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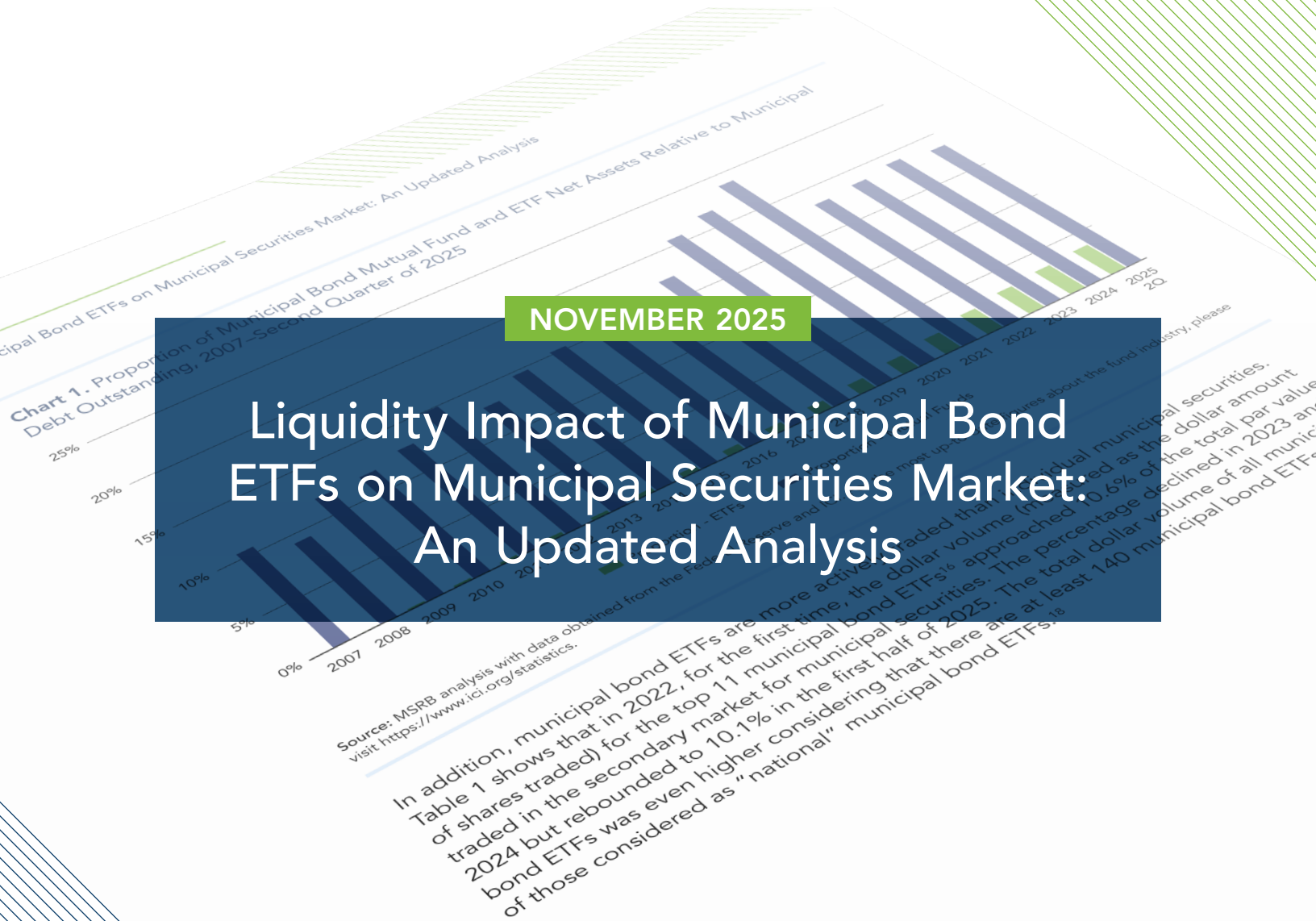

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Liquidity Impact of Municipal Bond ETFs on Municipal Securities Market: An Updated Analysis

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CONTENTS

Abstract[1]

As fixed-income exchange-traded funds (ETFs) continue to grow in popularity, it becomes increasingly important to understand the relationship between these funds and the corresponding markets for individual securities. Recent academic research into the corporate bond market has a mixture of findings. Some papers identify an inverse relationship between ETF growth and the liquidity of the underlying bonds, while most other papers point to a positive correlation. In 2018, the Municipal Securities Rulemaking Board (MSRB) published a research paper exploring the relationship between municipal bond ETFs and the liquidity of the municipal securities secondary market as measured by trading volume ("2018 MSRB ETF Paper").[2] This new paper attempts to update the 2018 analysis with recent data covering the period from September 2007 to June 2025. This paper utilizes a more robust trading volume model first developed in a 2025 MSRB study on municipal securities trading activities ("2025 MSRB Volume Paper").[3] The new results confirm the previous findings that there is no statistical relationship between the growth of ETF assets and municipal securities trading volume and that the growth of municipal bond ETFs have not had any deleterious impact on the liquidity of municipal securities.

1 The views expressed in the working papers are those of the author(s) and do not necessarily reflect the views and positions of the MSRB.

2 See Wu, Simon Z. and Meghan Burns, "Municipal Bond ETFs: Liquidity Impact on Municipal Bond Market," MSRB Research Paper, April 2018.

3 See Wu, Simon and John Bagley, "What Drives Trading Volume in the Municipal Securities Market? A Study of Likely Factors," Research Paper, Municipal Securities Rulemaking Board, February 2025.

Introduction

The growth of fixed-income ETFs has been robust in the past two decades, with ETF assets increasing at a rate of 27.2% annually between June 2007 and June 2025.[4] Relative latecomers to the market, municipal bond ETF products expanded at a faster rate of 31.2% per year between June 2008 and June 2025.[5] Increasingly, financial regulators, economists, policymakers and market practitioners are considering how the growth of ETFs might impact the underlying securities that comprise individual ETFs and the municipal securities market as a whole.[6] Although ETFs trade independently, they are intrinsically related to the underlying securities.

An ETF is a tradable security that tracks equity or bond indices, commodities, currencies or actively managed assets.[7] Like mutual funds, ETFs own the underlying assets and can create and redeem shares daily. Unlike mutual funds, ETFs trade in and out of positions throughout the day. ETFs trade like stocks on an exchange, which makes them attractive to investors who want to be able to react to market movements in real time.[8] Most ETFs are designed to track a benchmark index closely. The supply, demand and pricing of ETF shares are controlled by a unique creation and redemption process. This process involves authorized participants engaging in arbitraging activities to adjust the price for ETFs and/or underlying securities so that ETF prices align with the net asset value (NAV) of benchmark indices.[9] When there is a price deviation between ETFs and the NAV of their underlying securities, authorized participants create or redeem ETF shares as a way of arbitraging for profit making.[10]

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4 Based on the data from Investment Company Institute (ICI). For the most up-to-date figures about the fund industry, please visit https://www.ici.org/statistics.

5 Based on net asset data from ICI. For the most up-to-date figures about the fund industry, please visit https://www.ici.org/statistics. By comparison, government bond ETFs grew at 22.8% annually during the period, and corporate bond ETFs grew at 28.4% annually.

6 "In summary, the theoretical and empirical evidence regarding the impact of fixed-income ETF growth on the liquidity of the underlying bond markets is not conclusive, and is an area for future research," from SEC FIMSAC report on the impact of ETFs and Funds on the underlying securities, April 10, 2019. Found at: https://www.sec.gov/spotlight/fixed-income-advisory-committee/etfs-and-bond-funds-subcommittee-report-041519.pdf.

7 See Antoniewicz, Rochelle and Jane Heinrichs, "Understanding Exchange-Traded Funds: How ETFs work," Investment Company Institute (ICI) Research Perspective, Vol. 20, No. 5, September 2014, and Wu, Simon and Meghan Burns, "Municipal Bond ETFs: Liquidity Impact on Municipal Bond Market," Research Paper, Municipal Securities Rulemaking Board, April 2018.

8 Regardless of the product structure, all ETF products are subject to regulation by the Securities and Exchange Commission (SEC).

9 Only authorized participants, or APs, can participate in the process directly with issuers of ETFs.

10 See Wu, Simon Z. and Meghan Burns, "Municipal Bond ETFs: Liquidity Impact on Municipal Bond Market," MSRB Research Paper, April 2018. The 2018 paper provides a history of ETFs in the market which is not covered here.

This report focuses on the liquidity impact of municipal bond ETFs on municipal securities.[11] Recent research on corporate bond ETFs shows that ETFs could lead to either increased or decreased liquidity in the underlying bond markets. For example, Holden and Nam (2019), Ye (2019), Marta (2025), Finnerty, Reisel and Zhong (2024) and Rhodes and Mason (2020) all found that when a corporate bond was included in more ETFs, its liquidity measure also showed improvement. On the other hand, other studies illustrate declining market efficiency and hampered liquidity for underlying component securities accompanying increases in ETF ownership.[12] The 2018 MSRB ETF Paper examined the relationship between the growth of ETF assets and the trading volume of municipal securities and found no evidence of deterioration of municipal securities liquidity due to the growth of municipal bond ETFs. These results are confirmed by the findings of Marlowe (2020), who examined the impact of ETFs on municipal securities liquidity.[13] This report examines whether a correlation might exist between the growth of municipal bond ETFs and overall municipal securities secondary market trading, now 18 years after the first municipal bond ETF started trading in September 2007.

Data and Methodology

MSRB's Real-Time Transaction Report System (RTRS) database is used to calculate trading volume for municipal securities. In addition, all fixed-income ETFs' and mutual funds' NAV data are provided by the Investment Company Institute (ICI), while total municipal debt outstanding data are sourced from the Federal Reserve's Financial Accounts of the United States. Furthermore, data for a specific municipal bond ETF's daily trading volume and closing price are downloaded from Nasdaq.com, with the list of municipal bond ETFs and each ETF's total amount outstanding from etf.com and etfdb.com. Finally, other relevant data for the regression analysis are gathered from Bloomberg's BVAL, Municipal Market Analytics (MMA), LSEG and S&P Global.

[11] In addition, for many fixed-income ETFs, because the underlying securities tend to be less liquid than the ETFs themselves, there has been a view that the so-called "liquidity mismatch" would negatively affect the ETFs' price-tracking ability. If this is true, there is a possibility that the mismatch in liquidity could be exacerbated as the size of ETF assets and the number of ETF products grows, especially during a stress period. See Weinberg, Ari, "SEC Raises Concerns About Bond ETFs," the *Wall Street Journal*, February 7, 2016.

[12] Dannhauser (2016) found that corporate bonds' increase in ETF ownership negatively impacts the liquidity of the underlying individual bonds. Pan and Zeng (2017) found evidence of a liquidity mismatch in the corporate bond ETF market and that this mismatch can reduce market efficiency and increase ETF mispricing.

[13] Justin Marlowe, "Do Municipal Bond Exchange-Traded Funds Improve Market Quality?" Brookings Institution, *Hutchins Center Working Paper #71*, December 2020, https://www.brookings.edu/wp-content/uploads/2020/12/WP71_Marlowe.pdf.

For all the analyses below, commercial paper is excluded from the trading volume calculation for the municipal securities market, as it is typically not included in municipal bond ETFs. On the other hand, there are some municipal bond ETFs that invest in both fixed-rate and variable-rate securities; therefore, variable-rate securities are included in the trading volume calculation. As to the regression analysis methodology, please refer to the section below for the relevant discussion on how to test for the correlation between municipal bond ETFs' NAV and municipal securities' trading volume.

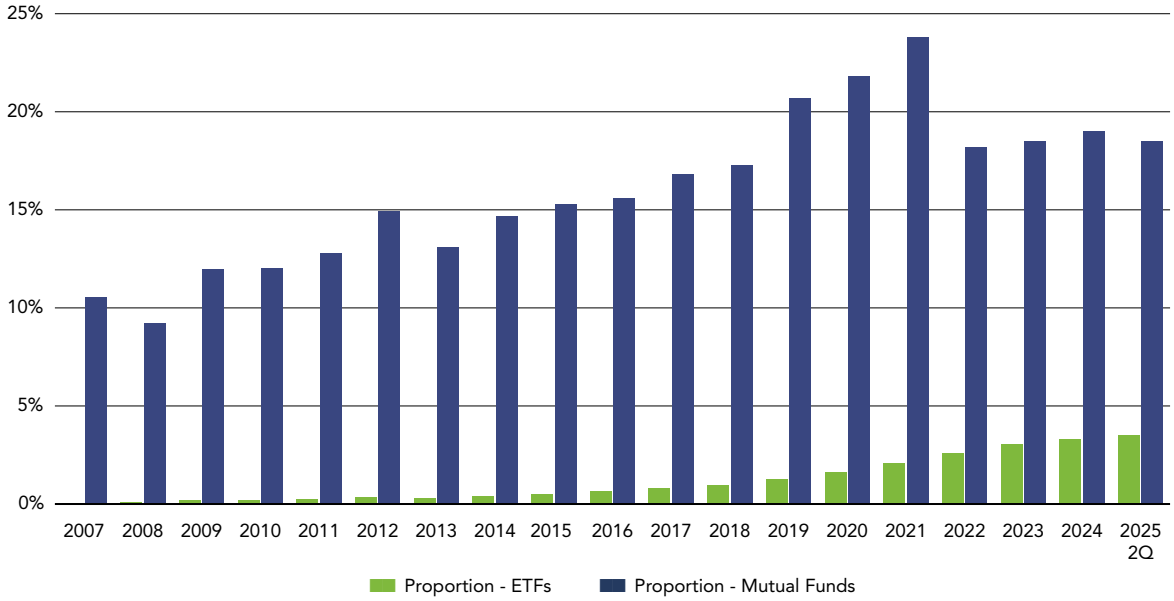
Growth of Municipal Bond ETFs

Municipal bond ETF assets have grown faster than the overall municipal debt level, even though ETF assets represented only 3.5% of total municipal securities outstanding as of the second quarter of 2025.[14] Chart 1 shows the proportions of municipal bond mutual funds and ETFs relative to total municipal securities outstanding (net assets). Both municipal bond mutual funds and ETFs steadily increased their respective shares until 2021. Municipal bond mutual funds' share peaked at 23.8% in 2021 before retreating to 18.5% in the second quarter of 2025. By comparison, the share of municipal bond ETFs continued to rise from 2.1% in 2021 to 3.5% in the second quarter of 2025. ETF net assets, still a fraction of the overall municipal securities market, have grown impressively over the last few years. The 2018 MSRB ETF Paper indicated that municipal bond ETFs represented less than 0.7% of the total market as of the first quarter of 2017. Now, eight years later, the ratio is about five times as much, which is remarkable especially when considering that the total amount of municipal debt also grew during the same period, from about $3.9 trillion to $4.3 trillion.[15]

[14] Municipal securities debt size data from the Federal Reserve's Financial Accounts of the United States, and net assets data from ICI https://www.ici.org/statistics.

[15] See the Federal Reserve's Financial Accounts of the United States.

Chart 1. Proportion of Municipal Bond Mutual Fund and ETF Net Assets Relative to Municipal Debt Outstanding, 2007–Second Quarter of 2025



Source: MSRB analysis with data obtained from the Federal Reserve and ICI. For the most up-to-date figures about the fund industry, please visit https://www.ici.org/statistics.

In addition, municipal bond ETFs are more actively traded than individual municipal securities. Table 1 shows that in 2022, for the first time, the dollar volume (measured as the dollar amount of shares traded) for the top 11 municipal bond ETFs[16] approached 10.6% of the total par value traded in the secondary market for municipal securities. The percentage declined in 2023 and 2024 but rebounded to 10.1% in the first half of 2025. The total dollar volume of all municipal bond ETFs was even higher considering that there are at least 140 municipal bond ETFs,[17] with 56 of those considered as "national" municipal bond ETFs.[18]

[16] Ticker symbol: MUB, MUNI, TFI, JMST, HYD, PZA, BAB, CMF, ITM, HYMB, VTEB. They are among the most actively traded municipal bond ETFs. University of Chicago recently selected the same 11 municipal bond ETFs for their "consistent daily put/call trading volume" to be included in the University of Chicago Municipal Bond VIX index calculation. See https://munifinance.uchicago.edu/data_dashboard/municipal_bond_vix/.

[17] See the website etf.com, which lists a total of about 140 municipal bond ETFs.

[18] See the website etfdb.com, which lists 56 "national" municipal bond ETFs, presumably excluding municipal bond ETFs focusing on geographic areas or sectors. The estimated total dollar volume traded for the 56 national municipal bond ETFs was about $164.2 billion in the first half of 2025, which was 10.8% of the total par value traded for all municipal securities, as compared to 10.1% for the top 11 ETFs in Table 1, indicating a high concentration of trading among the most-frequently traded municipal bond ETFs.

Table 1. Trading Volume of Top 11 ETFs and All Municipal Securities, 2020–June 2025

Year	Municipal Securities Secondary Market Par Value Traded	Dollar Volume Traded for All 11 ETFs in Municipal Bond VIX	Ratio of ETF Volume to Municipal Securities Volume
2020	$2,438,664,665,846	$95,067,381,373	3.9%
2021	$1,662,737,674,285	$89,006,928,407	5.4%
2022	$3,014,730,429,591	$320,262,757,751	10.6%
2023	$2,725,801,534,106	$204,178,612,260	7.5%
2024	$2,579,059,170,461	$190,606,056,519	7.4%
1st Half of 2025	$1,521,039,930,937	$153,529,483,543	10.1%

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

During periods of market stress, municipal bond ETFs played an even larger role than in normal times.[19] For example, in April 2025, financial markets experienced enormous volatility. While the total par value traded in municipal securities was 52% higher in April 2025 than in April 2024, the trading volume for the top 11 municipal bond ETFs was 176% higher. The ratio of ETF trading volume to municipal securities trading volume was 12.5% for April 2025, compared to an average of 9.3% for the other five months in the first half of 2025, suggesting the importance of ETFs in times of market turbulence.

Another way to illustrate the higher trading activity of municipal bond ETFs when compared to individual municipal securities is by measuring the turnover ratio – the annual dollar amount of trading as a percentage of the total outstanding amount. Table 2 shows that municipal securities' annual turnover ratio was nearly 71% in the first half of 2025,[20] which means that, on average, 71% of total municipal securities outstanding is expected to be traded in a year. By comparison, the annual turnover ratio was 241% for the top 57 municipal bond ETFs,[21] over three times more frequent than the corresponding ratio for municipal securities. When restricting the list of municipal bond ETFs to the top 11 municipal bond ETFs as in Table 1 above, the turnover ratio was even higher at 273%.

[19] See Bagley, John, Marcelo Vieira and Simon Wu, "April 2025 Market Recap," Research Paper, Municipal Securities Rulemaking Board, May 2025.

[20] For municipal securities, the annual total par value traded is calculated by doubling the total from the first six months of 2025.

[21] The 57 ETFs are a combination of the two lists, including the 11 ETFs cited above and all the other ETFs among the 56 national municipal bond ETFs from etfdb.com, with nine of those ETFs belonging to both lists and one additional ETF having incomplete data. For these 57 municipal bond ETFs, the average daily dollar value traded was calculated for each ETF through September 7, 2025, and then was annualized and aggregated.

Table 2. Turnover Ratio Based on Dollar Volume of Trading (2025 Data)

	Municipal Securities	Top-57 Municipal Bond ETFs	Top-11 Municipal Bond ETFs
Outstanding Amount	4,307,500,000,000	136,330,356,000	102,273,338,000
Annual Par/Dollar Value Traded	3,042,079,861,874	328,463,205,221	279,276,213,249
Turnover Ratio	70.6%	240.9%	273.1%

Source: MSRB analysis with data obtained from MSRB's RTRS, the Federal Reserve, etfdb.com, etf.com, Nasdaq.com and ICI.

It is likely that the high growth rate of ETF municipal bond assets and trading activities will continue for the near term, given the recent trends. Therefore, any potential impact on the municipal securities market may change over time as the ETF market evolves. The rest of the paper focuses on the central question: Would the growth of municipal bond ETF net assets impact municipal securities' market liquidity as measured by trading volume?

Municipal Bond ETFs—Analysis of Liquidity Impact

For fixed-income ETFs, the consensus is that ETFs have altered the bond investment universe by providing intra-day real-time pricing previously unavailable from major bond indices.[22] However, as to ETFs' impact on underlying bonds' liquidity, there is no universal agreement, as recent research papers on corporate bond ETFs have shown both positive and negative impacts. Additionally, very few research studies have addressed the impact of ETFs on the municipal securities market.[23] The rest of this analysis attempts to build upon the 2018 MSRB ETF Paper by extending a similar analysis to more recent periods and examining the relationship between market liquidity for municipal securities and the growth of municipal bond ETF net assets.

Liquidity Impact Hypotheses and Literature Review

In academic literature, there are two opposing theories on how the growth of ETF holdings affect the liquidity of underlying securities. First, on the positive side, ETFs could increase their liquidity through the ETFs' direct participation in the bond market or, as theories predict, by

[22] Although price discovery is not the focus of this report, recent academic and industry research into the corporate bond market has supported this notion that fixed-income ETFs could lead price discovery in the underlying securities due to the ETFs' superior liquidity. For example, see Tucker, Matthew and Stephen Laipply, "Fixed Income ETFs and the Corporate Bond Liquidity Challenge," iShares BlackRock, 2015, and "Bond Market Price Discovery: Clarity Through the Lens of an Exchange," *The Journal of Portfolio Management*, Winter 2013. Tucker and Laipply (2013) found that not only does the ETF price move in line with the bond market over time, but it also appears to absorb price information more rapidly. As a result, price movements in fixed-income ETFs can often lead price movements in individual bonds and market indices.

[23] For example, see Marlowe, Justin, "Do Municipal Bond Exchange-Traded Funds Improve Market Quality," Brookings Institution, *Hutchins Center Working Paper #71*, December 2020.

increasing opportunities for arbitrage by market participants. Generally, fixed-income securities, such as corporate bonds and municipal securities, are less liquid than Treasury securities or equities. Therefore, corporate and municipal securities are slower to adjust to a changing market environment, which creates more opportunities for arbitraging by participants in the secondary market. In addition, with improved price discovery from the trading of ETFs, their existence could also provide incentives for market participants to trade more underlying bonds, as the pricing linkage between the two products provides further prospects for profit-seeking trades.[24] Conversely, the second theory articulates that if ETFs offer a low transaction cost alternative with more intra-day price transparency and liquidity than the underlying bonds, uninformed investors may migrate from the underlying market to ETFs over time, leaving a higher proportion of informed investors in the underlying market, and thus potentially reducing liquidity.[25]

Initially, most of the earlier empirical evidence illustrated a negative relationship between ETF holdings and the liquidity of underlying securities, primarily in the corporate bond space.[26] Dannhauser (2016) showed that the growth of corporate bond ETF activities reduces investment-grade corporate bond liquidity but does not affect high-yield bond liquidity.[27] Pan and Zeng (2017) found evidence of a liquidity mismatch in the corporate bond ETF market, and that this mismatch can reduce market efficiency and increase ETF mispricing.[28]

Conversely, other more recent research papers found that an increase in ETF ownership and/or trading volume is accompanied by a positive impact on market efficiency and liquidity for the underlying component corporate bonds.[29] For example, Finnerty, Reisel and Zhong (2024), Holden and Nam (2019), Marta (2025), Rhodes and Mason (2020), and Ye (2019) all found that a corporate bond's inclusion in ETF products would improve its liquidity relative to other bonds

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[24] See Wu, Simon and Meghan Burns, "Municipal Bond ETFs: Liquidity Impact on Municipal Bond Market," Research Paper, Municipal Securities Rulemaking Board, April 2018.

[25] See Dannhauser, Caitlin Dillion, "The Impact of Innovation: Evidence from Corporate Bond ETFs," Working Paper, September 2016. Informed investors buy and sell based on the belief that they can predict the direction of the price movement, as opposed to non-informed investors who do not trade based on information.

[26] There are also research papers showing the negative correlation in the equity market. For example, Hamm (2014) and Israeli, Lee, and Sridharan (2016) also found a negative relationship between ETF holdings and the liquidity of underlying stocks, corroborating the results from Dannhauser's corporate bond ETF study.

[27] Dannhauser and Hoseinzade (2020) also looked into the liquidity mismatch problem between corporate bond ETFs and underlying bonds. They found that corporate bond ETFs amplified the effects of negative fundamental shocks during the Taper Tantrum, with redemptions used to maintain the relative price efficiency of the largest and most liquid ETFs leading to significantly higher yield spreads for four months before reverting.

[28] Pan, Kevin and Yao Zeng, "ETF Arbitrage under Liquidity Mismatch," Working Paper Series, No. 59, European Systemic Risk Board, December 2017.

[29] In addition, for equity-linked ETF products, an earlier paper by Hedge and McDermott (2004) found decreased transaction costs for Dow Jones 30 stocks following the introduction of the SPDR® Dow Jones® Industrial Average ETF (commonly referred to as "Diamond" ETF).

not in the funds.[30] Finally, with the benefit of hindsight from previous literature, Melo, Todorova and Gupta (2022) contended that both the positive and negative effects from ETF ownership and trading on underlying bonds' liquidity found in previous studies are not mutually exclusive.[31] Liquidity for bonds may benefit from bonds' inclusion in ETFs in the cross-section comparison (i.e., vis-à-vis bonds that are not included in ETFs), but some traders may substitute ETF transactions for transactions in the underlying securities, leading to reduced aggregate market liquidity. Melo, Todorova and Gupta (2022) analyzed the conflating factors and found that the net impact was not uniform across the corporate bond market, with investment-grade bond liquidity generally benefiting from ETFs while high-yield bond liquidity was generally reduced as a result of ETFs.[32]

Thus far, very few research studies have been carried out for the municipal securities market. Given the differences between municipal securities and corporate bonds, it is not clear whether the same conclusion could be drawn from the municipal securities market.[33] There are significant differences in market structure between municipal securities and other fixed-income securities, such as the large number of municipal issuers and outstanding securities, the tax-exempt status for many of the issued bonds, and the difficulty in shorting a municipal bond or hedging a bond portfolio position. Because of this, there is a possibility that the net impact of ETF growth on municipal securities liquidity could differ from their impact on investment-grade and high-yield corporate bond liquidity.

Regression Analysis

For the measurement of municipal securities' liquidity, we use trading volume by calculating the total par value traded for each month. The other popular measure of liquidity is transaction costs as measured by either bid-ask spread or effective spread, which is commonly used as a proxy for liquidity in the equity market. However, similar to other fixed-income products, such as corporate bonds, municipal securities' effective spread may not be solely indicative of market liquidity and can be impacted by other non-liquidity-related factors.[34] Therefore, trading volume would be

[30] See Finnerty, John D., Natalia Reisel and Xun Zhong, "ETFs, Creation and Redemption Processes, and Bond Liquidity," Working Paper, March 2024; Holden, Craig W., and Jayoung Nam, "Market accessibility, Corporate bond ETFs, and Liquidity," Working Paper, 2019; Marta, Thomas, "Corporate Bond ETFs, Bond Liquidity, and ETF Trading Volume," Working Paper, January 2025; Rhodes, Meredith E. and Joseph R. Mason, "ETF Corporate Bond Ownership and Market Quality," Working Paper, 2020; and Ye, Shuai, "How do ETFs Affect the Liquidity of the Underlying Corporate Bonds?" Chinese University of Hong Kong Working Paper, 2019.

[31] See Meli, Jeffrey, Zornitsa Todorova and Shobhit Gupta, "The Rise of Institutional Investors in Bond ETFs," Working Paper, 2022.

[32] *ibid*.

[33] The major differences in characteristics between municipal securities and corporate bonds include the number of issuers, number of securities (CUSIPs), size of issuance, maturity structure and optionality, among others.

[34] For example, transaction costs likely also reflect market transparency and technology advancement, as fixed-income securities markets typically do not have consolidated quote information that is updated in real-time, unlike the equity market. In any case, if we use effective spread for market liquidity in the regression analysis, the results do not change materially.

more appropriate for the purpose of this analysis.[35] For the main findings presented below, as mentioned above, commercial paper is excluded from the monthly trading volume calculation, as these securities typically are not included in municipal bond ETFs.[36]

We conducted a regression analysis to test and measure, on an aggregate level, whether the growth of total municipal bond ETF net assets over the period from September 2007 through June 2025 has had an impact on municipal securities secondary market trading volume. The benefits of performing a regression analysis are diverse. One benefit is to measure the correlation between one variable (dependent variable) and many other variables (independent or control variables) to simultaneously and statistically test the estimated impact for each independent variable while controlling for all other variables. Essentially, the estimated impact from each independent variable is conditioned on the economic principal of "all else being equal."

The regression model adopted for this paper is similar to a model used in the 2025 MSRB Volume Paper on municipal securities trading volume.[37] The 2025 Volume Paper tested the relationship between the dependent variable, Trading Volume, and a set of independent (control) variables, including trading volume from the month before, primary issuance volume, volatility, yield and yield from the month before. In addition to these control variables, this regression model also examines the effect of municipal bond ETF NAV on Trading Volume, which is the focus of this analysis, as well as the effect of municipal bond Mutual Fund NAV.[38]

The regression model is specified as follows:

$$\begin{aligned} &Trading\ Volume_t \\ &\quad = \alpha + \beta_1\ ETF\ NAV_{t-1} + \beta_2\ Mutual\ Fund\ NAV_{t-1} + \beta_3\ Trading\ Volume_{t-1} \\ &\quad + \beta_4\ Volatility_t + \beta_5\ Yield_t + \beta_6\ Yield_{t-1} + \beta_7\ Primary\ Offering\ Volume_t + \varepsilon_t \end{aligned}$$

[35] Another measure of liquidity is the turnover ratio, which can be calculated as a ratio of trading volume over the total amount of bonds outstanding. However, total municipal securities outstanding data are available only on a quarterly (not monthly) basis, which is the frequency adopted in the regression model. Also, during the relevant period, the amount of outstanding municipal securities had been relatively steady. Therefore, the fluctuation of the turnover ratio is likely not too different from the fluctuation of the trading volume.

[36] In any case, if we include commercial paper in the regression analysis, the results do not change materially.

[37] See Wu, Simon and John Bagley, "What Drives Trading Volume in the Municipal Securities Market? A Study of Likely Factors," Research Paper, Municipal Securities Rulemaking Board, February 2025.

[38] There may be other factors that could influence trading volume as well, such as technological advancement that facilitates locating available liquidity and executing trades, and increased use of SMAs by individual investors. However, those factors are impossible to quantify with data and therefore are excluded from the regression analysis.

All variables are specified in percentage change[39] and subscript *t* corresponds to a particular month. The independent variable Yield represents the average 10-year BVAL or MMA municipal bond yield[40] during a month, while the independent variable Volatility is calculated as the standard deviation of daily returns for the S&P Municipal Bond Index over a month. The model tests statistical significance and, if significant, measures the percentage of variation in municipal securities Trading Volume that is explained by the growth of ETF NAV. Essentially, the model tests whether one month's change in ETF NAV affects the following month's municipal securities Trading Volume. The test result should fall into one of the three categories:

- Statistically significant and positive, which means that the growth of municipal bond ETFs leads to more municipal securities trading volume
- Statistically significant and negative, which means that the growth of municipal bond ETFs depresses municipal securities trading volume
- No statistical significance, which means that the growth of municipal bond ETFs does not affect municipal securities trading volume

Empirical Findings

Table 3 below captures the full results of the regression analysis. Since the 2025 MSRB Volume Paper excluded variable-rate securities (and commercial paper) in the municipal securities trading volume calculation, Table 3 presents two versions of the analysis for Trading Volume, one with variable rate securities and one without, with both versions showing similar findings. The regression analysis shows that, on an aggregate basis to date, there is no evidence of deterioration in municipal securities liquidity as measured by Trading Volume as a result of the growth of municipal bond ETF NAV. All else being equal, the growth of municipal bond ETF NAV over the period from September 2007 through June 2025 did not have an impact on the overall municipal securities trading volume.[41] This result confirms the findings from the 2018 MSRB ETF Paper, when less than 0.8% of all municipal securities-related investments were in ETFs at the time (in 2017), compared to 3.5% as of the second quarter of 2025.[42]

While impact on municipal securities market liquidity could change over time if the ETF market continues to grow steadily, so far there has not been any effect on municipal securities trading volume. This finding corroborates one of the possible outcomes hypothesized by Melo, Todorova

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[39] For example, if the average monthly yield increases from 4% last month to 4.5% this month, the variable Yield will be calculated as (4.5%–4%) / 4% = 0.125, or 12.5% for the month. Essentially, this method acknowledges that the effect of a 0.5% increase from 4% would be very different from the effect of a 0.5% increase from, for example, 1%, which would be a 50% increase. Here the natural log difference was used as a proxy for percentage difference for all variables in the equation.

[40] Derived from Bloomberg BVAL Municipal AAA curves from January 2011 through June 2025 and from Municipal Market Analytics (MMA) for the period before 2011.

[41] The parameter β_1 tested in the model above is statistically insignificant.

[42] If restricting the sample period to the more recent timeframes, such as from November 2017 to June 2025 or from February 2022 to June 2025 when the interest rates started rising rapidly, the result is still the same, with no impact on municipal securities trading volume from the growth of the ETF assets.

and Gupta (2022)—that the net impact from the growth of the municipal bond ETFs could be neutral due to conflating factors. Furthermore, since the publication of the 2018 MSRB ETF Paper, the market has experienced a dramatic and sustained rising interest rate environment, resulting in a fixed-income "bear" market between 2022 and 2025, in addition to extraordinarily high trading volume during the same period. The fact that there is still no correlation between the growth of municipal bond ETF assets and municipal securities market liquidity should lend further credence to the findings.

Outside the variable ETF NAV, four control variables are found to have statistically significant impact on municipal securities trading volume:

- Contemporaneous monthly Primary Offering Volume, where a month with higher (lower) Primary Offering Volume has a positive (negative) impact on the same month's trading volume
- Contemporaneous average monthly Yield, where a month with higher (lower) average Yield has a positive (negative) impact on the same month's trading volume
- Contemporaneous municipal securities market Volatility, where a month with higher (lower) Volatility has a positive (negative) impact on the same month's trading volume
- Lagged municipal securities Trading Volume, where a prior month's Trading Volume increase (decrease) would decrease (increase) the next month's trading volume

The findings for control variables are as expected and are consistent with the 2018 MSRB ETF Paper as well as the 2025 MSRB Volume Paper. For example, Primary Offering Volume is positively correlated with Trading Volume, which is not surprising since a municipal bond is traded the most frequently during the initial period (e.g., the first 30 days) after its issuance, followed by infrequent or sporadic trading activity throughout the remaining life of the bond. In addition, market volatility is widely known to precipitate trading activity, as validated by the regression analysis on the positive correlation of Volatility statistically. Consistent with previous MSRB research,[43] the regression analysis demonstrates that Yield is positively correlated with Trading Volume. Moreover, the estimated coefficient for Yield indicates a substantially larger economic impact when compared to the effects of Volatility and Primary Offering Volume.[44]

Comparable to MSRB's previous findings,[45] there is a "bounce-back" effect on Trading Volume, all else being equal. In other words, when municipal securities trading volume increases in a given month, the following month's trading volume decreases (and vice versa), suggesting that there is no volume "pile-on" effect in the municipal securities market. This bounce-back effect exists

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[43] See Wu, Simon and John Bagley, "What Drives Trading Volume in the Municipal Securities Market? A Study of Likely Factors," Research Paper, Municipal Securities Rulemaking Board, February 2025.

[44] For example, using the version of the regression analysis excluding commercial paper only in Table 3, a hypothetical 10% increase in Yield (i.e., from 5% to 5.5%) corresponds to a contemporaneous increase of 5.5% in municipal securities' Trading Volume. By comparison, a hypothetical 10% increase in Primary Offering Volume is associated with only a 0.7% increase in Trading Volume; while a 10% increase in Volatility is associated with only a 0.8% increase in Trading Volume.

[45] See Wu, Simon and John Bagley, "What Drives Trading Volume in the Municipal Securities Market? A Study of Likely Factors," Research Paper, Municipal Securities Rulemaking Board, February 2025.

even after controlling for market conditions associated with the municipal securities market during each month. This suggests that all else being equal, the secular volume change is temporal and is partially offset in the following month.

Finally, similar to ETF NAV, the prior month's Mutual Fund NAV also does not have any impact on municipal securities Trading Volume. Here, the results are different from the findings in the 2018 MSRB ETF Paper, where Mutual Fund NAV was shown to have a positive impact on Trading Volume.[46] Open-end mutual funds have a very different operation mechanism from ETFs, where inflows and outflows of investment money directly result in purchasing or selling of securities in a fund portfolio, therefore elevating trading volume. Since both increases and decreases in Mutual Fund NAV would result in trading activity of municipal securities, it is logical to see that there may not exist a statistical correlation between the growth of Mutual Fund NAV and Trading Volume.

Table 3. Regression Analysis, September 2007–June 2025

Variable	Excluding Variable Rate Securities and Commercial Paper			Excluding Commercial Paper		
	Parameter Estimate	*t* Value	Statistically Significant at 5%?	Parameter Estimate	*t* Value	Statistically Significant at 5%?
Intercept	0.007	0.634	No	(0.001)	(0.045)	No
Municipal Bond Trading Volume Lag	(0.391)	(6.932)	Yes	(0.339)	(5.561)	Yes
Mutual Fund Net Asset Lag	(0.936)	(1.641)	No	1.179	1.843	No
ETF Net Asset Lag	(0.028)	(0.126)	No	(0.236)	(0.938)	No
Primary Offering Volume	0.081	2.994	Yes	0.067	2.211	Yes
Volatility	0.111	7.446	Yes	0.078	4.641	Yes
Yield	0.454	4.292	Yes	0.551	4.643	Yes
Yield Lag	0.146	1.136	No	0.169	1.195	No
Adjusted R-Square	0.46			0.35		
Number of Observations	212			212		

Source: MSRB analysis with data obtained from MSRB' RTRS, LSEG, Bloomberg, MMA, S&P Global and ICI.

The regression analysis statistically confirms that the growth of ETF ownership has not suppressed municipal securities trading volume.

[46] The 2018 MSRB ETF Paper attributed the positive correlation to the fact that most mutual funds are actively managed funds whereas a vast majority of the ETFs are passive investments, with actively managed funds having higher turnover of securities in the portfolio than passively managed funds. However, unlike stocks, bonds have expiration dates and could also be eligible for refunding; therefore, there are natural turnovers of securities even for passively managed funds.

Conclusions

The growth of the municipal bond and other fixed-income ETF markets offers another tool for investors and market participants that is different from what can be accessed directly in the over-the-counter bond market. While ETFs can provide intra-day price discovery and liquidity enhancement for the bond market overall, they remain structurally dependent upon the same bond market for their creation and redemption process.[47]

The empirical findings discussed in this paper do not show any evidence of deterioration of municipal securities liquidity because of the recent rapid growth of municipal bond ETFs. In other words, the growth of ETF assets neither helps nor hurts the liquidity for municipal securities. The new results confirm the findings from the 2018 MSRB ETF Paper with more recent data from September 2007 through June 2025. In addition, as noted above, the market has also witnessed a sustained rising interest rate environment since 2022, resulting in a bear market for bonds, as well as extraordinarily high trading volume. Therefore, the expanded analysis period covers both the fixed-income bull-market and bear-market periods, which should provide more validity to the findings. Of course, as the ETF market continues to grow, the liquidity impact on the municipal securities market could change in the future, and we will continue to monitor any new developments.

Regardless of the ultimate impact on the corresponding markets for individual securities, improving liquidity for the municipal securities market is essential for keeping both markets well-functioning and for providing both investors and municipal entities with more efficient avenues to access the capital markets.

[47] See Tucker, Matthew and Stephen Laipply, "Fixed Income ETFs and the Corporate Bond Liquidity Challenge," iShares BlackRock. In such a scenario the ETF would mechanically begin to function more like a closed-end fund, which is unable to grow or shrink in size in order to balance supply and demand.

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ABOUT MSRB

The Municipal Securities Rulemaking Board (MSRB) was established by Congress in 1975 with the mission to protect investors, issuers and the public interest and to promote efficiency, competition and capital formation. MSRB is a private, self-regulatory organization governed by an independent board of directors with market knowledge and expertise. MSRB does not receive federal appropriations and is funded primarily through fees paid by regulated entities. MSRB is overseen by Congress and the Securities and Exchange Commission.

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