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ABSTRACT

Asserting that school district officials facing the need of extensive capital expenditures must analyze all sources of funding, this paper focuses on the predominant local funding mechanism of the school district bond issue. It presents a bond rating model with three separate stages that relate to the different choices facing a school district official throughout the bond rating process. The choices are whether to have a bond rated (first stage) and whether to insure the bond (second stage). The final stage estimates the rating category. An empirical analysis of the model using data for 148 bond issues by districts from 10 different states during the period from July 1, 1993 through June 30, 1994 indicated that it is mainly the par value of the bond issue and not the credit quality that is the decisive factor in having a bond rated. Rural district's local marketing strategy also contributes to this decision. However, the findings for stages two and three do depend on the economic, demographic, and financial health of the school districts. (Contains 17 references.) (EV)

The Impact of Bond Rating Related Decisions for School Districts: A Multistage Bond Rating Model

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Abstract

School district officials facing the need of extensive capital expenditures must analyze all sources of funding. This article focuses on the predominant local funding mechanism of the school district bond issue. This bond rating model has three separate stages that relate to the different choices facing a school district official throughout the bond rating process. The choices are whether to have a bond rated (first stage) and whether to insure the bond (second stage). The final stage estimates the rating category. The results indicate that it is mainly the par value of the bond issue and not the credit quality that is the decisive factor in having a bond rated. Rural district's local marketing strategy also contributes to this decision. However, the findings for stages two and three do depend on the economic, demographic and financial health of the school districts. Further research into each of these stages will yield even more insightful results.

The Impact of Bond Rating Related Decisions for School Districts: A Multistage Bond Rating Model

1. Introduction

School district officials[1] are responsible for developing and overseeing all aspects of a district's budget. On the expenditure side this includes both annual operating expenditures and capital expenditures. Operational expenditures are typically budgeted on an annual basis for instruction and support services within the school district. Capital expenditures include funds utilized for the construction of new facilities, the renovation of existing facilities, and equipment purchases. For a variety of reasons the capital budgeting process has moved to the forefront as a matter of interest among those charged with making school spending decisions. These reasons include the natural life cycle deterioration of many schools built in the 1950's and 1960's, overcrowding in some places due to changing demographic patterns, mandates to comply with the Americans with Disabilities Act, and modernization to accommodate educational reform proposals and internet access. While there has been increased interest recently among those engaged in educational finance research on the capital expenditure component of school spending,[2] there is no doubt that this area of inquiry lags considerably behind that directed at the annual operating expenditure component.

In this paper we focus on a critical feature of the capital budgeting process – the bond issue. While a considerable literature has developed about the market for corporate bonds,[3] the market for municipal bonds, of which school district bonds comprise an important component, has received much less attention, at least with regard to empirical studies of the rating process.[4] In the analysis that follows we develop a model of the school district bond rating process that pays particular attention to the sequential nature of the decision-making procedure that school officials engage in when they decide to issue bonds to raise revenues for capital projects.

The next section of the paper describes the key elements of the decision process in which school officials engage when they decide to undertake a substantial capital expenditure, one that requires funding beyond what is typically available in the district's annual budget. The following section develops a framework to model this process. Special attention is focused on the sequential nature of the decision process. The following section presents an empirical analysis of the model using data for 148 bond issues by districts from ten different states during the period from July 1, 1993 through June 30, 1994. The final section offers some concluding remarks.

2. The Bond Issuing Process

A school district capital expenditure project typically begins with the issue of a bond to raise the required local revenue.[5] The rationale for financing capital

projects through bonds arises from the uneven time pattern of capital expenditures. Debt financing allows the annualized benefits derived from the purpose – new or renovated facilities or equipment that lasts for a number of years – of the capital outlay to be matched by an annual payment for its service. The proceeds of the bond issue provide the up-front funding necessary to support the capital project. Annualized payments to retire the bonded debt are then included in a district's future budgets over the useful life of the facility or equipment.

As school officials prepare to issue a bond, they must decide whether or not they wish to have it rated by an independent rating agency. This determination requires an implicit cost-benefit analysis on the part of the school official because, in order to accomplish this, the district must pay the independent agency a fee to cover the cost of conducting the credit rating. The stated purpose of the rating obtained is to provide to potential bond buyers a measure of the risk that the district will default on future payments. In practice, the bond market uses the rating as information about the credit worthiness of the district; and this information in turn influences the yield (interest rate) at which the bond offering can be issued.

There are three principal reasons why a school official may decide not to obtain a rating. One is that the official anticipates that the issue will receive such a poor rating that not having any rating at all is just as attractive. A second is that the official expects the issue to be marketed locally so that investors purchasing

the bond already have sufficient information about the credit worthiness of the district, and thus there is no need to incur the extra expense of paying an independent agency to conduct a rating. The third is that the amount of debt being issued is small enough that the potential interest savings from a good rating are not large enough to offset the cost of obtaining one.

Moody's Investors Services, Inc. (Moody's) and Standard & Poor Corporation (S&P) are the two major rating services for school district bond issues. Table 1 panel A presents a list of their ratings and definitions. They rate the bonds upon request by the issuing school district for an agreed upon fee. The fee is usually based upon the time and effort that the agency anticipates it will take to perform a bond rating; this amount averaged $7,000 per rating for the 1993-1994 time period. Once the rating agency rates a new bond issue, it then continues to maintain and renew the rating until the bond has been fully redeemed. These ratings were originally developed to assist investors in comparing different bond issues by utilizing an easily recognizable set of symbols (Lamb & Rappaport, 1980). Investors perceive that the rating agencies grade all types of bond issues on the same scale. Both Moody's and S&P have fundamental differences in the philosophy and policy of rating bonds, and only Moody's rates short-term municipal (which includes school district) debt. The two agencies do share some similar criteria when evaluating municipalities by examining the entity's already outstanding debt, economic base, finances and

management practices. The difference is that Moody's focuses more on outstanding debt and S&P focuses more on the economic base of the issuing entity.

The rating system of these agencies can be divided into investment grade bonds, rated BBB (S&P) or Baa (Moody's) and above, and speculative grade for all ratings below. Table 1 panel B presents an historical synopsis of the relationship between Moody's ratings and the yields of municipal bonds.[6] An investment grade rating provides a signal that the issuing entity has an adequate capacity to repay the debt obligations, with additional levels of protection to repay debt indicated by a higher rating within this category. Currently, throughout the U.S., 67% of school district bond ratings are in the 'A' category. (Hitchcock, 1992). Based on a study in 1999 by Fitch FBCA, the education sector had the lowest cumulative default rate (.05% for $143,115,000 worth of defaulted par) of all sectors considered, indicating that school districts overall display a high level of credit worthiness (Litvack, 1999).

Once a school district has obtained a rating for a particular bond issue, it may proceed to issue the debt with this rating. It may also decide, on the other hand, to purchase private insurance to improve the bond's credit rating. An insurance company in issuing this type of policy agrees to stand behind the debt obligations of the school district. This financial assurance will result in a higher rating for the bond issue – based on the credit quality of the insurance company.

The original fee incurred by the district to obtain the initial bond rating is not impacted by the purchase of insurance. However, if insurance is purchased, the district must pay the additional cost of the insurance premium. Such premiums average $35,000-$45,000 for a $5 million bond issue ($7-$9 per $1000) (Shapiro, 1989). It is obvious that a school official will choose to purchase this type of insurance only if the higher rating will result in a reduction in the overall bond financing cost – including the cost of the insurance premium. This will typically be the case if the reduction in interest cost is substantial because the presence of insurance results in a steep upgrade in the bond's credit rating.

School districts are not guaranteed the benefits apparent from this option to purchase bond-rating insurance. If the pre-insurance rating is below investment grade, then there might not be any insurance company of reputable credit quality willing to underwrite the policy. Also, if the size of the issue is too small, then the insurance company may refuse to undertake the risk associated with an unsuccessful marketing of the bond. The four main insurance companies in the municipal bond market are AMBAC, MBIA, FGIC and Bond Investors Guaranty Insurance Company. Any school district purchasing insurance from one of these companies will receive an automatic AAA rating from Moody's (Shapiro, 1989).

Several states have passed legislation since the early 1990s establishing state enhancement programs to help school districts secure a better bond rating when issuing debt. Under one type of program, utilized by New Jersey and

Texas, the state establishes a guarantee fund to back school district debt. The Texas School Permanent Fund guarantees a AAA rating for qualifying bond issues, while the New Jersey Fund for Support of Free Public Schools guarantees a AA rating. Under another variant, the state pledges to use annual state aid to cover debt service for qualifying school districts. This program generates a minimum rating in the A category if the state aid equals at least the district maximum annual debt service (Hitchcock, 1992).

3. Modeling the Bond Rating Process

As the above discussion highlights, when school districts issue bonds to support capital projects what we observe in the bond market is the rating that the bond carries or its lack of one. This observed phenomenon is the result of a series of sequential decisions: 1) the school official decides whether or not to obtain a rating; 2) the independent agency determines what rating the issue receives; and 3) the school official decides whether to purchase private insurance to upgrade the rating. Underlying all of these decisions are the financial parameters of the bond being issued and the fundamental characteristics that determine a school district's credit worthiness – the factors that influence the decision calculus at each stage of the process. Because school districts issue general obligation municipal bonds, backed by the full faith and credit of the district , these fundamental characteristics are the economic and financial measures that describe the district and its operations. Thus, in order to gain insight about the process it is necessary

to identify which of these measures play a critical role at which stage of the sequence. It is also necessary to consider how the decision mechanism at each stage of the process impacts what happens at a subsequent stage.

Figure 1 illustrates the sequential decision process in schematic format. In practice we do not observe the pre-insurance credit rating of those bond issues where private insurance has been obtained. We only observe whether or not an issue is rated, what its rating is, and whether or not private insurance has been purchased. The following set of equations describes the rating process in a model that will allow empirical testing:

RATING OBTAINED = f(economic and financial measures)

INSURANCE PURCHASED = g(economic and financial measures)

OBSERVED RATING =h(economic and financial measures, insurance).

Because of the sequential nature of the decision making process and the fact that the outcome at one stage may affect what happens subsequently, we adopt the following strategy to test this model empirically. We first estimate an equation to predict the dichotomous choice by the school official about whether or not to obtain a bond rating for the issue. Next, for those bonds that obtained a rating we estimate the dichotomous choice by the school official about whether or not to purchase private insurance. Finally, for all the rated bonds we estimate whether the rating obtained is Moody's high (AAA or AA) classification or its medium (A or Baa) classification.[7] Because all insured bonds carry a AAA

rating, we include in this equation the predicted value of having insurance from the second equation.

Economic and financial measures on the right hand side of each equation should include values that describe the economic and demographic characteristics of the district, values that describe the district's pre-existing financial condition at the time of the issue, and financial values that characterize the issue itself. In identifying operational measures to test the model empirically, we are subject to the usual consideration of data availability.[8]

4. Empirical Results

Our sample consists of 148 bond issues, representing ten different states. We include only bonds with a sale date from July 1, 1993 through June 30, 1994 where the proceeds were used for capital expenditures.[9] We include the following as variables in the three estimating equations:

ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS

INC – median household income of the district's population,

ENROLL – number of students enrolled in the district,

NW – percentage of the district's student population that is non-white,

URBAN – binary variable equal to one for urban districts,

RURAL – binary variable equal to one for rural districts.[10]

FINANCIAL CHARACTERISTICS

LTE – local tax effort, defined as local tax revenue per student divided by median household income in the district,

CASH – the district's end of the year cash fund balance,

INGVT – intergovernmental revenues, defined as the percentage of a school district's total revenue coming from all federal and state grants,[11]

GRDBT – gross debt, defined as a district's per capita sum of long-term debt outstanding at end of year plus short-term debt at end of year plus the par value of the bond issue under study.

BOND ISSUE CHARACTERISTICS

PAR – size of the bond issue, defined as it's par value,

RATED – binary variable equal to one if the bond is rated and zero if not,

INS – binary variable equal to one if the bond is insured and zero if not,

HIGH – binary variable equal to one if the bond is rated AAA or AA and equal to zero if the bond is rated A or Baa.[12]

Table 2 presents summary statistics for these variables for the entire sample of 148 school district bond issues.[13] *In toto* these variables capture a variety of factors that should enter the decision calculus of school district officials and credit rating agencies as they interact through the bond rating process.

Table 3 presents the mean values of the model's right-hand-side variables for the four credit rating classifications. It is interesting to note that the values for the three variables – INC, NW, and INGVT – that measure a school district's economic vitality are most positive for those districts rated AA. As the empirical

analysis below will show, this is because the most important determinant in obtaining a AAA rating is the purchase of private insurance to upgrade an initial rating that is less favorable.

Table 4 presents maximum likelihood estimates for the three equations that make up the sequential bond-rating model. Because all three dependent variables are dichotomous in nature, ordinary least squares regression analysis will not yield efficient parameter estimates for these equations. The parameter estimates in the table are based on the Logit estimating procedure.[14] Numbers in parentheses are t-statistics for the null hypothesis of no association.

Column one of Table 4 reports the results for whether or not the school official chose to have the bond rated by a rating agency. Of the 148 bonds in this data sample, 126 (85%) were rated and 22 (15%) were not. Only three of the estimated coefficients in this equation are statistically significant. The size of the bond issue (PAR) is positive and significant at the one percent level. Clearly this indicates that for large capital projects, the fixed cost associated with obtaining a credit rating can easily be offset by the savings potential of lower interest costs over the life of the bond if the rating is favorable. The binary variable representing rural districts is negative and significant at the ten percent level. This result is consistent with the premise that rural districts are more likely to market their bonds locally, so that potential investors are already familiar with the district's financial situation and do not need the (costly) additional information

that a credit rating provides. The final variable that is significant in this equation, also at the ten percent level, is the district's end of the year cash fund balance. The sign of this estimated coefficient is negative. This result is somewhat surprising. Because it seems reasonable for credit rating agencies to interpret a large cash balance as a positive signal about a district's financial condition, we would have expected this variable to increase the probability that a bond would be rated.

Column two of Table 4 reports the results for whether or not the school official chose to purchase private insurance to upgrade the rating once it had been obtained. Of the 126 bonds in this data sample, 55 (44%) purchased insurance while 71 (56%) did not. Because districts that initially receive a favorable rating will lack incentive to purchase insurance, we expect that characteristics associated with poor economic and financial conditions will exhibit a positive effect on the probability of purchasing insurance in this equation. The results are consistent with this expectation.

The percentage of the school district's population that is non-white is positive and significant at the ten percent level, consistent with the notion that poor districts have, on average, a higher portion of residents who are non-white. Gross debt is also positive and significant at the one percent level. This suggests that districts already carrying high levels of debt are more likely to need the help of insurance to upgrade a bond rating to finance additional capital projects.

The effect of a greater reliance on total intergovernmental grants in a school district's financial profile on its need to purchase insurance is particularly interesting. Although the programs in place by the federal government and the states to provide funds to local school districts are many and varied, the overall pattern is clearly need-based. This variable, therefore, presents a comprehensive measure of school district financial need that depends on a variety of social and economic characteristics of the district. The coefficient of this variable is positive and significant at the one percent level. The coefficient of its squared term is negative and significant at the one percent level. These combined results suggest that the propensity of districts to purchase private insurance increases with this measure of district 'neediness' but at a decreasing rate, reaches a maximum, and then decreases. Based on the coefficient estimates of 25.5 for the linear term and –22.4 for the quadratic term, the value of percent intergovernmental revenues at which the probability of purchasing insurance reaches a maximum is 56.9%, which is exactly the mean value for this data sample, as reported in Table 2. A possible explanation for this result is that the neediest of districts receive sufficient support from the state programs, described above, that have been put in place to help them secure better bond ratings so that they do not need to purchase private insurance. This is certainly an issue that deserves further investigation.

Column three of Table 4 reports the results for whether a district's bond receives a high (AAA or AA) rating (dependent variable equal to one) or a

medium (A or Baa) rating (dependent variable equal to zero). Of the 126 bonds in this data sample, 87 (69%) received a AAA or AA rating while 39 (31%) received a lower rating.[15]

As noted above, districts that purchase insurance from a reputable underwriter automatically receive a AAA rating from Moody's.[16] Whether or not a district purchases private insurance, therefore, is a clear determinant of the rating it receives and must be included in any model where rating is the dependent variable. The purchase of insurance is a choice variable of the school administrator, however, and thus endogenous to the model. For this reason we include in this equation the instrumental variable that is the predicted value of the probability of purchasing insurance from the previous equation. The coefficient of this variable, ^INS, is positive and significant at the one percent level, as we would expect. Several other variables also exhibit statistical significance in this equation.

Total enrollment is positive and marginally significant at the ten percent level. This suggests that school district size may be an advantage in the bond rating process. The percentage of the district's population that is non-white is negative and significant at the ten percent level, even though we have controlled for the fact that a higher non-white percentage of the population increases the likelihood of purchasing insurance. Not surprisingly, median household income is positive and significant at the one percent level. The rating agencies clearly

take the ability of a district's population to make future tax payments into account when providing a bond rating. The existing level of local tax effort is also positive and significant at about the one percent level. Apparently rating agencies also give weight to how much residents are currently willing to provide support for school district spending.

It is worthwhile to note that the par value of the bond being issued exhibits no statistically significant effect in explaining the rating that a bond receives. The size of an issue apparently does not influence how it will be rated. The coefficients for the share of the school district's revenues obtained through intergovernmental grants and the square of this measure barely miss exhibiting statistical significance at the commonly accepted level. The sign of each of these terms is consistent, however, with a similar interpretation about the direction of their joint causality to what we observed in the second equation that explains the propensity of a district to purchase insurance.

Gross debt is negative and significant at the ten percent level. Districts already carrying high levels of debt are viewed as posing a greater risk of defaulting on new issues than those not so encumbered.

The size of a district's year cash fund balance is negative and significant at the five percent level. This suggests that cash rich districts actually receive a less favorable rating. This result is counter-intuitive, as was the result for this variable in the first equation for whether or not a district had a bond issue rated in

the first place. Either we are not correctly interpreting what this variable actually measures within the context of a school district's financial profile, or the role that it plays in the bond rating process is more complicated that what this simple model is capable of capturing.

5. Conclusion

The multistage model developed in this paper provides a vehicle to understand more fully the process through which school district bonds are marketed. In particular, by focusing on the sequence of decisions that defines the process, and not just the outcome of the ratings that bonds receive, we are able to gain insight about the roles that different demographic, economic, and financial factors play in this process. Certainly these insights will prove valuable to policymakers who seek to make the process work more efficiently.

The results of estimating an equation that explains whether or not school officials choose to obtain a rating for a new bond issue contributes the first piece to the puzzle. The finding that par value of the bond issue is the most statistically significant determinant in this decision supports the supposition that districts may choose not to have their bonds rated due to the transaction costs of the rating process, and not necessarily because they are of poor credit quality. Likewise, the finding that school administrators of rural districts are more likely not to obtain a rating lends credence to the supposition that a local marketing strategy may also be a contributing factor in this decision. Perhaps the most interesting result

obtained in estimating this equation is the lack of significance for any of the variables that are associated with poor economic conditions for the district's population or an unhealthy profile of the district's finances. This result suggests that failing to obtain a rating because of pessimistic expectations about the result may not be as important a reason as has previously been speculated.

The second stage of the bond-rating model explains the choice to purchase insurance. In contrast to the results from the first equation, at this stage measures of district economic need and financial danger signals are all that seem to matter. A higher concentration of non-white population and a higher proportion of district revenues derived from intergovernmental grants both raise the likelihood that a district will purchase insurance to enhance a bond rating. A greater amount of pre-existing debt also increases this likelihood.

The final stage of the bond-rating model deals with estimating the rating categories themselves. Due to limitations of the sample data and prior information on bond yield differentials, we classify the ratings as either high (AAA or AA) or medium (A or Baa) investment quality. The strongest financial school districts appear to be in the AA category. This is expected since it is not typically cost advantageous for a school district rated initially AA to purchase insurance to improve the rating to AAA, for a slightly lower interest cost. The descriptive statistics for the AAA bonds in this sample suggest that it is private insurance coverage that leads to the higher rating, and not the financial condition of a school

district. Nonetheless, it is in this third equation that we find the greatest number of statistically significant explanatory variables. Measures of the underlying economic condition of the district's population, the districts financial profile, and characteristics of the bond issue itself all appear to contribute to a rating agency's determination of credit-worthiness, in ways that make intuitive sense.

The model and results presented here clearly represent a first step in investigating the complex process through which school administrators issue bonded debt to support capital projects. Given the obvious importance of this topic to policy-makers and practitioners in the field of education finance, further inquiry on the part of the research community to advance our understanding of how basic economic, financial, and demographic factors impact this process seems warranted.

Figure 1: Flowchart for School District Bond Issues
(n = 148 districts)

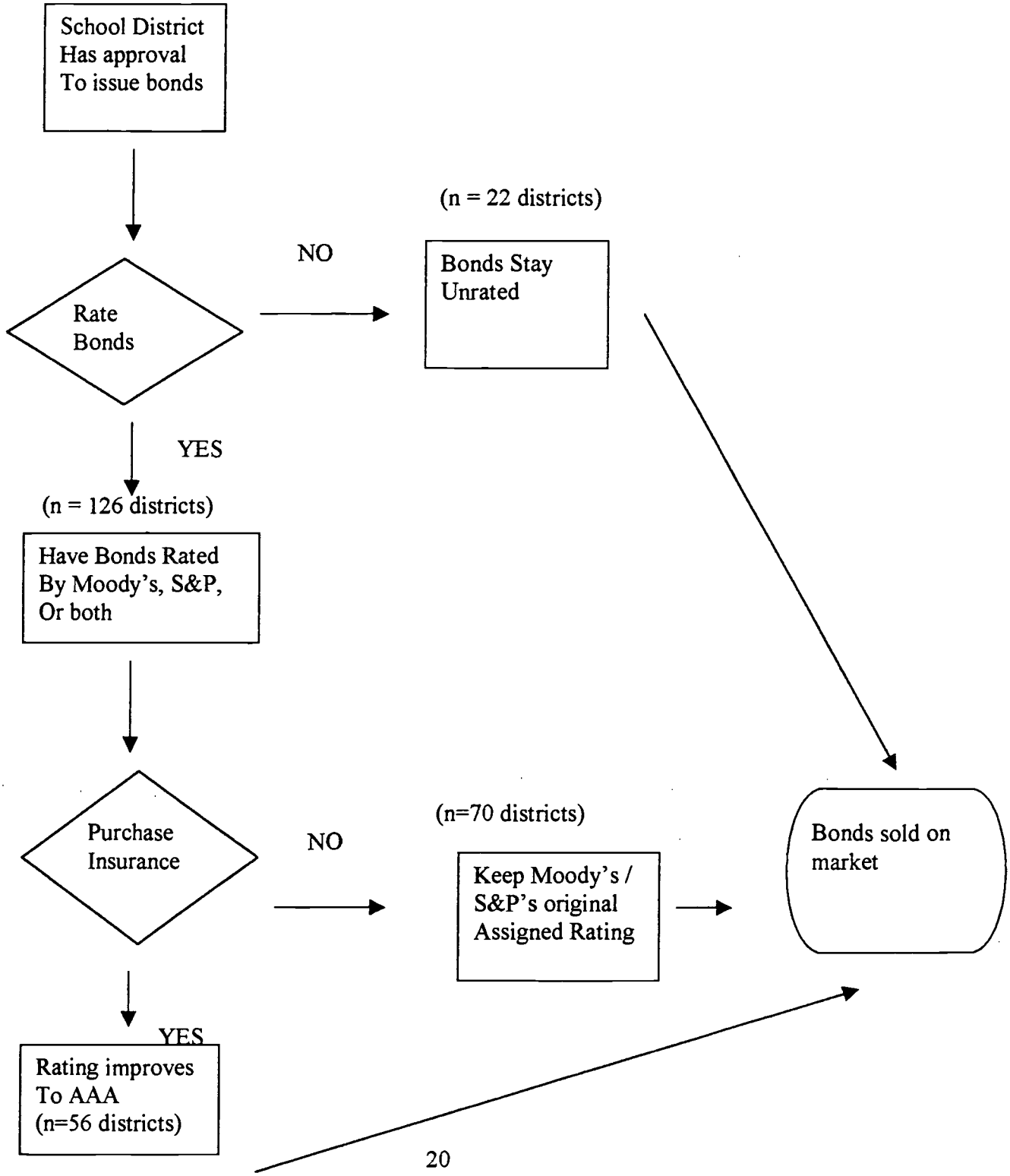

Table 1: Bond Rating Categories and Yield Averages

Panel A: Bond Rating Categories by Moody's and Standard & Poor

Moody's Rating	S&P's Rating	Descriptions
Aaa	AAA	Highest Quality (low default risk)
Aa	AA	High Quality
A	A	Upper Medium Grade
Baa*	BBB*	Medium Grade
Ba	BB	Lower Medium Grade
B	B	Speculative
Caa	CCC,CC	Poor (High default risk)
Ca	C	Highly Speculative
C	D	Lowest Grade

Panel B: Moody's Municipal Bond Yield Averages** over Time From 1950 to 1994

Month-Year	Average Municipal	Aaa	Aa	A	Baa
Jan – 50	2.03%	1.61%	1.82%	2.23%	2.46%
Jan – 60	3.92%	3.49%	3.73%	4.02%	4.43%
Jan – 70	6.74%	6.38%	6.60%	6.88%	7.13%
Jan – 80	6.98%	6.58%	6.72%	7.04%	7.60%
Jan – 90	7.02%	6.81%	6.93%	7.01%	7.35%
Jan – 93	6.10%	5.91%	6.05%	6.17%	6.28%
Jan – 94	5.33%	5.14%	5.19%	5.36%	5.60%

Source: Moody's Financial Government Manual, 1995, Volume 1.
*Bonds rated Baa(Moody's) and BBB(S&P) and above, are considered investment grade bonds.
**The above yields are for long term bonds.

Table 2: Descriptive Statistics for 148 School District Bond Issues

Variable	Mean	Median	Standard Deviation
PAR	$11,928,294	$5,125,000	$22,065,415
ENROLL	9,772	3,897	16,044
ATR	$.07	$.06	$.05
NW	17.01%	8.95%	19.71%
INC	$31,768	$27,364	$13,345
INGVT	56.9%	61.57%	21.56%
CASH	$986	$570	$1,379
GRDBT	$844	$664	$717

Table 3: Mean Values for Rating Categories

Variable	AAA	AA	A	BAA	Unrated
PAR(000's)	$13,957	$21,506	$7,867	$1,458	$2,111
ENROLL	8,267	15,493	9,650	11,510	4,422
ATR	$.06	$.09	$.06	$.02	$.07
NW	16.74%	13.61%	15.89%	13.99%	25.47%
INC	$30,947	$46,070	$25,776	$22,716	$24,065
INGVT	57.81%	36.54%	63.42%	82.10%	66.86%
CASH	$869	$1,034	$792	$643	$1,602
GRDBT	$1,129	$863	$524	$374	$738

Table 4: LOGIT Estimation Results from Three Stages of Bond Rating Model

	First Stage	Second Stage	Third Stage
Stage Variable	Rating Obtained RATED	Insurance Purchased INS	Observed Rating HIGH
Intercept	-.792	-7.26	-1.25
	(-.180)	(-2.26)**	(-.207)
PAR	+5.73E-07	+.761E-08	+.469E-07
	(3.140)*	(.560)	(1.105)
ENROLL	-1.16E-05	-.344E-04	+.592E-04
	(-.200)	(-1.33)	(1.62)***
LTE	+4.16	-2.099	+22.2
	(.470)	(-.296)	(2.42)**
NW	-.7079	+2.68	-5.99
	(-.570)	(1.78)***	(-1.65)***
INC	+4.34E-05	-.321E-04	+.229E-03
	(.899)	(-.950)	(3.49)*
INGVT	-1.52	+25.5	-39.4
	(-.178)	(3.13)*	(-1.54)
INGVTSQ	+3.15	-22.4	+35.3
	(.475)	(-3.17)*	(1.60)
CASH	-5.91E-04	+.979E-04	-.113E-02
	(-1.806)***	(.350)	(-2.83)*
GRDBT	-2.76E-04	+.188E-02	-.364E-02
	(-.379)	(3.77)*	(-1.72)***
^INS	N/A	N/A	+15.90
			(2.62)*
URBAN	+2.30E-03	+.187	-.631
	(.002)	(.300)	(-.742)
RURAL	-1.23	-.653	+2.18
	(-1.66)***	(-1.14)	(2.10)**
Log-Likelihood	-38.54	-63.19	-42.70
Chi-Square	47.34*	46.25*	70.52*
Correctly Predicted	89.90%	77.8%	81.8%

*significant at the .01 level
**significant at the .05 level
***significant at the .10 level

References

Aronson, J. Richard; Marsden, James R. "Duplicating Moody's Municipal Credit Ratings." *Public Finance Quarterly.* (Jan 1980): 97-106.

Brown, Patrick J. Bond Markets: Structures and Yield Calculations. AMACOM, New York (1998): Pp 24-38.

Crampton, Faith E.; Thompson, David C. (eds.) Introduction to the Special Issue: The Crisis in School Infrastructure Funding." Journal of Education Finance. (Fall 2001): 625-631.

Fabozzi, Frank J.; Fabozzi, T. Dessa. Bond Markets, Analysis and Strategies. Prentice Hall, Englewood Cliffs, NJ (1989): pp 154-159.

Greene, William H. Econometric Analysis, Fourth Edition. Prentice Hall, Saddle River, NJ, 2000.

Harris, Mary H. "School District Bond Finance: A Study on Bond Ratings and State Capital Aid Programs." *An unpublished dissertation.* Lehigh University (October 2001).

Hitchcock, David. "How School District Bonds are Rated." *School Business Affairs.* (Feb 1992): 15-18.

Kaplan, Robert S.; Urwitz, Gabriel. "Statistical Models of Bond Ratings: A Methodological Inquiry." *Journal of Business.* The University of Chicago, (1979): Vol 52, no. 2.

Kennedy, Peter. A Guide to Econometrics. The MIT Press, Cambridge, MA, 1998.

Lamb, Robert; Rappaport, Stephen P. Municipal Bonds: The Comprehensive Review of Tax-Exempt Securities and Public Finance. McGraw-Hill Book Company, New York. (1980).

Litvack, David. "Measuring Municipal Default Risk." *Government Finance Review.* Chicago, (Dec 1999): 19-21.

Moody's Investors Service. "Rating Approach" Moodys.com (2000).

Moon, Choon-Geol; Stotsky, Janet G. "Municipal Bond Rating Analysis: Sample Selectivity and Simultaneious Equations Bias." *Regional Science and Urban Economics.* (March 1993): 29-50.

Ravelle, Linda. "A Model of Revenue Bond Ratings for Water and Sewer Authorities In Pennsylvania." *An unpublished dissertation.* Lehigh University, (Oct. 1990).

School District Data Book Profiles: 1989-1990. Http://govinfo.library.orst.edu

Shapiro, Eric J. "Municipal bond insurance might enhance your next school bond." *American School Board Journal.* (August 1989): 15-16.

Ziebell, Mary T.: Rivers, Mary Jean. "The Decision to Rate or Not to Rate: The Case of Municipal Bonds." *Journal of Economics and Business.* (November 1992):301-16.

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[1] In this paper we consider the school district official as the person or persons responsible for making financial decisions for the school district. The institutions that determine how this responsibility is assigned differ across states. Though important, these differences are not the focus of the analysis presented here.

[2] A recent issue of the *Journal of Education Finance* (Fall 2001) deals solely with the infrastructure needs of elementary and secondary schools.

[3] Prior literature can be found in Fabozzi (1989) and Brown (1998), which were both discussed in the literature review section of the Harris (2001) dissertation.

[4] Studies of the municipal bond market rating process include Aronson and Marsden (1980), Ziebell and Rivers (1992) and Moon and Stotsky (1993).

[5] In this paper we focus only on locally raised revenues. See Harris (2001) for a comprehensive discussion of the different state aid programs that exist to support capital spending by school districts, as well as the state-specific rules about referenda requirements for bond issues and overall debt limitations.

[6] Investors do not pay federal individual income tax on the proceeds from investments in municipal bonds. Hence the yield on these bonds is lower than the yield on corporate bonds due to the tax advantage they receive.

[7] The yield differential in January 1994 between AAA and AA bonds was .05; between AA and A bonds was .17, and between A and Baa bonds was .24, providing the rationale for the rating classifications here.

[8] School district financial data are for the 1993-94 school year. For a few school districts where this information is not available, data for the 1992-1993 school year is utilized. School district demographic data is for 1993-94 year when available, otherwise data from the 1990 decennial census year is used. The primary source for this data is the National Center for Education Statistics' *Common Core of Data for School Districts*. Data for school districts with missing information in the NCES database can be found in the School District Data Book Profiles for 1989-1990, from the 1990 Census. These data are found on the website

http://govinfo.library.orst.edu. Data for bond ratings and insurance coverage are from the individual official bond statements.

[9] We thus exclude issues used to refinance existing debt.

[10] The omitted category serving as the reference for urban and rural districts is suburban school districts.

[11] In estimating the model we include both this variable and its squared term to allow for the potential of a nonlinear relationship.

[12] Although some bonds were rated by both Moody's and S&P, only the Moody's ratings were used as the RATING category for this research.

[13] The table of correlation coefficients shows that only the values relating par and enrollment (.63) and the values relating local tax effort and intergovernmental revenues (-.68) exceed 0.5. The full table of correlation coefficients is available from the authors upon request.

[14] We also estimated the model using the probit procedure and obtained results that were qualitatively indistinguishable. The only difference between these estimating procedures is the distributional assumption of the underlying disturbance term. See Kennedy (1998, pp. 233-235) for a concise review of the econometric issues involved when estimating models with dichotomous dependent variables.

[15] Although there was a similar rating differential between AA and A, and A and Baa, the first was chosen due to the limited number of observations in the Baa rating category.

[16] In this data sample, all of the AAA rated bonds had purchased insurance to secure the rating.

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