**Do State-Funded Property Tax Exemptions Actually Provide Tax Relief? Georgia’s HTRG Program\***

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**Abstract**

We examine the effect of a state-funded property tax homestead exemptions on the burden of property taxes. This class of exemptions is characterized by a grant from the state to local governments that is intended to replace the reduction in property tax revenue due to the exemption. The median voter model predicts that part of the homestead exemption will be used to increase expenditures. In addition, fiscal illusion could reduce the effectiveness of this type of grant in lowering the tax burden. We test these predictions for the Georgia’s Homeowner’s Tax Relief Grant program by separately using panels of county-level data and school system data. We find that over one third of funds transferred to counties through this program are used to increase revenues rather than provide tax relief. We find evidence of possible fiscal illusion for school systems.

JEL No: H7: Tax Relief, Intergovernmental Grants, Property Tax, Tax Incentives

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*“While the [grant program] had great motives initially – to reduce the local tax burden – it has not worked out that way.”* Governor Sonny Perdue (Salzer, 2008)

## Introduction

The burden of residential property taxes is a consistent source of voter concern, and as a result all states have implemented policies intended to provide some sort of property tax relief to homeowners. (Baer, 2008) reports that 47 states offer homeowners either a homestead exemption or a credit, 34 states have property tax circuit breakers, and 26 states allow deferrals on property taxes owed. While some of these state property tax relief policies are simply regulations that restrict the tax that local governments can levy on a given property, many tax relief programs involve actual transfers of state funds to local governments intended to replace lost property tax revenues.

One specific type of property tax relief program is a state-funded homestead exemption. Such programs generally consist of a fixed property tax exemption specified by the state that is paired with a grant to local governments that offsets the revenue that local governments would otherwise lose. Duncome and Yinger (2001) identified 13 states with some form of state-reimbursed property tax exemption, though 7 states only funded exemptions to special groups, such as residents over 65 years of age or military veterans. For the 6 states that do fund general homestead exemptions for all homeowners, Duncombe and Yinger note that state expenditures on this type of tax relief program can be quite large, for example, in fiscal year 2008-09, California paid out $442.5 million to local governments to fund a $7,000 general homestead exemption. Table 1 shows state expenditures for 5 state-funded homestead exemptions.

Georgia adopted a state-funded homestead exemption, entitled the Homeowner’s Tax Relief Grant (HTRG) program in 1999, during a period of state budget surpluses, which coincided with rising assessed property values and, subsequently, property tax payments. The governor at the time, Roy Barnes, proposed the creation of a state funded homestead exemption that would transfer surplus state funds to local governments as a means of offsetting rising property taxes (Tilley, 1999).

The HTRG initially gave all homeowners a homestead exemption worth $2,000 of assessed property value.[[1]](#footnote-1) The amount of the exemption changed multiple times over the life of the program. Table 2 displays the history of the size of the HTRG exemption and the state appropriation for the HTRG program. The last year the HTRG program was funded was 2008, after which it was discontinued due to state budget shortfalls. Under the program, homeowners receive a credit on their property tax bill equal to the property tax rate times the homestead exemption.[[2]](#footnote-2) The credit is non-refundable and is net of other homestead exemptions. The credit is initially financed by the local government, but the state provides a grant to each jurisdiction to offset the revenue local governments forgo as a consequence of the exemption.

We explore whether Georgia’s HTRG program succeeded in providing tax property tax relief to homeowners, or whether the program resulted in increases in pre-credit property taxes, as implied by the above quote by Governor Purdue. There are three reasons why the latter outcome is likely. First, the increased homestead exemption reduces the tax price of local expenditures, and thereby encouraging an increase in public service consumption. Second, the structure of the relief grant gives local officials an incentive to raise their property tax rates since the size of the credit, and thus the size of the grant, depends on the local millage rate. Third, because the revenue replacement grants are paid directly to local governments it is possible that taxpayers are not fully aware of how much tax relief they should receive. Given such fiscal illusion it may be possible for local officials to capture the grant by raising property tax rates. The result of these factors is that some or possibly all of the state funds designated for reducing the property tax burden through a homestead exemption may instead be used to increase local spending.

There are very few papers that have estimated the impact of policies similar to the state-funded homestead exemption on local fiscal behavior. The paper that is closest to ours is Fisher (1988). Fisher applies the median voter model to measure the effect of Michigan’s circuit breaker property tax relief program on the indirect demand for local property taxes. Fisher concludes that the credit led to a modest increase of somewhere between 1 and 8 percent in the level of local property taxes, suggesting that a portion of the tax relief was used to increase local public spending. Eom, Duncombe, and Yinger (2005) explore the impact of the New York School Tax Relief Program (STAR). One of the distinguishing features of the STAR program that sets it apart from other state-funded homestead exemptions is that the amount of the exempted property value is not uniform across the state, but it is weighted using a sales price differential. Their results indicate that the STAR program resulted in an increase in the property tax rate of approximately 21.33 percent for the average New York county.[[3]](#footnote-3)

We employ several panel regression models to estimate the impact of Georgia’s HTRG program on county and on K-12 school system property tax levies and tax rates. After controlling for other factors, we find that a portion of the state funds dedicated for tax relief resulted in higher local property taxes, and that the program is associated with higher property tax rates.

The rest of the paper is structured as follows: In the next section we set forth a theoretical framework in which to analyze the HTRG program. Section 3 presents the empirical strategy and discusses the data employed. Section 4 presents the results; some concluding thoughts are provided in the final section.

## Framework

Within the framework of the median voter model, and assuming that property value is given and that the marginal cost of a unit of public service is one[[4]](#footnote-4), the tax price of the median voter equals the ratio of the net assessed value of the median voter’s home divided by the net aggregate assessed value. Denote that tax price by, where is the net assessed value of the median voter’s property and is the net assessed value of all local property. Assume that the state mandates an additional locally funded homestead exemption, denoted *EL*. The tax price is then given by , where *n* is the number of homesteaded properties. If , then , i.e., the median voter’s tax price will be smaller with the homestead exemption. Of course, to finance the homestead exemption, the government will have to raise the tax rate or use other revenue. The difference between and reflects the change in tax price due to the locally funded homestead exemption.

With a state fully-funded homestead exemption, the state government compensates the locality for the loss of revenue due to the exemption by providing a grant equal to, where *t* is the property tax rate and *ES*is the state funded homestead exemption. The median voter’s share of the cost of funding local services declines because the grant effectively restores the value of the tax base removed by the exemption.[[5]](#footnote-5) This results in a tax price, denoted , equal to *(*, noting that. is clearly smaller than . The median voter, facing a reduced price for local public services, will prefer a greater public service level, which in turn will require an increase in *t*.

Note that the percentage reduction in the tax price due to a state funded homestead exemption is equal to . Because the value of the homestead exemption is uniform across jurisdictions, the percentage reduction in the median voter’s tax price will be progressively distributed according to the median voter’s assessed value. If the price elasticity of demand for public services is equal across jurisdictions we would expect a larger increase in property taxes in jurisdictions with smaller values of .

In addition to the effect on the property tax rate implied by changes in the tax price within the context of a fully informed median voter model, the level of public expenditures could change if the structure of the reimbursement grant facilitates a form of fiscal illusion. Following Filimon, Romer, and Rosenthal (1982), who present a grant illusion model in which taxpayers base their voting on perceived aid and perceived government expenditures, we assume that the perceived property tax exemption, , is a percent of the true exemption, that is,

, (1)

where Substituting (1) into the expression for results in a new tax price, ,

, (2)

which is smaller than for

Consider the extreme case in which the taxpayer is completely unaware of the exemption, i.e., . In this case the taxpayer’s perceived tax price will be equal to the initial pre-exemption tax price, i.e., . Thus, the median voter’s preferred level of property taxes will remain unchanged when *ES* is set. The household’s net taxable value, however, has been reduced to . Given , local officials can raise the property tax rate from the original tax rate,, to a higher rate, , in order to maintain a constant tax levy on the median voter, as depicted in equation (3).

(3)

At this higher tax rate, , total revenue will be the sum of the original property tax levy, i.e., , plus the revenue replacement grant, i.e., , which yields . In this case the entire grant would be dedicated to expanding public expenditures rather than replacing property tax revenue. With , equation (3) implies that the percentage increase in the tax rate associated with the fiscal illusion effect is given by

. (4)

One possible cause of this form of fiscal illusion is if taxpayers are attentive only to the actual tax payment that they must make and ignore the property tax rate. Officials could then raise the property tax rate when *ES* is set without increasing the taxpayer’s tax payment relative to the pre-exemption levy, and thus capture the unobserved portion of *E*. Support for this cause of fiscal illusion can be found in the public choice literature dealing with perceptions of the property tax; see Ordeshook (1979) and Lankford (1986).

Homeowners may also accept a degree of rational ignorance regarding the true cost of their services. Duncombe, Miner, and Ruggiero (1997) hypothesized that state aid, by lowering the tax price of services, reduces local taxpayer’s incentive to monitor the efficiency of local service production.[[6]](#footnote-6) This argument was supported by Eom and Rubenstein's (2006) findings that the state-funded homestead exemption (STAR) induces a greater reduction in efficiency of school system service provision than would a similar change in the homeowner’s share of the tax base.

The objective of the HTRG was to reduce property taxes on homeowners while retaining the same property tax rate. However, the median voter model implies that a state funded homestead exemption creates incentives that are predicted to cause local governments to increase total expenditures and the property tax rate. Property taxes may fall but not by the full amount of the grant calculated at the original property tax rate. Fiscal illusion, at its extreme, implies that the state grant will result in the property tax rate increasing to the point that there is no reduction in property taxes.

## Empirical Strategies and Data

* 1. ***Empirical Strategies***

Our objective is to estimate the effect of the Georgia state-funded homestead exemption on property taxes. We consider the effect of the credit program on two dependent variables: 1) the log of the sum of property tax receipts and the replacement grant, denoted *T*, and 2) the log of the property tax rate, denoted *R*. We approach the question in several different ways using two different types of jurisdictions, counties and school systems. In what follows we first discuss the approach using *T* and then discuss the approach using *R*.

In our first approach, we model the demand for *T* as a function of the local tax price, personal income, and variables that measure taste for and cost of public services. We first measure the effect of the HTRG program on *T* with the tax price parameter . A coefficient on that is negative and statistically significant is consistent with the hypothesis that the HTRG program has an effect on *T*.

Since the coefficient on does not tell us how much the HTRG program affected *T*, we separate the tax price into two components in order to measure the effect of HTRG more directly. In particular, we separate into the tax share pre-HTRG exemption, i.e., , and a measure of change in the tax price due to the HTRG program, denoted . We measure the change in the tax price in two separate ways. First, we use the percentage reduction in the tax price caused by the HTRG program, that is, , which we denote as *PCTP*. The second measure follows the approach used by Eom and Rubenstein (2006) who use , which we denote as *LPCTP*.[[7]](#footnote-7) In these regressions we do include .

To explore the presence of fiscal illusion, we use in place of . If the median voter’s perceived tax price does not equal , the coefficient on would be biased. This is another reason why the coefficient on may not measure the effect of HRTG.

In general our model is represented by the following linear form:

, (5)

where represents a jurisdiction and *t* represents the year; is the log of the sum of property tax and replacement grant revenue per capita; τ*jt* represents the log of tax price; is the change in the tax price due to the exemption (either *PCTP* or *LPCTP*); *Yjt* is the log of per capita personal income; is a time trend; *Zkjt* is a set of *k* taste and cost factors are jurisdiction fixed effects; and is a random error term. Equation 5 is estimated for each of the three different price structures: 1) equals and is omitted; 2) is and is ; 3) again taking the value of , while is .

Equation 5 is estimated with fixed-effect panel regression models; we correct for within-group correlation of the term by using jurisdiction-clustered standard errors and control for heteroskedasticity by estimating robust standard errors. The jurisdiction fixed-effects control for time-invariant jurisdiction-level factors that are unobserved in our data, but that influence . Since the composition of jurisdictions do not change much over the time period, the fixed effects control for factors such as age, gender, race, and education level. We also estimate an equation that uses a first difference model of equation 5. The first difference model eliminates the term, and focuses the analysis on changes in the price variables over time rather than cross-sectional differences.

Our second approach to measuring the effect of the HTRG replaces the variables with the actual replacement grant revenue per capita received through the HTRG program, denoted *GRTjt*. If there is no effect of *ES* on the combined revenue *Tjt*, then the HTRG grant would reduce property tax revenues on a dollar-per-dollar basis. If that were true, the coefficient on *GRTjt* would be zero. On the other hand, a positive coefficient on *GRTjt* would imply that there was an effect on *Tjt* from *ES*.

Using the revenue from the grant as an explanatory variable is problematic because it is endogenous with the dependent variable; both the level of revenue from the property tax and the size of the replacement grant are determined in part by the jurisdiction’s property tax rate. The simultaneous determination of the two variables would cause the value of the grant to be correlated with the error term in the estimating equation. Because of this relationship between the two variables we present an additional model that replaces the log of the actual amount of the grant with the log of the grant that the jurisdiction would have received if the millage rate had been maintained at the pre-HTRG level, denoted *PreGRT*. Since the tax rate and the grant are both endogenous, we calculate the *PreGRT* at the level it would have been if the millage rate was kept at the average millage rate for the three years prior to the HTRG program.

Our final approach attempts to identify the effect of fiscal illusion. If we assume that voter behavior conforms to the median voter model and there is no fiscal illusion, then voter behavior should be based on the tax price given by . If there is complete fiscal illusion, that is, *ρ =* 1, then the perceived tax price would equal . To estimate the extent of fiscal illusion we use as the principal independent variable and estimate equation 5 using non-linear regression techniques.

We also explore the effect of the HTRG program on the property tax rate. Note first that the sum of property tax revenue and the grant can be expressed as

(6)

since , and where *PT* is the property tax revenue, *Grant* is the grant, *B* is the tax base gross of *ES*, and the other variables are as defined above. Recall that *T* is the log of the sum of *PT* and *Grant* and *R* is the log of the property tax rate *t*. Solving equation 6 for *t* and taking logs yields

(7)

To estimate equation 7 we replace *T* with the right-hand side of equation 5, and estimate the resulting equation 7 using a fixed effect regression with robust clustered standard errors. Following the approach used by Holtz-Eakin and Rosen (1990), this strategy measures the substitution effect directly on the chief policy instrument that local officials employ to alter the property levy.[[8]](#footnote-8)

An alternative, and somewhat ad hoc, approach to estimating the effect of the HTRG program on the tax rate is to estimate the following equation

, (8)

where is the log of the tax rate pre-HTRG and thus captures all of the factors that determine the tax rate in year zero; is the percent reduction in the tax price due to the exemption; is the change in the log of the tax base per capita from year zero, and thus captures the effect of changes in the per capita tax base on the tax rate; is the of the change in the log of income per capita from year zero, and thus captures changes in demand for public services (and thus the demand for property taxes) due to changes in income; is the change in the log of *ST* for counties and of *SCHAID* for schools.

***3.2. Data***

We estimate the various regressions using Georgia county government data and K-12 school system data. For the county-level analysis, the property tax revenue data were obtained from the Report on Local Government Finances (RLGF) collected by the Georgia Department of Community Affairs; this is an annual report completed by local governments in Georgia that collects detailed information on revenues and expenditure data. However, not all jurisdictions complete the survey every year. For school systems, we collected information on system revenues from the Georgia Department of Education. Tax base and tax rate data are from the Georgia Department of Revenue.

Of the 159 counties in Georgia, we possess complete data for 116 counties over the 15-year period of 1996 to 2010 and adequate partial data for the remaining 43 counties. Georgia has 180 local school systems, of which 159 are county school systems (these encompass the entire county net of the independent school systems) and 21 are independent city systems. Because of missing data we exclude the 21 city systems. Of the 159 county school systems we possess full data for 120 school systems from 1996 through 2010. We also have at least 7 years of data for the remaining 39 districts. We use all jurisdiction-year observations when complete data is available for those jurisdictions for those years.

We follow the standard assumption that the median voter in a given locality owns the median value home. Median home value at the county level is not readily available except for the decennial census year. We approximate the median home values for the rest of the panel by increasing the 2000 Census Bureau median home value by the annual growth in the per parcel residential tax base in that county. This value is used as the term in each of the tax price specifications.

We use several variables to control for other determinants of the indirect demand for property taxes and the property tax rate. Log of county level per capita personal income, denoted *PCI*, and log of county level total employment per capita, denoted *EMPL*, come from the Bureau of Economic Analysis. We include population density, denoted *DEN*, (obtained from the Census Bureau) under the expectation that more concentrated populations will have a higher per-capita demand for public services and thus higher property taxes. We include the percent of county wages derived from agriculture, denoted *AGR*, and from the service sector, denoted *SER*, in order to measure any impact that the local economy would have on fiscal structure; these data came from the Quarterly Census of Employment and Wages collected by the Bureau of Labor Statistics. For counties, we also include the log of total sales tax receipts per capita, denoted *ST,* for the jurisdiction since local governments that have local option sales taxes are required to use the additional sales tax revenue to reduce property tax levies. For school systems we include the log of state school aid per capita, denoted *SCHAID*. The sales tax data for counties were obtained from DCA survey, while the data for schools came from the Georgia Department of Education. We also include the share of the property tax base that consists of residential property, denoted *RES*, obtained from the Georgia Department of Revenue. Summary statistics are displayed in Table 3. All dollar values are in real terms using the CPI (1983-84 = 100).

1. **Results**

In section 4.1 we report the results using *T* as the dependent variable and then in section 4.2 we report the results using *R*. Section 4.3 provides calculations of the percentage of the grant that was used to increase property taxes, while section 4.4 presents the results of an attempt to measure the extent of fiscal illusion.

* 1. ***Property Taxes and Replacement Grant Revenues Per Capita***

Table 4 contains the estimation results of our fixed effects model of *T* in levels*.* Columns 1 and 2 are the results using , that is, the log of the post-exemption tax price for counties and for school systems, respectively. The coefficients on are negative, as expected, for both the counties and school systems, and are very similar in magnitude. The implication is that the reduction in the tax price due to the HTRG program increased property taxes. Given that the HTRG program reduced the tax price by an average of 22 percent, the coefficients on imply that the HTRG program increased county (school system) property taxes by about 3.8 percent (3.5 percent). The size of the HTRG exemption reached its peak in 2006 with an allowable exclusion of up to $12,750 in assessed value. In that year the average percent change in tax price due to the exemption was -31.2 percent, which would yield an estimated 5.4 percent increase in property taxes for counties and 5.0 percent for school systems. The coefficients on *PCI*, i.e., the log of per capita income, are positive, as would be expected, and statistically significant, and are less than one. The income elastisticity is larger for schools. The coefficient on *TT*, the time trend, is positive and statistically significant in both regressions. With the exception of the residential share (*RES*) and agricultural share (*AGR*), the other control variables are generally not statistically significant. The coefficients on the tax price variables are robust to which control variables are included in the regressions.

The rest of Table 4 contains the results when we separate into and the two measures of the effect of the HTRG program on the tax price, *PCTC* and *LPCTC*. But for comparison purposes we first report in columns 3 and 4 regressions using but not the variable measuring the change in the tax price. We can think of this as a naïve model, since ignores the effect of *ES* on the tax price. As with , the coefficients on are negative and statistically significant for both types of jurisdictions. The coefficients on are larger in absolute value than the coefficients on , particularly for schools; this result is not surprising since the value of is smaller than the value of for all jurisdictions, which should yield a larger coefficient.

Since the proportional change in the tax price due to the HTRG program, *PCTP,* is measured as , we expect that the coefficient to be negative if HTRG increases *T.* For counties and school systems, the coefficients on are negative and statistically significant (columns 5 and 6 of Table 4). Given the coefficient for counties of -0.211, the mean value of *PCTP* of -0.22 implies that property taxes increased by about 4.6 percent due to the HTRG.

The coefficients on , i.e., *LPCTP*, are also both negative and statistically significant (columns 7 and 8 of Table 4). Given the relationship between the two measures of the change in tax price, it is not surprising that the coefficients on have the same signs and statistical significance as for *PCTP*. Given the coefficient on *LPCTP* for counties of -0.162 and a mean value of *LPCTP* of -0.26, the implied change in property taxes due to the HTRG program is 4.1 percent for counties and a somewhat smaller effect for school systems. These estimated effects of HRTG on property taxes using *PCTP* and *LPCTP* are consistent with the estimates using the coefficients on . Note that the absolute values of the coefficients on are unaffected by the inclusion of separate controls for the HTRG program. The coefficients on the control variables in columns 1, 5, and 7, and in columns 2, 6, and 8 are similar.

Table 5 contains the results from the first difference version of equation 5 using *LPCTP* to measure the HTRG program. In this set of results the estimated coefficients on are negative and statistically significant for both school systems and counties. However, they are somewhat smaller in magnitude than those reported in Table 4. The coefficients for the change in *LPCTP* are negative, as expected, statistically significant, and a bit smaller in magnitude as compared to coefficients in the levels equations. Given the mean value of *LPCTP* of -0.26, the coefficients indicate that the HTRG program is be associated with a 2.7 percent increase in county property taxes and a 2.9 percent increase for school systems.

The next set of results use the actual replacement grant amount to control for the impact of the HTRG on local fiscal policy. Table 6 contains two estimates each for the counties and the school systems. The first two columns use the log of the actual replacement grant per capita, i.e., *GRT*, as the key control variable, while the dependent variable remains the log of the combined property tax and replacement grant revenue per capita, *T*. Note that the actual replacement grant revenue is a component of the dependent variable and is the key explanatory variable in these equations. If there is no response to the HRTG, then the coefficient on the grant revenue should be zero because the grant would simply be replacing the property tax revenue and the overall revenue level would be held constant. The coefficient estimates for *GRT* are positive and statistically significant for both the counties and the schools, indicating that a 10 percent increase in replacement grant revenue increases combined property and replacement grant revenue by about 0.3 percent for counties and for school systems.

However, there is the potential for endogeneity to bias this estimate because the amount of grant revenue is determined by the current year’s millage rate, and thus is endogenous with property tax revenue. Therefore in columns 3 and 4 of table 6 we use an alternative measure, *PreGRT*, which is the HTRG homestead exemption multiplied by the pre-HTRG property tax rate, which measures what the grant would have been had the jurisdiction retained the same millage rate. The coefficients on *PreGRT* are statistically significant, but slightly smaller in magnitude as those in columns 1 and 2. These findings provide additional supporting evidence that the localities did exhibit a price response to the HTRG.

We also estimated regressions in which we replaced *PreGRT* with the percentage change in net taxable assessed value due to *ES*, i.e., , but we do not include these results in a table. Although this approach lacks the theoretical connection between the median voter’s preferences and the public choice mechanism, it reflects the magnitude of the overall exemption relative to the tax base. Assuming that the HTRG program does affect property taxes, we would expect that the larger the reduction in net assessed value due to the HTRG program the larger the increase in property taxes. Consistent with this supposition, we find that the coefficients on the percentage change in the net tax base are positive and statistically significant.

* 1. ***Property Tax Rate***

An alternative approach to measuring the effect of the HTRG program is to examine changes in the property tax rate. The property tax rate, as one of the determinants of the size of the replacement grant, is independently controlled by the local governments and would be the primary fiscal tool used to “capture” the property tax relief funds. Table 7 contains the results of applying the framework implied by equation 7. The coefficients for *PCTP* are all negative, indicating that property tax rates increased in response to the HTRG program’s reduction in tax prices, but are statistically significant only for the counties. The *PCTP* elasticity estimate suggests that county property tax rates increased by about 3.80 percent in response to the average 22 percent reduction in the tax price due to the exemption. Similar results are obtained if we use *LPCTP* or *PreGRT* to measure HTRG or estimate first difference regressions.

The coefficient estimate for the log of the net property tax base per capita, *V*, is significant and negative for both the counties and the school districts, revealing the not unexpected result that jurisdictions with higher tax bases per capita tend to have lower property tax rates. Interestingly, the magnitude of *V*’s effect in school districts is roughly half the size of the effect for counties, a difference that is statistically significant. This result suggests that as the property tax base increases school districts capture a larger share of revenue that would be generated by the increase in the base with no change in the tax rate than do counties.

This effect might explain why the coefficient on *PCTP* is smaller for school systems and is not statistically significant. In order to capture part of the HRTG grant by increasing property taxes, school systems may simply not adjust the tax rate when the school systems’ tax bases increases. School system may use this increase in the tax base rather than having to adjust the property tax rate to increase tax revenue. We do find that if we exclude the time trend, the coefficient on *PCTP* is larger in magnitude and statistically significant, a result consistent with our explanation.

Table 8 presents the results based on equation 8. Note that *R0*, *V0*, etc., are the 1996 values and that the regressions are estimated using data for 1997-2010. The coefficients on *PCPT* are negative as expected and statistically significant for both counties and schools. The estimated coefficients on *PCPT* indicate that the average change in the tax price of -0.22 was associated with an increase in the tax rate of 0.635 mills for the counties and 0.162 mills for the school districts. Similar results are obtained if we use *LPCTP* and *PreGRT* to measure the HTRG, furthermore the results are robust to excluding the other variables in the regression, or using the percentage change in the tax rate as the dependent variable and dropping *R0* as a dependent variable. The coefficients on the other variables are what one expects, except for the negative coefficients on income, and are generally statistically significant.

* 1. ***Estimating the Share of Grant Used to Increase Property Taxes***

Our analyses of property tax revenues and millage rates both provide supportive evidence that local governments used a portion of the replacement grant to increase revenue per capita rather than lowering the property tax burden by the total extent of the state grant. To further assess the impact of the HTRG we used the estimated coefficients to estimate the share of the grant that was used for tax relief. As noted above, the HTRG program increased the sum of property taxes and the grant, with the estimates ranging from about 2.7 to 5.3 percent. Given these estimates and the average values of county property taxes and of HTRG grant receipts in 2006, we calculate that between 33.8 percent to 64.8 percent of the grant was used to fund an increase in the property tax. For school districts the calculated percentage of the grant used to increase property taxes ranges between 44.9 and 86.0 percent.

An alternative way of developing such an estimate is to apply the coefficients from the first set of estimates of *LPCTP* given in columns 7 and 8 of Table 4. We first calculate the predicted value of the aggregate property and replacement grant revenue per capita, designated *PRED1*. We then compute a second set of predicted values, denoted PRED0, generated using the same coefficients, except that we replace the estimate of the homestead exemption’s effect on the tax price with the null hypothesis value of 0. This quantity represents the predicted sum of property tax and replacement grant revenue if there had been no substitution effect associated with the state-funded exemption. We transform these predicted values into real dollar amounts, multiply by county population, and aggregate across all jurisdictions for counties and school systems, respectively. We calculate the share of the grant used to increase local revenues from these predicted values. This is done by taking the difference between the transformed values of *PRED1* and *PRED0* and then dividing this difference by the total receipts from the grant. We interpret this as the share of the grant used to increase local spending rather than reduce property taxes.

We find that for counties the approximately 27 percent of the grant was used to fund property tax increases, while for school systems it is about 21 percent (Table 9), which are smaller than the calculation reported above. Considering the effect by individual years, the estimates ranged between 19 and 31 percent for counties and between 15 and 26 percent for the school systems. These estimates appear slightly larger than the actual elasticity estimates for *LPCTP* (-0.162 and -0.115 for counties and schools, respectively). Those elasticites, however, are relative to the per-capita values of the dependent variable, while these ratios are in normalized dollar amounts.

* 1. ***Fiscal Illusion***

Based on Filimon, Romer, and Rosenthal (1982), we modeled fiscal illusion as a misperception of the median voter regarding the actual value of the HTRG credit, as expressed in equation 2. If (*1-ρ*) = 1 in equation 2, there is no fiscal illusion, while if (*1-ρ*) = 0, the median voter acts as if he is unaware of the HTRG credit. To estimate the extent of fiscal illusion, we use a non-linear regression technique to estimate equation 5 using the log of to measure the tax price; we include fixed effects and report robust clustered standard errors. The estimated value of *(1-ρ)* is 0.969 for counties. However, the standard error is very large, yielding a 95 percent confidence interval for counties of 0.239 to 1.700. Thus, we can reject complete fiscal illusion for counties, i.e., that *(1-ρ)* = 0, but the size of the confidential interval suggests that there is a substantial probability that there is fiscal illusion. In contrast, the estimated value of *(1-ρ)* for the school districts was 0.53 with a 95 percent confidence interval of 0.17 to 0.89. Thus, we cannot reject the hypothesis that *(1-ρ)* = 0 Our estimates therefore indicate that a portion of the school districts’ fiscal response to the HTRG program was consistent with the fiscal illusion hypothesis and therefore would have exceeded the price response of a fully informed median voter.

We are not necessarily surprised that there might be more fiscal illusion for school systems than for counties. Generally, the activities of counties are more visible to the public than are school systems. In addition, the general support for education among voters suggests that they are less inclined to tightly monitor changes in school system expenditures relative to county expenditures.

1. **Conclusions**

In 1999, Georgia adopted a state funded homestead exemption, called the Homeowner Tax Relief Grant (HTRG) program, that applied to county and school system property taxes. The objective of this program was to reduce the burden of property taxes on homeowners. Subsequently, claims were made that local government used the HTRG program to fund increases in property taxes. Such an effect is consistent with a median voter model of property tax determination since the program reduces the tax price to the median voter. But it is also consistent with local governments taking advantage of possible fiscal illusion. We measure the effect of the HTRG program on property taxes. Using a panel consisting of Georgia county governments and a panel of Georgia public school systems, we find evidence that the Homeowner Tax Relief Grant program did increase the property tax burden. We estimate that this state-funded homestead exemption increased property tax revenues by more than a fifth of the amount of the state transfer. We find weak evidence that the result for school systems was, in part, due to fiscal illusion. These results are consistent with evaluations of similar programs conducted by Fisher (1988) and Eom, Duncombe, and Yinger (2005).

The portion of the substitution effect that originates from the median voter’s informed preference for a higher level of services due to the lower tax price may be a rational choice that improves taxpayers’ welfare. From the standpoint of policy analysis, however, this argument may be insufficient to support the use of a state-funded homestead exemption. Facilitating additional local spending is a separate state policy objective that could be pursued through other means that more effectively align with state policy-makers’ objectives. Rather than funding general local spending, state-officials are likely to prefer specific local programs that provide benefits either regionally or at the state level. These services can be more effectively target through restricted matching grants that align with state-level budgetary preferences.

Within a context of limited state resources, expensive state programs that fail to achieve their intended effect should be targets for reassessment and possible elimination. This paper has provided some evidence that a significant share of revenue dedicated to tax relief instead acts as a matching grant to local governments. Although the political objective may be to simply demonstrate that state officials are doing something to appease voters on the issue of excessive property tax burden, there are many other means of providing tax relief that have greater potential for actually producing the intended results.

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| **Table 1. Expenditures on State-Funded Homestead Exemptions** | | |
| **State** | **Fiscal Year** | **Expenditure**  **(in millions)** |
| New York | 2009/10 | $3,249 |
| California | 2008/09 | $439 |
| Georgia | 2007/08 | $432 |
| Indiana | 2008/09 | $140 |
| Iowa | 2009 | $90 |

Sources: New York State, Executive Budget Briefing Book – STAR; California Governor’s Budget – 9100 Tax Relief, ONLINE: <http://www.ebudget.ca.gov/StateAgencyBudgets/8000/9100/department.html> ; Georgia Law 2007 HB 95 made an Act pp. 223; Iowa Detailed Budget Book Fiscal Year 2009 – Associated Financial Statements, ONLINE: <http://www.dom.state.ia.us/state/budget_recommendations/archives.html> ; Indiana Appropriation HB 1001, ONLINE: <http://www.in.gov/apps/lsa/session/billwatch/billinfo?year=2008&session=1&request=getBill&docno=1001> .

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| **Table 2. History of HTRC Exemptions and Appropriations** | | |
| **Year** | **Statutory Exemption Value** | **State Appropriation for HTRC Grants** |
| 2008 | $8000 | $428,290,501 |
| 2007 | $8,000 | $428,290,501 |
| 2006 | *$10,000 ($12,750*a*)* | $567,703,126 |
| 2005 | $10,000 | $432,290,501 |
| 2004 | $10,000 | $380,000,000 |
| 2003 | $10,000 | $380,000,000 |
| 2002 | $8,000 | $353,000,000 |
| 2001 | $6,000 | $249,000,000 |
| 2000 | $4,000 | $166,000,000 |
| 1999 | $2,000 | $83,000,000 |

Sources: Georgia Law 2000 pp. 323, 1769; Georgia Law 2001 pp. 661; Georgia Law 2002 pp. 709; Georgia Law 2003 pp. 748, 760; Georgia Law 2004 pp. 1028; Georgia Law 2005 pp. 1400; Georgia Law 2006 pp. 145; Georgia Law 2007 HB 95 made an Act pp. 223.

a The FY 06 allowable exemption was initially set at $10,000 and the appropriation was $432,209,501. It was subsequently amended to provide a one-time increase to the exemption in order to return surplus FY07 funds to taxpayers. See amendment to Appropriations in HB 94. Ga. Law 2007 pp. 119

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| **Table 3. Descriptive Statistics** | | |
| **Variable** | **Mean** | **Std Dev** |
| Ln County Property Tax and Grant Revenue Per Capita, *T* | 4.66 | 0.42 |
| Ln School Property Tax and Grant Revenue Per Capita, *T* | 5.17 | 0.41 |
| Ln County Property Tax Rate, *R* | 2.26 | 0.39 |
| Ln School Property Tax Rate, *R* | 2.67 | 0.22 |
| Ln County Pre-Exemption Tax Price, | -9.61 | 1.01 |
| Ln School Pre-Exemption Tax Price, | -9.55 | 0.97 |
| Ln County Post-Exemption Tax Price, | -9.78 | 0.99 |
| Ln County Post-Exemption Tax Price, | -9.72 | 0.95 |
| LPCTC | -0.17 | 0.18 |
| PCTC | -0.14 | 0.14 |
| LPCTC 1999 – 2008 (the duration of the HTRG) | -0.26 | .16 |
| PCTC 1999 – 2008 (the duration of the HTRG) | -0.22 | .11 |
| Ln County HTRC Grant Per Capita, *GRT* | 1.36 | 1.03 |
| Ln Counterfactual County HTRC Grant Per Capita, *PreGRT* | 2.10 | 1.04 |
| Ln School HTRC Grant Per Capita, *GRT* | 1.54 | 1.14 |
| Ln Counterfactual School HTRC Grant Per Capita, *PreGRT* | 2.36 | 1.15 |
| Ln County Sales Tax Per Capita, *ST* | 4.36 | 0.61 |
| Ln State Aid to School Per Capita, *SCHAID* | 5.81 | 0.57 |
| Population Density (100 per sq. mile), *DEN* | 1.73 | 3.44 |
| Ln County Net Tax Base Per Capita, *V* | 9.42 | 0.37 |
| Ln School Net Tax Base Per Capita, *V* | 9.37 | 0.39 |
| County Change in Net Base Per Capita From Pre-HTRG, (Vt-V0) | 23.35 | 37.57 |
| School Change in Net Base Per Capita From Pre-HTRG, (Vt-V0) | 22.52 | 36.98 |
| Ln Per Capita Income, *PCI* | 9.48 | 0.18 |
| Change in Income Per Capita from Pre-HTRG, (PCIt-PCI0) | 10.83 | 13.71 |
| Percent of Gross Base Classified as Residential, *RES* | 44.20 | 16.16 |
| Percent of Wages in Agricultural Sector, *AGR* | 2.06 | 5.29 |
| Percent of Wages in Service Sector, SER | 42.29 | 14.16 |
| Ln Employment Per Capita, *EMPL* | -0.87 | 0.32 |

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| **Table 4. Basic Regression Results Using Tax Price.** | | | | | | | | |
| Dependent Variable: *T,* the Log of the Sum of Property Tax Revenue and HTRG Per Capita | | | | | | | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| VARIABLES | County: Post-Exemption Tax Price | School: Post-Exemption Tax Price | County: Pre-Exemption Tax Price | School: Pre-Exemption Tax Price | County: PCTP | School: PCTP | County: LPCTP | School: LPCTP |
|  |  |  |  |  |  |  |  |  |
|  |  |  | -0.232\*\*\* | -0.328\*\*\* | -0.218\*\*\* | -0.316\*\*\* | -0.216\*\*\* | -0.316\*\*\* |
|  |  |  | (-3.133) | (-4.212) | (-2.924) | (-4.055) | (-2.877) | (-4.046) |
|  | -0.173\*\*\* | -0.160\*\*\* |  |  |  |  |  |  |
|  | (-6.866) | (-5.957) |  |  |  |  |  |  |
| *PCTP* |  |  |  |  | -0.211\*\*\* | -0.166\*\*\* |  |  |
|  |  |  |  |  | (-5.180) | (-5.567) |  |  |
| *LPCTP* |  |  |  |  |  |  | -0.162\*\*\* | -0.115\*\*\* |
|  |  |  |  |  |  |  | (-5.163) | (-4.953) |
| *PCI* | 0.332\*\*\* | 0.596\*\*\* | 0.457\*\*\* | 0.709\*\*\* | 0.323\*\*\* | 0.604\*\*\* | 0.343\*\*\* | 0.628\*\*\* |
|  | (2.830) | (4.377) | (3.928) | (5.883) | (2.731) | (4.636) | (2.920) | (4.878) |
| *DEN* | -0.011 | 0.038\*\*\* | -0.016 | 0.020 | -0.017 | 0.019 | -0.015 | 0.020 |
|  | (-0.457) | (3.154) | (-0.701) | (1.374) | (-0.716) | (1.320) | (-0.658) | (1.389) |
| *EMPL* | 0.055 | 0.072 | 0.034 | 0.034 | 0.048 | 0.043 | 0.045 | 0.041 |
|  | (0.734) | (0.764) | (0.451) | (0.391) | (0.625) | (0.462) | (0.595) | (0.437) |
| *ST* | -0.009 |  | -0.005 |  | -0.009 |  | -0.008 |  |
|  | (-0.676) |  | (-0.403) |  | (-0.666) |  | (-0.647) |  |
| *SCHAID* |  | 0.006 |  | 0.009 |  | 0.006 |  | 0.006 |
|  |  | (0.961) |  | (1.270) |  | (1.030) |  | (1.070) |
| *SER* | -0.001 | 0.001 | -0.001 | 0.000 | -0.001 | 0.001 | -0.001 | 0.001 |
|  | (-0.905) | (0.680) | (-1.042) | (0.452) | (-0.954) | (0.542) | (-0.978) | (0.518) |
| *AGR* | 0.002 | -0.004\*\* | 0.002 | -0.003\* | 0.002 | -0.004\* | 0.002 | -0.004\* |
|  | (0.648) | (-2.053) | (0.821) | (-1.718) | (0.719) | (-1.747) | (0.702) | (-1.758) |
| *RES* | 0.003\* | 0.005\*\*\* | 0.003 | 0.006\*\*\* | 0.004\* | 0.007\*\*\* | 0.004\* | 0.007\*\*\* |
|  | (1.881) | (3.098) | (1.443) | (3.233) | (1.874) | (3.584) | (1.874) | (3.556) |
| *TT* | 0.029\*\*\* | 0.018\*\*\* | 0.030\*\*\* | 0.018\*\*\* | 0.029\*\*\* | 0.017\*\*\* | 0.029\*\*\* | 0.017\*\*\* |
|  | (11.976) | (8.428) | (11.908) | (8.167) | (11.328) | (7.753) | (11.327) | (7.793) |
| Constant | -0.417 | -2.443\* | -2.151 | -5.160\*\*\* | -0.780 | -4.076\*\*\* | -0.947 | -4.303\*\*\* |
|  | (-0.372) | (-1.970) | (-1.583) | (-4.044) | (-0.558) | (-3.016) | (-0.682) | (-3.215) |
| Observations | 2,320 | 2,325 | 2,320 | 2,325 | 2,320 | 2,325 | 2,320 | 2,325 |
| R-squared | 0.505 | 0.616 | 0.493 | 0.612 | 0.506 | 0.625 | 0.506 | 0.622 |
| Residual Sum Squares | 54.89 | 26.50 | 56.23 | 26.77 | 54.80 | 25.88 | 54.86 | 26.07 |
| Fixed effects regression with robust clustered standard errors  t-statistics in parentheses | | | | | | | | |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | | | | | | | | |

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| **Table 5. First Differences Regressions** | | |
| Dependent Variable: First Difference of the Ln of the Sum of Property Tax Revenue and HTRG Per Capita | | |
|  | (1) | (2) |
| VARIABLES | County | School |
|  |  |  |
| *Δ* | -0.105\* | -0.084\*\*\* |
|  | (-1.679) | (-2.678) |
| *ΔLPCTP* | -0.105\*\*\* | -0.112\*\*\* |
|  | (-3.007) | (-6.028) |
| *ΔPCI* | 0.082 | 0.437\*\*\* |
|  | (0.651) | (6.432) |
| *ΔDEN* | 0.078\* | 0.099\*\*\* |
|  | (1.844) | (4.330) |
| *ΔEMPL* | 0.094 | -0.040 |
|  | (1.038) | (-0.829) |
| *ΔST* | -0.017 |  |
|  | (-1.613) |  |
| *ΔSCHAID* |  | 0.000 |
|  |  | (0.099) |
| *ΔSER* | 0.002 | 0.001 |
|  | (1.287) | (1.302) |
| *ΔAGR* | -0.001 | -0.002 |
|  | (-0.543) | (-1.557) |
| *ΔRES* | 0.006\*\*\* | 0.005\*\*\* |
|  | (3.372) | (5.239) |
| Observations | 2,123 | 2,135 |
| R-squared | 0.017 | 0.071 |
| Residual Sum Squares | 55.03 | 16.06 |
| OLS regression with robust clustered standard errors | |  |
| t-statistics in parentheses | |  |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | |  |
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| **Table 6. Regression Using HTRG Grant per Capita** | | | | |
|  | (1) | (2) | (3) | (4) |
| VARIABLES | County | School | County | School |
|  | -0.227\*\*\* | -0.319\*\*\* | -0.183\*\* | -0.285\*\*\* |
|  | (-3.200) | (-4.246) | (-2.485) | (-4.094) |
| *GRT* | 0.034\*\*\* | 0.030\*\*\* |  |  |
|  | (6.938) | (9.349) |  |  |
| *PreGRT* |  |  | 0.034\*\*\* | 0.020\*\*\* |
|  |  |  | (7.200) | (7.101) |
| *PCI* | 0.215\* | 0.459\*\*\* | 0.340\*\* | 0.383\*\*\* |
|  | (1.730) | (3.398) | (2.315) | (3.159) |
| *DEN* | -0.026 | 0.009 | 0.003 | 0.015 |
|  | (-1.132) | (0.591) | (0.096) | (0.951) |
| *EMPL* | 0.050 | 0.049 | 0.008 | 0.107 |
|  | (0.668) | (0.529) | (0.085) | (1.138) |
| *ST* | -0.010 |  | -0.025\* |  |
|  | (-0.763) |  | (-1.883) |  |
| *SCHAID* |  | 0.005 |  | 0.002 |
|  |  | (1.083) |  | (0.431) |
| *SER* | -0.001 | 0.001 | -0.001 | 0.000 |
|  | (-0.764) | (0.735) | (-0.641) | (0.376) |
| *AGR* | 0.002 | -0.003 | 0.002 | -0.003\* |
|  | (0.819) | (-1.616) | (0.870) | (-1.804) |
| *RES* | 0.003\* | 0.006\*\*\* | 0.003 | 0.006\*\*\* |
|  | (1.663) | (3.410) | (1.306) | (3.273) |
| *TT* | 0.030\*\*\* | 0.018\*\*\* | 0.032\*\*\* | 0.017\*\*\* |
|  | (11.510) | (8.016) | (10.797) | (7.427) |
| Constant | 0.168 | -2.720\* | -0.634 | -1.570 |
|  | (0.118) | (-1.954) | (-0.411) | (-1.190) |
| Observations | 2,320 | 2,325 | 1,851 | 1,843 |
| R-squared | 0.513 | 0.642 | 0.394 | 0.456 |
| Residual Sum Squares | 54.05 | 24.69 | 39.03 | 16.73 |
| Fixed effects regression with robust clustered standard errors | | | | |
| t-statistics in parentheses | | | | |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | | | | |

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| **Table 7. Regressions for Log of Tax Rate** | | |
|  | (5) | (6) |
| VARIABLES | County: PCTP | School: PCTP |
|  |  |  |
|  | -0.078 | -0.055 |
| (-0.915) | (-1.198) |
| PCTP | -0.173\*\*\* | -0.022 |
|  | (-4.478) | (-0.819) |
| V | -0.630\*\*\* | -0.320\*\*\* |
|  | (-12.256) | (-8.927) |
| PCI | 0.142 | 0.154\* |
|  | (1.055) | (1.958) |
| DEN | 0.038 | 0.003 |
|  | (1.357) | (0.351) |
| ST | -0.018\* |  |
|  | (-1.753) |  |
| SCHAID |  | -0.003 |
|  |  | (-1.438) |
| EMPL | -0.015 | 0.009 |
|  | (-0.233) | (0.178) |
| SER | -0.000 | -0.000 |
|  | (-0.400) | (-0.052) |
| AGR | 0.002 | -0.002 |
|  | (0.816) | (-1.194) |
| RES | -0.001 | -0.001 |
|  | (-0.380) | (-0.505) |
| Constant | 0.021\*\*\* | 0.011\*\*\* |
|  | (8.625) | (6.211) |
| Constant | 5.945\*\*\* | 3.651\*\*\* |
|  | (3.878) | (4.016) |
|  |  |  |
| Observations | 2,336 | 2,315 |
| R-squared | 0.237 | 0.181 |
| RSS | 48.78 | 15.05 |
| Fixed effects regression with robust clustered standard errors | | | |  |  |  |  |  |  |
| t-statistics in parentheses\*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | | | |  |  |  |  |  |  |

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| **Table 8. Property Tax Rates**  **Dependent Variable: *Rt*** | | | |
|  | | (1) | (2) |
| VARIABLES | | County | School |
|  | |  |  |
| *R0* | | 0.737\*\*\* | 0.133 |
|  | | (13.93) | (1.56) |
| *PCPT* | | -0.204\*\*\* | -0.042\* |
|  | | (-5.22) | (-1.68) |
| *logVt-logV0* | | -0.035\* | -0.295\*\*\* |
|  | | (-1.70) | -8.57) |
| *SCHAIDt-SCHAID0* | |  | -0.006\*\*\* |
|  | |  | (-2.84) |
| *STt-ST0* | | -0.027\*\* |  |
|  | | (-2.44) |  |
| *PCIt-PCI0* | | -0.004 | -0.005\*\* |
|  | | (-0.83) | (-2.48) |
| *TT* | | 0.010\*\*\* | 0.011\*\*\* |
|  | | (4.97) | (8.37) |
| Constant | | 0.538\*\*\* | 2.278\*\*\* |
|  | | (4.41) | (9.75) |
|  | |  |  |
| Observations | | 2,167 | 2,147 |
| R-squared | | 0.585 | 0.048 |
| GLM regressions with robust clustered standard errors | | | |
| z-statistics in parentheses | | | |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | | | |

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| **Table 9. Estimating the Percentage of HTRG Used for Property Tax** | | |
|  | Counties | Schools |
| Aggregate Predicted Revenue | $17,730,688,863 | $30,726,365,525 |
| Null Hypothesis Predicted Revenue | 17,435,842,484 | 30,360,472,403 |
| Difference (=Estimated Property Tax Increase) | 294,846,279 | 365,893,122 |
| Total HTRG Payments To Counties | 1,076,812,779 | 1,754,295,111 |
| Percent Of HTRG Used for Property Taxes | 27.38% | 20.86% |

All dollar amounts are aggregated from 1999-2008.

1. Georgia’s assessment ratio is 40 percent, so that an $2,000 property exemption against assessed value is equivalent to an exemption of $5,000 of the property’s market value. There are also locally financed homestead exemptions. [↑](#footnote-ref-1)
2. Originally the program applied only to county and school district property taxes, but in 2002 municipal property taxes were added to the program. [↑](#footnote-ref-2)
3. There are other studies of the effect of intergovernmental policies on property taxes. For example, Holtz-Eaken and Rosen (1990) and Gade and Adkins (1990) consider the effect of the federal income tax deduction for property taxes, while Strauss (1974) studied the effect of federal block grants. [↑](#footnote-ref-3)
4. Authors focusing on the effect of intergovernmental transfers on the level of government expenditures or taxation have assumed unitary production costs, while those examining impacts on production efficiency, especially in the public education, have explicitly modeled how the marginal cost of can change. As an example of the former category, Filimon, Romer and Rosenthal (1982) frame their discussion in terms of government expenditure and do not address the actual production of the public good in their theoretical model. Alternatively, in their studies of the impact of New York’s state-funded homestead exemption on the efficiency of public schools, Duncombe, Miner, and Ruggiero (1997), Eom, Duncombe, and Yinger (2005), and Eom and Rubenstein (2006) have each modeled the production cost. [↑](#footnote-ref-4)
5. With the exemption and credit, the government’s budget equation is given by , where *Exp* denote the expenditure level. This ignores other revenue sources. [↑](#footnote-ref-5)
6. An alternative theoretical approach is the political cost model of Hettich and Winer (1984). In the Hettich and Winer model the median voter determines the preferred level of expenditures, but the revenue structure is determined by rational officials who seek to minimize the political and administrative costs associated with generating the necessary revenue. [↑](#footnote-ref-6)
7. Note that equals the log of the percentage change plus one. [↑](#footnote-ref-7)
8. There is the potential for officials to change assessment practices to capture the grant, but because the level of the exemption was changed on almost an annual basis over this period it is unlikely that local officials would have employed that strategy. In addition, the state annually evaluates the assessments. [↑](#footnote-ref-8)