The Downside of Dissemination: Evidence from the Municipal Bond Market

Riddha Basu
George Washington University
rbasu@email.gwu.edu

Xiangpei Chen
Loyola University Chicago
xchen25@luc.edu

James P. Naughton
University Of Virginia
naughtonj@darden.virginia.edu

April 2024

Abstract

We show that increased dissemination led to suboptimal retail investor outcomes in the municipal bond market. Our analyses exploit a regulatory change that made municipal credit rating information prepared by two of the three major credit rating agencies freely and publicly available on the Electronic Municipal Market Access (EMMA) database. We use a difference-in-differences framework that compares subsequent trading in bonds issued before the regulatory change, where the difference is whether rating information is provided on EMMA or not. We find that increased dissemination reduces transaction costs and increases trading by retail investors. However, we find that the increased trading by retail investors is suboptimal because retail investors appear to select bonds based on yield within a specific credit rating level. This selection approach results in the selection of bonds that are more likely to be subsequently downgraded. We find no evidence that institutional investors, who had access to the credit rating information prior to the regulatory change and are not reliant on EMMA, experience any deterioration in investment performance. Overall, we provide novel evidence of negative consequences of dissemination for retail investors even when there are broad improvements in market liquidity. In the setting we study, the adverse effect on retail investors is notable given that the specific intent of the regulatory change was to benefit them.

Keywords: Municipal bonds, credit ratings, information intermediaries.

JEL codes: G15, G18, M41.

Data Availability: Data are available from the public sources cited in the text.

Acknowledgements: We appreciate helpful suggestions and comments from Angela Gore, Ed deHaan, Bill Snyder, Nick Seybert, Clare Wang, and workshop participants at the Cherry Blossom Conference, Washington Accounting Research Symposium, FARS Midyear Conference, Hawaii Accounting Research Conference, Rutgers Accounting Research Conference, and Tulane University.

"We believe that there is nothing more relevant than making credit ratings available in one location, where the public can access the information quickly, efficiently, and at no cost to them."

- **Government Finance Officers Association**

1. Introduction

This paper contributes to our understanding of how investors respond to increased dissemination by examining the effect of credit rating dissemination on investor trading in the municipal bond market. Prior studies have examined dissemination in the context of equity markets via multiple outlets, including the business press and newswire services, conference calls, as well as more recently developed outlets such as corporate websites and social media (e.g., Blankespoor, deHaan, and Zhu, 2018). In general, these studies have found that increased dissemination generates higher trading volume and reduced transaction costs in stock market settings. We add to the dissemination and municipal literatures by showing that retail investors benefit from dissemination in terms of transaction costs, but that they are harmed through poor investment decisions that arise from an over reliance on the disseminated information. The former finding is consistent with studies that use an equity market setting, but the latter finding has not previously been explored in any setting.

Our analyses exploit the differential provision of credit rating information via the Electronic Municipal Market Access (EMMA) database by the Municipal Securities Rulemaking Board (MSRB), the sole repository for continuing disclosures for municipal bond investors starting July 1, 2009. Although other financial disclosures have been available via EMMA since 2009, rating information was unavailable until November 2011. At that time, MSRB initiated the provision of ratings information for Standard and Poor's (S&P) and Fitch Ratings (Fitch), two of

the three major agencies that rate municipal bonds.[1] The third major rating agency, Moody's Investors Service (Moody's), did not have their rating information provided through EMMA until 2015 because of concerns they raised about legal liability arising from the misuse of their ratings.[2] In our analyses, we identify bonds in the pre-dissemination period that were rated by either S&P or Fitch but not Moody's (treated observations), and bonds that were rated only by Moody's (control observations), and employ a difference-in-differences specification to isolate the effect of dissemination on trading outcomes in the municipal bond market.

This setting has several features that facilitate the identification of increased dissemination. First, it allows us to identify the effect of ratings dissemination without any underlying change in the issue's information set. Since the decision to post credit rating information from two of three major agencies via EMMA was undertaken based on a mutual discussion between the MSRB and the rating agencies, it is independent of issuer level fundamental information. In addition, we select our sample using bonds that were traded *before* the regulatory change, ensuring that the choice to be rated by a particular rating agency is independent of whether the rating information was later provided on EMMA. These two aspects of our setting and research design mitigate concerns about self-selection. Third, other bond-issue level information was already on EMMA starting in early 2009 (i.e., the start of our sample period). This aspect allows us to employ a research design where the only material change is the provision of ratings information, which allows us to better identify the effect of credit ratings dissemination independent of other financial information. Fourth, since EMMA is a third-party website, we can rule out the strategic dissemination of financial information independent of the underlying incentives of the issuers and rating agencies. Finally,

[1] See https://www.wsj.com/articles/BL-TOTALB-123 and https://www.sec.gov/rules/sro/msrb/2010/34-63086.pdf
[2] The MSRB worked with Moody's to alleviate this concern, resulting in the provision of Moody's ratings in 2015. We discuss this aspect of our setting in more detail in Section 2.

the rating disclosure, at least in part, is generally accepted to be a material item that should allow market participants to evaluate the relative quality of an issue (e.g., Cornaggia et al., 2018). This aspect of our setting helps to ensure that we have sufficient power to make meaningful conclusions.

Our analyses proceed in two parts. First, we examine whether there is a differential change in transaction costs for bonds where ratings information was newly disseminated via EMMA (i.e., bonds rated by either S&P or Fitch but not Moody's) with those where there was no dissemination (i.e., bonds rated only by Moody's). This aspect of our analyses is consistent with equity market studies that examine the consequences of increased dissemination. Second, we examine whether there is a differential change in investor demand for bonds that are subsequently downgraded across retail versus institutional investors. This aspect of our analyses is new to the dissemination literature, as it provides insights into how investors process and assimilate the disseminated information into their trading decisions.

We find economically meaningful and statistically significant reductions in transaction costs in analyses that control for the determinants of transaction costs and issuer economic conditions, and by including year, bond, and trade-type (i.e., buy or sell) fixed effects. We also employ an entropy matching procedure, which further controls for potential differences in bond issuance characteristics across the treatment and control samples.[3] More important, we find that the differential reduction in transaction costs only occurred for retail transactions, indicating that the benefits of dissemination are concentrated in the retail investor group. We use a transaction cost cutoff of $100,000 to separate trades into retail and institutional (e.g., Edwards et al., 2007; Schultz, 2001; Cuny, 2018; MSRB 2020). We also find that the dissemination effect is

[3] Our results are robust to using the a nearest neighbor matching procedure, which minimizes the distance between a vector of bond characteristics across treatment and control issuers to identify the best control firm for each treated firm.

concentrated in the bond purchase subsample, consistent with prior studies that have documented that information acquisition costs are a more important determinant of bargaining power in bond purchases than in bond sales (e.g., Cuny, 2018).[4]

While perhaps expected, our finding that increased dissemination of credit rating information increases trading and reduces transactions costs in the municipal bond market, particularly for retail investors, is not obvious based on studies that utilize stock market data. When compared to equity markets, the $4.2 billion municipal bond market is commonly characterized as opaque, fragmented, illiquid, and as a market that imposes high trading costs on its investors.[5] Unlike corporations, state and local governments are not subject to the SEC's registration and strict reporting requirements (Naughton and Spamann, 2015). Therefore, financial disclosure by municipalities is often less reliable, less comparable, and less timely than information released by corporations. Unlike equity markets, the municipal bond market largely functions as an over-the-counter market, where investors place their orders with dealers directly. In addition, the municipal bond market has fewer information intermediaries and a higher percentage of retail investors, and those retail investors tend to be older than equity market retail investors are.

Next, we examine how investors integrate the newly disseminated ratings information into their trading decisions.. These analyses, which proceed in two steps, are entirely new to the dissemination literature and are only possible because of our focus on the municipal bond market setting. In the first step, we show that there is a differential increase in retail but not institutional investor demand for highly rated bonds following the regulatory change. In the second step, we

[4] In untabulated robustness tests, we also document a differential and significantly positive increase in turnover, count of trades, and log of dollar value of trades for observation with newly provided credit rating information, indicating that the dissemination of credit ratings increased liquidity in the municipal bond market.

[5] Prior literature has documented that small purchases in the municipal bond market typically involve mark-up of 1% ,2%, or even 5% over the reoffering price (e.g., Green et al., 2007; Schultz 2012).

show that this increase in retail investor demand is associated with increased trading in bonds that are subsequently downgraded. This finding indicates that retail investors are differentially increasing their purchases of highly rated bonds that are subsequently downgraded, which is consistent with an over-reliance on discontinuous credit rating labels over other credit relevant information. Institutional investors were not similarly affected. Taken together, the contrasting results for retail and institutional investors suggest that only retail investors are making worse investment choices, which is notable given that those are the investors that were expected by the GFOA to benefit from the increased dissemination of credit ratings.

Lastly, we provide some exploratory tests that provide suggestive evidence as to whether the lack of timeliness and content of municipal disclosures is contributing to the suboptimal trading we document for retail investors. We suggest that information acquisition costs are higher for issuers with worse information environments, and hence the risk of suboptimal investor fixation on credit ratings is higher for those issuers. We use three proxies for issuers' information environment: (1) whether the issuer is subject to a mandatory audit, (2) whether there is posted financial information about the issuer on EMMA, and (3) whether the issuer has received a financial reporting award from the Government Finance Officers Association. For each of these three proxies, we separate our sample into two subsamples and conduct separate analyses to estimate the trading outcomes for retail versus institutional investors with 'worse' versus 'better' information environments. Across each analysis, we find consistent evidence that the negative effects on retail investor trading that arise from increased dissemination are greater among issuers with worse information environments.

Our use of the municipal bond market setting provides general insights into our understanding of dissemination in capital markets. Importantly, our setting allows us to examine

two distinct components of increased dissemination. First, we find that increased dissemination facilitates increased trading, which lowers transaction costs. This aspect of our results is consistent with the examination of dissemination in other settings (e.g., Blankespoor et al., 2014; Jung et al., 2018). Second, we find that the integration of newly disseminated information by investors does not necessarily improve trading outcomes nor does it improve information asymmetry, despite the fact that it does lower transaction costs. This aspect of our results provides a counterpoint to equity market studies where lower transaction costs are interpreted as an indication of improved trading, and highlights the importance of understanding how different groups of investors use newly disseminated information as part of establishing whether dissemination is beneficial or not. In our setting, we show that the dissemination of credit ratings is associated with suboptimal retail investor fixation in the municipal bond market, thus providing novel evidence on the possible negative effects of increased dissemination in capital markets.

Our study also contributes to our understanding of the role of dissemination in the municipal bond market, an important issue not yet fully explored in the municipal bond literature (e.g., Kim, Plumlee, and Stubben, 2021). A number of studies have examined how municipal market investors respond to credit events (e.g., Ivanov et al., 2022; Cornaggia, Cornaggia, and Israelsen, 2018) or to credit-relevant information (e.g., Reck and Wilson, 2006; Beck, 2018; Cuny, Even-Tov, and Watts, 2021; Cheng, Cuny, and Xue, 2022) without considering how that information is disseminated. We are aware of only one study that examines dissemination. Zhang (2024) documents that effective yields are lower by about 6-8 basis points but that there is no discernable difference in transaction costs when credit rating information becomes more accessible. We extend these studies by examining how the availability of information affects the

trading choices and transaction costs for retail and institutional investors in the municipal bond market.

Lastly, we contribute to the literature that examines the determinants of transaction costs in the municipal bond market. Green et al. (2007) suggest that sophisticated investors have access to price-relevant information that allows them to trade with lower transaction costs. Schultz (2012) asserts that transaction costs are a function of interdealer volume as a percentage of the number of bonds. In the accounting literature, Cuny (2018) documents that improvements in financial reporting for municipalities have been accompanied by lower transaction costs, and Cuny, Even-Tov, and Watts (2021) show that the mandated disclosure of transaction costs by bond-market professionals reduces markups for trades that are subject to the disclosure requirement relative to those that are not. We contribute to this literature by showing that information acquisition costs are also a driver of transaction costs in the municipal bond market, and that dissemination is one mechanism through which information acquisition costs can be alleviated.

The remainder of this paper is organized as follows. Section 2 describes the institutional setting. Section 3 summarizes the relevant literature and develops our hypothesis. The sample selection process is described in Section 4, followed by our main results in Section 5. Section 6 concludes.

2. Institutional Setting

Municipal bonds are debt securities issued by states, cities, counties, and other governmental entities, such as school systems or water treatment facilities, to fund day-to-day obligations and to finance capital projects. The market is relatively large, with approximately $4.2 trillion in holdings as of September 2020. The majority of investors in the municipal bond market

are retail investors who invest through direct holdings or mutual funds. However, due to the illiquid nature of the market, most trades are decentralized over-the-counter trades with broker dealers. As a result, retail investors rely on dealer quotes to glean information from the market prior to trading.

This lack of transparency for retail investors was an important driver of the development of the Electronic Municipal Market Access (EMMA) database by the Municipal Securities Rulemaking Board (MSRB).[6] The database was initially launched as a pilot on March 31, 2008, at which time it served as a free integrated public display of documents and data produced by other pre-existing MSRB systems, including official statements and advance refunding documents (e.g., escrow deposit agreements used in advance refunding) collected by the MSRB through its former Municipal Securities Information Library (MSIL) system as well as trade data collected by the MSRB's Real-Time Transaction Reporting System (RTRS). Prior to its launch, the information and documents displayed on the EMMA website were not generally freely or publicly available. On June 1, 2009, the official statement/advance refunding submission process, previously handled by the MSIL system, was migrated to the new EMMA Primary Market Disclosure Service. Since 2009, the EMMA website has been continuously updated to incorporate changes made to the various MSRB market transparency programs.

On May 20, 2010, MSRB filed with the U.S. Securities and Exchange Commission (SEC) a proposed rule change to amend the continuing disclosure service of the MSRB's Electronic Municipal Market Access system ("EMMA") to provide for the posting of credit rating information on the EMMA public website. Under the proposed rule change, MSRB would invite all NRSRO's to post their credit ratings "free of charge" on the EMMA website for investors. The

[6] http://emma.msrb.org

objective was to make credit ratings information easily accessible on an equal basis to all participants, especially retail investors, in the municipal securities market.

The Government Finance Officers Association (GFOA) strongly supported the proposed rule as "something that is a true benefit to investors and the public." In contrast, the credit rating agencies (i.e., S&P, Fitch, and Moody's) expressed the concerned that posting free ratings data at MSRB would be commercially untenable and would offer only limited incremental value to investors in municipal securities. The proposed rule was approved by SEC in October 2010[7], and MSRB started displaying CUSIP[8] level credit ratings for municipal bonds from Fitch and S&P starting November 2011. Moody's ratings were not displayed until June 2015.[9]

The provision of credit ratings through EMMA meant that all investors could now freely access credit rating information in a timely manner. Prior to the rule change, ratings were typically available through subscription-based services from the rating agencies. In addition, dissemination via EMMA provided investors with an interface that enabled ratings information to be integrated with other details about a security or issue. For example, users could identify all AA rated bonds and then sort by yield to identify the highest yielding bonds within that rating category.

3. Literature Review and Hypothesis development

The main objective of this study is to examine the capital market effects of dissemination in the context of credit rating information in the municipal bond market. Dissemination of information is distinct from disclosure, as the latter refers to the provision of information to the

[7] See https://www.sec.gov/rules/sro/msrb/2010/34-63086.pdf

[8] A CUSIP number is a unique identifier that stands for the Committee on Uniform Securities Identification Procedures. It is a nine-digit numeric or nine-character alphanumeric code that identifies a North American financial security for the purposes of facilitating clearing and settlement of trades.

[9] https://www.wsj.com/articles/BL-MBB-33860

public while the former is about the channel entities use to communicate information. Prior studies have found that dissemination via business press (Bushee, Core, Guay, and Hamm, 2010; Rogers, Skinner, and Zechman, 2016), newswire services (Li, Ramesh, and Shen, 2011), conference calls (Frankel, Johnson, and Skinner, 1999; Bushee, Matsumoto, and Miller, 2003), and social media (Blankespoor, Miller, and White, 2014; Jung et al., 2018) has important consequences above and beyond the disclosure decision. Each of these studies examines dissemination in U.S. stock markets, which are structured very differently from the municipal debt market (e.g., Harris and Piwowar, 2006). In particular, the municipal debt market has fewer information intermediaries (e.g., Basu and Naughton, 2020) and a set of investors that are primarily focused on downside as opposed to upside risk (Gillette et al., 2020). In addition, the municipal debt market has a relatively high percentage of retail investors (Schwert, 2017; MSRB, 2018).

Our setting focuses on the broad dissemination of credit ratings information via EMMA, a third-party website which is the sole repository for continuing disclosures for municipal bond investors. In general, prior research has found that credit ratings incorporate municipal financial information. Copeland and Ingram (1982) find a positive association between credit ratings and subsequent disclosure but only weak evidence that municipal financial statements predict credit ratings, suggesting that credit ratings are a leading indicator of what is disclosed in the financial statements. Consistent with this finding, Ingram, Brooks, and Copeland (1983) find that credit rating changes are more informative in the municipal bond market relative to the corporate market because municipal financial statements are produced with a greater lag and information processing costs are significantly higher. More recent papers have documented that municipal credit ratings continue to be relevant to investors and issuers (e.g., Cornaggia et al., 2018), and that credit ratings

influence issuer decisions, such as those related to the provision of municipal disclosure (Gillette et al., 2020; Basu et al., 2022).

The municipal bond market consequences of credit rating dissemination are unclear. Increased dissemination may provide investors with more readily available information on which to base trading decisions, thus reducing information acquisition costs and increasing the willingness to trade. In contrast, third-party dissemination of credit ratings may not have an impact on transaction costs for several reasons. First, investors can gather the same information from other sources, including rating agencies or issuer websites. Second, it may be the case that credit rating information displayed via EMMA is insufficient for retail investors to integrate credit risk into their trading decisions.[10] For example, Badoer and Demiroglu (2019) document that the dissemination of over-the-counter transactions in corporate debt securities increases the informational efficiency of bond prices and reduces the incremental information content of credit ratings. In our setting, this finding suggests that the availability of other financial information including trading data via EMMA could reduce the incremental informativeness of credit ratings.

Similarly, it is not obvious how the increased availability of credit rating information will influence the process by which investors choose municipal bonds. Given the structure of the EMMA interface, we conjecture that investors may use credit ratings to screen investment choices. One possible approach that is easily implementable is to select bonds with a specific credit rating, and then to pick among those bonds based on a second criteria such as yield. To the extent that investors are using credit ratings as a primary screen, it is possible that they are disregarding other credit relevant information, such as the underlying financial performance of the municipal entity.

[10] S&P's comment letter on the proposed implementation of the ratings disclosure rule states that "existing disclosure is sufficient to enable investors to access S&P's ratings". S&P further stated that "such information may not be sufficiently tailored to meet the needs of retail investors".

Prior studies have noted that investors face heterogeneous information acquisition costs. In our setting, institutional investors may have had relatively easy access to credit rating information before that information was disseminated on EMMA through subscriptions to the rating agencies. In contrast, retail investors may have found it difficult to acquire credit rating information in a timely manner, and may have faced substantially higher information acquisition costs in those cases where they wanted to compare ratings across multiple issues. In addition, retail investors could rely more on the information available on EMMA than institutional investors. These suggestions imply that credit rating dissemination may impact retail investor trading differently than institutional trading. However, it remains possible that no such difference manifests because retail investors may not change their trading behavior or because the underlying credit rating information is available from other sources.

Given the above discussion, we state each of our hypotheses in null form. Our first hypothesis, which focuses on transaction costs, is as follows:

> H1a: *The dissemination of credit ratings does not have a differential effect on municipal bond transaction costs for retail investors.*
>
> H1b: *The dissemination of credit ratings does not have a differential effect on municipal bond transaction costs for institutional investors.*

Our second hypothesis, which focuses on trading outcomes, is as follows:

> H2a: *The dissemination of credit ratings is not associated with suboptimal trading outcomes for retail investors.*
>
> H2b: *The dissemination of credit ratings is not associated with suboptimal trading outcomes for institutional investors.*

As outlined in more detail in Section 5, we primarily examine transaction costs using dealer markups, and we primarily test suboptimal trading outcomes by examining whether there is increased trading in bonds prior to those bonds being downgraded. Conceptually, transaction costs capture whether investors use the newly disseminated information, whereas trading outcomes

capture how investors use the newly dissemination information. Trading outcomes capture the overall effects when both the cost of trading and the assimilation of the information into trading choices are combined.

4. Sample Selection

Our empirical tests proceed in two parts. In the first part, we examine transaction costs. In the second part, we examine trading behavior using a subsample of the observations from the first part. We begin the process of building the sample for the first part by identifying the universe of municipal bonds that were issued between July 2009 and October 2011, the period after EMMA began displaying other financial information including continuing disclosures from the issuers and before it started displaying credit rating information.[11] We restrict our sample to bonds issued before October 2011 to ensure all issues have trading transactions in the pre-period and to mitigate the concern that selection bias may drive our results. In our setting, self-selection would occur if bond issuers chose a particular rating agency because rating information was displayed on EMMA. By restricting our sample to pre-October 2011 issues, all bonds in our sample were assigned to the treatment and control group before they were aware of the dissemination change, thus mitigating the self-selection issue. We obtain ratings and other bond level characteristics from Bloomberg. We also obtain secondary market bond transaction data from the MSRB between July 2009 through June 2015. We start with 13,268,764 total trades over the sample period, representing 298,281 unique bonds and 16,440 unique issuers. We then exclude 4,345,464 dealers' trades and exclude 546 bonds that are solely traded by dealers during the sample period.

[11] SEC Rule 15c2-12.

Next, we apply liquidity restrictions that are necessary for us to implement our research design. First, in order to measure transaction costs and other trading activity measures, we require at least one inter-dealer trade on the same day as the investor transaction. Second, to facilitate difference-in-difference tests, we limit the sample to issues with trading variables that can be measured in both the pre- and post-period. Furthermore, we require that bonds be traded at least once by both retail and institutional investors in both the pre- and post-period. Thus, each bond in the sample has a minimum of four dealer-matched investor purchases or sales across the sample period.

We define treatment observations as those bonds rated by S&P or Fitch but not by Moody's (i.e., those bonds where rating information becomes available on EMMA in November 2011) and control observations as bonds that are rated by Moody's but neither S&P nor Fitch (i.e., those bonds where rating information continues to be unavailable on EMMA for the entire sample period).[12] We exclude all other bonds that are not in the treatment group or the control groups. This removes transactions for bonds that are rated by both S&P and Moody's, and by both Fitch and Moody's. We also exclude unrated bonds, which prior research has found to have different characteristics than rated bonds (e.g., Reeve and Herring 1986, Ziebell and Rivers 1992, Peppe and Unal 2021). The application of these restrictions produces the sample we use for the first part of our analyses. This sample comprises 475,844 transactions across 6,339 bonds issued by 2,498 unique issuers, with 343,083 trades (4,273 bonds) in the treatment group and 132,761 transactions (2,066 bonds) in the control group.

[12] In untabulated robustness tests, we confirm that our results are robust to several alternate ways of defining the treatment group. Specifically, our conclusions are unchanged if we define treatment issues as those (1) rated by both S&P and Fitch, (2) rated by S&P, which eliminates issues rated by Fitch alone, and (3) rated by Fitch, which eliminates issues rated by S&P alone.

The second part of our analyses on trading outcomes relies on the time-series of ratings information, which we gather manually from regulatory disclosures on S&P's website. These disclosures only contain the credit ratings history information for S&P rated bonds. As noted in other studies (e.g., Cornaggia et al., 2018), there is currently no reliable source of Moody's credit ratings history prior to 2015. Therefore, we drop control observations (Moody rated bonds) due to the fact that no ratings history data is available. We then form the bond-month sample. The final sample contains 216,540 bond-month observations over the sample period, representing 4,273 unique bonds and 1,655 unique issuers. The sample selection process for the first (second) part of our analyses is detailed in Table 1 Panel A (Panel B).

Table 2 provides descriptive statistics for both samples. These data and our subsequent tests follow prior studies and use a transaction cost cutoff of $100,000 to separate trades into retail and institutional (e.g., Edwards et al., 2007; Schultz, 2001; Cuny, 2018). In Panel A, about 87.1 percent of transactions are made by retail investors, which indicates that even though we restrict our sample to bonds that are traded at least once by both retail and institutional investors, the majority of transactions are conducted by retail investors. The *Post* variable has a value of 0.393, indicating that about 39.3 percent of the trades in our sample occur after the regulatory change. This value indicates that there are fewer trades as bonds age, consistent with other studies and anecdotal evidence. In Panel B, the mean value of BSI for retail (institutional) trades is 0.061 (0.013), the median value is 0 (0), and the standard deviation is 0.372 (0.244). These descriptive values indicate that retail investors in the municipal bond market are overall net buyer of bonds, which is expected since most are buy and hold investors.

5. Research Design and Results

Our analyses proceed as follows. First, we examine whether dissemination leads to a change in transaction costs, and then examine whether any documented change in transaction costs is different for retail versus institutional investors. Second, we examine whether there are differential changes in trading outcomes for retail versus institutional investors. Lastly, we conduct a series of cross-sectional tests using proxies for the issuer's information environment to add context to our findings from the first two sets of analyses.

5.1 Transaction Costs

We examine the effect of credit rating dissemination on transaction costs in the municipal bond market using the following difference-in-difference specification:

$$TransactionCost_{b,t} = \alpha + \beta_1 Treated_{b,t} + \beta_2 Treated_{b,t} * Post_{,b,t} + \sum \gamma_j Controls + Fixed\ Effects + \varepsilon_{i,t} \quad (1)$$

We follow the methodology in Schultz (2012) and Cuny (2018) and proxy for transaction costs using *Markup*, the difference between a bond's inter-dealer price and the price paid by an investor. More specifically, the markup on any trade in bond *b* on date *t* using the formula below:

$$\text{Markup}_{b,t} = TradeSign_{b,t} * 10{,}000 * \text{Log}\left[\frac{\text{InvestorPrice}_{b,t}}{\text{AvgInterdealerPrice}_{b,t}}\right]$$

TradeSign is a buy/sell indicator equal to "1" if the trade is a customer purchase, "-1" if the trade is a customer sale, and "0" if the trade is inter-dealer. Markup can only be determined if there is both a transaction between an investor and dealer as well as at least one inter-dealer trade on the same day. The *InvestorPrice* is the purchase (sale) price paid (received) by an investor in bond *b* on date *t*. The *AvgInterdealerPrice* is the average price of all inter-dealer transactions in bond *b* on date *t*. The Markup captures the basis point difference between the inter-dealer price and the price at which investors purchase (sell) the same security on the same day. Following prior

literature, negative values of *Markup* are dropped as those are uncommon and akin to a negative bid-ask spread (e.g., Chordia et al., 2001).[13] We define *Treated* as an indicator that equals 1 for bonds rated by S&P or Fitch but not by Moody's and 0 for bonds that are rated by Moody's but neither S&P nor Fitch. *Post* is an indicator that equals 1 for transactions that take place after MSRB started posting S&P and Fitch credit ratings on November 21st, 2011.

We use control variables identified in the extant literature as correlated with transaction costs. These variables include the time remaining to maturity (*Duration*), the time in the dealer's inventory (*Inventory*, an indicator that equals 1 if a purchase (sale) does not follow (precede) a sale (purchase) within one day of the trade date (e.g., Sirri, 2014)), trade size (*Log(TradeSize)*), the par value of all transactions in a bond during a given month (*Log(AggTrades)*), and whether the trade is a retail trade or institutional trade (*Retail*, measured used a transaction size cutoff of $100,000). We also include state- year fixed effects to account for changes in issuer economic conditions. We winsorize all continuous variables at a 1% (99%) level to reduce the effect of outliers and possible data entry errors.[14] All variables are defined in Appendix A. Lastly, we include bond fixed effects, trade date fixed effects, and trade type fixed effects that identify whether the transaction is a customer purchase or sale.

Our main coefficient of interest is β_2, the coefficient on the interaction term *Treated*Post*, which captures the differential change in *TransactionCost* across the treatment bond-years (i.e., S&P or Fitch ratings disseminated via EMMA) and control bond-years (i.e., Moody's ratings not disseminated via EMMA). The standalone *Post* variable is subsumed by fixed effects. A reduction in transaction costs will produce a negative coefficient on β_3 .

[13] We drop 4.6% of trades (i.e., 20,918 out of 475,844 trades) due to a negative value for *Markup*.
[14] Our results are unchanged if we don't winsorize the variables.

The regression results from equation (1) are presented in Table 3. The dependent variable is *Markup* in columns (1), (2), and (3). All columns include trade date fixed effects, trade type (indicating whether the transaction is a purchase or sale) fixed effects, and state-year fixed effects. Column (1) and (2) include bond fixed effects, and Column (3) instead include issuer fixed effects and control variables at bond level. All specifications cluster standard errors by bond and trade date. Across all columns, the coefficient on the *Treated * Post* interaction term is significantly negative. This coefficient value indicates that investors trading bonds rated by S&P or Fitch had differentially lower markup in the post-dissemination period compared to those trading in bonds rated by Moody's. The effects we document are also economically meaningful. The coefficients on *Treated * Post* are negative and significant at 1% level (coefficient =-4.533 and t-statistic = 2.153 in column (1); coefficient =-4.193 and t-statistic = 2.088 in column (2); coefficient =-4.404 and t-statistic = 2.179 in column (3)), indicating that treated bonds have an approximately 4.5% relative decline in *Markup*.

5.2 Retail versus Institutional Investors

Next, we investigate whether the aggregate reduction in transaction costs is driven by retail investors, who likely face greater information acquisition costs. Following prior literature, we define trades with par values under $100,000 as retail trades and above $100,000 as institutional trades (e.g., Edwards et al., 2007; Schultz, 2001; Cuny, 2018; MSRB, 2020). The regression results in Table 4 show that there is a significantly negative effect on *Markup* for retail investors but not for institutional investors (Coefficient on *Treated * Post* = -4.632 and t-statistic = 2.010 for retail trading sample; and coefficient = 1.329 and t-statistic = 0.625 for institutional trading sample). An F-test shows the difference in the coefficients on *Treated * Post* is significant at the 1% level. In terms of economic significance, retail investors exhibit a decline in *Markup* of about 4.632 basis

points compared with virtually no change for institutional investors. Collectively, these results provide evidence that the dissemination effects are concentrated among retail investors, the group most likely to experience a decline in information acquisition costs as a result of the regulatory change.

In a related test, we disaggregate the overall aggregate effect of bond purchases and sales documented in Table 3 into the component that arises from purchases and the component that arises from sales. Prior studies have documented that information acquisition costs are a more important determinant of bargaining power in bond purchases than in bond sales (e.g., Cuny, 2018). In Table 5, we find that the coefficient on the interaction term *Treated * Post* is negative and significant for bond purchases but insignificant for bond sales (Coefficient on *Treated * Post* = -5.028 and t-statistic = 2.313 for purchase sample; and coefficient = -1.718 and t-statistic = 0.797 for sale sample). This result provides additional evidence that information acquisition costs contribute to our main results, since the effects we document are concentrated in those observations where information acquisition costs play a more important role.

5.3 Retail versus Institutional Trading Outcomes

Next, we investigate how the dissemination of credit ratings differentially affects retail versus institutional investor trading through investors' secondary market trading behavior. The goal of these analyses is to identify whether retail investors rely more on credit rating information after the regulatory change, and if so, whether they are harmed by this reliance. As a result, the analyses in this subsection proceed in two steps. In the first step, we show that investor demand varies with the bond's credit rating, and that this demand differential changes for retail investors after the regulator change. In the second step, we show that bond downgrades are predicted to a greater extent after the regulatory change only by retail investor demand, which allows us to

conclude that those investors are increasingly fixated on the credit rating and purchasing bonds that are more likely to be subsequently downgraded, thus generating investment losses. We focus on trading around downgrades because ratings are not continuous and therefore there are periods in advance of downgrades where reliance on ratings can result in suboptimal purchases.

We follow prior studies and calculate buy-sell imbalances at the monthly level (deHaan et al., 2022; Lee and Zhu, 2020; Ben-David et al., 2013; Kumar and Lee, 2006) using the following formulae:

$$BSI_{b,t}^{Retail} = \frac{\text{Total Retail Buy}_{b,t} - \text{Total Retail Sell}_{b,t}}{\text{Total Retail Buy}_{b,t} + \text{Total Retail Sell}_{b,t}}$$

$$BSI_{b,t}^{Instituional} = \frac{\text{Total Instituional Buy}_{b,t} - \text{Total Instituional Sell}_{b,t}}{\text{Total Instituional Buy}_{b,t} + \text{Total Instituional Sell}_{b,t}}$$

Where $\text{Total Retail (instituional) Buy}_{b,t}$ and $\text{Total Retail (Instituional)Sell}_{b,t}$ are the total dollar volume of all retail (institutional) investors' buys and sells for bond b in month t respectively. $BSI_{b,t}^{Retail(Instituional)}$ measures retail (institutional) investors' demand for a given bond b in a given month t, where a positive (negative) value indicates that investors are net buyers (net sellers) of that bond. We calculate BSI separately for retail and institutional investors because of the differential effect of the dissemination shock across these two groups of investors documented in Table 4. The buy-sell imbalance measures the difference between the aggregate value of bonds being bought and the aggregate value of bonds being sold within a particular time frame. When there is a buy-sell imbalance, it means that there is either a greater demand for bonds or a higher supply of bonds in the market compared to the opposite side.

We use the following empirical specification to implement the first step in our analyses:

$$BSI_{b,t}^{Retail(Instituional)} = \alpha + \beta_1 RATINGS_{b,t} + \beta_2 RATINGS_{b,t} * Post_{,b,t} + \sum \gamma_j Controls + Fixed\ Effects + \varepsilon_{i,t} \quad (2)$$

We use two different approaches for RATINGS. In the first approach, we use a numerical credit rating score that ranges from 1 (AAA) to 21 (C) for bond b during month t. In the second approach, we use three separate indicator variables for three groups of credit ratings: AAA and AA ratings in group 1, A ratings in group 2, and BBB in group 3. Under this approach, ratings below investment grades (BBB-) are the baseline group. In each specification, the control variables include the bond issuance amount and remaining time-to-maturity. *Post* is defined as in equation (1). We include bond fixed effects to focus our analysis on within bond variation in credit ratings and BSI. Bond fixed effects eliminate time-invariant characteristics that may correlate with credit ratings and determine BSI, including bond characteristics such as maturity, amount, or call features. We also include state and time fixed effects to control for temporal trends and macroeconomic conditions. Standard errors are clustered by bond and year-month.

Table 6 Panel A presents the results of estimating equation (2) using the bond month sample for retail investors. In column (1) – (2) the coefficient on the indicator for RATINGS is negative and statistically significant in the post dissemination period (Coefficient on *Rating * Post* = -0.012 and t-statistic = 5.407 in col (1); and coefficient = -0.011 and t-statistic = 5.039 in col (2)) indicating that retail investors have increased their demand for highly rated bonds. In column (3) and (4) we examine the effect of ratings coefficients for the discrete credit ratings groups. We find that the coefficients corresponding to groups 1 and 2 are positive and significant, indicating that the BSI for these rating groups are higher than the baseline group, which consists of below investment grade ratings. The results indicate that retail investors have increased their demand for highly rated bonds after S&P ratings became available on EMMA. Table 6 Panel B presents the results of estimating equation (2) using the bond month sample for institutional investors. We find that there is no significant change in the usage of credit ratings for institutional investors trades.

This is consistent with the fact that institutional investors, who had access to the credit rating information prior to the regulatory change, were unaffected by the increased dissemination of credit ratings.

We use the following empirical specification to implement the second step in our analyses:

$$Downgrade_{b,\,(t,t+h)} = \alpha + \beta_1 BSI_{b,t}^{Retail(Instituional)} + \beta_{2t} BSI_{b,t}^{Retail(Instituional)} * Post_{,b,t} + \sum \gamma_j \; Controls + Fixed\ Effects + \varepsilon_{i,t} \quad (3)$$

$Downgrade_{b,\,(t,t+h)}$ is an indicator for that takes the value of one if bond *b* is downgraded *h* months in the future, where *h* takes values of three, six, and twelve months. We include controls for the bond issuance amount, ratings level, and remaining time-to-maturity. We include bond fixed effects as before to eliminate time-invariant characteristics that may correlate with future downgrades. We also include state and time fixed effects to control temporal trends and macroeconomic conditions. All specifications cluster standard errors by bond and year-month.

Table 7 Panel A presents the results of estimating equation (3) using our bond month sample for retail investors. In all columns, the coefficients on the *BSI * Post* interaction term are significantly positive (coefficient = 0.015 and t-statistic = 2.491 in column (1)). A one-standard deviation increase in BSI is associated with 0.5% increase in the probability of downgrade over the next twelve months.[15] This effect is similar for columns (2) and (3) where we measure the probability of downgrades over six and three months respectively. These results indicate that in the post period retail investors are differentially more likely to trade in S&P rated bonds that are subsequently downgraded. For Table 7 Panel B the *BSI * Post* interaction term is insignificant. This implies institutional investors don't significantly increase their purchase around downgrades after the regulatory change.

[15] 0.5% is calculated by multiplying the standard deviation of BSI (0.372) with the regression coefficient of 0.015.

Collectively, the results in Table 6 and 7 indicate that the increased dissemination of credit ratings resulted in suboptimal retail investor trading. More specifically, the data shows that retail investors increased their demand for highly rated bonds, and that they were more likely to concentrate their trading in those highly rated bonds that were subsequently downgraded. This type of trading is indicative of suboptimal investor fixation. It is notable that institutional investors were not similarly affected. Taken together, the distinct results for retail and institutional investors suggest that only retail investors are making worse investment choices.

5.4. Cross-sectional effect based on information environment.

We add context to our findings by investigating whether the suboptimal fixation on credit ratings we document is exacerbated when there are fewer alternative sources of information about the issuers credit quality. We conduct these analyses using three proxies for issuers' information environment. The first cross-sectional variable partitions the sample based on whether state law requires municipalities to be audited. We expect that issuers in states that do not require mandatory audits will have lower quality financial disclosures and hence a worse information environment (Barber and Gore, 2008). The second cross-sectional variable partitions the sample based on whether the issuer earned a GFOA certificate for financial reporting excellence. The GFOA certificate is awarded to municipal governments that satisfy financial reporting standards set by GFOA including GAAP compliance and additional non-GAAP disclosures. We expect that issuers that were not awarded a GFOA certificate will have lower quality financial reporting and hence a worse information environment. The third cross-sectional variable partitions the sample based on whether the issuer is above or below the median level of financial filings on EMMA over the sample period. We expect issuers with fewer financial filings to have a worse information environment.

Table 8 Panel A presents the mandatory audit results. Columns (1) and (2) we measure the probability of downgrades over 12 months. The coefficient on *BSI * Post* is significant only for issuers in states that do not mandate audits (Coefficient on *BSI * Post* = 0.021 and t-statistic = 2.859 for non-mandatory audit sample; and coefficient = -0.008 and t-statistic = 0.833 for mandatory audit sample). An F-test shows the difference in the coefficients on *BSI * Post* is significant at the 1% level. These results indicate that the suboptimal investor fixation effect we document is concentrated in issuers that do not have mandatory audits. This effect is similar for columns (3), (4) and columns (5), (6) where we measure the probability of downgrades over six and three months respectively.

Table 8 Panel B presents the GFOA certificate results. We obtained the list of 2010 GFOA certificate award recipients from the Governmental Finance Officers Association website.[16] We then use fuzzy match and hand-clean to identify the issuers who received the certificate. Columns (1) and (2) show that the suboptimal investor fixation effect only exists for issuers with no GFOA certificate (Coefficient on *BSI * Post* = 0.016 and t-statistics = 2.410 for non-GFOA sample; and coefficient = -0.004 and t-statistics = 0.307 for GFOA sample). An F-test shows the difference in the coefficients on *BSI * Post* is significant at 1% level.

Lastly, Table 8 Panel C presents the results when we partition the sample based on the level of financial fillings on EMMA. Columns (1) and (2) show that the suboptimal investor fixation effect is much stronger for issuers that have below the median level of financial fillings on EMMA (Coefficient on *BSI * Post* = 0.021 and t-statistic = 3.048 for low disclosure sample; and coefficient = 0.004 and t-statistic =0.470 for high disclosure sample). An F-test shows the difference in the coefficients on *BSI * Post* is significant at 1% level. Overall, each of the three cross-sectional tests

[16] We use GFOA certificate award for 2010 fiscal year because that's the earliest year for which data is available.

indicates that the suboptimal retail investor fixation is accentuated among those issues where there is a worse information environment.

6. Conclusion

We examine how the dissemination of credit ratings affects transaction costs and trading outcomes in the municipal bond market. We conclude that dissemination lowers transaction costs in part through its lowering of information acquisition costs, but that retail investor reliance on the newly disseminated information results in suboptimal trading outcomes. These contrasting results indicate that there are tradeoffs in our setting that prior studies have not documented—while dissemination increases trade and lowers transaction costs (which is good), it also produces worse investment outcomes for retail investors (which is bad). Collectively, our results have substantial implications for the provision of information on EMMA. In particular, our results suggest that the MSRB may need to ensure that information provided on EMMA is used appropriately by retail investors, as the current approach of providing credit rating information appears to be suboptimal for that investor group.

REFERENCES

Adelino, M., and M. Ferreira. 2016. Bank Ratings and Lending Supply: Evidence from Sovereign Downgrades. The Review of Financial Studies 29 (7), pp. 1709–1746.

Almeida, H., Cunha, I., Ferreira, M.A. and Restrepo, F., 2017. The real effects of credit ratings: The sovereign ceiling channel. The Journal of Finance, 72(1), pp.249-290.

Baber W.R., and Gore A.K., 2008. Consequences of GAAP disclosure regulation: Evidence from municipal debt issues. The Accounting Review, 83 (3) pp. 565-591.

Baber, W., Beck, A., and Koester, A. 2022. Separation in the Municipal Debt Market Following GASB 34 Implementation. Georgetown University, working paper.

Badoer, D.C. and Demiroglu, C., 2019. The relevance of credit ratings in transparent bond markets. The Review of Financial Studies, 32(1), pp.42-74.

Bartov, E., Faurel, L. and Mohanram, P.S., 2018. Can Twitter help predict firm-level earnings and stock returns? The Accounting Review, 93(3), pp.25-57.

Basu, R. and J. Naughton. 2020. The Real Effects of Financial Statement Recognition: Evidence from Corporate Credit Ratings. Management Science, 66(4): 1672-1691.

Basu, R., Naughton, J.P. and Wang, C., 2022. The Regulatory Role of Credit Ratings and Voluntary Disclosure. The Accounting Review, 97(2), pp.25-50. Blankespoor, E., deHaan, E. and Zhu, C., 2018. Capital market effects of media synthesis and dissemination: evidence from robo-journalism. Review of Accounting Studies, 23, 1-36.

Beck, A. 2018. Opportunistic Financial Reporting Around Municipal Bond Issues. Review of Accounting Studies 23(3): 785-826.

Blankespoor, E., deHaan, E. and Zhu, C., 2018. Capital market effects of media synthesis and dissemination: Evidence from robo-journalism. Review of Accounting Studies, 23(1), pp.1-36.

Blankespoor, E., Miller, G.S. and White, H.D., 2014. The role of dissemination in market liquidity: Evidence from firms' use of Twitter™. The Accounting Review, 89(1), pp.79-112.

Bonsall, S.B. and Miller, B.P., 2017. The impact of narrative disclosure readability on bond ratings and the cost of debt. Review of Accounting Studies, 22(2), pp.608-643.

Bushee, B.J., Core, J.E., Guay, W. and Hamm, S.J., 2010. The role of the business press as an information intermediary. Journal of Accounting Research, 48(1), pp.1-19.

Bushee, B.J., Matsumoto, D.A. and Miller, G.S., 2003. Open versus closed conference calls: the determinants and effects of broadening access to disclosure. Journal of Accounting and Economics, 34(1-3), pp.149-180.

Cheng, S. 2021. The Information Externality of Public Firms' Financial Information in the State-Bond Secondary Market. Journal of Accounting Research 59(2), 529–574.

Cheng, S., Cuny, C., Xue, H. 2022. Disclosure and Competition for Capital. Management Science, forthcoming.

Chordia, T., Roll R., and Subrahmanyam A., 2001. Market Liquidity and Trading Activity. The Journal of Finance, 56(2), pp. 501-530.

Clor-Proell, S.M., Guggenmos, R.D. and Rennekamp, K., 2020. Mobile devices and investment news apps: The effects of information release, push notification, and the fear of missing out. The Accounting Review, 95(5), pp.95-115.

Copeland, Ronald M., and Robert W. Ingram. 1982. The association between municipal accounting information and bond rating changes. Journal of Accounting Research 20 (2): 275-289.

Cornaggia, J., Cornaggia, K.J. and Israelsen, R.D., 2018. Credit ratings and the cost of municipal financing. The Review of Financial Studies, 31(6), pp.2038-2079.

Cuny, C., 2018. When knowledge is power: Evidence from the municipal bond market. Journal of Accounting and Economics, 65(1), pp.109-128.

Cuny, C., Even-Tov, O., and Watts, E. 2021. From Implicit to Explicit: The Impact of Disclosure Requirements on Hidden Transaction Costs. Journal of Accounting Research 59(1): 215-242

Cuny, C., Li, K., Nakhmurina, A. and Watts, E.M., 2021. The Information Content of Municipal Financial Statements: Large-sample Evidence. Available at SSRN 4186418.

Dambra, M. and J. Naughton and O. Even-Tov. 2022. The Economic Consequences of GASB Financial Statement Disclosure. Journal of Accounting and Economics, forthcoming.

deHaan, E. and Li, J. and Watts, E., 2021. Retail Bond Investors and Credit Ratings. Unpublished working paper, University of Washington.

Edmonds, Christopher T., Jennifer E. Edmonds, Beth Y. Vermeer, and Thomas E. Vermeer. 2017. Does timeliness of financial information matter in the governmental sector? Journal of Accounting and Public Policy 36 (2): 163-176

Edwards, A., Harris, L, Piwowar, M., 2007. Corporate bond market transaction costs and transparency. The Journal of Finance. 62(3), 1421-1451.

Frankel, R., Johnson M. and Skinner, Dj., 1999. An empirical examination of conference calls as a voluntary disclosure medium. Journal of Accounting Research 37(1), pp.133-150

Gao, P., Lee, C. and Murphy, D., 2019. Municipal borrowing costs and state policies for distressed municipalities. Journal of Financial Economics, 132(2), pp.404-426.

Gillette, J.R., Samuels, D. and Zhou, F.S., 2020. The effect of credit ratings on disclosure: Evidence from the recalibration of Moody's municipal ratings. Journal of Accounting Research, 58(3), pp.693-739.

Green, R.C., Hollifield, B. and Schürhoff, N., 2007. Financial intermediation and the costs of trading in an opaque market. The Review of Financial Studies, 20(2), pp.275-314.

Hainmueller, J., 2012. Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. Political analysis, 20(1), pp.25-46.

Harris, L. and Piwowar M. S., 2006. Secondary trading costs in the municipal bond market. The Journal of Finance, 61(3), pp. 1361-1397.

Hilscher, J. and Wilson, M., 2017. Credit ratings and credit risk: Is one measure enough?. Management science, 63(10), pp.3414-3437.

Ingram, R.W., Brooks, L.D. and Copeland, R.M., 1983. The information content of municipal bond rating changes: A note. The Journal of Finance, 38(3), pp.997-1003.

Ivanov, I., Zimmermann, T. and Heinrich, N., 2022. Limits of disclosure regulation in the municipal bond market. Available at SSRN 4022819.

Jung, M.J., Naughton, J.P., Tahoun, A. and Wang, C., 2018. Do firms strategically disseminate? Evidence from corporate use of social media. The Accounting Review, 93(4), pp.225-252.

Kim, W.J., Plumlee, M.A. and Stubben, S.R., 2022. Overview of US State and Local Government Financial Reporting: A Reference for Academic Research. Accounting Horizons, 36(3), pp.127-148.

Li, E.X., Ramesh, K. and Shen, M., 2011. The role of newswires in screening and disseminating value-relevant information in periodic SEC reports. The Accounting Review, 86(2), pp.669-701.

McMullin, J.L. and Schonberger, B., 2020. Entropy-balanced accruals. Review of Accounting Studies, 25(1), pp.84-119.

MSRB 2018. Dealer Participation and Concentration in Municipal Securities Trading. https://www.msrb.org/-/media/Files/Resources/MSRB-Dealer-Participation-and-Concentration-Report.ashx

MSRB 2020. Different Buying Patterns of Retail and Institutional Investors in Municipal Bonds. https://www.msrb.org/Market-Transparency/~/media/EE1CD8A3B058465D815B047414AF2CC9.ashx

Naughton, J. and H. Spamann., 2015. Fixing Public Sector Finances: The Accounting and Reporting Lever. UCLA Law Review 62: 574–620.

Naughton, J., R. Petacchi and J. Weber. 2015. Public Pension Accounting Rules and Economic Outcomes. Journal of Accounting and Economics 59(2-3): 221–241.

Peppe, M. and Unal, H., 2021. Do Municipalities Pay More to Issue Unrated Bonds?. Available at SSRN 3946052.

Raman, Krishnamurthy K. 1981. Financial reporting and municipal bond rating changes. The Accounting Review 56 (4): 910-926.

Reck, J.L. and Wilson, E.R., 2006. Information transparency and pricing in the municipal bond secondary market. Journal of Accounting and Public Policy, 25(1), pp.1-31.

Reeve, James and Hartwell Herring, 1986, "An Examination of Non-Rated Municipal Bonds", Journal of Economics and Business 38(1), 65-76

Rogers, J.L., Skinner, D.J. and Zechman, S.L., 2016. The role of the media in disseminating insider-trading news. Review of Accounting Studies, 21(3), pp.711-739.

Schultz, P., 2001. Corporate bond trading costs: a peek behind the curtain. The Journal of Finance, 56 (2), 677-698.

Schultz, P., 2012. The market for new issues of municipal bonds: The roles of transparency and limited access to retail investors. Journal of Financial Economics, 106(3), pp.492-512.

Schwert, M., 2017. Municipal bond liquidity and default risk. The Journal of Finance, 72(4), pp.1683-1722.

Sirri, E.R., 2014. Report on Secondary Market Trading in the Municipal Securities Market. Technical Report.

Wallace, Wanda A. 1981. The association between municipal market measures and selected financial reporting practices. Journal of Accounting Research 19 (2): 502-520.

Wescott, Shari H. 1984. Accounting numbers and socioeconomic variables as predictors of municipal general obligation bond ratings. Journal of Accounting Research 22 (1): 412- 423.

Wilson, Earl R., and Thomas P. Howard. 1984. The association between municipal market measures and selected financial reporting practices: Additional evidence. Journal of Accounting Research 22 (1): 207-224.

Wu, Simon Z. 2018. Transaction Costs for Customer Trades in the Municipal Bond Market: What is Driving the Decline? Municipal Securities Rulemaking Board.

Zhang, V. 2024. Municipal Bond Credit Rating Access and Retail Investors' Transaction Costs. *The Accounting Review* 99 (1): 427–453.

Ziebell, Mary and Mary-Jean Rivers, 1992. The Decision to Rate or Not to Rate: The Case of Municipal Bonds: Journal of Economics and Business 44(4), 301-316.

Appendix A: Variable Definitions

Variable	Description	Data Source
Dependent Variables		
Markup	$TradeSign_{b,t} * 10{,}000 * \text{Log}\left[\frac{\text{InvestorPrice}_{b,t}}{\text{AvgInterdealerPrice}_{b,t}}\right]$ Trade Sign is a buy/sell indicator equal to "1" if the trade is a customer purchase, "-1" if the trade is a customer sale, and "0" if the trade is inter-dealer. The InvestorPrice is the purchase (sale) price of bond b on date t if at least one inter-dealer trade occurs on the same day. The *AvgInterdealerPrice* is the average price of all inter-dealer transactions in bond b on date t.	Constructed, MSRB
Turnover	Ratio of monthly trading volume to the outstanding bond amount	Constructed
Count of Trades	The natural log of the number of trades in a month	Constructed
$Trade	The natural log of the total dollar amount of trades per month	Constructed
Treatment Indicators		
Treated	Indicator set to one for bonds that are rated by S&P and Fitch but not by Moody's, and to zero for bonds that are rated by Moody's but neither S&P nor Fitch	
Post	Indicator set to one for trades that take place after MSRB started posting ratings from S&P and Fitch Ratings on November 21st 2011	
Treated_Moody's	Indicator set to one for bonds that are rated by Moody's but neither S&P nor Fitch, and to zero for bonds that are rated by S&P and Fitch but not by Moody's	
Post_Moody's	Indicator set to one for trades that take place after MSRB started posting Moody's ratings on June30th 2015	
Control and Cross-sectional Variables		
Duration	Time remaining to maturity	MSRB
Log(TradeSize)	The natural log of the trade value of the transaction.	Constructed
Log(AggTrades)	The natural log of the trade value of all transactions in a bond during a given month	Constructed
Inventory	An indicator equals one if a purchase (sale) does not follow (precede) a sale (purchase) within one day of the trade date	Constructed
Log(StateGDP)	The natural log of State GDP	Constructed
Log(PersIncome)	The natural log of state personal income level	Constructed
Retail	Indicator variable set to one for trades with par values under $100,000	Constructed
Bond Purchase	Indicator variable set to one if the transaction is a bond purchase	MSRB
Mandatory Audit	Indicator variable set to one for issuers in states that the state law requires mandate audits, 0 for issuers in states that do not mandate audits	

Variable	Description	Data Source
GFOA Award	Indicator variable set to one for issuers earned 2013 GFOA certificate, 0 for issuers did not receive GFOA certificate	GFOA Website
Financial Fillings	The number of financial filings on EMMA during the sample period	EMMA Website
Bond Characteristics		
Callable	Indicator variables set to one for callable bonds	Bloomberg
Yield	Yield of bond at issuance (in bps)	Bloomberg
Maturity	Years to Maturity	Bloomberg
Coupon	Bond coupon rate	Bloomberg
Log(Amount)	Natural logarithm of issue amount	Bloomberg
Insured	Indicator variables set to one for insured bonds, 0 otherwise	Bloomberg
Avg Retail	Average percent of retail trades in a given month	Constructed
Avg Rating	Equal to either the S&P, Fitch or Moody's rating, or the average of the Fitch and S&P rating if the issue is rated by both rating agencies	Bloomberg
State_City_County	Indicator variable set to one if a bond is issued by a state, city or county, 0 if by other governmental entities.	Bloomberg

Appendix B: Ratings Scale

The table describes categories for credit ratings, as well as the numerical scale used in the paper. Multiple numerical values for a single rating level represents the number assigned to ratings with a + qualifier, no qualifier, and a − qualifier, respectively for S&P and Fitch, and with a 1, 2 or 3 qualifier for Moody's. The source for ratings definitions is S&P Ratings Definitions from November 20, 2014 (http://www.standardandpoors.com/).

S&P Rating	Moody's Rating	Fitch Rating	Assigned Value	Group Description	S&P Ratings Definition
AAA	Aaa	AAA	1	Prime	An obligation rated 'AAA' has the highest rating assigned by S&P. The obligor's capacity to meet its financial commitment on the obligation is extremely strong.
AA	Aa	AA	2, 3, 4	High grade	An obligation rated 'AA' differs from the highest-rated obligations only to a small degree. The obligor's capacity to meet its financial commitment on the obligation is very strong.
A	A	A	5, 6, 7	Upper medium grade	An obligation rated 'A' is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher-rated categories. However, the obligor's capacity to meet its financial commitment on the obligation is still strong.
BBB	Baa	BBB	8, 9, 10	Lower medium grade	An obligation rated 'BBB' exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitment on the obligation.
BB	Ba	BB	11, 12, 13	Non-investment grade speculative	An obligation rated 'BB' is less Vulnerable to nonpayment than other speculative issues. However, it faces major ongoing uncertainties or exposure to adverse business, financial, or economic conditions which could lead to the obligor's inadequate capacity to meet its financial commitment on the obligation.
B	B	B	14, 15, 16	Highly speculative	An obligation rated 'B' is more Vulnerable to nonpayment than obligations rated 'BB', but the obligor currently has the capacity to meet its financial commitment on the obligation. Adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitment on the obligation.
CCC	Caa	CCC	17, 18, 19	Substantial risks	An obligation rated 'CCC' is currently Vulnerable to nonpayment, and is dependent upon favorable business, financial, and economic conditions for the obligor to meet its financial commitment on the obligation. In the event of adverse business, financial, or economic conditions, the obligor is not likely to have the capacity to meet its financial commitment on the obligation.
CC	Ca	CC	20	Extremely speculative	An obligation rated 'CC' is currently highly vulnerable to nonpayment. The 'CC' rating is used when a default has not yet occurred, but S&P expects default to be a virtual certainty, regardless of the anticipated time to default.
C	C	C	21	Default imminent	An obligation rated 'C' is currently highly vulnerable to nonpayment, and the obligation is expected to have lower relative seniority or lower ultimate recovery compared to obligations that are rated higher.

Table 1: Sample Selection

Panel A: Full Sample (Transaction Cost Analysis)

Sample Selection Criteria	Number of Trades	Number of Unique Bonds	Number of Unique Issuers
Bonds issued between July 2009 and Oct 2011, and traded during between 2009-2015	13,268,764	298,281	16,440
Dealer Trading	4,345,464	546	6
Liquidity Restrictions:			
Bond without dealer-matched customer purchase or sell	3,776,010	111,004	3,042
Bonds not traded by both retail and institutional investors in both the pre- and post-period	1,790,473	159,596	8,200
Bond Type Restrictions:			
Bonds rated by both S&P and Moody's or by both Fitch and Moody's	2,802,033	20,495	2,543
Unrated bonds	32,015	250	127
Bond issues with missing information	46,925	51	24
Full Sample	**475,844**	**6,339**	**2,498**

Panel B: S&P Subsample (Trading Outcomes Analysis)

Sample Selection Criteria	Number of Bond-Months	Number of Unique Bonds	Number of Unique Issuers
Full Sample	345,367	6,339	2,498
Moody's rated bonds	128,827	2,066	843
S&P Subsample	**216,540**	**4,273**	**1,655**

This table summarizes the sample selection process. Panel A provides sample selection for the transaction cost analysis while Panel B provides sample selection for trading outcome analysis.

Table 2: Summary Statistics

Panel A: Full Sample (Transaction Cost Analysis)

Variable (475,844 trades)	*Mean*	*Std. Dev.*	*P25*	*Median*	*P75*
Main Variables:					
Treated	0.721	0.449	0	1	1
Post	0.393	0.489	0	0	1
Dependent Variable:					
Markup	131.351	101.882	36.265	125.82	204.248
Control Variables:					
Log(AggTrades)	14.021	2.313	12.21	14.07	15.843
Duration	18.794	8.342	12	20	26
Log(TradeSize)	10.283	1.285	9.21	10.127	10.82
Inventory	0.67	0.47	0	1	1
Cross-sectional Variables:					
Retail	0.871	0.336	1	1	1
Bond Purchase	0.797	0.402	1	1	1

Panel B: S&P Subsample (Trading Outcomes Analysis)

Variable (216,541 Bonds-Months)	*Mean*	*Std. Dev.*	*P25*	*Median*	*P75*
Main Variables:					
BSI-Retail	0.061	0.372	0	0	0
BSI-Institutional	0.013	0.244	0	0	0
Dependent Variable:					
S&P Ratings	4.098	1.908	3	4	5
Control Variables:					
Time to Maturity	12.457	7.787	5.967	11.011	18.016
Amount	15.828	1.907	14.304	15.506	17.184
Downgrade-12 Mo	0.092	0.289	0.000	0.000	0.000
Downgrade-9 Mo	0.071	0.257	0.000	0.000	0.000
Downgrade-3 Mo	0.025	0.156	0.000	0.000	0.000
Cross-sectional Variables:					
GFOA Award	0.154	0.361	0	0	0
Mandatory Audit	0.202	0.402	0	0	0
Financial Fillings	19.345	9.52	9	13	21

Panel A presents descriptive statistics for the variables used in the transaction costs regression analyses, which consists of 433,353 daily trades representing 6,327 unique bond issuances from 2,447 issuers for the period 2009-2014. Panel B presents descriptive statistics for the S&P rated subsample used in the trading outcome regression analyses. All variables are defined in Appendix A.

Table 3: The Effect of Dissemination on Transaction Costs

	(1)	(2)	(3)
Dependent variable	*Markup*	*Markup*	*Markup*
Treated * Post	-4.533**	-4.193**	-4.404**
	(2.153)	(2.088)	(2.179)
Treated			3.782
			(0.693)
Control Variables:			
Log(AggTrades)		4.667***	4.791***
		(15.536)	(16.356)
Duration		5.477**	3.174***
		(2.033)	(26.648)
Log(TradeSize)		-10.287***	-10.947***
		(29.813)	(30.307)
Inventory		-12.879***	-11.707***
		(15.043)	(13.129)
Retail		15.182***	15.216***
		(18.143)	(17.296)
Insured			6.532
			(1.206)
Log (Amount)			-0.120***
			(3.788)
Callable			15.102***
			(9.056)
Rating			2.042***
			(2.592)
Adj R-squared	0.401	0.425	0.401
Number of Trades	475,844	475,844	475,844
Bond Fixed Effects	Yes	Yes	No
Issuer Fixed Effects	No	No	Yes
Trade Date Fixed Effects	Yes	Yes	Yes
Trade Type Fixed Effects	Yes	Yes	Yes
State X Year Fixed Effects	Yes	Yes	Yes

This table reports analyses of the effect of dissemination on transaction costs using *Markup*. Columns 1-3 reports multivariate results for the differential effect of S&P and Fitch rated firms (Treatment group) over Moody's rated issuers (Control group) on *Markup*. All columns present OLS coefficient estimates, and t-statistics based on robust standard errors clustered by bond and trade date. Variables are defined in Appendix A. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% p-levels (two-tailed), respectively.

Table 4: Differential Effect for Retail versus Institutional Investors

Dependent variable	(1) *Markup-Retail*	(2) *Markup-Institutional*
Treated * Post	-4.632**	-1.329
	(2.010)	(0.625)
F-stat	P = 0.000	
Control Variables:		
Log(AggTrades)	4.056***	-0.212
	(12.988)	(0.416)
Duration	7.588***	-2.728
	(2.637)	(0.892)
Log(TradeSize)	-6.916***	-13.619***
	(19.248)	(22.193)
Inventory	-13.059***	-10.369***
	(14.048)	(10.660)
Adj R-squared	0.417	0.324
Number of Trades	414,239	61,560
Bond Fixed Effects	Yes	Yes
Trade Date Fixed Effects	Yes	Yes
Trade Type Fixed Effects	Yes	Yes
State X Year Fixed Effects	Yes	Yes

This table reports analyses of the effect of dissemination on *Markup* separately for retail versus institutional investors. Column (1) restricts to retail trades and Column (2) restricts to institutional trades. All columns present OLS coefficient estimates, and t-statistics based on robust standard errors clustered by bond and trade date. Variables are defined in Appendix A. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% p-levels (two-tailed), respectively.

Table 5: Bond Sales versus Bond Purchases

Dependent variable	(1) *Markup -Purchase*	(2) *Markup -Sale*
Treated * Post	-5.028**	-1.718
	(2.313)	(0.797)
F-stat	P = 0.000	
Control Variables:		
Log(AggTrades)	3.620***	0.958***
	(10.815)	(2.587)
Duration	3.780	1.656
	(1.539)	(0.399)
Log(TradeSize)	-8.100***	-9.569***
	(21.348)	(19.022)
Inventory	-14.758***	-11.469***
	(14.170)	(14.398)
Retail	20.780***	-3.431***
	(21.858)	(3.312)
Adj R-squared	0.414	0.191
Number of Trades	379,411	95,939
Bond Fixed Effects	Yes	Yes
Trade Date Fixed Effects	Yes	Yes
Trade Type Fixed Effects	Yes	Yes
State X Year Fixed Effects	Yes	Yes

This table reports analyses of the effect of dissemination on Markup separately for bond purchases versus bond sales. Column (1) restricts to bond purchases and Column (2) restricts to bond sales. All columns present OLS coefficient estimates, and t-statistics based on robust standard errors clustered by bond and trade date. Variables are defined in Appendix A. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% p-levels (two-tailed), respectively.

Table 6: Investor Demand for Highly Rated Bonds

Panel A: Retail Investor

	(1)	(2)	(3)	(4)
Dependent variable	*BSI*	*BSI*	*BSI*	*BSI*
Rating * Post	-0.012***	-0.011***		
	(5.407)	(5.039)		
AAA/AA Rating * Post			0.169***	0.160***
			(3.016)	(2.876)
A Rating * Post			0.138**	0.131**
			(2.449)	(2.329)
B Rating * Post			0.083	0.076
			(1.362)	(1.253)
Control Variables:				
Maturity	0.001***	-0.044***	0.001***	-0.042***
	(4.066)	(3.878)	(3.717)	(3.752)
Log(Amount)	0.003***		0.003***	
	(3.543)		(3.650)	
Observations	216,540	216,540	216,540	216,540
Adjusted R-squared	0.028	0.032	0.027	0.032
Bond Fixed Effects	No	Yes	No	Yes
Issuer Fixed Effects	Yes	No	Yes	No
Year-Month Fixed Effects	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes
State X Year Fixed Effects	Yes	Yes	Yes	Yes

Table 6 (Continued)

Panel B: Institutional Investor

	(1)	(2)	(3)	(4)
Dependent variable	*BSI*	*BSI*	*BSI*	*BSI*
Rating * Post	-0.002	-0.001		
	(1.422)	(1.101)		
AAA/AA Rating * Post			0.013	0.008
			(0.752)	(0.436)
A Rating * Post			0.011	0.006
			(0.601)	(0.335)
B Rating * Post			-0.002	-0.005
			(0.149)	(0.311)
Control Variables:				
Maturity	-0.001***	-0.008	-0.001***	-0.007
	(7.140)	(1.317)	(6.866)	(1.283)
Log(Amount)	0.001		0.001	
	(1.234)		(1.536)	
Observations	216,540	216,540	216,540	216,540
Adjusted R-squared	0.031	0.032	0.031	0.032
Bond Fixed Effects	No	Yes	No	Yes
Issuer Fixed Effects	Yes	No	Yes	No
Year-Month Fixed Effects	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes
State X Year Fixed Effects	Yes	Yes	Yes	Yes

This table reports analyses of the effect of ratings dissemination on investors' BSI defined as a bond's monthly buy-sell imbalances in a given month. Rating is defined as the S&P ratings category at the time of the trade converted to a 1 through 21 numerical scale (see appendix). Because lower numbers represent higher credit ratings, a negative coefficient indicates that there is greater demand (higher BSI) for highly rated bonds (lower numerical rating). *Post* is an indicator that takes the value of one for bond-months after November 21st 2011. All columns present OLS coefficient estimates and t-statistics based on robust standard errors clustered by bond and year-month. Variables are defined in Appendix A. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% p-levels (two-tailed), respectively.

Table 7: Investor Demand and Subsequent Bond Downgrades

Panel A: Retail Investor

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Downgrade - 12 mon*	*Downgrade - 9 mon*	*Downgrade - 6 mon*	*Downgrade -12 mon*	*Downgrade - 9 mon*	*Downgrade - 6 mon*
BSI * Post	0.015**	0.010*	0.014***	0.012**	0.009*	0.009**
	(2.491)	(1.867)	(2.840)	(2.221)	(1.874)	(2.062)
Control Variables:						
Post	-0.255***	-0.218***	-0.163***			
	(26.878)	(12.009)	(5.018)			
BSI	-0.018***	-0.011**	-0.015***	-0.015***	-0.011**	-0.009**
	(3.100)	(2.363)	(3.074)	(2.928)	(2.480)	(2.371)
Rating	-0.131***	-0.090***	-0.070***	-0.125***	-0.091***	-0.071***
	(4.439)	(3.381)	(2.656)	(4.527)	(3.408)	(2.695)
Time to Maturity	-0.010	-0.029	-0.052***	-0.024	-0.016	-0.009
	(0.839)	(1.626)	(2.863)	(1.626)	(1.288)	(1.000)
Observations	216,540	216,540	216,540	216,540	216,540	216,540
Adjusted R-squared	0.371	0.308	0.206	0.383	0.332	0.265
Bond Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	No	No	No
Year-Month Fixed Effects	No	No	No	Yes	Yes	Yes
State X Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Institutional Investor

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Downgrade - 12 mon*	*Downgrade - 9 mon*	*Downgrade - 6 mon*	*Downgrade -12 mon*	*Downgrade - 9 mon*	*Downgrade - 6 mon*
BSI * Post	0.005	-0.007	-0.004	-0.001	-0.004	-0.004
	(0.700)	(1.379)	(1.022)	(0.109)	(0.642)	(1.007)
Control Variables:						
Post	-0.254***	-0.217***	-0.161***			
	(27.195)	(11.900)	(4.983)			
BSI	-0.003	0.006	0.003	0.002	0.002	0.003
	(0.504)	(1.439)	(0.738)	(0.500)	(0.533)	(0.730)
Rating	-0.132***	-0.090***	-0.070***	-0.125***	-0.092***	-0.071***
	(4.442)	(3.386)	(2.661)	(4.527)	(3.410)	(2.696)
Maturity	-0.010	-0.030	-0.052***	-0.024	-0.015	-0.009
	(0.848)	(1.632)	(2.866)	(1.583)	(1.249)	(0.955)
Observations	216,540	216,540	216,540	216,540	216,540	216,540
Adjusted R-squared	0.371	0.308	0.206	0.383	0.332	0.264
Bond Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	No	No	No
Year-Month Fixed Effects	No	No	No	Yes	Yes	Yes
State X Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 (Continued)

This table reports analyses of the effect of ratings dissemination on the relation between BSI and future downgrades. $Downgrade_{b,(t,t+h)}$ is an indicator for downgrade of bond b in the future h months, where h = there, six or twelve months Rating is defined as the S&P ratings category at the time of the trade. *Post* is an indicator that takes the value of one for bond-months after Novemeber 21st 2011. All columns present OLS coefficient estimates and t-statistics based on robust standard errors clustered by bond and year-month. Variables are defined in Appendix A. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% p-levels (two-tailed), respectively.

Table 8: Cross-sectional Tests based on Issuer Information Environment

Panel A – Conditional on Mandatory Audit States

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Downgrade - 12 mon No Mandatory Audit*	*Downgrade - 12 mon Mandatory Audit*	*Downgrade - 9 mon No Mandatory Audit*	*Downgrade -9 mon Mandatory Audit*	*Downgrade - 6 mon No Mandatory Audit*	*Downgrade - 6 mon Mandatory Audit*
BSI * Post	0.021***	-0.008	0.012**	0.001	0.017***	0.005
	(2.859)	(0.833)	(2.090)	(0.062)	(2.913)	(0.646)
F-stat	P= 0.000		P= 0.000		P= 0.000	
Control Variables:						
Post	-0.248***	-0.284***	-0.208***	-0.261***	-0.154***	-0.198***
	(24.666)	(17.188)	(11.668)	(10.944)	(4.841)	(5.447)
BSI	-0.025***	0.008	-0.014**	-0.002	-0.017***	-0.007
	(3.503)	(0.924)	(2.596)	(0.194)	(3.038)	(1.053)
Rating	-0.122***	-0.156***	-0.080***	-0.116***	-0.059**	-0.097***
	(4.199)	(4.126)	(3.111)	(3.420)	(2.478)	(2.757)
Time to Maturity	-0.009	-0.013	-0.029	-0.030	-0.051***	-0.057***
	(0.763)	(0.899)	(1.621)	(1.500)	(2.755)	(3.053)
Observations	173,554	42,986	173,554	42,986	173,554	42,986
Adjusted R-squared	0.369	0.381	0.304	0.323	0.201	0.228
Bond Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State X Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8 (continued)

Panel B – Conditional on GFOA Awards

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Downgrade - 12 mon*	*Downgrade - 12 mon*	*Downgrade - 9 mon*	*Downgrade -9 mon*	*Downgrade - 6 mon*	*Downgrade - 6 mon*
	No GFOA	*GFOA*	*No GFOA*	*GFOA*	*No GFOA*	*GFOA*
BSI * Post	0.016**	-0.004	0.011*	-0.012	0.017***	-0.009
	(2.410)	(0.307)	(1.939)	(1.145)	(3.166)	(0.978)
F-stat	P= 0.000		P= 0.000		P= 0.000	
Control Variables:						
Post	-0.280***	-0.118***	-0.240***	-0.098***	-0.179***	-0.071***
	(26.374)	(10.320)	(11.980)	(6.763)	(5.027)	(3.903)
BSI	-0.019***	-0.002	-0.013**	0.009	-0.018***	0.009
	(3.035)	(0.144)	(2.421)	(0.926)	(3.472)	(1.145)
Rating	-0.128***	-0.161***	-0.085***	-0.132***	-0.066**	-0.096***
	(4.293)	(3.550)	(3.199)	(3.411)	(2.519)	(3.298)
Time to Maturity	-0.012	0.006	-0.031	-0.017	-0.054***	-0.037**
	(0.912)	(0.670)	(1.615)	(0.983)	(2.793)	(2.264)
Observations	182,437	34,101	182,437	34,101	182,437	34,101
Adjusted R-squared	0.375	0.449	0.311	0.386	0.210	0.249
Bond Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State X Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8 (continued)

Panel C – Conditional on Financial Fillings

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Downgrade - 12 mon*	*Downgrade - 12 mon*	*Downgrade - 9 mon*	*Downgrade -9 mon*	*Downgrade - 6 mon*	*Downgrade - 6 mon*
	Low Disclosure	*High Disclosure*	*Low Disclosure*	*High Disclosure*	*Low Disclosure*	*High Disclosure*
BSI * Post	0.021***	0.004	0.014**	0.000	0.016***	0.009
	(3.048)	(0.470)	(2.513)	(0.038)	(2.712)	(1.406)
F-stat	P= 0.000		P= 0.000		P= 0.000	
Control Variables:						
Post	-0.258***	-0.251***	-0.223***	-0.212***	-0.172***	-0.152***
	(21.260)	(23.429)	(12.555)	(10.416)	(5.370)	(4.579)
BSI	-0.024***	-0.007	-0.016***	-0.002	-0.016***	-0.010
	(3.658)	(0.997)	(3.186)	(0.346)	(2.977)	(1.633)
Rating	-0.137***	-0.129***	-0.089***	-0.094***	-0.068**	-0.076***
	(3.979)	(4.354)	(3.001)	(3.581)	(2.405)	(2.928)
Time to Maturity	-0.008	-0.011	-0.027	-0.031	-0.055***	-0.049***
	(0.616)	(0.900)	(1.494)	(1.654)	(2.945)	(2.659)
Observations	114,864	101,675	114,864	101,675	114,864	101,675
Adjusted R-squared	0.381	0.403	0.324	0.330	0.218	0.222
Bond Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

This table reports analyses of the effect of dissemination on *Markup* separately in two groups based on proxies for the issuer's information environment: for Mandatory audit states vs Non-mandatory audit states (Panel A), for Bonds with GFOA awards vs Bonds with no GFOA awards (Panel B), and for Bonds that issued above median level of financial filings vs Bonds with below median level of financial filings on EMMA over the sample period (Panel C). All columns present OLS coefficient estimates and t-statistics based on robust standard errors clustered by bond and trade date. Variables are defined in Appendix A. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% p-levels (two-tailed), respectively.