution and expanding investors' access to information about the cost of buying or selling a municipal security. On May 14, 2018, the MSRB implemented rule amendments that require dealers to disclose their compensation for certain retail customer transactions in municipal securities, commonly known as mark-up and mark-down in the industry. Specifically, the paper examines whether changes in municipal securities trading patterns and transaction costs in the 12 months since the implementation of the mark-up disclosure rule could be attributable to the rule. The analysis focuses on two aspects of the market for determining any potential impact of the rule: 1) dealers' trading behavior in response to the mark-up disclosure rule, and 2) the average transaction costs measured as effective spread for dealer-to-customer trades. The report concludes that to date, there has been no discernible impact from the mark-up disclosure rule based on these measures. Dealers' trading patterns have been consistent with historic variation, and while transaction costs for municipal bonds have declined following the implementation of the mark-up disclosure rule, both retail-sized trades² and institutional-sized trades exhibit similar reduction in transaction costs, and the reduction for retail-sized trades also remains consistent with pre-mark-up downward trends.

We caution that our analysis does not control for any change in market liquidity during the measured period. In addition, the scope of the analysis in this paper is limited to the measures indicated above. Other measures could potentially produce different results. Finally, it is also possible that any impact from the mark-up disclosure rule on the municipal bond market may take more time to emerge.

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

² Currently, there are no reporting requirements to identify retail customer trades. However, the industry and the research community typically use \$100,000 or less par value trades as a proxy for retail customer trades.

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Introduction and Background

The analysis in this paper focuses on identifying any unintended consequences on municipal securities trading following amendments to MSRB rules, effective May 14, 2018, that require brokers, dealers or municipal securities dealers (collectively, “dealers”) engaging in principal transactions to disclose their compensation, commonly known in the industry as mark-up and mark-down (referred to as “mark-up” herein unless the context requires otherwise), on the customer trade confirmation (the “mark-up disclosure rule”). Customer trade confirmations now must include the dealer’s mark-up or mark-down for non-institutional customer transactions when the dealer purchased or sold the security on a principal basis and engages in one or more offsetting principal transactions on the same trading day as the non-institutional customer transaction.³ The paper examines whether any changes in municipal securities’ trading patterns and transaction costs could be attributable to unintended consequences of implementation of the mark-up disclosure rule.

This paper first presents findings in dealers’ trading behavior in relation to retail-sized customer trades (\$100,000 par value or less) in bonds during the one-year pre- and one-year post-mark-up periods using two analytical methods: 1) percentage of traded bonds with same-day retail customer purchase and sell transactions; and 2) percentage of retail customer trades with an offsetting trade for the same dealer on the same day.⁴ In addition, this paper extends a previous MSRB analysis conducted in 2018 on transaction costs in the municipal bond market, “Transaction costs for Customer Trades in the Municipal Bond Market: What is Driving the Decline?” (“2018 MSRB Research Paper”) and provides an estimate of the impact from the mark-up disclosure rule on investor transaction costs.⁵

Municipal Securities Market Structure

Unlike the equity market, fixed-income markets including the municipal bond market largely function as over-the-counter markets, where investors place their orders with dealers directly without a centralized facility. Dealers either execute the orders by committing dealer capital (principal trades) or by searching a counterparty in the market to facilitate the transactions, with the dealers charging a mark-up or a commission to the investors.⁶ For more background on the municipal bond market, please refer to the 2018 MSRB Research Paper as well as the 2018 MSRB pre-trade analysis report, “Analysis of Municipal Securities Pre-Trade Data from Alternative Trading Systems.”⁷

³ See MSRB Rule G-15(a)(i)(F) and Rule G-30. Note that Rule G-8(a)(xi) defines an institutional account as the account of (i) a bank, savings and loan association, insurance company, or registered investment company; (ii) an investment adviser registered either with the Commission under Section 203 of the Investment Advisers Act of 1940 or with a state securities commission (or any agency or office performing like functions); or (iii) any other entity (whether a natural person, corporation, partnership, trust, or otherwise) with total assets of at least \$50 million.

⁴ The methodology used in this paper to quantify offsetting trades does not fully conform to the requirements of the mark-up disclosure rule. See Data and Methodology section for more detail.

⁵ 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.

⁶ The dealer’s compensation depends on the type of trade in which it engages – principal, riskless principal or agency.

⁷ 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, and 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.

Mark-up Disclosure Rule

On May 14, 2018, the mark-up disclosure rule became effective. The MSRB implemented amendments to Rule G-15 and Rule G-30 requiring mark-up disclosure by dealers for certain retail customer transaction in municipal securities⁸ with the goal of providing transparency, improving trading execution and expanding investors' access to information about the cost of buying or selling a municipal security. The amendments were aimed specifically at retail investors who historically have had more limited information than professional market participants regarding municipal security pricing and trading mechanisms. Specifically, Rule G-15 requires the disclosure of mark-ups (and mark-downs) for non-institutional customer trades when dealers buy (or sell) municipal securities on a principal basis to (from) a non-institutional customer and conduct offsetting principal transaction(s) in the same municipal security on the same trading day. Rule G-30 mandates that dealer compensation "...is computed from the prevailing market price at the time of the customer transaction."⁹

As indicated in the economic research literature, a more informed investor is likely to have more effective negotiating power with dealers who execute trades on their behalf.¹⁰ Appendix B summarizes the recent literature on the impact of the mark-up disclosure rule and transaction costs in the municipal securities market.

⁸ FINRA implemented a similar mark-up disclosure requirement for dealers trading corporate bonds on the same day.

⁹ Rule G-30 – Supplementary Material .01 General Principals

¹⁰ See Cuny, Christine, "When Knowledge Is Power: Evidence from the Municipal Bond Market," *Journal of Accounting and Economics*, August 4, 2017; Green, Richard, Burton Hollifield and Norman Schürhoff, "Financial Intermediation and Costs of Trading in an Opaque Market," *Review of Financial Studies*, Volume 20, 2007; and Harris, Larry and Michael Piwowar, "Secondary Trading Costs in the Municipal Bond Market," *Journal of Finance*, Volume 61, 2006.

Empirical Analysis

The analysis consists of two components: 1) an analysis of dealers' trading patterns in relation to retail customer trades before and after implementation of the mark-up disclosure rule; and 2) an analysis of transaction costs for dealer-to-customer trades by calculating effective spread before and after implementation of the mark-up disclosure rule.

Data and Methodology

The MSRB's Real-Time Transaction Reporting System (RTRS) data are chiefly used for all analyses,¹¹ where dealer identifiers are included for all reported trades, in addition to supplemental third-party descriptive data that show an individual security's characteristics such as coupon rate, yield, insurance status, type of issuance, age of bond and bond maturity date, for example. All secondary market customer purchase and sale trades, except for variable-rate securities, are included in this analysis.¹² Since the RTRS data do not indicate whether a customer trade is for a retail or an institutional customer, customer trades with par value at \$100,000 or less are used as a proxy for retail customer trades.

Our analysis compares the statistics calculated for the one-year pre-mark-up period, May 12, 2017 through May 11, 2018, to the one-year post-mark-up period, May 14, 2018 through May 13, 2019.¹³ In addition, for the transaction-cost analysis as well as a few other analyses, we also included the computation for trade data dating back to January 2012 to include more data points to perform a robust time-series trend analysis.¹⁴ Furthermore, the analysis was performed for all fixed-rate customer trades, but with a particular focus on a customer trade size of \$100,000 or less par value, as the mark-up disclosure rule is only applied to retail customer trades.

For the analysis on dealers' trading behavior in relation to customer trades, the first analysis calculates the percentage of daily traded bonds that have both customer buy and sell trades and compares the percentage difference between the one-year pre-mark-up period and the one-year post-mark-up period.

¹¹ The MSRB upgraded the trade reporting system for the RTRS data on May 29, 2018, with the previous system being in service since the beginning of the RTRS on January 1, 2005. One change in the new RTRS system is that more trades are now published by the system that previously would have been flagged as "non-published" trades as a result of a delay in receiving certain security-related information, such as trades for tax-exempt commercial paper.

¹² Variable-rate securities are typically traded by sophisticated institutional investors with no mark-up. Sirri (2014) and Chalmers, Liu and Wang (2017) also excluded variable-rate securities in their analyses. In addition, primary offering transactions are not considered as secondary market trades and therefore are not included in this analysis.

¹³ See "MSRB Provides Implementation Guidance on Confirmation Disclosure and Prevailing Market Price," July 12, 2017.

¹⁴ January 2012 is selected as a starting point to allow for sufficient time elapsed since the Great Recession of the late 2000s when market volatility affected the financial markets substantially, including the municipal securities market.

The second analysis calculates the percentage of retail-sized customer trades with an offsetting same-day trade for the executing dealer during both the one-year pre- and one-year post-mark-up disclosure periods.¹⁵ The MSRB mark-up disclosure rule is triggered for dealer transactions in municipal securities where the dealer buys (or sells) a municipal security on a principal basis from (or to) a non-institutional customer if the dealer also executes one or more offsetting principal transaction(s) on the same trading day as the customer transaction in an aggregate trading size that meets or exceeds the size of the customer trade. As noted above, a non-institutional customer is a customer with an account that is not an institutional account, as defined in MSRB Rule G-8(a)(xi).¹⁶ A key difference between the mark-up disclosure rule and the methodology used for this analysis is the treatment of the aggregate trade size of the customer trades when identifying the offsetting transaction. While only customer transactions of \$100,000 or less were used to quantify the number of transactions that would trigger a mark-up, the pairing of customer trades and offsetting trades in this analysis did not take into account the aggregate trade size. It is important to note this approach could lead to including transactions that would not be eligible for mark-up disclosures and, conversely, missing eligible transactions. However, the MSRB believes the simpler methodology used to calculate the percentage of retail-sized customer trades with an offsetting same-day trade for the executing dealer is a useful proxy in identifying trends in transactions that would potentially be eligible for mark-up disclosure.

For the transaction cost analysis, similar to the MSRB 2018 Research Paper, municipal bond effective spread is used to compute transaction costs. Spread is a common measure of transaction costs paid by investors to execute their trades¹⁷ and is one barometer of financial market liquidity for economists.¹⁸ Contributing factors to transaction costs generally include characteristics of individual securities, liquidity, counterparty search cost, dealer-customer bargaining power as a result of information opacity,¹⁹ as well as other macro-environment factors. Effective spreads are computed daily for each bond as the difference between the average (volume-weighted) dealer-to-customer buy price and the average (volume-weighted) dealer-to-customer sell price, and then averaged across bonds using equal weighting. For each trading day, each security must have at least one customer purchase and one customer sell to be eligible for the analysis. We also performed an event study surrounding the implementation of dealer mark-up disclosure on customer trades. For a detailed description of effective spread and transaction costs, please refer to the 2018 MSRB Research Report.

¹⁵ If a dealer's offsetting principal trade is executed with a dealer affiliate and does not occur at arm's length, the dealer is required to "look through" to the time and terms of the affiliate's trade with a third party to determine whether the mark-up disclosure is required. See MSRB, "Resource on Disclosing Mark-ups and Determining Prevailing Market Price," July 2018. The analysis takes into account of the scenario where a dealer transacts with an affiliate.

¹⁶ See footnote 3.

¹⁷ In the municipal bond market, actual transaction costs incurred by investors can also include brokers' commissions for a small percentage of agency-based trades. MSRB's RTRS database converts the commission amount to the same units as dollar price and computes and disseminates a net dollar transaction price to customers inclusive of commission amount. See "Specifications for Real-Time Reporting of Municipal Securities Transactions," Version 3.0, July 2016.

¹⁸ See Division of Economic and Risk Analysis, the Securities and Exchange Commission, "Report to Congress – Access to Capital and Market Liquidity," August 2017.

¹⁹ See Cuny, Christine, "When Knowledge Is Power: Evidence from the Municipal Bond Market," *Journal of Accounting and Economics*, August 4, 2017; Green, Richard, Burton Hollifield and Norman Schürhoff, "Financial Intermediation and Costs of Trading in an Opaque Market," *Review of Financial Studies*, Volume 20, 2007; and Harris, Larry and Michael Piwowar, "Secondary Trading Costs in the Municipal Bond Market," *Journal of Finance*, Volume 61, 2006. "Search cost" is defined as the cost investors and dealers incur when seeking a counterparty to trade, while "information opacity" refers to the cost of gathering fundamental information that affects an investor's bargaining power with dealers.

It is important to note that this measure of effective spread is different from the disclosed dealer mark-up to customers as required by MSRB Rule G-15 and Rule G-30. For one thing, as mentioned above, the analysis below uses the trade size of \$100,000 par value or less as an indicator for retail customer trades. Currently, there are no reporting requirements to identify retail or institutional customer trades. Furthermore, the effective spread in this paper represents an approximation of the “round-trip” transaction cost that dealers charge for buying and selling a municipal bond to different customers on the same day, while the mark-up disclosure is required for each leg of the customer trade based on the same dealer’s offsetting transactions on the same day. Additionally, the disclosed dealer mark-up is calculated as a difference between the customer trade price and the prevailing market price at the time of the customer transaction, which may or may not be represented by the price of the same-day offsetting transaction. However, we expect the effective spread measure to be highly correlated with the actual amount of disclosed mark-up over time as the two calculations are closely connected.

Mark-up Disclosure and Trading Behavior

We first examined whether the mark-up disclosure rule has had any impact on the trading pattern between dealers and customers. Rule G-15 only requires the disclosing of mark-ups and mark-downs in principal transactions for non-institutional customer trades on retail customer trade confirmations when dealers conduct offsetting principal transaction(s) on the same trading day, and Rule G-30 requires establishing a prevailing market price based on dealers’ contemporaneous costs. If the retail customer trade and the offsetting trade for the same executing dealer occur on two separate trading days, the mark-up disclosure rule would not be applicable. We used two methods to assess any potential change in the dealer-to-customer trading pattern before and after the mark-up disclosure rule: i) percentage of daily traded bonds with both customer-buy and -sell trades; and ii) percentage of retail-sized customer trades with an offsetting trade for the same dealer.

Percentage of Traded Bonds with Both Customer Buy and Sell Trades

If, as a result of the mark-up disclosure rule, the time span between the retail customer trade and the offsetting trade for the same executing dealer had increased so that the two trades more often occur on different days, there would likely be fewer same-day customer-buy and customer-sell trades in the same bond as a percentage of all trades. Table 1 captures the average percentage of bonds traded daily by customers with both customer-buy and -sell trades from January 2012 through May 2019. While the percentage of bonds with same-day customer-buy and -sell trades declined from the one-year pre-mark-up period of 22.6% to the one-year post-mark-up period of 19.7% for retail-sized customer trades, the percentage also similarly declined for trades with greater than \$100,000 par value that are likely institutional trades and therefore not likely eligible for the mark-up disclosure, suggesting that other factors may have driven down the percentages.

Table 1. Percent of Daily Traded Municipal Bonds with Same-Day Customer Buy- and Sell-Trades (January 1, 2012 – May 13, 2019)

Year	Trade Size <= \$100,000	Trades Size > \$100,000	All Trades
2012	19.5%	20.7%	21.4%
2013	23.4%	24.5%	25.5%
2014	23.0%	22.5%	24.8%
2015	21.7%	22.3%	23.6%
2016	21.3%	22.7%	23.4%
2017	23.4%	23.8%	25.3%
2018 Pre-Mark-Up Period	22.1%	24.9%	24.3%
2018 Post-Mark-Up Period	19.6%	22.3%	21.7%
2019 (January-May)	19.9%	20.7%	21.7%
One Year Prior to Mark-up Disclosure	22.6%	23.8%	24.6%
One Year After Mark-up Disclosure	19.7%	21.7%	21.7%

Percentage of Retail-Sized Customer Trades with an Offsetting Trade

The analysis shows no significant impact of the mark-up disclosure rule on retail-sized customer trades with an offsetting trade for the same dealer since its implementation on May 14, 2018. As stated in the Data and Methodology section, the offsetting customer trade methodology used in this analysis is only a proxy for the actual requirements of the mark-up disclosure rule and not an attempt to quantify transactions that would be eligible under the rule. Chart 1 shows the daily number of retail-sized customer trades and the number of those trades with an offsetting trade for the same dealer both before and after the rule implementation, that is, from May 12, 2017 through May 13, 2019. Table 2 shows the daily averages for different periods before and after the rule implementation. The percentage of retail-sized customer trades with an offsetting trade for the same dealer averaged 39.6% during the 12-month period between May 12, 2017 and May 11, 2018 compared to 38.8% during the post-mark-up disclosure rule period of May 14, 2018 to May 13, 2019.

Chart 1. Percentage of Retail-Sized Customer Trades with Offsetting Trades (May 12, 2017 – May 13, 2019)

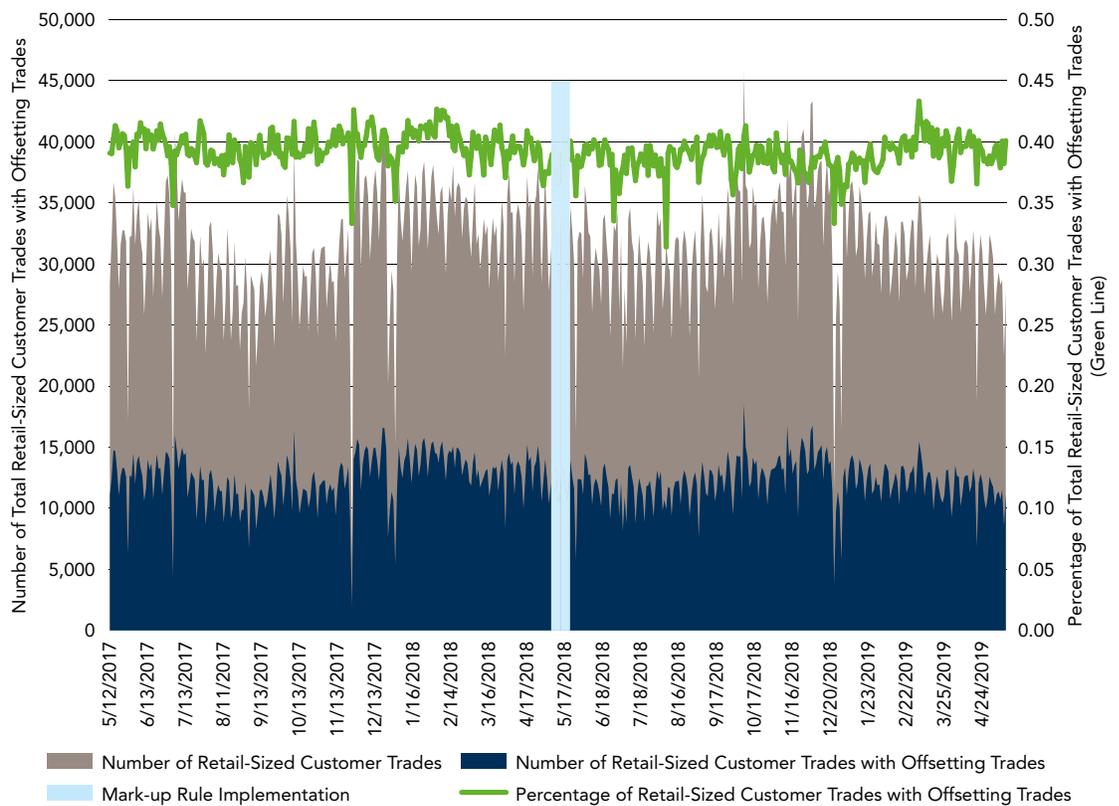
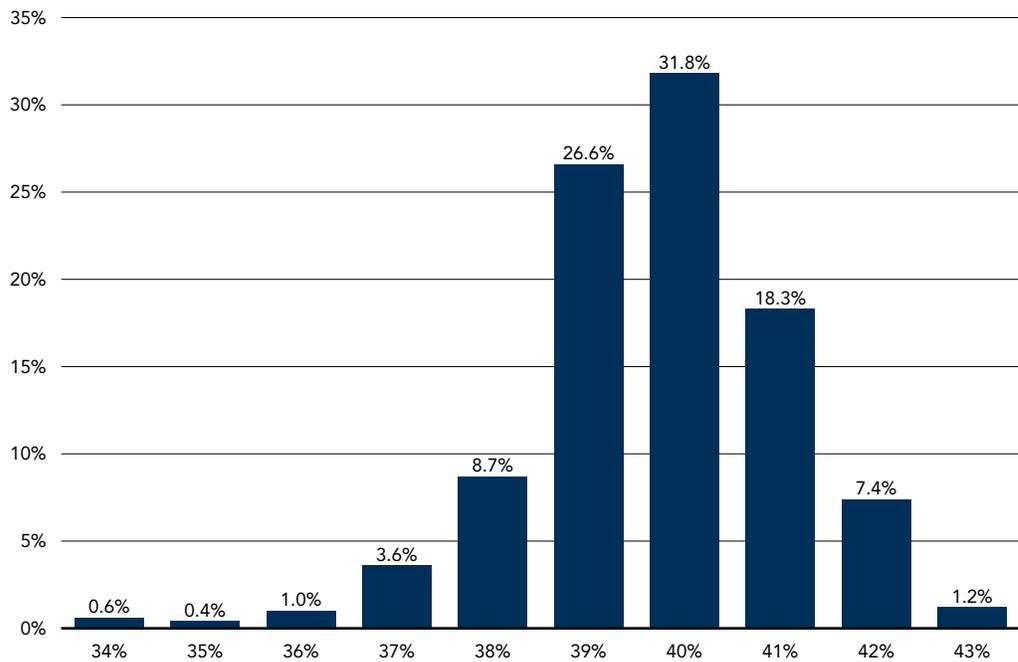


Table 2. Daily Average Number of Retail-Sized Customer Trades (May 12, 2017 – May 13, 2019)

Period	Retail-Sized Customer Trades	Retail-Sized Customer Trades with Offsetting Trades	Percentage of Retail-Sized Customer Trades with Offsetting Trades
2017 (May 12–December)	30,296	12,016	39.7%
2018 Pre-Mark-up Period	33,539	13,364	39.8%
2018 Post-Mark-up Period	31,716	12,255	38.6%
2019 (January–May 13)	30,732	12,074	39.3%

The analysis also shows a significant amount of daily trading volatility, as the daily percentage of retail customer trades with an offsetting trade for the same executing dealers ranges from 31% to 43% per day during the pre- and post-mark-up periods. However, for the vast majority of the trading days (over 90%), the daily percentage of retail-sized customer trades with an offsetting trade for the same dealer falls in a tight range between 38% and 42% (Chart 2).

Chart 2. Frequency Distribution of Percentage of Retail-Sized Customer Trades with an Offsetting Trade (May 12, 2017 – May 13, 2019)



Mark-up Disclosure and Transaction Costs

Transaction costs, as measured by the effective spread, are among the key determinants of net investment returns for investors, where high transaction costs diminish returns and can influence an investor’s decision to invest in certain types of securities.²⁰

Customer Trades with Non-Transaction-Based Compensation Arrangements

For certain municipal bond dealer-to-customer trades, dealers do not include a mark-up on the transaction price. For example, for customers in a separately managed account (SMA), dealers do not normally charge a mark-up for each customer trade, but instead collect fees based on the account asset value at a pre-set rate and frequency.²¹ If customers and dealers increasingly elect to use a fee-based account arrangement, as claimed by some market participants,²² the results from comparing the effective spread over time could be misleading as the shrinking effective spread may not necessarily represent declining trading costs for investors without factoring in the account fees paid to dealers. Hence, before presenting the analysis on effective spread, we first evaluated whether the market share of customer trades with non-transaction-based compensation (NTBC) arrangements have changed over the relevant period.²³

²⁰ 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.

²¹ See “A Guide to Separately Managed Accounts,” Legg Mason Global Asset Management, 2018.

²² See Healy, Patricia, “The Rise of Municipal Separately Managed Accounts – 2018 Update,” Cumberland Advisors, September 18, 2018. Also see “Comments on the MSRB Report ‘Transaction Costs for Customer Trades in the Municipal Bond Market: What is Driving the Decline?’” Bond Dealers of America (BDA), November 7, 2018.

²³ The NTBC flag is a useful indicator for customer trades that contain no dealer mark-ups. However, NTBC trades do not capture all SMA trades if an executing dealer has no relationship with the firm managing the SMAs.

Chart 3 shows the market share of fixed-rate municipal securities trades, that according to MSRB data, are classified as NTBC, has exhibited a slight upward trend since August 2016, when the MSRB began collecting information from dealers indicating NTBC trades. Between August 2016 to August 2018, the percentage of NBTC trades fluctuated between 19% to 21%, and by May 2019 had gradually ticked up to close to 23%.²⁴

Chart 3. Market Share of All Customer Trades with Non-Transaction-Based Compensation (NTBC) Arrangements (August 1, 2016 – May 13, 2019)



Note: Municipal variable-rate securities are excluded from this analysis.
Source: MSRB

More importantly, to be eligible for the transaction cost analysis in this paper, each security must have at least one customer-buy and one customer-sell trade on each trading day. The market share of NTBC trades for the sub-group of customer trades used in the analysis rose slightly from the one-year pre-mark-up period of 22.6% to the one-year post-mark-up period of 23.9%, however, the post-mark-up percentage is still in line with the percentages from late 2016 and 2017, as shown in Table 3. Consequently, we do not expect the share of NTBC trades to be a major factor in the movement of the effective spread.²⁵

²⁴ Chart 3 controls for an increase of published trades in commercial paper as a result of the revamping of MSRB’s RTRS starting on May 29, 2018. The reengineered RTRS allows some previously non-published trades to be publicly disseminated, which are predominantly commercial paper trades. Since a vast majority of commercial paper trades are conducted by institutional investors and those tend to be NTBC trades, there has been a slight upward shift in the market share of NTBC trades after May 2018 as a result of the system upgrade.

²⁵ Due to the limited availability of the NTBC trade flag, the regression analysis would not be able to control for the NTBC transactions in the data sample.

Table 3. Market Share of Non-Transaction-Based Compensation (NTBC) Arrangements for Eligible Customer Trades (August 1, 2016 – May 13, 2019)

Year	Market Share of NTBC Trades
2016 (August - December)	23.6%
2017	23.4%
2018 Pre-Mark-up Period	22.7%
2018 Post-Mark-up Period	23.7%
2019 (January - May)	24.1%
One Year Prior to Mark-up Disclosure	22.6%
One Year After Mark-up Disclosure	23.9%

Decline of Effective Spread in Recent Years

The steady decline of the effective spread for municipal bond customer executions has not abated in recent years and continued after implementation of the mark-up disclosure rule. Chart 4 illustrates that the long-term trend for effective spread continues to slope downward through May 2019, including the post-mark-up period from May 14, 2018 to May 13, 2019. In 2012, the average effective spread was around 140 basis points, or 1.4% of the average customer-buy and -sell trade prices, and by early 2019 had dropped to 66 basis points, a 53% decline. Comparing the one-year pre- and post-mark-up periods, Table 4 shows that the difference in effective spread is 10 basis points.

Chart 4. Municipal Bond Effective Spread for Customer Trades (January 1, 2012 – May 13, 2019)

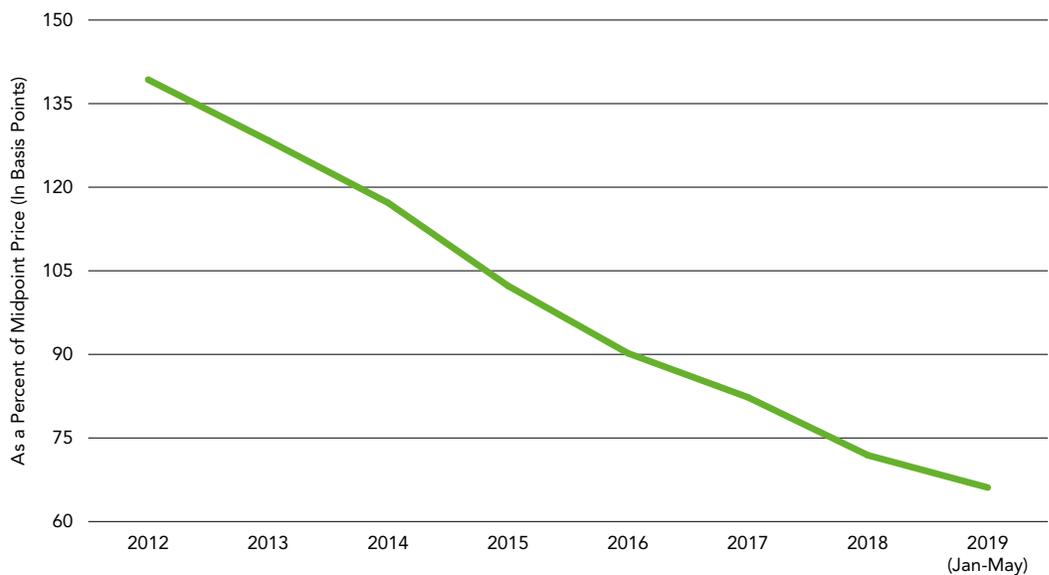


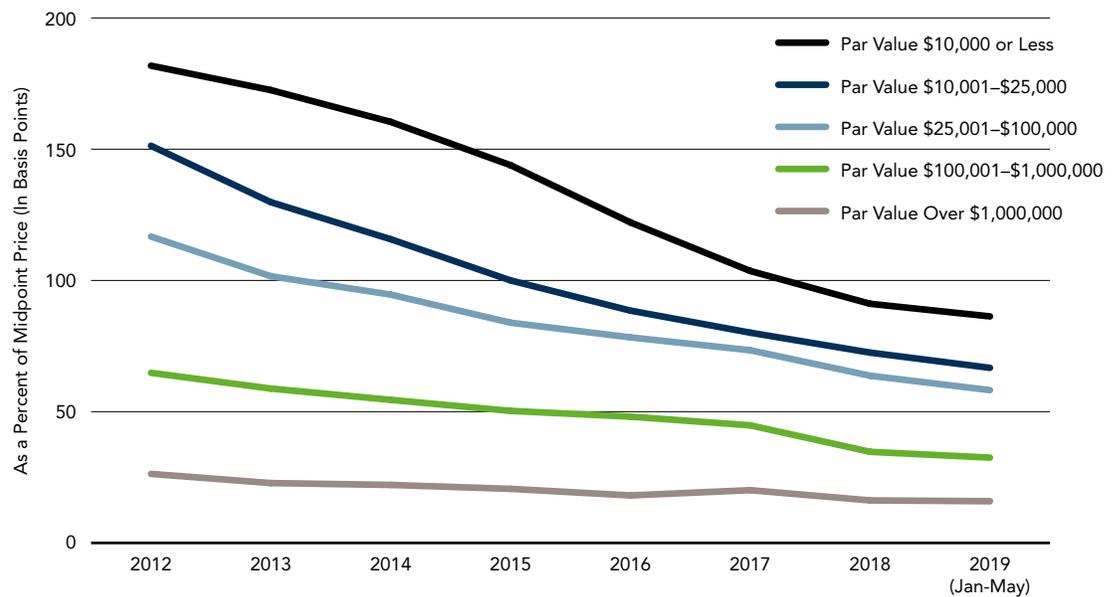
Table 4. Municipal Bond Effective Spread (May 12, 2017 – May 13, 2019)

	Effective Spread
One Year Prior to Mark-up Disclosure	79.3
One Year After Mark-up Disclosure	69.3

Note: Municipal variable-rate securities are excluded from this analysis.
Source: MSRB

Since the mark-up disclosure rule is applied to certain retail customer trades only, Chart 5 analyzes the effective spread for customer trades in different trade-size groups over the same period from January 2012 to May 2019. As previously mentioned, trade size of less than \$100,000 par value is usually considered a proxy for “retail” trades by the industry. Traditionally, there is an inverse relationship between trade size and transaction costs in the municipal securities market, with transaction costs decreasing as trade size increases. Academic researchers generally attribute this inverse relationship to the different degrees of information transparency available for retail and institutional investors, as well as to market structure issues such as a lack of an order display requirement.²⁶ The effective spread movement is illustrated in Chart 5 in five trade-size groups during the relevant period: \$10,000 par value or less, \$10,001–\$25,000 par value, \$25,001–\$100,000 par value, \$100,001–\$1,000,000 par value and over \$1,000,000 par value trades.

Chart 5. Municipal Bond Effective Spread for Customer-Buy and -Sell Trades by Trade Size (January 1, 2012 – May 13, 2019)



Note: Municipal variable-rate securities are excluded from this analysis.
Source: MSRB

²⁶ See Harris, Lawrence and Michael Piwowar, “Secondary Trading Costs in the Municipal Bond Market,” *Journal of Finance*, 2006; Cuny, Christine, “When Knowledge Is Power: Evidence from the Municipal Bond Market,” *Journal of Accounting and Economics*, August 4, 2017; and the Financial Economists Roundtable, “Statement on the Structure of Trading in Bond Markets,” 2015. Also, smaller-sized trades may have a higher fixed-cost component proportionately than larger-sized trades,

Chart 5 shows that, similar to the results in the 2018 MSRB Research Paper, the drop in effective spread since 2012 has been more pronounced for smaller-sized trades, such as trade-size groups with \$100,000 par value or less, than for larger-sized trades, especially trades with par value over \$1,000,000. However, as of May 2019, smaller-sized trades still had higher effective spread (and thus higher transaction costs) than larger-sized trades. Table 5 shows trades with par value over \$100,000 reflect a larger decline in percentage than trades with par value less than \$100,000 from the one-year pre-mark-up period to the one-year post-mark-up period. Since the mark-up disclosure rule is not applicable to institutional trades, there could be other market factors that drove the decline in larger-sized trades.

Table 5. Municipal Bond Effective Spread by Trade Size for Pre- and Post-Mark-up Periods (May 12, 2017 – May 13, 2019)

	Par Value \$100,000 or Less	Par Value Over \$100,000
One Year Prior to Mark-up Disclosure	86.3	38.4
One Year After Mark-up Disclosure	77.5	29.3
Change in Basis Points	(8.8)	(9.0)
Percentage Change	-10.2%	-23.6%

Note: Municipal variable-rate securities are excluded from this analysis.
Source: MSRB

Regression Analysis—Mark-up Disclosure Impact on Transaction Costs

Next, regression models are employed to test for any above-and-beyond impact from the mark-up disclosure rule implementation on transaction costs. The analysis controls for any change in characteristics of the aggregate pool of fixed-rate municipal bonds traded in the secondary market over time, such as trade size, maturities, yield, call status and age of bonds, as well as for the recent downward trend in effective spread exhibited even prior to May 14, 2018. The analysis examines transaction costs during the pre- and post-mark-up periods and compares the differences statistically using an event-study methodology.

The analysis employs two regression models. One model uses an ordinary least-square regression approach for daily average (across bonds) time-series data points to test the relationship between the dependent variable of effective spread and independent variables such as trade size, coupon rate, annual trading volume, issue type (e.g., general obligation or revenue), yield, insurance status, maturity, age, callable bond status, time trend and a post-mark-up period indicator. The other model uses an ordinary least-square regression approach for pooled cross-sectional and time-series data points (with no averaging) to test the relationship between the same set of dependent and independent variables. Specifically,

Model 1:

$$Effective\ Spread_t = \alpha + \beta_1 Trade\ Size_t + \beta_2 Coupon\ Rate_t + \beta_3 Issuance\ Type_t + \beta_4 Yield_t + \beta_5 Insurance\ Status_t + \beta_6 Maturity_t + \beta_7 Age_t + \beta_8 Call\ Status_t + \beta_9 Time\ Trend_t + \lambda Markup\ Period_t + \epsilon_t$$

Model 2:

$$Effective\ Spread_{it} = \alpha + \beta_1 Trade\ Size_{it} + \beta_2 Coupon\ Rate_{it} + \beta_3 Issuance\ Type_{it} + \beta_4 Yield_{it} + \beta_5 Insurance\ Status_{it} + \beta_6 Maturity_{it} + \beta_7 Age_{it} + \beta_8 Call\ Status_{it} + \beta_9 Time\ Trend_{it} + \lambda Markup\ Period_{it} + \epsilon_{it}$$

where all variables are specified in percentage change except for issuance type, insurance status, call status, time trend and mark-up period,²⁷ and subscript i corresponds to a particular security and subscript t corresponds to a particular trading date. Both models were applied to all trades as well as only to trades with size at \$100,000 par value or less, though only results for the sub-\$100,000 par value trades are illustrated below in relation to the mark-up disclosure rule impact (see Appendix C).²⁸

Time trend is specified as a running count of calendar days from January 1, 2012 through the trading date of each trade. Among the other independent (control) variables, trade size is expressed as par value, maturity measures the life span of a security at the time of its trade, and age measures the time elapsed since the bond issuance. In addition, four of the independent variables are indicator variables, essentially a yes-or-no test, including the most important object of this analysis, "Mark-up Period."²⁹

- **Mark-up Period:** assigned a value of one if the trade date is on May 14, 2018 or after and zero if the date is prior to May 14, 2018. It is the key variable to be tested statistically for any impact from the mark-up disclosure rule implementation based on an estimation of the coefficient λ , after controlling for all the other independent variables including the prior downward trend in the model.
- **Issuance Type:** assigned a value of one if the security is a general obligation bond and zero if it is not.
- **Insurance Status:** assigned a value of one if the security is insured and zero if it is not.
- **Call Status:** assigned a value of one if the security is callable and zero if it is not.

Appendix C captures the full results of the regression analysis. The parameter estimates for control variables in both models are as expected and mirror recent findings in other research such as the studies from Sirri (2014), Chalmers, Liu and Wang (2017) as well as the 2018 MSRB Research Paper. For example, coupon rate and trade size are found to be inversely related to effective spread,³⁰ while age and maturity of a bond are positively related to effective spread. In addition, bond yield is found to be positively correlated with effective spread. Since bond yield is typically associated with the perceived riskiness of a bond, all else being equal, the result suggests that riskier bonds tend to have higher effective spread. The same is true for a bond's call status, where a callable bond is associated with higher effective spread. Past studies have indicated that a fixed-income product with complex features such as callable status tends to have higher trading costs than a plain-vanilla bond.³¹ Both models' time-trend terms exhibit a downward trend over time, in line with the findings from the 2018 MSRB Research Paper, suggesting that effective spread had been declining even after controlling for idiosyncratic characteristics associated with the municipal bond portfolio traded during the relevant period.

²⁷ This analysis uses the natural log difference as a proxy for percentage difference for all variables in the equation.

²⁸ The results for all trades are very similar to the results for sub-\$100,000 par value trades.

²⁹ In statistics and econometrics, particularly in regression analysis, a dummy variable is one that takes the value of zero or one to indicate the absence or presence of some categorical effect that may be expected to shift the outcome.

³⁰ Except for when limiting the analysis to trades with \$100,000 par value or lower, the trade size variable is no longer negatively correlated with the effective spread.

³¹ See Craig, Louis, Abby Kim and Seung Won Woo, "Pre-trade information in the Municipal Bond Market," Securities and Exchange Commission White Paper, July 12, 2018, and Staff of the Division of Economic and Risk Analysis of the SEC, "Report to Congress: Access to Capital and Market Liquidity," August 2017.

The estimated parameters for the mark-up period in both models are negative and statistically significant. However, despite the statistical significance, the models found less than 0.2% lower effective spread for customer trades following implementation of the mark-up disclosure rule, which corresponds to an above-and-beyond downward impact on transaction costs after controlling for historic descending trend in effective spread and changes in characteristics of the aggregate pool of municipal bonds. The 0.2% above-and-beyond decline in spread would amount to a reduction from, for example, 100 basis-point effective spread to 99.8 basis points, which is economically immaterial. This is perhaps not surprising, given that the effective spread had already been declining steadily prior to implementation of the mark-up disclosure rule.

There are a few caveats with regard to the regression analysis results. First, the impact from the mark-up disclosure rule may not be immediate and may take time to manifest, a phenomenon shown in previous studies on significant changes in the municipal bond market, such as the 2005 transition to real-time transaction reporting.³² Presumably, the effect may take time to be realized—as dealers and investors become accustomed to the new disclosure and transparency prototype, retail investors learn to take advantage of the availability of mark-up information and regulatory examination and enforcement of the new disclosure requirement continue to develop. Retail investors especially may not have paid sufficient attention to the mark-up compensation disclosure yet given the short timeframe since the implementation of the rule. Additionally, the regression model does not control for any change in market liquidity during the relevant period. Economists and market participants generally define market liquidity as a market feature whereby an individual or a firm can quickly purchase or sell a financial asset without causing a discernable impact on the asset's price,³³ and any change in market liquidity would affect the effective spread as dealers typically charge a higher spread for less liquid securities due to the difficulty to liquidate a position.

³² Sirri (2014) found that the total customer-to-customer differential was reduced by 11 basis points when comparing the six-month periods before and after implementation of RTRS, by 19 to 20 basis points when comparing the one-year periods before and after implementation of RTRS, and by 34 to 59 basis points when extending the analysis to the full eight-year study period. See Sirri, Erik, "Report on Secondary Market Trading in the Municipal Securities Market," Research Paper, Municipal Securities Rulemaking Board, July 2014.

³³ See Staff of the Division of Economic and Risk Analysis of the SEC, "Report to Congress: Access to Capital and Market Liquidity," August 2017.

Conclusions

Overall, the impact to date on the municipal market from the mark-up disclosure rule since its implementation on May 14, 2018 has been muted and there have not been any unintended consequences of the rule based on the two measures of the market trading activities we have analyzed. The percentage of retail-sized customer trades with an offsetting trade for the same executing dealer has declined only slightly, to 38.8% from 39.6%, since the implementation of the mark-up disclosure rule, and the change was within the historic variation. In addition, the percentage of traded bonds with same-day retail-sized customer buy and sell trades also decreased from the one-year pre-mark-up period to the one-year post-mark-up period, but a similar decrease also occurred for institutional-sized customer trades that are unlikely eligible for the mark-up disclosure rule, suggesting that the decrease on the retail side was likely driven by factors other than the mark-up disclosure rule.

Similarly, transaction costs continued to decline after the implementation of the mark-up disclosure rule, with a 8.8 basis-point decline in effective spread for retail-sized customer trades when comparing the one-year post-mark-up period to the one-year pre-mark-up period. However, the magnitude of the decline for retail-sized customer trades was in line with the downward trend exhibited prior to the implementation of the mark-up disclosure rule as well as the reduction experienced by institutional-sized customer trades during the same period.

The impact from the mark-up disclosure rule may continue to unfold over the next few years. Past research on important changes in the marketplace, such as the January 2005 migration of municipal bond trade reporting to real-time transaction reporting, showed that the impact may not be fully manifested until a few years after rule implementation. As a result, it would be prudent to continue monitoring retail-sized customer trading practices over the next few years.

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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 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, 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.

Marcelo Vieira, Director of Research—Marcelo Vieira is the Director of Research for the Municipal Securities Rulemaking Board (MSRB). As director of the research program, Mr. Vieira's main objectives are to facilitate investor protection, market education and support of other MSRB programs by producing and disseminating analytical and statistical information. He is responsible for producing the MSRB's annual *Fact Book* and other research reports, and supports the organization's use of data in rulemaking and transparency initiatives. Prior to joining the MSRB, Mr. Vieira served in various research-related roles at the Securities Industry and Financial Markets Association (SIFMA), including director of market statistics and analysis and vice president of securities industry research. Mr. Vieira received his bachelor's degree in finance from the Robert H. Smith School of Business at the University of Maryland.

Appendix B—Review of Literature

While fewer academic studies have been performed on secondary market trading in the municipal securities market than in other financial markets, since 2005, several research papers have examined trading costs and other related metrics in the municipal bond market. The 2018 MSRB Research Paper summarized the findings from most of these papers, so this section does not provide a recap of those papers' conclusions but instead describes the findings from two relevant white papers published after the release of the 2018 MSRB Research Paper.

In July 2018, economists from the SEC's Division of Economic and Risk Analysis published a white paper on municipal bond trading and quoting on four ATS platforms for the four-month period from August 2014 through November 2014. The paper combined live offer quotes with response to bid-wanted requests and formed a "two-sided" quote to evaluate market trade prices relative to the quotes on the four ATSs. Using MSRB's RTRS trade data, this paper found the majority of customer trades were executed at worse prices than the best available dealer quotes on the platforms, which the paper stated might indicate a lack of knowledge of existing quotes. This result is also likely because of the dealer mark-up built into the customer trade prices to compensate dealers (and financial advisors, if applicable). In contrast, the majority of interdealer trades are executed very close to the best quoted prices as expected. Regardless, it is apparent that transaction costs for customer trades are higher than transaction costs for inter-dealer trades. In addition, the paper found that smaller customer trades (*i.e.*, less than \$100,000) had larger mark-ups than larger customer trades.³⁴

An article released by BondWave in November 2018 measured mark-ups and mark-downs on corporate, municipal and agency bonds and examined if there had been a noticeable impact since the implementation of the mark-up disclosure rule on May 14, 2018.³⁵ The early returns (through October 9, 2018) on the impact of the new mark-up disclosure rule were mixed. There appeared to be no impact when retail customers sold bonds, as mark-downs were very stable over the entire time period. The data were less certain when customers buy bonds, as there had been some ups and downs in mark-ups but residing in a relatively tight range and did not perfectly correlate with implementation of the rule.

³⁴ Craig, Louis, Abby Kim and Seung Won Woo, "Pre-trade information in the Municipal Bond Market," Securities and Exchange Commission White Paper, July 12, 2018.

³⁵ Daley, Paul, "An Early Look at the Post Mark-Up Disclosure World," BondWave, November 2018.

Appendix C—Regression Analysis for Retail-Sized Customer Trades (\$100,000 Par Value or Less)

Model 1. Ordinary Least Squares (OLS) Regression with Time-Series Daily Frequency Data³⁶

$$\begin{aligned} \text{Effective Spread}_t &= \alpha + \beta_1 \text{Trade Size}_t + \beta_2 \text{Coupon Rate}_t + \beta_3 \text{Issuance Type}_t + \beta_4 \text{Yield}_t + \beta_5 \text{Insurance Status}_t \\ &+ \beta_6 \text{Maturity}_t + \beta_7 \text{Age}_t + \beta_8 \text{Call Status}_t + \beta_9 \text{Time Trend}_t + \lambda \text{Markup Period}_t + \varepsilon_t \end{aligned}$$

Variable	Parameter Estimate	t Value	Standard Error
Intercept	-8.9209	-19.54	0.45653
Trade Size	0.0468	4.49	0.01042
Coupon Rate	-0.8405	-6.14	0.13696
Issuance Type	0.5567	6.03	0.09238
Yield	0.1791	14.76	0.01213
Insurance Status	0.1846	2.44	0.07559
Maturity	0.5254	12.34	0.04258
Age	0.0424	3.89	0.01091
Call Status	0.6265	10.19	0.06147
Time Trend	-0.0002	-14.58	0.00001
Period	-0.1293	-13.36	0.00968
Adjusted R-Square	0.95		
Number of Observations	1,839		

³⁶ Note: All variables are in natural logarithm form except for the time trend and the indicator variables mark-up period, callable bonds, issuance type and insurance status.

Model 2. Ordinary Least Squares (OLS) Regression with Panel Data³⁷

$$\begin{aligned}
 & \text{Effective Spread}_{it} \\
 & = \alpha + \beta_1 \text{Trade Size}_{it} + \beta_2 \text{Coupon Rate}_{it} + \beta_3 \text{Issuance Type}_{it} + \beta_4 \text{Yield}_{it} + \beta_5 \text{Insurance} \\
 & \text{Status}_{it} + \beta_6 \text{Maturity}_{it} + \beta_7 \text{Age}_{it} + \beta_8 \text{Call Status}_{it} + \beta_9 \text{Time Trend}_t + \lambda \text{Markup Period}_t + \varepsilon_{it}
 \end{aligned}$$

Variable	Parameter Estimate	t Value	Standard Error
Intercept	-6.4640	-718.84	0.00899
Trade Size	-0.1515	-256.42	0.00059
Coupon Rate	-0.4946	-209.46	0.00236
Issuance Type	0.0062	5.74	0.00108
Yield	0.6436	636.27	0.00101
Insurance Status	0.0648	55.77	0.00116
Maturity	0.3597	598.36	0.00060
Age	0.0724	147.07	0.00049
Call Status	0.2962	233.38	0.00127
Time Trend	-0.0003	-362.22	0.00000
Period	-0.1633	-88.92	0.00184
Adjusted R-Square	0.44		
Number of Observations	3,956,877		

³⁷ Note: All variables are in natural logarithm form except for the time trend and the dummy variables mark-up period, issuance type and insurance status.

ABOUT THE MSRB

The 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 Electronic Municipal Market Access (EMMA[®]) website, the official repository for information on 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 self-regulatory organization governed by a 21-member board of directors that has a majority of public members, in addition to representatives of regulated entities. The MSRB is overseen by the Securities and Exchange Commission and Congress.



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