ELECTRIC UTILITY OWNERSHIP BY MUNICIPALITIES: IMPACTS ON PROPERTY TAXES, BOND RATINGS AND NET INTEREST COST

By

Wanda A. Wallace

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ABSTRACT

The impact of public ownership of electric utilities on municipal net interest cost and bond rating and the possible substitution of municipally-owned utility profits for property taxes are examined by applying three research approaches--interviews, questionnaires, and empirical analysis of 106 bond issues over the period 1974-1976. Essentially, the survey results indicate that professionals in the municipal area perceive municipalities with publicly-owned utilities as having lower net interest cost and higher bond ratings and the bond analysis indicates that utility ownership significantly increases the explanation of variations in municipal bond ratings and appears to affect property assessment and tax collection practices. Only an indirect relationship appears to exist between utility ownership and net interest cost.

There have been a number of inconclusive studies about the economic advantages and disadvantages to public ownership of utilities. This study addresses several issues which can be resolved by empirical analysis. Are municipalities with publicly-owned utilities perceived to enjoy lower net interest cost and/or higher bond ratings by professionals in the municipal bond market? More important, do municipalities with publicly-owned utilities enjoy lower net interest cost and/or higher bond rating. A side issue warranting investigation relates to Colberg's (1955) contention that municipally-owned utility profits are a substitute for property taxes. In a study of Florida cities, he discovered that utility profits were a very common and a very considerable source of municipal revenues and displace property tax increases--in 1950 Florida utilities transferred an average of 22 percent of the total revenue earned by municipal (including electric) utilities to the general fund, while a $5,000 homestead exemption removed much owner-occupied real estate from the tax base. However, other researchers (e.g. Mann, 1970) have found that in different circumstances, publicly-owned utility firms have been recipients of subsidies. Hirshleifer, DeHaven, and Milliman (1960) found water services were being priced below average supply costs, and were subsidized by property taxes in many Southern California cities.

As Colberg (1955) suggests, the advantages of indirect taxation through high utility rates include an expedient way to raise revenue and a handy way to spread the tax burden with monthly billings. Such benefits must be weighed against the disadvantages of concealing the

real cost of government, distorting the long-run and short-run use of resources, and transferring real income from utility users to users of other municipally-provided services. Furthermore, the increasing dependence on an often highly-regressive tax deprives residents of an income tax deduction (the deduction for property taxes).

To determine the perceived impact of utility ownership on bond rating and net interest cost interviews were conducted with a number of individuals. Local government officials, colleagues who are active in municipal affairs, lawyers, underwriters, accountants, professional staff members of the Florida auditor general's office, and the bond raters commented on utility revenue-cost of capital relationships. Interviews with representatives of three different bond rating firms (Vice-presidents of the municipal bond rating department) and review of the bond rating companies' literature provided suggestions as to factors considered important by bond raters in their evaluations of issues, including their opinions concerning events in the municipal area.

The final conclusion that could be drawn concerning the impact of municipality ownership upon the bond rating was as follows:

> Ownership of a municipal utility is an advantage to a city in terms of its bond rating. However, the management of the utility influences how much of a favorable impact upon bond rating that ownership will have.

In addition to the interviews, an opinion survey was completed in an attempt to determine how the role of utility ownership is perceived by varied professional groups working in the municipal area. The questionnaire was mailed to underwriters and investment bankers, attorneys, CPAs, educators, municipal finance officers, bond raters, and rule-makers.

The survey questionnaire results are reported in the Appendix. The results indicate that the perceptions of the impact of publicly-owned utilities on municipality net interest cost and bond rating vary greatly with many professionals either perceiving no effect or claiming to have no opinion on the question. It should, however, be noted that the mean of the responses indicates a tendency to perceive a positive impact on net interest cost (i.e. a lowering of net interest cost) and bond rating (i.e. a raising of the bond rating) by publicly-owned utilities and a general belief that assessed versus actual value would be equivalent or lower for municipalities owning utilities relative to those municipalities served by privately-owned utilities. These survey results are useful in corroborating the econometric analysis which follows. The use of multiple research approaches allows conclusions to be made with a higher degree of confidence.

Empirical Analysis

To evaluate the impact of public utility ownership upon net interest cost and municipal bond rating and to compare the property tax levels in municipalities with different ownership forms for the local electric utility, data on all general obligation municipal bonds and utility revenue bonds issued in Florida for 1974 (23 issues), 1975 (34 issues), and 1976 (51 issues) were collected. Thirty-nine municipalities, fourteen counties, and two school boards are represented in the data base (however, two 1974 issues were eliminated from the analysis due to insufficient data).

Restriction of the sample to a single state was due largely to data availability. However, it also provides explicit control for difficult-to-measure state-specific conditions that affect net interest cost and bond rating. Members of the investment community are quick to point out that legal conditions within each state make each state's bonds unique. Also, supply conditions, state income tax laws, and state bank pledging requirements vary across states and should influence the net interest cost.

The focus is on new bond issues primarily because the research interest is on the impact of municipal electric utility ownership form on the cost of debt to the municipality. This cost is determined when the bonds are initially issued. Also, the focus on new issues avoids problems caused by rating change lags in the market.

Data

Fortunately, a substantial body of research exists on the determinants of net interest cost and bond ratings for individual state and local governments on their new long-term bond issues. Based on studies by Golaszewski (1977), Hastie (1972), Carleton and Lerner (1969), and Hendershott and Kidwell (1977), the following basic finance and demographic variable models were adopted for use in testing hypotheses; the coefficients (b's) are reported as absolute values and the signs describe the expected direction of influence on the dependent variable.

$$\text{NET INTEREST COST} = b_0 + b_1 X_I + b_2 X_R + b_3 X_Y + b_4 X_T + b_5 X_S + b_6 X_C + b_7 X_P - b_8 X_B - b_9 X_M$$

$$\text{BOND RATING (1 is the highest rating)} = b_0 - b_1 X_L - b_2 X_M + b_3 X_U - b_4 X_V - b_5 X_F + b_6 X_D + b_7 X_Y + b_8 X_A$$

Where X_I = Market Index: Bond Buyer's Index of 20 Municipal Bonds for the Week Prior to Issue

X_R = Moody's and Standard & Poor's Credit Rating (ranging from 1 for AAA to 8 for B and lower bonds)

X_Y = Years-to-Last-Maturity

X_T = Total Revenue Minus Total Expense (1 = negative)

X_S = Spread (Difference between price paid to an issuer and the reoffering price to investors, i.e. the cost of underwriting to the issuer--measured in dollars per $1,000 bond)

X_C = Type of Issuer 0 = County and 1 = Municipality

X_P = Prime Rate (Day of Issue, as reported in The Money Manager/ Weekly Bond Buyer, "Money Market Rates in the Week")

X_B = Number of Bids

X_M = MBIA Insurance (dummy variable, 1 = insured)

X_L = Population Change Ratio of Last Census Date to Previous Census Date, e.g. 1974/1970 (Florida Statistical Abstract 1975, 1976, 1977)

X_U = Ratio of Issue Size to Population

X_V = Revenue or General Obligation Bond (1 = General Obligation Bond)

X_D = Log of Outstanding Debt

X_F = Florida Turnpike Yield-to-Maturity for Week Prior to Issue (Supplied by Clifford Drake & Co. under "Municipal Dollar Bonds" in The Money Manager/Weekly Bond Buyer)

X_A = Assessed Value Per Capita

Note: X_T, X_D, and X_A were based on data available from State of Florida Local Government Financial Report Fiscal Year 1973-74, 1974-5, 1975-6

Other variables which will be included in statistical analysis include:

X_{PT} = Property Taxes

X_{EN} = Exempt/Nonexempt Property Ratio

X_{ED} = Deficit in the current operations of the publicly-owned electric utility (dummy variable, 1 = TR - TE is negative)

X_{DG} = Deficit balance in the General Fund (1 = deficit)

Note: X_{PT}, X_{EN}, and X_{ED} were based on the aforementioned State of Florida Local Government Financial Report.

X_{MU} was based on data concerning Generating Municipal Systems, 1974; Statistics of the Florida Electric Utility Industry 1960 through 1975, State Energy Office, September 1976, Department of Administration.

X_{DG} was based on annual financial reports and State Auditor General reports.

A necessary first step was to examine the correlation matrix (Table 1) to ascertain whether a problem with multicollinearity (Maddala, 1977) should be expected. Most of the correlations between variables range from zero to two and do not suggest a priori a problem with multicollinearity.

Table 1

CORRELATION MATRIX

	NIC	X_Y	X_I	X_{PT}	X_B	X_T	X_{MU}	X_{EN}	X_C	X_A	X_R	X_L	X_F
X_Y	.088												
X_I	.459	-.019											
X_{PT}	.001	-.287	.132										
X_B	-.316	-.116	-.328	.010									
X_T	-.221	-.022	-.092	-.156	.007								
X_{MU}	.053	.084	-.047	-.181	-.174	-.088							
X_{EN}	.143	-.040	.210	-.105	.181	.151	-.110						
X_C	-.007	.018	-.152	-.616	.160	-.138	.213	-.065					
X_A	-.022	-.051	.062	.058	.135	-.084	-.235	-.306	.061				
X_R	-.110	.039	.004	.270	.232	-.069	-.163	.033	-.218	.133			
X_L	.141	.139	.020	-.141	-.309	-.192	-.125	-.310	.113	.292	-.292		
X_F	.051	.021	.173	.105	.098	.103	.026	.233	-.184	-.253	-.159	-.165	
X_D	-.039	-.226	.043	.653	.202	-.131	-.020	-.163	-.315	.013	.447	-.109	-.044
X_{ED}	-.092	-.052	-.010	-.119	-.067	.236	.090	-.089	.143	-.037	-.220	.009	-.006
X_P	-.006	.098	-.295	-.100	.134	.024	-.108	.120	-.072	-.181	.066	-.096	.240
X_U	.053	.208	-.034	-.298	-.063	.090	-.039	-.116	.337	.418	.088	.117	-.373
X_V	-.107	-.303	-.131	.334	.188	-.178	-.146	-.071	-.102	.253	.106	-.023	-.084
X_S	.149	.219	.027	-.028	-.098	-.025	.448	-.126	.005	-.073	.053	-.078	-.030
X_{DG}	.166	.163	-.024	-.163	-.174	-.211	.459	-.201	.141	-.139	-.308	.279	-.020
X_M	.062	.227	.398	-.184	-.117	.102	-.031	.213	-.030	-.085	-.197	-.047	.195

	X_F	X_D	X_{ED}	X_P	X_U	X_V	X_S	X_{DG}
X_Y								
X_I								
X_{PT}								
X_B								
X_T								
X_{MU}								
X_{EN}								
X_C								
X_A								
X_R								
X_L								
X_F								
X_D								
X_{ED}		-.000						
X_P		-.157	-.023					
X_U		-.206	.098	-.011				
X_V		.185	-.032	-.045	-.028			
X_S		.140	.073	-.077	.059	-.072		
X_{DG}		.005	-.088	-.201	-.104	-.046	.326	
X_M		-.260	.033	-.126	-.023	-.194	-.018	-.019

A t-test Analysis

Each of the variables listed in Table 1 were subjected to a t-test analysis to determine whether there was a significant difference between municipalities with a publicly-owned electric utility and other municipal issuers. If the F test was more significant than .10 a separate variance was utilized in the computation; if less than or equal to .10 significance, the pooled variance was utilized. Table 2 reports all variables for which the significance of the t-statistic was greater than or equal to .10 level of significance.

Table 2 implies that a significantly higher level of property taxes, a lower ratio of exempt to non-exempt property, and a higher assessed value per capita prevail for municipalities served by private electric utilities. However, municipalities with publicly-owned utilities are more likely to have a deficit in the current operations of the general fund. It is also interesting to note that a quarter of the publicly-owned utility municipalities reported a deficit in current operations of the electricity operation. The growth in population was greater on average for municipalities without publicly-owned utilities. This lower population growth may well explain the higher issue price/population ratio for municipalities with a publicly-owned utility. Finally, it would appear that municipalities without publicly-owned electric utilities issue more general obligation bonds than those municipalities operating their own electric power plant.

Although the t-test statistics were less than .10 significant, it is interesting to note the means of the market valuation variables for the public versus private utility municipalities. These are reported in Table 3.

Table 2

A t-test Analysis of Variables

Variable	Public Utility (N=21)	Private Utility (N=80)	t-value	d.f.
PROPERTY TAXES				
Mean	2.228	23.068	4.75	80
Standard Deviation	1.597	39.084	(.000 significance	
Standard Error	.349	4.370		
TOTAL REVENUE MINUS	.571	.338	-1.98	99
TOTAL EXPENSES	.507	.476	(.051)	
(Negative = 1)	.111	.053		
EXEMPT/NON-EXEMPT	.724	.402	-3.29	99
PROPERTY	.461	.382	(.001)	
	.101	.043		
ASSESSED VALUE PER	7.694	11.228	3.72	86
CAPITA	2.619	6.798	(.000)	
	.571	.760		
LAST CENSUS OVER	1.263	1.428	1.65	96
PREVIOUS CENSUS	.165	.828	(.101)	
	.036	.093		
ELECTRIC UTILITY FUND	.238	.013	-2.35	21
DEFICIT	.436	.112	(.029)	
(Negative = 1)	.095	.012		
ISSUE PRICE/	.243	.132	-2.42	99
POPULATION	.186	.188	(.017)	
	.041	.021		
REVENUE vs.	.238	.450	1.77	99
GENERAL OBLIGATION BOND	.436	.501	(.080)	
(1 = General Obligation)	.095	.056		

Table 3

Market Valuation Variables

Variable	Publicly-Owned Utility	Privately-Owned Utility
Net Interest Cost		
Mean	6.529	6.528
Standard Deviation	.667	1.083
Standard Error	.146	.121
Bids		
Mean	2.810	2.325
Standard Deviation	2.015	2.453
Standard Error	.440	.274
Rating (1 = highest rating)		
Mean	4.429	4.700
Standard Deviation	2.357	2.563
Standard Error	.514	.287
Spread		
Mean	10.858	7.766
Standard Deviation	7.467	9.756
Standard Error	1.629	1.091

These means suggest a very slight higher net interest cost for municipalities with a publicly-owned electric utility, a higher number of bids attracted for issues, a higher bond rating, and a higher spread, although multiple regression analysis is needed to determine whether other characteristics of these municipalities are responsible for these differences.

There is a two-fold concern over the validity of the t-test analysis due to (1) the lack of normality of the data being analyzed (e.g. the Kolmogorov-Smirnov (K-S) goodness of fit test gave a 3.16 z value having a related 2-tailed p of zero, for the property tax sample; similarly, assessed value per capita led to a 2.34 z value with a 2-tailed p value of .0000) and (2) the lack of an interval scale for certain variables, e.g. bond rating involves an ordinal ranking (in addition the K-S z value for rating was 2.71 with a p value of .0000). As a check on the robustness of the t-test analysis, given these sample data characteristics, a Mann-Whitney analysis was run on the three variables discussed above. The Mann-Whitney results are reported in Table 4. A comparison of Tables 2 and 4 demonstrates the similarity of t-test and Mann-Whitney results for the property tax and assessed value per capita variables. As reported in table 4, the t-statistic for the bond rating was not significant; it has a value of .44 with 99 d.f. and a probability of .662. Hence, it appears that the t-test is robust as a means of analyzing the sample data. As a means of controlling other factors not considered in the t-test analysis or the Mann-Whitney analysis which could have an impact on the dependent variables of interest, multiple regression analysis was applied.

Table 4

Mann-Whitney Analysis

PROPERTY TAXES	MEAN RANK	U	Z	2-tailed P
Private Utility	54.9	524.0	-2.645	.0082
Public Utility	36.0			
ASSESSED VALUE PER CAPITA				
Private Utility	56.0	442.0	-3.331	.0009
Public Utility	32.0			
BOND RATING				
Private Utility	51.8	773.0	- .590	.5554
Public Utility	47.8			

Multiple Regression Analysis

As a means of assessing the contribution toward explaining variations in municipal net interest cost and bond rating of public ownership of an electric utility by a municipality, the regression models based on finance and demographic variables frequently suggested in the literature were compared to the same models with the public utility dummy variable added. In addition, the complete set of variables originally presented (except X_{DG}) were incorporated into a regression model and run on the 106 issue sample and subsamples of 85 (private utility municipalities and school districts) and 26 (public utility municipalities and school districts). The results of these regressions are reported in Table 5.

The overall F reported in Table 5 for each model tested suggests that $H_0 : b_2 = b_3 = . . . = b_k = 0$ can be rejected at the .01 level of significance for all of the net interest cost (NIC) and bond rating (BR) 106 issue models and the 85 issue BR model. This null hypothesis can be rejected at the .05 level for the 26 issue and 85 issue NIC models; it can be rejected at .074 for the 26 issue BR model. The hypothesis $H_0 : b_k = 0$ (k = 2, 3, ..., k) was tested and those individual regression coefficients found to be significantly different from zero at the .05 level are reported in Table 5. It is particularly interesting to note that an electric fund deficit is significant at .019 in the 26 issue sample of municipalities with publicly-owned municipalities for the all variable NIC model and at .017 in the 106 issue all variable BR model. In the BR analysis the municipal utility dummy variable is significant at .025

Table 5

Multiple Regression Analysis

106 Issue Sample:

BASE FINANCE/DEMOGRAPHIC MODEL:

$$NIC = \underset{(1.423)}{.0297} + \underset{(.174)}{.8818}\,X_I - \underset{(.037)}{.0524}\,X_R + \underset{(.013)}{.0107}\,X_Y - \underset{(.175)}{.3231}\,X_T \text{ ---------- } + \underset{(.008)}{.0106}\,X_S$$
$$+ \underset{(.203)}{.1107}\,X_C \text{ ---------- } + \underset{(.057)}{.1047}\,X_P - \underset{(.0395)}{.06013}\,X_B - \underset{(.218)}{.3635}\,X_M \qquad R^2 = .34424 \quad (\bar{R}^2 = .28276)$$

OVERALL F = 5.599 (.000 significance) SIGNIFICANT b's: X_I .000 significance

EXTENDED MODEL WITH MUNICIPAL PUBLICLY-OWNED ELECTRIC UTILITY DUMMY VARIABLE:

$$NIC = \underset{(1.438)}{.1246} + \underset{(.176)}{.8718}\,X_I - \underset{(.037)}{.0549}\,X_R + \underset{(.013)}{.0105}\,X_Y - \underset{(.177)}{.3307}\,X_T \text{ ---------- } + \underset{(.009)}{.01288}\,X_S$$
$$+ \underset{(.208)}{.1341}\,X_C \text{ ---------- } + \underset{(.058)}{.1025}\,X_P - \underset{(.040)}{.0640}\,X_B - \underset{(.218)}{.365}\,X_M - \underset{(.090)}{.0508}\,X_{MU}$$

OVERALL F = 5.03584 (.000) SIGNIFICANT b's: X_I .000 $R^2 = .34644$ $(\bar{R}^2 = .27765)$

ALL VARIABLES:

$$NIC = \underset{(1.504)}{.62496} + \underset{(.1874)}{.7814}\,X_I - \underset{(.0379)}{.0620}\,X_R + \underset{(.0133)}{.0107}\,X_Y - \underset{(.1942)}{.3274}\,X_T + \underset{(.0154)}{.00626}\,X_A + \underset{(.0089)}{.01499}\,X_S$$
$$+ \underset{(.2817)}{.1857}\,X_C - \underset{(.3840)}{.3699}\,X_{ED} + \underset{(.0602)}{.0904}\,X_P - \underset{(.0430)}{.0867}\,X_B - \underset{(.2235)}{.4019}\,X_M + \underset{(.2416)}{.3888}\,X_{EN} - \underset{(.0928)}{.0462}\,X_{MU}$$
$$+ \underset{(.0037)}{.00038}\,X_{PT} \qquad R^2 = .37423 \quad (\bar{R}^2 = .27796)$$

OVERALL F = 3.88724 (.000) SIGNIFICANT b's: X_I .000; X_B .046

26 ISSUE SAMPLE, ALL VARIABLES:

$$NIC = \underset{(1.98)}{1.318} + \underset{(.2360)}{.7181}\,X_I - \underset{(.0561)}{.0322}\,X_R + \underset{(.0166)}{.0127}\,X_Y - \underset{(.3572)}{.5062}\,X_T + \underset{(.04964)}{.0702}\,X_A - \underset{(.01145)}{.00034}\,X_S$$
$$+ \underset{(1.061)}{.0784}\,X_C - \underset{(.2797)}{.7686}\,X_{ED} + \underset{(.0627)}{.0905}\,X_P - \underset{(.0614)}{.1392}\,X_B - \underset{(.2626)}{.04935}\,X_M + \underset{(.5948)}{.01213}\,X_{EN} - \underset{(.0997)}{.1105}\,X_{MUA}$$
$$- \underset{(.2117)}{.008306}\,X_{PT} \qquad R^2 = .87562 \quad (\bar{R}^2 = .71731)$$

OVERALL F = 5.53121 (.004) SIGNIFICANT b's: X_I .011; X_{ED} .019; X_B .045

Table 5 - Continued

85 ISSUE SAMPLE, ALL VARIABLES:

$$
\begin{aligned}
NIC = \; & \underset{(2.054)}{.5187} + \underset{(.2362)}{.7966}\, X_I - \underset{(.0465)}{.0577}\, X_R + \underset{(.01635)}{.00766}\, X_Y - \underset{(.2612)}{.4253}\, X_T + \underset{(.01774)}{.00566}\, X_A + \underset{(.01069)}{.01713}\, X_S \\
& + \underset{(.3463)}{.1508}\, X_C - \underset{(1.059)}{.6099}\, X_{ED} + \underset{(.0855)}{.0997}\, X_P - \underset{(.0516)}{.0844}\, X_B - \underset{(.2842)}{.4697}\, X_M + \underset{(.3293)}{.4989}\, X_{EN} - \underset{(.111)}{.0594}\, X_{MUO} \\
& - \underset{(.00435)}{.000211}\, X_{PT}
\end{aligned}
$$

$R^2 = .34495$ $(\bar{R}^2 = .21394)$

OVERALL F = 2.633 (.004) SIGNIFICANT b's: X_I .001

106 Issue Sample:

BASE FINANCE/DEMOGRAPHIC MODEL:

$$
\begin{aligned}
RATING = \; & \underset{(1.674)}{3.044} - \underset{(.297)}{1.223}\, X_L - \text{--------} + \underset{(.4492)}{.0406}\, X_V + \underset{(1.311)}{.7077}\, X_U - \underset{(.4833)}{.615}\, X_M - \text{--------} \\
(BR) \quad & + \underset{(.331)}{1.63}\, X_D + \underset{(.0311)}{.0744}\, X_Y - \underset{(.196)}{.2520}\, X_F - \text{--------} + \underset{(.0388)}{.0714}\, X_A
\end{aligned}
$$

$R^2 = .37443$ $(\bar{R}^2 = .32284)$

OVERALL F = 7.25728 (.000) SIGNIFICANT b's: X_L .000; X_D .000; X_Y .019

EXTENDED MODEL WITH MUNICIPAL PUBLICLY-OWNED ELECTRIC UTILITY DUMMY VARIABLE:

$$
\begin{aligned}
RATING = \; & \underset{(1.65)}{3.48} - \underset{(.292)}{1.28}\, X_L - \text{--------} - \underset{(.4414)}{.0435}\, X_V + \underset{(1.284)}{.7769}\, X_U - \underset{(.475)}{.7013}\, X_M - \underset{(.187)}{.4235}\, X_{MU} \\
& + \underset{(.325)}{1.622}\, X_D + \underset{(.0305)}{.0789}\, X_Y - \underset{(.1920)}{.2619}\, X_F - \text{--------} + \underset{(.0386)}{.0560}\, X_A
\end{aligned}
$$

$R^2 = .40633$ $(\bar{R}^2 = .35067)$

OVERALL F = 7.30063 (.000) SIGNIFICANT b's: X_L .000; X_D .000; X_Y .011; X_{MU} .025

ALL VARIABLES:

$$
\begin{aligned}
RATING = \; & \underset{(1.686)}{2.994} - \underset{(.297)}{1.202}\, X_L - \underset{(.854)}{2.074}\, X_{ED} + \underset{(.4428)}{.0172}\, X_V + \underset{(1.289)}{1.006}\, X_U - \underset{(.4695)}{.6975}\, X_M - \underset{(.1909)}{.3780}\, X_{MU} \\
& + \underset{(.4028)}{1.889}\, X_D + \underset{(.0327)}{.0715}\, X_Y - \underset{(.1914)}{.2473}\, X_F + \underset{(.5342)}{.4535}\, X_{EN} + \underset{(.0391)}{.0596}\, X_A - \underset{(.00818)}{.00634}\, X_{PT}
\end{aligned}
$$

$R^2 = .45079$ $(\bar{R}^2 = .37993)$

OVERALL F = 6.361 (.000) SIGNIFICANT b's: X_L .000; X_D .000; X_Y .020; X_{ED} .017; X_{MU} .051

Table 5 - Continued

26 ISSUE SAMPLE, ALL VARIABLES:

$$\text{RATING} = \underset{(9.040)}{-3.890} + \underset{(3.928)}{4.762}\,X_L - \underset{(1.479)}{1.682}\,X_{ED} - \underset{(1.117)}{.7219}\,X_V - \underset{(4.410)}{1.693}\,X_U - \underset{(.9279)}{1.846}\,X_M - \underset{(.6272)}{.2464}\,X_{MUA}$$
$$+ \underset{(2.104)}{1.245}\,X_D + \underset{(.0814)}{.03187}\,X_Y + \underset{(1.261)}{.1479}\,X_F + \underset{(2.074)}{1.169}\,X_{EN} - \underset{(.3591)}{.1451}\,X_A + \underset{(.4826)}{.4413}\,X_{PT}$$

$R^2 = .68106$ $(\bar{R}^2 = .3867)$

OVERALL F = 2.313 (.074) SIGNIFICANT b's: ---

85 ISSUE SAMPLE, ALL VARIABLES:

$$\text{RATING} = \underset{(1.782)}{2.547} - \underset{(.2997)}{1.288}\,X_L - \underset{(2.006)}{1.914}\,X_{ED} - \underset{(.4877)}{.0159}\,X_V + \underset{(1.595)}{2.550}\,X_U - \underset{(.5380)}{.2946}\,X_M - \underset{(.2005)}{.4551}\,X_{MUO}$$
$$+ \underset{(.4277)}{1.890}\,X_D + \underset{(.0326)}{.0705}\,X_Y - \underset{(.2004)}{.1447}\,X_F - \underset{(.6833)}{.4007}\,X_{EN} + \underset{(.0406)}{.0504}\,X_A - \underset{(.00836)}{.00385}\,X_{PT}$$

$R^2 = .4995$ $(\bar{R}^2 = .41604)$

OVERALL F = 5.98718 (.000) SIGNIFICANT b's: X_L .000; X_D .000; X_Y .034; X_{MUO} .026

KEY:
- NIC = Net Interest Cost
- X_I = Bond Buyer's Index
- X_R = Bond Rating
- X_Y = Years-to-last-maturity
- X_T = Total Revenue Minus Total Expenses
- X_A = Assessed Value Per Capita
- X_S = Spread
- X_T = Type of Issuer
- X_{ED} = Electric Fund Deficit
- X_P = Prime Rate
- X_B = Number of Bids
- X_M = MBIA Insurance
- X = Exempt/Non-Exempt Ratio
- X_{EN} = Municipal Utility (1= publicly owned)
- X_{MU} = 1= Municipal
- X_{MUA} = 0= Unclassified/N/A i.e. school districts
- X_{MUO} = 1= Unclassified/N/A i.e. school districts
  0= Not publicly owned
- X_{PT} = Property Taxes
- X_L = Last Census Over Previous Census
- X_V = Revenue vs. General Obligation Bond
  1 = General Obligation Bond
- X_U = Issue Price/ Population
- X_D = Log of Oustanding Debt
- X_F = Florida Turnpike Yield-to-Maturity

in the 106 issue extended model, at .051 in the 106 issue all variable model, and at .025 in the 85 issue all variable model.

The variables' importance as determinants of municipal net interest cost and bond rating shifts for subgroups which are entirely publicly-owned electric utility municipalities (however, note the increased measurement error for these models due to the low number of issues, 26) or entirely privately owned. Comparison of the coefficients of each variable provides insight into the role of municipal utility ownership. For example, +.00038 X_{PT} (property taxes) for the all variable 106 issue NIC model becomes -.008306 X_{PT} for the municipalities with publicly-owned utilities and -.000211 X_{PT} for those served by private utilities. The negative signs make sense in that higher property taxes should indicate a greater source of revenue to meet debt commitments. The larger coefficient for the property tax variable for municipalities with publicly-owned utilities and the variable's greater beta elasticity of -.00273 (compared with -.00070 for the 85 municipalities served by private utilities) imply a greater decline in NIC per 1% rise in property taxes. There are not significant shifts in other variables in the 106, 85, and 26 issue NIC models except that the ratio of exempt/non-exempt property contributes much more to the increased NIC of the private utility municipalities (.4989 X_{EN}) than to those municipalities with publicly-owned utilities (.01213X_{EN}).
A comparison of the BR 106, 85, and 26 issue all variable models indicates significant changes in the role played by the following variables:
(1) X_L -- the greater the last census is relative to the previous census for municipalities with publicly-owned utilities (PUU) the lower their bond rating in contrast to municipalities served by private utilities (PRU)

(and the full 106 issue model) in which population growth raises bond rating; (2) X_V -- general obligation bonds receive a higher bond rating for PUU than PRU (for the total 106 issue sample, general obligation bonds receive lower ratings than revenue bonds); (3) X_U -- the bond rating is higher the larger the ratio of issue price to population for PUU, while other municipalities (and the 106 issue sample) demonstrate that the BR decreases as the ratio increases; (4) X_M -- MBIA insurance has a more favorable effect on BR for PUU; (5) X_F -- as Florida Turnpike bonds' Y-T-M rises, the BR falls for PUU, while BR is increased for the 85 and 106 issue samples; (6) X_{EN} -- a higher exempt/non-exempt ratio leads to a lower bond rating for PUU (and the 106 issue sample) and a higher BR for PRU; (7) X_A -- a lower assessed value per capita means a higher bond rating for PUU and a lower BR for PRU (and the 106 issue sample); (8) X_{PT} -- higher property taxes lead to lower BR for PUU and higher BR for PRU (and the 106 issue sample).

A somewhat different test of the regression equations presented in Table 5 can be applied to establish the influence of additional utility ownership and property tax related variables on the mean of the dependent variable. To test the hypothesis H_0 : R^2 for the full model = R^2 for the finance and demographic model against the alternative hypothesis of inequality the appropriate F statistics were computed (Kmenta, 1971, p. 370). The only model comparisons for which the null hypothesis can be rejected at the .05 level include: the 106 issue BR extended model compared with the base model--.40633 $\neq$ .37443 with a F statistic of $5.212_{1,97}$ ($\bar{R}^2$ values show .35067 $\neq$ .32284 with a F statistic of $4.157_{1,97}$); the 106 issue all variable BR model compared with the base model--.45079 $\neq$ .37443, $3.267_{4,94}$

($\bar{R}^2$ values indicate no significant difference at the .05 level with a $2.164_{4,94}$ F statistic); and the 26 issue all variable BR model compared with the 26 issue base model--.68106 ≠ .33637, $3.783_{4,14}$ ($\bar{R}^2$ values indicate no significant difference at the .05 level of significance with a $2.069_{4,14}$ F statistic).

The utility ownership dummy variable and its related tax variables do not contribute significantly to the NIC base model, however they do significantly increase the explanation of variation in bond rating. Since the bond rating is one of the independent variables in the NIC models, it is possible that it is capturing the explanatory power of the additional utility related variables.

Conclusions

There is substantial interest in the economic consequences of government ownership of business enterprises, although empirical data analyses involving the electric power industry have been interpreted in very different ways. De Alessi (1974) presents an excellent review and analysis of the theory and the evidence concerning government ownership in the electric power industry. Information regarding the consequences of government ownership is provided by Peltzman (1971) who utilizes a theoretical framework resting upon Alchian's (1965) argument that government ownership effectively rules out specialization in ownership, thereby reducing employers' incentive to police managerial behavior which they consider desirable. However, the direct evidence supporting any one of the individual conclusions is not overwhelming.

Neuberg (1977) would deny the strength of empirical findings claiming municipal cost inefficiency. And even if such evidence is accepted, it would remain unclear whether the cost of such inefficiency is greater than the cost of regulation--assuming one accepts the major premise underlying public utility regulation, i.e. that competition is an ineffective regulator in the supply of utility services (a natural monopoly). Mikesell and Seifried (1973) compare ownership types and note public ownership advantages and disadvantages. By focusing on a very narrow set of issues, the relationship between public ownership and municipal cost of capital has been clarified.

Bond raters in the municipal area perceive publicly-owned utilities as an advantage to a city, although the extent of the advantage rests upon the quality of the management for the utility. It appears that other professionals in the municipal area are uncertain as to the role of public ownership of utilities, but they tend to perceive cities with municipal utilities as having lower net interest cost and a higher bond rating relative to those cities served by private utilities. These results are based on interview and survey techniques. Empirical analysis of all general obligation and utility revenue bonds issued in Florida from 1974 to 1976 suggests that government ownership of utilities is accompanied by lower property taxes, a higher ratio of exempt to non-exempt property, a lower assessed value per capita, a higher likelihood of a deficit in the current operations of the general fund, a lower growth in population, and a tendency to issue less general obligation bonds. While no statistically significant differences existed between private and public utility municipalities, there were on average a higher number of

bids submitted on bond issues by cities with publicly-owned utilities and these issues enjoyed a higher average bond rating.

Based on multiple regression analysis, utility ownership and property tax variables significantly increase the explanation of variation in bond ratings. Efforts by municipal finance officers, governments, investment bankers, underwriters, investors, and the general public to either predict or raise the bond rating might yield more successful results if the decision maker considers the role of utility ownership, utility operations, property tax levels, percentage of exempt property, and the assessed value per capita in a municipality. Evidence on the shifting importance of these variables depending on whether one is predicting or trying to influence the bond rating of a municipality with a public utility or one served by a private utility is provided. It appears that a municipality's net interest cost is primarily influenced by public utility ownership characteristics only indirectly through the bond rating.

Limitations of this study include the relatively small number of issues by municipalities with publicly-owned utilities and the possible lack of generalization from Florida to other states. Possible extensions of this study include a thorough investigation of indenture agreements on bonds as a possible influence on the role of public utility ownership, including an investigation of the level of transfers between local utilities and municipalities' general fund. Similar studies for bond issues of other states would provide additional evidence on whether results from this research can be generalized to other states' municipal bond issues.

The use of three research approaches--interviews, questionnaires, and empirical analysis of actual market data--combine to strengthen the conclusions of this study. Utility ownership is definitely associated with the bond rating of municipalities and appears to affect property assessment and tax collection practices.

APPENDIX

SURVEY QUESTIONNAIRE RESULTS

Table A reports the distribution and response rate for the questionnaire.

Table A
Questionnaire Sample and Response Rate

	Group 1	Group 2	Group 3	Group 4
Distribution:	46 attorneys 60 106	168	106	112
Responses:	7 attorneys 33 40	43	49	38
Response Rate:	15.2% attorneys 55% others 37.7% GROUP 1	25.6%	46.2%	33.9%

Note: Group 1 = National Council on Government Accounting (NCGA); Municipal Bond Attorneys for Florida, New York, and Texas as listed in the 1976 spring edition of The Directory of Municipal Bond Dealers; an academician who has written a leading text in the area of government accounting; the Special Review Committee for the Municipal Finance Officers Association (MFOA) of the United States and Canada; Bond Raters; and a Municipal Insurance Company analyst

Group 2 = Investment bankers for Florida, Texas, and New York; all municipal finance consultants listed in the aforementioned directory

Group 3 = CPAs from Florida and Texas and CPAs on the NCGA and MFOA Review Committee (Note that the CPAs were known to have municipal clients based on examination of financial statements for municipalities in Florida and Texas)

Group 4 = All finance officers in Florida and Texas in the aforementioned directory as well as a directory of Florida finance officers

The figures above include 1 questionnaire from Group 1, 2 Group 2, 3 Group 3, and 7 Group D which were received after the original questionnaire analysis and the mean of these 13 questionnaires will be reported in Table D as a means of assessing "nonrespondent bias."

The response rate appears reasonable in light of (1) the diverse

background of the groups, particularly Group 2, (2) the large differences in the size of firms sampled, particularly Groups 2 and 3, (3) the inclusion of several branch offices of a single firm in the sample which may well have a policy of sending questionnaires to "home office" for completion (Groups 1, 2, and 3; since 20 attorney questionnaires circulated in Florida related to five law firms, it is reasonable to view the response rate as 23% for the attorney subgroup), (4) the limited number of attorneys considered professionals in the municipal area, and (5) the circulation of questionnaires near calendar year-end combined with the inadequate staffing of many municipal finance offices (based on telephone conversations with a small sample of nonrespondents).

Demographic data was examined for respondents as a means of assessing how representative of the population the groups appear to be regarding such characteristics as education level and experience in the municipal area. Table B summarizes experience, size of business, level of position, and education data per group. A t-test analysis was run on the total experience and the education level of the various groups. The results are presented in Table C.

It appears that significant differences in experience exist, except between underwriters and NCGA and others, and that significant differences exist in the education of underwriters versus NCGA, NCGA versus Finance Officers, and CPAs versus NCGA. These differences would be expected due to the young average age of CPA firm partners (however, the difference may well be magnified due to the unequal interval scale for which CPA responses could have frequently involved a 1, 2, or 3 coding), and inclusion of lawyers with NCGA which would increase the education level of

Table B
Demographic Data on Questionnaire Respondents

GROUP	TOTAL EXPERIENCE	EXPERIENCE IN CURRENT POSITION	LEVEL OF POSITION	EDUCATION LEVEL
CPAs Mean Values:	9.156	-	3.76	2.244
Standard Deviation:	9.143		.484	.679
FINANCE OFFICERS	22.14	8.04	-	2.129
	8.105	5.681		.718
UNDERWRITERS	16.08	6.029	2.57	2.31
	11.661	7.274	1.461	.893
NCGA and OTHERS	15.4	8.25	2.09	3.297
	9.58	7.52	1.489	1.53
Late Respondents' Mean Values	15.25	6.2 Except CPAs:	2.67 3.67 CPAs	2.08

	SIZE OF BUSINESS	PERCENT OF BUSINESS THAT IS MUNICIPAL
CPAs	3.2857	9.647
	1.419	10.328
UNDERWRITERS	-	57.31
		35.996
Late Respondents' Mean Values	5.0	45

Note: The unit of measure for total experience is 1 = less than 3 years, 2 = 3 to 5 years, 3 = 5 to 10 years, and values of 10 and above represent years. The unit of measure for experience in current position is years. The unit of measure for level of position for the CPA is 3 = manager and 4 = partner. The unit of measure for level of position for groups other than CPAs is a scale from 1 to 7 with 1 = top management. The unit of measure for the education level is 2 = Bachelor's Degree, 3 = Master's Degree, 4 = advanced accounting degree, 5 = Juris Doctor. The unit of measure for the size of business is 3 = under $500,000 and 4 = $500,000 to $1,000,000.

Table C
The t-values for Demographic Questions on Experience and Education Level

GROUP	t-value	df	Probability
UNDERWRITERS COMPARED WITH NCGA			
Total Experience	.17	47	.866
Education	-3.47	74	.001
UNDERWRITERS COMPARED WITH CPAs			
Total Experience	3.05	82	.003
Education	.37	82	.714
NCGA COMPARED WITH FINANCE OFFICERS			
Total Experience	-2.16	37	.037
Education	4.14	53.12	.000
CPAs COMPARED WITH NCGA			
Total Experience	-1.94	53	.058
Education	-3.89	47.67	.000
CPAs COMPARED WITH FINANCE OFFICERS			
Total Experience	-6.23	72	.000
Education	.71	74	.479
UNDERWRITERS COMPARED WITH FINANCE OFFICERS			
Total Experience	-2.53	66	.014
Education	.90	68	.369

that group when compared with the other respondents. The late respondents' characteristics do not differ significantly from the values for the group scores reported. The statistics in Table B appear to be reasonable attributes.

The questions, frequency count, mean, standard deviation, and standard error for each question for each group sampled are provided in Table D. The coding zero means the question was not appropriate (e.g. Canadian respondents found some questions inapplicable to municipal accounting in their country); the coding 8 means the respondent had no opinion and states that, while the coding 9 means the question was misunderstood.

There were t-tests per question run between groups. An F-test at a .10 level of significance was the cut-off per question for utilizing the pooled-variance estimate (significance greater than .10) or the separate variance estimate (less than or equal to .10). Question 1 demonstrated a difference in the CPAs and the Finance Officers with a t-value of 1.39, 68 degrees of freedom (d.f.), and a related probability of .169. Likewise, a difference existed between NCGA and others and the Finance Officers with a t-value of 2.08, 54 d.f. and .042 probability. The implication is that finance officers identify a more favorable impact on net interest cost than the CPAs and the NCGA and other group. Question 2 demonstrated a difference in the CPAs and the Finance Officers with a t-value of 1.83, 66 d.f., .072 probability, as well as a difference between NCGA and others and the Finance Officers with a t-value of 1.81, 51 d.f., and .076 probability. This implies that finance officers identify a more favorable impact on bond rating than the CPAs and the NCGA and other group.

Table D

Frequency Count, Mean, Standard Deviation, and Standard Error for Each Question for Each Group Sampled

QUESTION #1 : Ownership of the public utility by the municipality has the following impact or lack of impact on the net interest cost of municipal securities:

1 = significant favorable impact
2 = little favorable impact
3 = no impact
4 = little unfavorable impact
5 = significant unfavorable impact
6 = no opinion

RESPONSES:	0	1	2	3	4	5	6	8	9	MEAN	STANDARD DEVIATION	STANDARD ERROR
NCGA, others	0	5	6	16	1	1	8	0	2	2.55	.950	.176
(Late Respondents)				(1)								
UNDERWRITERS	0	11	7	10	1	2	6	0	3	2.23	1.18	.211
			(1)				(1)					
CPAs	0	11	8	22	2	0	2	1	0	2.35	.92	.141
			(1)	(1)			(1)					
FINANCE OFFICERS	0	10	6	11	0	0	3	0	1	2.04	.90	.173
		(2)	(1)	(1)			(2)					
Overall Mean for Late Respondents:										2.13		

QUESTION #2 : Ownership of the public utility by the municipality has the following impact or lack of impact on the bond rating of municipal securities: (same numerical scale as above)

RESPONSES:	0	1	2	3	4	5	6	8	9	MEAN	STANDARD DEVIATION	STANDARD ERROR
NCGA, others	0	6	5	14	2	0	9	0	3	2.44	.934	.180
(Late Respondents)				(1)								
UNDERWRITERS	0	10	7	11	1	1	8	0	2	2.2	1.06	.194
			(1)				(1)					
CPAs	0	10	7	23	2	0	2	2	0	2.4	.912	.141
			(1)	(1)			(1)					
FINANCE OFFICERS	0	9	8	9	0	0	4	0	1	2.0	.849	.166
		(2)		(2)			(2)					
Overall Mean for Late Respondents:										2.25		

QUESTION #3 : The assessed versus actual property ratio is higher for municipalities owning utilities than municipalities with privately-owned utilities.

Describe your reaction to the above statement by using the following code: 1 = strongly agree 2 = agree 3 = neutral 4 = do not agree 5 = strongly disagree 6 = no opinion.

Table D - Continued

RESPONSES:	0	1	2	3	4	5	6	8	9	MEAN	STANDARD DEVIATION	STANDARD ERROR
NCGA, others	0	0	1	7	5	4 (1)	22	0	0	3.72	.895	.211
UNDERWRITERS	0	0	5	7	9	6 (1)	11 (1)	0	2	3.59	1.05	.202
CPAs	0	0	3 (1)	12	8	4	19 (2)	0	0	3.48	.893	.172
FINANCE OFFICERS	0	0	2 (1)	6	9 (2)	1	13 (4)	0	0	3.5	.786	.185
Overall Mean for Late Respondents:										3.67		

Note: The parameters are calculated without 0, 6, 8, and 9 values. Also, only 12 late respondents are noted for questions 1 and 2 since one questionnaire only had question 3 completed with no indication of why the first two questions were left uncompleted.

There were no probabilities more significant than a .20 level for any other groups with regard to replies for Questions 1, 2, and 3. Examination of Table D indicates that the late respondent group's mean values for the three questions are consistent with those means obtained from timely respondents; such a comparison suggests a lack of nonrespondent bias if one considers late respondents to be somewhat representative of nonrespondents.

As described in the body of the paper, Table D suggests that the perceptions of professionals in the municipal area vary greatly regarding the role of public utility ownership as a factor which influences net interest cost and bond rating; many professionals perceive no effect or claim no opinion. However, it is clear that the mean responses indicate a tendency to perceive that public ownership of electric utilities lowers net interest cost and raises the bond rating and that assessed versus actual value of property would be equivalent or lower for municipalities owning utilities relative to those municipalities served by privately-owned utilities.

BIBLIOGRAPHY

Alchian, A.A., "Some Economics of Property Rights," Il Politico (December, 1965), pp. 816-829.

Carleton, W.T. and E.M. Lerner, "Statistical Credit Scoring of Municipal Bonds," Journal of Money, Credit, and Banking (November, 1969), pp. 750-764.

Colberg, M.R., "Utility Profits: A Substitute for Property Taxes," National Tax Journal (December, 1955), pp. 328-387.

DeAlessi, L., "An Economic Analysis of Government Ownership and Regulation: Theory and the Evidence From the Electric Power Industry," Public Choice (Fall, 1974), pp. 1-42.

Golaszewski, R.S., "The Significance of the Type of Audit on the Interest Cost of Local Government General Obligation Bonds," unpublished Master's Thesis, Wharton School of Business (1977).

Hastie, K.L., "Determinants of Municipal Bond Yields," Journal of Financial and Quantitative Analysis (June, 1972), pp. 1729-1748.

Hendershott, P.H. and D.S. Kidwell, "The Impact of Relative Security Supplies: A Test With Data From a Regional Tax-Exempt Bond Market," Journal of Money, Credit and Banking (February, 1977), pp. 1-25.

Hirshleifer, J., J.C. DeHaven, and J.W. Milliman, Water Supply: Economics, Technology, and Policy (Chicago, Illinois: University of Chicago Press, 1960), pp. 289-351.

Kmenta, J., Elements of Econometrics (Macmillan Publishing Co., Inc., 1971).

Maddala, G.S. Econometrics (McGraw-Hill Book Co., 1977).

Mann, P.C., "Publicly-Owned Electric Utility Profits and Resource Allocation," Land Economics (November, 1970), pp. 467-484.

Meyer, R.A., "Publicly Owned Versus Privately Owned Utilities: A Policy Choice," The Review of Economics and Statistics (November, 1975), pp. 391-399.

Mikesell, J.L. and E.J. Seifried, "Rates of Return in Publi and Private Enterprise: Electric Utilities in the United States," Mississippi Valley Journal of Business and Economics (Fall, 1973), pp. 41-54.

Neuberg, L.G., "Two Issues in the Municipal Ownership of Electric Power Distribution Systems," The Bell Journal of Economics (Spring, 1977), pp. 303-323.

Peltzman, S., "Pricing in Public and Private Enterprises: Electric Utilities in the United States," Journal of Law and Economics (April, 1971), pp. 107-147.