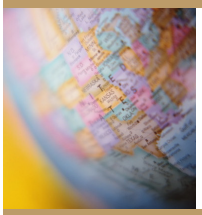

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THE IMPACT OF PENSIONS ON STATE BORROWING COSTS

*By Alicia H. Munnell, Jean-Pierre Aubry, and Laura Quinby**

Introduction

Municipal bond prices are tumbling and rates rising just as public borrowers face pressure to refinance deals cut during the financial crisis. At the same time, the funded status of public pension plans has declined, and states and localities will have to come up with more money to meet future benefit payments. In the private sector, numerous studies have shown that pension underfunding affects corporate bond ratings. And Moody's just announced that it would combine unfunded pension liabilities with outstanding bonds when evaluating a state's leverage position.[1] These developments raise the question of how future pension commitments affect today's borrowing costs in the public sector.

The *brief* proceeds as follows. The first section describes the municipal bond market. The second section describes the factors that traditionally have been considered in the bond rating process. The third section summarizes what other researchers have found regarding the relationship between pension commitments and borrowing costs in the private and public sectors. The fourth section presents a model for the period 2005-2009 that relates borrowing costs to factors generally considered by the rating agencies, such as the state's management, finances, economy, and debt structure. Pensions are a component of the debt structure, and the extent to which states make their Annual Required Contribution (ARC) has a statistically significant – albeit modest – impact on the cost of debt. A side finding is that the bond's rating explains relatively little about the variation in interest cost, and the effect of pensions remains significant

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even including the bond's rating in the equation. The final section concludes that while pension underfunding had only a small effect on borrowing costs in the 2005-2009 period when pension expenses were only 3 to 4 percent of state budgets, its impact could become more significant as the cost of pensions increases.

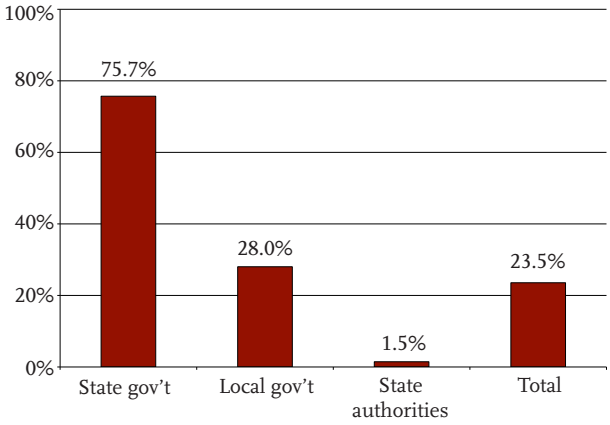
The Municipal Bond Market

The municipal bond market is large and diverse. In 2010, state and local debt amounted to $2.4 trillion or about 6 percent of the total debt outstanding from business and government.[2] Issuers include states, cities, counties, redevelopment agencies, school districts, public utility districts, publicly-owned airports and seaports, and other government entities. Major infrastructure projects, schools, housing units, and public utilities are financed through municipal bond proceeds. Many municipal bonds raise small amounts; three-quarters of the issues are for $1 million or less.[3]

Municipal bonds can generally be grouped into two types – general obligation bonds and revenue bonds. (Of course, states can also "borrow" indirectly by, for example, not making their pension contributions.) General obligation bonds are secured by the full faith, credit, and taxing power of the issuing entity. At the local level, the bond is typically secured by the taxing power of the locality. At the state level, the backing is generally based on appropriations made by the state legislature. In contrast, revenue bonds are payable from identified sources of revenue, such as bridge tolls for a bridge reconstruction project, rents from a housing project, or receipts from electric and gas production and transmission. General obligation bonds are generally viewed as the safest.[4] Interestingly, general obligation bonds represent only 24 percent of total dollars issued during the 2005-2010 period (See Figure 1).[5]

The Supreme Court ruled in 1895 that the federal government under the U.S. Constitution had no right to tax the interest on municipal bonds, so in most cases the interest is exempt from federal tax.[6] In addition, many states exempt the interest on in-state bonds from the state income tax. In 1986, however, the federal government tightened the qualification for tax-exempt status, indicating that it was no longer willing to subsidize (through the loss of federal income tax revenue) state and local activities that did not significantly benefit the general public. As a result, borrowing for investor-led initiatives, such as housing projects or sports facilities, was no longer eligible for tax-exempt status. The same treatment was accorded pension obligation bonds that states and localities issued to replenish underfunded pension plans. The federal government's new position was upheld in 1988 when the Supreme Court ruled that the Constitution did not preclude federal taxation of interest on state and local debt.[7]

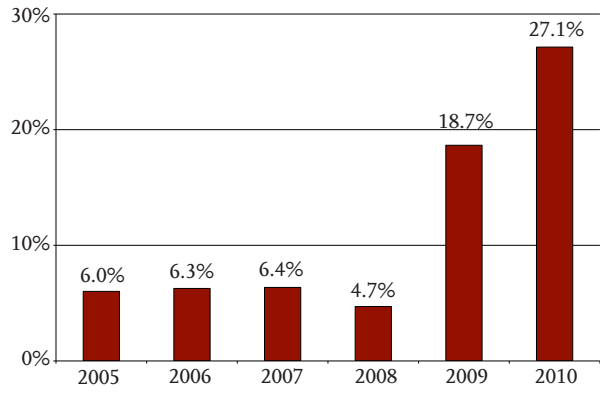
Figure 1. General Obligation Bonds as a Percent of Total Dollars of Municipal Bonds Issued, 2005-2010



Source: Thomson Reuters *SDC Municipal Bond Dataset* (2005-2010).

The American Recovery and Reinvestment Act of 2009 introduced a new type of taxable municipal security – Build America Bonds. This program allowed states and localities to issue an unlimited amount of taxable debt on which they would receive a subsidy from the federal government. As a result, taxable issuances accounted for a much larger percentage of total municipal bonds in 2009 and 2010 than in previous years (see Figure 2). The program ended in 2010.

Figure 2. Taxable Bonds as a Percent of Total Dollars of Municipal Bonds Issued, 2005-2010



Source: SDC (2005-2010).

The Rating of Municipal Bonds

The interest cost on municipal bonds is directly related to their rating.[8] The question for this *brief* is the extent to which pensions enter into the rating process. Rating agencies say that they take pensions into account when rating municipal bonds, and state officials express concern over how rating agencies will respond to pension developments.[9]

Moody's provides a detailed description of its rating methodology for state-issued bonds.[10] This methodology focuses on four aspects of each state – its economy, finances, debt, and management. Moody's tends to put more weight on finances and management than on the economy and debt. On the management side, the agency looks for institutional arrangements that lead to effective financial management and flexibility, processes that ensure the maintenance of balanced budgets, a track record of political compromise, and effective capital and debt planning processes. In terms of finances, the target is a balanced operating budget, a stable and efficient tax system, the maintenance of a positive GAAP fund balance in the General Fund, strong liquidity, and no previous downgrades.

Moody's tends to put less weight on the state's economy and outstanding debt. The key economic factors include per capita income growth, a diverse industrial base, low-to-moderate sensitivity to recessions, and a relatively small dependent population that could require large spending on education and Medicaid. Debt factors include a low-to-moderate tax-supported debt burden, a conservative debt structure with low-to-moderate exposure to variable interest rates, no or very limited use of short-term debt for current expenditures, and a well-funded pension system. Moody's analysts consider both the funded status of the issuer's pension fund and the extent to which the issuer is making contributions to limit the growth of future unfunded liabilities, but to date pension funding is only one factor in a category that the analysts "underweight" in making their evaluations.[11]

Differences in Rating of Municipal vs. Corporate Bonds

The approach to rating municipal bonds differs from that used for corporate bonds. While the two main raters – Moody's and Standard and Poor's – base their municipal bond ratings on the fiscal strength of the issuing entity, they rate corporate bonds on the risk of loss. This approach means that municipal bonds have a much lower default history than corporate bonds with the same rating (see Table 1). To eliminate this discrepancy, federal legislators introduced The Municipal Bond Fairness Act in 2008, but the legislation was not enacted.

Table 1. Cumulative Historic Default Rates, 1970-2006

Rating categories	Moody's		S&P	
	Municipal	Corporate	Municipal	Corporate
Aaa/AAA	0.00	0.52	0.00	0.60
Aa/AA	0.06	0.52	0.00	1.50
A/A	0.03	1.29	0.23	2.91
Baa/BBB	0.13	4.64	0.32	10.29
Ba/BB	2.65	19.12	1.74	29.93
B/B	11.86	43.34	8.48	53.72
Caa-C/CCC-C	16.58	69.18	44.81	69.19
All	0.10	9.70	0.29	12.98

Source: Frank (2008).

Findings on the Relationship between Cost of Funds and Pensions

According to the capital asset pricing model (CAPM), the rate of return on a risky asset can be decomposed into the rate of return on a risk-free asset plus a risk premium.[12] This risk premium reflects the issuer's ability to repay its future obligations. Although no state has literally defaulted since at least World War II, investors worry about the potential for missed, delayed, or renegotiated payments.[13] In the case of corporations, default is a relevant issue.

On the public side, researchers have estimated the relationship between bond rates and economic characteristics and fiscal institutions of various issuers of both state and local debt.[14] Because, to date, comparable data on state bond rates have not been readily available, researchers have tended to rely on the Chubb's "Relative Value Survey." This survey, which was conducted every six months between 1973 and 1997, asked about 25 traders to estimate cur-

rent yields on a hypothetical general obligation bond relative to bonds issued by New Jersey.[15] Researchers generally find that existing debt burden and recent growth in debt tend to be associated with higher rates, while growth in income, revenues, or low unemployment tend to be associated with lower rates. States with institutions that make it difficult to issue more debt or roll deficits from one year to the next also see lower rates. A few studies have examined the factors affecting the yield on municipal bond issues.[16] Here the property tax base and the burden of debt outstanding affect both the rating and the interest rate. To our knowledge, none of the studies of either state or local bonds explicitly include pensions in the analysis.

On the corporate side, a number of studies have examined the relationship between pension funding and equity prices, and a few have looked at the relationship between pension funding and corporate debt ratings. This literature reflects the assumption that, while pensions are autonomous legally, investors view pension assets and liabilities as part of an expanded corporate balance sheet and thus take them into account when valuing a corporation's equities or bond rating. The evidence suggests that the status of the pension fund influences both the price of equities and corporate debt ratings.[17]

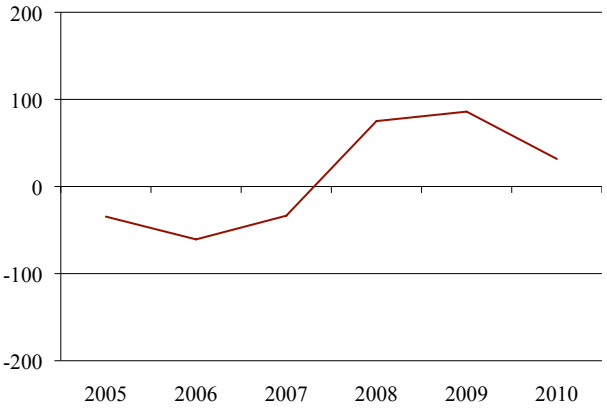
In short, the literature from the private sector indicates that pensions should play a role in the cost of funds. To date, however, researchers have not explored whether this conclusion carries over to the public sector.

An Empirical Analysis

In order to determine whether the funded status of pensions has an impact on the borrowing costs of states, we undertook a regression analysis based on a Thomson Reuters dataset of 758,000 municipal bonds issued between 2005 and 2010. The dataset tracks the bond sale date, duration, yield at issue, if the bond is taxable, whether the rate is fixed or variable, and if the bond is insured or credit enhanced. To have relevant economic/management information for each bond required limiting the sample to state bonds, and since 2009 is the latest Census data, the period was limited to 2005-2009. For ease of interpretation, we also focused on tax-exempt fixed-rate bonds, producing a final sample of about 37,500 new issues. (Appendix A describes the derivation of the final sample.)

To control for differences in duration of the state-issued securities and fluctuations in interest rates over time, the dependent variable is defined as the spread between the rate of interest on a non-taxable state-issued bond and on a Treasury bond of the same duration issued in the same week (see Figure 3).

Figure 3. Spread between Yields on State-Issued Bonds and Treasuries, 2005-2010

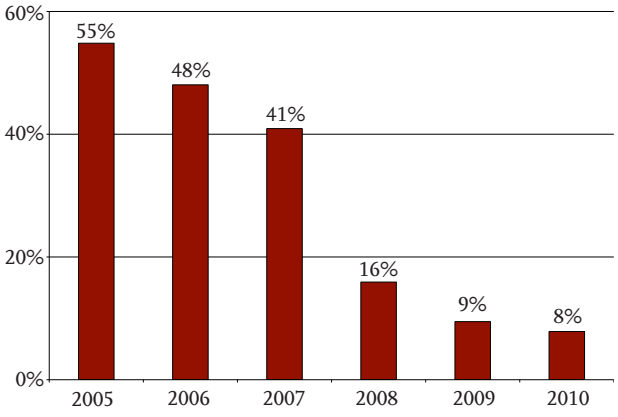


Note: The municipal bond spread equals the yield of a municipal bond minus the yield in a U.S. Treasury of similar duration issued during the same week. The spreads are weighted by the dollar amount of each bond issue.
Sources: SDC (2005-2010); and Federal Reserve Bank of St. Louis (2005-2010).

Before the 2008 financial collapse, state-issued municipal bond yields averaged about 60 basis points less than Treasuries of similar duration; since the financial collapse the pattern has reversed. The reversal can be attributed to two factors. First, Treasury yields dropped precipitously when investors rushed to safety, forcing Treasury rates down. Second, the required rates on municipal bonds rose as the percentage of new issues with insurance dropped sharply (see Figure 4, on the next page).[18]

Within this macro environment, the task is to explain why some bonds have higher spreads over Treasuries than others and to see whether pension funding has a discernible impact. The explanatory variables fall into the four categories used by Moody's, whether the bond is general obligation and/or credit enhanced, and the tax treatment of the bond interest within the state.

Figure 4. Insured Bonds as a Percent of Total Dollars of State Bonds Issued, 2005-2010



Source: SDC (2005-2010)

Management characteristics were represented by three variables:

- Economic advisors. States that had a council of economic advisors would be considered better managed and therefore appear more secure to investors, thereby reducing interest costs.
- Consensus forecast. States that based their revenue projections on realistic forecasts also would be viewed as more credible, reducing interest costs.
- Carry deficit. States where it was possible to carry deficits from one year to another and thereby circumvent the balanced budget mandate would be viewed as less well managed, thereby increasing borrowing costs.

Financial status was captured by two variables:

- Growth in expenditures. States with rapid five-year growth in expenditures would have many competing demands for funds and therefore have to pay a higher rate.
- Fund balance. A positive GAAP fund balance in the General Fund and other key operating funds would reflect a consistent trend of balance sheet health and thereby reduce the cost of borrowing.

Economy was represented by two variables:

- Unemployment rate. At any moment in time, states with higher levels of unemployment face more financial stress and therefore would be forced to pay higher rates.
- Dependency ratio. States with a high proportion of the population under 17 and 65 and over would be more exposed to the budget pressures of education and Medicaid, and therefore would have to pay more on their debt.

Debt was represented by two variables:

- Debt service as a percent of revenue. States with an already high level of debt service would be viewed as more risky and thereby forced to pay higher interest rates.
- Percent of ARC paid. States that pay a higher percent of their pension plan's ARC, which includes normal cost and a payment to amortize the plan's unfunded liability, would have lower demand on their resources going forward, requiring them to pay less to finance their debt.

Bond characteristics included two factors:

- General obligation. As discussed above, general obligation bonds are backed by the full faith and credit of the state and would be expected to reduce the required interest cost.
- Credit enhanced/insured. Investors would require a lower yield on bonds that were accorded additional security through credit enhancement or insurance.[19]

Marginal tax rate: Most states exempt the interest on domestic bonds from the state income tax; some states (Illinois, Iowa, Kansas, Oklahoma, and Wisconsin) do not. All else equal, having the interest tax-exempt lowers the required premium. This effect varies with the magnitude of the marginal tax rate that bondholders face. This variable equals zero for those states that tax the interest of domestic bonds and equals the marginal tax rates for those that do not.

Comprehensive Results

The results of the regression are shown in Figure 5.[20] For "yes/no" variables, the bars represent the relationship between the characteristic and the spread and for continuous variables between a one-standard deviation change and the spread. For example, bonds issued in states that allow the carryover of deficits from one year to the next have a spread over Treasuries of comparable duration 13 basis points higher than bonds issued in states that do not allow such a carryover. In the case of the five-year growth in expenditures, the bar indicates that a one-standard-deviation increase in that ratio would be associated with an additional 11 basis points on the spread.

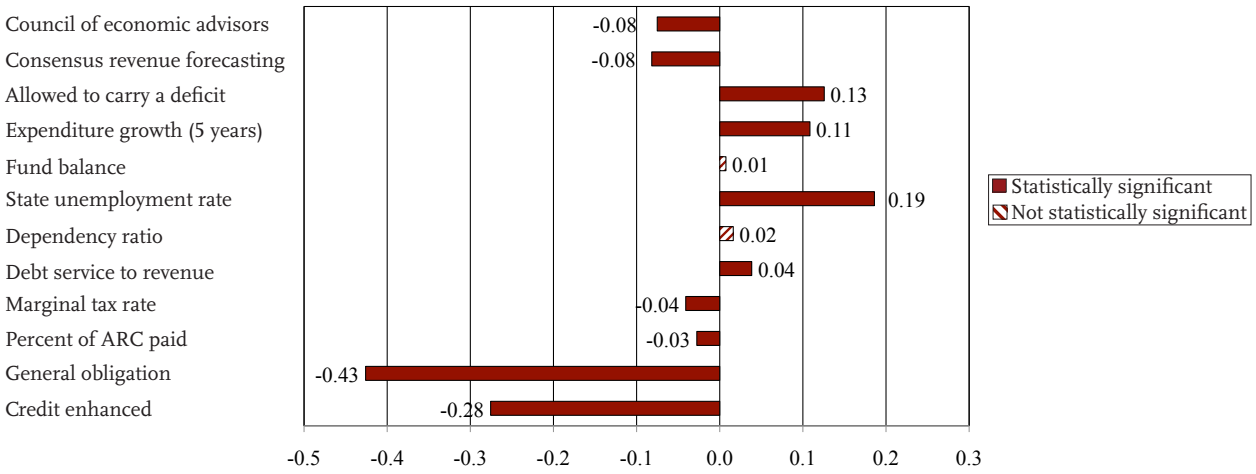
Generally, the variables work in the expected direction and are statistically significant. The two exceptions are the ratio of the GAAP fund balance to expenditures and the dependency ratio, where the coefficients are statistically insignificant.[21]

With regard to pensions, the results suggest that pensions affect the cost of state debt.[22] Increasing the percent of ARC paid by one standard deviation reduces the required interest rate by 3 basis points.[23] This impact is modest compared to other factors, but pension costs were only a small portion of state budgets during the sample period – from 3.0 percent of state budgets in 2005 to 3.8 percent in 2008.[24] Even if the regression is re-estimated weighting by dollar amounts rather than treating each bond issue equally, the pension effect only increases to 7 basis points.[25]

The Role of Moody's Ratings

A subsidiary question is "How do Moody's bond ratings fit into the preceding analysis?" To explore that question, we proceeded in several steps. First, we estimated an equation that included only the Moody's rating for each bond. Moody's letter grades were set equal to 1 for Aaa and 21 for C with the intervening ratings taking on their respective values. Interest-

Figure 5. Impact of Selected Characteristics on Spread between Yields on State-Issued Bonds and Treasuries, 2005-2009



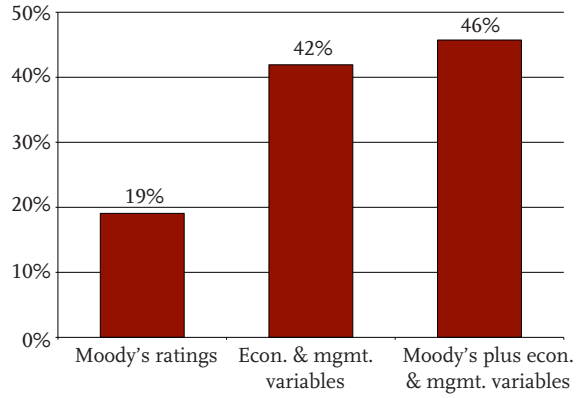
Note: Solid bars indicate the coefficient is statistically significant at the 95 percent level. The results shown are for a one-standard-deviation change; in the case of dummy variables, the results show a change from zero to one. Standard errors have been adjusted for state-level clustering.
Sources: Authors' calculations from *SDC Municipal Bond Dataset* (2005-2009); *Public Plans Dataset* (2005-2009); *State and Local Government Finances* (2005-2009); *Current Population Survey* (2005-2009); U.S. Census Bureau (2010); Moody's Investors Service (2005-2009); National Association of State Budget Officers (2008); Securities Industry and Financial Markets Association (2011); and The Tax Foundation (2005-2009).

ingly, the Moody's rating explained only 19 percent of the variance in interest rates, compared to 42 percent explained by all the economic/management variables reported above (See Figure 6). Further, adding Moody's rating to all the economic/management variables increased the percent of variance explained by only 4 percentage points.[26]

The regression results including the Moody's rating are really interesting (see Appendix Table B3). Not only does the Moody's rating have a statistically significant impact, but the inclusion of the Moody's rating variable has virtually no effect on the coefficients of the economic/management variables. Including the Moody's rating *does* reduce the magnitude of the effect of the bond being a general obligation bond or being insured/credit enhanced, suggesting Moody's takes these characteristics heavily into account when rating the bonds.

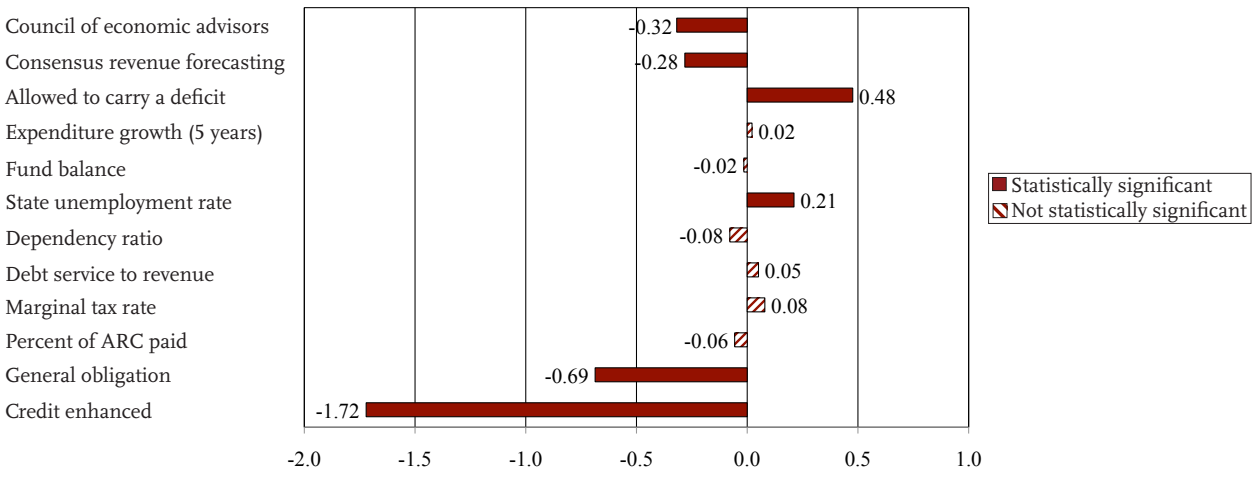
To determine what other factors Moody's might take into account, the final equation set Moody's ratings as the dependent variable.[27] The results, shown in Figure 7, confirm that the bond characteristics – general obligation and credit enhanced – are important in the Moody's rating process. Council of economic advisors, consensus forecasting, and ability to carry over a deficit also appear to enter the rating decision, which is consistent with the emphasis that Moody's says it puts on management factors in the description of its rating methodology. The unemploy-

Figure 6. Percent of the Spread Explained by Moody's Bond Ratings and Economic & Management Variables



Sources: Authors' calculations from *SDC Municipal Bond Dataset* (2005-2009); *Public Plans Dataset* (2005-2009); *State and Local Government Finances* (2005-2009); *Current Population Survey* (2005-2009); U.S. Census Bureau (2010); Moody's Investors Service (2005-2009); National Association of State Budget Officers (2008); Securities Industry and Financial Markets Association (2011); and The Tax Foundation (2005-2009).

Figure 7. Impact of Selected Characteristics on Moody's Municipal Bond Ratings, 2005-2009



Note: Standard errors have been adjusted for state-level clustering.
Sources: Authors' calculations from *SDC Municipal Bond Dataset* (2005-2009); *Public Plans Dataset* (2005-2009); *State and Local Government Finances* (2005-2009); *Current Population Survey* (2005-2009); U.S. Census Bureau (2010); Moody's Investors Service (2005-2009); National Association of State Budget Officers (2008); Securities Industry and Financial Markets Association (2011); and The Tax Foundation (2005-2009).

ment rate is also important. Of course, Moody's takes into account many other factors that cannot be easily quantified in addition to the few variables defined in this *brief*. Interestingly, pension funding, as represented by percent of ARC paid, does not appear to enter into the rating decision.[28]

Conclusion

In conversation, state officials frequently indicate that they are concerned about the impact of their pension decisions on their bond ratings. Our results indicate that, while the rating agencies say they consider pensions, pension funding does not have a statistically significant effect on bond ratings. In contrast, it does have an effect on the spread, albeit modest – 3 to 7 basis points. That result is not surprising given that pension expense accounted for only 3.8 percent of state budgets in 2008. The magnitude could increase, however, to the extent that pensions become an increasingly important component of state budgets.

Endnotes

1 Hampton (2011).

2 U.S. Board of Governors of the Federal Reserve System (2010)

3 U.S. Securities and Exchange Commission (2004).

4 Frank (2008).

5 The explanation probably rests on the fact that general obligation bonds are subject to constitutional debt limits and/or voter approvals. Governments get around these limits by issuing revenue bonds, which do not have the same constraints. As discussed, revenue bonds carry higher interest costs because they are riskier, so governments end up issuing increasingly expensive debt.

6 *Pollock v. Farmers' Loan & Trust Co.* (1895).

7 Tax Reform Act of 1986, and *South Carolina v. Baker* (1988).

8 Ratings for bonds issued by states have generally been higher and more concentrated in the "A" categories than those issued by local governments. States have a larger and more diverse economic base and a sovereign right to tax that is not constrained by the Constitution (with the exception of interstate commerce or international trade). Localities have a much narrower base and derive their power to tax from the state. Moreover, a state's general obligation pledge is a very strong commitment, and states cannot go bankrupt.

9 See Mattoon (2006) for a discussion of the credit risks of pension underfunding.

10 Kutter and Blake (2004).

11 This weighting may change in the wake of Moody's announcement that it will combine unfunded liabilities with outstanding debt to assess the leverage position of states.

12 Varian (1987). Technically, the equilibrium rate of return on a risky asset equals the rate of return on a risk-free asset, plus its covariance with the market portfolio, multiplied by the excess of the expected return on a market portfolio over the risk-free rate.

13 Lowry and Alt (2001).

14 Poterba and Reuben (1999); Bayoumi et al. (1995); Eichengreen and Bayoumi (1994); and Goldstein and Woglom (1991).

15 Andersen, Lassen, and Nielsen (2010).

16 See Capeci (1991 and 1994).

17 Daley (1984); Dhaliwal (1986); Landsman (1986); Maher (1987); and Carroll and Niehaus (1998).

18 The market collapse caused a decline in credit ratings of the bond insurers, making it difficult for municipalities to purchase a higher rating. Further, many insurers left the market; currently, only two large municipal insurers remain.

19 Municipal bond insurance, introduced in the United States in 1971, comes in two basic forms: nonpayment insurance, which ensures that the bond insurer will pay any principal and interest left unpaid by the issuer, and a purchase agreement, whereby the insurer purchases the bonds from the issuer. The insurer is then responsible for placing the bonds with investors and making payments on the bond. Bonds placed in this manner are accorded the healthy bond rating of the insurer, who is now responsible for the debt payments.

20 The management data came from a National Association of State Budget Officers 2008 study, and were assumed to be constant for each state over the period in question. The financial and debt service data came from the U.S. Census Bureau *State and Local Government Finances* dataset, with the exception of GAAP fund balances, which were provided by Moody's from state Comprehensive Annual Financial Reports. Pension data were obtained from our Center's *Public Plans Dataset*. We calculated state-level unemployment rates from the *Current Population Survey* produced by the U.S. Census Bureau. Likewise, the dependency ratio came from population data released by the U.S. Census. Lastly, state tax information came from the Tax Foundation and the Securities Industry and Financial Markets Association.

21 Full regression results and summary statistics are presented in Appendix B.

22 In actuality, we can only infer correlation between any of the explanatory variables and the spread because there may be an omitted factor in our analysis that affects both the values of the explanatory variables and the spread. In this case, we would mistakenly attribute the effect of the omitted factor to our explanatory variables.

23 Replacing the percent of ARC paid with a conventional funded ratio produced a statistically insignificant coefficient, suggesting that what matters to investors is whether a state is sticking to its funding plan, rather than a snapshot measure of assets and liabilities.

24 Munnell, Aubry, and Quinby (2010).

25 In results *not* shown, we also tried Moody's new measure of outstanding debt and unfunded liabilities relative to expenditures, and found it had no impact.

26 This result held even when Moody's ratings were included as dichotomous variables to allow for a non-linear relationship between the rating and bond spread.

27 The results presented below are derived from ordinary least squares for ease of presentation. Because the relationships between the Moody's ratings are probably not linear, the correct approach is to use an ordered probit, but the coefficients from such an equation are very difficult to interpret. Fortunately, the two equations yield similar answers in terms of the variables considered (see Appendix B).

28 Our analysis covers the period 2005-2009. But the influence of pension funding on bond ratings may already be changing. In addition to the recent announcement by Moody's that it will include unfunded pension liabilities in its assessments, Standard & Poors cut New Jersey's bond rating on February 9 in part due to its unfunded pension shortfall.

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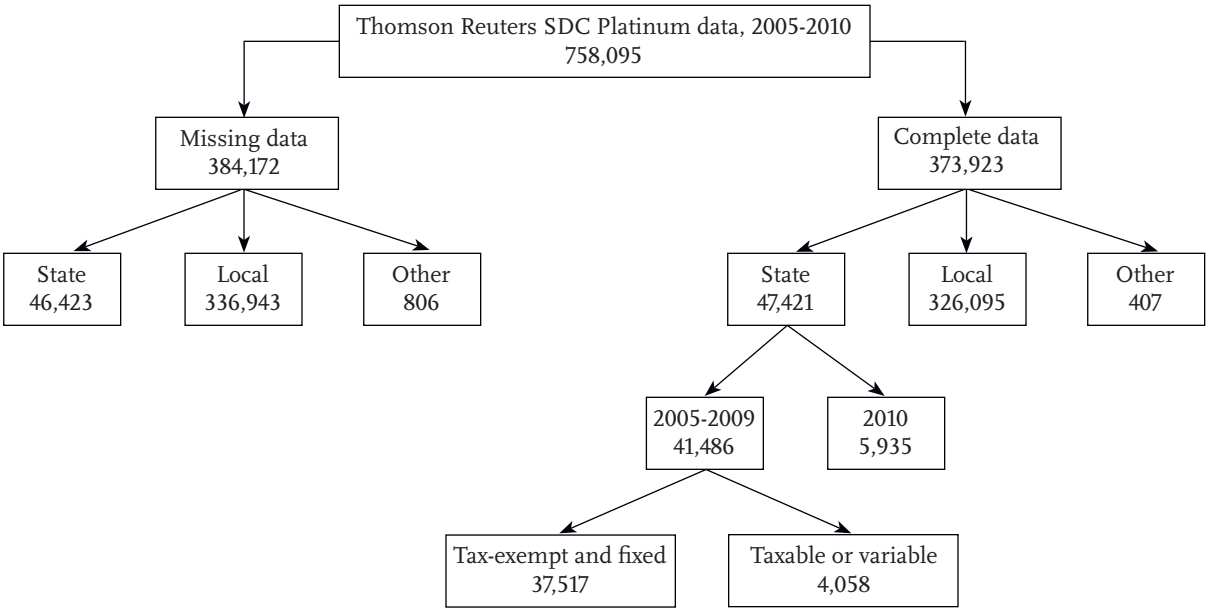
APPENDICES

Appendix A

Figure A1. Derivation of Sample from Thompson Reuters SDC Municipal Bond Dataset



Source: Authors' illustration from *SDC Municipal Bond Dataset* (2005-2009).

Appendix B

Table B1. Summary Statistics of Variables Included in the Regressions

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
Risk premium	37,517	-0.12	0.85	-4.73	5.03
Council of economic advisors	37,517	0.54	0.50	0	1
Consensus revenue forecasting	37,517	0.50	0.50	0	1
Allowed to carry a deficit	37,517	0.16	0.37	0	1
Expenditure growth (5 year)	37,517	23.15	16.95	-34.34	58.96
Fund balance	37,517	4.42	16.49	-22.56	233.25
State unemployment rate	37,517	5.33	1.90	2.31	14.62
Dependency ratio	37,517	37.09	1.15	33.56	40.22
Debt service to revenue	37,517	7.40	2.27	2.16	18.97
Marginal tax rate	37,517	5.19	3.21	0	11
Percent of ARC paid	37,517	86.53	28.74	15.50	358.39
General obligation	37,517	0.14	0.35	0	1
Credit enhanced	37,517	0.42	0.49	0	1
Year	37,517	6.87	1.40	5	9
Moody's rating	30,575	2.46	1.94	1	13

Note: Summary statistics shown for regression sample precluding Moody's rating.
Sources: Authors' calculations from *SDC Municipal Bond Dataset* (2005-2009); *Public Plans Dataset* (2005-2009); *State and Local Government Finances* (2005-2009); *Current Population Survey* (2005-2009); U.S. Census Bureau (2010); Moody's Investors Service (2005-2009); National Association of State Budget Officers (2008); Securities Industry and Financial Markets Association (2011); and The Tax Foundation (2005-2009).

Table B2. Regression Results on the Spread of State-Issued Bonds, Excluding and Including Moody's Rating, 2005-2009

Variable	Excluding Moody's rating	Including Moody's rating	Moody's rating only
Council of economic advisors	-0.075 **	0.092	–
	(0.03)	(0.01)	
Consensus revenue forecasting	-0.082 ***	-0.065 **	–
	(0.03)	(0.03)	
Allowed to carry a deficit	0.130 ***	0.087 **	–
	(0.03)	(0.04)	
Expenditure growth (5 years)	0.006 ***	0.006 ***	–
	(0.00)	(0.00)	
Fund balance	0.000	0.001 *	–
	(0.00)	(0.00)	
State unemployment rate	0.098 ***	0.083 ***	–
	(0.02)	(0.02)	
Dependency ratio	0.014	0.016 *	–
	(0.02)	(0.02)	
Debt service to revenue	0.017 ***	0.011 *	–
	(0.01)	(0.01)	
Marginal tax rate	-0.013 **	-0.014 **	–
	(0.01)	(0.01)	
Percent of ARC paid	-0.001 **	-0.001 **	–
	(0.00)	(0.00)	
General obligation	-0.426 ***	-0.311 ***	–
	(0.04)	(0.04)	
Credit enhanced	-0.276 ***	-0.086 *	–
	(0.03)	(0.04)	
Year	0.312 ***	0.292 ***	–
	(0.01)	(0.01)	
Moody's rating	–	-0.092 ***	-1.185 ***
		(0.01)	(0.04)
Constant	-3.199 ***	-3.408 ***	3.408 ***
	(0.60)	(0.62)	(0.29)
R-squared	0.424	0.464	0.193
Number of observations	37,517	30,575	30,806

Note: Robust standard errors adjusted for state-level clustering are in parentheses. Coefficients are significant at the 1 percent level (***), 5 percent level (**), or 10 percent level (*).
Sources: Authors' calculations from *SDC Municipal Bond Dataset* (2005-2009); *Public Plans Dataset* (2005-2009); *State and Local Government Finances* (2005-2009); *Current Population Survey* (2005-2009); U.S. Census Bureau (2010); Moody's Investors Service (2005-2009); National Association of State Budget Officers (2008); Securities Industry and Financial Markets Association (2011); and The Tax Foundation (2005-2009).

Table B3. Regression Results on Predicting Moody's Ratings, OLS and Ordered Probit Models, 2005-2009

Variable	OLS		Ordered probit	
Council of economic advisors	-0.318	**	-0.242	***
	(0.13)		(0.09)	
Consensus revenue forecasting	-0.282	**	-0.177	**
	(0.12)		(0.08)	
Allowed to carry a deficit	0.477	**	0.237	**
	(0.18)		(0.12)	
Expenditure growth (5 years)	0.001		0.001	
	(0.01)		(0.00)	
Fund balance	-0.001		-0.001	
	(0.00)		(0.00)	
State unemployment rate	0.116	***	0.064	**
	(0.04)		(0.03)	
Dependency ratio	-0.067		-0.067	
	(0.06)		(0.05)	
Debt service to revenue	0.023		0.012	
	(0.03)		(0.02)	
Marginal tax rate	0.025		0.016	
	(0.02)		(0.02)	
Percent of ARC paid	-0.002		-0.001	
	(0.00)		(0.00)	
General obligation	-0.686	***	-0.369	**
	(0.22)		(0.18)	
Credit enhanced	-1.721	***	-1.504	***
	(0.16)		(0.11)	
Year	0.164	***	0.140	***
	(0.22)		(0.02)	
Constant	4.162		–	
	(2.51)		–	
R-squared	0.3198		0.1515	
Number of observations	37,110		37,110	

Note: Robust standard errors adjusted for state-level clustering are in parentheses. Coefficients are significant at the 1 percent level (***), 5 percent level (**), or 10 percent level (*).
Sources: Authors' calculations from *SDC Municipal Bond Dataset* (2005-2009); *Public Plans Dataset* (2005-2009); *State and Local Government Finances* (2005-2009); *Current Population Survey* (2005-2009); U.S. Census Bureau (2010); Moody's Investors Service (2005-2009); National Association of State Budget Officers (2008); Securities Industry and Financial Markets Association (2011); and The Tax Foundation (2005-2009).

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