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Do Municipalities Pay More to Issue Unrated Bonds?

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Opinions expressed in this paper reflect those of the authors and do not necessarily reflect those of the FDIC or the United States.

Abstract

Approximately 34% of local municipal bond issues were issued without ratings during 1998 to 2017. We study the circumstances that affect the decision to obtain a rating and whether unrated bonds, controlling for observable risk factors, are more expensive to issue than rated bonds. Results show that issuers are less likely to obtain ratings for smaller issues, negotiated offerings, and bonds with high proxies for risk such as coming from areas with low personal income. We estimate the effect of forgoing a rating on offering yields using a doubly-robust Inverse Probability Weighted Regression Adjustment that controls for confounding that arises from risk and other characteristics affecting both the choice to obtain a rating and the yield. We separately analyze revenue bonds, general obligation bonds, bank qualified, and not bank qualified bonds and find ratings decrease offering yields by 47, 49, 60, and 42 basis points respectively. The higher offering yields cost municipalities $22.5B in higher interest expense during our sample period. We find the choice of issuers to forgo ratings despite the substantial potential savings appears to be influenced by the dual underwriters who also work as advisors to the issuer. These underwriters benefit from not obtaining a rating because it lowers the price investors are willing to pay from the bond, but also lowers the price the underwriter must pay the issuer and thus increases the underwriter's profit.

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1. Introduction

Municipalities do not obtain ratings for a significant portion of the bonds they issue. We use a sample of bonds that municipalities issued from 1998 to 2017. Of the sample, 34% of the approximately 200,000 bond offerings did not have a rating. This percentage accounted for 14% of the $3.7 trillion worth of municipal bonds issued. This feature of bond issues can have cost implications for municipalities. In the absence of a rating to assess the risk of a bond, investors can require higher compensation for the potential risk. A rating is valuable information for investors because it reduces the information risk these bonds might expose them to when purchased.[1] In other markets, investors may want ratings for other reasons, such as regulatory concerns or investment standards. For example, in the corporate bond market Murray and Nikolova (2021) show ratings-based capital requirements affect insurer demand and thus bond pricing. However, ratings are unlikely to play this role for municipal bonds. Retail investors are likely to be more reliant on ratings as a source of information compared to institutional investors, as deHaan, Li, and Watts (2021) find in corporate bond markets.

We conjecture that in the absence of a rating, investors can assume the bond issuer avoided one because managers expected to receive a poor rating. Consequently, investors will assume the bond is very risky and require a correspondingly higher yield rather than an appropriate yield corresponding to the actual risk of the bond. Further, the absence of a rating also can cause investors who are not confident in their ability to assess risk to avoid investing in the issue. These factors can raise the issue yield to the municipality. To the extent that issuing an unrated bond is more expensive to a municipality, it is a missed opportunity to increase investment in public goods or decrease the tax burden. Thus, an understanding of why

[1] Bhojraj and Sengupta (2003) define information risk as managers having private information that adversely affects the default risk of the bond.

municipalities forgo obtaining ratings for bond issues and whether unrated bonds are more expensive than rated bonds is of economic and policy interest.

The primary cost to issuers of getting a rating is the fee that they pay to an agency for that rating. Beatty, Gillette, Petacchi, and Weber (2019) report that the median fees of a sample of California and Texas municipal bonds are approximately 0.1% of the issued amount. Issuers can incur other costs associated with preparing information for ratings agencies, such as hiring third-party financial experts.

In this study, our goal is to quantify the possible savings that can result from obtaining a rating for a municipal bond. However, an estimation of how a rating affects the offering yield is complicated by the fact that an issuer's decision to obtain a rating can be affected by the rating the issuer expects the bond to receive, which will be determined by the risk factors that also affect the yield. In fact, we find evidence that issuers of riskier bonds are less likely to obtain a rating. We address this challenge by using an Inverse Probability Weighted Regression Adjustment (IPWRA) model that controls for the decision to obtain a rating and the other factors that affect the yield.

When applying the IPWRA, we first estimate a logistic model for the municipality's decision to obtain a rating as a function of the bond characteristics as well as of the proxies for local economic conditions and the financial strength of the local government. We then use the predicted probabilities of municipalities obtaining a rating for each bond that are implied by the logistic model to generate weights to form a pseudo-sample, in which rated and unrated bonds are equally likely to get a rating. We give low weights to rated bonds that seem likely to get a rating and to unrated bonds that seem unlikely to get a rating. We give high weights to rated bonds that seem unlikely to get ratings and unrated bonds that seem likely to get ratings. We use

these weights in a linear regression that predicts the bond's yield spread to Treasuries as a function of whether municipalities get a rating for the bond, its characteristics, and local economic and financial conditions.

Other studies have applied the IPWRA approach to address confounding arising from circumstances that affect both the treatment decision and the outcome of interest. The following are some examples: Cornaggia, Hund, and Nguyen (2022) use IPWRA to control for the decision to obtain insurance on municipal bonds. Schweitzer and Barkley (2017) use the technique to explain the decision to borrow from online lenders. Stuart and Yim (2010) use the approach to control for the selection of board members when studying the effect of directors having previous experience with private equity deals when becoming a target. Lin, Schmid, and Xuan (2018) use it to control for the determination of employee representation when studying its effect on financial leverage. IPWRA is similar to propensity score matching. However, IPWRA has the advantage of using the full population for analysis. Further, Wooldridge (2007), Imbens and Wooldridge (2009), and Wooldridge (2010) show that IPWRA is doubly robust, meaning that if either the first stage or second stage is correctly specified, the estimate of the effect of the treatment on the outcome is consistent. To the best of our knowledge such property has not been shown for propensity score matching.

The results of our logistic regression show systematic differences between rated and unrated bonds. In general, municipalities are less likely to get bonds rated if they have characteristics that indicate higher risk. For example, issuers with lower local incomes and higher liability-to-asset ratios are less likely to get a bond rated. Issuers are also less likely to obtain ratings for revenue bonds. We also find that smaller bond offerings and offerings that are sold in a negotiated rather than competitive placement are less likely to get rated.

Using an IPWRA model that controls for the decision of obtaining a rating, we estimate that forgoing a rating increases offering yields by 47 basis points for revenue bonds and 49 basis points for general obligation bonds during our sample period from 1998 to 2017. These increased offering yields correspond to $22.5 billion (in 2015 dollars) in aggregate costs to municipalities from interest payments net of rating fees during our sample period. These findings are much higher than the 10-basis point yield spread reported by Reeve and Herring (1986) who use a limited sample from an earlier period. The size of potential savings if issuers had obtained ratings for unrated issues indicates they underestimate the benefits of obtaining a rating.

A rational issuer should obtain a rating for an issue when the expected benefit exceeds the expected cost. However, our findings show that some local governments are irrationally leaving money on the table by not getting a rating. There are two possible reasons for this result. One reason is that unsophisticated local government officials might not realize the extent to which obtaining a rating would lower costs. The second is local officials rely on underwriters and advisors for advice on this decision and they may not receive optimal advice from some underwriters. We find underwriter fixed effects provide a large increase in fit for a logistic model predicting whether a rating will be issued. This result might reflect variation in the financial sophistication of underwriters. Indeed, we show that issuers are less likely to obtain ratings for issues underwritten by smaller underwriters.

Underwriters can also be motivated against recommending ratings by conflicts of interest. A dual underwriter, one who serves as an underwriter and a financial advisor for the issuer, has a competitive advantage over other potential underwriters if the issuer is more opaque. Maintaining higher opacity by not obtaining a rating can increase the underwriter's profits by lowering the price paid to the issuer even if it also reduces the price paid by investors. Garrett

(2021) shows that preventing financial advisors from also serving as underwriters for competitive issues they advised decreased offering yields. Consistent with Garrett (2021) findings, we find a strong negative association between dual underwriters and obtaining a rating for competitive offerings. In addition, we find some evidence of this relationship for negotiated placements, where there is no auction to underwrite the bond but maintaining opacity can still help the issuer retain the business.

Alternatively, issuers might appear to leave money on the table by forgoing a rating because they are considering information that is publicly unobservable but discoverable by ratings agencies when deciding whether to obtain a rating. For example, Caton et al. (2011) find rating agencies tend to assign lower ratings to firms that inflate their reported earnings. In this case, issuers who are aware of this information risk rationally anticipate the issue would receive a lower rating than the observable information might suggest. Investors, in turn, rationally anticipate that issuers who do not obtain a rating have hidden risks and require higher yields to invest in those issues than in rated issues with similar characteristics. This self-selection of riskier issuers into unrated status falls into the category of adverse selection problems explored by Akerlof (1970), which has been applied to the choice of corporations to solicit a rating by Bannier, Behr, and Guttler (2010). In any case, our results show that taxpayers should closely scrutinize unrated bond issues and that local governments need to step up efforts to reduce the cost of their bond issues.

The rest of the study is organized as follows: We discuss the related literature in Section 2 and present the institutional background and data in Section 3. In Section 4, we describe the empirical approach to estimating the impact of obtaining a rating on yields. Section 5 presents the results. Section 6 concludes.

2. Related Literature

Despite the extensive literature on the effect of receiving a particular rating, few studies exist on the determinants and consequences of not getting a rating for an issue. In the corporate bond market, Gonis, Salima, and Tucker (2012) study a sample of UK corporations and find that firms with lower leverage and more financial flexibility are more likely to obtain a rating. However, more profitable firms are less likely to obtain a rating. This finding can indicate less need for certification. The authors do not address the impact of forgoing a rating on the yields of the bonds.

Two studies specifically address unrated municipal bonds. Reeve and Herring (1986) examined 7,802 offerings between 1977 and 1980. Comparing average characteristics of rated and unrated municipal bonds, they find the unrated bonds have smaller issue sizes and are from smaller population cities. Using a linear regression, they show that unrated municipal bonds have higher yields than rated municipal bonds, especially for larger issues. The market prices smaller (less than $1,000,000 par value) nonrated bonds on average 10 basis points below the lowest investment grade tier, while it prices larger nonrated issues on average 30 basis points higher than the lowest investment grade tier. This regression does not include any proxies for risk or otherwise attempt to differentiate between the effect of an issue's riskiness and the effect of the rating on the yield. Ziebell and Rivers (1992) examine a sample of 440 cities in 1984 with a logistic regression. They find that unrated municipal bonds come from smaller cities on the Pacific coast and that higher local incomes are associated with rated issues.

Both of these studies involve relatively short and small samples compared to our study, which covers over 200,000 offerings over a 20-year period. Their samples also cover a time when investors would have found it more difficult to obtain information and the financial market

was also less sophisticated. Neither study attempts to estimate the effect of obtaining a rating on the offering yield while controlling for other offering characteristics.

Our study is also related to those on the effect of the information environment on municipal bonds. For example, Cuny and Dube (2021) show that better disclosure by municipal bond issuers protects against downgrades and yield increases after housing price shocks. Gao, Lee, and Murphy (2020) find that the closing of local newspapers leads to more opaque information on local government activities that increases the yields of municipal bonds. Our finding that investors require higher yields in the absence of information from a rating agency is consistent with these findings.

There are other studies that examine whether the rating assigned to a security affects its price. For municipal bonds in particular, several studies use a 2010 ratings recalibration as a natural experiment. Moody's and Fitch, but not Standard & Poor's (S&P), recalibrated their rating scales for municipal bonds. The recalibration resulted in some issuers receiving improved ratings despite no change in their risk. Cornaggia, Cornaggia, and Israelsen (2018) show that bond yields decreased for issuers with improved ratings both in the secondary market and for new offerings. This result means that at least some investors were reliant on ratings to judge a bond's risk. The effect was strongest for less transparent issuers. Adelino, Cunha, and Ferreira (2017) show that the resulting lower yields on new issues led to increased expenditures and borrowing. Beatty, Gillette, Petracchi, and Weber (2019) show that Moody's and Fitch charged higher fees after the recalibration and increased their market share relative to S&P.

Beck, Parsons, and Sorensen (2021) predict ratings for a sample of municipal bonds from California and Texas and show that unexpectedly high ratings are associated with slightly lower

yields, while unexpectedly low ratings are associated with both substantially higher yields and higher rating fees.

These studies show that investors rely on bank ratings as well as public information and rating differential has cost consequences.

3. Institutional Features and Data

a. Institutional Background

Municipal bonds have two main characteristics: who purchases the bonds and who backs the bonds. There are two types of backing: general obligation bonds (GOs) and revenue bonds (RBs). GOs are backed by the full faith and credit of the government issuing the bond. Revenue bonds are backed only by a specified revenue source, often from a project funded by the bonds. RBs and GOs differ in several ways that could affect the costs and benefits of obtaining a rating. Because RBs depend on a specific revenue source, they are riskier. The risks of a certain revenue source can be more opaque to investors, and that can increase the value of a rating. This is consistent with Livingston and Zhou (2016) who find additional ratings are more valuable for more opaque corporate bonds. However, a rating for a RB is more costly to obtain. Conversations with officers of rating agencies indicate that rating fees are higher for RBs than GOs in general and vary based on the type of project. Rating fees for RBs backed by airport or healthcare revenue are around 20% higher than for GOs, while the rating fees for affordable or military housing and charter schools are approximately 75% higher because of the due diligence and site visits required.

The municipal bond market is largely dominated by retail investors. However, certain municipal bonds from small issuers are bank qualified, meaning that banks can purchase these bonds and deduct interest expense to finance the purchase. In general, banks cannot deduct the

interest expense incurred to acquire or carry tax-exempt municipal bonds. This restriction effectively eliminates the tax benefit of municipal bonds. But the IRS Code of 1986 created an exemption that allows banks to deduct 80% of the carrying cost of a "qualified tax-exempt obligation." There is a limit to the amount of debt an issuer can issue per year for its municipal bonds to be bank qualified. The IRS Code of 1986 set the limit at $10 million per year and this limit was in effect for most of our sample period, although the American Recovery and Reinvestment Act of 2009 (ARRA) temporarily raised the limit to $30 million effective February 2009 through December 2010. Dagostino (2019) shows that banks hold approximately 80% of the bank-qualified bonds. The study also shows that the issuer values the ability to place their debt with banks. Many issuers of bank-qualified bonds raised close to the maximum amount possible without exceeding the limit required to retain their qualified status, and they expanded their borrowing when ARRA temporarily raised the limit.[2]

We predict that ratings will provide less value to banks than to retail investors. Banks are sophisticated investors capable of conducting their own due diligence. In addition, to the extent that local banks purchase the bank-qualified bonds, they can access the private information that local officials might have. During our sample period, banks lacked a regulatory reason to care about municipal bond ratings. Part 939A of the Dodd-Frank Act required all federal agencies to remove references to credit ratings in their regulations.[3] Ratings do not affect the risk-weighting for capital requirements under Basel III. Any GO receives a 20% risk weight, and every RB receives a 50% risk weight regardless of whether it has a rating or what that rating is (Dagostino

[2] Indirect evidence that different types of investors place different values on a rating comes from Boyer and Postenau (2020) who study the effect of reforms that reduced money market fund holdings of municipal bonds. Of issuers who had previously placed bonds with money market funds, those that issued unrated bonds were most affected.

[3] Part 939A of the Dodd Frank Act. The Federal Reserve issued a report to Congress on the implementation of Part 939A in July 2011 https://www.federalreserve.gov/publications/other-reports/credit-ratings-report-201107.htm.

2020). Therefore, we predict that bank-qualified bonds will be issued without a rating more frequently compared to bonds that are not bank qualified.

There are two major issuance methods for municipal bonds. The most common method is a negotiated sale, which is like book-building in the corporate bond market. In a negotiated sale, the issuer selects one or more underwriters who make an offer to purchase bonds from the issuer. The underwriter is sometimes involved in setting the terms of the issue in addition to negotiating the price. The underwriter can seek orders from investors before the issuer determines the offering yield and then adjust the price based on investor interest. After finalizing the terms and price, the underwriter purchases bonds from the issuer and sells them to investors. The other major issuance method is a competitive sale, which is essentially an auction. The bonds are advertised with set terms to underwriters, and the bonds are sold to the underwriter or group of underwriters who bid the lowest yield. The underwriters then resell the bonds to investors. Ratings are likely to be more valuable in a competitive offering, which involves a wider range of potential underwriters and investors who are less familiar with the issue.

b. Data Sources

We study the decision to obtain a rating and the effect of obtaining a rating on yields by utilizing several data sources. Our primary source of data on municipal bonds is the Mergent Municipal Bond Securities Database. This database provides the issuer name, state of issuance, issuance date, lead underwriter, placement type, maturity date, offering yield, coupon rate, type of coupon, use of funds, and the bond's rating. It also specifies whether a bond has put or call options, is insured, is bank-qualified, and is a general obligation or a revenue bond.

While the Mergent database records some bonds issued as early as the nineteenth century, the database does not have full coverage of that time. In particular, the coverage of the bond

rating dataset seems sparse in the early years. For this reason, we restrict our analysis to bonds issued in or after 1998, the first year in which we can identify at least 1,000 bond issues rated by Moody's, Fitch, and S&P.

Prior to 2017, the Mergent database did not track the full ratings history of bonds. If a bond was downgraded or upgraded by a ratings agency, Mergent would replace the old rating with the new rating. For our analysis, this is not a problem because we only need to identify if the issue was rated or unrated. Issuers have no incentive to seek a rating for an originally unrated issue after selling it to investors, so we are still able to determine whether the issue was originally rated even if we are not confident about the original rating it received.

To capture observable risk factors that affect the bonds, we supplement the Mergent data with information on local economic and government financial conditions at the county level. We obtain annual fiscal data on local governments from the Bloomberg Government Portal. Specifically, we obtain liabilities, assets, and the proportion of revenue derived from property taxes. The Bloomberg data are only available after 2002, so specifications including variables based on these data exclude earlier bond issues. We use annual data on local personal income per capita from the Bureau of Economic Analysis. Following Gao, Lee, and Murphy (2019), we analyze the spread between the offering yield and the same-duration US Treasury yield rather than the offering spread itself to account for the time variation in interest rates. Daily data on parameters to compute the entire US Treasury yield curve, as described in Gürkaynak, Sack, and Wright (2007), are provided by the Federal Reserve Board.

To link the bonds to these datasets, we first must identify where bonds were issued. Using the state of issue and the issuer name, we match each municipal bond at the county level by searching for names of cities, counties, and census-designated places within the issuer names.

For the unmatched bond issues, we hand-match them to their county of issue using information from the prospectus in addition to their name. For a small number of issuers, accounting for 0.1% of the dollar amount issued within the sample, we were unable to identify a match.

We find that approximately 51% of the municipal bond issues in the database are issued by entities above the county level. Many of these issuers are state-level entities, such as the "Arizona State Lottery Revenue" or the "California Statewide Financing Authority Tobacco Settlement." They also include multi-county entities such as the "North Texas Municipal Water District" that covers 10 counties, and a small number of cities that cross county borders, such as Ackley, Iowa which is partially in Hardin and Franklin counties. We exclude these issuers from our sample because they could not be matched to county-level conditions. The remaining issuers consist of counties or county-equivalent cities, smaller municipalities such as cities and towns contained entirely with a single county, and special districts contained within a single county. We also exclude a small number of bonds that are neither GOs nor RBs, which is approximately 3% of the sample by dollar amount. The resulting sample comprises 46% of the bonds in Mergent by amount issued and 67% by number of bonds.

Figure 1 shows the dollar amount of municipal bonds issued each year that are covered in the Mergent database and that are in our sample. The figure also shows the annual issuance of municipal bonds according to the Securities Industry and Financial Markets Association (SIFMA) that is the trade association for broker-dealers, investment banks, and asset managers which tracks the issuance of fixed-income securities. The amount issued according to their reports closely tracks the amount we see issued in the Mergent data throughout our sample period and indicates that the sample we use fully covers this market.

Figures A-A31 in the appendix show the trends in the issuances of municipal bonds over our sample period broken down into RBs and GOs and bank-qualified and not bank-qualified samples. GOs have become relatively more prevalent over time, particularly since the financial crisis. The average size of GO issues is consistent, while the average RB issue has grown larger. There is substantial variation in what issuers use bonds for over time. For RBs in particular, what the purpose is may be important to the decision to obtain a rating or the required offering yields because the bonds are often funded by revenue associated with a project. For this reason, we add fixed effects for use of funds in our specifications. There was a temporary spike in bank-qualified issues in 2009 and 2010 due to the temporary change in the threshold, but bank-qualified issues have also grown as a proportion of the market over time. The change in the threshold is evident in Figure A3 that shows the average size of bank-qualified and not bank-qualified issues each year. The percentage of rated issues was consistent over time, although slightly more GOs were rated in the pre-crisis period and slightly more RBs afterwards.

c. Distribution of Ratings

Table 1 shows the proportion of rated and unrated municipal bonds in our sample. The number of unrated bonds accounts for 34.2% of the total number of bond offerings, while the dollar amount of unrated bonds represents 13.7% of the total dollar amount of all offerings.

In Table 2, we further break down the distribution of ratings. A higher proportion of bank-qualified bonds go unrated. A somewhat larger proportion of GOs get a rating compared to RBs as a percentage of the number of issues, but not as a percentage of the amount issued.

Figure 2 shows the number and dollar amount of rated issues over time. Rated bonds have increased over time. There was a dip in the issuance of unrated bonds after the financial crisis, and the issuance has stayed relatively consistent since then. Figure 3 separately shows the

time series of ratings for GOs and RBs. A higher proportion of GOs got a rating prior to the financial crisis and a higher proportion of RBs got a rating afterwards. The drop in RB issues after the crisis could have caused this trend. It is likely that the investors' appetite for the riskier RBs decreased, and as we will show, riskier bonds are generally less likely to get a rating. Figure 3 also shows the time-series of ratings separately for bank-qualified and not bank-qualified bonds. Those that are bank-qualified get ratings less, but the two categories move in parallel and rated bonds increase as a proportion of both after the financial crisis.

Table 3 shows the distribution of defaults. Of all the municipal bonds in our sample, 0.54% experience a default at some point. In contrast, 1.24% of unrated bonds default. Yang and Abbas (2020) find a significant relationship between the lack of a rating and default risk. Default risk accounts for most of the municipal bond yield spread relative to Treasuries after adjusting for tax-exempt status with a liquidity component accounting for 16% to 26% (Schwert 2017) or 8% to 19% (Wang, Wu and Zhang 2008). Several studies address how specific sources of default risk affect bond yields. For example, Gao, Lee, and Murphy (2019) show that the state policies that allow municipalities unconditional access to Chapter 9 bankruptcy led to higher yields.

4. Empirical Setup

Our objective is to understand how obtaining a rating affects the cost of issuance. We model the determinants of offering yield spread over comparable maturity Treasury yield as a function of issuer riskiness, issue characteristics, and market conditions. We estimate the following linear model:

$$
\begin{aligned}
&YieldSpread_i \\
&= f(Rated, BankQualified_i, RevenueBond_i, CcompetitiveOffering_i, \\
&\ln PersonalIncomePerCapita_i, \frac{Liabilities}{Assets}_i, \frac{Property\ Tax}{Total\ Revenue_i}, \\
&\ln Maturity\ Size_i, \ln Time\ to\ Maturity_i, Put_i, Call_i, Insured_i, \\
&BAA - AAASpread_i, F_{quarter}, F_{state}, F_{Use\ of\ Funds})
\end{aligned} \tag{1}
$$

In Equation 1, Personal Income per Capita, Liabilities to Assets of the issuing county, and property tax revenue as a percentage of total county revenue are proxies for issuer riskiness. Personal income per capita is an indicator of local economic strength, and one of the primary factors that ratings agencies consider. The ratio of liabilities to assets is an indicator of the local government's financial position, while the ratio of property tax to total revenue is an indicator of the consistency of its future revenue.[4]

We also control for several issue characteristics. A larger issue size may be associated with higher liquidity, which should decrease the yield. During our sample period interest rates experienced large swings causing issuers and bond buyers seek protection against interest rate risk. In a high interest rate environment, bond issuers seek protection against falling rates by issuing callable bonds and accept paying higher yields in exchange for this protection. In contrast, in a low interest rate environment, bond buyers seek protection against rising rates by purchasing bonds with a put option and are willing to accept lower yields in return. Hence, the call and put options in bonds influence issue yields.

We control for whether the bond is insured. Insurance may indicate lower risk because the insurer has guaranteed payments in the event the issuer defaults. However, Cornaggia, Hund,

[4] Property taxes are generally less volatile and particularly more stable during recessions than alternative sources of revenue such as sales or income taxes (McCubbins and Moule 2010).

and Nguyen (2022) find that insured issues are more likely to face be downgraded in the future, suggesting insurance may actually indicate higher risk of a default occurring. Investors may worry that the benefits of insurance are not adequate to address this risk. There may be delays in payment even if an insurer covers the default, and investors may not have confidence in the insurer's guarantee, particularly after the large monoline insurers were downgraded following the financial crisis.

Revenue bonds are riskier than general obligation bonds because they are backed only by a specific source of revenue rather than the full faith and credit of a municipality. We include an indicator for whether the bond is bank qualified because the inclusion of banks as potential investors is likely to lower the offering yield. In addition, we add offering type of the issue. Competitive offerings can result in lower yields by increasing underwriter competition (Cestau, Green, Hollifield, and Schurhoff 2019).

The BAA-AAA spread is included to capture time variation in the risk premium. State fixed effects capture institutional differences between states and differences in risk related to state support for municipalities, quarterly fixed effects capture changes yields over time, and use-of-funds fixed effects capture differences in the risk of RBs.

Table 4 provides a summary of the variables in Equation 1 and Table 5 presents the summary statistics of the regression variables.

The OLS results are shown in Table 6. A rating is associated with a decrease in offering yield of between 50 and 52 basis points. The control variables have the expected signs. Higher income and higher reliance on property tax indicate lower risk and are associated with lower yields. A higher liabilities / assets ratio indicates higher risk and is associated with higher yields for general obligation bonds. Revenue bonds are riskier and have higher yields. Bank qualified

bonds have lower yields. Maturity size, indicating liquidity, is generally associated with lower yields except among not bank qualified bonds where it is insignificant. Yields are lower if investors have a put option and higher if the issuer has a call option. Competitive offerings have lower yields than negotiated offerings.

However, these OLS estimates do not properly separate the characteristics that affect the decision to obtain a rating and the characteristics that affect the bond's yield. Of particular concern, issuers could have more of an incentive to obtain ratings for bonds that are less risky because they will receive good ratings. As the riskiness of a bond is the primary factor that affects its yield, a comparison of the yields of unrated and rated bonds would capture the effect of risk on the yield rather than the effect of the rating.

To address this confounding concern, we use a matched sample approach that uses inverse probability weights to estimate the yield regression model of Equation 1. The inverse probability weighted regression approach (IPWRA) controls the selection effects by augmenting the regression of the offering yields (the outcome variable) with probability weights derived from a logistic model for the rating selection variable (the treatment). In the first stage, we estimate a logistic regression to predict the probability that a municipality will get a bond rated based on its observable characteristics. In the second stage, we estimate a linear regression model that uses the weights that control for the decision to obtain a rating by creating a pseudo-sample in which rated and unrated bonds have similar characteristics other than their rating.

These weights are calculated using predicted probabilities of obtaining a rating from the first stage as follows:

$$\begin{cases} \dfrac{\hat{P}(rated = 1)}{\hat{P}\,(rated = 1 \mid X\ =\ x_i)}\ if\ rated\ =\ 1 \\ \dfrac{1 - \hat{P}(rated = 1)}{1\ -\ \hat{P}\,(rated = 1 \mid X\ =\ x_i)}\ if\ rated\ =\ 0 \end{cases} \quad (2)$$

The procedure gives high weights to the bonds that seem unlikely to get rated but are actually rated, such as bonds from low-income areas; and low weights to the bonds that seem likely to get rated and are rated, such as bonds from high-income areas. The procedure also gives high weights to the bonds that seem likely to get rated but are not, such as bonds from high-income areas; and low weights to the bonds that seem likely to go unrated and are not rated, such as bonds from low-income areas. The result is a sample where weighted and unweighted bonds appear to have similar characteristics based on proxies for risk such as local income and other factors that affect the decision to obtain a rating. We then estimate a linear model for yield spreads using the weights. The IPWRA estimator has the property of double robustness in which the estimates of the effect of the rating on the yield are consistent if either the logistic regression for obtaining a rating or the yield regression is correctly specified (Wooldridge 2007).

5. Results

a. The Decision to Obtain a Rating

The logistic model of the decision to obtain a rating that we estimate in the first stage is as follows:

$$\begin{aligned} \Pr(Rated_i)\ = f(&\ln IssueSize_i\,,\ BankQualified_i,\quad RevenueBond_i, \\ &ln\ PersonalIncomePerCapita_i\,,.\frac{Liabilities}{Assets}_i, \frac{Property\ Tax}{Total\ Revenue_i}, \\ &Insured_i, BAA - AAASpread_i, F_{quarter}, F_{state}, F_{Use\ of\ Funds}) \end{aligned} \quad (3)$$

We include several characteristics of the offering that affect the decision to obtain a rating. We include the logarithm of issue size because it is a proxy for liquidity, access to a large number of investors, and scale economies in issue costs**.** In addition, we include an indicator for whether a bond is bank-qualified because these bonds are primarily held by banks that we predict will value ratings less than retail investors. Whether a bond is a GO or a RB may affect the decision for several reasons**.** We include an indicator for whether the issuers place the bond in a competitive (as opposed to negotiated) offering because that setting is likely to involve a wider group of potential underwriters and investors who are less familiar with the issuer.

We include several variables related to the risk of the bond. The risk of the bond may be relevant to the decision to obtain a rating in two conflicting ways. An issuer may be more inclined to seek a rating if that rating is likely to be good in which case issuers are less likely to obtain ratings for riskier issues. However, an issuer with observable characteristics that indicate low risk might decide that those characteristics are sufficient to assure investors of the bond's safety. As in equation 1, we include personal income per capita, the ratio of liabilities to assets, the ratio of property tax to total revenue, an indicator for revenue bonds, and various fixed effects as risk proxies.

Table 7 shows the results of the logistic regressions that predict whether bond issues will get a rating using the specification in equation 3. We estimate the model separately for two splits of the sample based on whether the bond is a GO or a RB and whether it is bank-qualified. As expected, we find that placing the bonds in a competitive offering is associated with obtaining a rating in all subgroups. Also as predicted, larger bond issues are more likely to get a rating.

Proxies for higher risk are generally associated with forgoing a rating. Higher personal income per capita is positively associated with obtaining a rating in all subgroups. A higher liability-to-asset ratio, which indicates an issuer with less financial strength, is negatively associated with obtaining a rating in the GO and bank-qualified samples but is insignificant in the RB and not bank-qualified samples. The lack of significance in the RB sample makes sense because revenue bonds are backed by a specific source of revenue, so the overall financial health of the local government is less relevant. Property taxes as a proportion of total revenue is positively associated with obtaining a rating in all but the not bank-qualified subsample, where it is not significant. Revenue bonds are less likely to be rated than GOs. Bank-qualified bonds are less likely to get a rating if they are also RBs but more likely to get a rating if they are GOs.

The model does a good job of predicting whether a bond will be rated, correctly predicting rating status for 78% to 82% of bonds depending on the sample. The McFadden's pseudo-R-squared range from 20% to 34%, indicating excellent fit.

Table 8 shows the standardized differences of the covariates between the rated and unrated bonds before and after applying the inverse probability weights (IPW). Before applying the IPW, the rated and unrated bonds in our sample have large, standardized differences in most characteristics. After weighting, the rated and unrated bonds appear similar. Rubin (2001) suggests a cutoff of 0.25 for checking the covariate balance; a standard we always meet after IPW. Some other authors suggest a stricter cutoff of 0.1 that we meet except for a few covariates in the GO sample and one covariate in the not bank-qualified sample. These standardized differences indicate the IPW were successful at creating a pseudo-sample in which rated and unrated bonds are similar.

b. The Effect of a Rating on the Yield

We re-estimate Equation 1 using the weights shown in Equation 2 based on predicted probabilities obtained from fitting the model in Equation 3.

Panel A of Table 9 shows the results from a linear regression of yield spread on whether a bond gets a rating and control variables after applying the IPW. The results indicate that a rating is associated with a decrease in the offering yield of 42 to 60 basis points when controlling for the decision to obtain a rating and other characteristics that affect the yield. This is quite substantial considering the average offering yield of an unrated municipal bond in our sample is 4.03% and the median is 4.25%. It is also large relative to the costs of obtaining a rating, generally a one-time cost of around 10 basis points. Our estimate is also substantially higher than the 10-basis point difference found by Reeve and Herring (1986) in a limited sample. It is also large compared to other effects on municipal yields that have been studied. For example, Gao, Lee, and Murphy (2020) find newspaper closures increase yields by 5 to 11 basis points. Cestau, Green, Hollifield, and Schurhoff (2020) find the use of negotiated sales increases yields by 15-17 basis points.

c. Robustness Tests

One important advantage of IPWRA is that it is doubly robust. For the estimation to be valid, the IPWRA must correctly specify all the elements that go into the decision to obtain a rating or that affect the yield of the issue. In other words, the credit risk profile of an issuer is a crucial element in this decision. The goal is conditional on fully and correctly capturing the risk profile of an issuer, to estimate the marginal effect of the presence or absence of a rating. In this section, we undertake additional tests to capture fully the credit risk profile of the issuers.

Some of our control variables are measured at the county level, and the financial variables measure the financial strength of the local government rather than the financial strength of the

project backing the revenue bonds. To remedy this problem, we estimate the model on a subsample consisting only of GO bonds issued by county governments. For this subsample, where we are especially confident in our risk proxies, we find that a rating is associated with a decrease of 52 basis points in the offering yield, which is consistent with our prior results.

Another robustness test pertains to the spillover effects between rated and unrated municipal bonds issued by the same or related issuers. Panel B of Table 10 shows the results of estimating our model on a sample including only issuers that issue either all unrated bonds or all rated bonds. Panel A of Table 10 shows the distribution of percentage rated issues by issuer. There are many such issuers. We find the effect of a rating on offering yields is stronger, ranging from 60 to 74 basis points. This is consistent with unrated bonds receiving some spillover benefits from related rated issues.

Addressing the same issue, we estimate the model on a sample including only counties that issue fewer than 20% or more than 80% of their bonds with ratings. Panel A of Table 11 shows the distribution of percent rated issues by county. Unlike the issuer level, there are fewer counties that exclusively issue rated or unrated bonds, but many that mostly issue rated or unrated bonds. We find a somewhat stronger effect than when analyzing the full sample, with ratings reducing offering yields by 43 to 60 basis points. This is also consistent with unrated bonds receiving some spillover benefits from related rated issues.

The accumulated evidence from these robustness tests shows that as we define the risk profiles better the significance of forgoing a rating on yields increases. This result provides strong support for our prior results.

d. Heterogenous Effects of Rating on Yield

The previous results give an average treatment effect, and an estimate of how much a rating reduces the yield for a typical bond in the sample. However, the amount a typical rated bond's yield would increase if it did not get a rating and the amount a typical unrated bond's yield would decrease if it got a rating might be different. With different weighting schemes, we can estimate the effect of not obtaining a rating on the yields of rated bonds or the effect of obtaining a rating on unrated bonds.

To estimate how much getting a rating would decrease the offering yield for unrated bonds, we compare unrated bonds to rated bonds that were unlikely to get rated, such as bonds from low-income areas. This is accomplished by using the weights:

$$\begin{cases} \dfrac{1 - \hat{P}(rated = 1 \mid X = x_i)}{\hat{P}\,(rated = 1 \mid X = x_i)} \; if\; rated = 1 \\ 1 \; if\; rated = 0 \end{cases} \tag{4}$$

To estimate how much not having a rating would increase the yields for rated bonds, we compare rated bonds to unrated bonds that were likely to get rated, such as bonds from high-income areas. This is accomplished by using the weights:

$$\begin{cases} \dfrac{\hat{P}(rated = 1 \mid X = x_i)}{1 - \hat{P}\,(rated = 1 \mid X = x_i)} \; if\; rated = 0 \\ 1 \; if\; rated = 1 \end{cases} \tag{5}$$

Panel A of Table 12 shows the results using the weighting to estimate the effect on unrated bonds, while Panel B shows the results using the weighting to estimate the effect on rated bonds. We estimate larger decreases in the offering yield from getting a rating for rated

bonds that range from 46 to 69 basis points, and smaller decreases in offering yields from getting a rating for unrated bonds that range from 37 to 48 basis points.

e. Counterfactual Results

We quantify the inflation-adjusted net dollar value of the reduction in offering spreads. Every unrated bond is treated as if it is a fixed semi-annual coupon bond sold at par. The reduction in yield is thus interpreted as a reduction in each coupon payment. We calculate the hypothetical savings for each coupon payment, then discount those savings back to the time of issuance using the risk-free rate to compute the (historic) present value. We subtract an assumed 0.1% rating fee based on the fees reported in Beatty, Gillette, Petacchi, and Weber (2019), then convert to 2015 dollars using the consumer price index. Table 13 shows that our main specification results in $4.2 billion in savings for GOs and $18.3 billion for RBs over the sample period.

f. Value of a Rating Over Time

To investigate the possibility that the value of obtaining a rating varies across time, we re-estimate the model specified in equation 3 by replacing the indicator for whether a bond gets a rating with the interaction of whether a bond gets a rating with variables for the year. The coefficients for each year's interaction term estimate the value of obtaining a rating in that year. For this analysis, we need to omit the ratio of assets to liabilities and the percentage of revenue from property taxes from the specification because these data are only available starting in 2004. These results are shown in Figure 4 with corresponding counterfactual savings shown in Table 12.

The results show substantial temporal variation in which the yield reduction from obtaining a rating is particularly high for periods following the 2001 recession and the 2008 financial crisis.

Using the annual estimates of the reduction in the offering yield, we find forgoing ratings is associated with approximately $17.6 billion in costs to municipalities between 1998 and 2017

6. Underwriters and the Choice to Obtain a Rating

In previous sections, we show that there is a large reduction in offering yield and savings net of costs of obtaining a rating in municipal bond offerings. These findings raise the question of why municipalities issue so many unrated bonds. In this section, we focus on one explanation, which stems from the conflict of interest between advisers/underwriters and municipal bond issuers.

We use Garrett's (2021) framework to argue that advisors and underwriters can affect whether the issuer obtains a rating but may influence the choice to benefit themselves rather than the issuer. From the issuer's perspective, obtaining a rating is optimal if it lowers the cost of interest payments by more than the cost of the rating. However, the underwriter wants to maximize its profits by increasing the difference between the price at which it purchases the bonds from the issuer and the price at which it sells the bonds to investors. A rating will generally increase the price investors are willing to pay for the bonds but can increase the price the underwriter must pay the issuer even more and thus reduce the underwriter's profits. This conflict of interest is particularly strong for the competitive offerings because underwriters bid in an auction to underwrite the issue. The financial advisor plays a critical role in the bond issue process, by providing a comprehensive plan for the bond issue. The advisor to an offering has private information about the offering that is more valuable in the auction when opacity is higher. Obtaining a rating reduces the advisor's asymmetric information advantage, so an advisor who plans to bid on the bonds as an underwriter has an incentive to discourage obtaining a rating. When the underwriter acts as a financial advisor (dual advisor) additional conflict of interest can

arise because dual advisors can direct the municipalities to structure the bond offering to the best interest of the underwriter. Indeed, Garrett (2021) shows that when advisors were prohibited from underwriting the issues they advise by the Dodd-Frank act, issuers who previously used dual advisors became more likely to obtain ratings and their cost of borrowing decreased.

Within this framework, we analyze the relationship between underwriters and the decision to obtain a rating in three ways with alterations to our selection model specified in equation 3.

First, we examine whether individual underwriters systematically influence the decision to obtain a rating. To address this question, we re-estimate the model in equation 3 adding fixed effects for the lead underwriter. Table 15 shows the results of this model. To ensure a sufficient number of observations per underwriter, we remove the 5% of the sample whose lead underwriters underwrote the fewest number of issues in our sample period. The cutoff is 78 issues across the sample period. This exclusion has negligible effect on the model fit. However, adding the lead underwriter fixed effects improves the fit substantially. The pseudo-R-squared increases by between 0.10 to 0.17 while the percentage correctly classified increases by 4%-6%. These results show underwriters play a strong role in deciding whether to obtain a rating.

Next, we investigate whether certain characteristics of underwriters affect the decision to obtain a rating. We estimate the model specified in equation 3 while adding the lead underwriter's market share decile in the offering year as a control variable. Cornaggia, Hund, and Nguyen (2022) show underwriters in higher market share deciles lead issuers to purchase insurance even when it costs more than it saves in offering yield, suggesting influential underwriters are better able to mislead issuers. However, market share could also proxy for the financial sophistication of the underwriter. Table 16 shows that higher underwriter market share is positively associated with obtaining a rating. This result shows that conflict of interest is more

prevalent for issues that have smaller underwriters, in which case the issuer is less likely to obtain ratings.

In addition, we test the effect of a financial advisor also serving as the lead underwriter on an issue. For this analysis, we include only issues with financial advisor information available in Mergent. As Garrett (2021) showed, advisors have a strong incentive to not recommend ratings for competitive offerings they advise. The type of offering is also correlated with advisor conflicts. For these reasons, we test the effect of dual underwriters separately for competitive and non-competitive offerings.

In our sample issues with dual underwriters are more frequently unrated. Among non-competitive offerings, 57.3% of dual-underwriter issues are unrated compared to 17.9% of issues with non-conflicted advisors. Among competitive offerings, 45.4% of dual-underwriter issues are unrated compared to 28.1% of issues with non-conflicted advisors.

Table 17 shows the results of estimating our logistic model described in equation 3 while controlling for dual-underwriter status. Panel A shows the results for competitive offerings. Consistent with Garrett (2021), a dual underwriter consistently has a negative and highly significant relationship with obtaining a rating. Panel B shows the results for non-competitive offerings. The relationship here is not as strong as for competitive offerings but the results indicate the conflict of interest likely plays a role for non-competitive offerings as well. The point estimates are consistently negative across samples, but the coefficient is significant at the 5% level only in the not bank-qualified sample. It is also significant at the 10% level for revenue bonds. These results suggest conflicted underwriters can fail to sufficiently encourage issuers to obtain ratings.

7. Conclusion

We demonstrate that a substantial percentage of municipal bonds do not obtain ratings: 14% by dollars issued and 34% by number of issues.

Issuers are more likely to forgo ratings for a bond that is riskier. In particular, issuers are less likely to obtain a rating if they have lower local income. For general obligation bonds, which are backed by the faith and credit of the local government rather than a particular revenue source, they are less likely to obtain a rating if they are more indebted or are more reliant on revenue sources other than property taxes. Issuers are also less likely to obtain ratings for revenue bonds which could be due to their higher risk or due to difficulties evaluating their risk. These results are consistent with issuers forgoing ratings for bonds that they expect will receive poor ratings.

Some characteristics of the offering not directly related to risk also affect the decision to obtain a rating. Bonds placed in a negotiated offering are less likely to get a rating than bonds placed in a competitive offering. Contrary to our expectations, bank-qualified issues are not generally less likely to get a rating. Bank-qualified issues are more likely to get a rating for general obligation bonds, but less likely to get a rating for revenue bonds.

If issuers make fully informed and rational decisions to avoid obtaining ratings, we predict that any potential effect from obtaining ratings on the offering yields to be small and less than the cost of obtaining a rating. However, ratings appear to cause an economically significant decrease on the cost of issuance. The results of our primary specification indicate that unrated bonds could lower offering yields by 47 basis points for revenue bonds and 49 basis points for general obligation bonds by obtaining a rating. When we consider only a subsample where we are sure we accurately measure risk, county-level GO bonds, we find a similar reduction of 52 basis points. These yield reductions are substantially higher than the typical fees that rating agencies charge and are a one-time cost at issuance of approximately 0.10% the amount issued. These

increased offering yields correspond to $22.5 billion (in 2015 dollars) in aggregate cost to municipalities net of rating fees between 1998 and 2017

These potential savings indicate issuers do not fully appreciate the value of obtaining a rating. We find suggestive evidence that issuer's failure to obtain ratings may be driven by the advice they receive from underwriters or advisors. Underwriter fixed effects provide a large increase in fit for a logistic model predicting whether a rating will be obtained. Issuers are less likely to obtain ratings for issues underwritten by smaller and potentially less sophisticated underwriters. Issuers are also less likely to obtain ratings when working with financial advisors who also underwrite the issue.

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Table 1: Distribution of Ratings at Time of Issue

This table shows the proportion of rated and unrated bonds both by number of bond offerings and amount issued for the entire sample.

Rating Status	Bond Offerings	(%)	Issue Amount	(%)
Rated	132,417	65.8%	$3,192,013,225,149	86.3%
Unrated	68,690	34.2%	$507,019,433,532	13.7%
Total	**201,107**	**100%**	**$3,699,032,658,681**	**100%**

Table 2: Proportion of Rated Bonds by Bank-qualified Status and Type of Bond

This table shows the proportion of rated bonds in our sample both by number of bond offerings of amount issued within offerings that are bank-qualified or not bank-qualified (Panel A) and whether the bond is a general obligation or revenue bond (Panel B).

Panel A

	Bank Qualified				Not Bank Qualified			
Rating Status	**Bond Offerings**	**(%)**	**Issue Amount**	**(%)**	**Bond Offerings**	**(%)**	**Issue Amount**	**(%)**
Rated	55,163	57.8%	$273,368,161,583	74.7%	77,254	73.1%	$2,918,645,063,566	87.6%
Unrated	40,257	42.2%	$92,665,408,058	25.3%	28,433	26.9%	$414,354,025,474	12.4%
Total	**95,420**	**100%**	**$366,033,569,641**	**100%**	**105,687**	**100%**	**$3,332,999,089,040**	**100%**

Panel B

	General Obligation				Revenue Bond			
Rating Status	**Bond Offerings**	**(%)**	**Issue Amount**	**(%)**	**Bond Offerings**	**(%)**	**Issue Amount**	**(%)**
Rated	81,095	67.4%	$1,300,821,919,019	86.2%	51,322	63.6%	$1,891,191,306,130	86.4%
Unrated	39,300	32.6%	$208,768,343,598	13.8%	29,390	36.4%	$298,251,089,934	13.6%
Total	**120,395**	**100%**	**$1,509,590,262,617**	**100%**	**80,712**	**100%**	**$2,189,442,396,064**	**100%**

Table 3: Default Rates Among Municipal Bond Offerings

This tableshows the number and percentage of defaults, both by number of offerings and amount issued, for various categories of municipal bonds.

	Issued (#)	Issued ($)	Defaults (#)	Defaults ($)	Default Rate (#)	Default Rate ($)
All Municipal Bonds	210,310	$3,847,438,089,123	1,130	$26,809,908,885	0.54%	0.70%
Rated	141,620	$3,340,418,655,591	276	$14,854,125,014	0.19%	0.44%
Unrated	78,529	$690,050,359,076	973	$20,509,325,601	1.24%	2.97%
Bank Qualified	98,329	$380,119,117,221	155	$714,193,548	0.16%	0.19%
Not Bank Qualified	111,981	$3,467,318,971,902	975	$26,095,715,337	0.87%	0.75%
General Obligation	124,104	$1,548,451,547,482	83	$2,085,376,548	0.07%	0.13%
Revenue Bond	86,206	$2,298,986,541,641	1,047	$24,724,532,337	1.21%	1.08%

Table 4: Variable Definitions

Variables included in the regression analysis.

Variable	Definition
Rated	An indicator variable equal to 1 if the bond has received a credit rating and 0 otherwise.
Log(Personal Income Per Capita)	The natural logarithm of the personal income per capita in the county of the bond's issuer in the year of issuance.
Property Tax / Total Revenue	The proportion of total revenue raised from property taxes in the county of the bond's issuer in the year of issuance.
Liabilities / Assets	The ratio of total liabilities to total assets in the county of the bond's issuer in the year of issuance.
Log(Maturity Size)	The natural logarithm of the total amount of the bond issued.
Put	An indicator variable equal to 1 if the bond includes a put option for the holder to sell the bonds back to the issuer and 0 otherwise.
Call	An indicator variable equal to 1 if the bond includes a call option for the issuer to purchase the bonds from investors and 0 otherwise.
Insured	An indicator equal to 1 if the issuer of the bond purchased insurance and 0 otherwise. If the issuer purchases bond insurance at the time of issuance, the insurer guarantees payments of interest and principal to bond holders in the event the issuer defaults.
Revenue Bond	An indicator variable equal to 1 if the bond is a revenue bond backed only by a specific source of revenue and 0 if it is a general obligation backed by the full faith and credit of the issuer.
Bank Qualified	An indicator variable equal to 1 if the bond is issued by a bank qualified issuer and thus banks can benefit from its tax-deductibility and 0 otherwise.
Competitive Offering	An indicator variable equal to 1 if the bond is placed in competitive offering where underwriters bid for the bond and 0 otherwise.
BAA-AAA Spread	The yield spread between Baa and Aaa rated corporate bonds.

Table 5: Summary Statistics on Regression Sample

Means and standard deviations of variables used in the regression analysis

	Revenue Bonds		General Obligation		Bank Qualified		Not Bank Qualified	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Rated	0.85		0.91		0.84		0.93	
Risk Proxies								
Log(Personal Income Per Capita)	3.80	0.31	3.82	0.27	3.77	0.25	3.85	0.31
Property Tax / Total Revenue	30.38	14.88	35.53	16.38	35.41	16.40	32.32	15.63
Liabilities / Assets	0.48	0.30	0.54	0.32	0.48	0.30	0.55	0.32
Bond Characteristics								
Log(Maturity Size)	13.21	1.43	12.85	1.41	12.23	1.09	13.61	1.37
Log(Time to Maturity)	1.87	0.76	1.84	0.77	1.79	0.77	1.90	0.76
Put	0.00		0.00		0.00		0.00	
Call	0.33		0.32		0.34		0.31	
Insured	0.36		0.38		0.38		0.37	
Revenue Bond	1.00		0.00		0.22		0.45	
Bank Qualified	0.29		0.55		1.00		0.00	
Offering Characteristics								
Competitive Offering	0.37		0.61		0.61		0.46	
BAA-AAA Spread	1.05	0.43	1.06	0.45	1.10	0.48	1.02	0.41

Table 6: OLS Estimates of the Effect of Rating on Offering Yield Spread

Results of a regression of municipal bond offering yield spreads on whether the bond gets a rating and other explanatory variables. *Competitive Offering* is equal to one if the offering is competitive and zero otherwise. *Log(Maturity Size)* is the natural logarithm of the amount issued of the bond. *Log(Personal Income per Capita)* is the natural logarithm of the personal income per capita in the county where the bond was issued. *Property Tax / Total Revenue* is the proportion of the local government's revenue raised from property taxes. *Liabilities / Assets* is the ratio of assets to liability of the local government. *Bank Qualified* is equal to one if the bond offering is bank-qualified and zero otherwise. *Revenue Bond* is equal to one if the bond offering is a revenue bond and zero if it is a general obligation bond. *Log(Time to Maturity)* is the natural logarithm of the time from the offering date until the maturity date. *Put* is equal to one if the bond has an option for investors to sell the bond back and zero otherwise. *Call* is equal to one if the bond has an option for the issuer to buy back the bond and zero otherwise. *Insured* is equal to one if the bond has insurance and zero otherwise. *BAA-AAA* Spread is the yield spread between BAA and AAA rated corporate bonds. Continuous variables are standardized to have a mean of zero and a standard deviation of one. Standard errors are adjusted for clustering at the bond issue level.

	Bond Yield Spread Regression - IPWRA							
	Revenue Bonds		General Obligation		Bank Qualified		Not Bank Qualified	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
Rated	-0.51	0.00	-0.50	0.00	-0.51	0.00	-0.52	0.00
Risk Proxies								
Log(Personal Income Per Capita)	-0.04	0.00	-0.01	0.03	-0.01	0.00	-0.01	0.00
Property Tax / Total Revenue	-0.01	0.06	-0.03	0.00	-0.03	0.00	-0.03	0.00
Liabilities / Assets	-0.01	0.03	0.01	0.00	0.01	0.02	-0.01	0.00
Bond Characteristics								
Log(Maturity Size)	-0.01	0.00	-0.02	0.00	-0.06	0.00	0.00	0.33
Log(Time to Maturity)	-0.10	0.00	-0.17	0.00	-0.18	0.00	-0.11	0.00
Put	-0.80	0.00	-0.71	0.03	-0.13	0.92	-0.80	0.00
Call	0.22	0.00	0.27	0.00	0.20	0.00	0.32	0.00
Insured	-0.01	0.15	0.09	0.00	0.05	0.00	0.06	0.00
Revenue Bond					0.05	0.00	0.21	0.00
Bank Qualified	-0.12	0.00	-0.10	0.00				
Offering Characteristics								
Competitive Offering	-0.09	0.00	-0.07	0.00	-0.07	0.00	-0.09	0.00
BAA-AAA Spread	0.30	0.00	0.26	0.00	0.25	0.00	0.34	0.00
Quarter Fixed Effects	Yes		Yes		Yes		Yes	
State Fixed Effects	Yes		Yes		Yes		Yes	
Use of Funds Fixed Effects	Yes		Yes		Yes		Yes	
R-Square	0.65		0.65		0.65		0.66	
Observations	215,722		407,585		287,638		335,669	

Table 7: Logistic Regression Predicting Rating (Rated=1, Unrated = 0)

Results of a logistic regression that predicts whether a bond offering gets a rating. *Competitive Offering* is equal to one if the offering is competitive and zero otherwise. *Log(Size)* is the natural logarithm of the amount issued in the offering. *Log(Personal Income per Capita)* is the natural logarithm of the personal income per capita in the county where the bond was issued. *Property Tax / Total Revenue* is the proportion of the local government's revenue raised from property taxes. *Liabilities / Assets* is the ratio of assets to liability of the local government. *Bank Qualified* is equal to one if the bond offering was bank-qualified and zero otherwise. *Revenue Bond* is equal to one if the bond offering is a revenue bond and zero if it is a general obligation bond. Continuous variables are standardized to have a mean of zero and a standard deviation of one.

	Logistic Regression Predicting Rating (Rated=1, Unrated=0)							
	Revenue Bonds		General Obligation		Bank Qualified		Not Bank Qualified	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
Risk Proxies								
Log(Personal Income Per Capita)	0.16	0.00	0.16	0.00	0.08	0.00	0.30	0.00
Property Tax / Total Revenue	0.02	0.30	0.04	0.05	0.05	0.01	-0.01	0.59
Liabilities / Assets	-0.01	0.54	-0.11	0.00	-0.08	0.00	-0.02	0.24
Issue Characteristics								
Log(Size)	0.81	0.00	1.22	0.00	1.71	0.00	0.75	0.00
Revenue Bond					-0.79	0.00	-0.64	0.00
Bank Qualified	-0.18	0.00	0.17	0.00				
Offering Characteristics								
Competitive Offering	0.75	0.00	0.18	0.00	0.25	0.00	0.35	0.00
Quarter Fixed Effects	Yes		Yes		Yes		Yes	
State Fixed Effects	Yes		Yes		Yes		Yes	
Use of Funds Fixed Effects	Yes		Yes		Yes		Yes	
Unrated Observations	12,608		17,801		16,311		14,098	
Rated Observations	32,074		50,220		32,508		49,786	
McFadden's Pseudo R-Squared	22%		32%		34%		20%	
% Correctly Classified with 0.5 Threshold	78%		82%		80%		81%	

Table 8: Standardized Difference of Rated and Unrated Bond Offerings Before and After Inverse Probability Weighting

Standardized differences of covariates before and after applying the inverse probability weights. The standardized difference for a covariate is defined as the difference of the means for the covariate between the rated and unrated samples divided by the square root of the average of sample variances of the covariate in the rated and unrated samples. *Competitive Offering* is equal to one if the offering is competitive and zero otherwise. *Log(Size)* is the natural logarithm of the amount issued in the offering. *Log(Personal Income per Capita)* is the natural logarithm of the personal income per capita in the county where the bond was issued. *Property Tax / Total Revenue* is the proportion of the local government's revenue raised from property taxes. *Liabilities / Assets* is the ratio of assets to liability of the local government.

Revenue Bonds

Covariate	Before IPW	After IPW
Bank Qualified	-0.26	0.02
Competitive Offering	0.24	0.08
Liabilities / Assets	0.18	0.00
Log(Personal Income Per Capita)	0.13	0.01
Log(Offering Size)	0.79	-0.03
Property Tax / Total Revenue	-0.04	-0.03

Bank Qualified

Covariate	Before IPW	After IPW
Revenue Bond	-0.11	-0.06
Competitive Offering	-0.01	0.02
Liabilities / Assets	-0.02	-0.05
Log(Personal Income Per Capita)	0.03	0.00
Log(Offering Size)	1.04	-0.06
Property Tax / Total Revenue	0.18	-0.02

General Obligation Bonds

Covariate	Before IPW	After IPW
Bank Qualified	-0.36	0.19
Competitive Offering	-0.13	0.16
Liabilities / Assets	-0.12	-0.02
Log(Personal Income Per Capita)	0.07	-0.01
Log(Offering Size)	0.93	-0.25
Property Tax / Total Revenue	0.28	0.07

Not Bank Qualified

Covariate	Before IPW	After IPW
Revenue Bond	-0.20	-0.08
Competitive Offering	0.21	0.12
Liabilities / Assets	-0.07	0.02
Log(Personal Income Per Capita)	0.06	0.01
Log(Offering Size)	0.68	-0.02
Property Tax / Total Revenue	0.18	-0.01

Table 9: IPWRA Regression Predicting Yield Spread

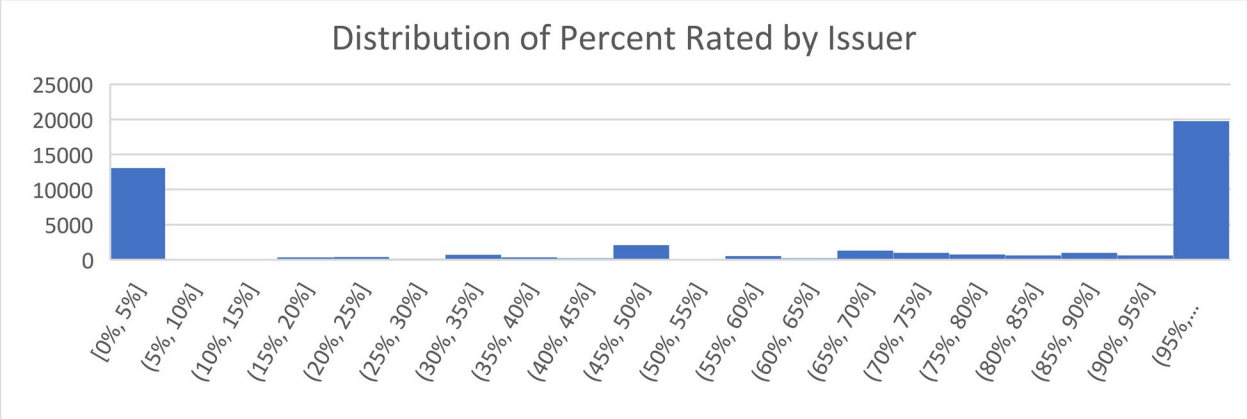
Predicted yields if the bonds in the sample were rated, unrated, and the difference based on a regression of municipal bond offering yields on whether the bond gets a rating and other explanatory variables matching those used in Table 6. Standard errors are adjusted for clustering at the bond issue level. Panel A shows the results for the entire sample while Panel B shows the results for a sample including only GO bonds issued by county-level entities.

	Inverse Probability Weighted Regression Approach			
	Revenue Bonds	**General Obligation**	**Bank Qualified**	**Not Bank Qualified**
Panel A: Main Specification				
Average Rated Yield Spread	0.28	0.10	0.16	0.17
Average Unrated Yield Spread	0.75	0.59	0.76	0.59
Average Treatment Effect	-0.47***	-0.49***	-0.60***	-0.42***
Number of Observations	215,722	407,585	287,638	335,669
Panel B: County-Level GO Bonds				
Average Rated Yield Spread		0.15		
Average Unrated Yield Spread		0.67		
Average Treatment Effect		-0.52***		
Number of Observations		147,388		

Table 10: IPWRA Regression for Yield Spread Only Including Bonds from Issuers with Exclusively Rated or Unrated Bonds

Panel A of Table 10 shows the distribution of issuers by percentage of rated issues. Panel B shows the predicted yields if the bonds in the sample were rated, unrated, and the difference based on a regression of municipal bond offering yields on whether the bond gets a rating and other explanatory variables matching those used in Table 6. Standard errors are adjusted for clustering at the bond issue level. The sample includes only bonds from issuers who issued either entirely rated or entirely unrated bonds.

Panel A



Panel B

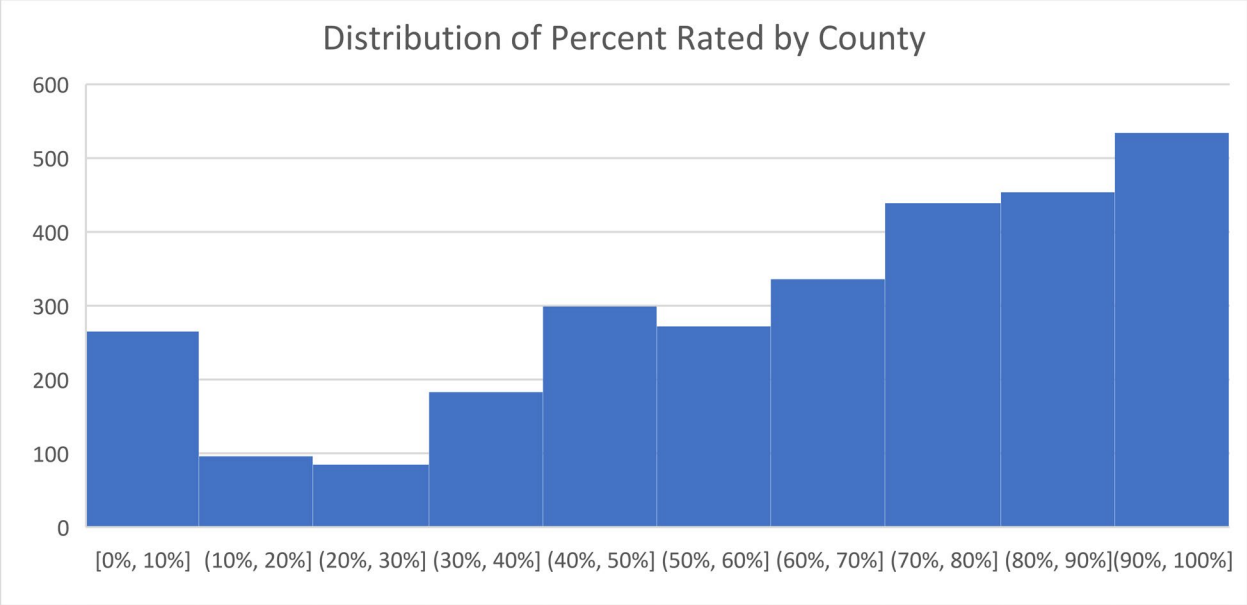
Inverse Probability Weighted Regression Approach - Issuers That Exclusively Issue Rated or Unrated Bonds

	Revenue Bonds	General Obligation	Bank Qualified	Not Bank Qualified
Average Rated Yield Spread	0.27	0.12	0.15	0.20
Average Unrated Yield Spread	0.92	0.76	0.89	0.79
Average Treatment Effect	-0.65***	-0.65***	-0.74***	-0.60***
Number of Observations	131,905	187,406	161,737	157,574

Table 11: IPWRA Regression for Yield Spread Only Including Bonds from Counties that Issued Mostly Rated or Unrated Bonds

Panel A of Table 11 shows the distribution of counties by percentage of issued bonds that are rated. Panel B shows the predicted yields if the bonds in the sample were rated, unrated, and the difference based on a regression of municipal bond offering yields on whether the bond gets a rating and other explanatory variables matching those used in Table 6. Standard errors are adjusted for clustering at the bond issue level. The sample includes only bonds from issuers in counties where either fewer than 20% or more than 80% of bonds were rated.

Panel A:



Panel B:

Inverse Probability Weighted Regression Approach - Counties with >80% or <20% Rated Issues

	Revenue Bonds	General Obligation	Bank Qualified	Not Bank Qualified
Average Rated Yield Spread	0.27	0.16	0.21	0.18
Average Unrated Yield Spread	0.78	0.76	0.80	0.61
Average Treatment Effect	-0.51***	-0.60***	-0.59***	-0.43***
Number of Observations	100,476	197,815	137,610	160,681

Table 12: IPWRA Regression Predicting Effect of Rating on Yield Spread of Rated and Unrated Bonds

Predicted yields if the bonds in the sample were rated, unrated, and the difference based on a regression of municipal bond offering yields on whether the bond gets a rating and other explanatory variables matching those used in Table 6. Standard errors are adjusted for clustering at the bond issue level.

Panel A shows the results from a regression using the inverse probability weights from equation 4 to estimate the effect of a rating on savings for unrated bonds. Panel B shows the results from a regression using the inverse probability weights from equation 5 to estimate the effect of a rating on savings for rated bonds.

	Inverse Probability Weighted Regression Approach			
	Revenue Bonds	**General Obligation**	**Bank Qualified**	**Not Bank Qualified**
Panel A: Average Treatment Effect on Rated Bonds				
Average Rated Yield Spread	0.27	0.10	0.14	0.17
Average Unrated Yield Spread	0.80	0.62	0.82	0.63
Average Treatment Effect	-0.53	-0.52	-0.69	-0.46
Number of Observations	215,722	407,585	287,638	335,669
Panel B: Average Treatment Effect on Unrated Bonds				
Average Rated Yield Spread	0.31	0.11	0.20	0.18
Average Unrated Yield Spread	0.78	0.49	0.58	0.65
Average Treatment Effect	-0.48	-0.37	-0.39	-0.47
Number of Observations	215,722	407,585	287,638	335,669

Table 13: Estimated Dollar Value of Counterfactual Savings from Obtaining a Rating

Etimates of the dollar value of savings from obtaining a rating. The dollar value of savings is estimated by assuming every unrated bond has a fixed coupon payment and is issued at par, with coupons reduced by the estimated reduction in yield spread. Savings are discounted back to the year of issue at the risk-free rate and then adjusted for inflation using the CPI to 2015 values.

	GO	RB
Unrated Dollars Issued (IA)	$237,324,386,037	$357,050,595,879
Yield Reduction	0.49%	0.47%
Dollar Savings (IA)	$4,167,581,328	$18,318,857,111
% Savings	1.76%	5.13%

Table 14: Estimated Dollar Value of Counterfactual Savings from Obtaining a Rating using Annual Estimates

For each year in the sample, this table shows the estimated decrease in the yield spread from obtaining a rating, the dollar amount of unrated bonds issued, the dollar savings of interest expenses adjusted to 2015 dollars, and the dollar savings as a percentage of the amount issued adjusted to 2015 dollars. * indicates statistical significance at the 0.05 threshold.

	Savings from Rating		Unrated Dollars Issued (Inflation Adjusted)		Dollar Savings (Inflation Adjusted)		% Savings	
Year	GO	RB	GO	RB	GO	RB	GO	RB
1998	0.09%*	0.24%*	$10,688,560,041	$28,265,471,920	$53,812,756	$747,209,424	0.5%	2.6%
1999	0.11%*	0.28%*	$5,191,454,770	$21,235,937,430	$26,006,117	$636,841,900	0.5%	3.0%
2000	0.18%*	0.28%*	$4,540,568,334	$16,888,526,832	$49,093,460	$506,641,198	1.1%	3.0%
2001	0.32%*	0.58%*	$5,738,816,393	$18,266,405,333	$60,724,705	$1,075,156,017	1.1%	5.9%
2002	0.33%*	0.59%*	$14,732,755,648	$23,405,417,496	$216,675,609	$1,516,355,585	1.5%	6.5%
2003	0.36%*	0.63%*	$6,823,974,018	$20,492,330,691	$115,697,998	$1,289,476,441	1.7%	6.3%
2004	0.29%*	0.56%*	$18,904,576,682	$24,328,156,706	$114,527,497	$1,323,538,529	0.6%	5.4%
2005	0.23%*	0.34%*	$16,658,616,872	$30,653,392,849	$117,131,306	$1,018,260,004	0.7%	3.3%
2006	0.22%*	0.36%*	$18,994,340,996	$36,139,877,747	$128,571,608	$1,189,136,383	0.7%	3.3%
2007	0.28%*	0.34%*	$18,189,485,595	$44,832,324,817	$177,962,508	$1,428,911,024	1.0%	3.2%
2008	0.61%*	0.44%*	$14,616,742,592	$16,148,254,238	$411,984,743	$886,297,224	2.8%	5.5%
2009	0.78%*	0.26%	$12,818,301,666	$5,916,817,005	$176,103,685	$139,844,719	1.4%	2.4%
2010	0.68%*	0.64%*	$11,036,558,333	$7,496,392,793	$141,621,536	$522,199,471	1.3%	7.0%
2011	0.63%*	0.68%*	$9,951,085,386	$6,516,136,648	$144,379,384	$504,522,600	1.5%	7.7%
2012	0.35%*	0.76%*	$11,217,885,773	$8,344,989,923	$114,680,330	$783,783,194	1.0%	9.4%
2013	0.32%*	0.59%*	$11,802,861,348	$7,694,727,633	$105,597,320	$554,295,121	0.9%	7.2%
2014	0.32%*	0.52%*	$11,468,147,844	$7,006,461,525	$113,723,106	$494,021,735	1.0%	7.1%
2015	0.25%*	0.27%*	$12,571,034,665	$11,749,957,564	$80,079,927	$393,989,180	0.6%	3.4%
2016	0.19%*	0.09%	$10,830,348,816	$9,675,375,349	$50,950,996	$118,238,590	0.5%	1.2%
2017	0.13%	0.06%	$10,548,270,266	$11,993,641,384	$29,601,191	$86,210,455	0.3%	0.7%
Total			**$237,324,386,037**	**$357,050,595,879**	**$2,428,925,782**	**$15,214,928,795**	**1.0%**	**4.3%**

Table 15: Logistic Regression Predicting Rating with Underwriter Fixed Effects

Table 15 shows the results of a logistic regression that predicts whether a bond offering gets a rating. *Competitive Offering* is equal to one if the offering is competitive and zero otherwise. *Log(Size)* is the natural logarithm of the amount issued in the offering. *Log(Personal Income per Capita)* is the natural logarithm of the personal income per capita in the county where the bond was issued. *Property Tax / Total Revenue* is the proportion of the local government's revenue raised from property taxes. *Liabilities / Assets* is the ratio of assets to liability of the local government. *Bank Qualified* is equal to one if the bond offering was bank-qualified and zero otherwise. *Revenue Bond* is equal to one if the bond offering is a revenue bond and zero if it is a general obligation bond. Continuous variables are standardized to have a mean of zero and a standard deviation of one. The model includes fixed effects for the lead underwriter of the issue.

	Logistic Regression Predicting Rating (Rated=1, Unrated=0)							
	Revenue Bonds		General Obligation		Bank Qualified		Not Bank Qualified	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
Competitive Offering	0.70	0.00	0.01	0.00	0.09	0.00	0.30	0.00
Log(Size)	0.70	0.00	1.34	0.00	1.82	0.00	0.68	0.00
Log(Personal Income Per Capita)	0.10	0.00	0.14	0.00	0.03	0.00	0.21	0.00
Property Tax / Total Revenue	0.02	0.00	0.06	0.00	0.04	0.00	0.03	0.00
Liabilities / Assets	-0.03	0.00	-0.06	0.00	-0.03	0.00	-0.03	0.00
Bank Qualified	-0.03	0.00	-0.12	0.00				
Revenue Bond					-0.75	0.00	-0.73	0.00
Lead Underwriter Fixed Effects	Yes		Yes		Yes		Yes	
Quarter Fixed Effects	Yes		Yes		Yes		Yes	
State Fixed Effects	Yes		Yes		Yes		Yes	
Use of Funds Fixed Effects	Yes		Yes		Yes		Yes	
Unrated Observations	10,940		15,524		14,437		12,027	
Rated Observations	30,323		48,492		31,294		47,521	
McFadden's Pseudo R-Squared	**33%**		**49%**		**48%**		**33%**	
Without Underwiter FE	23%		32%		34%		21%	
Improvement	10%		17%		15%		12%	
% Correctly Classified with 0.5 Threshold	**83%**		**88%**		**86%**		**85%**	
Without Underwiter FE	78%		82%		80%		81%	
Improvement	4%		6%		6%		4%	

Table 16: Logistic Regression Predicting Rating With Underwriter Market Share

Table 16 shows the results of a logistic regression that predicts whether a bond offering gets a rating. *UW Decile* indicates the decile of market share of the lead underwriter in the offering year. *Competitive Offering* is equal to one if the offering is competitive and zero otherwise. *Log(Size)* is the natural logarithm of the amount issued in the offering. *Log(Personal Income per Capita)* is the natural logarithm of the personal income per capita in the county where the bond was issued. *Property Tax / Total Revenue* is the proportion of the local government's revenue raised from property taxes. *Liabilities / Assets* is the ratio of assets to liability of the local government. *Bank Qualified* is equal to one if the bond offering was bank-qualified and zero otherwise. *Revenue Bond* is equal to one if the bond offering is a revenue bond and zero if it is a general obligation bond. Continuous variables are standardized to have a mean of zero and a standard deviation of one.

	Logistic Regression Predicting Rating (Rated=1, Unrated=0)							
	Revenue Bonds		General Obligation		Bank Qualified		Not Bank Qualified	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
UW Decile	0.19	0.00	0.22	0.00	0.19	0.00	0.20	0.00
Competitive Offering	0.73	0.00	0.18	0.00	0.26	0.00	0.32	0.00
Log(Size)	0.75	0.00	1.11	0.00	1.59	0.00	0.69	0.00
Log(Personal Income Per Capita)	0.14	0.00	0.15	0.00	0.06	0.00	0.29	0.00
Property Tax / Total Revenue	0.02	0.43	0.04	0.03	0.05	0.01	-0.01	0.74
Liabilities / Assets	-0.01	0.61	-0.10	0.00	-0.07	0.00	-0.02	0.21
Bank Qualified	-0.14	0.00	0.18	0.00				
Revenue Bond					-0.79	0.00	-0.63	0.00
Quarter Fixed Effects	Yes		Yes		Yes		Yes	
State Fixed Effects	Yes		Yes		Yes		Yes	
Use of Funds Fixed Effects	Yes		Yes		Yes		Yes	
Unrated Observations	12,608		17,801		16,311		14,098	
Rated Observations	32,074		50,220		32,508		49,786	
McKelvey-Zavoina	0.68		0.79		0.82		0.65	

Table 17: Logistic Regression Predicting Rating With Dual Underwriter/Advisor Indicator

Table 17 shows the results of a logistic regression that predicts whether a bond offering gets a rating. *Competitive Offering* is equal to one if the offering is competitive and zero otherwise. *Log(Size)* is the natural logarithm of the amount issued in the offering. *Log(Personal Income per Capita)* is the natural logarithm of the personal income per capita in the county where the bond was issued. *Property Tax / Total Revenue* is the proportion of the local government's revenue raised from property taxes. *Liabilities / Assets* is the ratio of assets to liability of the local government. *Bank Qualified* is equal to one if the bond offering was bank-qualified and zero otherwise. *Revenue Bond* is equal to one if the bond offering is a revenue bond and zero if it is a general obligation bond. Continuous variables are standardized to have a mean of zero and a standard deviation of one.

Panel A: Logistic Regression Predicting Rating (Rated=1, Unrated=0) for Competitive Offerings

	Revenue Bonds		General Obligation		Bank Qualified		Not Bank Qualified	
	Estimate	**p-Value**	**Estimate**	**p-Value**	**Estimate**	**p-Value**	**Estimate**	**p-Value**
Dual Underwriter	-1.20	0.00	-0.87	0.00	-0.75	0.00	-1.44	0.00
Log(Size)	1.15	0.00	0.98	0.00	1.43	0.00	0.68	0.00
Log(Personal Income Per Capita)	0.16	0.00	0.21	0.00	0.14	0.00	0.35	0.00
Property Tax / Total Revenue	0.07	0.39	0.11	0.00	0.13	0.00	-0.03	0.64
Liabilities / Assets	0.07	0.32	-0.14	0.00	-0.07	0.02	-0.19	0.00
Bank Qualified	-0.38	0.00	0.06	0.11				
Revenue Bond					-0.35	0.00	-0.83	0.00
Quarter Fixed Effects	Yes		Yes		Yes		Yes	
State Fixed Effects	Yes		Yes		Yes		Yes	
Use of Funds Fixed Effects	Yes		Yes		Yes		Yes	
Unrated Observations	1,205		8,389		6,539		3,055	
Rated Observations	7,141		24,357		15,432		16,066	
McFadden's Pseudo R-Squared	39%		33%		32%		37%	
% Correctly Classified with 0.5 Threshold	90%		82%		79%		88%	

Panel B: Logistic Regression Predicting Rating (Rated=1, Unrated=0) for Non-Competitive Offerings

	Revenue Bonds		General Obligation		Bank Qualified		Not Bank Qualified	
	Estimate	**p-Value**	**Estimate**	**p-Value**	**Estimate**	**p-Value**	**Estimate**	**p-Value**
Dual Underwriter	-0.43	0.07	-0.33	0.14	-0.20	0.35	-0.79	0.00
Log(Size)	1.01	0.00	1.10	0.00	1.28	0.00	0.99	0.00
Log(Personal Income Per Capita)	0.22	0.00	0.19	0.00	0.14	0.02	0.24	0.00
Property Tax / Total Revenue	0.08	0.16	0.07	0.29	0.05	0.47	0.06	0.24
Liabilities / Assets	0.05	0.35	-0.10	0.07	-0.09	0.14	0.10	0.03
Bank Qualified	0.29	0.00	-0.14	0.12				
Revenue Bond					-0.82	0.00	-1.69	0.00
Quarter Fixed Effects	Yes		Yes		Yes		Yes	
State Fixed Effects	Yes		Yes		Yes		Yes	
Use of Funds Fixed Effects	Yes		Yes		Yes		Yes	
Unrated Observations	2,098		1,130		1,236		1,992	
Rated Observations	9,464		10,041		5,252		14,253	
McFadden's Pseudo R-Squared	30%		36%		36%		30%	
% Correctly Classified with 0.5 Threshold	86%		92%		86%		90%	

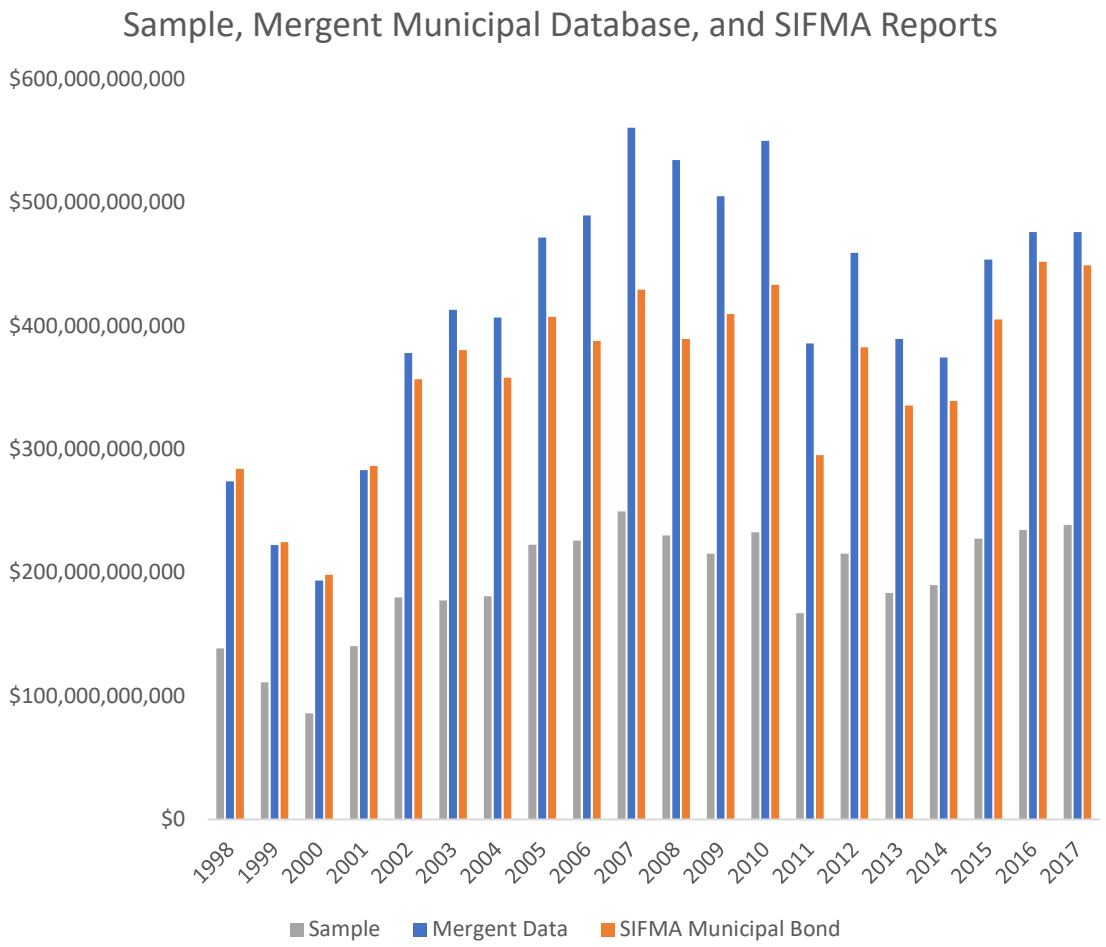
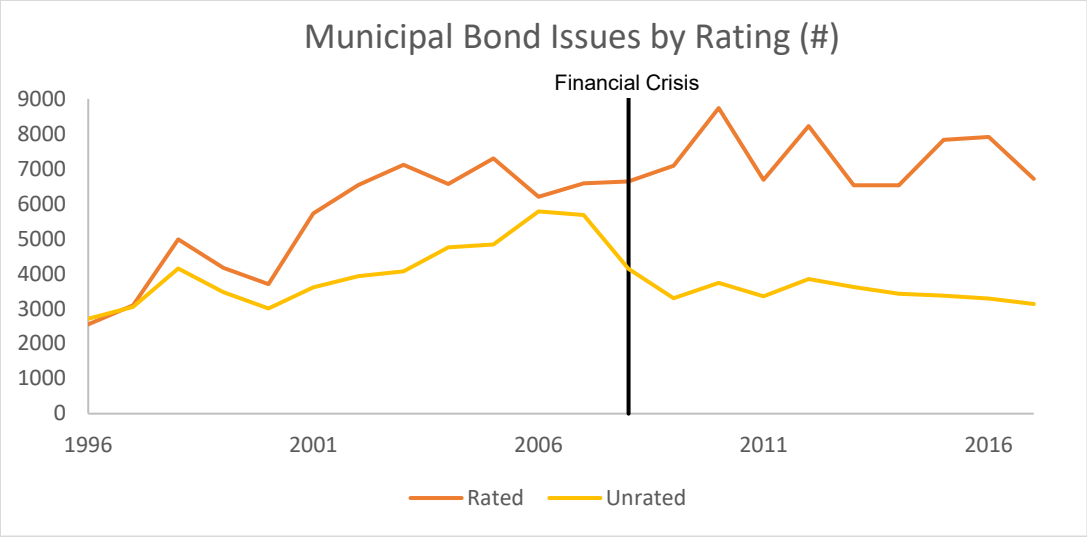


Figure 1. Figure shows the dollar amount of municipal bonds issued each year according to the SIFMA issuance reports in the total Mergent data and after applying filters to create our sample.



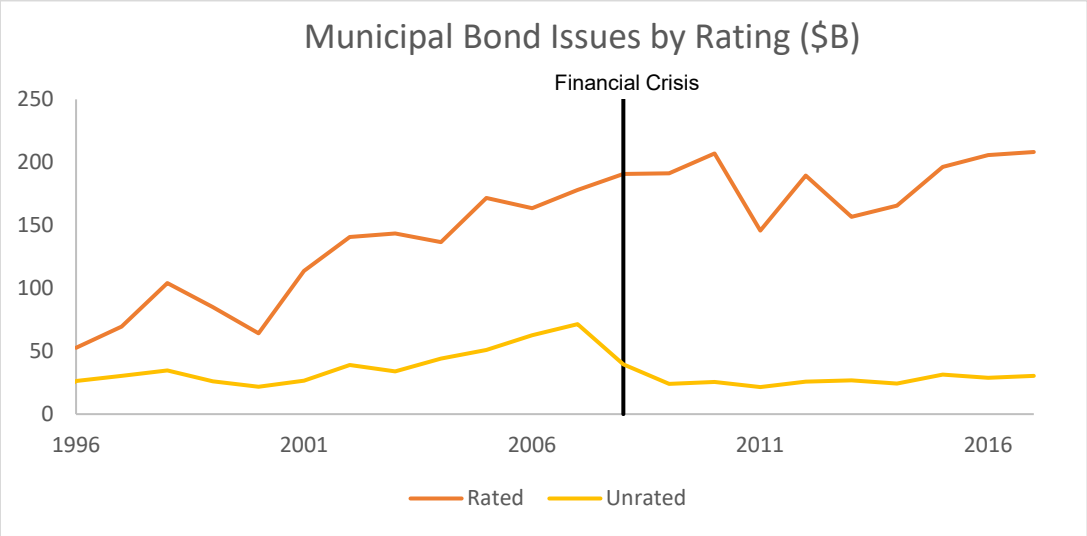


Figure 2. Figure shows the number of municipal bond issues each year classified by whether they received a rating or no rating.

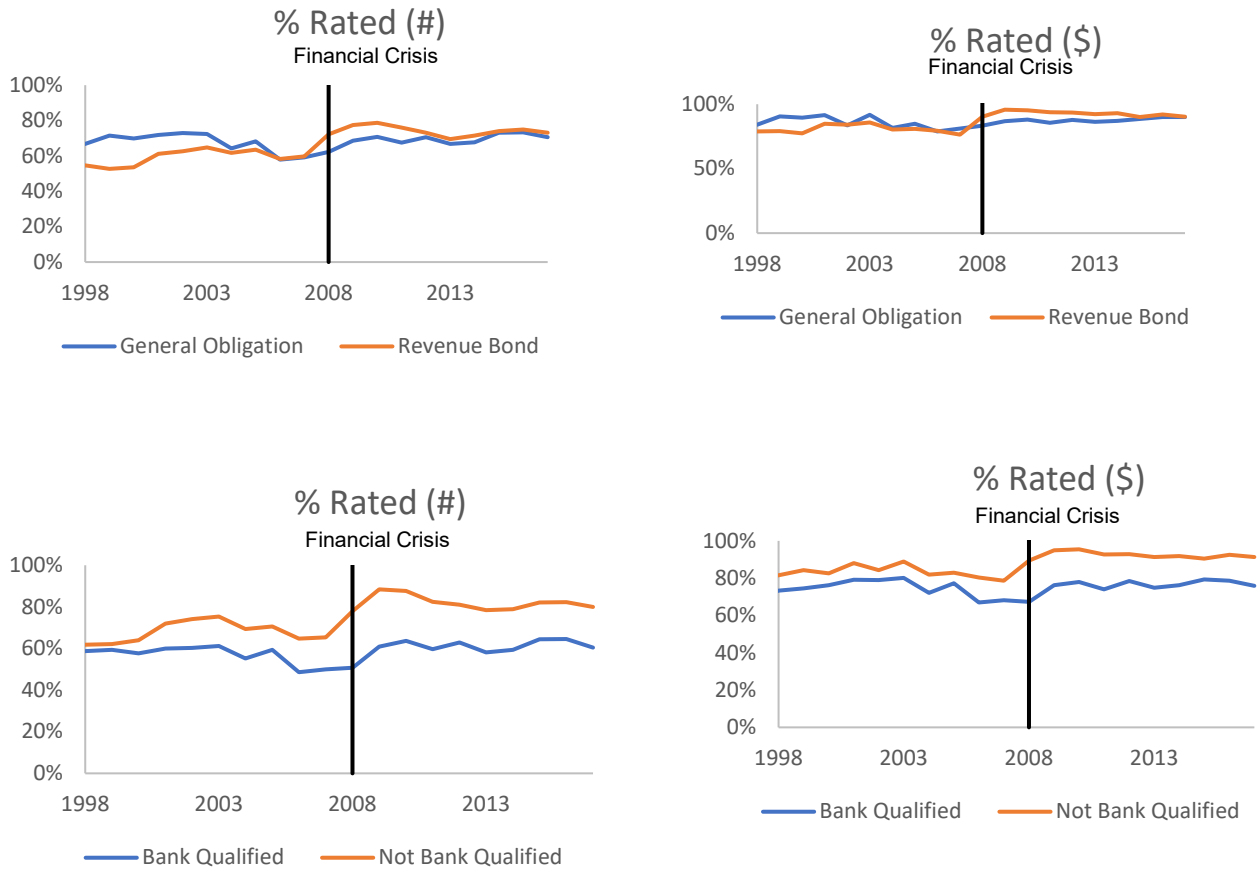


Figure 3. The time series of ratings separately for general obligation and revenue bonds and bank-qualified and not bank-qualified bonds.

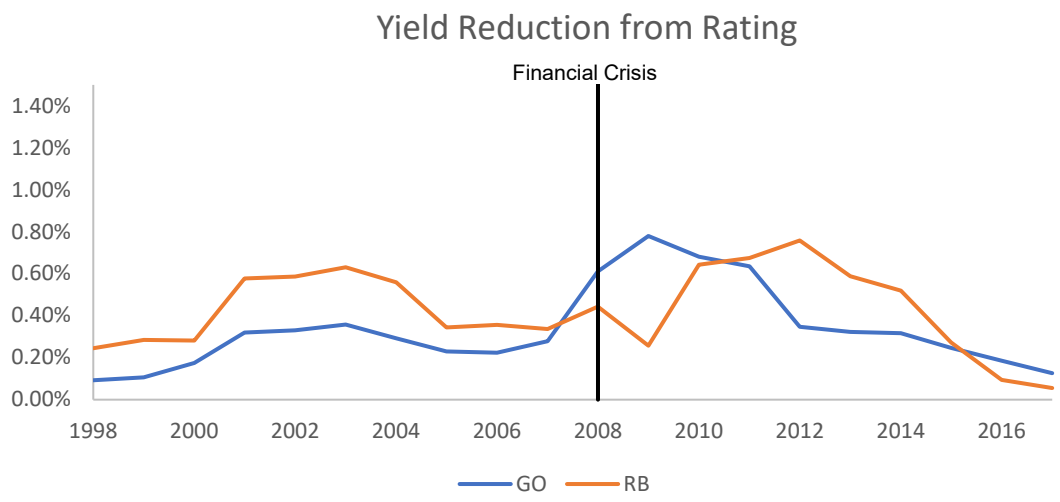


Figure 4. Figure shows the annual estimates of the value of obtaining a rating in terms of a reduction in the offering yield spread. Estimates are obtained using the model specified in equation 3 with the indicator variable for rating replaced by an interaction between the rating and year indicator variables. The estimated savings is the negative of the coefficient for the interaction term for the year. *Property Tax / Total Revenue* and *Liabilities / Assets* are omitted as the data was unavailable prior to 2004.

APPENDIX: Variation Among Municipal Bond Issues

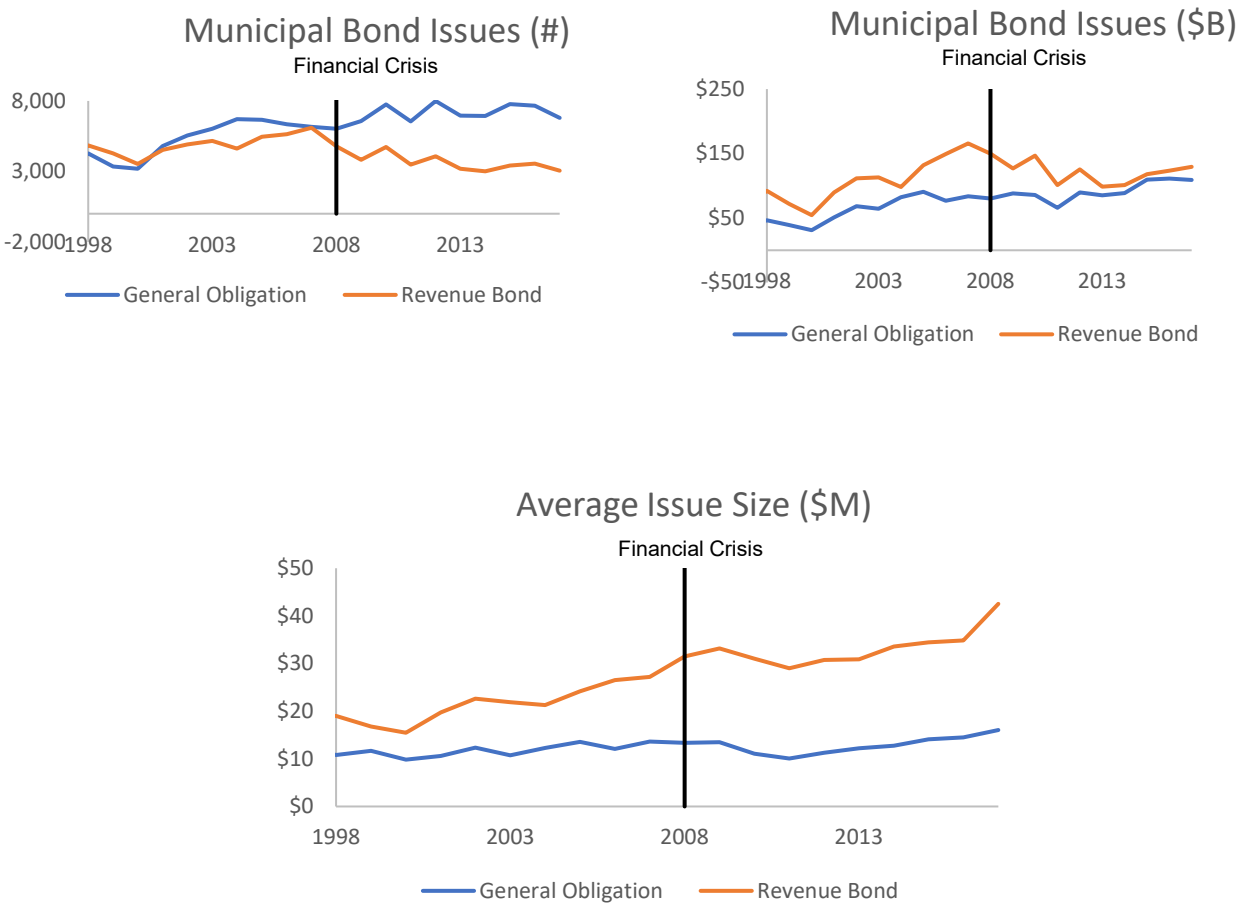


Figure A1 Issuance of general obligation and revenue bonds over time within our sample.

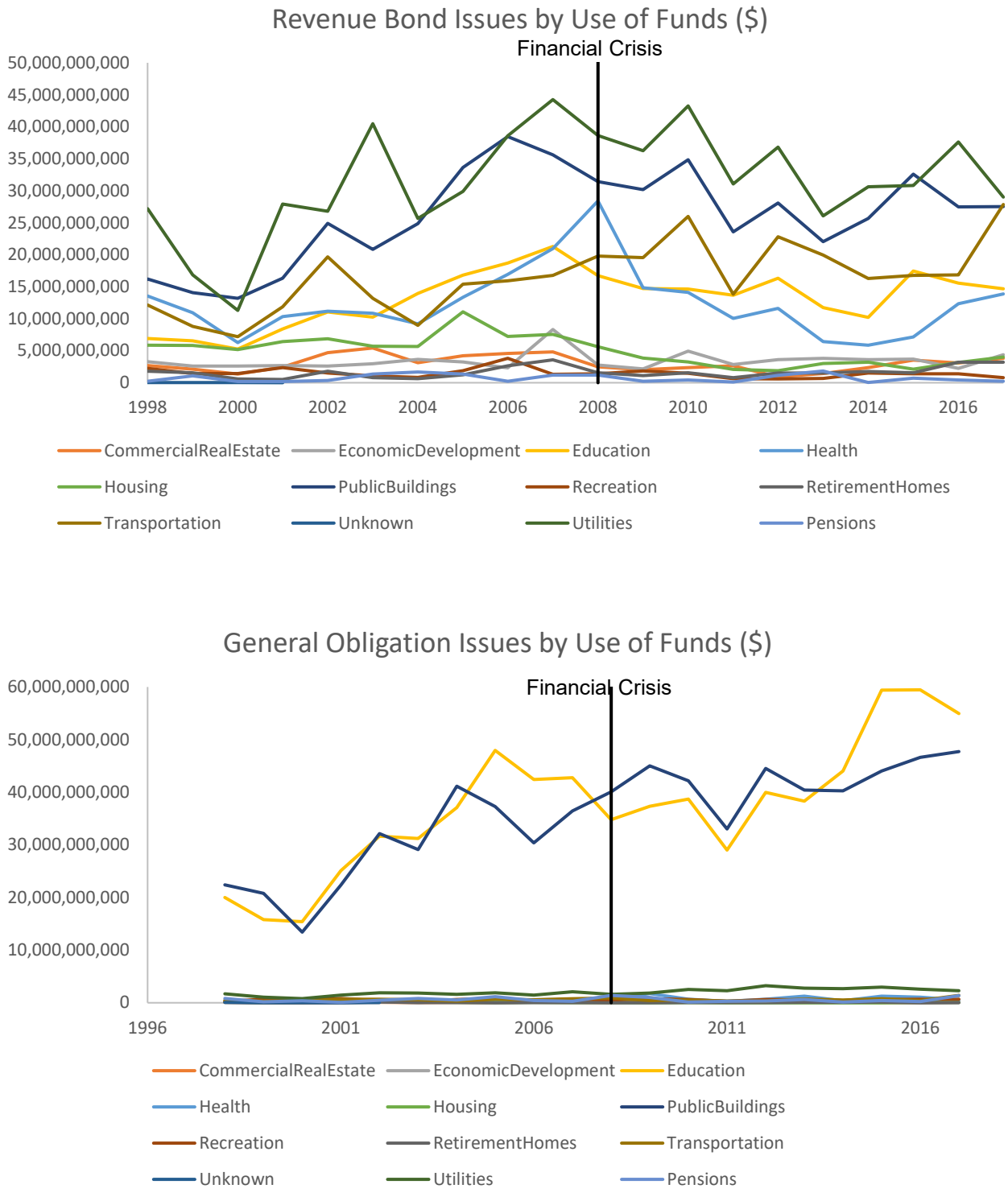
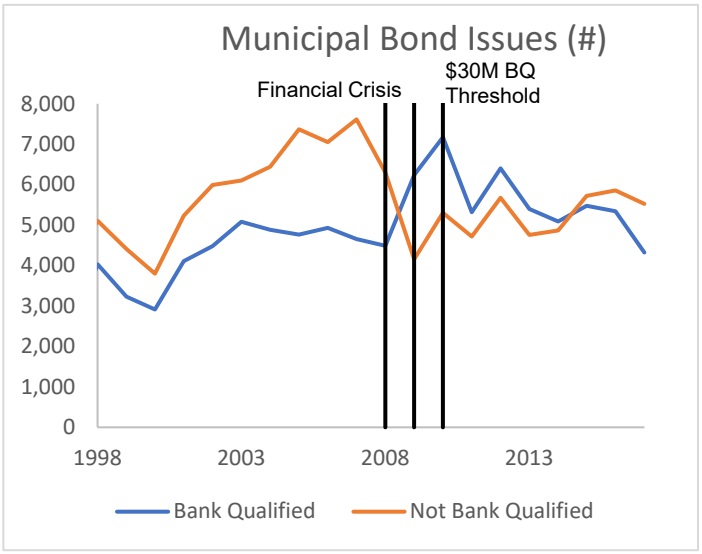
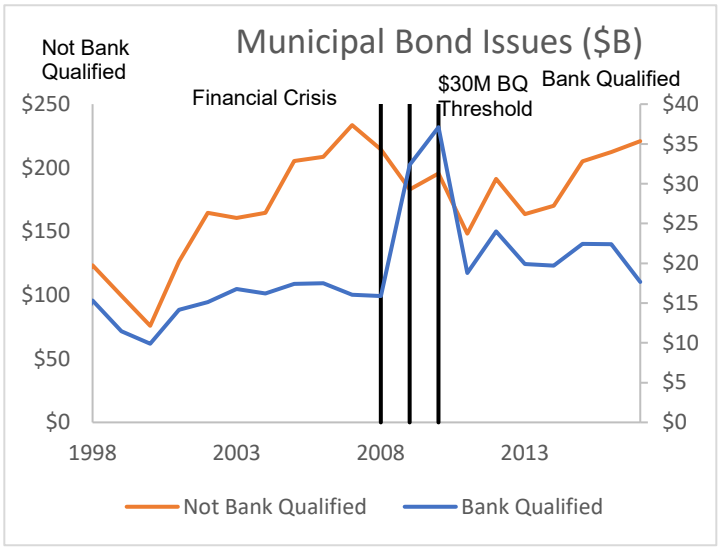


Figure A2 The distribution of revenue bonds and general obligations by use of funds.





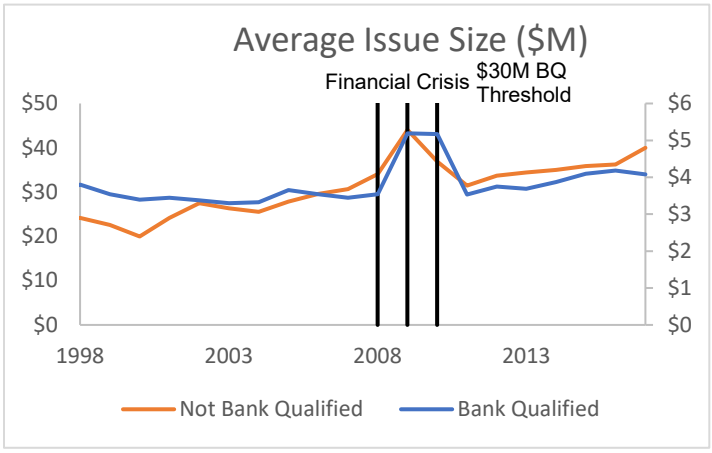


Figure A3. The time-series of bank-qualified and not bank-qualified bond issues.