Issuing frequency and the cost of municipal financing

Jon Fulkerson*
jfulkerson1@udayton.edu
School of Business Administration
University of Dayton
Dayton, OH 45469

Nancy Haskell
nhaskell1@udayton.edu
School of Business Administration
University of Dayton
Dayton, OH 45469

Mitchell Johnston
mjohnston2@udayton.edu
School of Business Administration
University of Dayton
Dayton, OH 45469

May, 2023

Working Paper

Abstract: Over the period 1990-2018, municipalities that issued bonds infrequently paid a higher yield compared to municipalities that issued frequently. We find that there is systematically less demand for bonds from infrequent issuers in most states, and the yield for these bonds are as much as 16 basis points higher in some scenarios. We explain this lower demand as the result of investor barriers to evaluating the issuer. When the incentives to hold these bonds increase or the barriers to evaluating the bonds decrease, we find no difference in yields between frequent and infrequent issuers. Municipalities that issue infrequently pay higher financing costs as a result of these barriers.

Keywords: municipal bonds; publc finance; financial reporting; corruption.
JEL: G12; G28; H74

***** Corresponding author. Jon Fulkerson discloses previous work with the Investment Advisors Association and Natixis Investments; Nancy Haskell discloses previous work with the city government of Dayton, OH.

Issuing frequency and the cost of municipal financing

1. Introduction

Large municipalities issue bonds frequently and dominate the municipal bond market. This market is large ($4 trillion), and some municipalities (like Boston or Los Angeles) issue multiple times per year. Over 90% of new issues in a given year come from municipalities that issued bonds in at least five of the previous ten years.

Infrequent issuers by definition represent a smaller portion of this market. Only 21% of municipal bonds were issued without being preceded by an issuance from the same municipality in the prior three years (our working definition of "infrequent issuer"). This group tends to be associated with lower population than frequent issuers and issue in smaller amounts. The unconditional average yield is also 13 basis points higher on municipal bonds for infrequent issuers, suggesting a substantial "penalty" in the form of higher borrowing costs. Our primary empirical finding is that after including common controls for municipal yields, infrequent issuers pay between 2.2 and 4.2 basis points per year more than equivalent bonds from frequent issuers. While a higher yield for investors, this represents a nontrivial penalty for municipal governments that access the market infrequently.

Our findings are consistent with lower demand for bonds from infrequent issuers. Nationwide investors have many choices, and a little-known issuer from a smaller municipality with low total issuance will not have as much inherent demand compared to large issues from big municipalities. We demonstrate this market dynamic in two ways. First, we exploit between state variation in demand caused by state income tax rates. As described in Babina, Jotikasthira, Lundblad, and Ramadorai (2021), high tax states have much higher demand for in-state bonds than .other states, and we find that the higher yield for infrequent issuers is primarily in low tax (and

therefore low in-state demand) states. As a second test, we use time-series variation within states to identify months when many other municipalities issue. The presence of close substitutes in a month, primarily from high frequency issuers, leads to a higher yield for infrequent issuers that disappears in months with fewer competing issues.

Having found lower investor demand for infrequent issuers, we show that the premium arises from the barriers investors face in evaluating these bonds. Investors may find it challenging to get information on these municipalities or it may be hard for investors to evaluate the quality of this information (see, for example, Gao, Lee, and Murphy (2020)). Investors also have many choices, and may rationally limit their attention to familiar issuers. These barriers are more likely to exist with infrequent issuers and cause lower demand in the presence of close substitutes from frequent issuers. As recently described by Gillers (2022a) in the *Wall Street Journal*:

> "[Issuers] publish updated information when they issue new debt. But small towns… and other borrowers may go years without returning to the market. That means financial statements are often the only trustworthy gauge investors have of those borrowers' financial health. Asset managers say they sometimes find more current information in budget ordinances, newspaper clippings or research by nonprofit organizations, but those numbers aren't audited."

We demonstrate these barriers in several tests. First, we show how state-level issuer reporting requirements leads to higher yields for infrequent issuers in states with less consistent financial reporting (see Baber and Gore, 2008). Second, we find that high levels of public official corruption leads investors to require a higher yield for all issuances in a state, but more so for

infrequent issuers. Third, we find that when the SEC required greater information disclosure for municipal bonds in 1995, it lowered the yields on all bonds. But infrequent issuers benefited less from the rule change than frequent issuers, consistent with limited investor attention following the large increase in disclosure for all issuances. We find in all cases infrequent issuers pay a higher premium when the investors face more barriers to evaluating the quality of the issue.

We contribute to the literature on two points. First, we show differences in demand for infrequent issuers even after controlling for common characteristics. This difference has real effects on municipalities, and is roughly the equivalent to the difference on a 3-year bond between an AA and an otherwise equivalent A+ bond in the current municipal bond market. Second, we demonstrate how barriers to evaluating municipal bonds have a particularly large effect on municipalities that issue infrequently. Some factors match closely with prior literature, and it is not surprising that infrequent issuers pay more when the state adopts nonstandard reporting requirements or when local officials are more likely to be corrupt. However, other factors have received less attention, such as the crowding out effect of issuing simultaneously with many other issuers. This relates to recent policy discussions on reporting requirements, as described by Gillers (2022a, 2022b).

The rest of this study is organized as follows. Section 2 highlights related literature; Section 3 describes our dataset construction; Section 4 provides our main finding; Section 5 demonstrates differences in demand for frequent and infrequent issuers; and Section 6 explains these differences as the result of investor barriers to evaluating bonds from infrequent issuers. Section 7 concludes with a discussion of how our paper fits into the literature and some policy implications of our findings.

2. Related literature

When considering how issuing frequency affects bond yields, our study builds on several decades of bond market research. As with corporate bonds, typical fixed income factors matter for determining yields. Term, treasury yield curve, credit enhancements, default risk, call features, and federal tax rates are all important characteristics when evaluating yield to maturity (YTM) in municipalities.

Another characteristic receiving significant attention is the tax-exempt status of municipal bonds. Many studies document the curious result that tax-exempt municipal bonds appear to have a higher yield than would be expected relative to the after-tax yields on corporate bonds with equivalent risk (Pye, 1969; Green, 1993; sometimes referred to as "the muni puzzle"). Regardless, the tax-exempt status attracts many retail investors, making the operations of the market of particular interest to regulators (Schultz, 2012).

Municipal bonds are also a very "local" market, and state and local factors affect yields beyond the typical characteristics discussed above. For example, state tax exemptions on in-state municipal bond interest greatly increases in-state investor demand, and Babina et al. (2021) document how in-state demand leads to market segmentation in high tax states. In supporting studies, Fulkerson and Haskell (2021) show how state income taxes drive flows to state-specific municipal bond funds, while Adelino, Cheong, Choi, and Oh (2022) show how state fund flows may drive the issuance of bonds by municipalities. Even relatively short-term state policies impact the municipal bond market, as differences in state-level COVID lockdown responses affected yields (Tran and Uzmanoglu, 2022). Local factors matter, too. Debt issuance interacts with local migration (see, e.g., Schultz and Sjöström, 2001) by allowing municipalities to improve public

goods to attract in-migration that cover the costs of the municipal debt issuance, while Gao, Lee, and Murphy (2020) shows how local news availability affects local municipal borrowing costs.

Finally, an important determinant of municipal bond yields are the barriers to evaluating the issuing entity. Baber and Gore (2008) and Gao, Murphy, and Qi (2019) use GAAP (Generally Accepted Accounting Principles) reporting requirements to represent the quality of information associated with the financial reports issued by municipalities within a given state. Both studies demonstrate that more standard reporting (GAAP) is associated with a lower cost of borrowing for municipalities. This decline in borrowing costs is attributed to the improvement in the transparency of information and can reduce information asymmetry when reporting is compulsory. Similarly, Reck and Wilson (2006) show that investors are able to more accurately price bonds immediately following required additional disclosure by municipalities. Corruption also may deter investment, as investors demand higher yields when financial statements are less reliable (Butler, Fauver, and Mortal, 2009). These findings underscore the variation in how easy it is for investors to evaluate and invest in a municipality's bonds. These barriers are especially relevant given that Cornaggia, Hund, and Nguyen (2022) document investor inattention in the municipal bond market, even among sophisticated investors.

Our research fits with these strands of the literature, as we examine the impact on municipalities for infrequently participating in the municipal bond market. Prior studies focused on the "average" municipal bond issuance, but we demonstrate how infrequent issuers pay a premium to access capital that goes beyond typical determinants of bond yield. We will demonstrate how lower demand drives this yield. We then show that investors' barriers to evaluating infrequent issuers explains this lower demand.

3. Sample construction

A. Data sources

The sample starts with all municipal bond issues available in the SDC Platinum database from 1980-2019. We keep only issues by county and city governments (issuer types 11 and 12, respectively). We retain data on issue amount, price, YTM, coupon rate, sell date, call date, credit enhancements, and characteristics about the issue such as if it was rated, callable, taxable, competitively bid, had credit enhancements, or a sinking fund.

The key dependent variable for our study is the municipal bond issuance's premium relative to comparable US Treasury bonds. For each issue, we separate each component bond by term and coupon, and estimate the bond's yield premium as the after-tax spread relative to a synthetic Treasury bond of identical term. We estimate this premium following the approach of Butler and Yi (2022), which we briefly summarize here. To get the synthetic Treasury bond yield, we calculate the present value of the municipal bond's coupons discounted at the implied Treasury yields obtained from the Federal Reserve for each coupon's payment date. This represents the hypothetical price of an equivalent Treasury bond with identical coupon rate and term as the municipal bond. The YTM implied by this price is what we use as the synthetic Treasury YTM. We then calculate the after-tax synthetic Treasury YTM based on the highest federal personal income tax as of January 1 for the year of the bond issuance.

For each municipal bond, we use the SDC reported YTM if available. If not available, we estimate the yield based on the SDC reported issue price. The spread for each bond in an issue is the difference between the bond's YTM and the after-tax YTM on the synthetic Treasury bond.

Finally, we use the average spread across all bonds for a given issuance weighted by the total par value of each bond as our measure of the municipal bond issuance's premium.[1]

Individual issuances are mapped to state, county, and place location data algorithmically and hand checked for poor quality matches. County population data for these locations comes from the U.S. Census Bureau American Community Survey. Bonds issued jointly by more than one location are flagged in the dataset as a joint issuance, and joint issuances that include multiple counties are associated with the combined population of all counties on the issuance.[2] We use information for each location's state to link our data with the top marginal tax rates in each state from the Urban Institute Tax Policy Center and the Federation of Tax Administrators. We also include data on white-collar crime convictions at the state level, collected from the Department of Justice (as in Butler, Fauver, and Mortal, 2009).

B. Who are the infrequent issuers?

We categorize a municipality as an infrequent issuer if the municipality has issued no bonds in the past three years. Figure 1 is a histogram of years since issuance and shows that approximately 80% of observations would not meet this definition of infrequent issuer.[3] The SDC database has

[1] We take a few additional steps in cleaning the data to ensure the integrity of the sample. If the bond is callable, we use the yield to call rather than yield to maturity and base it on the earliest call date listed. All date calculations are based on the sell date, and the Treasury yield curve data is used either as of the sell date or for the most recent available date prior to the sell date up to four days prior. In the early part of the sample, the implied Treasury yield curve is not estimated for long maturities, and we assume the longest maturity rate available applies to any municipal bond longer than that term. Maturity is based on the maturity date variable if available but is filled if missing with a calculation based on the years to maturity variable. We drop any issues with coupon rates over 20 percent. We drop any observations with missing data for any of the characteristic variables discussed.

[2] Approximately 4% of the sample include joint issuances, which occur most frequently by a city government and its associated county.

[3] "Infrequent issuer" could be defined many ways, so we primarily focus on the most conservative definition of three years. We also provide results that define infrequent issuers using a four- and five-year convention, which present qualitatively similar results. Joint issuances are categorized as infrequent if none of the associated municipalities have issued in the past three years.

more sporadic coverage in the 1980's, and given the 1986 Tax Reform substantially affected the municipal bond market, we choose to start our sample in 1990. This decision allows us to identify infrequent issuers in the first years of our regression sample using the bond data from the late 1980's. Our regression sample ends in 2018, given data availability for some of the county-level controls.

Table 1, Panel A, shows summary data for the full sample of bonds, and for infrequent and frequent issuers separately. The two groups have some similar characteristics; both groups seem equally likely to issue revenue bonds and to have a credit enhancement. Infrequent issuers are less likely to be rated, less likely to be taxable, and less likely to be competitively bid, while they are more likely to be callable and more likely to have a sinking fund. A key difference, however, is that infrequent issuers have a higher average premium (75 basis points) than frequent issuers (62 basis points).

[Insert Table 1 here]

Municipalities that issue bonds infrequently borrow smaller amounts, on average, compared to frequent issuers (Table 1, Panel A) and are located in less populated counties (Table 1, Panel B). Other location characteristics shown in Table 1, Panel B, are similar among frequent and infrequent issuers, including the likelihood of the issuer being a city government, the distribution of top marginal state tax rates, and the state level corruption.

4. Primary model and methods

A. An empirical model for estimating the infrequent issuer yield premium

We estimate the impact of being an infrequent issuer on the after-tax yield premium, conditional on characteristics of the bond issuance, the top marginal state tax rate, the county

population, whether it was a joint issuance by multiple entities, and whether the issuing entity is a city or county government.[4] The baseline regression model takes the form:

$$y_{ict} = \beta_0 + \beta_1 Infreq_{ict} + \beta_2 \ln(IssueAmount)_{ict} + \gamma X_{ict} + \theta Z_{ct} + \beta_3 City_{ict} + \delta_t + \varepsilon_{ict} \quad (1)$$

where, the subscript *i* denotes a bond issuance by a specific municipal government, *c* denotes the county associated with that municipality, and *t* represents the year. The dependent variable is the yield premium on the municipal bond, measured as the spread between the municipal bond's YTM and the after-tax YTM for a synthetic Treasury bond as described in Section 3. The variable of interest is an indicator variable, *Infreq*, equal to one if the location has not issued municipal debt in the past three, four, or five years and zero otherwise. Most of our discussion will focus on the three-year timeframe as the most conservative definition of infrequent issuing, but our results are similar or larger for the longer timeframes.

We also include a common set of controls for municipal bond yields. We control for a vector, *X*, of indicator variables representing bond characteristics denoting whether the issuance is rated, callable, taxable, competitively bid, a revenue bond, credit enhanced, or has a sinking fund. The vector, *Z*, represents a set of county or state level variables including the natural logarithm of county population and the top marginal tax rate in the state where the municipality resides. We control for the natural logarithm of the issue amount, measured in millions of dollars, an indicator variable for a joint issuance, and an indicator variable representing whether the issuing municipality is a city or county. All models also include year fixed effects, δ_t, to control for

[4] We use county population as a proxy for the size of the municipality due to difficulty obtaining reliable measures of population at the city level on an annual basis throughout the sample period.

macroeconomic conditions that affect premiums and a linear time trend. We do not include municipality fixed effects due to the relatively rare instance of debt issuances in general, but particularly for infrequent issuers in the data sample.

B. Base model estimation

Table 2 reports results for our baseline model described in equation (1). The first column shows estimates for our preferred definition of infrequent issuers, those who have not issued municipal debt in the past three years. Subsequent columns show results for 4-year and 5-year definitions of infrequent issuers for robustness. Conditional on bond and county characteristics, infrequent issuers pay a yield premium on their municipal debt that is 2.2-4.2 basis points higher, on average, than frequent borrowers. The univariate difference in premiums in Table 1 was 13 basis points, so even with controls, 15-30% of the difference appears to be a premium paid by infrequent issuers. This premium associated with being an infrequent issuer is larger for stricter definitions of infrequent, which represents more time since the last debt issuances.

[Insert Table 2 here]

We hypothesize that infrequent issuers pay higher yield premiums than frequent issuers due to lower investors demand for bonds from infrequent issuers, on average. The next section considers differences in demand as an explanation for the differences in yields between frequent and infrequent issuers.

5. Investor demand and the infrequent issuer premium

The simplest explanation for the premium is that there is lower demand for infrequent issuers. Intuitively, frequent issuers have lots of information available for investors and the information has been evaluated recently. The availability of information related to the municipality

may reduce the perceived risk and time required to process information relevant to the new issuance, which will increase demand relative to infrequent issuers. Another possibility is that state tax laws may induce higher demand. In the following section, we consider both of these demand stories.

One test of demand is to consider how cross-sectional differences in state income taxes change demand for in-state investors to hold in-state municipal bonds. Babina et al. (2021) demonstrate how high state income taxes create market segmentation in state municipal bond markets.[5] When a state has low state income taxes or no tax-exemption for in-state municipal bonds, in-state investors have less incentive to hold in-state bonds. A key prediction from their model is that investors in high tax states overinvest in municipal bonds to the point they are under-diversified. We hypothesize that this under-diversification makes bonds issued by infrequent issuers very desirable to in-state investors as a way to diversify the risk in a portfolio concentrated in a few big municipalities. In low tax states, however, investors sacrifice less return by investing out of state and do not have the same demand for the diversifying effects of an infrequent issuer.

Against this background, we measure whether there is lower demand for infrequent issuers by comparing the infrequent issuer premium in high- and low-income tax states. We test this by estimating equation (1) with the addition of an interaction term for being an infrequent issuer in a high tax state. We report these results in Table 3.

[Insert Table 3 here]

Consistent with higher demand, the infrequent issuer premium disappears in high tax states. Column (1) of Table 3 shows the disadvantage to being an infrequent issuer in a low tax state. Infrequent issuers in low tax states pay 3.4-5.6 basis point higher premiums, on average, while

[5] The high tax states defined by Babina et al. (2021) are: California, Oregon, Hawaii, Vermont, Rhode Island, Montana, Maine, New Jersey, and Minnesota.

infrequent issuers in high tax states pay 1.6-2.8 basis point lower premiums than frequent borrowers. We argue that these differences represent lower demand on average for infrequent issuers in low tax states.

As another test of demand is the time variation in the availability of close substitutes for bonds from infrequent issuers. Municipalities do not issue bonds evenly across the calendar year, and our own calculations (unreported) show a spike in June and July. The timing also varies year to year. We use this variation in issuances across time to test whether infrequent issuers pay a higher premium when there are many close substitute bonds available. We hypothesize that a high number of other new municipal bond issuances within the same state and month lowers the demand for infrequent issuers. The lower demand may result from limited investor attention, where investors are forced to prioritize which bonds to evaluate when there are many bonds available. This may also result from there being more recent information available for frequent issuers that is presumably more reliable. Regardless, we expect the presence of many other in-state bond issuances in a given month to result in higher premiums for infrequent issuers.

To test this, we define a new dummy variable that is equal to one when a state-month has a high number of issuances, and estimate equation (1) with an added interaction term between being an infrequent issuer and this new variable. We test four different definitions of "high issue months," which are that total issuances in the state for the month are: (i) at least two standard deviations above the state's full sample mean, (ii) at least 50% of the highest number of issuances in a month for that state, (iii) at least 80% of the highest number of issuances in a month for that state, or (iv) at least 90% of the highest number of state issuances in a month for that state over the entire sample period. Select coefficient estimates for these regressions are reported in Table 4.

[Insert Table 4 here]

Infrequent issuers in months with a high number of other issuances in the state experience significantly higher premiums. Considering the broadest definition of infrequent issuer in Panel A, we find 3.9-18.1 basis point higher premiums, depending on the definition of high issuance month. The estimated impact is lowest in the least crowded definition (50% of the state max) and increases in specifications that restrict the definition to more crowded months. Results are similar and, in most cases, slightly stronger for subsequent panels using stricter definitions of infrequent issuers.

6. Explaining lower demand for infrequent issuers

The prior section demonstrates that on average infrequent issuer bonds are seen as less desirable than bonds from frequent issuers, even after controlling for relevant characteristics. We hypothesize that investors expect higher premiums from infrequent issuers when it is harder to find and evaluate information about the issuer. These barriers may be due to less information available, poor quality information, or too many issues to evaluate. This section considers how investor barriers reduce demand by looking at three different situations that create barriers for investors to evaluate a municipal bond's quality.

A. State reporting requirements

A primary source of information for municipal issuances is the required financial reporting. However, different states have different requirements. Baber and Gore (2008) examine state-level municipal reporting requirements for financial statements, and find significant variation between states. Some states require municipalities comply with GAAP in their reporting. Others require a mix of GAAP and state-specific standards. And, a third group of states do not place any constraints

on municipal reporting at all.[6] We use this third group to measure how the lack of reporting standards creates a barrier for investors when evaluating municipal bonds.

We expect infrequent issuers in stricter or standardized reporting states to have more easily processed information than infrequent issuers in states without common reporting standards. If so, we expect infrequent issuers to pay a higher premium in states without standardized reporting, given the additional work required by the average investor to interpret the financial reports. To test this, we estimate equation (1) with the addition of an interaction term for being an infrequent issuer in a state without reporting requirements, which we term *non-GAAP*. We report these results in Table 5.

[Insert Table 5 here]

As shown in the first column of Table 5 infrequent issuers in *non-GAAP* states pay premiums that are 6.6 to 7.3 basis points higher than infrequent issuers in states with stricter reporting requirements. The fact that infrequent issuers pay negligibly different premiums in states with strong reporting requirements suggests that information quality explains a significant portion of the infrequent issuer premium documented in Table 2. Columns (2)-(3) of Table 5 show that the results are stronger for stricter definitions of the infrequent issuers.

B. Corruption

Investors may also demand a higher premium from municipalities when they have doubts about public official behavior. Corruption is commonly associated with declines in accounting quality (e.g. Schipper (1989) and Chen, Che, Zheng, and You (2020)). Butler, Fauver, and Mortal (2009) link corruption directly to bond yields by showing that municipalities in more corrupt states

[6] These states include: Alabama, Delaware, Idaho, Missouri, Nebraska, North Dakota, Pennsylvania, South Carolina, Texas, and Vermont.

pay a higher premium, attributing the difference to lower integrity for political officials and higher default risk. We take a similar, but slightly different stance on this premium. We speculate that investors view higher corruption as creating higher uncertainty regarding the quality of information about a municipality.[7] Infrequent issuers have little history to offset these potential concerns, and we expect the impact of corruption in a state is higher for infrequent issuers compared to frequent issuers.

To control for corruption, we use a rolling count over the past four years of convictions per 100,000 population for white collar crime and political corruption in the state as a proxy for the trustworthiness of the local municipal government. We estimate equation (1) with an added interaction term between state-level convictions and being an infrequent issuer, and provide these results in Table 6.

[Insert Table 6 here]

We find that that a one standard deviation (0.7) increase in state-level convictions per 100,000 over the past four years increases the municipal bond premium by 2.4-2.7 basis points for frequent issuers, and by 4.0-4.9 basis points for infrequent issuers.

C. Disclosure changes

As another test of reporting requirements and information quality, we also consider an important rule change by the SEC in 1995 that increased the reporting requirements for municipalities. Reck and Wilson (2006) evaluate how this revision of SEC Rule 15c2-12 changed information transparency in the municipal bond market.[8] They find that the rule improved pricing

[7] Butler et al. (2009) connect the corruption premium to higher default risk because the difference disappears when the municipality gets some type of credit enhancement.

[8] The rule was revised in 1994, but was effective as of 1995. Further, there were several rule changes during this time that explicitly target the municipal bond market, so we acknowledge that the effects we discuss may relate to multiple regulatory changes from the same timeframe.

in the secondary bond market as a result of the increase in disclosure quality and frequency, which was a key goal of the rule change. In the context of infrequent issuers, investors could now distinguish between bonds with lots of information available from previous disclosures (frequent issuers) and those without this information (infrequent issuers). While we expect yields to be lower for all bonds after 1995, *ceteris paribus*, we expect infrequent issuers did not benefit as much as frequent issuers because they categorically have less public information available. To test this, we estimate equation (1) with the addition of an interaction term for being an infrequent issuer post-1995, after the change in SEC Rule 15c2-12. Table 7 reports these results.

[Insert Table 7 here]

After the rule change, we see a decrease in yields for all municipal bonds, consistent with greater transparency. Infrequent issuers, however, pay approximately 5-6 basis points more on their premiums after 1995, around twice the size of the base estimate documented in Table 2. The results suggest, that while the SEC ruling increased information availability, it increased the visibility of close substitutes for infrequent issuers and made it easier for investors to opt for bonds from frequent issuers with more information available.[9]

7. Conclusion and implications

Infrequent municipal bond issuers pay a penalty of 2-4 basis points per year because of how rarely they enter the market. These differences in yields come from lower investor demand

[9] We also consider whether the presence of outstanding bonds in the secondary market increases the information quality for infrequent issuers. Municipalities with outstanding bonds must make annual disclosures, thereby reducing information asymmetry. We proxy for the presence of outstanding bonds by calculating whether prior issuances by a municipality have a term length that encompasses the current issuance date. This process is imprecise, however, and we find no statistically significant difference in premiums for infrequent issuers based on the presence of outstanding bonds trading in the market. As noted in Gillers (2022a), some municipalities, and particularly those that issue infrequently, do not regularly disclose audited financial data even though they are required to do so. Even the presence of bonds in the market does not guarantee that information is available for the municipality. These results are available upon request.

for infrequent issuer bonds, which translate into a lower price and a higher yield on average. The lower demand occurs because of the barriers investors face when evaluating the bonds from infrequent issuers. In some cases, these barriers cause municipalities to pay 15 basis points or more per year beyond what would be expected for equivalent bonds from frequent issuers when investors have a harder time evaluating the bond. This has several implications.

First, we show differences in demand for issuers even after controlling for common characteristics, including population. However, it is notable that infrequent issuers tend to be associated with lower population (less densely populated) areas. This investor preference has real effects on these municipalities, and is roughly the equivalent to the difference between a 3-year AA bond and an equivalent A+ bond in the current municipal bond market. We find even bigger penalties for infrequent issuers in some states, equivalent to ratings several notches lower than otherwise equivalent frequent issuers. One interpretation, therefore, is that the market is punishing smaller municipal governments that may be the most capital constrained.

Second, we expand on what is known about the impact of regulatory requirements on municipalities that issue infrequently. The non-standardized reporting requirements for some states have particularly large negative effects, suggesting that common financial reporting is beneficial for municipalities. We also see how increased reporting requirements following the 1995 SEC rule change reduced yields overall for municipalities. In both cases, however, more information disclosure reduced the cost of borrowing for municipalities, but reduced it less for infrequent issuers.

Third, we provide additional support for limited investor attention in the municipal bond market. Cornaggia, Hund, and Nguyen (2022) find that investors do not fully respond to information available in publicly available data on credit quality, and attribute the weak secondary

market response to limited investor attention. We find evidence suggesting that municipal bond investors may have limited attention in the primary market. Infrequent issuers have higher yields than equivalent bonds from frequent issuers if they issue at the same time as many other issuers, and they have higher yields when there is an increase in information disclosure by all issuers in the market. Both situations increase the amount of information to process, and we would expect investors with limited attention to respond by demanding a higher yield for those issuers that would be hardest to evaluate.

Finally, our research relates to recent policy discussions in the United States. Legislation to standardize municipal financial disclosures has been a topic of recent debate (Gillers, 2022b). Advocates suggest improved information and standardization to make the disclosures machine readable will lower borrowing costs for municipalities. Those opposed worry about increased administrative costs, particularly for municipalities that issue bonds infrequently and may opt for other sources of capital in response to additional reporting standards. Our research suggests that regulations on financial reporting may also have differential impacts on municipality borrowing costs (yields), depending on issue frequency. We show that standardization tends to reduce the yield premium for infrequent issuers, while increases in total information benefit infrequent issuers less than more frequent participants due to the limited investor attention. Leveraging technology to parse municipal financial data may reduce the role of limited investor attention and further improve efficient capital allocation across frequent and infrequent issuers. The extent to which the benefits in terms of lower borrowing costs outweigh the added reporting costs, particularly for infrequent issuers, remains an open question.

Citations

Adelino, Manuel, Chiyoung Cheong, Jaewon Choi, and Ji Yeol Oh, 2022, Mutual fund flows and the supply of capital in municipal financing, Duke University working paper.

-

Baber, William, and Angela Gore, 2008, Consequences of GAAP disclosure regulation: Evidence from municipal debt issues, *The Accounting Review* 83, 565-592.

Babina, Tania, Chotibhak Jotikasthira, Christian Lundblad, and Tarun Ramadorai, 2021, Heterogenous taxes and limited risk sharing: evidence from municipal bonds, *Review of Financial Studies* 34, 509-568.

Butler, Alexander, Larry Fauver, and Sandra Mortal, 2009, Corruption, political connections, and municipal finance, *Review of Financial Studies* 22, 2873-2905.

Butler, Alexander, and Hanyi Yi, 2022, Aging and public financing costs: Evidence from U.S. municipal bond markets, *Journal of Public Economics* 211, 1-18.

Chen, Yunsen, Limei Che, Dengjin Zheng, and Hong You, 2022, Corruption culture and accounting quality, *Journal of Accounting and Public Policy* 39, 1-22.

Cornaggia, Kimberly, John Hund, and Giang Nguyen, 2022, Investor attention and municipal bond returns, *Journal of Financial Markets* 60, 1-27.

Fulkerson, Jon, and Nancy Haskell, 2021, State income tax changes and the demand for municipal bond funds, *Quarterly Journal of Finance* 11.

Gao, Pengjie, Chang Lee, and Dermot Murphy, 2020, Financing dies in darkness? The impact of newspaper closure on public finance, *Journal of Financial Economics* 135, 445-467.

Gao, Pengjie, Dermot Murphy, and Yaxuan Qi, 2019, Political uncertainty and public financing costs: Evidence from US gubernatorial elections and municipal bond markets, *Available at SSRN 1992200*.

Gillers, Heather, 2022a, "Municipal-Bond Issuers Fall Behind on Disclosures", www.wsj.com/articles/municipal-bond-issuers-fall-behind-on-disclosures-11657704781, Accessed 5/12/2023.

Gillers, Heather, 2022b, "Local Governments, Many on Wall Street Line Up Against Muni-Data Bill", www.wsj.com/articles/local-governments-many-on-wall-street-line-up-against-muni-data-bill-11669393779, Accessed 5/12/2023.

Green, Richard, 1993, A simple model of the taxable and tax-exempt yield curves, *Review of Financial Studies* 6, 233-264.

Pye, Gordon, 1969, On the tax structure of interest rates, *Quarterly Journal of Economics* 83, 562-579.

Reck, Jacqueline, and Earl Wilson, 2006, Information transparency and pricing in the municipal bond secondary market, *Journal of Accounting and Public Policy* 25, 1-31.

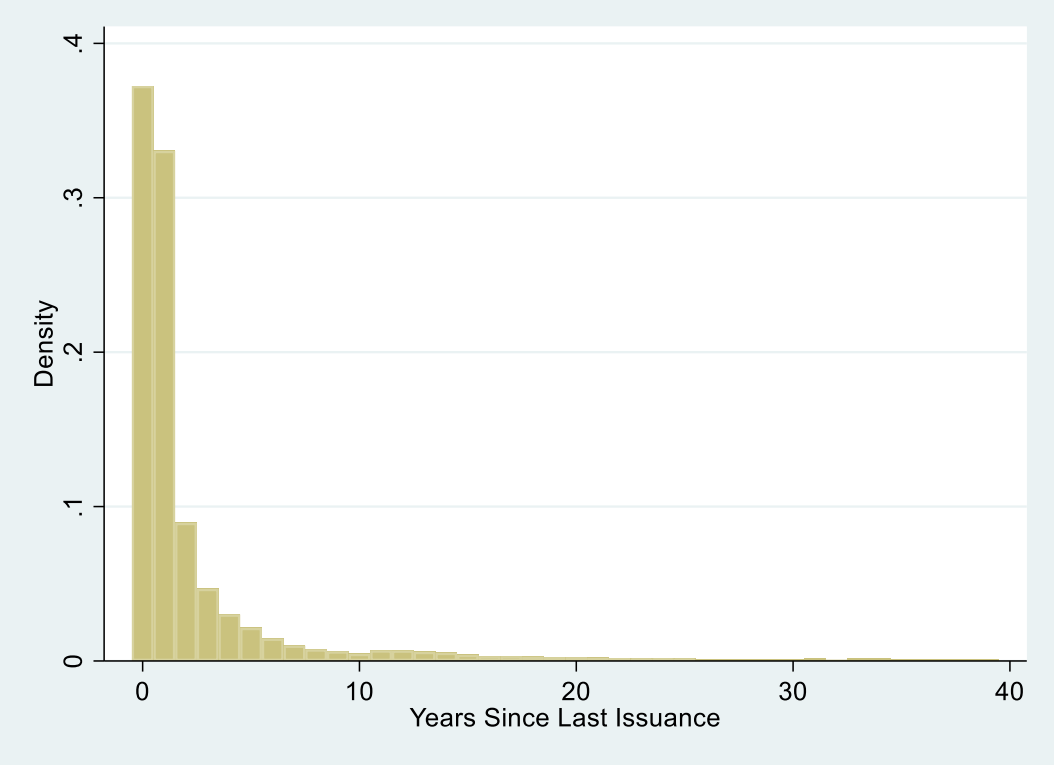
Schipper, Katherine, 1989, Earnings management, *Accounting Horizons* 3, 91.

Schultz, Christian, and Tomas Sjöström, 2001, Local public goods, debt and migration, *Journal of Public Economics* 80, 313-337.

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

Tran, Nhu, and Cihan Uzmanoglu, 2022, COVID-19, lockdowns, and the municipal bond market, *Journal of Banking & Finance* 143, 1-17.

Figure 1: Distribution of Time Since Last Issuance



Notes: We report the distribution of years since last bond issuance for the full sample of bonds issued in 1990 or later. Approximately 37% of entities in our dataset issue every year. In contrast, 21% of bond issuances in the sample were made by entities that had not issued in the last 3 years. We have data from 1980 onward, but elect to start our sample in 1990 due to incomplete data coverage in the 1980's, as well as the presence of the 1986 tax changes that created substantial disruptions to the municipal bond market. By starting in 1990, we are able to observe recent issuances in the late 1980's in order to appropriately determine infrequent and frequent issuers even in the first years of our sample period.

Table 1: Summary statistics

	Full Sample	Infrequent Issuer	Frequent Issuer
Panel A: Bond Characteristics			
Premium (percentage points)	0.65	0.75	0.62
	(1.19)	(1.21)	(1.19)
Issue Amount (millions)	14.72	6.08	16.99
	(49.76)	(18.26)	(54.89)
Rated	0.48	0.35	0.51
	(0.50)	(0.48)	(0.50)
Callable	0.65	0.74	0.62
	(0.48)	(0.44)	(0.48)
Taxable	0.08	0.05	0.09
	(0.27)	(0.21)	(0.29)
Revenue Bond	0.26	0.31	0.25
	(0.44)	(0.46)	(0.43)
Competitive Bid	0.48	0.35	0.51
	(0.50)	(0.48)	(0.50)
Credit Enhancement	0.26	0.29	0.25
	(0.44)	(0.45)	(0.43)
Sinking Fund	0.23	0.30	0.21
	(0.42)	(0.46)	(0.41)
Panel B: County and State Characteristics			
City Government Issuer	0.80	0.80	0.80
	(0.40)	(0.40)	(0.40)
Joint Issuance	0.04	0.02	0.05
	(0.21)	(0.14)	(0.22)
Population	598,207.4	406,727.1	648,449.0
	(1,082,918)	(1,031,824)	(1,090,380)
Top Marginal State Tax Rate	0.05	0.05	0.05
	(0.04)	(0.03)	(0.04)
Convictions per 100 thousand	1.15	1.17	1.15
	(0.67)	(0.71)	(0.65)
Number Observations	128,098	26,625	101,473

Notes: We report averages for the full sample, as well as the subsample of frequent and infrequent issuer, with standard deviations listed in parentheses. We use our primary definition of infrequent issuers (places that have not issued a bond in the last three years) for the regression sample of bonds issued between 1990 and 2018.

Table 2: Base model estimate of the infrequent issuer yield premium

	(1)	(2)	(3)
VARIABLES	3-year Definition of Infrequent	4-year Definition of Infrequent	5-year Definition of Infrequent
Infrequent Issuer	0.022***	0.029***	0.042***
	[0.007]	[0.008]	[0.009]
ln(Population)	0.026***	0.027***	0.027***
	[0.002]	[0.002]	[0.002]
ln(Issue Amount)	-0.049***	-0.049***	-0.049***
	[0.003]	[0.003]	[0.003]
Term Length	0.036***	0.036***	0.036***
	[0.001]	[0.001]	[0.001]
Rated	-0.305***	-0.305***	-0.305***
	[0.007]	[0.007]	[0.007]
Callable	-0.229***	-0.229***	-0.229***
	[0.007]	[0.007]	[0.007]
Taxable	1.046***	1.046***	1.047***
	[0.014]	[0.014]	[0.014]
Revenue Bond	0.357***	0.357***	0.356***
	[0.008]	[0.008]	[0.008]
Competitive Bid	-0.369***	-0.369***	-0.369***
	[0.006]	[0.006]	[0.006]
Credit Enhancement	-0.338***	-0.338***	-0.337***
	[0.007]	[0.007]	[0.007]
Sinking Fund	0.610***	0.610***	0.610***
	[0.008]	[0.008]	[0.008]
Top Marginal State Tax Rate	0.210***	0.210***	0.212***
	[0.080]	[0.080]	[0.080]
Joint Issuance	0.036**	0.036**	0.036***
	[0.014]	[0.014]	[0.014]
City Issuer	-0.034***	-0.034***	-0.034***
	[0.008]	[0.008]	[0.008]
Constant	-0.073**	-0.076**	-0.081**
	[0.034]	[0.034]	[0.034]
Year Fixed Effects	Y	Y	Y
Linear Time Trend	Y	Y	Y
Observations	128,098	128,098	128,098
R-squared	0.328	0.328	0.328

Notes: The dependent variable is the spread between the municipal bond YTM and that of a synthetic Treasury bond, reported in percentage points. All regressions include year fixed effects and a linear time trend. Coefficient estimates are reported with heteroskedasticity-robust standard errors in parentheses. One, two, and three asterisks denote statistical significance at the 10-, 5-, and 1-percent levels, respectively.

Table 3: The infrequent issuer premium in high personal income tax states

	(1)	(2)	(3)
VARIABLES	3-year Definition of Infrequent	4-year Definition of Infrequent	5-year Definition of Infrequent
Infrequent Issuer	0.034***	0.041***	0.056***
	[0.008]	[0.009]	[0.009]
(Infrequent Issuer)*(High Tax State)	-0.062***	-0.057***	-0.073***
	[0.017]	[0.020]	[0.021]
High Tax State	0.079***	0.076***	0.076***
	[0.007]	[0.007]	[0.007]
ln(Population)	0.026***	0.026***	0.026***
	[0.002]	[0.002]	[0.002]
ln(Issue Amount)	-0.049***	-0.049***	-0.049***
	[0.003]	[0.003]	[0.003]
Term Length	0.036***	0.036***	0.036***
	[0.001]	[0.001]	[0.001]
Rated	-0.304***	-0.304***	-0.304***
	[0.007]	[0.007]	[0.007]
Callable	-0.227***	-0.227***	-0.227***
	[0.007]	[0.007]	[0.007]
Taxable	1.045***	1.046***	1.046***
	[0.014]	[0.014]	[0.014]
Revenue Bond	0.357***	0.357***	0.357***
	[0.008]	[0.008]	[0.008]
Competitive Bid	-0.375***	-0.375***	-0.375***
	[0.006]	[0.006]	[0.006]
Credit Enhancement	-0.336***	-0.335***	-0.335***
	[0.007]	[0.007]	[0.007]
Sinking Fund	0.608***	0.608***	0.607***
	[0.008]	[0.008]	[0.008]
Joint Issuance	0.036***	0.037***	0.037***
	[0.014]	[0.014]	[0.014]
City Issuer	-0.039***	-0.039***	-0.039***
	[0.008]	[0.008]	[0.008]
Constant	-0.065*	-0.066**	-0.071**
	[0.033]	[0.033]	[0.033]
Year Fixed Effects	Y	Y	Y
Linear Time Trend	Y	Y	Y
Observations	128,098	128,098	128,098
R-squared	0.328	0.328	0.328

Notes: High tax states refers to the set of states defined by Babina et al. (2021) that segment market demand. We omit the top marginal tax rate control from these regressions, and instead control for an indicator variable indicating whether the state meets the Babina et al. (2021) definition of high tax. The dependent variable is the gap between the municipal bond YTM and that of a synthetic Treasury bond, reported in percentage points. All regressions include year fixed effects and a linear time trend. Coefficient estimates are reported with heteroskedasticity-robust standard errors in parentheses. One, two, and three asterisks denote statistical significance at the 10-, 5-, and 1-percent levels, respectively.

Table 4: The infrequent issuer premium during high issuance months (select estimates)

Panel A: 3-Year Definition of Infrequent				
	(1)	(2)	(3)	(4)
Definition of a High Issue Month:	Issuances in the month ≥ 2 standard deviations above state mean	Issuances in the month ≥ 50% of state maximum	Issuances in the month ≥ 80% of state maximum	Issuances in the month ≥ 90% of state maximum
Infrequent Issuer	0.019**	0.014*	0.016**	0.020***
	[0.007]	[0.009]	[0.007]	[0.007]
(Infrequent Issuer)*(High Issue Month)	0.044*	0.025*	0.137***	0.161**
	[0.027]	[0.014]	[0.036]	[0.063]
High Issue Month	0.019*	0.004	-0.030**	0.005
	[0.011]	[0.006]	[0.013]	[0.025]

Panel B: 4-Year Definition of Infrequent				
	(1)	(2)	(3)	(4)
Definition of a High Issue Month:	Issuances in the month ≥ 2 standard deviations above state mean	Issuances in the month ≥ 50% of state maximum	Issuances in the month ≥ 80% of state maximum	Issuances in the month ≥ 90% of state maximum
Infrequent Issuer	0.025***	0.022**	0.024***	0.028***
	[0.008]	[0.010]	[0.008]	[0.008]
(Infrequent Issuer)*(High Issue Month)	0.057*	0.025	0.122***	0.144**
	[0.029]	[0.016]	[0.039]	[0.068]
High Issue Month	0.019*	0.005	-0.023*	0.013
	[0.011]	[0.006]	[0.013]	[0.025]

Panel C: 5-Year Definition of Infrequent				
	(1)	(2)	(3)	(4)
Definition of a High Issue Month:	Issuances in the month ≥ 2 standard deviations above state mean	Issuances in the month ≥ 50% of state maximum	Issuances in the month ≥ 80% of state maximum	Issuances in the month ≥ 90% of state maximum
Infrequent Issuer	0.038***	0.035***	0.037***	0.041***
	[0.009]	[0.010]	[0.009]	[0.009]
(Infrequent Issuer)*(High Issue Month)	0.060*	0.024	0.120***	0.117
	[0.032]	[0.017]	[0.043]	[0.071]
High Issue Month	0.020*	0.006	-0.020	0.020
	[0.010]	[0.006]	[0.013]	[0.025]

Notes: Each column of each panel reports results from a different regression using the specified definition of an infrequent issuer and a different definition of a high issue month. High issuer months are defined in the top row of the table, based on whether an issuance occurs during a month in which total issuances in the state for that month are above 2 standard deviations from the state monthly mean over the entire sample period (1990-2018), or whether the issuance occurs during a month in which total issuances in that state for that month exceed 50%, 80%, or 90% of the highest number of issuances in a month for that state over the entire sample period. Each panel represents one of the three different definitions of an infrequent issuer used throughout the paper. All regressions also control for all other variables from our baseline specification in Table 2, including population, issue amount, bond characteristics, year fixed effects and linear time trend. The dependent variable is the gap between the municipal bond YTM and that of a synthetic Treasury bond, reported in percentage points. Coefficient estimates are reported with heteroskedasticity-robust standard errors in parentheses. One, two, and three asterisks denote statistical significance at the 10-, 5-, and 1-percent levels, respectively.

Table 5: The infrequent issuer premium and state reporting requirements

	(1)	(2)	(3)
VARIABLES	3-year Definition of Infrequent	4-year Definition of Infrequent	5-year Definition of Infrequent
Infrequent Issuer	0.005	0.012	0.022**
	[0.008]	[0.009]	[0.010]
(Infrequent Issuer)*(Non-GAAP State)	0.066***	0.067***	0.073***
	[0.016]	[0.017]	[0.019]
Non-GAAP State	0.013	0.016*	0.017**
	[0.009]	[0.009]	[0.008]
ln(Population)	0.027***	0.027***	0.027***
	[0.002]	[0.002]	[0.002]
ln(Issue Amount)	-0.049***	-0.049***	-0.049***
	[0.003]	[0.003]	[0.003]
Term Length	0.036***	0.036***	0.036***
	[0.001]	[0.001]	[0.001]
Rated	-0.305***	-0.305***	-0.304***
	[0.007]	[0.007]	[0.007]
Callable	-0.231***	-0.231***	-0.231***
	[0.007]	[0.007]	[0.007]
Taxable	1.048***	1.048***	1.049***
	[0.014]	[0.014]	[0.014]
Revenue Bond	0.360***	0.359***	0.359***
	[0.008]	[0.008]	[0.008]
Competitive Bid	-0.365***	-0.365***	-0.364***
	[0.006]	[0.006]	[0.006]
Credit Enhancement	-0.340***	-0.340***	-0.340***
	[0.007]	[0.007]	[0.007]
Sinking Fund	0.609***	0.609***	0.609***
	[0.008]	[0.008]	[0.008]
Top Marginal State Tax Rate	0.242***	0.244***	0.246***
	[0.080]	[0.080]	[0.080]
Joint Issuance	0.033**	0.033**	0.033**
	[0.014]	[0.014]	[0.014]
City Issuer	-0.033***	-0.034***	-0.034***
	[0.008]	[0.008]	[0.008]
Constant	-0.082**	-0.084**	-0.089***
	[0.034]	[0.034]	[0.034]
Year Fixed Effects	Y	Y	Y
Linear Time Trend	Y	Y	Y
Observations	128,098	128,098	128,098
R-squared	0.328	0.328	0.328

Notes: Non-GAAP refers to the set of states that do not impose GAAP or other state-specific reporting requirements. The dependent variable is the gap between the municipal bond YTM and that of a synthetic Treasury bond, reported in percentage points. All regressions include year fixed effects and a linear time trend. Coefficient estimates are reported with heteroskedasticity-robust standard errors in parentheses. One, two, and three asterisks denote statistical significance at the 10-, 5-, and 1-percent levels, respectively.

Table 6: The infrequent issuer premium and public corruption

	(1)	(2)	(3)
VARIABLES	3-year Definition of Infrequent	4-year Definition of Infrequent	5-year Definition of Infrequent
Infrequent Issuer	-0.013	0.003	0.018
	[0.013]	[0.014]	[0.016]
(Infrequent Issuer)*(Convictions)	0.027***	0.020*	0.018
	[0.010]	[0.011]	[0.012]
Convictions	0.034***	0.037***	0.038***
	[0.005]	[0.005]	[0.005]
ln(Population)	0.025***	0.025***	0.025***
	[0.002]	[0.002]	[0.002]
ln(Issue Amount)	-0.051***	-0.051***	-0.051***
	[0.003]	[0.003]	[0.003]
Term Length	0.036***	0.036***	0.036***
	[0.001]	[0.001]	[0.001]
Rated	-0.302***	-0.302***	-0.301***
	[0.007]	[0.007]	[0.007]
Callable	-0.222***	-0.222***	-0.222***
	[0.007]	[0.007]	[0.007]
Taxable	1.048***	1.048***	1.049***
	[0.014]	[0.014]	[0.014]
Revenue Bond	0.357***	0.357***	0.357***
	[0.008]	[0.008]	[0.008]
Competitive Bid	-0.368***	-0.368***	-0.367***
	[0.006]	[0.006]	[0.006]
Credit Enhancement	-0.341***	-0.341***	-0.341***
	[0.007]	[0.007]	[0.007]
Sinking Fund	0.609***	0.609***	0.608***
	[0.008]	[0.008]	[0.008]
Top Marginal State Tax Rate	0.212***	0.210***	0.210***
	[0.080]	[0.080]	[0.080]
Joint Issuance	0.038***	0.038***	0.038***
	[0.014]	[0.014]	[0.014]
City Issuer	-0.029***	-0.029***	-0.029***
	[0.008]	[0.008]	[0.008]
Constant	-0.124***	-0.130***	-0.136***
	[0.034]	[0.034]	[0.034]
Year Fixed Effects	Y	Y	Y
Linear Time Trend	Y	Y	Y
Observations	128,098	128,098	128,098
R-squared	0.328	0.328	0.328

Notes: Convictions refers to the rolling 4-year total of state-level white collar crime and political convictions per 100,000 population. The dependent variable is the gap between the municipal bond YTM and that of a synthetic Treasury bond, reported in percentage points. All regressions include year fixed effects and a linear time trend. Coefficient estimates are reported with heteroskedasticity-robust standard errors in parentheses. One, two, and three asterisks denote statistical significance at the 10-, 5-, and 1-percent levels, respectively.

Table 7: The impact of the 1995 SEC rule change on the infrequent issuer premium

	(1)	(2)	(3)
VARIABLES	3-year Definition of Infrequent	4-year Definition of Infrequent	5-year Definition of Infrequent
Infrequent Issuer	-0.088***	-0.066***	-0.061***
	[0.017]	[0.018]	[0.019]
(Infrequent Issuer)*(Post 1995)	0.136***	0.118***	0.129***
	[0.018]	[0.020]	[0.021]
Post 1995	-0.219	-0.223	-0.210
	[0.474]	[0.474]	[0.474]
ln(Population)	0.026***	0.027***	0.027***
	[0.002]	[0.002]	[0.002]
ln(Issue Amount)	-0.049***	-0.049***	-0.049***
	[0.003]	[0.003]	[0.003]
Term Length	0.036***	0.036***	0.036***
	[0.001]	[0.001]	[0.001]
Rated	-0.306***	-0.305***	-0.305***
	[0.007]	[0.007]	[0.007]
Callable	-0.228***	-0.228***	-0.228***
	[0.007]	[0.007]	[0.007]
Taxable	1.047***	1.047***	1.048***
	[0.014]	[0.014]	[0.014]
Revenue Bond	0.356***	0.356***	0.356***
	[0.008]	[0.008]	[0.008]
Competitive Bid	-0.369***	-0.368***	-0.368***
	[0.006]	[0.006]	[0.006]
Credit Enhancement	-0.339***	-0.339***	-0.338***
	[0.007]	[0.007]	[0.007]
Sinking Fund	0.609***	0.609***	0.609***
	[0.008]	[0.008]	[0.008]
Top Marginal State Tax Rate	0.201**	0.203**	0.205**
	[0.080]	[0.080]	[0.080]
Joint Issuance	0.036**	0.036**	0.036***
	[0.014]	[0.014]	[0.014]
City Issuer	-0.032***	-0.033***	-0.033***
	[0.008]	[0.008]	[0.008]
Constant	-0.095	-0.112	-0.117
	[0.141]	[0.141]	[0.141]
Year Fixed Effects	Y	Y	Y
Linear Time Trend	Y	Y	Y
Observations	128,098	128,098	128,098
R-squared	0.328	0.328	0.328

Notes: Post 1995 is an indicator variable that takes a value of 1 after 1995 and 0 otherwise. The dependent variable is the gap between the municipal bond YTM and that of a synthetic Treasury bond, reported in percentage points. All regressions include year fixed effects and a linear time trend. Coefficient estimates are reported with heteroskedasticity-robust standard errors in parentheses. One, two, and three asterisks denote statistical significance at the 10-, 5-, and 1-percent levels, respectively.