Institutional Aspects and Fiscal Outcomes of U.S. Municipal Governance

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at George Mason University

By

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Fall Semester 2009
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Dedication

This dissertation is dedicated to my family.

Acknowledgments

I would like to thank the administration of George Mason University for their financial and academic support as well as the University faculty and staff at large for providing and maintaining such a wonderful learning environment. I sincerely thank my advisor Dr. Thomas Stratmann for his willingness to work with me and time spent imparting his always to the point advice and comments. I also thank my committee members Dr. Alex Tabarrok and Dr. John Petersen for their input and their time in contributing to this work.

I am grateful for having the opportunity to have learned from and be influenced by numerous professors at George Mason University, in particular Dr. Robert E. Wagner and Dr. David M. Levy. I am also most grateful to have learned from my colleagues, especially Andres Gramajo, SangHo Yoon, and Silviu Dochia.

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Abstract

INSTITUTIONAL ASPECTS AND FISCAL OUTCOMES OF U.S. MUNICIPAL GOVERNANCE

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George Mason University, 2009

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A large body of literature suggests that institutional arrangements for collective political decisions are not simply "veils", but exert a real influence on the particular policies that emerge. This thesis is a compilation of three essays exploring various institutional aspects of governance at the municipal level in the United States. Each essay empirically tests whether those institutions have implications for public fiscal outcomes.

The first essay attempts to investigate whether, and if so how, financial markets assess institutional arrangements where the policy outcomes will bear directly on the valuation of financial securities. A model of interest rate determination for municipal bond issues is presented and tested using market data from bond issues to assess whether formal debt limitations, tax limitations, and expenditure limitations affect municipal market participants' credit evaluations of the issuing governments. The empirical results suggest

that tax limits in particular increase borrowing costs to local governments by approximately 5 to 8 basis points.

The second essay tests whether increased jurisdictional competition in the local provision of publicly financed goods results in lower per capita debt levels. The empirical results find evidence that in U.S. metropolitan counties, increased jurisdictional fragmentation lowers all non-school related local government debt burdens, particularly non-guaranteed debt.

The final essay considers political institutions in large U.S. cities, and whether partisanship at the local level can impact fiscal outcomes. Specifically, the essay tests whether local politicians engage in the strategic use of debt. Two different models of the strategic use of debt are tested by considering mayoral election prospects and corresponding city per capita debt levels. The results do not support the hypothesis that this type of political behavior is a significant determinant of large U.S. city debt levels. The essay conjectures that other institutions such as strong Tiebout competition or majoritarian electoral systems may mute or prevent partisanship behavior such as the strategic use of debt.

1. Formal Fiscal Rules and Local Government Borrowing Costs

Introduction

This paper investigates the impact of formal fiscal rules on the interest rates at which municipalities in the Unites States can issue debt. I consider the proposition that institutional structures are of critical importance in determining outcomes of collective decisions. Under such a proposition, analysis of the institutional apparatus through which participants interact in the political arena yield insights into the patterns of outcomes expected to emerge.

The above proposition would lead one to conclude that actors beyond economists, political scientists, and policy makers give analytical attention to institutional structures. Specifically, financial market participants would have incentive to do this whenever the value of a particular financial security is sensitive to public decisions or outcomes. For these securities, valuation must include some expectation of these future conditions. If institutional arrangements can yield insight into patterns and scope of future decision or policy outcomes, they should be important factors in the valuation process.

This paper empirically tests this idea by considering the role that formal fiscal rules play in lenders' credit assessments of local governments. I do this by considering the interest rates at which municipal governments can issue their general obligation bonds. A sample of initial municipal bond issues is used to statistically test for any influences formal fiscal rules have on bond interest rates.

1.1 Formal Fiscal Rules, Fiscal Outcomes, & Financial Markets

The role that fiscal institutions play in impacting public fiscal outcomes has been an active research area over the past 15 to 20 years. Much of the literature has been focused on the question of whether institutions exert an independent influence on the outcome of public finance decisions or whether institutions are simply "veils" in the public decision-making process. Empirical studies have attempted to provide evidence on this question by focusing on the variation in institutions across U.S. states. Among such studies, there is evidence that formal fiscal rules are institutions which influence the outcome of public finances. For instance, states that have tax limitations and/or expenditure limitations (together usually called TELs) have been shown to have lower state expenditures as a percentage of personal income (Rueben 1996). Similarly, states with constitutional debt limits or restrictions have been found to issue less debt (Bunche 1991; Eichengreen 1992; Kiewiet & Szakaly 1996; Von Hagen 1991).

Another approach to investigating the effects of these formal fiscal rules is by observing the behavior of participants in the municipal bond market. Municipal budgetary outcomes are important variables used by these financial market participants in evaluating a municipality's creditworthiness. Thus, if such rules shape the expected outcomes and distributions of these variables, the rules themselves will be important credit factors to municipal market participants.

There are a few interesting empirical studies which have attempted to test the existence of a relationship between formal fiscal rules and financial markets (Eichengreen 1992; Goldstein & Woglom 1992; Bayoumi, Goldstein, & Woglom 1995; Poterba & Rueben 1997; and Johnson & Kriz 2005). These studies have investigated the relationship between U.S. states' formal fiscal rules and their related cost of borrowing when issuing debt. For instance, Eichengreen (1992), Goldstein and Woglom (1992), and Bayoumi, Goldstein, & Woglom (1995) focus on the Advisory Council on Intergovernmental Relations' (hereafter ACIR) index of the strictness of state anti-deficit rules as a variable for fiscal institutions (ACIR 1987). All three studies find evidence suggesting that states with stricter anti-deficit rules face lower interest rates on general obligation (or GO) bonds.[1]

[1] General obligation (GO) bonds come with the legally binding promise of the government to use all resources at its disposal to repay the bonds. The governments pledge their "full faith and credit" for repayment. In contrast, governments issue many non-guaranteed bonds, which do not carry this legally binding promise. For instance, revenue bonds are a type of non-guaranteed debt. They are often used by governments for projects that are expected to generate revenue. Bond repayment is then planned to be made from project revenues. The government makes no explicit promise and is under no legal obligation to help pay off the revenue bonds should project revenues fall short of expectations.

The studies by Poterba & Rueben and Johnson & Kriz are particularly interesting because they expanded the set of fiscal institutions tested beyond the ACIR index. Poterba & Rueben include dummy variables that account for strict anti-deficit laws, limitations on the issuance of general obligation debt, and also to TELs that cannot be overcome by a legislative majority vote (4 dummy variables in all). They conclude that fiscal institutions and rules can have important impacts on the interest rates that investors demand from the states. Consistent with prior studies, the existence of a strict anti-deficit law was found to reduce borrowing interest rates. Their estimates suggest a reduction by as much as 10 to 15 basis points. Expenditure limitations similarly reduced borrowing interest rates, though by a lesser magnitude. On the other hand, states with revenue limits had increased funding costs (on average between 15 and 20 basis points), as it is assumed lenders were concerned that such a rule could restrict the states abilities to pay its obligations.

Like Poterba & Rueben, Johnson & Kriz investigate the fiscal institutions of balanced budget rules, debt limitations, tax limitations, and expenditure limitations. One notable difference between their paper and the prior research is the use of market data from actual bond sales by U.S. states. The other referenced papers have all used the Chubb Relative Value Study. This is a survey taken every six months of 20 to 25 bond traders on the interest rate spreads they would apply to hypothetical 20-year general obligation bonds from different states relative to the State of New Jersey. Johnson & Kriz compile a data set of over 500 initial GO bond sales for states spanning an eight year period (1990 to

1997). The authors conclude that revenue/tax limitations cause rates to rise by as much as 17 basis points, estimates very much in line with Poterba & Rueben. They also find that strict anti-deficit laws and expenditure limitations reduce borrowing rates, although do so via their impact on credit ratings.[2]

This paper represents a logical extension of the literature cited above. The referenced research on formal fiscal rules and borrowing rates have all been carried out at the state level. Municipal governments face fiscal rules similar in nature to those described above (TELs and debt restrictions) that are usually imposed upon them by their state (in some cases municipalities may create formal fiscal limits in their own charter when the state otherwise does not restrict them). There is good reason to expect that fiscal rules may have even greater impact on interest rate costs at the municipal level. First, local government finances are often quite different than state finances. Often, the revenue source for local governments is more concentrated due to narrow taxing authority and a less diverse economic base. Thus, tax limitations may particularly constrain local revenue more so than at the state level. Second, creditors are often less informed about the finances of local governments than they are of state governments, where financial information is much more readily obtainable. Formal fiscal constraints may provide a signal where asymmetric information exists between municipalities and creditors. This

[2] Johnson & Kriz employ a modeling and estimation method which attempts to trace the direct effect of institutions on interest rates as well as indirect effects via institution impacts on credit ratings. Poterba & Rueben do not include credit ratings in their specification.

may cause the discount in interest rate for debt limits and expenditure limits (and premium for tax limits) to be of a greater magnitude than at the state level.

This study also contributes to the existing literature by using a data set that is new and that also comes from actual market transactions. As mentioned earlier, all previous studies except Johnson & Kriz use the Chubb Relative Value Study. Therefore, this is only the third data set used to analyze the relationship between fiscal institutions and financial markets, only the second to use market transaction data, and the first to do so at the municipal level.

I have compiled a data set of interest rates on actual initial GO municipal bond sales by cities, towns, and villages over about a two-year span. In a competitive initial sale, underwriters bid on the entire series of maturities. The underwriter that bids with the lowest yield to maturity buys the entire series. The use of interest rates (the yield to maturity; called "True Interest Cost" by the municipal markets) from actual competitive bids is more persuasive than survey data. However, it does bring complications that the survey does not have, such as call options, municipal bond insurance, and average weighted maturities (since the entire series of bond maturities are issued intact).

1.2 Modeling & Variables

In estimating the yield to maturity, or True Interest Cost (TIC), on issuance of a series of municipal bonds, previous research[3] has generally separated relevant factors into three categories: characteristics of the market at time of issuance, characteristics of the specific issue, and characteristics of the issuing entity. I will employ a simple linear model of these factors with the yield to maturity as the dependent variable (r) for issue i of municipality j at time t:

$$r_{ijt} = \alpha + \gamma' M_t + \beta' I_{ijt} + \lambda' C_j + \varepsilon_{ijt}$$

where,

M = set of market characteristics at the time of issuance

I = set of bond issue characteristics

C = set of community characteristics

There is only one market variable considered in the model: a yield constructed from the Lehman Municipal Bond Indices on the day of sale. Linear interpolation is used to match the weighted average maturity of the specific municipality issue. I use this municipal yield in lieu of constructing a risk-free yield from U.S. treasury bonds. The yields on municipal bonds will differ from treasury bonds in regards to credit differences and tax treatment (or expected tax treatment) both of which can fluctuate over time. By using the Lehman Municipal Bond Indices, I can abstract from those issues over time, because the dependent variable, the borrowing rate of a specific municipality, will differ from the

[3] Capeci 1994; Kidwell, Koch, & Stock 1984

Lehman Index only on the specific bond characteristics and the municipality's relative creditworthiness.

Important specific bond issue characteristics include the dollar size of the bond series, its average weighted maturity, whether or not the issuer has a call option, and the number of bidders for the series. Community characteristics include government finance statistics as well as the population's economic and demographic characteristics which influence the probability that a community will find itself in the position of defaulting on its obligations. Key variables include revenue per capita, percentage of revenue from state and federal aid, debt per capita, total real estate value in the municipality, and income per capita.

The community characteristics will also include the institutional variables of interest. The three categories of rules are: limitations on the amount of debt issued, limitations on the growth of revenues (directly or through caps on tax rates & assessments), and limitations on increases in expenditures. All three are dummy variables. No distinction is made between rules that are constitutional or statutory or whether they come from the state or the municipality itself.

Descriptions and sources for the above mentioned variables, as well as a few other control variables, can be found in Table 1.1.

Table 1.1 Variable Definitions for True Interest Cost Regressions

Expected Effect	Variable	Description and Source
N/A	*TIC*	True Interest Cost (yield to maturity); TM3
+	*LIndex*	Construction of yield using Lehman Municipal Bond Indices (1,3,5,7,10,15,& 20yr maturities) & linear interpolation to match weighted average maturity on day of sale; Datastream
-	*BQ*	Bank Qualified (Banks lending receive deduction on their interest costs); TM3
-	*LNBid*	Natural log of number of underwriters offering a bid for the issue; Bond Buyer
+	*LNAVMAT*	Natural log of weighted Average Maturity of the series; TM3
+	*CALL*	Dummy for whether the bond is callable or not; TM3
-	*Issue*	amount of current bond issue (in millions); TM3
-	*GRev*	General Revenue per Capita (in thousands) over most recent fiscal year; Census of Governments 2002
+	*Aid*	Federal and State aid as percentage of General Revenue in last fiscal year; Census of Governments 2002
-	*Inc*	per capita Income (in thousands), 1999 dollars; Census 2000
-	*LNValue*	Natural log of total market value of real estate in municipality; Census 2000
+	*DEBT*	Total Debt per capita (in thousands) at end of last fiscal year plus population weighted percentage of County debt (water & sewer debt excluded) plus per capita amount of current issue (except refunding issues). Census of Governments 2002
-	*TaxSt*	Difference between the income tax rate a state charges on bonds from in-state issuer versus out-of- state issuer.
-	*StInc*	2002 State per capita Income (in thousands); BEA
-	*DLIM*	Dummy Variable for formal debt limit of the amount of debt allowed; Various Sources
+	*TLIM*	Dummy variable for the existence of limits to revenue in nearly any form; Various Sources
-	*XLIM*	Dummy variable for existence of state imposed limits to expenditures; Various Sources

1.3 Data & Estimation

Data for the variables comes from a variety of sources. Information on the details of bond sales was given by Thomson Municipal Market Monitor (TM3) and collected from the Bond Buyer. The sample includes only bonds and not notes or alternative financing instruments such as certificates of participation. All issues are unlimited tax GO bonds[4], are at least $ 1 million in principal, and were issued between December of 2001 and June of 2003. This period was chosen to coincide with data available from the 2002 Census of Governments. This Census provided fiscal information on municipalities for all fiscal years ending 7/1/2001 to 6/30/2002. Bonds were included in the sample only if they were issued within one year of that fiscal year end for the respective municipality. Census 2000 was used to get other statistics on the municipalities. Insured municipal bonds are allowed in the data set but only if it explicitly states that the cost of insurance is to be paid by the purchaser. This means that the winning bidder pays for third party insurance after buying the series, so that the initial TIC bid should not have been affected (as would be the case if the issuer had already insured the bonds prior to bidding).[5] Only issues that used lowest TIC as the criterion for winning bid and not NIC (Net Interest Cost) were kept in the data set (NIC is a simple interest calculation). One consequence of

[4] In some states "limited general obligation" bonds exist. Such bonds generally may not have been submitted to voters for a referendum and the taxes used for the debt service must remain *within* any tax limitations. In contrast, unlimited general obligation bonds legally allow (in fact require) the municipality to use taxes without limitation to repay the bonds.

[5] Some previous municipal interest rate studies have allowed insured bonds in the data set and included a dummy variable to indicate the presence of insurance. I consider such modeling to be inappropriate because the impact of insurance will not be constant for all cities. For example, insurance lowers the interest rate much more for a city with a B credit rating than one that has a AAA credit rating.

this decision is the complete exclusion of issues from certain states where all bidding is NIC.[6]

The process results in a sample of 410 bond issues from 27 states. A breakdown of the number of observations by state and the fiscal rules by state are presented in Table 1.2. There is no recent source that compiles the fiscal rules of municipalities. Therefore, the existence of debt, expenditure, and tax limits was determined by researching various sources including state constitutions and statutes, bond issue official statements, and municipal codes in effect for the period of examination. The definition of a debt limit used is any formal constitutional or statutory law which sets a maximum amount of debt that may be issued. From Table 1.2 we can see there are actually few municipalities not subject to some type of overall formal limit. Of states in the sample, only the states of Florida, Maryland, and Tennessee place no limits to debt issuance for municipalities. Home-rule Illinois municipalities are also not limited in this respect. Some cities in these states, however, have charters in which they place debt limits on themselves. For the purposes of the debt limit variable, these cities were coded as having a debt limit.

The primary revenue source for the majority of municipalities is the property tax, and tax limitations throughout this paper therefore refer to limitations on that tax. A limitation was defined to exist if either the overall revenue allowed through property taxation was

[6] It is possible to convert one rate (NIC) into another (TIC); however, the information on the bond series and bid required to do so is generally not readily available and therefore not practical for expanding the data set.

Table 1.2 Compositions of Samples for True Interest Cost Regressions & Summary of Fiscal Rules

St	Sample Size N=410	Sample Size N=100	*DLim*	*TLim*	*XLim*
AZ	5	3	Y	Y	Y
CA	8	6	Y	Y	Y
CO	3	1	Y	Y	Y
CT	19	8	Y	N	N
DE	1	1	Y	Y	N
FL	1	1	N	Y	N
IA	38	6	Y	Y	N
KS	22	6	Y	N	N
KY	1	1	Y	Y	N
LA	2	1	Y	Y[2]	N
MA	30	9	Y	Y	N
MD	5	5	N[3]	N[3]	N
ME	12	4	Y	N	N
MI	8	4	Y	Y	N
MN	121	9	Y	Y	N
MO	1	0	Y	Y	N
MT	2	0	Y	Y	N
NC	11	5	Y	Y	N
ND	4	1	Y	Y	N
NH	2	2	Y	N	N
NY	21	3	Y	Y[4]	N
OH	2	1	Y	Y	N
OK	4	3	Y	Y	N
OR	1	0	Y	Y	N
RI	8	2	Y	Y	N
TN	3	2	N[5]	N	N
UT	1	0	Y	Y	N
VA	11	9	Y	N	N
WA	3	2	Y	Y	N
WI	37	1	Y	N	N

This table shows debt, tax, & expenditure limits by state. It also displays the composition of two data samples by state. The second sample displayed is a sub-sample of the first, where the bond issue size is great than $1million.

1 Home-rule Illinois municipalities are not subject to state debt or tax limitations. Most of the issues in the sample are home-rule municipalities.

2 The city of New Orleans is not subject to tax limitation

3 Some city charters contain debt or tax limitations.

4 Towns in NY are not subject to tax limitation while cities & villages are.

5 Some city charters contain debt limitations.

limited or if there was a limit to the maximum tax rate that may have been levied. Eight states do not impose a limit of this nature on their municipalities. For the sample, about one third of the issues do not have a tax limitation (see Table 1.3).

The data set of 410 issues has an inordinate amount of issues from the state of Minnesota (almost 30%). This is an unintended result which appears to have occurred simply because of the overall prevalence of debt finance in that state combined with their specific use of issue characteristics matching the criterion used to compile the data set (TIC, uninsured, etc.).

Table 1.3 Descriptive Statistics of Full Sample for True Interest Cost Regressions N = 410

Variable	Mean	Std.Dev.	Min	Max
TIC	3.734	0.712	1.191	5.307
LIndex	3.410	0.688	1.558	4.98
BQ	0.585	0.493	0	1
LNBid	1.454	0.530	0	2.564
LNAvmat	2.050	0.451	0.606	2.971
Call	0.821	0.383	0	1
Issue	10.710	21.494	1.000	262.2
GRev	1.646	0.981	0.578	6.914
Aid	0.201	0.120	0.005	0.656
Inc	25.672	11.342	14.057	94.479
LNValue	20.776	1.416	16.823	25.738
Debt	2.870	2.769	0.360	47.882
TaxSt	6.790	1.720	3.0	10.036
StInc	32.367	3.925	25.073	42.545
DLim	0.936	0.244	0	1
TLim	0.668	0.471	0	1
XLim	0.039	0.194	0	1

The nature of the sample raises concerns that estimation results may be heavily influenced by factors specific to the state of Minnesota. Therefore, a sub-sample will also be used to estimate parameters and provide a comparison against the Full Sample.

The sub-sample will consist of bond issues which are of at least $10 million in issue size. One rationale to focus on the large issues is that the set of potential investors is different than that for small issue sizes. Small issue sizes are more likely to be purchased by local investors who focus on in-state bonds. However, the large issue sizes draw more attention from investors who invest across states. This set of investors is therefore much more likely to compare fiscal institutions across states. As can be seen in Table 1.2, the sub-sample has 100 bond issues in it and is distributed much more evenly across states than the Full Sample.

Table 1.4 Descriptive Statistics of Sample when Issue at least $10mil for True Interest Cost Regressions N = 100

Variable	Mean	Std.Dev.	Min	Max
TIC	3.791	0.71	1.191	5.307
LIndex	3.482	0.687	1.639	4.98
LNBid	1.608	0.464	0	2.397
LNAvmat	2.18	0.423	0.871	2.971
Call	0.86	0.348	0	1
Issue	32.122	35.751	10	262.2
GRev	2.053	0.994	0.578	4.37
Aid	0.222	0.136	0.041	0.656
Inc	27.355	11.927	15.168	77.519
LNValue	22.139	1.208	19.261	25.738
Debt	3.178	1.459	0.714	9.029
TaxSt	6.257	1.881	3	10.036
StInc	32.569	4.707	25.175	42.545
DLim	0.91	0.287	0	1
TLim	0.58	0.496	0	1
XLim	0.1	0.301	0	1

Descriptive statistics of variables are presented in Table 1.3 for the Full Sample and Table 1.4 for the Over $10 million Sample. Regression results for both samples are

presented in Table 1.5. The dependent variable in both cases is TIC, the true interest cost of the issue. OLS was used to obtain parameter estimates & robust standard errors are reported. The only differences in model specifications is dropping the bank qualified dummy variable (*BQ*) for the Over $10 million Sample, since issues of that size cannot be bank qualified.[7] For the Full Sample, a model with a quadratic term for issue size was estimated to test for the possibility of a U-shaped relationship, but results were not meaningfully different than the linear specification and are not reported.

To summarize the results, we can see that the coefficient on the debt limit variable (*DLIM*) was of different sign in the two regressions and not found to be statistically significant in either. The expenditure limit dummy (*XLIM*) is of the expected sign, but is not statistically significant in both regressions. However, the tax limit variable (*TLIM*) was found to be statistically significant with the effect of increasing the interest rate by about 5 and 8 basis points for the Full Sample and Over $10 million Sample regressions respectively. While significant, these magnitudes are less than the effects of revenue limits found at the state level by Poterba & Rueben (1997) and Johnson & Kriz & (2005), who estimated coefficients with magnitudes ranging from 15 to 20 basis points. This is also in contradiction to the conjecture put forth earlier, that limits may have a greater impact at the municipal level than the state.

Other intriguing results are that variables *LNAvmat*, *Issue*, & *Inc* (natural log of average

[7] Bank qualified bonds allow banks to deduct interest costs incurred when purchasing and holding such bonds.

Table 1.5 OLS Regression Results for True Interest Cost

Variable	OLS, Full Sample N=410	OLS, Issue Over $10mil N=100
LIndex	.9804 ***	.8787 ***
	(.0224)	(.0340)
BQ	-.0584 ***	
	(.0193)	
LNBid	-.06958 ***	-.07384 **
	(.01306)	(.03047)
LNAvmat	-.00875	.08826
	(.03843)	(.06074)
Call	.08565 ***	.21010 ***
	(.02554)	(.06031)
Issue	.000386	.000186
	(.000300)	(.000281)
GRev	-.00799	-.02470 *
	(.00820)	(.01382)
Aid	.14808 **	.32504 ***
	(.06531)	(.10603)
Inc	-.00103	.00148
	(.00083)	(.00125)
LNValue	-.02709 ***	.00398
	(.00809)	(.00958)
Debt	.00504 ***	-.00781
	(.00195)	(.00924)
TaxSt	.00720	-.00716
	(.00699)	(.00698)
StInc	-.00367	-.00940 ***
	(.00271)	(.00317)
DLim	-.03346	.07314
	(.04530)	(.06644)
TLim	.05567 ***	.08652 ***
	(.01793)	(.02749)
XLim	-.02682	-.04232
	(.03701)	(.04291)
R-squared	.9660	.9755

Robust standard errors in parentheses. Constant not reported.
* statisticalqly significant at the 10% level
** statistically significant at the 5% level
******* statistically significant at the 1% level

maturity, issue size, and income per capita respectively) are not found to be statistically significant in either regression. The *CALL* dummy variable is highly significant but has a much larger magnitude in the regression on the large issue sample than the full sample. The fiscal variables *Aid*, *LNValue*, and *Debt* (percentage of general revenue from government aid, natural log of real estate market value, and debt per capita) are significant and of the expected sign in the Full Sample regression. However, only *Aid* is significant in the regression on large issues. The other two parameter estimates change signs and are not statistically significant. Part of the behavior of the *Debt* variable may be explained by an extreme value for one observation. As can be seen on Table 1.3, the highest value for *Debt* is 47. In the Full Sample of 410 observations, the next highest value is around 12. If the observation with the maximum debt value is removed from the Full Sample regression, the debt variable is no longer statistically significant. This is shown in the first column of Table 1.8.

1.4 Estimation Issues

One problem in the above analysis is the potential for simultaneity between interest rate yields and some of the right-hand side variables. For instance, a city that faces low interest rates has an incentive to utilize debt finance over taxation more so than a city which faces high interest rates. Thus, we may expect the *Debt* variable to be influenced by the interest rate. Also, we expect the *Issue* variable to be interest rate sensitive. To deal with the potential endogeneity of these variables, I employ a two-stage least squares

(2SLS) regression with instrumental variables that are correlated with the endogenous variables but not the interest rate. Some previous studies on municipal yields have suggested that demographic and lagged fiscal variables may serve as appropriate instruments in this role (Capeci 1991; Capeci 1994; Metcalf 1993). I attempt to use population from the 1990 Census (*Pop*) and the previous year's outstanding long-term debt per capita (*Debt-1*) as instrumental variables.

Results of the 2SLS regression for the Full Sample and Over $10 million Sample are shown in Table 1.7 (all first stage regression results for the instrumental variables are shown in Table 1.6). The *Debt* variable is shown to be of higher magnitude than the OLS result and still statistically significant in the Full Sample. This is consistent with an expectation of endogeneity between yields and debt levels, because the OLS estimation will bias the coefficient downwards. A Hausman test for exogeneity also allows us to reject the hypothesis that the *Debt* variable is exogenous. For the Over $10 million Sample, the 2SLS regression results in a change of the sign of the *Debt* variable from the OLS estimate. However, it is still statistically insignificant and the Hausman test cannot reject exogeneity. For both samples, the *Issue* variable remains not statistically significant.

The second column of Table 1.8 also presents 2SLS results when the outlier is removed from the Full Sample. This results in a large increase in magnitude of the *Debt* variable over the OLS results and also results in the variable becoming statistically significant.

Table 1.6 First Stage Regression Results for all 2SLS Regressions
Dependent Variables: Debt, Issue Instruments: Debt-1, Pop

Data Set:	**Full Sample N=410**		**Issue Over $10mil N=100**		**Full Sample -1 N=409**	
Variable:	**Debt**	**Issue**	**Debt**	**Issue**	**Debt**	**Issue**
LIndex	-.0289 (.1242)	-2.06 (1.97)	.2185 (.2803)	-1.24 (6.61)	.0040 (.1265)	-2.23 (2.01)
BQ	-.4833 (.1143)	-4.38 (1.81)	N/A	N/A	-.5006 (.1149)	-4.29 (1.83)
LNBid	-.1267 (.0869)	5.47 (1.38)	-.0047 (.2646)	13.29 (6.24)	-.1256 (.0868)	5.47 (1.38)
LNAvmat	.4736 (.1959)	6.37 (3.11)	.2250 (.5007)	1.87 (11.80)	.4110 (.2011)	6.68 (3.20)
Call	-.0153 (.1437)	5.53 (2.28)	.1724 (.4281)	22.81 (10.10)	.0115 (.1449)	5.40 (2.30)
GRev	.0835 (.0551)	3.21 (.874)	.0796 (.1445)	7.09 (3.41)	.0936 (.0555)	3.16 (.882)
Aid	-1.351 (.392)	11.74 (6.23)	-1.082 (.993)	14.59 (23.41)	-1.369 (.3923)	11.83 (6.237)
Inc	.0205 (.0045)	-.042 (.071)	.0108 (.0131)	-.295 (.309)	.0199 (.0045)	-.039 (.072)
LNValue	-.2000 (.0449)	2.345 (.711)	-.1551 (.1200)	7.41 (2.83)	-.1988 (.0448)	2.34 (.713)
TaxSt	-.0614 (.0358)	-.630 (.568)	.0875 (.0721)	-1.26 (1.70)	-.0556 (.0360)	-.658 (.572)
StInc	.0054 (.0136)	.0155 (.2164)	.0227 (.0302)	.189 (.712)	.0058 (.0136)	.0135 (.0217)
DLim	-.0836 (.2187)	3.77 (3.47)	-.5120 (.4414)	-4.92 (10.41)	-.0823 (.2185)	3.76 (3.47)
TLim	.2495 (.1052)	.86 (1.67)	.4351 (.2451)	4.44 (5.78)	.2674 (.1059)	.773 (1.683)
XLim	-.2992 (.2433)	.863 (3.859)	-.7237 (.4157)	.833 (9.802)	-.3235 (.2437)	.983 (3.874)
Pop	.00034 (.00019)	.0459 (.0030)	.0002 (.0003)	.0384 (.0068)	.00036 (.00019)	.0459 (.0030)
Debt-1	.9254 (.0175)	-.258 (.277)	.7232 (.0912)	.488 (2.150)	.8874 (.0331)	-.070 (.525)
F test	1408.7	116.9	32.0	16.08	366.7	116.2

Instruments variables are *Debt-1* (previous year's debt per capita) and *Pop* (2000 Census city Population in thousands). F-tests are of the hypothesis that the instrumental variables were jointly insignificant.

Table 1.7 2SLS Regression Results for True Interest Cost
Endogenous Variables: Debt, Issue

Variable	2SLS, Full Sample N=410	2SLS, Issue Over $10mil N=100
LIndex	.9777 ***	.8717 ***
	(.0223)	(.0334)
BQ	-.0576 ***	
	(.0193)	
LNBid	-.06848 ***	-.06994 **
	(.01309)	(.03184)
LNAvmat	-.00566	.09606
	(.03874)	(.06203)
Call	.08534 ***	.20613 ***
	(.02533)	(.05652)
Issue	.000170	.000062
	(.000429)	(.000542)
GRev	-.01095	-.02475 *
	(.00840)	(.01416)
Aid	.16407 **	.3415 ***
	(.06609)	(.1145)
Inc	-.00103	.00138
	(.00086)	(.00149)
LNValue	-.02488 ***	.00741
	(.00903)	(.01371)
Debt	.00783 ***	.00347
	(.00224)	(.00949)
TaxSt	.00696	-.00938
	(.00702)	(.00775)
StInc	-.00353	-.00975 ***
	(.00271)	(.00367)
DLim	-.02905	.07328
	(.04584)	(.07426)
TLim	.05286***	.07790 ***
	(.01775)	(.02498)
XLim	-.02166	-.02430
	(.03849)	(.04454)
R-squared	.9658	.9751
Hausman tests:		
Debt	reject exogeneity	cannot reject exogeneity
Issue	cannot reject exogeneity	cannot reject exogeneity

Robust standard errors in parentheses. Constant not reported.
* statistically significant at the 10% level
** statistically significant at the 5% level
*** statistically significant at the 1% level

Table 1.8 Regression Results for True Interest Cost N = 409
OLS & IV results for Full Sample minus 1 extreme observation

Variable	OLS, Full Sample -1 N=409	2SLS, Full Sample -1 N=409
LIndex	.9817 ***	.9732 ***
	(.0229)	(.0230)
BQ	-.0598 ***	-.0530 ***
	(.0192)	(.0198)
LNBid	-.06987 ***	-.06748 ***
	(.01305)	(.01331)
LNAvmat	-.01069	-.00067
	(.03910)	(.00395)
Call	.08662 ***	.08231 ***
	(.02599)	(.02576)
Issue	.000406	.000086
	(.000301)	(.000434)
GRev	-.00771	-.01248
	(.00831)	(.00883)
Aid	.14548 **	.17488 ***
	(.06467)	(.06715)
Inc	-.00101	.00108
	(.00081)	(.00089)
LNValue	-.02737 ***	-.02375 ***
	(.00807)	(.00914)
Debt	.00340	.01332 **
	(.00497)	(.00644)
TaxSt	.00734	.00647
	(.00695)	(.00698)
StInc	-.00364	-.00361
	(.00269)	(.00271)
DLim	-.03337	-.02845
	(.04518)	(.04645)
TLim	.05671***	.04917 ***
	(.01851)	(.01832)
XLim	-.02824	-.01669
	(.03713)	(.03873)
R-squared	.9660	.9656
Hausman tests:		
Debt		reject exogeneity
Issue		cannot reject exogeneity

Robust standard errors in parentheses. Constant not reported.
** statistically significant at the 5% level
*** statistically significant at the 1% level

The estimated coefficient suggests that an increase of $1,000 in per capita debt increases the yield by almost 1.4 basis points.

The various estimations do not materially impact the estimated OLS results for the institutional variables (*DLIM*, *TLIM*, and *XLIM*). The tax limit dummy increases the borrowing rate around 5 or 8 basis points and is statistically significant in all cases. In no case is the debt limit or expenditure limit found to be statistically significant.

1.5 Conclusion

This essay extends the literature on fiscal institutions by focusing on municipalities and also considering the perspective of financial market participants. It is one of only a handful of studies which focuses on the relationship between formal fiscal rules and the financial markets, and the first to do so at the municipal level. It is also only the second such study to use actual market data (the others using survey data). It essay also is of practical importance for policymakers and citizens alike in considering the costs and benefits of debt, tax, and expenditure limits.

The empirical results find that debt limits and expenditure limits do not influence the interest rate for municipal borrowers' general obligation bonds. However, tax limits are found to increase the cost of borrowing in the range of 5 to 8 basis points. The magnitude of these estimates is less than previous studies' state level results (closer to 15

to 18 basis points). This stands in contrast to my prior conjecture that such limits could have greater impact at the municipal level than at the state level. Nevertheless, the results support the hypothesis that financial market participants do consider formal fiscal rules, at least tax limitations, to be important factors in public finance outcomes.

One deficiency in this study that may be improved upon in the future is the lack of time series data. This study relies upon the Census of Government data which is compiled only every 5 years. Annual municipal financial data is difficult to acquire. Perhaps future researchers will be able to obtain data from a major credit rating bureau to allow for a longer sample time. This would allow the impact of formal fiscal rules to be tested over varying economic, interest rate, and credit market environments. A large enough sample could also test the hypothesis that the impact of formal fiscal rules on borrowing rates may vary in the different environments.

Another improvement may be made by more carefully considering the degrees of strictness in formal rules. Debt limits, in particular, may vary widely in the degree to which municipalities are constrained. Taking account of these differences may yield different and more insightful results than grouping together all debt limits as the same. For instance, it may be found that the significance of such a limit depends on its strictness.

2. The Impact of Local Government Structure on Municipal Debt Levels

Introduction

Previous research on U.S. municipal debt levels has not prominently considered the impact that the structure of local governments may have on the amount of debt issuance. However, other strains of research exist which have found that variety in local government structure can affect local government fiscal outcomes. These empirical studies have primarily focused on the degree of competition in the structure of local governments and corresponding expenditure levels and expenditure growth. The effect on debt levels has not been specifically addressed. This study does so by presenting an empirical estimation of the impact that local government structure has on municipal debt levels.

The remaining chapter is divided into four sections. The first section presents brief theoretical explanations of why local government structure will affect government fiscal outcomes, including debt issuance, and reviews some previous studies in this area. Section two describes the factors believed to be important in determining municipal debt levels, the collection of data, and techniques to be employed for the empirical estimation. Section three presents and discusses the estimation results and section four makes some concluding remarks.

2.1 Local Government Structure & Fiscal Consequences

Previous research in the provision and production of government services has suggested that the structure of local governments can have consequences on budgetary outcomes. One such strain of research contemplates the tendency of government units to behave as monopolistic suppliers. This research is motivated by theories of how bureaucratic organizations operate within democratically elected regimes. When such organizations are populated by self-interested individuals, the rational tendency for bureaucrats may be to maximize budgets through expanded output or to produce goods at higher costs than possible with technical efficiency (Niskanen 1975). This bureaucratic model suggests governments will supply goods at expenditures and service levels beyond those preferred by the majority of its citizens.

In metropolitan areas, two structural features which may curb such monopolistic power are fragmentation and overlapping. Fragmentation refers to a service being provided by more than one government in an area. For instance, within a county there may exist numerous cities or towns each of which provide their own police or fire services. Overlapping refers to different services being provided by different governments for a single resident. For instance, a citizen may reside in a city which provides some services while the county provides others while other services may be provided by special districts such as school districts or flood control districts whose geographic boundaries may be

different than any other political unit. Thus a resident may have several different government units providing various services[8].

In jurisdictionally fragmented metropolitan areas, competition between governments can reduce their abilities to act as monopolists. The existence of many polities in an area can lead to comparisons in their ability to provide particular public goods (Ostrom, Tiebout, & Warren 1961). Citizens may be better informed about the costs and quality of the services provided. Such comparison can put pressure on the inefficient producers of those public goods. Governments must compete to retain and attract residents and businesses, otherwise they will lose resources to other governments (Tiebout 1956). Overlapping similarly adds competition to governments by allowing residents to choose the government to provide a particular service. Where special district formation is not overly restricted, they may also create new governments just to provide a single function. Thus, overlapping, like fragmentation, may provide a check on undesired and inefficient supply of public goods.

These notions have been tested empirically and some studies have found results consistent with an expansionary bureaucratic model. In two cross-sectional studies DiLorenzo (1983) and Wagner & Weber (1975) have empirically associated a greater degree of fragmentation and overlapping respectively with higher expenditure levels by local governments. Schneider (1986) presents an empirical study which finds that more

[8] For further description of these concepts in metropolitan governance see ACIR (1988)

fragmented metropolitan areas exhibit slower growth in local government expenditure. DiLorenzo (1981) and Martin & Wagner (1978) investigated the effect of legal changes in the manner by which special districts and municipalities may be formed. For instance, Martin & Wagner analyzed the introduction of Local Area Formation Commissions (LAFCOs) in California counties, which were given authority to approve or disapprove proposed municipal incorporations in 1963. As each commission was primarily composed of representatives from the county and existing cities, they severely slowed the growth of new municipal incorporations, limiting competitive pressure on existing governments. Martin & Wagner find the effect of LAFCOs was to increase both the total and per capita expenditures for the sum of government units within each California county in the post 1964 period. DiLorenzo (1981) finds a similar result in local government expenditure growth in states that introduced greater restrictions on the formation of new special districts.

The hypothesis of the current paper is that the bureaucratic model, which provides an explanation for the above empirical results, also yields implications for the local debt levels citizens will experience. If increased jurisdictional competition increases the efficiency in the supply of services by local governments, the effects should not only be observed in current expenditures but also where payment for such services is deferred over some future time pattern. It is expected that the present value of costs, reflected in the dollar amount of a bond to be issued, would be less where competitive constraints are present. This is a logical relationship to the empirical results observed between

expenditure level and growth and levels of competition. Debt must be accompanied by future expenditure so that if the observed empirical results persist over time, competition must be accompanied with lower long-term debt levels. The next section presents these notions in a more concrete form by introducing a model based primarily on Niskanen's original formulation (Niskanen 1968) and the inclusion of a debt component to public expenditures.

2.2 Model of Debt Determination

In this section a model of supply and demand for publicly financed goods is presented. Supply is assumed to be provided by bureaus, similar to Niskanen's original model (Niskanen 1968). Bureaucrats are assumed to be budget maximizers. In contrast to that model, the budget is allowed to be composed of current taxation and debt. Another critical difference is that demand is determined by politicians who aim to maximize a political support function (Becker 1983).

In the original Niskanen model, the politician's demand for output is posited without any specific assumptions of its relation to the voters or constituents. One possibility would be to model the politician demand as being driven by the median voter. This model does not appear to be appropriate for determining public debt for some practical reasons. If politicians reflected the desires of the median voter, how could we explain the emergence of institutional rules such as majority rule referendum requirements on bond issues? Further, it is not unusual at all to observe bond issue referendums fail a majority rule

vote, and politicians turn to alternative debt-like financing (such as lease-revenue) to proceed with their desired activities (Kittredge & Kreutzer 2001). These observations suggest that a model of political support driven demand for public debt is more appropriate than a purely median voter driven demand.

We begin formally to model the politician's objective function as:

$P^n = S^n(X) - R^n(T,D)$, subject to $T+D = B$

where:

P = net political support function

X = output of publicly financed good[9]

B = budget

T = current taxation

D = debt

The net political support function is composed of two separable functions, S & R, which represent support generated from the existence of X and resistance generated from its financing. S & R are specific to the population, n, and taxes are assumed to be collected on a per capita basis. This approach allows the support and resistance that an individual, group, or organization may have for a specific budget and output combination to be disaggregated and then separately summed across groups. It also implies that an individual's, group's, or organization's resistance is only a function of the budget and its composition and its support is only a function of the amount of output. Thus support and

[9] The model and following analysis are presented in terms of output. However, to be appropriate for many public goods, it may be more instructive to consider quality instead of output.

resistance are independent of one another and the net support for the politician is their sum.

S & R are further described by the following inequalities:

$\partial S/\partial X > 0$, $\partial^2 S/\partial X^2 < 0$

$\partial R/\partial T > 0$, $\partial^2 R/\partial T^2 > 0$

$\partial R/\partial D > 0$, $\partial^2 R/\partial D^2 > 0$

The marginal change in support for increases in output is positive but declining. The marginal resistances from either debt or taxation is positive and at an increasing rate. Note that the marginal resistance from either finance option is a function of the level of both taxes and debt.

2.2(a) No debt allowed

Analysis of this model begins by considering the budget and output results under Niskanen's original model where politicians are uninformed about costs of production, bureaus are well informed of the politician net political support function, bureaucrats are budget maximizers, there are increasing marginal costs to production, and debt is not allowed. Also, it is assumed that the bureaucrats and other factors of production do not influence the support function. This assumption is included to imply that for any given

output level, the politician maximizes his political support by paying the least he can for that output.

Under these restrictive assumptions, for any particular output, the bureau wishes to maximize its budget. However, politicians will not support an output/budget combination where net support is negative. For instance, at an output of X_1, the politician's net support is zero where $R(T_1,0) = S(X_1)$ (where debt is zero current taxation equals the budget so $T_1 = B_1$). At any budget above this point, resistance exceeds the support for the given output level, and politicians would reject any such offers. Figure 2.1 displays these conditions. Line Z represents the combination of budgets and outputs where political support is zero. C(X) shows the technically feasible costs of production. Under the assumptions presented, the bureaucrat maximizes the budget at the intersection of the Z & C(X) curves (output/budget of X_n,B_n).

2.2(b) Unrestricted Public Debt

How does the introduction of debt finance alter this outcome? The outcome is changed if the resistance to debt finance is different than to current taxation. Specific groups may have a preference for debt finance. A combination of debt and current taxation may therefore generate less resistance than one composed entirely of current taxation for a specific budget amount. For any given budget, resistance is minimized

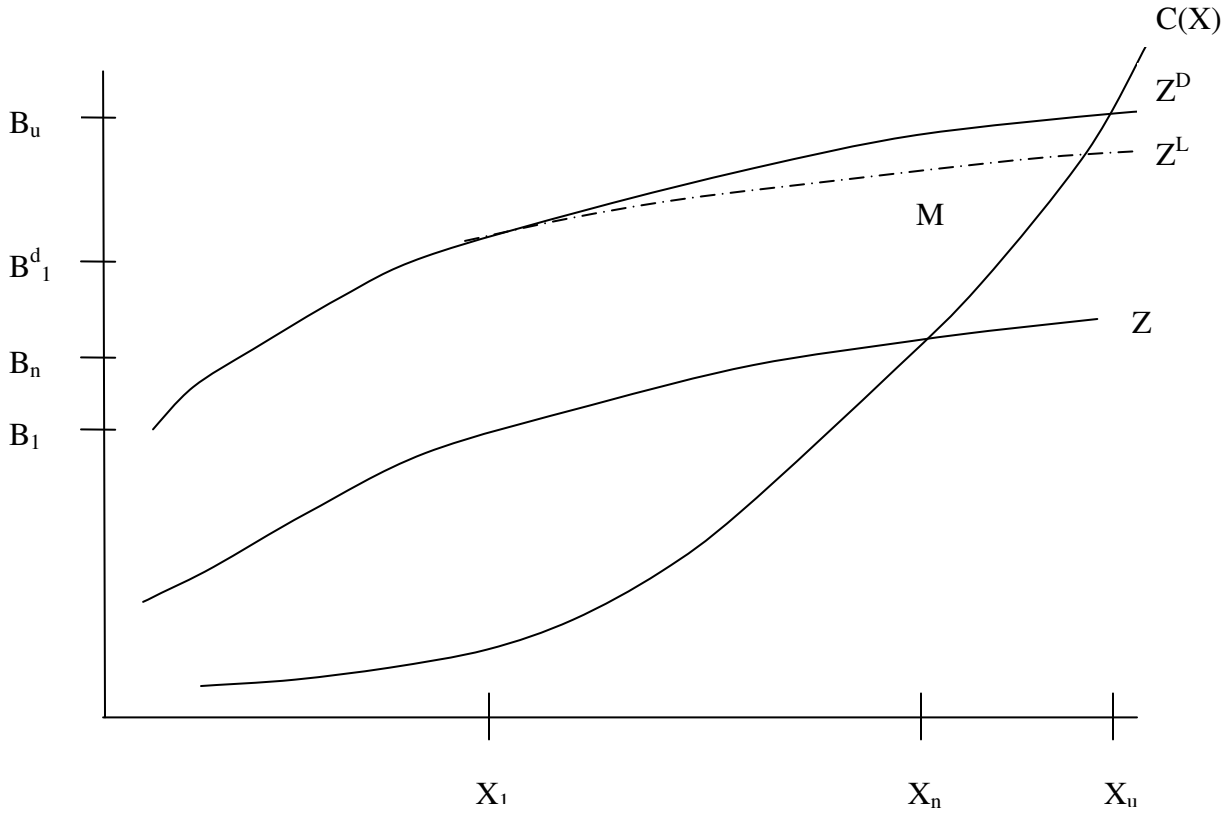

FIGURE 2.1 Bureau Budget, Output, and Cost

where the marginal resistance from finance options are equal. That is, for a specific B, R(T,D) is minimized where $\partial R/\partial T(T,D) = \partial R/\partial D(T,D)$ subject to the constraint T+D=B.

In the previous scenario $P = 0 = S(X_1) - R(T_1,0)$ and $B_1 = T_1$. However, when public debt is allowed, so long as there exists some range between 0 and T_1 for which $\partial R/\partial T(T,0) > \partial R/\partial D(T,0)$ debt may be substituted for a portion of the current taxation to generate less political resistance for the budget B_1. Thus, there exists a combination of taxation and

debt which generates positive political net support for the combination B_1,X_1. It is clear that the zero net support conditions for a given output may occur under larger budgets when public debt is allowed than when it is prohibited. The new combinations of outputs and budgets that generate zero net support are shown in Figure 2.1 as Z^D. Note that each point of Z^D is associated with a specific debt level, and that Z^D only projects 2 dimensions of a three dimensional iso-net support curve. Also, it is important to note that the mathematical assumptions of the resistance function imply that the amount of debt will increase with the size of the budget.

The degree to which an expansion of the zero net support curve occurs will depend on the relative magnitudes of the marginal resistances to debt and current taxation. Figure 2.1 shows that under bureaucratic first degree price discrimination and debt allowance, the output and budget are expanded from X_n, B_n to X_u, B_u. Debt will take on the positive value D_u such that $S(X_u) = R(T_u,D_u)$, $\partial R/\partial T\ (T_u,D_u) = \partial R/\partial D\ (T_u,D_u)$, and $T_u+D_u = B_u = C(X_u)$. Besides the marginal resistances to finance options, the degree of expansion of output and budget will also be dependent upon the shape of the cost curve.

2.2(c) Debt Limitations

Within this construction, introducing a formal limitation on the amount of public debt that may be incurred changes the outcomes of the previous analysis only if that debt limitation (D_L) is less than the unrestricted debt outcome (D_u). Suppose that the debt

limit becomes binding at X_1. That is, assume that under unrestricted debt issuance, the maximum budget that generates zero net support for an output of X_1 is B^d_1 which is composed of debt $D_1 = D_L$. For any budgets that exceed B^d_1 (regardless of output), resistance is minimized with a debt level that exceeds or is equal to D_L. However, the limit restricts debt to D_L so that any further expansions of the budget may occur only by increasing current taxation. For outputs beyond X_1, the zero-net support budgets will be lower than is the case when debt is not limited. This is because resistance increases faster when only current taxation is used to expand the budget and the marginal resistances to finance options cannot be equalized. The result is a new zero net support frontier which mimics the unconstrained case until X_1, where the debt limit is reached, and then is below the unconstrained frontier. This is shown in Figure 2.1 as Z_L.

Under the price discriminating scenario, the resulting output and budget combination occurs at the intersecting of the cost curve and Z_L. This is a lower budget, lower output, and lower debt level than occurs in the unconstrained debt case. The magnitudes of the differences will again depend on the cost curve and marginal resistance as well as the size of the debt limit. Large debt limits may not be constraining at all in which case they have no impact on the budget and output outcome. The lower the debt limit is relative to the unconstrained debt outcome, the more impact it will have on reducing budgets and outputs.

2.2(d) Competitive Environment

The above model suggests that where the amount of borrowing is unrestricted the bureau will attempt to obtain an output/budget combination of X_u,B_u. However, if the local government structure can be characterized as competitive, in the sense that alternative governmental jurisdictions are within reasonable geographic proximity, the revenue maximizing bureau may pursue a different strategy. If residents can move freely between jurisdictions, those residents most dissatisfied with the output and budget combination will move to jurisdictions that offer more favorable combinations. For instance another jurisdiction may offer a combination at point M, which would induce residents into their jurisdiction and away from a jurisdiction which offers X_u, B_u. The influx of residents expands the zero net support frontier as resistance is less at each output and budget combination than it was with only a population of n. Thus, the bureau may be able to expand its budget by not initially acting as a revenue maximizer with the given population n, and inducing residents to move from another jurisdiction where the bureau does act as a monopoly revenue maximizer. This second bureau would experience the opposite effects: resident outflow, a fall in the zero net support curve and a fall in overall budget.

This analysis suggests that a bureaucrat must consider the actions of the bureaus from other jurisdictions in determining how to maximize his budget. Any direct budgetary gain from his bargaining with politicians must be offset with the potential loss of budget because of resident outflow. No formal equilibrium condition of resident movement is derived. However, for a city of given population of size n, the equilibrium will occur at a

lower, output, budget, & debt level where there is jurisdictional competition than where there is not.

2.3 Variables & Data

To test the hypothesis that increased jurisdictional fragmentation reduces municipal debt levels a cross-sectional regression of local debt levels in U. S. metropolitan counties will be employed. A simple linear model of debt levels will be estimated using ordinary least squares. This section will define and discuss the variables of the model. All variables are also listed in Table 2.1.

The dependent variable in this study will be per capita long-term debt of all governments within a county. Excluded is debt for non-higher education[10]. This therefore includes the debt of the county, special districts (excluding school districts), and any other municipal corporations (cities, villages, towns, townships, etc.) which lay geographically within the county.[11] The sum of all government debt in the county is the appropriate statistic to use because it represents the full burden to county residents. The distribution of functional activities between types of government units (for example a city versus a county) varies considerably across states, sometimes set by state law. Therefore, unless such variation

[10] There are two good reasons to exclude schools. One is that in many states rules which place restrictions on debt issuance are different for schools than for cities, counties and special districts. A second practical reason is that many school districts overlap counties so that assigning the appropriate debt burden to the appropriate county becomes problematic.

[11] This does not include Virginia independent cities even though they may be geographically encircled by the county.

Table 2.1 Variable Definitions for Total County Debt Level Regressions

Debt	Sum of Long-Term Debt for all governments in county scaled to population. Excludes primary & secondary school debt. Source: 1992 Census of Governments
GDebt	Guaranteed portion of *Debt* variable
NGDebt	Non-Guaranteed portion of *Debt* variable
Popgrowth	Change in county population from the 1980 to 1990 U.S. Census
Urbanpop	The percentage of county classified as urban. Source: 1990 U.S. Census
Over65	The percentage of county population over the age of 65. Source: 1990 U.S. Census
IncomeMed	Median Household Income. Source: 1990 U.S. Census
Elect88	Percentage of voters that voted Democrat in 1988 election out of those that voted Democrat or Republican.
Owner	The percentage of county households occupied by owner. Source: 1990 U.S. Census
Munpop	Number of municipalities in county per 100,000 residents. Source: 1992 Census of Governments.
SpD	Number of Special Districts in county per 100,000 residents. Source: 1992 Census of Governments.
STRestrict	Dummy variable equal to 1 if state either constitutionally prohibits state debt issuance or requires referendum.
NoLim	Dummy variable equal to 1 if either the county or cities do not face debt limit.
REFGO	Dummy variable equal to 1 if referendum for general obligation bonds required.
REFBoth	Dummy Variable equal to 1 if referendum is required for issuance of both general obligation and revenue bonds.

in functional activity is accounted for, a study focused on only one specific government unit (for instance only city debt levels) would suffer from a missing variable and potentially introduce bias into the estimates.[12]

[12] The same type of problem exists between state and local governments. However variables will be introduced which will attempt to attenuate that problem.

These debt measurements come from the 1992 Census of Governments and are broken down into two types of debt: guaranteed and non-guaranteed. Guaranteed debt is composed of debt incurred from the issuance of general obligation bonds. These bonds are called guaranteed because they have a pledge from the issuing government that they will use their full taxing power where necessary to repay the bonds. Non-guaranteed debt has no such pledge. Revenue bonds are a type of non-guaranteed debt. These bonds are generally to be repaid from income generated from the projects which they finance.[13] Regressions will be run for both types of debt.

The main variable of interest in this study will be the one measuring the degree of fragmentation in the county government structure. Simple constructions will be employed here although some of the previous research cited has also used slightly more sophistication.[14] The degree of fragmentation is measured as the number of municipalities in the county per every 100,000 people. Based on the hypothesis presented in this paper, the sign of the coefficient is expected to be negative.

A number of previous studies estimating municipal debt levels were particularly interested in the effect of formal restraints on municipal borrowing (Pogue 1970; Farnham 1986; McEachern 1978). Such restraints often exist at the state constitutional or statutory level and usually take the form of debt limitations (usually a percentage of

[13] For Census of Government purposes, not included in either debt category are "leases, lease-purchase arrangements, lease-rental agreements, and the like" (U.S. Census 1992).
[14] DiLorenzo (1983) uses something similar to the four-firm concentration ratio from industrial organization theory.

taxable assessed property in the jurisdiction) or referendum requirements. These studies have obtained mixed results as to whether such restraints are effective in depressing debt levels. For instance, debt limits that constrain a city or county may result in the creation of new special districts that are primarily formed just to obtain the ability to issue more debt. This results in an increase in the number of special districts but no reduction in debt levels attributable to the formal limitations. Another argument regarding the ineffectiveness of debt limitations suggests that the composition of debt simply changes from guaranteed debt to non-guaranteed debt. Debt limitations generally apply only to guaranteed debt. Therefore, where such limitations are constraining, governments may simply rely more heavily on non-guaranteed debt. Thus, a debt limitation may induce a substitution in the type of debt issued but not impact the overall debt level.

Variables for debt limits and referendum are taken from an Advisory Council on Intergovernmental Relations (ACIR) study which compiles such restrictions for each state that existed as of 1990. No distinction is made between statutory and constitutional restrictions. The dummy variable *NoLim* takes on the value 1 if either cities or county do not have a debt limit. Thus a debt limit here in terms of the variable exists only when both are constrained. There are two referendum dummy variables: one if local governments are required to have a referendum on guaranteed debt (*REFGO*); and another variable represents if all bond issues (general obligation and revenue) require a referendum (*REFBOTH*).

A variable is included to measure the strictness of debt restrictions on the state government. This is to account for the varying degree of functional supply between states and local governments (similar to the problem between cities and counties outlined in the description of the dependent variable). Where states face strict restrictions on the issuance of debt, local governments may provide a larger role in public goods supply and consequently incur higher debt levels. Therefore, a dummy variable (*STRestrict*) is included to indicate if a state has either a constitutional ban on debt issuance or a referendum requirement on debt issuance. These two types of restrictions were found to be most significant in constraining state debt levels according to Kiewiet & Szakaly (1996). One problem with this approach is that the residents of states with strict state restrictions may in general be adverse to debt issuance and will therefore have lower local debt levels. Therefore, a variable is included to attempt to account for the ideology of the county. The variable included is the percentage of people who voted Democratic in the 1988 election out of the number of those who voted either Democratic or Republican.

Other variables describing the economic and demographic characteristics of the county are included to account for variations in demand. Population growth from the 1980 census to 1990 census is included to account for fast-growing areas. Such areas often exhibit higher per capita debt ratios to expand their capital infrastructure. Also, the percent of the county population designated as urban is expected to have higher public goods demand and therefore higher debt levels. Income is expected to be positively

correlated with debt levels if public goods are normal. Therefore the county median income is included as a variable.

The final two variables included measure the percentage of the population over 65 and the percentage of housing units that are occupied by the owner. The first demographic variable is included to account for differences in demand that may be due to the burden of debt repayment. As the payment of debt is deferred over time, elder residents may be less likely to bear the cost of goods financed through debt. Therefore this group of individuals may be more likely to support debt issuance. Home owners however, may be less likely to support debt issuance. This argument relies on owners being aware of the debt liability being capitalized in housing prices. Such capitalization prevents homeowners from moving without paying the present value of the debt liability through a reduction in price received. Renters that may wish to move in the future are not subject to this capitalization.

The sample set for the regressions is composed of 772 counties from metropolitan areas (as defined by the OMB 6/30/1993). Data for the variables comes primarily from the 1990 Census and 1992 Census of Governments. A number of states are excluded from the study including Alaska, Hawaii, and the New England counties[15]. Also excluded are

[15] Hawaii has county governments but no municipal governments; Alaska has relatively high debt levels because of its oil reserves. In any event, exclusion of these states results in the loss of only one metropolitan county from each state. New England counties are not historically important and have at different times been established and abolished. Data for the Census does not always match that for the Census of Governments, which sometimes has missing data for county areas. Thus it was decided to exclude New England for this study.

the counties of New York City because of confusion in matching up data correctly from different sources. This leaves the 772 metropolitan counties spread across 42 states, all of which are represented by at least 2 counties (DE, ID, MT, WY). The states with the highest number of counties included in the sample are Texas (58), Georgia (42) and Ohio (39).

Table 2.2 Descriptive Statistics of Sample for Total Debt Regressions

Variable	Mean	Std Dev	Median	Min	Max
Debt	1498	1952	993	0	30918
Gdebt	314	341	207	0	3229
NGDebt	1184	1879	654	0	30622
Popgrowth	0.150	0.207	0.096	-0.221	1.630
Urbanpop	0.615	0.273	0.653	0	1
Over65	0.120	0.036	0.119	0.015	0.338
IncomeMed	29851	7007	28526	14670	59284
Elect88	0.420	0.100	0.412	0.195	0.743
Owner	0.481	0.084	0.479	0.083	0.697
Munpop	9.480	9.618	6.750	0.000	75.254
SpD	13.365	15.557	8.160	0.000	125.847
STRestrict	0.534	0.499			
NoLim	0.207	0.406			
REFGO	0.867	0.340			
REFBoth	0.653	0.476			

Table 2.2 displays the summary statistics of the variables to be used in the regressions. Further information about the sample is found in Table 2.3 and Table 2.4. Table 2.3 shows the number of counties from each state in the sample and the mean and median

Table 2.3 Sample Debt Levels by State

State	# of Counties	Guaranteed Mean	Guaranteed Median	Guaranteed Rank*	Non-Guaranteed Mean	Non-Guaranteed Median	Non-Guaranteed Rank*
Alabama	21	290	197	21	979	803	23
Arizona	5	463	578	33	2181	2576	36
Arkansas	11	93	33	5	1085	924	25
California	34	204	160	17	1619	1322	31
Colorado	10	841	726	41	3103	2582	42
Delaware	2	381	381	28	846	846	20
Florida	34	138	71	10	2606	2253	38
Georgia	42	93	40	6	997	675	24
Idaho	2	48	48	4	129	129	1
Illinois	28	351	292	25	591	504	9
Indiana	37	134	94	9	536	382	6
Iowa	10	434	428	31	750	566	15
Kansas	9	584	528	35	2267	1023	37
Kentucky	22	31	2	2	2654	1651	39
Louisiana	24	353	190	26	1922	1042	35
Maryland	15	950	708	42	614	382	10
Michigan	25	308	270	22	798	467	19
Minnesota	18	677	637	40	1461	1227	29
Mississippi	7	435	386	32	1744	806	32
Missouri	23	95	88	7	541	307	7
Montana	2	144	144	11	572	572	8
Nebraska	6	269	297	20	747	436	14
Nevada	3	611	813	37	1237	1790	26
New Jersey	21	671	666	39	1323	600	28
New Mexico	6	166	64	13	1760	818	33
New York	33	561	521	34	426	342	3
North Carolina	35	346	242	24	763	223	16
North Dakota	4	585	685	36	950	997	21
Ohio	39	188	147	15	517	332	5
Oklahoma	14	98	33	8	969	552	22
Oregon	9	315	303	23	737	269	13
Pennsylvania	33	250	228	18	1530	1109	30
South Carolina	16	187	157	14	2771	785	40
South Dakota	3	43	33	3	423	556	2
Tennessee	26	421	336	30	777	538	17
Texas	58	409	317	29	1290	904	27
Utah	4	154	165	12	2785	1066	41
Virginia	36	194	72	16	786	175	18
Washington	11	359	336	27	658	564	12
West Virginia	12	30	15	1	1886	1420	34
Wisconsin	20	660	590	38	451	419	4
Wyoming	2	253	253	19	619	619	11

Table 2.4 Debt Restrictions by State

State	*STRestrict*	*NoLim*	*REFGO*	*REFBOTH*
Alabama	Y	N	Y	Y
Arizona	Y	N	Y	Y
Arkansas	Y	N	Y	N
California	Y	N	Y	Y
Colorado	Y	N	Y	N
Delaware	N	N	N	N
Florida	N	Y	Y	Y
Georgia	N	N	Y	Y
Idaho	Y	N	Y	N
Illinois	N	N	Y	Y
Indiana	Y	N	N	N
Iowa	Y	N	N	N
Kansas	Y	N	Y	N
Kentucky	Y	N	Y	Y
Louisiana	N	N	Y	Y
Maryland	N	N	N	N
Michigan	N	N	Y	Y
Minnesota	N	N	Y	Y
Mississippi	N	N	Y	Y
Missouri	Y	N	Y	N
Montana	N	N	Y	Y
Nebraska	Y	Y	Y	Y
Nevada	N	N	Y	Y
New Jersey	Y	N	N	N
New Mexico	Y	N	Y	Y
New York	Y	N	Y	N
North Carolina	Y	N	Y	N
North Dakota	Y	N	N	Y
Ohio	Y	N	Y	Y
Oklahoma	Y	N	N	N
Oregon	N	N	Y	N
Pennsylvania	N	N	Y	Y
South Carolina	N	N	Y	Y
South Dakota	N	N	Y	Y
Tennessee	N	Y	Y	N
Texas	Y	Y	Y	Y
Utah	N	N	Y	Y
Virginia	N	Y	Y	Y
Washington	N	N	Y	N
West Virginia	Y	N	Y	Y
Wisconsin	N	N	Y	Y
Wyoming	N	N	Y	Y

debt levels of those counties by state for guaranteed and non-guaranteed debt. A ranking of lowest to highest mean debt level is listed for the 42 states for both debt categories. Table 2.4 displays the formal debt restrictions in place for each state.

2.4 Estimation Results

The results of the regressions are shown in Table 2.5. There are three regressions for three different dependent variables: combined guaranteed and non-guaranteed debt (*Debt*), guaranteed debt (*GDebt*), and non-guaranteed debt (*NGDebt*). All regressions use the same model and are estimated using ordinary least squares.

Interesting differences emerge between the guaranteed and non-guaranteed regressions. In both cases, the percentage of urban population and the ideology of the county are highly significant variables that positively affect debt levels. For both cases, the magnitudes of the estimates are greater in the case of non-guaranteed debt. This is not surprising since in sum there is a greater amount of non-guaranteed to guaranteed debt. All variables that are percentages have units in percentage points. Thus, for instance, the coefficient for the *Urbanpop* variable in the non-guaranteed regression implies that a 1% percentage point increase in urban population results in an increase of $9.76 in the per capita level of non-guaranteed debt.

A number of the variables describing the demographic and economic characteristics of

Table 2.5 Regression Results Total County Debt Level

Variable	Debt	GDebt	NGDebt
Intercept	-447.6	-331.2 ***	-116.4
	(744.1)	(131.7)	(707.5)
Popgrowth	8.273 **	-0.705	8.979 **
	(4.312)	(.974)	(3.909)
Urbanpop	14.064 ***	4.300 ***	9.764 ***
	(3.441)	(.425)	(3.427)
Over65	7.036	-6.357 **	13.394
	(17.623)	(3.165)	(16.975)
IncomeMed	0.00253	0.01813 ***	-0.0156
	(.0115)	(.00247)	(.0114)
Elect88	27.072 ***	6.181 ***	20.891 ***
	(8.958)	(1.400)	(8.799)
Owner	-5.266	-4.471 ***	-0.795
	(9.739)	(2.080)	(8.905)
Munpop	-27.397 ***	0.697	-28.094 ***
	(10.307)	(1.776)	(9.796)
SpD	1.496	-1.268	2.764
	(5.341)	(1.638)	(4.275)
STRestrict	-56.275	-76.761 ***	20.489
	(130.40)	(24.904)	(127.33)
NoLim	92.850	63.665 **	29.185
	(170.98)	(25.034)	(167.35)
REFGO	-4.473	23.066	-27.539
	(183.68)	(44.704)	(177.45)
REFBoth	254.99	-153.70 ***	408.69 **
	(157.95)	(27.27)	(151.67)
Rsq	0.1202	0.3459	0.0923
F-test	18.78	21.04	6.43

Robust standard errors in parentheses. 772 observations for each regression.

* Significant at 10% level

** Significant at 5% level

*** Significant at 1% level

the counties are found statistically significant in the regression for guaranteed debt but not so in the non-guaranteed regression. This is the case for the variables *IncomeMed*, *Over65*, and *Owner*. This explains the goodness of fit statistics, as the specified model is able to explain a greater degree of the variation in guaranteed debt than in non-guaranteed debt. In the guaranteed regression, median income is positively related to per capita debt while the percentage of owner occupied houses is negatively related. This is consistent with pre-regression hypotheses. In contrast, the percentage of population over the age of 65 is negatively related to guaranteed debt levels. This is not consistent with the notion that elderly may prefer debt finance as a method to escape the costs for currently supplied public goods.

Contrary to the other economic and demographic variables, population growth was found to be statistically significant in explaining non-guaranteed debt and not guaranteed debt. The coefficient estimate is positive as expected (however it is negative in the guaranteed regression although statistically insignificant).

The two variables of main interest in this study, *Munpop* and *SpD*, are not found to be statistically significant in the regression on guaranteed debt. However, the *Munpop* variable is found to be statistically significant in the non-guaranteed debt regression. Based on the estimate, an increase of one municipality per 100,000 residents results in a decline in the non-guaranteed per capita debt of about $28. This is consistent with the theory that increased fragmentation will result in lower debt levels.

The previous result is interesting when combined with those on the variables for formal debt restrictions. For instance, the coefficient for the *NoLim* variable in the guaranteed debt regression indicates that when both the county and city have debt limitations the overall guaranteed debt per capita falls by $63. However this variable is not statistically significant in the non-guaranteed debt regression. This does not support the notion that where guaranteed debt is constrained by limits, the use of non-guaranteed debt will increase. These estimates taken with the *Munpop* estimates also perhaps suggest that since debt limitations are effective in constraining guaranteed debt, municipal competition is less influential on guaranteed debt levels. However, since limits do not apply to non-guaranteed debt, fragmentation may then become an important factor on non-guaranteed debt levels.

The *REFGO* variable is found to be statistically insignificant in both the guaranteed and non-guaranteed regressions. This implies that requirement of a referendum on general obligation bonds does not restrain guaranteed debt. It also does not induce higher non-guaranteed debt levels (although given the previous sentence we should not be surprised that such substitution does not occur). The *REFBOTH* variable, which indicates that a referendum is required on both guaranteed and non-guaranteed bond issues, yields statistically significant coefficients in both regressions. Interpretation, however, is confounding. For instance the effect of the referendum requirement on guaranteed bonds and non-guaranteed bonds is to reduce guaranteed per capita debt by about $130 over counties that have no referendum requirements. This is confusing because the *REFGO*

variable has no statistically interpretive effect on debt levels. The addition then of a requirement of a referendum for non-guaranteed bonds should perhaps induce a substitution effect away from revenue bonds to general obligation bonds so that the *REFGO* effect would be positive. If such referendums are ineffective, then the coefficient would be expected to be not statistically significant from zero. However the regression results find a statistically significant negative effect. This result has no ready explanation. Similarly confusing is the positive coefficient for *REFBOTH* in the non-guaranteed debt regression. The statistics imply that having a referendum on both types of bonds increases the non-guaranteed debt per capita by about $381 over those counties with no referendums and by about $435 over those with referendums only on guaranteed bonds.

The statistical estimates of the *REFBOTH* variable may perhaps raise concerns about the appropriateness of the model specification. As the results run counter to intuition and are without ready explanation, we may be suspicious that an important factor correlated with the *REFBOTH* variable is absent from the model. This would result in a biased estimate of that coefficient and also would bias the other coefficient estimates should they be correlated with such a missing variable.

2.5 Conclusion

The results of this empirical study are in some ways consistent with theories about monopolistic government powers and bureaucratic supply. The specific hypothesis that increased competition in the supply of public goods will reduce debt levels is supported when focusing on non-guaranteed debt levels. The statistical study shows a negative relationship between the degree of fragmentation and per capita non-guaranteed debt. The estimated effect is that an increase of one municipality per 100,000 people reduces per capita non-guaranteed debt by about $28. Such a relationship is not borne out when speaking of guaranteed debt. However, guaranteed debt levels do appear to be limited by formal debt limits. These results suggest that where such limitations are not imposed on non-guaranteed debt, fragmentation becomes an important factor in constraining non-guaranteed debt.

The degree of overlapping, measured as the number of special districts per 100,000 people, was not found to be a significant influence on guaranteed or non-guaranteed debt levels. This is not consistent with the hypothesis that overlapping increases competition for local governments, reducing per capita debt levels.

3. Strategic Use of Debt in U.S. Municipal Government

3.1 Introduction: Strategic use of Debt Models

The prominence of local governments in the Unites States and their ability to engage in significant debt finance makes understanding the use of local debt and its consequences an important and interesting area of inquiry. This essay will empirically examine whether models of the strategic use of debt can help to explain variations in the use of debt across large U.S. cities.

The strategic use of debt can be thought of as an example of a specific behavior or policy outcome under a framework where competing political parties or policymakers care about policy outcomes. Modeling political behavior in this way stands in contrast to the standard approach which presumes politicians to be vote-maximizers in order to optimize their chances of winning elections. As Alberto Alesina explains:

> Parties may not care only about winning elections per se, but also about the quality of the policies resulting from an election. In this case the candidates of the two parties view winning an election not only as a goal per se, but also as a means of implementing a better policy for their respective constituencies (Alesina 1988).

Standard models of vote-maximizing politicians lead to the well known "median voter theorem." In a two-party election, competing factions move their policy positions towards one another as they attempt to increase votes by moderating positions. In theory, their policies converge at the policy preference of the median voter. By introducing a second non-trivial objective for politicians, that they care about what policies are implemented, the convergence outcome can be disturbed. For instance, Alesina presents a model where in a repeated game between two competing parties, the degree of convergence of policies will depend upon the parties' discount rates, degree of difference in party preferences, and the relative popularity of the parties amongst the electorate (Alesina 1988).

Using this framework, where parties are concerned about specific policy outcomes, papers by Alesina & Tabellini (1990) and Perrson & Svensson (1989) each develop models of the strategic use of public debt. The underlying concept to the strategic use of debt is that policymakers in power can influence succeeding policymakers through deficit finance. The degree to which policymakers finance current public goods[16] through public debt impacts the debt service level of subsequent policymakers and therefore impacts their overall public spending decisions and abilities. Thus, the amount of public debt chosen is said to be strategic in that it is chosen to influence subsequent policymakers as opposed to other objectives (ex. optimal tax smoothing). The degree to which current policymakers engage in deficit finance will likely be influenced by whether they (or their

[16] Public goods in this paper are defined only by the quality of being paid for by the government.

party) expect to win in the next election cycle. However, how these expectations influence debt finance decisions is actually a point of difference in the Alesina & Tabellini and Perrson & Svensson models.

Alesina & Tabellini (1990) hypothesize that the behavior of the incumbent party will be the same regardless of its specific party ideology (ex. liberal or conservative). This follows from their assumption that competing political parties vying for control of the government do not differ in their desired amount of public spending; but rather, they do have differences in their desired composition of that spending. For example, a group of conservative policymakers may prioritize spending on national defense, drug interdiction, highways, and subsidies for oil and pharmaceutical companies, while a liberal group may prefer spending on welfare, education, healthcare, public transportation and subsidies for alternative energy companies or medical research. A party in power may use debt to expand public spending on its preferred priorities in the current period. The cost of such debt is borne in higher taxes and reduced public consumption in future periods. Therefore, if a party expects to lose political control to a competing party that has alternative public spending priorities, it is less concerned about the reduced future public consumption that accompanies current debt. The more certain a party is that it will lose power, the less likely it expects to bear the cost of reduced public consumption from debt finance since that forgone future public consumption is not that which it prefers. The use of debt will also be greater the more polarized are the priorities and preferences of the alternating policymakers. Alesina & Tabellini therefore hypothesize that we should

expect to observe greater public debt levels the lower the probability of reelection and the larger the degree of polarization in party preferences.

Perrson & Svensson (1989) provide us with a very similar model to Alesina & Tabellini's. However, these authors make an alternative assumption about the differences between the preferences of a conservative versus liberal government. This results in a different conclusion than Alesina & Tabellini's. Perrson & Svensson assume that a conservative government has a preference for a lower level of government spending than does a liberal government. The current taxation and debt decisions of an incumbent conservative government will be influenced by its expectation of retaining power. If it expects to lose power, the conservative government has an incentive to influence the fiscal choices available to the succeeding liberal government by increasing debt. In the Perrson & Svensson model, the liberal government is required to pay down the debt it inherits and overall government consumption is a decreasing function of inherited debt. In this way, the conservative government can use debt to influence the subsequent period's government consumption. The amount of debt it passes to a liberal government is greater than the debt it would use if it knew that it would retain power.

In contrast, a liberal government in power behaves in nearly the opposite fashion when it expects to be succeeded by a conservative government. By leaving less debt, or surpluses, they can influence larger government consumption under the conservative

government than if they left a large inherited debt. For the liberal government, they will use less debt than would be the case if they expected to retain power.

In summary then, Perrson & Svensson suggest that the orientation of the party is important in determining the debt and taxation decision. When facing the prospect of electoral defeat, a conservative government will increase the public debt while a liberal government will decrease it. This also implies that the use of debt finance will be more volatile the greater is the competition between parties and the greater is the difference in their preferred level of government consumption.

3.2 Previous Empirical Testing of the Strategic Use of Debt

This section reviews some empirical research done at the state or local level of government into the effect that political partisanship can have on financial or economic outcomes, including specifically the strategic use of debt. Empirical testing of the strategic use of debt at the national level is generally confounded by a limited number of observations. The degree of institutional and constitutional variation across countries makes pooling of different countries problematic. Two empirical studies which avoid these problems by focusing on sub-national government units are Crain & Tollison (1993) and Pettersson-Lidbom (2001). Both papers specifically consider the Perrson & Svensson hypothesis. [17]

[17] Both of these papers use the legislature to define party control.

Crain & Tollison (1993) suggest that the variability of debt and tax policies will be directly related to the variability of political control. We see this, for example, in the Perrson & Svensson model where liberal governments expecting to lose control decrease deficits (or leave surpluses) while conservative governments will expand deficits. To test this hypothesis empirically, Crain & Tollison analyze U.S. state finances over a 20 year period. They regress the volatility in real growth rates of various fiscal variables (such as surplus/deficits, revenue, expenditures) on independent variables which attempt to measure political stability (along with some control variables). Among these is a variable measuring the probability of a change in power in the legislature.[18] They find this variable to be highly significant across all the different dependent fiscal variables tested. Also, the magnitude is found to be greater for impacting revenue than expenditure. They report that a 1% point rise in the probability of the legislature retaining power results in a 6% decline in the volatility of revenue. In contrast, the volatility of expenditures falls by only .4% for a similar probability increase in legislative stability.

As mentioned above, the study by Pettersson-Lidbom (2001) is similar to Crain & Tollison in that it analyzes sub-national governments and uses the legislature to define party control. Pettersson-Lidbom, however, collects a panel data set of debt accumulation and election results for 277 Swedish municipalities over a 20 year period. Swedish local governments have positive attributes as units of analysis in that they are

[18] A probability is derived from the cumulative normal distribution by taking the absolute value of Democrat's share of seats minus 50% over about a 20 year period and dividing by the standard deviation to generate a z statistic.

economically significant, have the same election cycle, and have a large degree of fiscal freedom (including debt issuance authority). Other characteristics of Swedish municipalities include a municipal council as the only elected governing body and a closed-list proportional representation electoral system to elect the council. I note that this stands in contrast to U.S. cities, where many have an elected mayor to head the executive branch and most, if not all, use a majoritarian electoral system.

Pettersson-Lidbom develops a regression model with per capita debt levels in election years as the dependent variable and the probability of electoral defeat among the explanatory variables. The probability variable is a proxy derived from ex-post election results. The model specification includes an interactive variable from the probability of defeat variable and a dummy variable indicating whether the incumbent government is left-wing. This design produces results that will show if left-wing governments behave differently than right-wing, and therefore a comparison of the hypothesis of the Alesina & Tabellini model against that of the Perrson & Svensson model. Pettersson-Lidbom obtains results consistent with the latter's model. When expecting to be replaced in power with certainty, a right-wing government increases its level of debt by 15%, while a left-wing government will decrease it by 11%.

Two other interesting and related papers by Pettersson-Lidbom (2007) and Ferreira & Gyourka (2009) focus on the causal effect that party control has on fiscal and economic outcomes, though not on the strategic use of debt specifically. Determining whether

party partisanship has a casual impact on policy outcomes or whether parties are merely correlated with policy outcomes is difficult to discern because of an inability to observe certain underlying local municipal traits (such as underlying voter preferences). Both papers attempt to generate unbiased estimates of the effect of party control by employing a regression discontinuity design. This approach is used by Pettersson-Lidbom, exploiting the discrete nature of party control around the 50% vote share threshold. The idea is that the municipalities where election results are close to this threshold are on average similar in their underlying characteristics. Party control can then be assumed to be randomly assigned across these cases, and can be viewed as a treatment effect. This regression discontinuity design had been previously applied by Lee, Moretti, & Butler (2004) in finding that party affiliation impacts voting decisions of U.S. Congressional Representatives.

For his study, Pettersson-Lidbom again uses Swedish local governments (288 municipalities over a 21 year span). He estimates a regression model which includes a dummy variable for party control and a control function of Left-Wing vote share. The control function includes polynomials of the left-wing vote share[19] and in some specifications other controls for city characteristics (income, population, % of population under age 17 and also % over 65). Pettersson-Lidbom tests a number of dependent variables based on total revenue, total expenditures, current spending, proportional income tax rate, unemployment rate, and government employee per capita. He concludes

[19] Note that the left-wing vote share determines the result for the binary dummy variable.

that left-wing governments have causal effects of increasing expenditure as a share of income on average by 2-3%, decreasing the unemployment rate by 7%, and increasing government employee per capita by 4%. Pettersson-Lidbom interprets his results as a strong rejection of political convergence. Further, he claims that the results imply Tiebout sorting at the local level does not completely deter politicians from engaging in partisan behavior.

For their paper, Ferreira & Gyourka (2009) focus on the effects of political partisanship at the local level of government in the U.S. As mentioned earlier, they also use a regression discontinuity approach to test whether partisanship has effects on fiscal and political outcomes such as the size of government, composition of spending, and crime rate statistics. In contrast to Pettersson-Lidbom, who used municipal council election results in his analysis, Ferreira & Gyourka focus on executive branch election results. They collect a data set of mayoral election results for U.S. cities spanning 37 years.[20]

The authors conclude that political partisanship has no material effect on various measures of the size, budget composition, and crime rate statistics of U.S. municipalities. These results stand in stark contrast to prior studies' results at the state level as well as the local level findings of Pettersson-Lidbom in Sweden. Ferreira & Gyourka suggest that their results may occur because of the degree of homogeneous sorting and Tiebout

[20] Their final data set analyzed has 1,993 elections from 413 cities (all with population over 25,000 in the year 2000). It only includes elections where a Democrat and Republican are pitted against one another. As I discuss in the next section, this is often *not* the case in major U.S. cities.

effects that characterize the local level of government in the U.S. These characteristics may provide an environment that incentivizes local politicians to credibly commit to moderate policies and refrain from partisan behavior which deviates significantly from the median voter. Ferreira & Gyourka provide some analysis suggestive that this mechanism might be at work. They first demonstrate that cities in the United States are more homogeneous than United States Congressional Districts along income and political diversity lines.[21] Second, they divide their sample into two groups based on a measure of local competition in the metropolitan area of the city.[22] They then apply their regression discontinuity approach to each group. They find that some of the less fragmented group's estimates of partisan impact are statistically different from zero and generally are of greater magnitude than the more fragmented group's estimates.

3.3 Strategic Use of Debt in U.S. Cities

How might the strategic use of debt be used in large U.S cities and how might one go about testing for such effects? There are certain features of U.S. municipal governance that are relevant for consideration in addressing these questions.

First, many large cities in the United States have been dominated by one political party for decades on end. Often times all the top candidates of a particular election will be

[21] Their measure of heterogeneity is the coefficient of variation for family income across census block groups in the year 2000 for all U.S. cities and congressional districts. Political heterogeneity is defined as local vote share for George W. Bush in the 2000 Presidential election.
[22] Local competition was measured by the creation of a Herfindahl index based on the population of each city within the metropolitan area.

members of the same party. The competition for political control may therefore be more appropriately characterized across certain local special interest groups than along familiar Democratic and Republican party lines. This suggests that if debt is used strategically in these cities, it is done more in line with the Alesina & Tabellini model than Perrson & Svensson's in that spending priorities, rather than the overall level of government spending, are more likely to describe the differences between policymakers in power. Domination by one political party might also suggest greater homogeneity in citizen preferences. In both Alesina & Tabellini and Perrson & Svensson models, more similarity in preferences lessens the use of strategic debt.

Secondly, the vast majority of municipalities in the U.S. are organized in one of two forms of government: mayor-council and council-manager. The first is often called the "strong mayor" form of government. In this form, the elected mayor holds tangible executive powers such as the appointment of bureau and commission heads, the veto, and a role in the budget process. The council is then the legislative branch, composed of elected councilmen. In contrast, under the council-manager form of government, there is no independent executive power and council members are the only elected officials with policy-making ability. The mayor, if one exists at all, is largely a figurehead. The elected council has the power to choose a city manager who is then responsible to manage the various city departments. When considering the application of the strategic debt models, the second form of government has the attractive feature of having only one elected branch of government.

Unfortunately, the scope of compiling data of the political makeup of city councils across cities over an extended period of time is a formidable task. This is in part due to another characteristic of U.S. local governance: many politicians are not easily classified into strictly defined parties. In many cases, the elections themselves (mayoral and council) may be non-partisan, so that the particular party of the candidates is not explicitly known.

These described features of local governance in large U. S. cities sway me to conjecture that if strategic debt behavior is observed, the Alesina & Tabellini assumption is more appropriate than the Perrson & Svensson. The use of strategic debt is most likely to be used by the policymakers in power towards projects benefiting their preferred special interest groups (police, fire, teacher unions; development authorities; unions; industrial parks; housing developments; anti-tax groups; parks/open space; etc.). I lean towards this conclusion from the facts that elections are frequently nonpartisan and that in many major cities power is completely held by one party. Therefore, my first empirical priority is to test the strategic use of debt under the Alesina & Tabellini assumption. However, I have put together a data set that allows testing of both the Alesina & Tabellini and Perrson & Svensson hypotheses. I use an empirical strategy similar to Pettersson-Lidbom (2001): focusing on specific elections as the units of observation, generating probabilities of the retention of power, and testing whether debt levels are statistically related to those probabilities. This direction is motivated in part by the data & informational limitations described above. To apply the Crain & Tollison approach via city councils, we would require detailed information of council party compositions over time across city to

generate some measure of political stability. We may additionally be confounded in deriving our variable by the non-partisan/independent status of many council members. Thus I will focus solely on the executive office, i.e. city mayors. Further, I focus only on those cities with the mayor-council form of government, as described above.

As mentioned, many mayoral elections involve candidates from only one party or are non-partisan elections where the candidate parties are not easily identifiable. The Alesina & Tabellini perspective under this scenario would be that the candidates represent competition amongst special interest groups and their government spending preferences rather than competition amongst parties. In such elections however, a simple party label does not readily allow one to know which special interest groups a politician represents. For instance, if a Democratic mayor in office is retiring, and there are two Democratic candidates facing off in the election to replace him, one will not know which of the two (if either) represents an extension of the mayor's spending preferences unless they are intimately familiar with the details of that particular race in that particular city. This is a problem in attempting to collect a data set to test the strategic debt hypothesis since such detailed election knowledge and information cannot feasibly be compiled across cities over time, and even if it were, would involve a good deal of subjective evaluation in assigning politicians to the interest groups they represent.

However, one situation where we can infer the probability of a change in political control is when an incumbent mayor faces reelection. Under this scenario, we are confident that

his opponent represents a tangible change in the preferred spending priorities. This is the case whether that opponent is from the same political party, an opposing party, or if both of them are independents running in a non-partisan race. By using the outcome of incumbent mayoral elections, we can infer the likelihoods of changes in political control and observe whether there is a relation to debt policies. Construction of a data set in this manner also allows empirical testing of the Perrson & Svensson hypothesis. Similar to Pettersson-Lidbom, we can test to see if debt is used strategically in an opposite manner by incumbent Democrat versus incumbent Republican mayors.

3.4 Modeling & Data

I will generally borrow the framework from Pettersson-Lidbom for this model. The variable of observation is the debt per capita level. The independent variable of interest is the probability of reelection. Other independent variables include control variables for the debt level. The equation specified is:

(1) $\text{Debt}_{it} = \alpha + \beta P_{it} + \Gamma_{it}\varphi + \varepsilon_{it} \quad i = 1,2.....,N; \; t = 1,2,....,T$

P_{it} represents the probability of reelection for the incumbent mayor of city i in year t. Γ_{it} represents a row vector of control variables for the debt level, φ a column vector of coefficients for those control variables, and ε_{it} represents an error term. Pettersson-Lidbom included a dummy variable in his model to capture the political orientation of the incumbent policymakers. That is the primary difference between that model and this one.

The first hypothesis to be tested is that β is less than zero, implying that as the probability of electoral victory rises, the debt level will fall. To generate probabilities of victory, I will use the actual vote shares from mayoral elections. The probability will be based on the difference between the incumbent mayor's percentage of votes received and those received by the most successful challenger ("most successful" defined by most votes received). This method of using the spread in percentage points is used because in many elections there are more than two significant candidates. The spread in percentage points has a range of -1 to 1 and can be transformed into a probability with a simple linear transformation.[23]

This method of generating probabilities of electoral victory is distinct from the approach of Pettersson-Lidbom. He uses the ex post election results to create a dummy variable for whether or not the incumbent party retains power. OLS is then applied to estimate his model including this binary dummy variable which he claims to be a proxy for the probability of retaining party control.

In a more sophisticated approach, Pettersson-Lidbom applies an instrumental variable model, estimating the probabilities of victory in an initial regression with those fitted values then used for the debt regression. This approach deals with the possibility that the probability of victory is endogenous to the dependent debt variable and also measurement

[23] Defining the spread in voter percentage as δ, we can linearly transform δ into P as: $P_{it} = (\delta_{it} + 1)/2$. P then has the property of ranging from 0 to 1. This transformation carries with it the implication that the change in probability of victory for a change in voter percentage spread is the same across the entire range of the voter percentage spread. In other words, the probability of victory changes at the same rate whether the election is a landslide or whether it is close. We could find alternative transformations of the voter spread to the probability of reelection that would incorporate a different rate of change in probability over different ranges of voter spreads.

error that occurs with the use of a dummy variable as the proxy for a probability. He first estimates the probabilities of victory with a probit model where the only independent variables are dummy variables for the specific municipalities. The rational is that cities contain fixed effect characteristics that influence the likelihood of a change in party control. Some municipalities will, over time, have more volatility in party control than others. For instance, Pettersson-Lidbom reports that 87 municipalities had no change in party control during the time period of his sample. The fixed effects model then incorporates that degree of volatility into the estimated probabilities of defeat.

Other variables I included to control for the level of debt will be population and economic statistics. This includes demographic information such as the percentage of the population age 65 and over, the percentage of owner occupied homes, and the per capita income. The first group is expected to be associated with higher debt levels. The elderly can be expected to be in favor of more debt by benefiting from present spending and deferred taxation, to the extent they expect not to have to pay in the future or are not concerned with the future taxes capitalized in their home values (in the case where they are owners). Home owners in general, however, are expected to oppose higher debt levels, because they still bear the deferred taxation as capitalized in their property value. Therefore the percentage of owner occupied houses is expected to be negatively associated with debt. Finally, higher income per capita is expected to be associated with a higher demand for government spending and therefore associated positively with the per capita debt level.

There are three other variables I include to control for debt levels. The first is a ratio of local government debt to state debt. These debt statistics are available annually for each state. The purpose of including this variable is to account for differences in the assignment of public goods across states. The degree to which the provision of public goods is centralized through state activity versus more decentralized local government activity can vary widely across states. This ratio, therefore, is a proxy for the degree of decentralization and we should expect it to be positively related to city debt level. The natural log of this ratio is used in the model.

A final control variable I include is the per capita debt level two years prior to the fiscal year in which the election occurs. Its purpose is to provide a control for the historical debt level up until the final two years of the mayor's term.

I constructed a data set over a time period of 1980 to 2004. A full listing of variables and sources is given in Table 3.1. As mentioned before, only major U.S. cities that have a "strong mayor" form of government were considered. All election results where an incumbent mayor was running for office were found using various sources (newspapers, journals, official city/county voting records, etc.). Major cities are roughly defined as those in the top fifty to sixty in population at some point during that time period. In total there are 30 cities in the data set and 107 elections. A full listing of cities and year of elections may be found in Table 3.2. As described above, the spread between the incumbent mayor's percentage of votes received and the top vote getting challenger's

were used to derive the ex ante probability of incumbent victory. This is our main independent variable of interest.

The dependent variable *Debt* is defined as the per capita debt at the end of the fiscal year in which the election occurs (both short-term and long-term debt). This annual data was provided to me upon request from the U.S. Census Bureau. Data for income per capita

Table 3.1 Variable Definitions for Strategic Debt Regressions

Debt	Outstanding City debt per capita at fiscal year end of the year in which election occurs. Source: U.S Census Bureau, Annual Survey of Local Government Finances
Debt_2	2 year lagged debt per capita
LocalSt	Ratio of total debt outstanding for sum of local governments to state government for each state in each year. Source: Census of Governments
OwnOcc	Percentage of houses occupied by the owner. Sources: U.S. Census Deci-Annual Census, & American Community Survey
Over65	Percentage of population over age 65. Sources: U.S. Census Deci-Annual Census, & American Community Survey
Income	Income per capita. Sources: U.S. Census Deci-Annual Census, & American Community Survey
PWin	Probability of victory by incumbent mayor.

and the above described socioeconomic variables are taken from a variety of sources over the years (see Table 3.1). All fiscal data is in 1999 dollars. Data for some variables is

not available between certain census years, and is therefore linearly extrapolated. This is specifically the case for the percentage of population age 65 and over, percentage of owner occupied houses, and income per capita. We should not expect these statistics to fluctuate wildly over the time so I do not consider this data extrapolation to be a heroic assumption.

Table 3.2 Sample Composition for Strategic Debt Regression by City

City	Elections	Election Years
Albuquerque, NM	4	2001, 1989, 1985, 1981
Atlanta, GA	2	1997, 1985
Baltimore, MD	3	1995, 1991, 1983
Boston, MA	3	2001, 1991, 1987
Chicago, IL	4	2003, 1999, 1995, 1991
Cleveland, OH	4	1997, 1993, 1985, 1981
Columbus, OH	1	1995
Denver, CO	4	1999, 1995, 1987, 1983
Detroit, MI	4	1997, 1989, 1985, 1981
El Paso, TX	7	2003, 1999, 1995, 1993, 1991, 1987, 1983
Houston, TX	8	2001, 1999, 1995, 1993, 1989, 1987, 1985, 1983
Indianapolis, IN	4	2003, 1995, 1987, 1983
Jacksonville, FL	1	1983
Los Angeles, CA	4	1997, 1989, 1985, 1981
Louisville, KY	2	1993, 1989
Memphis, TN	5	2003, 1999, 1995, 1991, 1987
Mesa, AZ	3	2004, 1994, 1986
Milwaukee, WI	5	2000, 1996, 1992, 1984, 1980
Minneapolis, MN	5	2001, 1997, 1989, 1985, 1981
Nashville, TN	3	2003, 1995, 1983
New Orleans, LA	3	1998, 1990, 1982
New York City, NY	4	1997, 1993, 1985, 1981
Omaha, NE	5	2001, 1997, 1993, 1985, 1981
Philadelphia, PA	3	2003, 1995, 1987
Pittsburgh, PA	4	2001, 1997, 1985, 1981
San Francisco, CA	4	1999, 1995, 1991, 1983
Seattle, WA	3	1993, 1985, 1981
St. Louis, MO	2	1989, 1985
Tampa, FL	2	1991, 1983
Tulsa, OK	1	1998

Besides the aforementioned variables, the model estimation will also include dummy variables to capture time specific factors on debt levels. This in particular accounts for the business cycle, credit market conditions, and interest rates all of which impact decisions about issuance of municipal debt. However, instead of using a dummy variable for each year, I will use one dummy variable for two year periods (except for one dummy used to represent one year since the data spans an odd number of years). I use this approach primarily because a dummy variable for every year requires the sacrifice of too many degrees of freedom in estimation given the size of the sample.

In order to empirically test the strategic use of debt under the Perrson & Svensson hypothesis, equation (1) must be adjusted to account for the specific party of the incumbent and challenger. Of elections within the data set where the party of both candidates can be determined and classified as either Democratic or Republican, there are three different incumbent vs. challenger scenarios (the Republican vs. Republican scenario does not occur). Thus, I change the debt equation by adding dummy variables for the Republican vs. Democrat (RvD) and Democrat vs. Democrat (DvD) elections and also add those dummy variables interacted with the probability of reelection:

(2) $Debt_{it} = \alpha_1 + \alpha_2 * RvD_{it} + \alpha_3 * DvD_{it} + P_{it} * [\beta_1 + \beta_2 * RvD_{it} + \beta_3 ** DvD_{it}] + \Gamma_{it}\varphi + \mu_{it}$
where $i = 1,2.....,N;\ t = 1,2,....,T$

Under this arrangement, the coefficient β_1 variable represents the change in debt per capita for a change in probability of victory when a Democratic mayor is challenged by a

Republican candidate. In the Perrson & Svensson model, we would expect the sign of this coefficient to be positive. When a Republican mayor is being challenged by a Democratic challenger, the change in debt per capita for a change in probability of victory is represented by $\beta_1 + \beta_2$. The sum of these coefficients should be negative if the Perrson & Svensson model holds. In the case of Democrat versus Democrat elections, the impact of a change in the probability of reelection is $\beta_1 + \beta_3$. We have no specific expectation in this scenario. However, if we make the assumption that Democratic challengers are on average more similar to the preferred spending level of Democratic incumbents than are Republican challengers, $(\beta_1 + \beta_3)$ should be less than $(\beta_1 + \beta_2)$. In other words, Democrat incumbents are more responsive in their debt decision when their challenger is a Republican than when it is a Democrat.

3.5 Estimation Results

Table 3.3 presents descriptive statistics of the variables for the first data set. This data set includes 107 elections of incumbent mayors. The *Debt* variable ranges from $556 to $11,009 per capita with a mean of $2,754. The *PWin* variable ranges from about .35 to .93 with a mean of .663 (the median is effectively equal at .668). This is consistent with the election results, where incumbent mayors won 91 of the 107 elections in the sample.

A second data set is described in Table 3.4. This is a subset of the 107 elections where the incumbent and challenger could be positively identified as either a Democrat or

Table 3.3 Descriptive Statistics of Sample for Alesina & Tabellini Strategic Debt Regressions N = 107

Variable	Mean	Std Dev	Min	Max
Debt	2,754	1,931	556	11,009
Debt_2	2,553	1,720	260	10,331
LocalSt	3.231	2.556	0.37	18.24
LNLocalSt	0.909	0.738	-0.994	2.904
Over65	12.0	2.3	7.3	17.2
OwnOcc	49.9	9.0	24.2	65.4
Income	18,293	3,837	12,107	34,490
PWin	0.6629	0.1388	0.3486	0.9371

Table 3.4 Descriptive Statistics of Sample for Perrson & Svensson Strategic Debt Regressions N = 86

Variable	Mean	Std Dev	Min	Max
Debt	2,878	2,022	556	11,009
Debt_2	2,657	1,796	565	10,331
LocalSt	2.885	2.490	0.37	18.24
LNLocalSt	0.796	0.720	-0.994	2.904
Over65	12.1	2.3	7.3	17.2
OwnOcc	49.1	9.2	24.2	65.4
Income	18,565	3,842	12,294	34,490
PWin	0.656	0.1358	0.3486	0.9371

Republican. This does not mean they were necessarily running as a partisan candidate in the particular election (as mentioned earlier, many elections are non-partisan). This data is to be used to test the strategic use of debt under the Perrson & Svensson hypothesis, which holds that how debt will be used strategically is determined by the particular party

in power. As Table 3.4 displays, there are 86 elections in the data set, and the descriptive statistics are very similar to the full 107 observation data set.

I ran four different regressions, the results of which are highlighted in Table 3.5. The first two regressions are with the full data set (107 observations) and are run under the Alesina & Tabellini hypothesis where we are not concerned with the particular party or ideology of the mayoral incumbent or challenger. Regression (1) is estimated with ordinary least squares. In regression (2), I apply an instrumental variable method similar to that used by Pettersson-Lidbom (2001). As was alluded to earlier in describing Pettersson-Lidbom's study on strategic debt, it is possible that our *PWin* variable is endogenous if the debt per capita level can influence the mayor's chances of winning. Pettersson-Lidbom uses city-specific dummy variables as instrumental variables to develop proxy probabilities of victory. I attempt a similar approach in regression (2), using two stage least squares where city dummy variables are used as the instruments for *PWin*[24] (full regression results as well as all first stage regressions are shown in the Appendix). Table 3.5 shows that the estimates of the coefficient on the *PWin* variable are negative in both regressions, which is consistent with expectations under the Alesina & Tabellini model. The magnitude of the estimates are interesting, in as they imply that per capita debt increases by as much as $244 (in the case of the IV estimate) for a 10% decline in the probability of incumbent victory. This is a non-trivial amount where the

[24] There are 30 cities in the sample; see Table 3.1

sample mean of per capita debt $2,754. However, in neither regression can the estimates be claimed to be statistically different from zero.

Table 3.5 Results for Strategic Debt Regressions

	(1)	(2)	(3)	(4)
Hypothesis Tested:	Alesina & Tabellini		Persson & Svensson	
Estimation Method	OLS	2SLS	OLS	2SLS
Sample Size:	N=107	N=107	N=86	N=86
PWin	-501.9 (862.2)	-2443.5 (1936.6)	672.4 (1207.4)	-1079.1 (1984.4)
*PWin * RvD*	N/A	N/A	-2835.7 (2111.2)	-875.7 (4436.8)
*PWin * DvD*	N/A	N/A	-2420.9 (1957.7)	-2792.1 (2615.9)

The dependent variable is city debt per capita. Regressions (1) & (2) test the Alesina & Tabellini hypothesis and (3) & (4) the Perrson & Svensson. For the 2SLS regressions, the three variables above involving the probability of victory are considered endogenous. City dummy variables are used as instruments. Full estimation results of all model variables as well as all first stage regressions are found in the Appendix.

Regressions (3) and (4) on Table 3.5 are designed to estimate results under the Persson & Svensson hypothesis using the 86 observations from the second data set. As noted earlier, all incumbents and challengers were identified as either Republican or Democrat in the elections comprising this data set. Equation (2) from the previous section is estimated first with OLS and then with two-stage least squares using the city-specific dummy

variables as instruments for all three variables with *PWin*. The results are presented in Table 3.5, where PWin, PWin*RvD, and PWin*DvD represent the coefficients on the *PWin* variable and its interactions with RvD and DvD dummy variables. While some of the estimates do conform to our expectations under the Persson & Svensson model in terms of the signs on the coefficients (particularly the OLS results), we again find that none of the estimated parameters are statistically significant.

3.6 Further Discussion

The results presented do not provide evidence that the strategic use of debt is an important factor in the political landscape of large cities in the United States. These results stand in contrast to some prior empirical work on the strategic use of debt, particularly Pettersson-Lidbom (2001)'s research at the local level in Sweden. Interestingly, as I noted in the Previous Empirical Testing section, Pettersson-Lidbom (2007) found contrasting empirical results from Ferreira & Gyourko on the impact of partisanship on local governments. Pettersson-Lidbom concluded that in Sweden, local party control has a causal impact on economic outcomes and that Tiebout sorting does not nullify the impacts of partisanship. Ferreira & Gyourko come to the very opposite conclusion when focusing on local governments in the United States. They find that partisanship has no material impact on the size of government, allocation of spending across functions, and property or crime rates of local governments. They conclude that

these results suggest competing jurisdictions and homogeneous sorting reduce partisanship behavior.

The contrasting outcomes from these four studies beg the question: what are the differences between local governments in the United States and Sweden which drive these divergences in the empirical observations? One possibility is that Tiebout-type competition and homogeneous sorting is stronger in the United States than in Sweden and therefore mitigates partisanship. As discussed earlier, Ferreira & Gyourko present some limited analysis on their data set which is supportive of this possibility. Also, Chapter 2 of this dissertation ("The Impact of Local Government Structure on Municipal Debt Levels") finds that the degree of fragmentation in U.S. metropolitan counties is negatively correlated with debt per capita. Allowing fragmentation to be a proxy for the strength of Tiebout competition, this presents an empirical result that Tiebout competition is negatively correlated with public debt. The emphasis of Chapter 2 was to test whether Tiebout forces led to lower debt levels via competitive forces lessening the scope for bureaucratic inefficiencies. However, it may be that those empirical results follow from a different mechanism: greater Tiebout forces induce homogeneous sorting and lesson the incentive and scope for partisanship behavior such as the strategic use of debt.

As was mentioned earlier, another institutional difference that is clearly known between local governments in Sweden and the United States is their respective electoral systems. In the United States, local politicians are elected via majoritarian, winner-take-all

systems.[25] In contrast, Sweden employs proportional representation electoral systems at all levels of government. As Pettersson-Lidbom (2007) explains, the Swedish Elections Act details that municipal councils are to be elected under a wholly closed-list proportion system. Thus political parties are very influential at the local level of government as they choose the list and order of their candidates.

Ferreira & Gyourka do not explore this difference as a potential contributory factor in the contrast of their and Pettersson-Lidbom results. However some previous authors have concluded that there is less deviation from party-voting in proportional representation systems than in majoritarian, and less incentive for individual politicians to be responsible to their voters. As Perrson & Tabellini express:

> Politicians may have stronger direct incentives to please the voters if they are held accountable individually, rather than collectively. Thus, party lists discourage effort by officeholders, essentially because they disconnect individual efforts and re-election prospects (Perrson & Tabellini 2004).

Stratmann (2006) demonstrates this empirically, analyzing the voting records of legislators of the German Bundestag, which has a mixed member election system. He finds that legislators elected through the majoritarian system are more likely to vote against their party's position than are the legislators elected through the proportional representation system.

[25] As the United States local electoral systems are entirely decentralized, there are of course differences across local governments, such as at-large vs. district council elections (as well as mixtures of the two). However, I am aware of no government that uses proportional representation to allocate council seats.

The difference in these electoral systems may help explain the discrepancies in the empirical results on partisanship between Sweden and the United States at the local level. Local Swedish municipal councilpersons must be more responsive to their political party than directly to voters in order to improve their reelection prospects. However, more explanation than this may be required to explain why U.S. mayors do not engage in the specific partisan behavior of using debt strategically when they know their reelection is unlikely.

One possibility in the United States is that reputational effects prevent mayors from using debt strategically even when expecting electoral defeat. Even defeated mayors often hope to continue their political careers. They may run for mayor at a later date or for higher office. Thus, as they are more beholden to voters than their party under the majoritarian system, they may be concerned about the reputational effects that might occur from using debt strategically. We can contrast that situation with a councilperson in Sweden expecting their party to lose power. First, the councilperson still could be reelected even though the party loses its majority. Second, the councilperson's best chance of reelection under the closed-list election system is to be high on the party's list. Thus, the councilperson has an incentive to support partisan policies, including using debt strategically, as doing so may actually improve their reelection prospects if they are rewarded by the party with a higher list position. Furthermore, compared to the U. S. mayor's situation, the councilperson's costs in terms of negative reputational effects are probably very small. As one councilperson amongst many, their share of accountability

by voters for partisan behavior will surely be less than would be the mayor's share as the head of the executive branch. Also, damaging one's political reputation amongst voters in Sweden is not as costly as in the United States because the voters do not select candidates at elections but only make chooses amongst party lists.

To summarize on the comparisons between Sweden and the United States at the municipal level of government, there exist institutional differences in the form of electoral systems, branches of governments (strong-mayor versus single council), and potentially the degree of Tiebout competition. An area for further research is to attempt to understand the effect of these institutions, individually and jointly, on local political partisanship.

3.7 Conclusion

This essay investigated whether the strategic use of debt is a significant factor in determining debt levels of large cities in the United States. The strategic debt models of Alesina & Tabellini and Persson & Svensson were considered. The first model assumes that when facing electoral defeat, an incumbent politician will increase debt. The second model assumes that conservative incumbents will increase debt while a liberal incumbent will decrease debt. I tested these hypotheses by creating a unique data set of mayoral election results of large U.S. cities when the incumbent mayor was seeking reelection.

I regressed city debt per capita on control variables and the incumbent's probability of victory, which was generated from the election results. I also did this including the probability of victory interacted with party dummy variables to test if incumbent and challenger party affiliation matter. In no scenario did I find the independent variables relating to the probability of reelection to be significant explanatory factors of city debt per capita. These results do not support the hypothesis that mayors use debt strategically in large U.S. cities.

This essay's results are consistent with Ferreira & Gyourka's recent finding of the lack of a party effect at the local level of government in the United States. However, Pettersson-Lidbom has found a party effect as well as evidence of the strategic use of debt in Swedish municipalities. Focusing on institutions such as strength of Tiebout competition, branches of governments (strong-mayor versus single council), and electoral systems may be a fruitful direction for future research to take in attempting to reconcile these results.

APPENDIX

Full Estimation Results for Table 3.5, Strategic Debt Regressions

	(1)	(2)	(3)	(4)
Hypothesis Tested:	Alesina & Tabellini		Persson & Svensson	
Sample Size:	N=107	N=107	N=86	N=86
Estimation Method:	OLS	2SLS	OLS	2SLS
Debt_2	.8131 (.0751)	.8372 (.0557)	.7784 (.0974)	.8108 (.0630)
LNLocalSt	225.9 (188.3)	271.5 (215.3)	135.8 (192.9)	153.5 (207.3)
OwnOcc	-20.212 (10.884)	-28.558 (15.665)	-10.464 (10.139)	-17.682 (10.199)
Over65	41.323 (52.990)	67.939 (65.536)	37.250 (57.909)	50.334 (57.368)
Income	.0645 (.0319)	.0039 (.0033)	.1006 (.0468)	.0737 (.0343)
PWin	-501.9 (862.2)	-2443.5 (1936.6)	672.4 (1207.4)	-1079.1 (1984.4)
*PWin * RvD*	N/A	N/A	-2835.7 (2111.2)	-875.7 (4436.8)
*PWin * DvD*	N/A	N/A	-2420.9 (1957.7)	-2792.1 (2615.9)
RvD	N/A	N/A	1197.8 (1222.7)	-48.7 (2702.4)
DvD	N/A	N/A	1354.5 (1372.3)	1549.0 (1834.7)
Constant	-440.8 (1095.)	1268.3 (1537.2)	-2085.6 (2124.4)	-318.8 (1637.4)
R-squared	.765	.7496	.7878	.7746

First Stage Regression Results for Table 3.5, Strategic Debt Regressions

Regression	(2)	(4)		
Hypothesis Tested:	Alesina & Tabellini	Persson & Svennsson		
Sample Size:	N=107	N=86	N=86	N=86
Endogenous Variable:	*PWin*	*PWin*	*PWin*RvD*	*PWin*DvD*
Debt_2	.00003 (.00001)	.000045 (.000017)	-.000005 (.000005)	.000042 (.000013)
LNLocalSt	-.034 (.057)	-.089 (.070)	-.038 (.024)	-.084 (.055)
OwnOcc	-.0041 (.0131)	-.0031 (.0169)	-.001 (.006)	.010 (.013)
Over65	.017 (.019)	.030 (.023)	.006 (.007)	.017 (.018)
Income	-.00003 (.00001)	-.00003 (.00002)	-.000006 (.000007)	-.000031 (.000017)
Atlanta	.221 (.234)	.232 (.392)	.024 (.131)	.411 (.307)
Baltimore	.234 (.174)	.313 (.203)	.002 (.080)	.230 (.159)
Boston	.317 (.386)	.451 (.519)	.004 (.174)	.626 (.407)
Chicago	.213 (.228)	.307 (.288)	.018 (.967)	.351 (.226)
Cleveland	.081 (.172)	.136 (.205)	.759 (.069)	.184 (.161)
Columbus	.213 (.207)	.384 (.256)	.109 (.086)	.268 (.201)
Denver	.102 (.187)	.144 (.240)	-.033 (.081)	.194 (.189)
Detroit	.006 (.105)	.048 (.140)	.049 (.047)	.016 (.110)
El Paso	.050 (.128)	.094 (.176)	.011 (.059)	-.005 (.138)
Houston	.380 (.238)	.570 (.312)	-.028 (.105)	.564 (.245)
Indianapolis	.251 (.090)	.318 (.105)	.060 (.035)	.196 (.083)
Jacksonville	.275 (.142)	.303 (.159)	.025 (.053)	.049 (.124)
Los Angeles	.263 (.299)	.453 (.397)	-.008 (.133)	.587 (.312)

First Stage Regression Results for Table 3.5, Strategic Debt Regressions (continued)

Regression	(2)	(4)		
Hypothesis Tested:	Alesina & Tabellini	Persson & Svennsson		
Sample Size:	N=107	N=86	N=86	N=86
Endogenous Variable:	*PWin*	*PWin*	*PWin*RvD*	*PWin*DvD*
Louisville – Jefferson	.266 (.155)	.213 (.204)	.014 (.068)	-.006 (.160)
Memphis	.233 (.144)	.384 (.199)	-.005 (.067)	.328 (.156)
Mesa	.275 (.148)	.259 (.251)	.008 (.084)	.255 (.197)
Milwaukee	.075 (.199)	.167 (.243)	.031 (.081)	.309 (.191)
Minneapolis	.182 (.185)	.258 (.239)	-.015 (.080)	.297 (.187)
New York	-.038 (.432)	-.114 (.549)	-.004 (.184)	.328 (.431)
Nashville-Davidson	.412 (.155)	.380 (.186)	-.011 (.062)	.467 (.146)
New Orleans	-.022 (.219)	-.055 (.259)	.028 (.087)	-.114 (.203)
Omaha	.301 (.142)	.391 (.191)	-.068 (.064)	.449 (.150)
Philadelphia	.096 (.144)	.117 (.183)	.008 (.061)	.114 (.143)
Pittsburgh	.245 (.192)	.281 (.230)	-.023 (.077)	.252 (.180)
San Francisco	.291 (.410)	.307 (.615)	-.098 (.206)	.591 (.482)
Seattle	.357 (.237)	.350 (.304)	-.070 (.102)	.538 (.238)
St. Louis	.122 (.228)	.210 (.262)	.001 (.088)	.171 (.206)
Tampa	.240 (.144)	.224 (.157)	-.017 (.053)	.223 (.123)
Tulsa	-.034 (.167)	-.046 (.193)	.015 (.065)	.016 (.151)
RvD	N/A	-.046 (.072)	-.617 (.024)	-.054 (.057)
DvD	N/A	.0295 (.0486)	.0295 (.0486)	.616 (.038)

First Stage Regression Results for Table 3.5, Strategic Debt Regressions (continued)

Regression	(2)	(4)		
Hypothesis Tested:	Alesina & Tabellini	Persson & Svennsson		
Sample Size:	N=107	N=86	N=86	N=86
Endogenous Variable:	*PWin*	*PWin*	*PWin*RvD*	*PWin*DvD*
Constant	.983	.309	-.138	-.525
	(.801)	(.971)	(.325)	(.762)
F-Test	2.14	1.76	.67	1.83

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Curriculum Vitae

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