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What Has Driven the Surge in Transaction Costs for Municipal Securities Investors Since 2022?

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Municipal Securities Rulemaking Board

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Abstract[1]

Secondary market customer transaction costs for fixed-rate municipal securities trended consistently downward between January 2009 and February 2020. However, in the last three years, the market witnessed two abrupt upsurges in customer transaction costs, as measured in effective spread. One was the brief 2020 spike during the COVID-19 market crisis. The second has been the steady increase in the effective spread since early 2022. Unlike the 2020 spike, the second increase has lasted much longer although the initial surge was smaller. In addition, while the difference in effective spread between individual-sized customer trades and institution-sized customer trades shrank between 2009 and 2021, since January 2022, the convergence trend seems to have reversed. As of March 2023, the effective spread for the sub-$100,000 par value trades is three times as large as the effective spread for the over $1,000,000 par value trades. This paper investigates the likely causes behind the most recent surge in the effective spread since early 2022, finding that the decline in bond prices as a result of rising inflation and interest rates was likely the main culprit. The bond price decline may have elevated the effective spread because discount bonds are less liquid than premium bonds due to the Internal Revenue Service's (IRS's) Market Discount Rule (also known as the *de minimis* tax rule), with the impact increasing the further the bond price is from par value. Also, dealers tend to charge a relatively fixed markup for customer trades, so when prices decline, the effective spread increases.[2]

Finally, the paper also addresses the relationship between the different types of customer accounts and the amount of effective spread for customer trades, with customer trades that are flagged with non-transaction-based compensation (NTBC), typically tied to a fee-based customer

[1] The views expressed in this commentary are those of the author(s) and do not necessarily reflect the views and positions of the MSRB.

[2] Dealers typically quote a fixed amount of spread (e.g., 25 basis points when expressed in yield), whether it is for a markup or markdown, or a spread from a benchmark index such as Treasury securities. In the case of markup, dealers may have a grid system that lists different amounts of markup depending on whether it is a premium bond, a discount bond, or a zero-coupon bond, but generally the amount is fixed within a certain bond price range.

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account, receiving a 30-basis point lower effective spread than customer trades from a non-fee-based customer account. This variation in effective spreads exists even after controlling for other idiosyncratic characteristics of municipal securities traded over the relevant period in a regression analysis.

Introduction

In 2021, the MSRB published a report titled "Transaction Costs During the COVID-19 Crisis: A Comparison between Municipal Securities and Corporate Bond Markets" (2021 MSRB Research Paper),[3] which showed that the COVID-19 pandemic and the extensive economic shutdown in the spring of 2020 created unprecedented volatility in global financial asset pricing, including the normally placid municipal securities market, causing a spike in transaction costs for investors buying and selling municipal bonds during the market stress period.[4] Following that, after a relatively quiet 2021,[5] where market volatility dissipated and annual trading volume was the lowest since the launch of the Real-Time Transaction Reporting System (RTRS) in 2005, the municipal securities market experienced another tumultuous year in 2022, when interest rates escalated throughout the year, mirroring the rising inflation rate. Since the beginning of 2022, the municipal securities market has experienced three new developments: municipal bond prices have been declining along with those of other fixed-income securities; 2) effective spreads have increased again, bucking the long-term downward trend; and 3) trading volume in 2022 exceeded the previously record high reached during the peak of the 2008 financial crisis. Did the same factors responsible for the 2020 increase in transaction costs resurface in 2022, or has there been something else driving the increase? This paper investigates the possible driving force behind the rise in the effective spread since 2022.

Following the worst of the 2008 financial crisis, the average effective spread for the municipal securities market declined steadily until the COVID-19 crisis hit in March 2020. As our previous research has indicated, the trend was drastically reversed in March 2020, as a result of severe market volatility, the liquidity crunch in fixed-income markets and the uncertainty surrounding financial asset pricing in general at the peak of the crisis. Following the high point in March 2020, the effective spread declined swiftly and fell below the lowest pre-pandemic level by late 2020, reaching a historic low point by the end of 2021. Just when it appeared that the COVID-19 spike

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3 *See* Wu, Simon Z. and Nicholas J. Ostroy, "Transaction Costs During the COVID-19 Crisis: A Comparison between Municipal Securities and Corporate Bond Markets," Research Paper, Municipal Securities Rulemaking Board, August 2021. The 2021 MSRB Research Paper examined transaction costs as measured in effective spread for municipal securities for the periods before, during and after the COVID-19 crisis and additionally used the corporate bond market as a comparison to comprehend the scope of this crisis.

4 This research paper extends the transaction cost analysis for dealer-to-customer trades in municipal securities from previous MSRB research conducted in 2018 (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 2019 (Wu, Simon Z. and Marcelo Vieira, "Mark-up Disclosure and Trading in the Municipal Bond Market," Research Paper, Municipal Securities Rulemaking Board, July 2019).

5 Based on the number of trades.

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was an anomaly and the average effective spread for municipal securities resumed its long-term downward trend, the bear market of 2022 again coincided with a rising effective spread and yields. Only this time, the upsurge has lasted longer than during the COVID-19 crisis.

Data and Methodology

As previously explained, transaction costs are an important metric to monitor for the following reasons. First, they are important to investors because they are one of the determinants of net investment returns, as high transaction costs diminish returns. Second, market-related contributing factors to transaction costs, such as market liquidity and volatility,[6] usually affect these costs across all municipal securities. Economists and other industry researchers therefore use transaction costs as one measure to capture a dimension of market liquidity,[7] with higher transaction costs generally suggesting less liquidity, ceteris paribus.[8] Consequently, analyzing transaction cost trends provides unique insight into the secondary market for municipal securities.

Unlike the stock market, where trading activity is primarily facilitated by an exchange, the municipal securities market largely functions as an over-the-counter marketplace without a centralized facility, where investors place their orders with dealers directly. Dealers either execute orders by committing dealer capital (principal trades) or by searching for an intermediary in the market to facilitate transactions. Investors then normally pay the dealer either a markup (or commission) or an annual fee for a fee-based account[9] to compensate for providing intermediary services and/or for taking on and bearing principal risk.[10] Contributing factors to transaction costs generally include characteristics of individual securities, liquidity, volatility, counterparty search cost

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6 *See* 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.

7 Other measures of liquidity include total trading volume and price impact from a given size of a trade.

8 For more background information on transaction costs, please refer to 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.

9 Trades conducted as a part of a fee-based account (such as separately managed accounts) may incur less or no transaction cost as the costs are typically incorporated into the account fee assessment.

10 For more background information on transaction costs, please refer to 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.

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and dealer-customer bargaining power resulting from information opacity,[11] as well as other macro-environmental factors.[12] To quantify the transaction costs paid by investors to execute their trades, financial economists and market participants use spread as a common measure, which could be based on pre-trade quote data (bid-ask spread) or actual trade data (effective spread).[13]

The MSRB has previously used the effective spread from secondary market trade data to compute transaction costs.[14] This analysis similarly uses the effective spread as a measurement for transaction costs, as opposed to the bid-ask spread based on pre-trade quote data. This is because pre-trade quote data are not universally available or nationally consolidated for the municipal bond market. Effective spread is calculated daily for each fixed-rate bond as the difference between the volume-weighted average dealer-to-customer buy and sell prices, and then averaged across bonds using equal weighting. Therefore, for each trading day, a security must have at least one customer purchase and one customer sale to be eligible for the analysis. Effective spread in this paper is calculated as a percent of the average of customer purchase price and customer sale price (mid-point customer trade price) and expressed in basis points.[15] Additionally, variable-rate municipal securities were excluded in this analysis, as they are typically traded by sophisticated institutional investors at par and with no markup.

For the municipal securities analysis, the MSRB's Real-Time Transaction Reporting System (RTRS) database is used to derive the effective spread calculation. With a few exceptions, all municipal securities trades are reported to the MSRB's RTRS within 15 minutes of a trade.[16] The data used in this paper also relies on the MSRB's proprietary and third-party security descriptive data ("security master database") to supplement the analysis. The security master database shows an individual

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[11] *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.

[12] The databases used in this paper (RTRS) do include an indicator for some of these trades for municipal securities that contain no transaction-based dealer compensation and the regression analyses below account for those trades with no transaction costs.

[13] In the municipal securities market, actual transaction costs incurred by investors can also include brokers' commissions for a small percentage of agency-based trades. MSRB's Real-Time Transaction Reporting System (RTRS) 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 4.0, October 2019.

[14] *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.

[15] For example, if the average customer purchase price for a municipal security is 100.25 and the average customer sale price is 99.75, then the effective spread is calculated as (100.25–99.75) / 100 = 0.5%, or 50 basis points.

[16] RTRS was first implemented by the MSRB in January 2005. Prior to 2005, the trade reporting system maintained by the MSRB, TRS, was not a real-time trade reporting system and only required dealers to submit trades to TRS by the end of a trading day.

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security's relevant characteristics, such as coupon, bond price, yield, call feature, insurance status, type of issuance, tax status and maturity date.[17] For all of the analyses below, January 2019 was selected as the starting point and March 2023 is used as the ending point.

For more background information on the municipal securities market or a detailed description of effective spread and transaction costs, please refer to the 2018 MSRB Research Paper.[18]

Summary of Findings

This section first analyzes the movement of the effective spread for the municipal securities market from January 2019 through March 2023. The second part of the analysis focuses on the possible explanation for the increase in the effective spread since the beginning of 2022.

Overview of Municipal Securities Market Since COVID-19 Crisis

Chart 1 presents the monthly average effective spread for all municipal securities between January 2019 and March 2023. Similar to previous MSRB findings, the effective spread for municipal securities consistently decreased from January 2009, during the peak of the financial crisis, through the beginning of the COVID-19 crisis in March 2020. The only exception was during the time period around the 2013 "Taper Tantrum," when the Board of Governors of the Federal Reserve System (the Federal Reserve) indicated future tapering of its quantitative easing policy.[19] When measured as a percentage of daily mid-point customer trade price, the effective spread steadily declined from around 70 basis points in January 2019 to 54 basis points in February 2020, a pre-pandemic low. As stated in the 2021 MSRB Research Paper, the trend drastically reversed in March 2020, during the depth of the COVID-19 crisis, when the average effective spread soared to 97 basis points, coinciding with sharply rising market volatility likely caused by a severe liquidity crunch. Since the high point in March 2020, the effective spread declined swiftly, reaching a historic low of 42 basis points by the end of 2021. Therefore, other than a brief upward blip caused by the COVID-19 crisis, the effective spread seemed to have returned to its long-term downward trajectory in 2021.

However, amid rising inflation and interest rates beginning in January 2022, the effective spread started ascending again, peaking at 63 basis points in May 2022. Unlike the 2020 spike, which was dramatic but brief, the effective spread barely declined after the May 2022 peak and remained elevated up until March 2023, though still lower than the 2019 level.

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[17] Individual bond ratings for municipal securities were not available for this analysis.

[18] *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.

[19] Please also refer to Appendix B for the average effective spread of fixed-rate municipal securities customer trades from January 2009 through March 2023, as well as the two-year and ten-year Treasury yields during the same period.

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Chart 1. Effective Spread for Fixed-Rate Municipal Securities Customer Trades—as a Percent of Mid-Point Customer Trade Price, January 2019–March 2023

Source: MSRB analysis with data obtained from MSRB's Real-Time Transaction Report System (RTRS) database.

Chart 2 shows the effective spread for 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–$999,999 par value and $1,000,000 par value or more. A similar pattern emerged in most trade size groups, including the below $100,000 trade size groups where individual investors usually predominate, with some variation in the magnitude of the change in effective spread. As described in the 2021 MSRB Research report, the market dislocation and liquidity crunch caused by the COVID-19 pandemic triggered a significant rise in effective spread for all five trade size groups in March 2020. Following that, all trade size groups experienced a rapid decline in effective spread, reaching the pre-pandemic levels by late 2020 or early 2021. The effective spread continued to decline for all five trade size groups for the rest of 2021 and seemed to have returned to the long-term downward trendline.

However, starting in January 2022, four out of the five trade size groups began to experience a rise in effective spread and unlike during the COVID period, the effective spread did not revert back down quickly, staying above the long-term trend line through early 2023. The one exception was the $1,000,000 par value or more trade-size group, traditionally associated with institutional-sized trades, which did not show an increase in effective spread in 2022 and early 2023. Except for a brief moment in 2020 surrounding the COVID-19 crisis, the average effective spread for the over $1,000,000 par value trade-size group has been relatively stable, hovering around 20 basis points since at least 2010. Given that large-sized trades typically demand more liquidity than smaller-sized trades and that the effective spread was steady for these $1,000,000 par value or greater trades, market liquidity may not be the main cause for the rise in transaction costs for municipal securities

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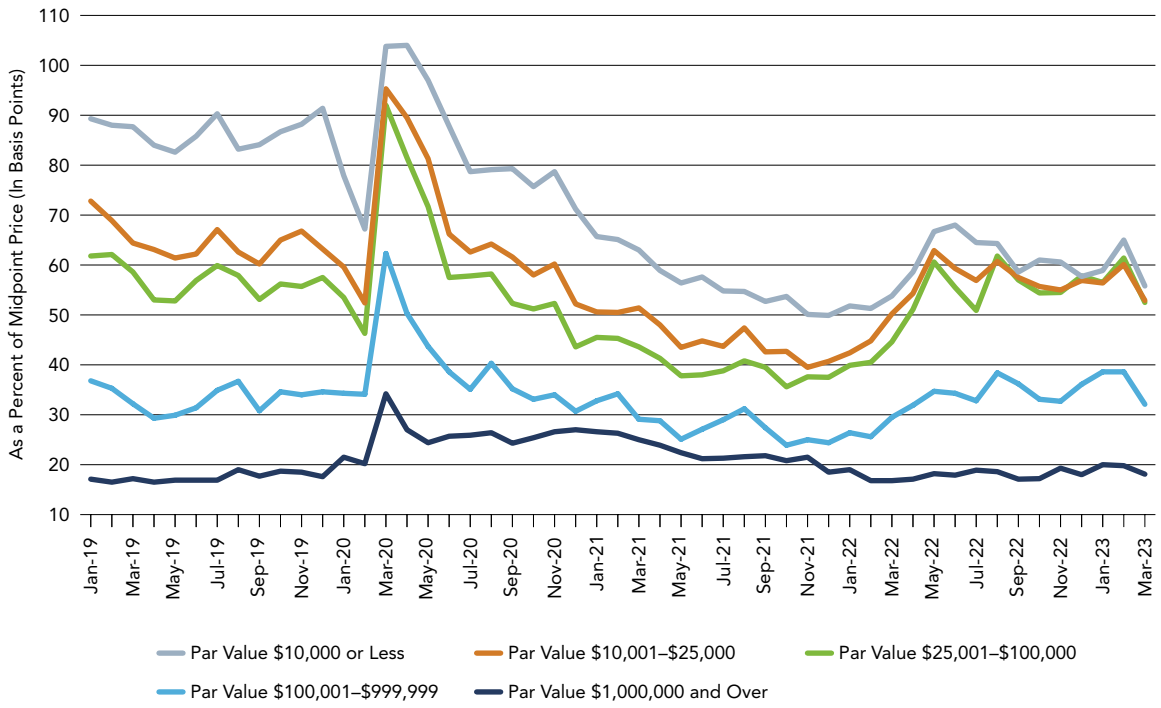
trades since 2022.[20] Indeed, trading volume in 2022 was historic, with the number of trades being the highest since real-time trades started to be reported to the MSRB in 2005 and par value traded being the highest since 2008, suggesting there was sufficient liquidity in the marketplace.

Chart 2. Effective Spread for Fixed-Rate Municipal Securities Customer Trades—by Trade Size as a Percent of Midpoint Customer Trade Price, January 2019–March 2023



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

Larger trade size groups continue to have a lower average effective spread than smaller trade size groups, with a uniformly inverse relationship between trade size and effective spread. In addition, the difference in effective spread between smaller individual-sized customer trades and larger institutional-sized customer trades have persisted as of March 2023. While the gaps in effective spread between larger and smaller trade-size groups were shrinking before 2022, the recent development since 2022 seems to have reversed the progress smaller trade-size groups made

[20] Since only municipal securities with at least one customer buy and one customer sell for the same CUSIP number on the same trading day were included in this analysis, fewer $1,000,000 par value or more trades would be included in this analysis when limiting to each trade size group. One possible reason that these large trades' effective spread has not risen since 2022 and has historically fluctuated much less than smaller-size trades' effective spread is that ,when they are included in the analysis, customer buy and sell transactions may be "arranged" by a dealer or a group of dealers, with the dealers essentially crossing the two customer orders, with a smaller amount of markup charged.

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previously.[21] Table 1 shows that the effective spread for the $25,001–$100,000 par value group, a proxy for individual-sized customer trades, still was three times as large as the effective spread for the $1,000,000 par value or more group, a proxy for institutional-sized customer trades, as of early 2023. As recently as 2021, the effective spread for individual-sized customer trades was only 1.7 times the effective spread for institutional-sized customer trades.

Table 1. Effective Spread for Fixed-Rate Municipal Securities Customer Trades—by Trade Size as a Percent of Midpoint Customer Trade Price, January 2019–March 2023

Year	Par Value $25,001–$100,000	Par Value $1,000,000 and Over	Ratio
2019	57.2	17.4	3.3
2020	63.5	26.8	2.4
2021	40.1	22.9	1.7
2022	52.9	17.9	3.0
2023 (January–March)	54.5	18.1	3.0

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

What Could Explain the Elevated Level of Effective Spread Since 2022?

Unlike the COVID-19 crisis, when the entire financial sector was temporarily disrupted but then staged a swift recovery, the 2022 market did not experience a similar V-shaped improvement. In fact, as mentioned earlier, in 2022 the municipal securities market experienced the highest annual trading volume since real-time trades started to be reported to the MSRB in 2005, implying sufficient liquidity in the marketplace. Instead of prices and yields swinging up and down, a classic example of volatility, since 2022 there has been a steady and sharp rise in interest rates, especially short-term interest rates, on the heels of rising inflation.[22] As a result, all fixed-income securities have experienced a price decline since the end of 2021.

If market liquidity and price fluctuation were not the causes for the increasing effective spread, would declining bond prices explain the increase? While it is economically reasonable to expect the amount of effective spread, as determined by the amount of markup/markdown charged by a dealer, to be proportional to the bond price, in reality, this is often not the case because of dealers' preference for charging a relatively fixed amount of markup. For example, a dealer may charge a fixed fee of $5.00 per bond for a customer buy order regardless of whether a bond is traded at 101 or 106; therefore, the actual markup in basis points would vary from 47.2 basis points (0.5/106) to 49.5 basis points (0.5/101). This scenario of "markup stickiness" may explain the abrupt rise in effective spread in 2022, as the persistent bond price decline during 2022 may indeed have elevated the effective spread when measured as a percent of the average daily bond price for each municipal security. Chart 3 shows that the average traded municipal securities price declined throughout 2022 and had not returned to the previous level as of early 2023, which corresponds to the rising interest rate environment.

[21] The effective spread for the three sub-$100,000 par value trade size groups, however, seemed to be converging, with miniscule difference between the three trade size groups as of early 2023.

[22] One-directional volatility.

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Chart 3. Average Monthly Traded Securities Price, January 2019–March 2023

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

Similarly, Table 2, which presents the annual percentage of trades involving premium bonds (bond price greater than 100) from 2019 through March 2023, shows that only 80.8% of 2022 trades and 76.3% 2023 trades were for premium bonds, a sharp decline from premium bond trades in the preceding three years, where the average percentages ranged from 92.3% to 97.1%. A decrease in the trading of premium bonds and a corresponding increase in the trading of discount bonds may also explain the rise in effective spread because of the liquidity impact. Investors may prefer trading premium bonds over discount bonds because of the IRS's Market Discount Rule, which has a greater impact the further away the discounted bond price is from par value.[23] Therefore, discount bonds are likely less liquid than premium bonds.

[23] Market Discount Rule (also known as the *de minimis* tax rule) sets the threshold at which a discount municipal bond should be taxed as a capital gain rather than as ordinary income. The *de minimis* amount is calculated by multiplying the par value by 0.25% and multiplying the result by the number of full years between the discounted bond's purchase date and the maturity date. The threshold is then calculated by subtracting the derived *de minimis* amount from the bond's par value.

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Table 2. Percentage of Trades for Premium Bonds, January 2019–March 2023

Year	Percent of Trades for Premium Bonds
2019	92.3%
2020	93.5%
2021	97.1%
2022	80.8%
2023 (January–March)	76.3%

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

The data illustrated in both Chart 3 and Table 1 indicate there is a relationship between bond prices and effective spread. However, the correlation cannot be verified and statistically established without controlling for other factors that may have also influenced the effective spread during the relevant period. The next section presents a regression analysis to examine the correlation between bond price movement and effective spread economically and statistically after controlling for other relevant factors and idiosyncratic characteristics of the aggregate bond pools traded over the period.

Regression Analysis

The benefits of performing a regression analysis are diverse. One benefit is to be able to measure the correlation between one variable (dependent variable) and many other variables (independent variables or factors) simultaneously and statistically test the estimated impact for each factor while controlling for all other factors. Essentially, the estimated impact from each independent variable is conditioned on the economic principal of "all else being equal."

The regression analysis employs a panel data regression model for pooled cross-sectional and time-series data points to test the relationship between the dependent variable to effective spread and a set of independent variables including trade size, issue type (e.g., general obligation or revenue), tax status,[24] bond price, yield, insurance status, maturity, age, callable bond status,

[24] For the purpose of this analysis, AMT-taxable only municipal securities are lumped with tax-exempt municipal securities.

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NTBC[25], original offering amount, whether a bond was traded during the COVID-19 period and time trend. The panel data regression model is specified as follows:[26]

Panel Data Regression Model[27]

$$\begin{aligned} Effective\ Spread_{it} &= \alpha + \beta_1 COVID\ Period_{it} + \beta_2 Bond\ Price_{it} + \beta_3 Insurance\ Status_{it} + \beta_4 Issuance\ Type_{it} \\ &+ \beta_5 Call\ Status_{it} + \beta_6 NTBC\ Trade_{it} + \beta_7 Taxable\ Bond_{it} + \beta_8 Age_{it} + \beta_9 Maturity_{it} \\ &+ \beta_{10} Trade\ Size_{it} + \beta_{11} Yield_{it} + \beta_{12} Amount\ of\ Offering_{it} + \beta_{13} Time\ Trend_t + \varepsilon_{it} \end{aligned}$$

All variables are specified in percentage change except for issuance type, insurance status, call status, taxable bond, NTBC status, COVID period, and time trend in the municipal securities model,[28] while subscript *i* corresponds to a particular security and subscript *t* corresponds to a particular trading date. Time trend is specified as a running count of calendar days from January 1, 2019, 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, several of the independent variables are indicator variables, essentially a yes-or-no test:[29] Issuance type (general obligation bond), insurance status, call status, taxable bond, COVID period and NTBC flag.

The panel data regression model uses both the ordinary least squares approach and the issuer and date fixed effects approach. Though not always, the fixed effects approach is generally preferred to the ordinary least squares approach in a panel data setting because of the potential possibility for omitted variable bias when using the ordinary least squares approach,[30] which would produce inaccurate estimations of correlation between variables. In any case, both approaches' results are presented in this paper, and the results of the two approaches are similar in terms of the independent variables' directional impact on the dependent variable of effective spread.

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25 NTBC is a trade reporting flag used by the MSRB to distinguish if a customer trade did not include a markup, mark-down or commission.

26 Please refer to Appendix C for detailed regression analysis results.

27 Panel data can be seen as a combination of two-dimensional data, typically cross-sectional and time-series data. Cross-sectional data is described as one observation of multiple objects at a specific point in time, while time-series data observes the same object recurrently over time. Panel data comprises characteristics of both into one model by collecting data from multiple, same objects over time.

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

29 In statistics and econometrics, particularly in regression analysis, an indicator 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 Omitted variable bias occurs when a statistical model fails to include one or more relevant variables that may be correlated with the variables included in the regression. Some of those omitted variables may be unobservable, therefore the omission would be unavoidable.

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Appendix C captures the full results of the regression analysis. The parameter estimates for control variables are as expected and mirror findings in previous MSRB research papers.[31] For example, trade size is found to be inversely correlated to effective spread, while age, maturity, whether the bond was traded during the COVID period and taxable status of a bond are positively correlated to effective spread.[32] 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 and insurance status, where a callable bond and/or an insured bond is associated with higher effective spread. Past studies have indicated that a fixed-income product with complex features such as being callable and having insurance tends to have higher transaction costs than a plain-vanilla bond.[33] Finally, the time-trend term continues to exhibit a downward trend over time when using the ordinary least squares approach, suggesting the effective spread had been declining even after controlling for idiosyncratic characteristics associated with the municipal bonds traded during the relevant period. This is in line with the findings from previous MSRB's research papers,[34] though the downward slope has a more moderate gradient due to the recent upward blips.

The regression analysis statistically confirms a negative correlation between bond price and effective spread, even after controlling for a bond's yield, as well as other idiosyncratic characteristics. This finding seems to support the aforementioned hypothesis that declining bond prices may raise the effective spread measure because: 1) discount bonds are less liquid than premium bonds due to the IRS's Market Discount Rule, whose impact increases the further away the discounted bond prices are from par value;[35] and 2) dealers' markup for customer trades tend to be relatively fixed. Since the effective spread is calculated as the difference between customer purchase price and customer sale price and expressed as a percentage of bond price, declining bond prices with a relatively fixed markup would make the effective spread higher. As to the exact economic impact, a 10% decrease (increase) in bond price would lead to about 16% increase (decrease) in effective spread. In other words, if the average effective spread was 46.6 basis points

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31 *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; Wu, Simon Z. and Marcelo Vieira, "Mark-up Disclosure and Trading in the Municipal Bond Market," Research Paper, Municipal Securities Rulemaking Board, July 2019; and Wu, Simon Z. and Nicholas J. Ostroy, "Transaction Costs During the COVID-19 Crisis: A Comparison between Municipal Securities and Corporate Bond Markets," Research Paper, Municipal Securities Rulemaking Board, August 2021.

32 Prior MSRB research found taxable municipal securities tend to be less liquid than tax-exempt municipal securities, which may explain the higher effective spread for trading taxable municipal securities. *See* Wu, Simon Z. and Nicholas J. Ostroy, "Transaction Costs During the COVID-19 Crisis: A Comparison between Municipal Securities and Corporate Bond Markets," Research Paper, Municipal Securities Rulemaking Board, August 2021.

33 *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.

34 *Ibid.*

35 Because of the Market Discount Rule, a vast majority of discount bonds are traded near par. *See* Kalotay, Andrew and Guy Davidson, "Managing Duration Extension and Negative Convexity Near Par," October 20, 2020, The Bond Buyer.

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in 2021, a 7% drop in the average traded bonds' price, which approximately reflects the actual change in bond price between 2021 and 2022, would be associated with a 11.2% rise in effective spread in 2022, resulting in an effective spread of 51.8 basis points. This magnitude of change (51.8 – 46.6 = 5.2 basis points) predicted by the regression analysis captures most of the actual change (9.6 basis points) in effective spread between 2021 and 2022. No other independent variable had nearly as large an economic impact (positive or negative) on effective spread as bond price based on the regression model estimates. Furthermore, none of the other independent variables experienced a similar magnitude of shift as the bond price did that would have explained the increase in effective spread in 2022.

Lastly, this research paper also addresses one finding by a recently published academic paper. Griffin, Hirschey and Kruger 2023[36] concluded that municipal bond customer purchase prices frequently vary even for the same bond sold on the same day, and even by the same dealer within the day, among other findings. The authors found that even when considering the same dealer selling the same bond on the same day, purchase price differences of at least 0.5% occur between the 10% most expensive and 10% least expensive small trades in 35% of trading days.[37] One possible explanation for the variation in transaction costs could be the difference in the types of customer accounts, with some dealers, aside from the bid-ask spread, charging little or no markup for customer trades tied to a fee-based account, such as separately-managed accounts (SMA accounts).[38] SMA account trades would typically contain a NTBC flag when reporting to MSRB's RTRS database[39] and represent about 21% of all customer trades during the relevant period. Not surprisingly, the regression analysis shows a statistically significant negative correlation between NTBC trades and effective spread, all else being equal, with a 10% increase in NTBC trades leading to around 5% reduction in effective spread. Table 3 below summarizes the difference in effective spread between NTBC customer trades and non-NTBC customer trades, with a 30-basis point difference in the average effective spread between the two groups.

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[36] Griffin, John M., Nicholas Hirschey and Samuel Kruger, "Do Municipal Bond Dealers Give their Customers 'Fair and Reasonable' Pricing?" Journal of Finance, Volume 78, Issue 2, April 2023.

[37] *Ibid.*

[38] Even the same dealer may choose to charge different markup amounts for different types of customer accounts, with fee-based customer accounts paying a lower markup amount than regular non-fee-based customer accounts, or none at all. It should be noted that even with zero markup for customer trades, there may still be an effective spread as calculated in this analysis, as inter-dealer trades may incur a bid-ask spread as well.

[39] As mentioned above, NTBC flags refer to a customer trade that does not include a mark-up, mark-down or commission. The remaining non-NTBC customer trades either have a markup or a mark-down already included in the trade price, or have a commission paid by customers separately (agency trades), in which case the RTRS converts the commission amount to the same units as dollar price and computes and disseminates a net dollar transaction price inclusive of commission amount.

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Table 3. Average and Median Effective Spread for NTBC and Non-NTBC Trades In Basis Points,[40] January 2019–March 2023

NTBC Flag	Average Effective Spread	Median Effective Spread
Non-NTBC Customer Trades	67.6	28.2
NTBC Customer Trades	37.7	21.9

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

Conclusion

After a 12-year-long decline since the end of the 2008 financial crisis, recent years witnessed two abrupt upsurges for secondary market customer transaction costs in municipal securities. Unlike the 2020 COVID-19 market crisis, the 2022 increase in customer transaction costs, as measured in effective spread, was caused by a decline in bond prices as a result of rising inflation and interest rates. The bond price decline may have elevated the effective spread because discount bonds are less liquid than premium bonds due to the impact of the IRS's Market Discount Rule, which is especially pronounced on bonds with deep discounts. In addition, dealers tend to charge a relatively fixed amount of markup for customer trades, which means effective spreads rise when bond prices fall. In addition, while the difference in effective spread was shrinking between individual-sized customer trades and institution-sized customer trades, since January 2022, the convergence trend has reversed, with the effective spread for the sub-$100,000 par value trades being three times as large as the effective spread for the over $1,000,000 par value trades as of March 2023. The disparity in effective spread between individual-sized customer trades and institution-sized customer trades has essentially reverted back to the 2019 level.

Finally, the paper also addressed the relationship between the difference in brokerage customer models and the amount of effective spread for customer trades, with customer trades carrying an NTBC flag, typically tied to a fee-based customer account, receiving 30 basis-point lower effective spread than customer trades without an NTBC flag. This variation in effective spread exists even after controlling for other idiosyncratic characteristics of the municipal securities traded over the relevant period in a regression analysis.

[40] Since the effective spread is calculated for each bond on each trading day by taking a difference between the average customer purchase price and the average customer sale price, for this analysis, the NTBC customer trades group contains all customer trades with a NTBC flag, while the non-NTBC customer trades group contains all customer trades with no NTBC flag.

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References

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.

Griffin, John M., Nicholas Hirschey and Samuel Kruger, "Do Municipal Bond Dealers Give their Customers 'Fair and Reasonable' Pricing?" Journal of Finance, Volume 78, Issue 2, April 2023.

Harris, Larry and Michael Piwowar, "Secondary Trading Costs in the Municipal Bond Market," Journal of Finance, Volume 61, 2006.

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.

Wu, Simon Z. and Marcelo Vieira, "Mark-up Disclosure and Trading in the Municipal Bond Market," Research Paper, Municipal Securities Rulemaking Board, July 2019.

Wu, Simon Z. and Nicholas J. Ostroy, "Transaction Costs During the COVID-19 Crisis: A Comparison between Municipal Securities and Corporate Bond Markets," Research Paper, Municipal Securities Rulemaking Board, August 2021.

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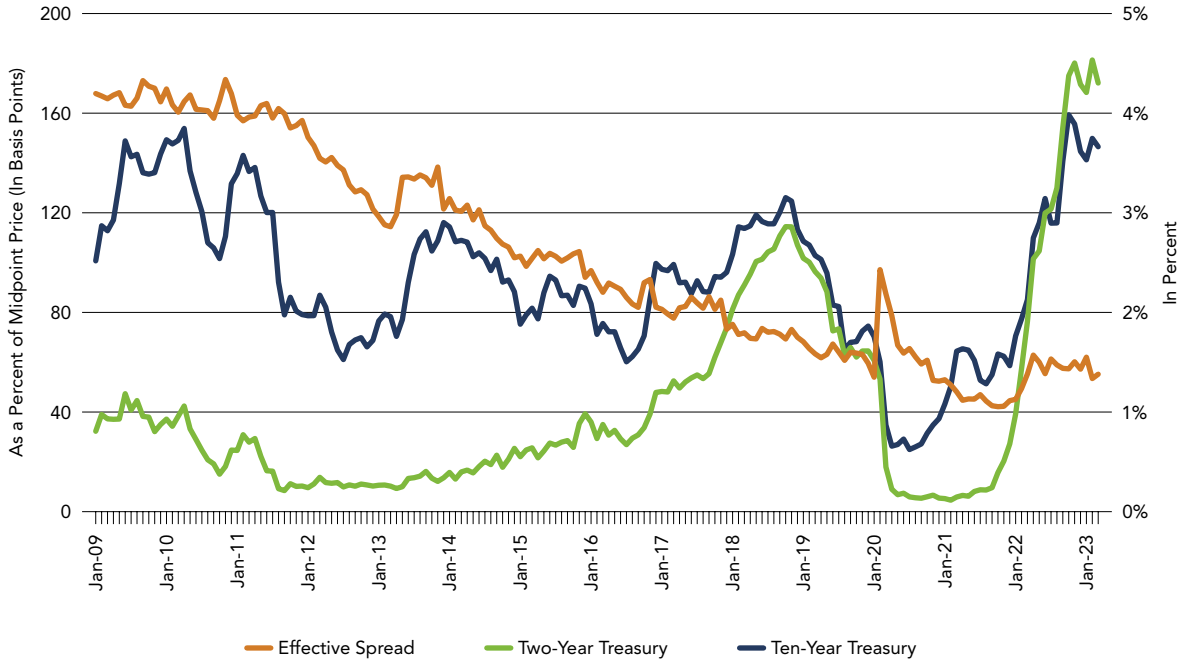
Appendix B—Effective Spread for Fixed-Rate Municipal Securities Customer Trades, Two-Year Treasury and Ten-Year Treasury Yields (January 2009–March 2023)



Source: MSRB analysis with data obtained from MSRB's RTRS database and the Board of Governors of the Federal Reserve System.

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Appendix C—Regression Analysis Results

Panel Data Model for Municipal Securities

$$Effective\ Spread_{it} = \alpha + \beta_1 COVID\ Period_{it} + \beta_2 Bond\ Price_{it} + \beta_3 Insurance\ Status_{it} + \beta_4 Issuance\ Type_{it} + \beta_5 Call\ Status_{it} + \beta_6 NTBC\ Trade_{it} + \beta_7 Taxable\ Bond_{it} + \beta_8 Age_{it} + \beta_9 Maturity_{it} + \beta_{10} Trade\ Size_{it} + \beta_{11} Yield_{it} + \beta_{12} Amount\ of\ Offering_{it} + \beta_{13} Time\ Trend_t + \varepsilon_{it}$$

	Ordinary Least Square Model			Issuer and Date Fixed Effects Model		
Variable	Parameter Estimate	t Value	Statistically Significant at 1%	Parameter Estimate	t Value	Standard Error
Intercept	9.5739	242.70	Yes			
COVID Period	0.4205	186.27	Yes			
Bond Price	-1.5402	-185.32	Yes	-1.6342	-111.31	Yes
Insurance Status	0.2958	129.37	Yes	0.1622	24.62	Yes
Issuance Type	0.0368	25.96	Yes	-0.0179	-2.25	No
Call Status	0.2566	150.27	Yes	0.0865	32.15	Yes
NTBC Trade	-0.5236	-211.48	Yes	-0.4633	-123.89	Yes
Taxable Bond	0.5141	168.43	Yes	0.3241	57.96	Yes
Age	0.0416	64.25	Yes	0.0457	36.34	Yes
Maturity	0.4316	561.32	Yes	0.4329	343.13	Yes
Trade Size	-0.2379	-504.45	Yes	-0.2409	-345.76	Yes
Yield	0.3097	281.77	Yes	0.6042	188.95	Yes
Amount of Offering	0.0074	15.70	Yes	0.0301	18.48	Yes
Time Trend	-0.0004	-228.82	Yes			
Adjusted R-Square	0.34			0.75		
Number of Observations	3,289,817			3,289,817		

Source: MSRB analysis with data obtained from MSRB's RTRS database and security master database.

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