

# **Debt Maturity, Credit Risk, and Information Asymmetry: The Case of Municipal Bonds**

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Using a system of equations approach, this paper empirically tests the impact of credit quality, asset maturity, and other issuer and issue characteristics on the maturity of municipal bonds. We find that under conditions of lower information asymmetry that prevails in the municipal sector, higher-rated bonds have longer maturities than low-rated bonds. This result differs from that observed in the corporate sector. Overall, our results support the asset maturity hypothesis. In addition, our analysis finds that fundamentals matter. Issue features that provide additional protection or convenience to the investor tend to increase debt maturity.

Keywords: municipal bonds, debt maturity, risk, credit quality, information asymmetry

JEL classifications G110, G120, G140

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## **1. Introduction**

The debt maturity literature (see for example Flannery, 1986; Diamond, 1991; Berger, Espinosa-Vega, Frame, and Miller, 2005; Bali and Skinner, 2006) emphasizes the importance of credit risk and information asymmetry in the debt maturity decision for corporate firms. In the absence of information asymmetry, issuers tend to match debt maturity to asset maturity to minimize debt agency problems. Under information asymmetry, credit quality of the issuer influences debt maturity. High quality firms prefer short-term debt to avoid moral hazard problems that result from poor quality firms trying to mimic them if transaction costs are not high enough. Poor quality firms issue long-term debt because they may not be able to roll over short-term debt if information about their low quality investment project is disclosed. If they are unable to refinance short-term debt at maturity, they face sub-optimal liquidation.

We analyze the choice of debt maturity for municipal bonds. Municipal bonds provide an interesting market to analyze the debt maturity decision because they are tax-exempt, free of cash flow restrictions, and not prejudiced by particular types of asset selections. The municipal bond market provides a natural laboratory where the friction of the underlying asset and its volatility are reduced or absent, allowing for better interpretation of the role of contract terms and issuer characteristics on the debt maturity decision.

Several additional factors make the municipal bond market attractive in investigating the debt maturity decision. First, municipalities are semi-sovereign. That is, they may not go bankrupt or even if they go bankrupt, they do not undergo liquidation or any change in ownership. Corporations could face liquidity problems when the debt matures, hence they face sub-optimal liquidation. In contrast, municipal default is rare and even in these cases, recovery rates have

been significantly higher relative to corporations. Even in bankruptcy, courts are not empowered to impair the municipality's ability to collect tax or issue securities.

Second, the widespread debt agency problem in the corporate sector is far less prevalent in the municipal sector. Actions relating to debt issuance could be influenced more by considerations such as patronage (Vijayakumar, 1995) or corruption (Butler, Fauver, and Mortal, 2008). Such issues as underinvestment or excessive risk-taking seen in the corporate sector are largely absent in the municipal sector. Investments are based on community service needs and not on profit. If there is greater growth opportunity, corporations reduce debt maturity to minimize debt agency problems. However, municipalities reduce debt maturity to lower financing costs. Third, corporations strive to achieve some optimal debt ratios and aim for an optimal capital structure. A municipality's level of debt is influenced by its expenditures on community programs and needs, voter approval, borrowing costs, and legal considerations that could impose debt ceilings. Officials, therefore, have to carefully balance the costs and benefits of increased debt. Fourth, there is less information asymmetry in local government decisions relative to corporations. Eliminating information asymmetry in relation to bond issuance decisions is difficult.<sup>1</sup> However, information asymmetries at local government levels are significantly lower because decisions are made after open public debates and local council approval. While a general uncertainty about project performance exists, the insider-outsider dichotomy surrounding information access that is prevalent in the corporate sector is not observed in the municipal sector.

Another institutional feature unique to municipal bond markets relates to the two types of bond issues, General Obligation (GO) and Revenue Bonds (RV). GO bonds are issued to finance a wide variety of operations. The bonds are guaranteed by the full faith and credit of the local

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<sup>1</sup> Municipal issuers don't have to explicitly disclose the costs of bond insurance; trading is infrequent; and the market is also not well regulated, all which account for opaqueness. We thank an anonymous referee for these factors.

government issuing the bond, and repayment is from taxation and other general revenue sources. RV bonds are issued to raise funds for specific long-term capital projects such as constructions of airports, parking facilities, etc. The revenue from the project they finance secures RV bonds, and repayment is from revenue derived from the investment. RV bondholders face project risk; GO bondholders face general municipality revenue risk. These features provide a good opportunity for testing the asset maturity hypothesis, which implies that RV bonds have longer maturity than GO bonds.

We test these issues using a large data set of tax-exempt municipal securities that combines bond issue data from Thomson Financial SDC Platinum (SDC) and demographic data of the issuing municipalities. Supporting the asset maturity hypothesis, our empirical analysis confirms our expectation that GO bonds have shorter maturities than RV bonds after controlling for contract terms and issuer and issue characteristics. Our results also show direct relations between credit quality and debt maturity, contrary to the results obtained for corporate debt under conditions of information asymmetry. We also find that municipalities choose long-term debt if issue (transaction) costs are high. Consistent with Bali and Skinner (2006), features, such as bond insurance, that favor the investor and increase security for the issue tend to increase debt maturity. Our analysis also indicates that certain factors affect debt maturities of GO and RV bonds differently. For example, higher leverage is associated with lower maturity for GO bonds but has no significant influence on the maturity of RV bonds.

## **2. Literature review and hypotheses development**

### *2.1. Information asymmetry and credit quality*

Existing literature on debt maturity focuses on corporate debt. Flannery (1986) and Diamond (1991) develop models of debt maturity choice based on the assumption of information asymmetry about the borrower's investment. Flannery's model implies negative relations be-

tween firm quality and its debt maturity. Diamond's model implies that high quality firms and extremely poor quality firms issue short-term debt, and medium quality firms issue long-term debt. Absent information asymmetry, borrowers match their debt maturity with asset maturity. Under informational asymmetries, high quality firms face moral hazard problems from issuing long-term debt (Barnea, Haugen, and Senbet, 1980) so they issue short-term debt and roll it over at maturity. Since transaction costs are lower than moral hazard costs for low quality firms, they try to mimic the high quality firms. However, if information is disclosed about their investments, they may not be able to roll over their debts, and they could face sub-optimal liquidation. Hence, there is a separating equilibrium in which high quality firms issue short-term debt and low quality firms issue long-term debt. Diamond's model argues that poor quality firms could be excluded from the long-term debt market because of high default risk and therefore issue only short-term debt, implying non-monotonic relations between firm quality and debt maturity.

Barclay and Smith (1995), Johnson (2003), Berger, Espinosa-Vega, Frame, and Miller (2005), and Gottesman and Roberts (2004) find support for the information asymmetry hypothesis. They find negative relations between firm quality, measured by credit rating and returns, and debt maturity. Such relations, however, change when informational asymmetries are removed. Debt maturity is then positively related to asset maturity and credit quality.

Little research exists relating to debt maturity in the municipal sector other than controlling for maturity while examining borrowing costs (see for example, Kessel, 1971; Vijayakumar and Daniels, 2006). Given lower information asymmetries with municipal bonds relative to corporate bonds, we expect high-rated issues to have longer maturities than the low-rated issues. Unlike corporate bonds, we expect positive relations between credit quality and debt maturity for the municipal bonds. Therefore, our first hypothesis is:

**H1:** Issues of higher credit quality have longer maturity.

We do not, however, expect that this relation will hold for both GO and RV issues. GO issues are guaranteed by the full faith and credit of the issuing authority, while RV bonds finance specific projects, have greater information asymmetries, and hence resemble corporate bonds. Because of this, we believe that the relation between debt maturity and credit quality is likely to be different for these two categories, leading to the following hypotheses:

**H1A:** GO issues of higher credit quality have longer maturities.

**H1B:** RV issues of higher credit quality have shorter maturities.

We use the Standard and Poor's or Moody's bond rating, whichever is better in the case of a split, (RATING) as a proxy for credit quality. We convert the credit rating of the issue to a 24-point ordinal scale with higher numbers indicating higher quality ratings. To control for possible quadratic relations between maturity and ratings, we also use the squared measure of ratings (RATESQ) in our analysis.

**Bond Insurance:** Bond insurance serves to reduce credit risk. In that sense, insurance can serve as a substitute for bond ratings. Gore, Sachs, and Trzcinka (2004) show that municipal issuers in unregulated disclosure environments trade off between disclosure and insurance. Nanda and Singh (2005) show that the benefits to insurance increase with maturity. Thus, bond insurance serves the dual purpose of reducing information asymmetries and reducing credit risk. Prior studies show that bond insurance reduces borrowing costs (Kidwell, Sorensen, and Wachowicz, 1987) and transaction costs (Daniels and Vijayakumar, 2001). These results suggest that bond insurance would lead to longer maturities for municipal bonds, leading to Hypothesis 2:

**H2:** Issues with bond insurance have longer maturities.

We expect that this relation would definitely hold for GO bond issues since lower information asymmetries are associated with these issues. However, because of differences between GO and RV bonds discussed earlier, we believe that the relation between insurance and maturity would be reversed for RV bonds. Thus, we hypothesize:

**H2A:** GO issues with bond insurance have longer maturities.

**H2B:** RV issues with bond insurance have shorter maturities.

We use a dummy variable (DINS) that takes a value of 1 for insured issues in our tests.

**Leverage:** In the municipal sector, leverage is positively associated with credit risk. Higher amounts of debt affect bond ratings and borrowing costs. Legal limits on GO debt also exist.

Longer maturities can lead to local governments getting too close to the debt limits or exceeding them. On the other hand, higher amounts of debt can result in greater monitoring from the bondholders and a reduction in information asymmetries permitting longer maturities. We believe, however, that the influence of credit risk and legal limits on debt would be greater than incentives caused by reduction in information asymmetries, thus leading to Hypothesis 3.

**H3:** Issues with higher leverage have shorter maturities.

We believe that this relation applies to both GO and RV bonds. Yet, since revenue debt is backed by project-specific revenues and generally are not subject to the debt limitations, we believe that this association would be stronger for GO bonds. We measure leverage (LEV) as the ratio of total debt to the sum of total debt, cash and securities, and capital expenditures for the bond issuer.

## *2.2. Asset maturity hypotheses*

Issuers try to match debt maturity with asset maturity. As discussed previously, the asset maturity hypothesis implies that GO bonds should be of shorter maturity than RV bonds. Also, given that borrowing costs are lower for shorter maturities, efficiency arguments (for city man-

agers) and political incentives (for mayors) could dictate that they follow the lower borrowing cost alternative leading to shorter maturities for GO bonds.<sup>2</sup> Thus, Hypothesis 4 is as follows:

**H4:** GO bonds have shorter maturities than RV bonds.

To test this hypothesis, we include in our tests a dummy variable DGO that takes a value of 1 for a GO bond and 0 if it is a RV bond.

### *2.3. Information asymmetry and uncertainty*

Herfindahl-Hirschman Index: While the degree of information asymmetry in the municipal bond market is low, we consider the general uncertainty of the bond issue and its impact on debt maturity by examining factors that could contribute to the uncertainty. In our analysis, we include the Herfindahl-Hirschman Index (HHI1) for municipalities based on their sources of revenues. The higher the HHI1 index, the lower the informational asymmetry and the longer the maturity of debt. Therefore, we propose the following:

**H5:** There is a positive relation between the HHI1 and debt maturity.

The HHI1 index may not be as relevant for RV bonds relative to GO bonds since project-specific revenues back RV bonds. Hence, we believe that the relation between the index and debt maturity will be more relevant for GO bonds.

Another factor generating uncertainty in relation to local government debt could be the levels of economic activity in the state. Greater economic activity, while representing potential growth opportunities, could also induce more uncertainty and greater information asymmetries, in turn causing a municipality's debt maturity to be shorter. Thus, Hypothesis 6 is:

**H6:** There is a negative relation between economic activity levels and debt maturity.

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<sup>2</sup> Political patronage can lower maturities in the municipal sector (e.g., Vijayakumar, 1995; Butler, Fauver, and Mortal, 2008). The financial services industry (e.g., underwriting and financial services firms) is a large political contributor. Firms can extract rents and payback by obtaining more business from local governments. Shorter maturities increase the likelihood of more future debt offerings and hence more business and greater rents for these firms.

We consider the level (and changes; DOUTPUT) of economic activity growth opportunities by using an index of the state's economic activity (OUTPUT). We use the state coincident indexes reported by the Federal Reserve Bank of Philadelphia to measure OUTPUT and DOUTPUT.

#### 2.4. Information asymmetry and issue-specific features

**Bid Type:** The two most commonly used methods of issuance are competitive and negotiated bids. Under competitive bidding, underwriters compete to win the contract. However, with competitive bidding, underwriters have little influence on the issuer and on issue features. They have no role in structuring the issue and may have to rely on public information in evaluating the issue. Under negotiated bid or private placement, underwriters have significant influence in structuring the issue and in disclosing information. In fact, one of their roles is to alleviate information asymmetries by providing information to potential buyers (Butler 2008). Negotiated offerings can be structured to have longer maturities since there is greater potential to reduce information asymmetries associated with the issue. Thus, Hypothesis 7 is:

**H7:** *Negotiated or private placement issues will have longer maturities than competitively bid issues.*

DBIDC is a dummy equal to one for competitively bid issues. We also include an interaction term (DINS\*DBIDC) in our analysis.

**Syndicate structure:** In a municipal bond issue, the underwriting syndicate gathers information, prices the issue, underwrites, and distributes the issue to investors. Syndicated issues are likely to benefit from greater information availability because of the information gathering and dissemination roles of the syndicate members. In addition, larger syndicates are expected to do a better job in the information gathering process, thereby reducing information asymmetry and resulting in longer maturity of debts. We expect the following:

**H8:** *Issues that are syndicated have longer maturities.*

**H9:** Issues with larger syndicate size have longer maturities.

The dummy variable (DSYND) is coded as one if the issue is syndicated. We measure syndicate size (NOMGRS) by the number of underwriters in the syndicate.

### 3. Methods and data

Barclay, Leslie, and Smith (2003) suggest that factors such as leverage, maturity, covenants, convertibility, etc., are endogenous facets of corporate capital structure that are often chosen concurrently. We expect similar endogeneity in the municipal sector. Therefore, we test our hypotheses by estimating the following system of three equations simultaneously using the seemingly unrelated regression (SUR) estimation method (Zellner, 1962).

$$\begin{aligned}
 RATING_i = & \alpha_0 + \alpha_1(\log(AGREV_i)) + \alpha_2(AGEXPPC_i) + \alpha_3(DSVC_i) + \alpha_4(DCITY_i) + \alpha_5(HHI1_i) + \alpha_6(TAXB_i) \\
 & + \alpha_7(DGO_i) + \alpha_8(DREF_i) + \alpha_9(DFINAD_i) + \alpha_{10}(DBANKM_i) + \alpha_{11}(NOMGRS_i) + \alpha_{12}(REP_{-25}_i) \\
 & + \alpha_{13}(DSYND_i) + \alpha_{14}(\log(SIZE_i)) + \alpha_{15}(DBIDC_i) + \alpha_{16}(DINS_i) + \alpha_{17}(DINS_i * DBIDC_i) + \alpha_{18}(DRP_i) \\
 & + \alpha_{19}(IP2_i) + \alpha_{20}(SLOPE_i) + \alpha_{21}(OUTPUT_i) + \alpha_{22}(DOUTPUT_i) + \sum_{j=23}^{26} \alpha_j(REG_j) + \sum_{u=27}^{35} \alpha_u(USE_u) \\
 & + \sum_{y=36}^{49} \alpha_y(YEAR_y) + \alpha_{50}(GSPREAD_i) + \alpha_{51}(LEV2_i) + \alpha_{52}(YMAT_i) + \varepsilon_r \dots\dots\dots(1)
 \end{aligned}$$

$$\begin{aligned}
 LEV2_i = & \beta_0 + \beta_1(\log(AGREV_i)) + \beta_2(AGEXPPC_i) + \beta_3(DSVC_i) + \beta_4(DCITY_i) + \beta_5(HHI1_i) + \beta_7(TAXB_i) \\
 & + \beta_8(TIEDD_i) + \beta_9(DGO_i) + \beta_{10}(DREF_i) + \beta_{11}(\log(SIZE_i)) + \beta_{12}(DBIDC_i) + \beta_{13}(DINS_i) \\
 & + \beta_{14}(DINS_i * DBIDC_i) + \beta_{15}(DRP_i) + \beta_{16}(IP2_i) + \beta_{17}(SLOPE_i) + \beta_{18}(OUTPUT_i) + \sum_{j=19}^{22} \beta_j(REG_j) \\
 & + \sum_{u=23}^{31} \beta_u(USE_u) + \sum_{y=32}^{45} \beta_y(YEAR_y) + \beta_{46}(GSPREAD_i) + \beta_{47}(RATING_i) + \beta_{48}(YMAT_i) + \varepsilon_l \dots\dots\dots(2)
 \end{aligned}$$

$$\begin{aligned}
 YMAT_i = & \gamma_0 + \gamma_1(\log(AGREV_i)) + \gamma_2(AGEXPPC_i) + \gamma_3(DSVC_i) + \gamma_4(HHI1_i) + \gamma_5(TAXB_i) \\
 & + \gamma_6(DGO_i) + \gamma_7(DREF_i) + \gamma_8(DFINAD_i) + \gamma_9(DBANKM_i) + \gamma_{10}(NOMGRS_i) + \gamma_{11}(REP_{-25}_i) \\
 & + \gamma_{12}(DSYND_i) + \gamma_{13}(\log(SIZE_i)) + \gamma_{14}(DBIDC_i) + \gamma_{15}(DINS_i) + \gamma_{16}(DINS_i * DBIDC_i) + \gamma_{17}(DRP_i) \\
 & + \gamma_{18}(IP2_i) + \gamma_{19}(SLOPE_i) + \gamma_{20}(OUTPUT_i) + \sum_{j=21}^{24} \gamma_j(REG_j) + \sum_{u=25}^{33} \gamma_u(USE_u) + \sum_{y=34}^{47} \gamma_y(YEAR_y) \\
 & + \gamma_{48}(GSPREAD_i) + \gamma_{49}(RATING_i) + \gamma_{50}(RATESQ_i) + \gamma_{51}(LEV2_i) + \varepsilon_m \dots\dots\dots(3)
 \end{aligned}$$

In these equations, subscript  $i$  identifies the bond issue, and  $\varepsilon_r$ ,  $\varepsilon_l$ , and  $\varepsilon_m$  represent error terms of the rating, leverage, and maturity equations, respectively. Our approach is similar to that in Billet, King, and Mauer (2007) and Barclay, Leslie, and Smith (2003) who also use a system of equations approach to analyze corporate debt maturity.

We control for market-wide interest rates by including the slope of the yield curve (SLOPE) measured as the yield difference between ten-year and three-month treasuries at the time of issue. When the yield curve is upward sloping, investors can expect future interest rates to increase and will try to lock in current rates long term by issuing longer-term debt. We also control for the default risk premium (DRP), measured as the yield difference between BBB and AAA rated bonds, and the inflation rate (IP2) at the time of the issue. Higher values for both are expected to be associated with lower maturities as issuers can expect lower interest rates in the future and therefore issue short-term debt to reduce borrowing costs.

Following Bali and Skinner (2006) and Gottesman and Roberts (2004), contract features in the bond issue that protect the creditor in the form of additional monitoring mechanism, seniority, or security tend to increase debt maturity. We include dummy variables to control for bank-managed issues (DBANKM) and issues with financial advisors (DFINAD), and we expect these issues to have longer maturities. Similarly, we include a measure of underwriter reputation (REP\_25), coded as one if the issue is managed by a top 25 rated underwriting firm. Issues managed by more reputed underwriters are expected to have longer maturities.

Previous studies find positive relations between size of the issue and debt maturity. Long-term debt involves more issuing costs and large issuers, and large size issues have scale advantage to absorb these costs. We include LOG(SIZE), the log of the size of the issue, in the analysis. Additionally, we include a variable DREF that takes on a value of one if it is a refunding is-

sue since refunding type issues are more likely to be short-term by design and are more complex in structure (Vijayakumar and Daniels, 2006).

We include the following issuer characteristics as controls: LOG(AGREV), the log of aggregate revenue of the issuer to proxy for the size of the issuer; AGEXPPC, the aggregate per capita expenditure for the issuer; and a dummy variable DCITY that takes a value of 1 (0) if the issuer is a city (county). We control for possible regional variations by including dummy variables for the regions of the country where the issuer is located. As additional control measures we include a debt service measure, (DSVC) measured as total interest expense divided by total revenues and the ratio of property taxes to total tax revenue (TAXB). We also control for issue purpose using dummy variables that represent the Bond Buyer classification for use of proceeds. Finally, our model includes year fixed effects to control for intertemporal variations.<sup>3</sup>

Table 1 presents descriptions of these variables.

**Insert Table 1 about here**

### **3.1. Data and sample description**

Our sample consists of tax-exempt city and county bonds issued during the period 1990-2004. The bond data are obtained from the SDC municipal database. We include all bonds issued by cities and counties since census data is available only for these municipal entities. We exclude issues of maturity less than one year. Our final sample has 27,116 bond issues with a complete set of data. Table 2 presents a brief description of the sample.<sup>4</sup>

**Insert Table 2 about here**

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<sup>3</sup> Including all variables in the maturity equation for the ratings and leverage equations could result in an identification problem. Therefore, we exclude TIEDD from the ratings equation. We also do not include DFINAD, DBANKM, NOMGRS, REP\_25, DSYND, DOUTPUT, and RATESQ in our LEV2 equations, and TIEDD and DOUTPUT in the maturity equation.

<sup>4</sup> All census data are from the Census Bureau's Annual Survey of Governments. Data relating to inflation, the slope of the yield curve, and default risk premium are from the Federal Reserve.

The sample is made up of 21,009 (77%) GO bonds and 6,107 (23%) RV bonds. Competitive bids constitute 45% (51% for GO and 24% for RV bonds) and negotiated bids constitute 55%. City-issued (county-issued) bonds constitute 31% (69%) of the sample. The average issue size of the sample is \$18.77 million, \$16.28 (\$27.37) million for GO (RV) bonds. The average issuer size by revenue is \$818 million, being \$889 million for RV bonds and \$798 million for GO bond issuers.

Three percent of our sample is AAA rated, 15% AA, 12% are rated A, 69% are not rated and the rest are BBB to B. Insured issues constitute 48% of the sample, 46% (54%) for GO (RV) issues. Of the issues, 94% are managed by single underwriters, while the rest are syndicate-managed. Bank-managed issues are 11% (12% for GO and 7% for RV). The top 25 ranked underwriters lead-manage 57% of our sample issues (53% for GO and 67% for RV), and 57% of all issues have a financial advisor. The proportion of property tax to total tax revenue (or tax burden) of the issuer averages 70%, 72% for GO bonds and 61% for RV bonds. The HHI1 index of revenue sources average 0.37, and GSPREAD, the gross spread for the issue, averages 104 basis points for the full sample. Gross spread is higher for RV issues relative to GO issues.<sup>5</sup>

## **4. Results**

### *4.1 Descriptive statistics*

Table 3 presents the maturity of municipal bonds by type, intended use of proceeds, size of issue, tax burden, and some contract terms. The average maturity for the full sample is 16.34 years. Consistent with our expectations, the average maturity for RV bonds at 19.29 years is significantly greater than the average maturity of 14.13 years for GO bonds.

**Insert Table 3 about here**

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<sup>5</sup> Several correlations (not reported in detail) are significant at  $p < 0.01$ , but they do not appear to be large enough to cause multicollinearity problems.

Examining maturity by use of proceeds indicates that housing, health care, and utilities tend to have longer maturities than education, environment, public facilities, and general purpose. These results are consistent with Bali and Skinner (2006), who find that maturities of new issue corporate bonds are related to the use of the proceeds and the asset maturity of the funded project.

Municipal bond maturity monotonically increases with increases in issue size. Bond maturities average 11.05 years for the first size quartile and 20.24 years for the fourth quartile. Issuing long-term bonds involves significant issue costs, and large size issuers have a scale advantage in absorbing these costs. Insured issues have significantly longer average maturity than uninsured issues. This is consistent with the additional security arguments of Bali and Skinner (2006) presented earlier. Consistent with our expectations, competitively bid issues have significantly shorter maturities than negotiated issues.

Average maturities of refunding and non-refunding issues are 19.08 years and 14.66 years, respectively. Debt maturities also vary by credit rating categories. The non-rated bonds have the shortest maturities, but the relations between debt maturity and rating classes are not monotonic. Syndicate size, the concentration of revenue measured by HHI1 index, tax burden, and the size of the municipality measured by its total revenue also show cross-sectional variations in debt maturities. Issues with multiple managers have longer maturities than issues with a single manager. Issues of larger issuers show longer maturities.

#### **4.2. Regression analysis**

Table 4 presents results of regression analysis using the SUR approach on the full sample (both GO and RV issues together) of municipal bond issues. We focus on the relation between YMAT and our variables of interest, as specified in our hypotheses. We first examine the full sample results without the inclusion of GSPREAD. Our first hypothesis is the influence of the credit rating on debt maturity. The coefficient of RATING is positive and statistically significant.

Such direct relations between credit quality and debt maturity is consistent with the results obtained for corporate debt under reduced information asymmetry (Berger , Espinosa-Vega, Frame, and Miller, 2005). Our second hypothesis suggests a direct relation between insured issues and maturity. The coefficient of DINS is positive and significant, supporting Hypothesis 2. We also expect a negative relation between leverage and debt maturity. The coefficient of LEV2 is negative but not significant.<sup>6</sup>

The coefficient for DGO in Table 4 is negative and significant, supporting our fourth hypothesis that GO bonds have shorter maturities than RV bonds. Likewise, the coefficient of HHI1 is positive and significant, supporting our fifth hypothesis that higher levels of the HHI1 index lead to lower levels of information asymmetry and hence longer debt maturities. Hypothesis 6 suggests a negative relation between levels of economic activity (OUTPUT) and debt maturity. The coefficient of OUTPUT is negative and significant, supporting our hypothesis. The coefficient of DBIDC is negative and significant, supporting Hypothesis 7 that negotiated issues have longer maturities than competitively bid issues. This probably results from the issuer's desire to match debt maturity to asset maturity and negotiate on that basis. It could also be due to reductions in information asymmetry consequent to negotiations. Reduced information asymmetries leading to longer maturities is supported by the results for the interaction variable DINS\*DBIDC. The coefficient of this variable is positive and significant. Insurance appears to certify credit quality and reduce information asymmetries, leading to longer maturities. The coefficient of DSYND is positive as predicted but not significant. However, the coefficient of NOMGRS is positive and significant, supporting Hypothesis 9. The larger the syndicate size, the

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<sup>6</sup> We also replicate our entire analysis using an alternate measure for leverage, debt per capita, computed as total debt divided by total population, and for underwriter reputation, calculated as the contemporaneous market share (by dollar volume) of the lead manager for the issue. The results are qualitatively similar to those reported.

greater its information gathering ability and the lower the degree of informational asymmetry. Hence, we have positive relations between syndicate size and debt maturity.

Overall, these results support the results of the Flannery (1986) and Diamond (1991) models that under conditions of lowered information asymmetry, there is a positive relation between credit quality and maturity. The result relating to DGO provides support for the asset maturity hypothesis showing that in the municipal sector, issuers try to match debt maturity with asset maturity.

Several control measures are also significant. LOG(SIZE) is positive and significant, showing that larger issues have longer maturities. The coefficient of SLOPE is negative as expected but not significant. The coefficient of LOG(AGREV) is negative and significant, suggesting that larger issuers issue shorter maturity debt. Similarly, coefficients for DBANKM and DFINADV are also negative and significant. It appears that issues managed by banks and with financial advisors could be steering their issuers to shorter-term debt since borrowing costs are generally lower for shorter maturities.

Similar results are observed when we examine the estimation results for the subsample with GSPREAD data and with YMAT as the dependent variable. The explanatory power of the model is higher with the inclusion of GSPREAD. The coefficient of GSPREAD is positive and significant, consistent with the explanation that high transaction costs lead to issuance of longer maturity debts. While results for most variables are similar to what we see in the regression without GSPREAD, the coefficient of RATING is not significant. Also, the coefficient of DINS\*DBIDC is negative and significant when GSPREAD is included. An examination of the subsample with GSPREAD data shows that these are larger issues (mean value of \$24.93 million for issues with GSPREAD compared to \$13.75 million for issues without GSPREAD). The credit

quality of these issues is also lower (lower bond ratings) relative to the sample that does not have GSPREAD. Hence, it is possible that even with insurance, information asymmetries for these larger issues could be greater, thus leading to lower maturities.

**Insert Table 5 about here**

We also estimate separate regressions for GO and RV bonds. The results are in Table 5. Hypotheses 1A and 1B make different predictions about the association between credit quality and maturity for GO and RV bonds. The coefficient of RATING in the GO (RV) bonds estimation is positive (negative) and significant. This further shows that under conditions of reduced information asymmetry, credit quality and maturity are positively related, while with increased information asymmetry they are negatively related. Except for the tax-exempt feature, RV bonds are in many respects similar to corporate issues. The negative relation between RATING and debt maturity for RV bonds is consistent with the results observed in the corporate sector under greater information asymmetry. Different results are also observed as predicted for the DINS variable. The coefficient of DINS is positive (negative) and significant in the GO (RV) bonds subsample. Also, LEV2 is negative and significant for GO bonds but not significant for RV bonds, as expected. Leverage affects GO bonds since they are subject to statutory debt limitations. For RV bonds, project-specific information plays a greater role. The coefficient of HHI1 is positive and significant for GO bonds and insignificant for RV bonds. The HHI1 index and OUTPUT have greater impact for GO bonds since RV bonds are affected more by project-specific factors and GO bonds more by general conditions of the issuers. Also, as predicted, the coefficient of OUTPUT is negative and significant for GO bonds and insignificant for RV issues.

Competitively bid issues (DBIDC) have shorter maturities for GO issues but do not appear to influence RV issues. The coefficient of DINS\*DBIDC is positive and significant for GO

bonds, providing further evidence that reduced information asymmetry leads to longer maturities. The coefficient of DSYND is positive and significant for GO issues, as predicted, but is not significant for the RV issues. The coefficient of LOG(SIZE) is positive and significant for both GO and RV issues. Larger issues have longer maturities for both GO and RV issues.<sup>7</sup>

## 5. Conclusions

An examination of the determinants of the municipal debt maturity decision provides considerable insight into the role of credit risk, information asymmetry, and other contract features. Under conditions of lowered information asymmetries that exist in the municipal sector, we develop and test a model that shows positive relations between credit quality and debt maturity for the municipal bonds for our full sample and for our GO subsample. This is a departure from the current literature relating to corporate bonds that finds inverse relations between credit quality and debt maturity for corporate bonds where greater information asymmetry exists.

Revenue bonds have longer maturities than general obligation bonds. This is consistent with the asset maturity hypothesis given that RV bonds finance special purpose long-term projects while GO bonds are used for more general expenditures. The relation between credit quality and debt maturity is also negative for RV bonds. This relation is similar to that for corporate bonds and supports the view that under increased information asymmetry an inverse relation exists between debt maturity and credit quality. We find that factors that reduce information asymmetry tend to increase debt maturity. Our results from the municipal sector provide additional insights regarding the effect of informational asymmetries on the debt maturity decision.

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<sup>7</sup> We also estimate models separately for GO and RV issues where we have GSPREAD data. Results, available from the authors, show that RATING is significantly and positively (negatively) associated with GO (RV) issues. The coefficient of DINS is positive and significant for GO but not RV issues. The coefficient of LEV2 is negative and significant as predicted for GO and RV issues. The coefficient of GSPREAD is positive and significant (similar to full sample results) for both GO and RV issues, indicating that transaction costs are greater for longer term issues.

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**Table 1**  
**Variable descriptions**

<b>Variable code</b>	<b>Description</b>
<i>AGEXPPC</i>	Aggregate expenditure per capita (Aggregate expenditure divided by total population).
<i>DCITY</i>	Dummy variable with a value of 1 for city issuer and 0 for county issuer
<i>DSVC (%)</i>	Debt service ratio determined as total interest expense divided by total revenue, expressed as a percent.
<i>HHI1</i>	Herfindahl-Hirschman index of revenue sources
<i>LOG(AGREV)</i>	Log of aggregate revenue of the municipality (size of issuer)
<i>TAXB</i>	Tax burden, the ratio of property tax to total tax revenue
<i>TIEDD</i>	Interest coverage ratio multiplied by dummy variable identifying issuers with debt
<i>DBANKM</i>	Dummy variable with a value of 1 for bank managed issues
<i>DBIDC</i>	Dummy variable with a value of 1 for competitive bid issues
<i>DFINAD</i>	Dummy variable with a value of 1 for issues that retained financial advisor
<i>DGO</i>	Dummy variable with a value of 1 for General Obligation bonds and 0 for Revenue bonds
<i>DINS</i>	Dummy variable with a value of 1 for insured issues
<i>DREF</i>	Dummy variable with a value of 1 for refunding type issues
<i>DSYND</i>	Dummy variables with a value of 1 for syndicated issues
<i>LOG(SIZE)</i>	Log of issue size in dollars (size of issue)
<i>NOMGRS</i>	Number of managers involved in the issue
<i>REP_25</i>	Dummy variable with a value of 1 for issues underwritten by top 25 underwriter
<i>OUTPUT</i>	Index of the state's economic activity during the month of the issue
<i>DOUTPUT</i>	Monthly change in the index of the state's economic activity
<i>DRP</i>	Default risk premium measured as the yield difference between BBB and AAA rated bonds
<i>IP2</i>	Inflation rate during the month of issue, the series used excludes food and energy
<i>SLOPE</i>	Slope of the yield curve measured as the difference between 10-year and 3-month treasuries
<i>REG_FW, REG_MW, REG_SE, REG_SW</i>	Regional dummies: FW=far west, MW=midwest, SE=southeast, SW=southwest, NE=Northeast (NE is not coded)
<i>USE_DV, USE_ED, USE_EF, USE_EP, USE_GP, USE_HC, USE_HS, USE_PF, USE_TR</i>	Dummies for the type of use of the proceeds: DV=development, ED=education, EF=environmental facilities, EP=electric power, GP=general purpose, HC=healthcare, HS=housing, PF=public facilities, TR=transportation, and UT=utilities (we did not code UT)
<i>Y90 – Y04</i>	Dummies for year of issue (1990–2004) (Year 2004 is not coded)
<i>GSPREAD</i>	Gross spread of the issue, transaction cost as a percent of gross issue size
<i>RATING</i>	Credit rating of the issue converted to a 24-point ordinal scale with higher numbers indicating higher quality.
<i>RATESQ</i>	Squared values of the credit rating ordinal scales
<i>LEV2</i>	Leverage, the ratio of total debt to the sum of total debt, cash and securities, and capital Expenditure
<i>DPCPITA</i>	Total debt divided by total population, used as an alternative measure of leverage
<i>YMAT</i>	Maturity of the debt issue in years

**Table 2**  
**Descriptive statistics**

The mean of each discrete variable indicates the percentage of the sample. Figures are in \$million for SIZE and AGREV (log form used in regressions). All variables are defined in Table 1.

Variable	Full sample N=27,116		GO bonds		RV bonds N=6,107	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
<b>CONTINUOUS</b>						
AGEXPPC	1.09	1.39	1.04	1.49	1.23	0.91
DSVC (%)	5.43	6.50	4.89	5.60	7.27	8.68
HHI1	0.37	0.10	0.38	0.10	0.34	0.13
AGREV*	\$818.00	\$3,447.0	\$798.00	\$3,695.0	\$889.00	\$5,467.0
TAXB	0.70	0.25	0.72	0.25	0.61	0.26
TIEDD	85.09	1428.56	81.23	633.49	98.36	2771.57
SIZE*	\$18.77	\$53.37	\$16.28	\$50.41	\$27.37	\$61.74
NOMGRS	2.36	2.67	2.41	2.78	2.21	2.25
OUTPUT	129.80	19.04	130.28	18.48	128.29	20.81
DOUTPUT	0.20	0.27	0.20	0.28	0.22	0.26
DRP	87.48	23.77	87.94	24.04	85.92	22.77
IP2	0.03	0.03	0.03	0.03	0.03	0.03
SLOPE	195.00	119.00	195.00	118.00	198.00	118.00
GSPREAD	1.04	0.74	1.00	0.78	1.13	0.64
LEV2	0.42	0.20	0.42	0.20	0.43	0.19
<b>DISCRETE</b>						
DCITY	0.31		0.25		0.55	
DBANKM	0.11		0.12		0.07	
DBIDC	0.45		0.51		0.24	
DFINAD	0.57		0.57		0.58	
DGO	0.77					
DINS	0.48		0.46		0.54	
DREF	0.14		0.13		0.14	
DSYND	0.06		0.05		0.08	
REP_25	0.57		0.53		0.67	
AAA Rated	0.03		0.04		0.01	
AA Rated	0.15		0.15		0.12	
A Rated	0.12		0.11		0.14	
BBB Rated	0.02		0.02		0.03	
BB Rated	0.01		0.00		0.01	
B Rated	0.01		0.00		0.01	
Non-Rated	0.69		0.68		0.69	

**Table 3**  
**Debt maturity by classification**

Purpose describes the purpose of the assets funded by the municipal bonds (as classified by the Bond Buyer) and is intended to illustrate differences between short and long horizon assets. Tax burden represents the portion of total taxes supported by the property tax, and credit rating represents the best of the S&P and Moody credit rating with the S&P rating shown. Issuer size represents the size of the issuer based on total revenue. HHI1 represents the Herfindahl-Hirschman Index based on proportion of revenue from different sources.

	<b>Mean</b>	<b>Median</b>	<b>Std.</b>	<b>Minimum</b>	<b>Maximum</b>	<b>N</b>
Full sample	16.34	16.00	8.12	1.00	32.00	27,116
RV bonds		20.00	7.51	1.00	32.00	6,107
GO bonds	14.13	15.00	7.93	1.00	32.00	21,009
<b>CREDIT RATINGS</b>						
AAA	17.27	18.77	7.04	1.50	31.69	878
AA	15.66	15.93	6.70	1.00	31.98	3,925
A	16.11	15.51	7.24	1.17	31.78	3,092
BBB	17.30	17.74	7.50	1.00	31.52	522
Non-rated	14.88	15.75	8.56	1.00	32.86	18,699
<b>INSURANCE</b>						
Insured		19.00	6.38	2.00	32.00	14,418
Not insured	12.69	12.51	8.68	1.00	31.00	12,698
<b>REFINANCING</b>						
Refunding		20.00	5.58	1.00	32.00	3,622
Not refunding	14.66	15.00	8.30	1.00	32.00	23,494
<b>BID TYPE</b>						
Competitive		15.01	8.05	1.00	32.00	12,146
Negotiated	16.22	16.55	8.06	1.00	32.00	14,970
<b>SIZE</b>						
1 <sup>st</sup> quartile	11.05	10.01	7.46	1.00	31.00	6,777
2 <sup>nd</sup> quartile	15.66	15.08	6.24	1.00	31.00	6,777
3 <sup>rd</sup> quartile	17.47	18.76	6.38	1.00	32.00	6,777
4 <sup>th</sup> quartile	20.24	20.00	6.50	1.00	32.00	6,785
<b>SYNDICATE SIZE</b>						
Single manager		14.13	8.54	1.00	32.00	10,510
Multiple manager	17.83	19.01	6.62	1.00	32.00	16,606

\*\*\* indicates means within category are significantly different at  $p < 0.01$ .

**Table 3 (Continued)**

	<b>Mean</b>	<b>Median</b>	<b>Std.Dev.</b>	<b>Minimum</b>	<b>Maximum</b>	<b>N</b>
<b>HHI1</b>						
1 <sup>st</sup> quartile	16.61	18.25	8.18	1.00	31.00	6,777
2 <sup>nd</sup> quartile	14.00	15.00	7.87	1.00	32.00	6,777
3 <sup>rd</sup> quartile	14.34	15.00	8.13	1.00	30.36	6,777
4 <sup>th</sup> quartile	16.10	17.06	8.01	1.00	32.00	6,785
<b>Tax burden</b>						
1 <sup>st</sup> quartile	16.13	17.26	8.24	1.00	31.00	6,777
2 <sup>nd</sup> quartile	15.00	15.51	8.18	1.00	32.00	6,777
3 <sup>rd</sup> quartile	16.00	17.13	8.43	1.00	32.00	6,777
4 <sup>th</sup> quartile	13.95	14.93	7.42	1.00	32.00	6,785
<b>Issuer size</b>						
1 <sup>st</sup> quartile	14.46	15.00	7.39	1.00	32.00	6,777
2 <sup>nd</sup> quartile	14.95	15.50	7.97	1.00	32.00	6,777
3 <sup>rd</sup> quartile	15.27	16.00	8.11	1.00	32.00	6,777
4 <sup>th</sup> quartile	16.38	18.00	8.82	1.00	32.00	6,785
<b>PURPOSE</b>						
Development	18.21	19.45	7.09	1.00	31.00	268
Education	14.52	15.00	8.13	1.00	32.00	16,736
Environment	17.37	19.56	7.48	1.00	32.00	118
Electricity	18.59	19.78	7.31	1.00	32.00	298
General purpose	14.70	15.33	7.93	1.00	32.00	5,263
Healthcare	22.21	23.00	7.24	1.00	32.00	280
Housing	24.35	29.30	7.67	1.00	32.00	160
Public facilities	15.38	16.58	8.19	1.00	32.00	701
Transportation	16.46	17.02	7.95	1.00	32.00	624
Utilities	18.49	20.00	7.06	1.00	31.00	2,668

**Table 4**  
**SUR results for the full sample and the sample with GSPREAD**

All variables are described in Table 1. Robust standard errors of coefficients are in parentheses.

	Full sample (not using GSPREAD)			Including GSPREAD variable		
	RATING	LEV2	YMAT	RATING	LEV2	YMAT
Constant	-21.3761*** (1.214226)	0.2972*** (0.022376)	25.0826*** (1.645204)	-11.35297*** (1.693857)	0.257782*** (0.032222)	20.6252*** (1.430504)
LOG(AGREV)	0.1801*** (0.03444)	0.0216*** (0.000621)	-0.1995*** (0.046442)	0.332972*** (0.0503)	0.017759*** (0.000946)	-0.339649*** (0.042548)
AGEXPPC	-0.0948** (0.039597)	0.0014** (0.00073)	-0.25*** (0.053333)	-0.044854 (0.074795)	-0.001834 (0.001424)	-0.131692** (0.063255)
DSVC	0.0488*** (0.008995)	0.0097*** (0.000155)	-0.0076 (0.012122)	-0.014163 (0.012614)	0.010125*** (0.000222)	0.009696 (0.010664)
DCITY	3.2441*** (0.203562)	-0.0055 (0.003771)	-1.9502*** (0.275369)	2.386766*** (0.276869)	0.005863 (0.00529)	-0.31321 (0.234787)
HHI1	-0.4148 (0.53445)	-0.2711*** (0.00971)	3.3839*** (0.719554)	0.509932 (0.726813)	-0.261093*** (0.013649)	1.577811** (0.614346)
TAXB	-0.0135 (0.20834)	-0.064*** (0.003806)	0.1972 (0.280625)	-1.85235*** (0.308207)	-0.026693*** (0.005862)	-0.831101*** (0.260847)
TIEDD		-0.000004*** (0.000000636)			-0.0000025*** (0.00000067)	
DGO	1.0913*** (0.152244)	0.008*** (0.002804)	-3.4027*** (0.205035)	1.393584*** (0.198733)	0.012477*** (0.00379)	-2.27672*** (0.167975)
DREF	0.2801* (0.15755)	-0.0068** (0.002904)	3.2708*** (0.211203)	0.079572 (0.206842)	-0.007445* (0.003943)	2.767623*** (0.173155)
DFINAD	1.0998*** (0.130132)		-0.5249*** (0.175528)	-0.517555*** (0.176308)		1.438938*** (0.148573)
DBANKM	0.8812*** (0.171384)		-0.4024* (0.230967)	1.395186*** (0.28438)		0.180169 (0.240568)
NOMGRS	0.1492*** (0.02295)		0.2883*** (0.030922)	-0.12574*** (0.032967)		0.038143 (0.027971)
REP_25	0.9548*** (0.114214)		-0.2281 (0.154169)	1.392775*** (0.162929)		0.204406 (0.138166)
DSYND	0.761*** (0.234691)		0.3178 (0.316203)	0.52935* (0.303728)		0.355533 (0.256884)
LOG(SIZE)	1.1995*** (0.045268)	0.0019** (0.000792)	1.2147*** (0.061842)	0.948079*** (0.073499)	0.002378* (0.001294)	2.223559*** (0.05956)
DBIDC	1.5529***	0.0036	-2.6673***	4.452849***	-0.011131**	0.291741

	(0.158558)	(0.002641)	(0.21332)	(0.261525)	(0.004756)	(0.223623)
	-6.3328***	-0.0126***	3.5052***	-8.63391***	0.007646**	2.270936***
DINS	(0.143242)	(0.002727)	(0.199761)	(0.175479)	(0.003629)	(0.162285)
	-2.5893***	0.0138***	2.102***	-4.466388***	-0.005054	-0.809889***
DINS*DBIDC	(0.204622)	(0.003724)	(0.276178)	(0.341944)	(0.006536)	(0.291126)
	-0.0021	-0.0003***	-0.010	-0.002082	-0.000224	-0.011004*
DRP	(0.005404)	(0.000098)	(0.007153)	(0.007546)	(0.000142)	(0.006287)
	-9.369***	0.04280	-2.6371	-17.59938***	0.075199	4.200436*
IP2	(2.025011)	(0.03737)	(2.728697)	(2.900907)	(0.055369)	(2.456244)
	-0.0042***	0.00001	-0.0005	-0.003926***	-0.0000184	-0.000655
SLOPE	(0.001053)	(0.0000194)	(0.001419)	(0.001514)	(0.0000289)	(0.001281)
	0.0635***	0.0004***	-0.0407***	0.046178***	0.000381**	-0.041489***
OUTPUT	(0.00667)	(0.000122)	(0.0089)	(0.009135)	(0.000172)	(0.00762)
	-62.5637**			-48.48315		
DOUTPUT	(26.31774)			(36.09684)		
				-1.405552***	-0.000208	2.786224***
GSPREAD				(0.112842)	(0.002139)	(0.092765)
			0.0035			-0.001744
RATESQ			(0.003158)			(0.002743)
		-0.00065***	0.18***		0.000424**	0.031731
RATING		(0.000111)	(0.032006)		(0.000172)	(0.028155)
	-1.9603***		-0.6212	1.033948**		0.192383
LEV2	(0.329013)		(0.443377)	(0.474901)		(0.401689)
	0.0801***	-0.00011		0.068187***	0.000113	
YMAT	(0.004495)	(0.0000831)		(0.01071)	(0.000204)	
Region dummies	Included	Included	Included	Included	Included	Included
Use of proceed dummies	Included	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included	Included
N	27,116	27,116	27,116	12,180	12,180	12,180
R-squared	0.238893	0.341914	0.166385	0.343942	0.332149	0.328425
Adj. R-squared	0.237459	0.340795	0.164814	0.341129	0.329561	0.325546

Statistical significance of coefficients are indicated by \*\*\*, \*\* and \* for 1%, 5%, and 10% levels, respectively, (two-tail tests).

**Table 5**  
**SUR results for GO and RV subsamples**

All variables are described in Table 1. Robust standard errors of coefficients are in parentheses.

	GO Subsample			RV Subsample		
	RATING	LEV2	YMAT	RATING	LEV2	YMAT
Constant	-24.30612*** (1.441971)	0.228224*** (0.026093)	25.46007*** (1.843819)	-7.430738*** (2.277071)	0.420236*** (0.045214)	18.38259*** (3.797867)
LOG(AGREV)	0.320247*** (0.040606)	0.023534*** (0.000717)	-0.29542*** (0.051597)	-0.039172 (0.070088)	0.011609*** (0.001386)	0.147227 (0.116859)
AGEXPPC	-0.104492** (0.041918)	0.002351*** (0.000758)	-0.221339*** (0.053211)	0.13458 (0.135352)	0.00113 (0.002706)	-0.189146 (0.225024)
DSVC	0.061496*** (0.012175)	0.011213*** (0.000206)	-0.039643** (0.015459)	0.016091 (0.012596)	0.007391*** (0.000233)	0.016007 (0.020951)
DCITY	4.011629*** (0.298015)	0.003803 (0.005409)	-3.438711*** (0.379414)	2.021627*** (0.281436)	-0.002398 (0.005638)	0.907903* (0.469898)
HHI1	-0.26468 (0.655796)	-0.207711*** (0.011755)	4.739087*** (0.831754)	-2.531532*** (0.901107)	-0.366133*** (0.0174)	0.667169 (1.499304)
TAXB	-0.460412* (0.243541)	-0.067769*** (0.004352)	0.170826 (0.309146)	0.731478* (0.404363)	-0.046195*** (0.008061)	-0.24331 (0.672625)
TIEDD		-0.0000203*** (0.00000163)			-0.00000162** (0.000000669)	
DREF	0.218881 (0.18203)	-0.009613*** (0.00329)	3.381752*** (0.2298)	-0.334351 (0.297757)	0.00414 (0.005947)	1.785959*** (0.494528)
DFINAD	1.206385*** (0.155452)		-0.150834 (0.197679)	0.881171*** (0.227092)		-1.25265*** (0.377857)
DBANKM	0.991271*** (0.190844)		-0.514688** (0.242443)	0.854607** (0.390194)		-0.084584 (0.649451)
NOMGRS	0.142827*** (0.025406)		0.289818*** (0.03227)	-0.006014 (0.052737)		0.17311** (0.087665)
REP_25	0.946907*** (0.129955)		-0.123872 (0.165335)	0.857694*** (0.228721)		-0.357266 (0.381)
DSYND	1.004986*** (0.280896)		0.721573** (0.356633)	0.028691 (0.400081)		-0.663692 (0.6652)
LOG(SIZE)	1.149727*** (0.05264)	0.004298*** (0.00091)	1.159803*** (0.067757)	1.400869*** (0.08717)	-0.002778* (0.001606)	1.825387*** (0.146519)
DBIDC	0.697792*** (0.18045)	0.001663 (0.002924)	-2.232879*** (0.228615)	6.35023*** (0.345726)	0.023246*** (0.006665)	-0.320754 (0.590655)

DINS	-6.598773*** (0.175186)	-0.017279*** (0.003251)	5.492182*** (0.228669)	-6.293984*** (0.238133)	0.007824 (0.005013)	-1.479591*** (0.418352)
DINS*DBIDC	-2.132068*** (0.235962)	0.022808*** (0.004176)	1.180143*** (0.300211)	-6.486041*** (0.449045)	-0.037584*** (0.009109)	-0.169931 (0.759408)
DRP	0.000167 (0.006257)	-0.000298*** (0.000111)	-0.011602 (0.007808)	-0.009101 (0.01004)	-0.000152 (0.000197)	-0.01972 (0.016415)
IP2	-9.172463*** (2.334456)	0.044242 (0.042239)	-2.607109 (2.96426)	-11.70613*** (3.821682)	0.063434 (0.076431)	-6.654484 (6.359376)
SLOPE	-0.00335*** (0.001202)	0.0000245 (0.0000218)	-0.00081 (0.001527)	-0.006616*** (0.002076)	-0.000027 (0.0000415)	-0.00087 (0.003455)
OUTPUT	0.072522*** (0.007887)	0.000642*** (0.000141)	-0.054801*** (0.009937)	0.023348* (0.01218)	0.000354 (0.000239)	-0.001303 (0.019893)
DOOUTPUT	-100.2896*** (30.20937)			95.45265* (50.88277)		
RATESQ			0.008565** (0.003439)			-0.016568** (0.007743)
RATING		-0.000819*** (0.000124)	0.298843*** (0.034281)		-0.000506** (0.000255)	-0.363064*** (0.083378)
LEV2	-2.530766*** (0.380518)		-1.056297** (0.483346)	-1.335853** (0.640857)		0.938527 (1.06572)
YMAT	0.134218*** (0.005394)	-0.000203** (0.0000981)		-0.068836*** (0.007667)	0.000116 (0.000154)	
Region dummies	Included	Included	Included	Included	Included	Included
Use of proceeds dummies	Included	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included	Included
N	21,009	21,009	21,009	6,107	6,107	6,107
R-squared	0.233407	0.365649	0.156383	0.339126	0.328076	0.104347
Adj. R-squared	0.231578	0.364287	0.154371	0.33367	0.323087	0.096952

\*\*\*, \*\* and \* indicate statistical significance at 1%, 5% and 10% levels respectively (two tail tests).