

# **Property Tax Exemptions and Tax-Exempt Bonds: Do Federal Income Tax Exemptions Influence Municipal Capital Finance?**

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### **Abstract**

The federal income tax deduction for property taxes and tax-exempt municipal bonds are a substantial subsidy to local governments. A tax deductibility hypothesis is postulated to explain why communities might have differing preferences for the way their local government chooses to finance long term assets. Empirical findings are consistent with the tax deductibility hypothesis of municipal finance in that high income communities in New Jersey favor property taxes, while low income communities favor tax-exempt debt. The variables employed to gauge whether the residents were likely to itemize deductions on their federal income tax return also have a statistically significant relationship to a municipality's use of property tax financing. The observed impact of the tax deductibility variables on debt financing is different than postulated, suggesting that factors in addition to the tax deductibility hypothesis also motivate the use of debt financing.

## **Property Tax Exemptions and Tax-Exempt Bonds: Do Federal Income Tax Exemptions Influence Municipal Capital Finance?**

Local governments rely on the property tax and tax-exempt bonds to fund a substantial portion of long-term assets and infrastructure. Both financing alternatives benefit from a significant subsidy through the federal tax code. Property taxes are deductible from personal income taxed by the federal government, and the interest earned on qualified municipal bonds is not taxable income for the bondholder. The research discussed in this paper examines whether such tax deductions influence the way that municipalities finance their expenditures. A better understanding of the impact of federal tax deductions on local government finance provides important context for the repercussions of federal income tax reforms.

### ***Debt Leverage***

Debt, like bonds and loans, are different in fundamental ways from other revenue sources like the property tax. Financial resources generated through debt create contractual obligations to external agents requiring interest and principal payments. Long term assets financed with property taxes or other revenues are acquired without creating an offsetting liability, and therefore can be viewed as a type of equity financing. The debt or equity choice is a long standing question in the research on corporate finance.

Before addressing the value of debt leverage to municipalities, it is helpful to briefly summarize the key issues that have emerged from the extensive literature on the use of debt by the for-profit firm. Debt is known to leverage the return on the equity portion of a firm by maximizing potential profits, but debt payments are fixed and therefore also

exacerbate potential losses and thereby forces the equity holders to take on additional risk. Debt payments are generally fixed and more certain, which reduces the risk born by the creditors. In perfect markets the increased risk born by the owners is exactly offset by the risk reduction carried the debt holders. Therefore, there is no financial incentive to use debt over equity. Modigliani and Miller (1958) were the first to theorize that the firm's choice between debt and other financing sources does not matter if the capital markets are completely efficient. In such conditions, the market value of any firm is independent of its capital structure, as there would be no financial advantage to financing assets through debt or equity.

The federal tax on corporate income treats debt and equity differently and therefore provides a financial incentive for a firm to prefer debt to equity. Interest costs of debt are considered deductible for tax purposes while dividends are not. If taken to the extreme, the tax deduction for corporate interest payments would motivate firms to finance entirely with debt. However, the cost of financial distress is a disincentive for using debt (Warner 1977; Weiss 1990). As debt outstanding increases, the credit risk increases, causing creditors to increase interest rates and demand more collateral, which diminishes the return on owners' equity. The trade-off theory for capital structure has emerged from this research and asserts that firms will seek to balance the benefit of the debt tax shield against the costs of financial distress.

### ***Government Debt***

Governments have been borrowing money for centuries and there is no dearth of literature that examines the topic. Long before Modigliani and Miller postulated that the mix of financing does not enhance the value of the firm under perfect markets, David

Richardson had theorized that in perfectly functioning markets, governments and citizens are indifferent between tax and debt finance (see Barro, 1979). In theory, the mix of tax and debt financing should not matter, but the empirical research shows that debt does matter.

One characteristic of public debt is that it distributes expenditures over future periods of time, raising questions about the intergenerational equity of debt financing (Lerner 1948; Ferguson 1964, Buchanan 1958, chapter 4, Barro 1979). The heart of the issue is whether debt shifts the tax burden from current taxpayers to future taxpayers to support the debt, in which case the elderly might rationally prefer debt financing. Empirical studies that include the age distribution of voters in investigating the state and local debt utilization report that the elderly population generally opposes local borrowing (Asefa et al.1981; Clingermayer 1991; Ellis and Schansberg 1999).

Fiscal illusion literature on debt finance purports that voters underestimate the present value of debt and therefore view debt as less expensive than tax finance (Vickrey 1961; Buchanan 1964). Several empirical tests of the debt illusion hypothesis have employed a capitalization approach to demonstrate that the costs of debt issues are underestimated or even perceived as benefits by voters (Vitaliano 1988; Dollery and Worthington 1995; Hur 2001). This empirical evidence implies that the method of financing may have real effects on public expenditures.

Debt plays an important role in the fiscal administration literature. Benefit matching, or inter-period equity, is the idea that citizens benefiting from public services are those who should pay for the services. Under this convention, government projects that provide benefits for multiple years should be debt financed with matching bond maturities

(Marks and Raman 1996; GASB 1999). Benefit matching has the added advantage of smoothing tax revenues and reduces volatility in the tax rates.

Debt financing has also been examined from an affordability perspective or debt capacity. This literature also takes an administrative approach in that it presumes that some level of debt financing is necessary and it is the financial manager's role to manage debt to ensure lowest issuance and interest costs. Hackbart and Ramsey (1993) provide an overview of this literature. Bahl and Duncombe (1993) examine the interstate variation of debt burden and find that demand for government services and institutional constraints, rather than the capacity to finance, seem to drive the variation in debt burden.

All of these factors discussed in the literature are important motivators of government debt finance and variables will be employed through the analysis to help control for these influences. The prime objective of this paper is to examine whether municipalities chose to finance public expenditures through a strategic mix of debt and property tax financing that take advantage of federal personal income tax exemptions.

### ***Tax Deductibility Hypothesis***

The federal government allows income deductions for tax-exempt bonds and local property taxes. Local and state governments can issue tax-exempt bonds, where the interest earned on such bonds is not taxed at the federal level. The tax exemption results in a lower cost of capital for the government because the exemption reduces the required bond yields relative to similar taxable bonds. The deduction of property tax payments from the income taxed at the federal level reduces the tax liability owed by the citizen. Notably, a citizen must itemize deductions on Schedule A in order to claim the deductions, and such efforts are most justified to filers in higher tax brackets.

Gordon and Slemrod (1983) and Feldstein and Metcalf (1987) have examined the deductibility of the state and local property tax and municipal expenditures, looking primarily at the efficiency of the deductions as a subsidy to state and local governments. These studies also evaluate the federal subsidy for tax-exempt municipal bonds as stimulus for municipal expenditure. A complimentary framework in Holtz-Eakin (1993) demonstrates the influence of the marginal federal-tax rate on the supply of tax-exempt debt and provides empirical evidence that increases in the average personal federal-tax rates leads to less aggregate public sector borrowing. This literature suggests that arbitrage opportunities afforded through the federal tax deductions for property taxes and municipal bond interest may influence the level of capital expenditures and to some extent the mix of tax revenues. While these studies are not directly focused on the questions of municipal capital structure, the tax arbitrage arguments provide a link between a resident's individual financial interests and the municipalities financing options and provide the foundation for a tax deductibility hypothesis for municipal finance. The deductions influence the real (after-tax) cost of capital from the citizen's perspective, and therefore influence a government's choice of financing. The benefit of deductions to an individual depends on the value of their marginal tax rates.

At this point it is helpful to precisely define what I am calling the tax deductibility hypothesis for municipal finance. The tax deductibility hypothesis is that municipalities will choose between property tax and tax-exempt bonds to finance long term assets in such a way that citizens benefit the most from federal income tax deductions.

The tax deductibility hypothesis for municipal finance builds on the theoretical framework in Holtz-Eakin (1993) and Denison and Hur (2000). Assume there is a planned

capital expenditure to be financed through the property tax or general obligation bonds.

Furthermore, assume that 1) individuals will finance a property tax increase through borrowing in the private market<sup>1</sup>, and 2) the private borrowing rate is the same as the government-borrowing rate without a tax exemption.<sup>2</sup> Define the following terms:

$r_p$ = private rate of borrowing

$c_m$ = after tax cost per dollar of municipal borrowing (citizen perspective)

$c_t$ = after tax cost per dollar of property tax financing (citizen perspective);

$t$ = individual's marginal tax rate;

$t^*$ =the tax rate that equates the after tax returns on taxable and tax-exempt bonds.

In such conditions it can be shown that  $c_m=r_p(1-t^*)$  and  $c_t=r_p(1-t)$ . A citizen will prefer to finance the expenditure with bonds when  $c_m$  is less than  $c_t$ , which occurs when  $t < t^*$ .

Similarly, when  $t > t^*$  the citizen will prefer property tax finance. Citizens are indifferent when  $t=t^*$ . Observe that  $t^*$  is determined in the market place and the local government has no direct control over  $t^*$ . Specifically,  $t^*$  is the tax rate where the marginal investor in the bond markets is indifferent between investing in taxable or tax-exempt bonds.

Generally, the bond market is viewed as a national market, but there is evidence that states with income taxes become unique segments in the tax-exempt bond market (Marlin 1995).

The critical point is that the national or local governments have very little influence on  $t^*$ .

On the other hand, the individual tax rate,  $t$ , is the combined effect of the federal and state tax rates on personal income. Governments do have a direct impact on  $t$  as they establish tax rates and brackets, and authorize deductions for determining taxable income.

Lastly, consider that  $c_m$  is also going to increase as costs of financial distress and bankruptcy increase. Thus  $c_m=r_p(1-t^*)+ \phi$  where  $\phi$  is the cost of financial distress.

Financial distress for general obligation debt depends on a jurisdiction's tax capacity and the level of outstanding debt. This condition provides that there is some fiscal constraint

on debt financing for low-income municipalities. The fiscal constraint ties directly into the debt affordability and debt capacity literature as summarized earlier in the paper.

To my knowledge there are only a few studies that have specifically examined the mix of debt and tax financing of local government capital expenditures (Asefa et al. 1981; Eberts and Fox 1992; Temple 1994; Metcalf 1989). These studies are somewhat mixed in their findings regarding household income and debt finance. Consistent with the theory discussed, Asefa et al. (1981) and Metcalf (1989) find that the use of debt is inversely correlated with median household income. On the other hand, Eberts and Fox (1992) and Temple (1994) find that income is positively related to debt. The inconsistency of empirical findings may be a result of the units of analysis and measurement of debt and income. Eberts and Fox examine a pooled time series of 31 large cities and employ an average measure of household income. Temple aggregates state and local bond issuance on a statewide basis and doing so may be problematic in that states rely on income and sales taxes while local governments principally rely on property taxes that are deductible. It is reasonable that the effective costs of tax and debt financing are different for the states than for local governments and therefore should be modeled separately. Furthermore, both studies are looking at jurisdictions sufficiently large enough to cloud evidence of Tiebout sorting.

This section illustrates that individuals in different income tax brackets should have different preferences for the way a government finances long term assets. Individuals subject to high income tax rates would rationally prefer to finance with a property tax, as long as the property tax is deductible when calculating taxable income. It is important also to remember that the federal tax code requires that property tax deductions are claimed on

the Schedule A form along with other deductions. Therefore the deductibility of the property tax only benefits those individuals who own property and itemize their deductions. The benefits of tax-exempt bond finance are not conditional upon property ownership or filing a Schedule A form. Since an individual's marginal tax rate usually increases with taxable income, communities with low median income might be expected to use proportionally more debt financing than a community with a relatively high median income.

### ***Data and Method***

Fiscal information on the revenues, expenditures, and outstanding debt was obtained for the municipalities in New Jersey from the Annual Report of the Division of Local Government Services, NJ Department of Community Affairs, 1990. The analysis focuses on general obligation debt, since revenue bonds usually rely on user-fees rather than the tax base. New Jersey municipalities are especially convenient for analyzing general obligation debt because the school districts and municipalities have conterminous boundaries. Population and median household income for each municipality was obtained from the Census of Population and Housing, 1990. The decision to use data from 1990 considers the availability of key variables, and perhaps more importantly, that the Alternative Minimum Tax (AMT) was applicable to a much smaller segment of the population than it is now. The AMT eliminates most the income tax deductions, and thus diminishes the impact of the federal tax deductions on the way that municipalities finance long term assets.

Of the 567 municipalities in NJ, 494 municipalities had usable data. An additional 20 observations were dropped from the sample because the municipality had zero debt

outstanding and were clearly outliers relative to the other NJ municipalities.<sup>3</sup> The city of Camden was also dropped from the data set because residual plots and the Cooks D statistics indicated that it was also a significant outlier on several dimensions.

The debt leverage of a for-profit firm is typically calculated by dividing total debt outstanding by total equity. However, the fund accounting used by governments does not report a comparable proxy for equity<sup>4</sup>. Therefore, a different debt ratio must be employed in the study of government capital structure. The debt-per-capita ratio and the debt-per-total-personal-income ratio are often used in assessing the debt burden and financial condition of governments. However, these ratios are incomplete indicators of leverage, because they focus on the current debt burden and the cities' ability to issue additional debt rather than the use of debt financing relative to other municipal revenues. Two additional ratios are viewed to provide a better indication of the capital structure of a municipality. One ratio is derived by dividing total general obligation debt outstanding by property tax revenues, and another similar ratio is total general obligation debt outstanding divided by total revenues. As none of the debt ratios are perfect proxies of debt leverage, regression analysis is applied using each of the four debt ratios as the dependent variable. In addition, the regression model also is run using the property tax ratio (see Table 1) as the dependent variable. In this case the expected sign of the income variable coefficient is positive.

Table 1 about here

The objective of this study is to examine whether the federal income tax exemptions influence a city's choice on financing with property taxes or municipal bonds. As discussed in the preceding section, the incentives to prefer debt financing or property tax financing are driven by the individual tax rate. Unfortunately, the individual tax rates

are not known explicitly, but they are highly correlated with household income. As a result, low income households would favor tax-exempt debt, and high income households eligible for the property tax deduction would favor property tax financing.

The units of analysis are the municipalities in New Jersey. The underlying premise of the study is that a municipality will finance long term assets in a way that benefits the majority of its citizens. The premise that the community will reflect individual preferences is grounded in two well established models of public expenditure: the median voter model, and the Tiebout model.<sup>5</sup> This study is not concerned with a specific test of the median voter model or Tiebout model, but starts with the assumption that individual preferences will be reflected in the financing choices made by the municipality.

The median household income is of great interest in this analysis because the income level is a proxy for the median income tax rate of community and therefore an important factor in the mix between property tax financing and tax-exempt general obligation bonds. There are a number of variables expected to influence the debt ratio in addition to median household income. These variables are described in Table 1.

Of particular interest are the variables: *Op\_h tenure*, *Occupiedp*, and *Tax\_inc*. These variables are related to the deductibility of the property tax on a Schedule A Form. *Tax\_inc* is the percentage of the population with an annual income over 15,000 dollars. The standard deduction for the federal income tax is a little less than 15,000 dollars and therefore, those making less than 15,000 dollars a year will pay no (or very little) income tax.<sup>6</sup> As the percentage of citizens with an income below 15,000 dollars increases, deductibility hypothesis predicts that the citizens will desire more debt finance.

*Occupiedp* is the portion of citizens that own their homes. This variable is important because home owners will pay the property tax directly and therefore are able to itemize the deductions. A community with a larger share of residents who rent will prefer debt financing over property taxes.

The *Op\_h tenure* is a variable created to control for the impact of a mortgage on deductibility. For a homeowner to itemize property taxes the total of the itemized deductions must exceed the standard deduction. Often, the property tax alone is insufficient for the homeowner to itemize deductions. The interest on a mortgage is deductible, however, and the mortgage interest and the property tax together are more likely to encourage the itemization of deductions. The *Op\_h tenure* variable captures the interaction of the proportion of the population who own their homes and the average length of time the homeowners have lived in their home. The length of time in their home is important because mortgage interest is higher in the early years of a standard mortgage. Thus, this variable is a proxy for the average household mortgage interest payment. As the value of *Op\_h tenure* increases, the average homeowners are expected to have lower mortgage payments and are therefore less likely to itemize deductions, reducing the advantage to property tax financing.

The other variables in the regression model are control variables. Capital expenditures per capita are an important control for this cross sectional data, as jurisdictions are unlikely to issue long-term debt without capital expenditures. Intergovernmental aid per capita will reduce the reliance on both debt and property tax finance. The change in population is expected to have a positive correlation to debt because it is common practice to issue debt during periods of rapid growth and an

expanding tax base. The proportion of elderly population in the community will capture the intergenerational effects of debt.

Population is potentially an important variable because financial distress will be much higher for very small municipalities. Municipalities with small populations have fewer taxpayers and therefore have higher levels of financial risk because the local economy is often less diversified. Thus municipalities with a large population have more capacity to support debt, and will experience lower costs of financial distress and thus issue more debt.

Credit ratings are important determinants in the debt levels. Credit ratings reflect the default risk of a bond and therefore the ability to issue more debt and the interest cost in issuing more debt. A municipality with a AAA rating has the advantage of being able to issue additional debt at lower interest costs because it has a more vibrant tax base to sustain the debt. On the other extreme, a municipality without a bond rating will issue additional debt at a higher cost because of the uncertainty of the underlying credit risk. The uncertainty of the credit risk in a non rated bond may also signal a weak tax base and concern as to whether the city is able to generate sufficient property taxes service additional debt.

Table 2 about here

Cross sectional data is suspect to heteroscedasticity and statistical tests suggest some heteroscedasticity. Therefore, table 2 reports the OLS estimates with the Huber/White robust standard errors (White 1980) for the four debt ratios and property tax ratio. The F statistics on the models are significant and all five models have good explanatory power for a cross sectional regression model as measured by the r-squared

statistics. The primary variable of interest is the median household income, which has the expected negative coefficient and is statistically significant in every model using a debt ratio as dependent variable. Median income shows a positive impact on the use of property tax which is also consistent with the tax deductibility hypothesis.

The impact of the tax deductibility variables is mostly consistent with the a priori expectations. An increase in percentage of the population with an annual income more than \$15,000 results in a lower debt ratio and a higher property tax ratio. As the average tenure in owner occupied housing (*Op\_h tenure*) increases, the property tax ratios in the municipality decrease as expected. The coefficient of *Op\_h tenure* is also negative for the debt ratios, which is not consistent with the tax deductibility hypothesis. One rationale for the observed negative relationship between average housing tenure and the debt ratios is that mature neighborhoods may have less demand for long-term capital assets and therefore would not use as much tax-exempt bond financing relative to newer communities.

The proportion of the population who are homeowners (*Occupiedp*) has the expected positive relationship with the property tax ratio. The unexpected result is that *Occupiedp* also has a positive relationship with the debt ratios. One plausible explanation for this result can be drawn from the debt literature on benefits matching and expenditure smoothing mentioned earlier in the paper. It is reasonable that homeowners have more interest in the long-term assets (such as schools and infrastructure) provided through the municipality. However, these purchases would require substantial outlays at the time of acquisition that would require large fluctuations in the property tax payments. Remember that one of the underlying assumptions to the tax deductibility hypothesis is that a large

property tax payment would be financed through a loan in the private market. In practice, few individuals really want to borrow through a personal loan to pay property taxes<sup>7</sup>, and therefore, the homeowner prefers that the government borrow to distribute the tax payments more evenly over several years. The positive coefficient on *Occupiedp* in the debt ratio models suggests that the tax smoothing effect of debt is more important to the home owner than the tax deductibility of the property tax payment. Better control variables are required to disentangle the particular influence of the tax deductibility and tax smoothing on the desirability of debt financing.

Capital expenditures per capita are also statistically significant in each of the debt models. The coefficients on *Aaa* and *rate\_na* are also consistent with prior expectations. The variables for percent change in population (*Pctpop*) and intergovernmental aid (*Aidcap*) are not statistically significant in any of the models except the one with property tax ratio as the dependent variable.

The coefficients on the *Elderly* variable are interesting. The coefficients on *Elderly* are negative and statistically significant in the debt ratios using revenues as the denominator. This is also true for the property tax ratio. In the debt per capita model the coefficient on *Elderly* is positive and statistically significant. This implies that debt decreases relative to other financing resources in communities as the portion of the population older than 62 increases. However, the debt per capita increases for these same communities. Thus, those scholars interested in examining the relationship between an aging population and debt should pay particular attention to the way debt is measured.

The leverage ratios somewhat obscure the magnitude of the impact that household income has on municipal debt finance. To illustrate the impact of income on debt,

consider that the average New Jersey municipality in the data analyzed has a median household income of \$46,800 and debt outstanding of \$11.2 million. The regression model in Table 2 implies that the same municipality with a median household income of \$55,000 would have debt outstanding of \$10.4 million. Conversely, the same municipality with a median household income of \$36,400 would have debt outstanding of \$12.0 million.<sup>8</sup>

### ***Conclusions***

The tax deductibility hypothesis predicts that communities with a high median household income would favor property tax finance because the property tax deduction benefits households in the high tax brackets. In contrast, communities with a low median household income prefer municipal bond financing of long term assets because in this case the benefit of the tax exemption for municipal bonds exceeds the benefit of the property tax deduction. The analysis of the data from New Jersey municipalities provides support for the tax deductibility hypothesis. New Jersey municipalities with a low median income utilize a higher proportion of bond finance; municipalities with a high median income utilize a higher proportion of property tax finance.

The benefit of a property tax deduction depends on whether an individual itemizes the deductions on the Schedule A Form and whether the sum of the itemized deductions exceeds the standard deduction amount. Several variables were employed to gauge whether the individuals in the community were likely to itemize deductions on their federal income tax return. All these variables had the expected relationship to a municipality's use of property tax financing. The coefficients on the tax deductibility variables are

inconsistent with the tax deductibility hypothesis for municipal debt finance, suggesting that factors in addition to tax deductibility also motivate the use of debt financing.

The property tax deduction is a powerful incentive on the way a jurisdiction finances long term assets. This is not surprising in that nearly every resident in high income tax brackets within a given jurisdiction will see some benefit from a property tax deduction. The property tax deduction results in a direct impact on individual wealth, while the lower interest costs of tax-exempt debt will accrue first to the municipality and then may (or may not) be passed on to individuals. Furthermore, the demand for municipal bonds is driven by more than just the tax-exemption on interest income. Bond buyers also consider criteria such as diversification and other trade-offs among fixed-income securities (taxable or not), equities and real estate.

In summary, low income communities rely less on property tax revenues and proportionally more tax-exempt debt. Jurisdictions with citizens in high tax brackets who itemize federal income deductions utilize proportionally more property taxes. However, additional research is necessary to pinpoint how tax deductibility influences debt finance relative to the other incentives for local governments to issue debt.

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Table 1 Variable Description and Descriptive Statistics for New Jersey Municipalities,

Variable	Description	Mean	Std. Dev.	Min	Max
Debtr2	Total GO debt outstanding/ total revenue	0.428	0.334	0.004	2.822
Debtprop	Total GO debt outstanding / property tax revenue	0.576	0.494	0.005	4.713
Debtcap	Total GO debt outstanding/ population	795	916.6	6.7	10686
Debt_inc	Total GO debt outstanding/ total personal income	0.041	0.047	0.000	0.471
Ownrev	Property tax percentage of total revenues	0.770	0.098	0.312	0.915
Med_inc	Median Household Income (thousands)	46.79	15.39	16.78	135.66
Lnpop	Natural log of population	9.03	1.09	5.60	12.53
Aidcap	Total intergovernmental aid per capita	29.33	79.60	0.00	1437.84
Capcap	Capital expenditures per capita	127.55	200.31	0.90	2002.87
Pctpop	Percent change in population 1980 to 1990	7.69	22.05	-39.60	187.00
Elderly	Percent of population over age 62	17.04	6.69	1.70	62.38
Occupiedp	Percent of residents who own household	73.19	16.38	19.30	96.20
Op_htenure	Homeowner years in household multiplied by Occupiedp	9.59	3.12	0.67	16.75
Tax_inc	Percent of population with income over \$15,000	92.53	5.77	60.43	100
Aaa	Equals 1 if city has AAA bond rating	0.13	-	0	1
Rate_na	Equals 1 if city has no rating or rating is not available	0.32	-	0	1

**Table 2: Regression of Leverage ratios**

	1	2	3	4	5
	Debt to total revenue [Debtr2]	Debt to property tax revenue [Debtprop]	Debt per capita [Debtcap]	Debt per aggregate personal income [Debt_inc]	Property tax portion of total revenue [Ownrev]
Med_inc	-0.00339 (3.55)**	-0.00555 (3.61)**	-2.23 (0.85)	-0.00071 (3.50)**	0.00161 (4.75)**
Lnpop	-0.00205 (0.14)	0.00160 (0.07)	-74.48 (2.44)*	-0.00391 (2.24)*	0.00578 (1.45)
Aidcap	-0.00029 (2.15)*	-0.00010 (0.25)	0.37 (0.45)	0.00002 (0.48)	-0.00043 (3.67)**
Capcap	0.00078 (3.69)**	0.00112 (3.48)**	2.98 (4.95)**	0.00013 (4.78)**	-0.00005 (1.64)
Pctpop	0.00083 (1.17)	0.00102 (1.05)	-0.54 (0.31)	-0.00005 (0.56)	-0.00059 (2.94)**
Elderly	-0.00798 (3.97)**	-0.01259 (4.33)**	14.39 (1.84)+	0.00015 (0.44)	0.00185 (3.68)**
Op_htenure	-0.02091 (2.44)*	-0.02451 (2.06)*	-85.65 (3.18)**	-0.00419 (3.19)**	-0.00591 (2.75)**
Occupiedp	0.00481 (2.58)*	0.00566 (2.08)*	15.81 (2.77)**	0.00087 (3.23)**	0.00083 (1.67)+
Tax_inc	-0.00787 (2.17)*	-0.01583 (2.50)*	-2.30 (0.37)	-0.00088 (1.80)+	0.00431 (3.98)**
Aaa	0.09533 (1.77)+	0.14167 (1.79)+	49.45 (0.39)	0.00733 (1.02)	-0.01598 (1.49)
Rate_na	-0.11110 (3.57)**	-0.12390 (2.68)**	-362.00 (5.44)**	-0.01779 (4.56)**	-0.02866 (3.28)**
Constant	1.24467 (3.57)**	2.19518 (3.78)**	926.59 (1.48)	0.15373 (3.83)**	0.24337 (2.72)**
F-Statistic	11.23	10.00	8.06	9.11	22.66
Observations	469	469	469	469	469
R-squared	0.30	0.30	0.54	0.44	0.45

Robust t statistics in parentheses

+ significant at 10%; \* significant at 5%; \*\* significant at 1%

Robust SE employs Huber/White sandwich estimator for variance

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<sup>1</sup> The results are the same even if a citizen prefers the lump sum payment of taxes, provided that interest rates are essentially the same for borrowing and saving.

<sup>2</sup> Some literature purports that government as an institution can borrow more cheaply than private individuals. Under this scenario the bias is in favor of debt financing. Consider  $c_m = r_g(1-t^*)$  and  $c_t = r_p(1-t)$  where  $r_g$  is the municipal borrowing rate without tax exemption (taxable equivalent bond). Define  $\theta = r_p - r_g$ , and assume that  $\theta > 0$ , so  $r_p = r_g + \theta$ . Now,  $c_m < c_t$  if  $r_g(1-t^*) < (r_g + \theta)(1-t)$ , and  $[r_g(1-t^*)]/(r_g + \theta) < (1-t)$  for the  $c_m$  to be less than  $c_t$ . Thus when  $t = t^*$ , there will still be a preference for debt. The larger  $\theta$  is, the more a community will be biased toward government debt. On the other hand,  $t$  must be larger to offset the comparative advantage of government debt to make the property tax the preferred alternative.

<sup>3</sup> The outliers were examined for similar traits but no common characteristics were identified other than zero debt outstanding.

<sup>4</sup> GASB Statement 34 (1999) now requires a statement of net assets reported on an accrual basis, so one might be able to use this data to develop a better measure of government equity.

<sup>5</sup> See Mueller (1979) for a survey of the literature on the Median voter models and elaboration on Tiebout (1956)

<sup>6</sup> The 15,000 dollar threshold was used because that was the level available through the census data that was closest to the standard deduction.

<sup>7</sup> One problem is that a private loan is not capitalized in to the housing value in the same way as property taxes and even general obligation debt.

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<sup>8</sup> This illustration applies the Debtr2 model and assumes average values for all other independent variables and dummy variables are equal to zero. The median values for household income are the 75<sup>th</sup> and 25<sup>th</sup> percentiles.