Community Heterogeneity and Local Response to Fiscal Incentives

Jonah E. Rockoff*
December, 2003

Abstract

One of the most important functions of local government is providing public education. There is, however, variation in preferences for school expenditure among different local groups. How the preferences of heterogeneous groups affect school spending is an important question for public policy. In this paper, I examine the unintended effects of a tax relief program in New York State that lowered the marginal cost of educational expenditure to homeowners by paying a portion of their property taxes to school districts. I find these fiscal incentives had statistically and economically significant effects on local government behavior; school expenditures rose by 1.6% on average in response to the state paying 10% of all local property taxes. Moreover, I find that the distribution of tax relief across local taxpayers and the mobility of non-residential property were important determinants of local response. My results suggest that, as a group, homeowners are relatively more influential on local decisions to increase expenditure than renters or owners of non-residential property, and that local taxpayers perceive significantly higher long-run costs to raising taxes on commercial and industrial property relative to more immobile property, such as vacant land. These findings highlight a potentially important issue that has received little attention in the literature on fiscal federalism: policies that seek to change local public expenditure may be made more effective by focusing on the preferences of more influential groups of local taxpayers.

*E-mail: rockoff@fas.harvard.edu. I have benefited greatly from advice and comments from David Cutler, Caroline Hoxby, Marty Feldstein, and Larry Katz, and from very helpful discussions with and suggestions from Nava Ashraf, Roland Fryer, Matt Gentzkow, Adam Looney, Jesse Shapiro and Monica Singhal. Last, but not least, I am grateful to Patrice Cohen, Jack Conroy, Steve Fountain, Bill Heidelmark, Bruce Jesiolowski, and others in the New York State agencies that generously provided much of the data for this project. This work was supported by the Taubman Center for State and Local Government at the Kennedy School of Government and the Earle A. Chiles Foundation. All errors are my own.

1 Introduction

One of the most important functions of local government is providing public education. There is, however, variation in preferences for school expenditure among different local groups. Families with children are the direct beneficiaries of elementary and secondary education, but families without children generally pay a greater share of the costs. Homeowners may benefit from high quality local schools through capitalization into their home values, but renters and non-residential property owners pay the same property tax rates. State governments may desire a certain level of expenditure on schools, but school districts may be unable or unwilling to support such expenditure with local funds.

It is typically a challenge to uncover how the preferences of heterogeneous groups affect school spending. To do so, one needs exogenous variation within communities in the incentives faced by different groups, and this is difficult to find. In this paper, I take advantage of variation in incentives created by a property tax relief program in New York State. This program targeted homeowners, not other property owners or other voters, and had differential relief and timing for the elderly and non-elderly. It therefore creates a rare opportunity to learn about how the conflicting interests in public education compete for influence on local school spending.

Understanding the impact of competing interests on school spending also provides insight into how state government policies affect the behavior of local governments. Local governments in the United States provide a number of essential public services, but their fiscal powers and much of their financial resources are derived from state sources. State

governments actively try to influence the level and distribution of local public expenditure through programs that alter incentives for local governments to tax and spend. The optimal design of such policies depends on how local taxpayers respond to fiscal incentives. If some groups of local taxpayers are more influential than others, programs that target these groups will have the greatest impact on local spending decisions.

The New York School Tax Relief Program lowered the marginal cost of spending on local schools for homeowners. It did so by paying a percentage of homeowners' property taxes to school districts; this percentage was greater for less expensive homes and grew over time for all homeowners. The phase-in of program benefits, as well as variation across districts in homeownership rates, home values, and the fraction of non-residential property, created exogenous variation in the fraction of local property taxes paid by the state. I use this variation to identify the average effect of property tax relief on school expenditure. I find that expenditures on local schools rose by 1.6% on average when the state paid 10% of local property taxes.

I then examine how variation in the distribution of program benefits relates to changes in school expenditure. I find that the distribution of tax relief among local households and property owners was an important determinant of the degree of local response. Conditional on the fraction of district property taxes paid by the state, districts with more renters, more non-residential property, and thus more generous benefits for homeowners, raised expenditures by a significantly greater amount. This is consistent with homeowners having a greater influence on local expenditure decisions than renters or owners of non-residential property.

In addition, the positive relation between increases in expenditure and the fraction of non-residential property was stronger for immobile property, such as vacant land, and weaker for

mobile property, such as commercial and industrial parcels. This suggests that voters may perceive significantly higher costs to increasing taxation on mobile non-residential property. Finally, I use the difference in the timing of benefits for elderly and non-elderly homeowners to estimate the relative impact of tax-relief for these groups on expenditure. My results indicate that the effect on district spending of lowering the marginal cost of schools for these two groups was roughly equal.

In sections 2 and 3, I describe the property tax relief program and my data in detail. In section 4, I present my methodology and report empirical results, and section 5 concludes.

2 The New York School Tax Relief Program

The New York School Tax Relief Program (NYSTAR) was proposed by New York Governor George Pataki in the winter of 1996 and passed by the state legislature in the summer of 1997.[1] Governor Pataki promoted the policy as a general reduction in property taxes for homeowners and as a way to safeguard homeownership for senior citizens and encourage homeownership by younger families.[2] The program indirectly created incentives for school districts to increase expenditures by having the state pay a portion of homeowners' property taxes. These incentives were perceived by the Pataki administration; the proposal for the program contained a cap on annual increases in school budgets with the expressed purpose of preserving tax reductions, but this provision was rejected by the state legislature and not included in the final legislation.

[1] This program is typically referred to as the STAR program. I use the acronym NYSTAR to avoid confusion with the well-known Tennessee STAR class size experiment.

[2] For more information on the original proposal and its promotion, see 1997 press releases by the Pataki administration on January 11, February 12, February 15, March 10, March 26, and May 16.

The basic formula for property taxes in New York State is given in equation 1.

$$(1)\ property\,tax_i = local\,revenue * \frac{property\,value_i}{\sum_i property\,value_i}$$

Taxes paid by each property owner i are proportional to the fraction of local property owned. Local school districts in New York set the amount of local revenue to be raised, and the burden of paying this amount is divided among property owners.[3]

NYSTAR lowers homeowners' property taxes by exempting a fixed amount (X) from the taxable value of owner-occupied homes, as shown in equation 2.[4] After exemptions have been granted to homeowners, the state reimburses school districts for all property taxes forgone.

$$(2)\ property\,tax_i = local\,revenue * \frac{property\,value_i - X}{\sum_i property\,value_i}$$

Two types of exemptions were given: Enhanced NYSTAR for homeowners aged 65 or older with incomes below \$60,000, and Basic NYSTAR for all other homeowners.[5] Figure 1 shows how NYSTAR exemptions were implemented over time. Enhanced NYSTAR became available in the 1998-1999 school year and exempted \$50,000 of home value. The value of

[3]The practice of setting local revenue and letting the property tax-rate be implicit, or setting the tax-rate and letting revenue be implicit, varies across states.

[4]Exemptions are not granted on rental property, non-residential property, or secondary residences, nor are they applicable to property taxes paid to other local governments. Homeowners must apply for the NYSTAR exemption by filling out a one-page application and submitting it to their local tax assessor. Homeowners receive an annual letter reminding them to apply, and reapplication is only necessary for recipients of Enhanced NYSTAR, who must show continued age-income eligibility. In my empirical work, I test whether potentially endogenous take-up of the NYSTAR program affects my results. In practice, endogenous take-up does not appear to be an important phenomenon.

[5]The definition of income for the purposes of Enhanced NYSTAR changed after the first year of the program. In the 1999-2000 school year and thereafter, income was defined as federal adjusted gross income minus taxable IRA distributions, and did not include social security income. In the 1998-1999 school year, the income definition was based on the definition used in another program that gives tax exemptions to poor elderly households. This definition was more complicated and, notably, included social security income.

Basic NYSTAR exemptions were phased in, starting at $10,000 in the 1999-2000 school year and increasing in $10,000 increments until reaching $30,000 in the 2001-2002 school year. In the eight New York counties with the highest home values, the dollar amounts of NYSTAR exemptions were higher than in the rest of the state.[6] In Westchester County, for example, exemption amounts were more than double those given in a typical county (see table 1).

The amount of additional taxes an individual or group must pay when public spending rises is commonly referred to as the "tax-price" of public spending. In equation 2 one can see that the tax-price is equal to the fraction of local *taxable* property owned by each household. By decreasing the taxable value of owner-occupied homes, NYSTAR exemptions lower the tax-price of school expenditure for homeowners. What is important to note is that the percentage of property exempted, and the percentage decrease in tax-price, is greater for homeowners who own less property. This is illustrated in figure 2a, which shows the relation between home value and the percentage of home value exempt by NYSTAR.

In order to compare exemption amounts to actual home values in New York, figure 2b shows the cumulative distribution of the median owner-occupied home in each school district (excluding those counties who received higher exemption levels).[7] 15% of school districts had a median owner-occupied home worth $60,000 or less, so by 2001-2002 at least half of all homeowners in those districts were eligible for at least a 50% reduction in tax-price.

[6] Counties receiving higher exemptions are: Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, Sullivan, and Westchester. In order to calculate the adjustments to exemption values, median home sale values are computed for each county and for the whole state using the most recent three years of sales data. In counties with median home sale values greater than the statewide median, exemptions are increased in proportion to the ratio of the county median to the state median. For example, if the state median home sale were $100,000 and the median in Sullivan county were $120,000, exemptions in Sullivan county would be raised by 20%.

[7] Note that if self-reported home values in the census are larger than the home values used to compute property taxes then this figure will understate the tax-price reductions from NYSTAR.

72% of districts had a median value of $90,000 or less (implying at least a 33% reduction in tax-price), and 92% of districts had a median value of $120,000 or less (at least a 25% reduction).[8]

Payments to school districts through NYSTAR constituted a significant portion of public school district revenue. As the benefits of NYSTAR exemptions were phased in, payments rose from about $500 million in 1998-1999 to about $2 billion in 2001-2002—from 3% to 9% of total school district revenue.[9] Counting NYSTAR payments along with traditional aid to school districts, the state share of district revenue rose from 40% in 1997-1998 to 51% in 2001-2002.

3 Data

Information on household demographics and the value of owner-occupied homes comes from the School District Demographics data from the 2000 decennial census and microdata from the 2000 Integrated Public Use Microdata Series (IPUMS) 5% state sample for New York. The New York Education Department and the Office of the Comptroller provided me with district finance and enrollment data, and the Office of Taxation and Finance provided annual data on the aggregate adjusted gross income and the number of income tax returns filed in each school district. Information on the structure of the program, NYSTAR payments to school districts, and the distribution of property taxes across property classes were provided

[8] In the eight counties with high property values, NYSTAR exemptions were smaller relative to home values but still substantial. For instance, in Westchester County (where the basic exemption was over $70,000 in 2001-2002), 25% percent of districts had median home values below $280,000, implying at least a 25% tax-price reduction for half of their homeowners. 60% of districts had median values below $350,000 (20% tax-price reduction), and 75% had median values below $420,000 (15% tax-price reduction).

[9] These figures, and my analysis, exclude New York City. New York City homeowners received benefits from NYSTAR through decreases in personal income taxes.

by the Office of Real Property Services. In combination, these sources provide a fairly complete picture of the demographics and finances of every school district in New York State from the 1995-1996 school year through the 2001-2002 school year.[10]

There are several advantages to studying local fiscal response in the state of New York. There are a large number of school districts—619 in my panel—that vary dramatically in size, demographic composition, and other characteristics.[11] These districts are fiscally independent from other local governments, and their only limit on taxation and spending is that their budgets must be approved by annual local referenda.[12] In addition, New York is one of a small number of states that does not redistribute local revenue among districts in an effort to equalize spending. State aid to schools is distributed progressively based on district property value and income, but all funds are raised through statewide (income and sales) taxes and lottery revenues.

The means and standard deviations for a number of key variables are shown in table 2. In the 1997-1998 school year average per pupil spending in my sample was $10,362 (the national average was around $7,200), and about 90% of this amount was operational

[10] Two shortcomings in the data are worth noting. First, the time period in my analysis only includes three years prior to the start of the NYSTAR program. Additional pre-program data would help considerably in establishing counterfactual trends in public school expenditures. Second, I have no direct measures of how the cost of public education changed over this time period, though by including district fixed effects in my analysis I will control for fixed differences in the cost of education across districts. I adjust all financial data to 1999-2000 dollars using the Northeast urban consumer price index averaged from the July preceding each school year to the June following each school year. However, the relation between the CPI and the cost of education is unclear, and changes in costs may vary across areas of the state.

[11] I do not include the "Big 5" cities (New York, Buffalo, Syracuse, Rochester, and Yonkers) whose school districts are not fiscally independent from city governments, 47 districts that serve only elementary or only high school students, 15 districts that were involved in mergers during this time period, and 17 districts that serve only disabled pupils and others with special needs.

[12] If the district cannot pass a budget, it is placed on a contingency budget based on the previous year. Since the 1997-1998 school year, districts were allowed two budget votes before being placed on a contingency budget. Also city school district budgets were not subject to referenda prior to the 1997-1998 school year. Approximately 10% (57) of the districts in my sample are cities. My results are all quite similar if these districts are excluded from the sample.

expenditure.[13] Average state aid for operations was $3,356 per pupil and average federal aid per pupil was $368. The fraction of local property taxes paid through NYSTAR grew from 6% in 1998-1999 to 21% in 2001-2002.[14]

I exclude capital expenses from my analysis and focus only on operations. State aid for operations is distributed through lump-sum grants and the costs and benefits of operational expenses are realized concurrently. In contrast, state aid for capital expenses is generated through a complex system of matching grants, and funding for capital projects often involves local bond issues that are subject to separate referenda.[15] For simplicity, I will use "expenditure" and "spending" to mean "operational expenditure" throughout the rest of this paper.

4 Empirical Analysis

School districts in New York are fiscally independent and local voters must approve increases in school district budgets. This institutional structure strongly suggests that changes in public spending reflect changes in the preferred spending level of the median voter.[16] Equation

[13] The two categories of expenditure excluded from operations are debt service (e.g., for school construction) and transportation capital (e.g., purchases of school buses).

[14] The other variables listed in table 2 will be used in my analysis and are described in section 4.

[15] By ignoring capital expenses I will not measure any effects NYSTAR had on this part of spending, and may therefore understate the overall impact of NYSTAR. On the other hand, the matching rate for some capital expenses was raised in 1998, and the extent to which this increased capital spending and led to complementary increases in operational expenses would lead me to overstate the effects of NYSTAR. Nevertheless, given that capital expenses are small relative to the overall budget, it is unlikely that their omission is driving my results.

[16] If voter preferences are single peaked with respect to the size of the local budget then, in a majoritarian vote, the preferred budget of the median voter cannot be defeated by a competing proposal (Black, 1948). However, Romer and Rosenthal (1979) show how a budget maximizing agenda setter can propose and pass higher spending levels than the median voter prefers. School boards propose the budget, and thus their theory may be applicable in this setting. Romer et al. (1992) present suggestive evidence that school boards in larger districts may behave this way—budget increases tend to be larger and tend to win by smaller margins. Nevertheless, school board members must also be elected, and may be voted out if they propose higher budgets than the median voter prefers. (After all, they cannot set the "agenda" of who runs against them.) Also, when one applies Romer and Rosenthal's idea to a dynamic setting where the

3 displays the demand for education spending of voter i in district j and year t, as a function of voter characteristics (V), income (Y), the tax-price (P), district characteristics (Z), and lump-sum grant aid (Aid).

$$(3)\ E^*_{ijt} = E(V_{ijt}, Y_{ijt}, P_{ijt}, Z_{jt}, Aid_{jt})$$

Identifying the characteristics of the median voter is a long-standing problem in empirical analysis of aggregate data on public spending.[17] It is often handled by making assumptions under which a relation can be made between preferences and observable characteristics, e.g., the voter with median preferences is the voter with median income (Bergstrom and Goodman, 1973). Policies that change fiscal incentives uniformly among voters (e.g., a matching grant) are useful for evaluating the determinants of individuals' preferred levels of spending on local public goods. This is because, given some restrictions on the expenditure demand function, one can assume that the identity of the median voter is unaffected by the policy. If this assumption is true, then one can treat the community as a single decision maker with a single set of characteristics (i.e., those of the median voter), and use changes in public expenditure to estimate the average effect of fiscal incentives on the individual preferences.

Changes in fiscal incentives due to NYSTAR vary among households depending on home-ownership, age, income, and property value. Unfortunately, the median voter framework cannot be readily applied to policies that change fiscal incentives differently among local

reversion amount is the previous budget, it is still the case that budgets rise only when the median voter's preferences rise.

[17] See Inman (1979) for a discussion of this issue.

residents because, in general, it is unclear whether such policies change the identity or preferred expenditure of the median voter. Nevertheless, policies that do not change fiscal incentives uniformly among voters, such as NYSTAR, may be quite useful for learning about the relative influence of different groups on local spending decisions.

My empirical framework treats the community as a single decision maker facing a single budget constraint, i.e., the budget constraint of the community as a whole. I use this framework to estimate the average effect of NYSTAR on local expenditure across all school districts, and then examine how local response varied with the distribution of tax relief across groups of taxpayers, conditional on changes in the community budget constraint.[18]

4.1 Public Choice and the Community Budget Constraint

Consider a model in which the community acts as a single decision maker facing a single set of fiscal incentives that can be captured by the budget constraint of the community as a whole. The budget constraint for a single school district is shown in figure 3a. The community faces a trade-off between spending on public schools (E) and aggregate consumption of all other goods (C). The shape of the budget constraint is determined by aggregate community income (Y), lump-sum grants (Aid), and the community tax-price (P). At the point 'A' the district collects no property taxes and spends only lump-sum grants on public education. As property taxes increase, the district trades P dollars in consumption for each additional dollar of spending on public schools.[19] All school districts in New York State receive grant aid and all districts levy property taxes, picking a point on their budget constraint such as

[18] In section 4.4, in order to compare the effects of tax-relief for elderly and non-elderly homeowners, I adjust this framework to incorporate group-specific tax-prices.

[19] The distribution of taxes and consumption may vary across owners and renters of school district property, but aggregate spending and consumption must conform to the community budget constraint.

'B.'

NYSTAR exemptions shift the budget constraint outward by lowering the community tax-price, as depicted in figure 3b. As the community tax-price falls, the budget line rotates around point 'A,' increasing the amount spent on public schools for any given (positive) level of property taxes. The school district is now free to choose a point such as 'C', where total public school spending increases and total property taxes decrease.

Point 'A' is crucial for determining the impact of a given change in tax-price for this community. To see why this is so, extend the original community budget line back to the vertical axis, where it crosses at the point '$\widetilde{Y}_1$.' Note that another community with aggregate income of $\widetilde{Y}_1$ and no grant aid that chooses the point 'B' would be exactly the same as the original district in terms of aggregate spending on public schools and aggregate consumption. However, an equivalent change in tax-price for the community with real income $\widetilde{Y}_1$ creates a much larger shift in its budget constraint, allowing it to choose a combination of consumption and school expenditure such as point 'D.'

This example is illustrative of a broader empirical issue that is often overlooked in studies of fiscal federalism. The impact of a lump-sum grant on spending is smaller when there is a matching grant, and vice-versa. Two extreme examples demonstrate this point: First, if there is a 100% matching grant (i.e., public education is free) then a lump-sum grant should have little or no impact on spending. Second, if a community is receiving a lump-sum grant so large that it is levying no property taxes (i.e., it chooses point 'A'), then decreasing the tax-price through a matching grant should have little or no impact on spending.

To account for the interaction of lump-sum grants and matching grants, I specify the point at which the community budget constraint would cross the vertical axis. This point,

which I will refer to as "virtual income," is equal to aggregate income plus the product of lump-sum grants and the tax-price.[20] Returning to figure 3b, one can see that a shift in the community budget constraint around point 'A' (due to a fall in tax-price) also leads to a fall in virtual income, i.e., from $\widetilde{Y}_1$ to $\widetilde{Y}_2$. The total effect of lowering tax-prices can therefore be expressed as a combination of the price effect ('B' to 'D') and the virtual income effect ('D' to 'C'). This notion is summarized by equation 3.

$$(3)\ \Delta E \approx \frac{\partial E}{\partial P}\Delta P + \frac{\partial E}{\partial Y}\Delta \widetilde{Y} \qquad \frac{\partial E}{\partial P} < 0\ , \frac{\partial E}{\partial Y} > 0$$

Note that the price effect and the virtual income effect are of opposite signs, so that the total change in expenditure is lower than the price effect for any district receiving grant aid. Thus, estimates of price effects that fail to control for virtual income will be biased towards zero.

4.2 The Average Impact of NYSTAR on Public School Expenditure

Equation 4 states that public school expenditure (E_{jt}) in district j during year t is a log linear function of virtual income ($\widetilde{Y}_{jt}$), community tax-price ($1 - nystar\%_{jt}$), district specific characteristics (Z_{jt}) and unobservable factors (ε_{jt}).

$$(4)\ \ln E_{jt} = \pi \ln \widetilde{Y}_{jt} + \delta \ln (1 - nystar\%_{jt}) + \beta Z_{jt} + \varepsilon_{jt}$$

[20] This terminology is borrowed from the empirical literature on labor supply, where a similar issue arises because of kinks in an individual's budget constraint caused by a progressive tax system.

Community tax-price is equal to one minus the fraction of local property taxes paid by NYSTAR (i.e., how much the community must pay in property taxes to spend an additional dollar on education). The log-linear form has been used commonly in studies of the demand for local public expenditure, and I make use of it here.[21]

Perhaps the most important district characteristic affecting expenditure on public schools is the number of students enrolled. I therefore control for both the natural log of student enrollment and the change in log enrollment from the previous year. The latter variable is included to capture the possibility that temporary fluctuations in enrollment have smaller impacts on spending than persistent trends. I will assume that other important but unobservable district characteristics are fixed over this time period and use district fixed effects to account for these factors.

I make several other alterations to the specification shown in equation 4. The first change is motivated by a well known empirical regularity in public economics known as the "flypaper effect," i.e., an additional dollar of grant aid tends to increase public expenditure by a larger amount than an additional dollar of income.[22] In order to allow for the flypaper effect in my analysis, I split virtual income into two components and estimate separate coefficients on each one. This separation is shown in equation 5. The first component will capture the impact of variation in aggregate income and the second component will capture the impact

[21] Many studies use the log linear form. Some examples are Feldstein (1975) and Gramlich and Rubinfeld (1982). See Rothstein (1991) for a discussion of this model. One useful property of using natural logs is that the error terms (ε_{jt}) are expressed as proportions instead of absolute amounts, removing heteroskedasticity caused by district size.

[22] For literature reviews on the flypaper effect, see Thaler (1995) or Bailey and Connolly (1998).

of variation in lump-sum grants.

$$(5)\ \ln(\widetilde{Y}_{jt}) = \ln(Y_{jt}) + \ln\left(1 + \frac{(1 - nystar\%_{jt}) * Aid_{jt}}{Y_{jt}}\right)$$

Note that the impacts of grants and aggregate income on expenditure are still closely linked, despite the separation of terms. Looking at the right hand side of equation 5, we can see that when aggregate income increases, the first term rises and the second term falls. Furthermore, when lump-sum grants increase, the degree to which the second term rises is mediated by the ratio of lump-sum grants to income. In other words, proportional changes in aggregate income or grants have larger impacts on spending when each resource is relatively more important to the community. A district that relies heavily on grants to fund its schools will be more affected by a 10% rise in aid than a district that relies almost exclusively on income.

In addition to data on aggregate income, I also know the number of tax returns filed in each district and each year. In order to use this additional information, I separate the natural log of aggregate income into the log of tax returns and the log of mean income. This separation is shown by equation 6, where $returns_{jt}$ are the number of tax returns and $\overline{Y}_{jt}$ is mean reported income in district j and year t. These two variables will reflect somewhat different information regarding community resources (e.g. population growth versus wage

growth) and it therefore seems reasonable to allow their coefficients to differ.[23]

$$(6)\ \ \ln(Y_{jt}) = \ln(returns_{jt} * \frac{1}{returns_{jt}} Y_{jt}) = \ln(returns_{jt}) + \ln\left(\overline{Y}_{ijt}\right)$$

These alterations in specification are shown in equation 7.

$$(7)\ \ \ln E_{jt} = \alpha_j + \pi_1 \ln(returns_{jt}) + \pi_2 \ln\left(\overline{Y}_{jt}\right) + \pi_3 \ln\left(1 + \frac{(1 - nystar\%_{jt}) * Aid_{jt}}{Y_{jt}}\right)$$
$$+\delta \ln(1 - nystar\%_{jt}) + \gamma \ln S_{jt} + \mu \ln \frac{S_{jt}}{S_{jt-1}} + \varepsilon_{jt}$$

Note that tax-price, tax returns, mean income, and lump-sum grants are all embedded in the third component of virtual income. The coefficients π_1, π_2, and δ should be interpreted as spending elasticities for a (hypothetical) district that receives no lump-sum aid. The total impact on spending of a proportional change in tax-price, tax returns, or mean income for a district with positive lump-sum grants will depend on all four variables, as well as the coefficient π_3. Additionally, the coefficient π_3 is not the elasticity of spending with respect to grant aid. As mentioned above, the effect of a proportional change in grants on spending is mediated by how important grant aid is relative to aggregate income. For expositional purposes, I will refer to coefficient estimates on the tax-price, tax returns, and mean income variables as elasticities, which they are for a district that receives no grant aid.

Since much of the variation in the incidence of NYSTAR occurred over time, changes in community tax-prices may be correlated with other unobservable factors that led to increases

[23] Note also that changes in enrollment will be correlated with changes in population, and changes in population may have a direct effect on expenditure. The bias from this omitted variable will be limited to the extent that changes in the number of tax filers are correlated with changes in population.

in expenditure, such as the cost of education. In order to be sure that my estimates of the impact of NYSTAR are not biased upwards by these factors, I include a linear year trend for each of eight regions of the state and an additional trend for city school districts.[24]

Results from a least squares regression of equation 7, including these time controls, are shown in column 1 of table 3. Standard error calculations are clustered at the school district level. All regressions are unweighted, though the results are not qualitatively different if regressions are weighted by enrollment or by the number of households counted in the 2000 census.[25]

The estimated elasticity of expenditure with respect to community tax-price ($\widehat{\delta}$) is -.178 with a standard error of .021, implying that a (hypothetical) district receiving no lump-sum grants would raise expenditure by 1.78% as a result of NYSTAR paying 10% of its property tax revenue. The estimated elasticities of expenditure with respect to the number of tax returns ($\widehat{\pi}_1$) and mean income ($\widehat{\pi}_2$) are, respectively, .207 and -.003, with the latter being statistically indistinguishable from zero. The coefficient estimate on the third component of virtual income ($\widehat{\pi}_3$) is .638. Wald tests on the pairwise equality of the three virtual income coefficients ($\widehat{\pi}_1$,$\widehat{\pi}_2$, and $\widehat{\pi}_3$) are all rejected, supporting the estimation of separate coefficients on these terms.[26]

[24]Regional classifications come from the New York State Comptroller, and are mapped in figure A.1. In a series of robustness checks below, I examine the use of other time controls.

[25]My decision not to weight these regressions is motivated by both theoretical and practical issues. I am interested in how local communities and local governments make allocation decisions, and thus the natural unit of observation is a district, large or small. If I were more interested in the impact of NYSTAR on the average pupil, then weighting by pupil counts would be more appropriate. As a practical matter, weighting may lead to more efficient estimates if there is heteroskedasticity in the dependent variable whose nature is known, e.g. in the use of population averaged data. I have no reason to think that residual variation in log expenditure is any greater for small districts than for large districts. In point of fact, there is no relation between district enrollment and the variance of residuals from a regression of log expenditure on district fixed effects.

[26]The coefficient estimates on enrollment also support this choice of specification. The elasticity of spending with respect to enrollment levels is positive (.28) and the elasticity with respect to enrollment changes

In order to measure the total effect of NYSTAR on expenditures, one must take into account the interaction of community tax-price changes and lump sum grants. For a district with the state average ratio of grant aid to aggregate income (.05) a 10% fall in community tax-price is expected to increase expenditure by 1.6%.[27] In contrast, for a district with a ratio of grant aid to income at the 95th percentile (.12), a 10% fall in community tax-price raises expenditure by only 1.1%.

Note that all of the additional revenue for increased expenditure must be generated by additional property taxation. Local taxes only funded 60% of expenditure for the typical school district in the 1997-1998 school year (before NYSTAR began), so an increase of 1.6% in expenditure for this typical school district would necessitate a 2.7% increase in property taxation.[28]

In sum, these estimates imply that a typical school district, which received 20% of its revenue through NYSTAR in the 2001-2002 school year, raised operational expenditure by 3.4% and local property taxes by 5.7% in response to the change in fiscal incentives. Such

is negative (-.18), indicating that temporary shifts in enrollment have a smaller impact on expenditure than permanent shifts. For example, an increase in enrollment of 10% leads to a 2.8% increase in expenditure through the level effect but also a 1.8% decrease through the effect of enrollment gains, leaving an overall increase of 1%. The following year, however, enrollment is still 10% higher but there is no gain, so expenditure is expected to be 2.8% higher.

[27] The estimated changes in expenditure caused by 10% changes in other fiscal variables are: 1.8% for tax returns, essentially zero for mean income, and .3% for grant aid. To see how these results are indicative of the flypaper effect, first recall that the flypaper effect is a statement about the propensity to spend out of absolute (as opposed to proportional) increases in grants versus income. In the typical school district, roughly 40% of expenditure is funded through grant aid. If a 10% increase in grant aid were spent entirely on schools then expenditure would rise by 4%. My estimates imply that a 10% increase in grants leads to a .3% increase in expenditure, so the propensity to spend out of an additional dollar of grant money is about .075 (i.e. .3% divided by 4%). In contrast, aggregate personal income is roughly 800% of expenditure for the typical school district, so a 10% increase in income spent fully on schools would raise expenditure by 80%. If a 10% increase in aggregate income (through an increase in tax returns) leads to a 1.8% increase in expenditure, the propensity to spend out of additional personal income is about .022 (i.e., 1.8% divided by 80%), less than one third of the propensity to spend out of additional grant aid.

[28] If all additional expenditure is funded through property taxes and the district previously received 40% of its revenue through lump-sum grants, then increases in property taxes will be two thirds greater than increases in expenditure.

changes in expenditure and taxation would crowd out relatively little of the benefits of NYSTAR exemptions for homeowners with relatively inexpensive homes. However, a 5.7% increase in property taxes would crowd out a substantial fraction of the tax relief given to some homeowners (e.g. 34% of the benefits for a $200,000 home), increase the tax-burden on owners of non-residential properties, and increase rental prices.

To document the virtual income effect outlined above, I estimate the effect of NYSTAR on spending without adjusting for the interaction between grant aid and tax-price (column 2 of table 3).[29] As expected, the estimated tax-price coefficient shrinks towards zero, from -.178 to -.145. One reason why the bias may be limited in this case is that there is a high correlation (about .6) between $nystar\%$ and the ratio of grant aid to aggregate income. This correlation greatly decreases the variation in the grant/income ratio conditional on $nystar\%$, and it is this variation that drives the bias.

4.2.1 Robustness Checks: Endogenous Takeup and Alternative Time Controls

Two empirical issues are potentially important for interpreting the average effect of NYSTAR found above as causal. The first issue is that homeowners must apply for NYSTAR exemptions, so some of the variation in the fraction of local taxes paid by the state ($nystar\%$) will be due to variation in the takeup of the program. If variation in $nystar\%$ due to takeup has only a direct effect on spending then my findings would still be accurate. However, if takeup rates were correlated with unobservable characteristics that affected spending growth then my findings would be biased.

I check for any effect of endogenous takeup by estimating equation 7 via two-stage least

[29] In terms of equation 7, $\ln\left(1+\frac{(1-NYSTAR\%_{jt})*Aid_{jt}}{Y_{jt}}\right)$ is replaced with $\ln\left(1+\frac{Aid_{jt}}{Y_{jt}}\right)$.

squares, using predicted values as instruments for community tax-price and the component of virtual income that contains $nystar\%$.[30] These results are reported in column 2 of table 4; for ease of comparison, the OLS estimates are reported in column 1. The estimated impact of NYSTAR is only slightly smaller (-.172 instead of -.178) and none of the other point estimates change in any noticeable way. I therefore continue to use OLS in the remainder of my analysis.

A second concern is that time-varying unobservable factors correlated with the incidence of NYSTAR are not fully captured by the region and city linear trends. In other words, if educational expenditure in New York was growing over this time period for other reasons, and this growth was non-linear, my estimates may be biased. One way to examine the plausibility of this story is to use average spending growth among states similar to New York as a control variable in my analysis. It is difficult to know which states are most similar to New York. I examine two groups of comparison states: first, a group of states that, like New York, do not redistribute local revenue across districts as part of their school finance equalization (SFE) systems and, second, a group of neighboring states.[31]

Columns 3 and 4 of table 4 report the results of regressions that control for the average per-pupil instructional spending of comparison states.[32] Controlling for spending in states

[30] Predicted values of $NYSTAR\%$ are based on the number of households eligible for exemptions, the statutory value of exemptions, and the total property value in the school district. For the 1998-1999 school year, only elderly households who own their own homes and have incomes that qualify them for Enhanced NYSTAR are considered eligible, and for later years all homeowners are considered eligible. A detailed explanation of how I calculate the number of elderly households eligible for Enhanced NYSTAR benefits is included in appendix A.

[31] The states with no SFE systems are Delaware, Mississippi, Nevada, North Dakota, and North Carolina, the neighboring states are Connecticut, New Jersey and Pennsylvania. School finance equalization information is taken from Hoxby (2001) and the report of the American Education Finance Association for the 1998-1999 school year.

[32] These data come from the National Public Education Financial Survey, collected by the National Center for Educational Statistics. Spending figures are adjusted for inflation using the appropriate regional CPI for all urban consumers. Operational expenditure is not available so I use instructional expenditure as a proxy.

with no SFE systems, the estimated community tax-price elasticity is somewhat smaller (-.122), but controlling for spending in neighboring states, the estimated community tax-price elasticity is considerably larger (-.269). Thus, the evidence from other states gives little indication that my estimates are biased upwards due to a general acceleration in spending growth coincident with the introduction of NYSTAR.

As a final check on the robustness of my results, I include region-year fixed effects and a separate set of year effects for city school districts. In this specification, the effect of NYSTAR is identified solely from variation in community tax-price within years and similar geographic areas. However, all of the truly exogenous variation in community tax-price occurs within districts over time; variation within years is due to differences in districts' property values, tax-base composition, and demographics. These estimates are shown in column 5 of table 4. The estimated community tax-price elasticity is -.089 with a standard error of .034. This coefficient (along with π_3) implies that a typical school district increased spending by .7% in response to a 10% fall in community tax-price. This serves as a lower bound on the average effect of NYSTAR on expenditure.

4.3 Heterogeneity in Local Response and the Distribution of Tax Relief

Results on the average impact of NYSTAR indicate that school expenditure responds significantly to changes in the marginal cost to local taxpayers. However, the benefits of this program were not distributed equally among local voters and property owners; the state only

Data for the 2001-2002 school year are not yet available, so I predict 2001-2002 spending using state-specific regressions of spending on a quartic in year.

paid a percentage of taxes for homeowners, and the percentage was larger for homeowners with less expensive homes. The incidence of tax relief within the community provides an opportunity to examine how groups with heterogeneous interests influence expenditure on local schools. If particular groups of taxpayers have greater influence on the decision to change local spending, then targeting fiscal benefits to those groups should lead to greater increases in expenditure.

Within communities, the property tax relief from NYSTAR varies along two dimensions. First, there is variation in the generosity of benefits for those receiving exemptions. This is largely a function of the variation in owner-occupied home values within the school district. Second, there is variation in the fraction of households and property owners receiving exemptions. This will depend on the percentage of property that is owner-occupied, the percentage of property that is residential but renter-occupied, and the percentage of property that is non-residential.

In order to examine how the distribution of tax relief affects local response, I estimate interactions between the community tax-price and measures of distribution. My regression specification is shown in equations 8a and 8b.[33]

$$(8a)\ \ln E_{jt} = \alpha_j + \pi_1 \ln(returns_{jt}) + \pi_2 \ln\left(\overline{Y}_{jt}\right) + \pi_3 \ln\left(1 + \frac{(1 - nystar\%_{jt}) * Aid_{jt}}{Y_{jt}}\right) + \delta W_{jt} * \ln\left(1 - nystar\%_{jt}\right) + \varepsilon_{jt}$$

$$(8b)\ W'_{jt} = \begin{bmatrix} 1 & (1 - own\%_j) & (1 - res\%_j) & \sigma_j^{value} \end{bmatrix}$$

The variable $own\%$ is the fraction of district households who own their homes, $res\%$ is the

[33] Enrollment variables and time controls are omitted for simplicity.

residential share of local property, and σ^{value} is the variation in the value of owner-occupied homes within the district.[34] I measure σ^{value} by taking the difference in value between the 75th and 25th percentile home and dividing this difference by the median.[35]

Note that the interacted variables are written as the fraction of households that *rent* their homes, the share of *non-residential* property, and the variation in owner-occupied homes. The estimated coefficient on community tax-price can therefore be interpreted as the elasticity of expenditure in a district where all property consists of identically valued owner-occupied homes. In this "uniform" district, tax-prices change uniformly for all taxpayers, and NYSTAR is equivalent to a matching grant. Thus, the coefficient on community tax-price could be used to estimate an individual household's price elasticity of demand for educational expenditure.

Before proceeding to the results, it is important to understand exactly what variation is captured by these interactions. To help in this regard, equation 9 shows that the fraction of all local property taxes being paid through NYSTAR ($nystar\%$) can be approximated by three components: the residential share of property taxes ($res\%$), the homeownership rate

[34] Note that the main effects of the interaction terms are not included as separate regressors. The measured fraction of renters and measured variation in home values do not vary over time and will be picked up by the district fixed effect. The share of non-residential property does vary over time, but is potentially endogenous to changes in expenditure, so I use the mean non-residential share from 1991-1995 instead of its contemporaneous value.

[35] This measure is easy to implement because the quartile and median values are reported in the 2000 School District Demographics data. I find similar results using the coefficient of variation, which can be estimated from this data using the tabulation of homes across value categories.

($own\%$) and the fraction of owner-occupied property exempt from taxation ($exempt\%$).[36]

$$(9)\ nystar\%_{jt} \approx res\%_j * own\%_j * exempt\%_{jt}$$

Holding constant the fraction of taxes paid by the state ($nystar\%$), variation across districts in homeownership ($own\%$) or residential share ($res\%$) must be balanced by variation in the fraction of owner-occupied housing exempt from taxation ($exempt\%$). In other words, in districts with high shares of non-residential property or high shares of renters, a given amount of tax relief must be concentrated in the hands of taxpayers who own their homes.

If homeowners tend to have greater influence on the margin of local public decisions than renters or owners of non-residential property, the concentration of benefits may lead to larger increases in local expenditure on schools. For example, if owners of non-residential property and renters do not vote and taxation of non-residential and rental property does not influence the preferences of homeowners, then one would expect expenditures to rise by more when homeowners get more generous benefits, even though a substantial share of local households (renters) or local (non-residential) property owners receive nothing.

One reason homeowners may be more influential than other groups is that renters are significantly less likely to vote in local elections (Moomau and Morton, 1992, DiPasquale

[36] The fraction of total property taxes paid by the state through NYSTAR is actually equal to the product of the residential share of all property, the owner-occupied share of residential property, and the fraction of owner-occupied property exempt. Data on the owner-occupied share of residential property is unavailable, and the use of homeownership rate as a substitute makes the relation in equation 9 only approximate. Since owner-occupied homes are likely to be more valuable that rented homes, the fraction of homeowner households will generally underestimate the fraction of own-occupied residential property. However, what is important for my results is that an increase in the number of homeowner households, holding constant the total fraction of taxes paid the state and the fraction of non-residential property, must be offset by a fall in fraction of owner-occupied property exempt from taxation. This should be the case so long as the owner-occupied share of residential property is positively correlated with the homeownership rate.

and Glaeser, 1999) and owners of non-residential property may live outside the district.[37] However, the fact that renters currently vote less often than homeowners does not mean that they would not vote if the benefits of doing so were greatly altered. In addition, local voters might perceive significant costs to increased taxation of non-residential properties, even if the owners of these properties cannot vote locally. A principle concern may be that the mobility of non-residential property and the capitalization of taxes into property values may lead the non-residential tax-base to shrink in response to increased taxation, shifting taxes onto owners of residential property in the long-run. Indeed, there is a substantial empirical literature that finds tax rates are negatively related to firm location.[38]

The relation between local response and variation in district home values is also theoretically ambiguous. NYSTAR exemptions are progressive in the sense that, within districts, tax-prices fall by a greater amount for homeowners with less expensive homes. If preferences for public expenditure and home value were positively correlated within communities, the progressiveness of NYSTAR may help to mitigate differences in preferences across homeowners by giving stronger fiscal incentives to those with lower preferences for school spending. In contrast, if preferences for public expenditure and home value were negatively correlated within communities, the progressiveness of NYSTAR may exacerbate differences in prefer-

[37] There is, as far as I know, no survey data on property ownership that contains information on the geography of ownership. Only about 8% of families own any equity in non-residential real estate (Survey of Consumer Finances, 2001).

[38] See Wasylenko (1980), Fox (1981), Charney (1983), and McGuire (1985) for studies of firm location. There are several other reasons why voters may perceive significant costs to taxing non-residential properties. Producers of goods and services may respond to increases in property taxation by raising prices to local consumers. Taxation of non-residential property can also be costly to the extent that non-residential properties contain assets valued by local residents for reasons beyond property taxation, e.g., a factory that employs local workers and may respond to taxation by lowering wages and employment. Finally, even if owners of non-residential property could not vote in local elections, they may be able to influence the opinions of local voters or local government officials through other means.

ences across homeowners.[39]

Estimates of equation 8a are displayed in column 1 of table 5.[40] The interactions of community tax-price with measures of distribution are all negatively signed, though only the interaction of community tax-price with the variation in owner-occupied home value is statistically significant.[41] The estimated tax-price elasticity for a district with the state average values of the interaction terms is -.198 with a standard error of .022, whereas the point estimate for the baseline effect of community tax-price is -.058 with a standard error of .053.[42] These results provide mild evidence that concentration of tax-benefits among homeowners and variation in the generosity of exemptions led to greater local response.

One potentially important issue in the estimation of equation 8a is that all non-residential property is treated alike. However, local residents may perceive higher costs to taxing properties that differ in their mobility, the value of their productive assets, the success of their owners in influencing the opinions of local decision makers, etc. All else equal, districts

[39]The empirical evidence on the distribution of preferences within communities does not give a clear indication of the unconditional correlation between home value and preferences for spending on local public services. For example, Gramlich and Rubinfeld (1982) find that, conditional on home value, households with higher incomes prefer significantly more local spending, but, conditional on income, households with more valuable homes prefer significantly less spending.

[40]These estimates include controls for linear time trends by region and a separate trend for city school districts. For space considerations I do not report coefficient estimates and standard errors for regressions on income or enrollment measures in table 5. They are included with full results in appendix table A.1.

[41]Means and standard deviations of interacted variables are given in table 2. Increasing the fraction of renters from zero to the state average (25%) raises the community tax-price elasticity from -.058 to -.074. Increasing the fraction of non-residential property from zero to the state average (36%) raises tax-price elasticity to from -.058 to -.075, and raising variation in owner-occupied homes from zero to the state average (.53) raises tax-price elasticity from -.058 to -.166.

[42]To reiterate, the coefficient estimate for the level effect of community tax-price is an approximation of the elasticity of expenditure for the uniform school district and thus an approximation of an individual household's tax-price elasticity of demand for education. Given that the mean values of the interacted variables are quite far from the values used to compute this figure, it is not surprising that the coefficient is not tightly estimated. Nevertheless, it is worth noting that the implied elasticity of demand with respect to tax-price for an individual household is considerably smaller than estimates from previous studies that used cross-sectional variation to identify income and price effects. These estimates of price elasticity have generally ranged from -.15 to -.5. See Inman (1979) and Gramlich (1977) for reviews of these early studies.

that contain non-residential property for which the costs of taxation are higher should react significantly less to the fiscal incentives provided by NYSTAR.

The New York Office of Real Property Services divides non-residential properties into eight classes, the details of which are given in appendix table A.2. To simplify my analysis, I place these eight classes into four groups based on the likely cost to local residents of increasing taxation on these properties due to mobility. The first group, which I refer to as "immobile," is comprised of properties that are clearly tied to the land on which they are situated. These are properties classified as "Vacant Land," "Wild, Forested, Conservation Lands and Public Parks," or "Recreation and Entertainment."[43]

The second group, which I refer to as "semi-mobile," is comprised of properties that derive part of their value from the production of goods and services, not solely from land, and therefore may be mobile in response to taxation. The group contains properties classified as "Commercial," "Agricultural," or "Community Services" (e.g., educational, correctional, or health facilities). The third group consists of "Industrial" properties, which are separated because evidence from previous empirical studies suggests that the costs to taxing industrial property may be greater than commercial or agricultural property.[44]

The fourth and final group consists of "Public Services" properties, i.e., public utilities. Utilities may be similar to industrial properties in the economic value they impart to the

[43]The "Recreation and Entertainment" class contains some properties whose value appears commercial (e.g., movie theaters, sports facilities) in addition to properties whose value is closely tied to land (e.g., golf courses, beaches). The character of my results is not different if this class is instead included in the group containing "Commercial" property.

[44]Ladd (1974) examines variation in the taxation of commercial and industrial property to pay for local public schools and finds consistent evidence that local residents perceive higher costs to taxing industrial properties relative to commercial properties. Abeyratne and Johnson (1989) use panel data to estimate the elasticity of tax-base to changes in tax rates for agricultural versus industrial/commercial property and find significantly lower elasticities for agricultural property.

local community, but they may be considerably less mobile. Furthermore, school districts and other local governments frequently negotiate payment in-lieu-of tax (PILOT) agreements with utility owners, whereby a set amount of taxes are paid annually over a number of years.[45] Unfortunately, I cannot distinguish payments made through PILOT agreements from normal tax collection. To the extent that PILOT agreements are present, I will incorrectly measure the fiscal incentives facing a school district in several ways.[46] Thus, one must be cautious in interpreting the estimated interaction of tax-price with the (measured) share of property taxes paid by public utilities.

Equations 10a and 10b show the regression specification that includes interactions of tax-price with non-residential property composition.[47]

$$(10a)\ln E_{jt} = \alpha_j + \pi_1 \ln(returns_{jt}) + \pi_2 \ln\left(\overline{Y}_{jt}\right) + \pi_3 \ln\left(1 + \frac{(1 - nystar\%_{jt}) * Aid_{jt}}{Y_{jt}}\right) + \delta W_{jt} * \ln\left(1 - nystar\%_{jt}\right) + \varepsilon_{jt}$$

$$(10b) W'_{jt} = \begin{bmatrix} 1 & (1 - own\%_j) & (1 - res\%_j) & \sigma_j^{value} & immobile\%_j & industrial\%_j & utility\%_j \end{bmatrix}$$

Interactions of community tax-price with the total non-residential share and the shares of all four non-residential property groups cannot be included because they are linearly dependent.

[45] While the value of utilities may be fairly independent of the characteristics of the community in which they are located, moving costs may be extremely high. PILOT agreements protect utility owners from increases in taxes imposed after location decisions have been made, and they protect local residents from fluctuations in tax revenue that would arise from variation in the market value of these large properties. Payments from PILOT agreements have the same effect on fiscal incentives as grants from state and federal governments—they must be spent on local schools but have no impact on tax-price.

[46] Specifically, I will underestimate the share of local property taxes paid (on the margin) by owners of residential and other non-residential properties, I will underestimate lump-sum payments from outside sources received by the school district, and I will underestimate the change in community tax-price for the district.

[47] Enrollment variables and time controls are omitted for simplicity. *immobile*%, *industrial*%, and *utility*% are the mean fractions of local property taxes paid by owners of immobile, industrial, and public utility property from 1991-1995.

I choose to omit the semi-mobile group because these properties are most prevalent among school districts, but my results are not sensitive to this choice.

Note that the interaction of community tax-price with the total non-residential share will reflect how local response changes when the residential share of local property falls and the (omitted) semi-mobile share of local property rises. The effect of replacing residential property with other types of non-residential property will be reflected in the sum of this coefficient and the coefficient on the interaction of community tax-price with the particular non-residential group. Thus, if voters perceive roughly equal costs to additional taxation on all types on non-residential property we would expect none of these additional interaction terms to be statistically distinguishable from zero.

Estimates of equation 10a are shown in column 2 of table 5. The additional interaction terms between community tax-price and particular types of non-residential property are all statistically significant. This indicates that voters may perceive different costs to raising taxes on different kinds of property. The signs and magnitudes of these estimates further suggest that perceived costs are positively related to property mobility.[48]

In panel B of table 5, I calculate the estimated change in tax-price elasticity when the share of each type non-residential property group rises by 10%. A 10% increase in immobile or semi-mobile property is expected to magnify community tax-price elasticity, lowering it by -.080 and -.029, respectively.[49] In contrast, replacing residential property with industrial or public utility property is expected to *shrink* tax-price elasticity by .018, though this

[48] Recall that the implied change in community tax-price elasticity for replacing residential property with "immobile" property is the sum of the coefficient on the interaction of community tax-price with total non-residential share and the coefficient on the interaction of community tax-price with "immobile" share.

[49] The estimated effects on local response of increasing the fraction of renters in the community or of increasing the variation in home values are similar to those found in the restricted specification, and indicate that local response was greater in districts with more renters and wider variation in home values.

change is not statistically significant.[50] The results of this analysis show clearly that the distribution of tax relief was important to the degree of local response, and suggest that homeowners, as a group, may be more influential in local public decisions than renters or owners of non-residential property. They also indicate that voters may perceive different costs to taxing different kinds of non-residential property, and that costs may be positively related to property mobility.

4.4 The Relative Impact of Tax Relief for Elderly versus Non-Elderly Homeowners

Policymakers and researchers have raised concerns that the aging of the U.S. population may decrease support for public expenditure on schools. Several studies have shown that, in recent decades, increases in the share of elderly residents within geographic areas have been negatively correlated with spending on education.[51] In addition, survey and voting data indicate that individuals without school-aged children prefer significantly lower spending on public schools.[52] Given that elderly households are unlikely to contain school aged children, the rise in the elderly population share from 13% today to over 20% in 2050 may have a

[50] The last two columns of table 5 show checks for robustness. Replacing the linear year trends with year effects (column 3) yields very similar results. In column 4, I report estimates that include controls for interactions of a year trend with each measure of tax-base composition (i.e., $1 - res\%$, $immobile\%$, $industrial\%$, and $utility\%$) as a check on whether the composition of non-residential property was correlated with important time-varying unobservable factors not picked up by the region or city time trends. While only the relation between local response and "immobile" remains statistically significant in this specification, the additional interactions between tax-base composition and year trends are neither individually nor jointly statistically significant. I find it difficult to believe that time-varying unobservables uncorrelated with the broader set of time controls but correlated with non-residential property composition are biasing my estimates.

[51] See Cutler et al. (1993), Poterba (1996) and Harris et al. (2001). In constrast, Goldin and Katz (1998) and Hoxby (1998) show that the correlation between the share of elderly residents and funding for education at the state and local level was positive in the early part of the twentieth century.

[52] See Rubinfeld (1977), Bergstrom et al. (1982), Gramlich and Rubinfeld (1982), Lankford (1985), and Baldson and Brunner (2003).

significant impact on public support for expenditure on elementary and secondary education.

Almost every state currently has at least one program designed to lower property taxes for elderly households. Economic theory suggests that shifting the burden of taxation away from residents with lower preferences for public goods may lead to more economically efficient outcomes (Barlow, 1970). One motivation (or justification) for these state programs may be to encourage the elderly to support increases in expenditure on local public schools, and, in turn, make all members of the community better off.

The impact of tax relief for the elderly on education spending will depend on the influence of the elderly on the margin of local decisions. One reason to think that the elderly are more influential than other groups is that they are more likely to vote in local elections, even among homeowners (DiPasquale and Glaeser, 1999). Voter turnout for school budget referenda is notoriously low, so a small group with high turnout may have a large impact on the size of school budgets.[53]

On the other hand, the preferences of the elderly may be relatively inframarginal. In other words, elderly preferences may be so far from the median, on average, that lowering the marginal cost of schooling for the elderly may not change whether they support increases in expenditure. Thus, whether giving fiscal incentives to elderly households has a larger impact on expenditure than giving incentives to other households must be addressed empirically.

The variation in the timing of Enhanced and Basic NYSTAR exemptions creates an opportunity to examine the relative influence of elderly and non-elderly homeowners on the margin of local expenditure decisions. In particular, this variation allows for identification

[53] 2003-2004 was the first school year that the New York education department collected data on voting in budget referenda. Dividing the election vote counts by the districts' voting age populations from the 2000 census and then averaging over districts, one finds an average turnout rate of 14%.

of the impact of tax relief for each group. The relative magnitudes of these effects can then be compared, taking into account the relative size of each group as a fraction of local households. If the two groups are equally influential on the margin and make up equal fractions of the community, then a given change in tax-prices for each group should result in the same change in district expenditure.

In order to compare the relative impact of tax relief for the two groups, I estimate separate tax-prices for elderly and non-elderly homeowners, instead of a single community tax-price. The tax-price for a group of households is the amount of money the group as a whole must pay when educational spending rises by one dollar. Since I do not have data on the amount of taxable property owned by elderly and non-elderly homeowners, I construct this variable using 2000 census tabulations and other data sources.[54] Group tax-prices are lower on average for elderly homeowners (.16) than non-elderly homeowners (.49).[55] This difference is mostly due to the fact that, on average, roughly 20% of households are elderly homeowners and roughly 55% of households are non-elderly homeowners—the remaining 25% are renters. Thus, for each additional dollar of spending, elderly homeowners as a group pay less on average than non-elderly homeowners.[56]

Equation 11 shows the basic estimating equation with group tax-price terms for elderly

[54] A full explanation of the calculation of group tax-prices is given in appendix A.

[55] The overall range of group tax-prices is from .005 to 1.07. In general, these tax-prices will be overestimated to the extent that self-reported home values are overestimated.

[56] Scaling group tax-prices by group size will not affect my results. Since, I measure the elasticity of spending with respect to group tax-prices separately for non-elderly and elderly, and control for district fixed-effects, these coefficients are identified from proportional changes in group tax-prices within schools districts. Thus, they will only capture the impact of percentage changes in the amount of property taxes each group must pay to raise spending by one dollar.

(P^e) and non-elderly (P^n) homeowners.[57]

$$(11)\ \ln E_{jt} = \alpha_j + \pi_1 \ln(returns_{jt}) + \pi_2 \ln\left(\overline{Y}_{jt}\right) + \pi_3 \ln\left(1 + \frac{(1 - nystar\%_{jt}) * Aid_{jt}}{Y_{jt}}\right)$$
$$+\delta^e \ln(P^e_{jt}) + \delta^n \ln(P^n_{jt}) + \lambda^e I^e_j \ln(P^e_{jt}) + \lambda^n I^n_j \ln(P^n_{jt}) + \varepsilon_{jt}$$

Tax-prices (P^e_{jt} and P^n_{jt}) are interacted with the fraction of district households in each group (I^e_j and I^n_j). The interactions will measure the additional impact from giving tax relief to a larger fraction of local taxpayers. One would expect these interactions to be negative, so that decreasing tax-prices for a particular group has a bigger impact on spending when that group constitutes a larger fraction of local taxpayers.[58] The estimated relation between tax-price effects and group size can then be used to compare tax relief for elderly and non-elderly homeowners, conditional on the two groups being of equal size.

Estimates of equation 11 that include linear time trends are shown in column 1 of table 6. The coefficients on elderly and non-elderly group tax-prices are both negative and statistically significant, indicating that tax relief for either group led to increases in school expenditure. For a district with a typical fraction of elderly and non-elderly homeowner households (i.e., 20% elderly and 55% non-elderly) the elasticities of spending with respect to elderly and non-elderly group tax-prices are -.028 and -.101, respectively. However, comparing these elasticities under the presumption of equal group size is complicated by the fact that the

[57] Time controls and enrollment variables are omitted for simplicity. Measures of income, including virtual income, are specified at the community level for two reasons. First, group-specific income data is not available. Second, most of the variation in the third component of virtual income comes from variation in lump-sum grants, not tax-prices. Inclusion of group-specific terms therefore leads to problems of multicollinearity.

[58] Note that this interaction with group size is conditional on group tax-price, not community tax-price, so there is no underlying tradeoff between benefit generosity and the number of households receiving benefits.

interactions of group tax-price with group size are not statistically distinguishable from zero.[59]

This problem is illustrated in figure 4, which displays point estimates and 95% confidence intervals for the elasticity of expenditure with respect to group tax-prices at various levels of group size. The estimated group tax-price elasticity is significantly larger for non-elderly homeowners, even conditioning on group size. However, the estimates indicate that changing the non-elderly group tax-price has roughly the same effect on spending whether non-elderly homeowners constitute 25% or 75% of local households. The estimated impact of changes in elderly group tax-price on spending is estimated to be *smaller* when elderly homeowners constitute a larger fraction of local households. Given a strong prior belief that increases in group size tend to increase group influence, it is hard to believe that the group size interactions in equation 11 are well identified.

A primary reason why the relation between group size and tax-price effects may be poorly identified is that variation in the size of each group across districts is relatively small compared with the difference in size between the two groups.[60] Another potential problem for identification is sorting of elderly and non-elderly homeowners across school districts. Such sorting might generate correlations between the portion of households in each group and unobservable factors that affect local response.[61]

[59] Other coefficient estimates are quite similar to estimates in earlier parts of the analysis. Inclusion of higher order interactions between group tax-prices and group sizes does not change the character of the results.

[60] The mean fraction of households that are elderly homeowners is .195 with a standard deviation of .046 and the mean fraction that are non-elderly homeowners is .562 with a standard deviation of .100.

[61] Sorting based on the composition of non-residential property is not driving these results. Though there are significant correlations between the fraction of households in each group and the composition of non-residential property, adding interactions between group tax-prices and property composition does not change the character of the results.

Although estimates from the data regarding the relation between group tax-price effects and group size are not statistically significant, one could assume that the impact of changing the tax-price of a particular group is proportional to group size. The proportionality restriction can be implemented by simply dropping the group tax-price terms from equation 11, leaving only the interactions between group tax-prices and group size. Given this restriction, comparing the relative impact of tax relief on expenditure for elderly and non-elderly homeowners is equivalent to comparing the size of the coefficient estimates on these interactions. Estimates from this restricted specification are shown in column 2 of table 6. Again, tax-price changes for both elderly and non-elderly homeowners have significant effects on expenditure, but the effect for non-elderly homeowners is significantly larger.[62]

The separate identification of tax-price changes for elderly and non-elderly homeowners is primarily due to the timing of Enhanced and Basic exemptions. Thus, one might be concerned that the effect of tax relief for the elderly is biased down because time varying unobservable factors decreased spending in 1998-1999 relative to later years. When year effects are substituted for year trends (column 3), the point estimate for non-elderly homeowners remains larger though no longer statistically different from the effect for elderly households. The effect of changing tax-prices for these two groups are both smaller but significantly different from zero. Together, these results suggest that, at least at the margin, non-elderly homeowners are equally influential in public expenditure decisions as elderly homeowners.[63]

[62] A Wald test of the equality of the elderly and non-elderly coefficients is rejected at the 5% level.

[63] One other potential source of bias is that tax relief for a particular group of households may have diminishing returns. Since tax relief is greater on average for elderly homeowners (due to Enhanced NYSTAR exemptions), the relative impact of tax relief for the elderly may be underestimated. One way to explore this possibility is to restrict the sample to districts with high home values, since the difference in tax-relief between elderly and non-elderly for these districts will be smaller than for the entire sample. I find slightly larger differences between elderly and non-elderly tax-price effects when I restrict the sample to districts with median owner-occupied home values greater than $50,000, greater than $75,000, and greater than $100,000.

5 Conclusion

The unintended consequences of property tax relief in New York have important implications for policy. Local governments and local taxpayers react predictably to changes in fiscal incentives and constraints, and state policymakers can and should take these behavioral responses into account when designing policies. This point has been made by other researchers, but it is worth repeating here.

In addition, state governments should consider the relative influence of particular groups of local taxpayers on local decisions. From the most common tools of fiscal federalism, such as lump-sum and matching grants, to the most complicated school finance equalization systems, most state policies that seek to change local taxation and expenditure focus their attention at the level of local government. This usually results in fiscal incentives that are uniform across all local taxpayers.

Whether uniform treatment of all local taxpayers results in an efficient allocation of resources is an open question, and not addressed in this paper. However, policies that treat all groups equally can be viewed as just a small subset of policies that allow for different incentives to be given to different groups. By considering this broader set of options, state policymakers may be able to better construct policies that fit their goals. In the case of increasing local support for public school expenditure, the evidence provided in this paper suggests that offering incentives to homeowners—either elderly or non-elderly—is an option worth considering.

References

[1] Abeyratne, Frederick and Thomas G. Johnson, "Use Value Taxation and the Impact of Tax Rate Change on the Value of Agricultural Real Property Tax Base," University of Missouri-Columbia Working Paper, March 1989.

[2] Bailey, Stephen J. and Stephen Connolly, "The Flypaper Effect: Identifying Areas for Further Research," Public Choice, 1998.

[3] Baldson, Ed and Eric Brunner, "Intergenerational Conflict and the Political Economy of School Spending," University of Connecticut Working Paper, August, 2003.

[4] Bergstrom, Theodore C. and Robert P. Goodman, "Private Demands for Public Goods," American Economic Review, June, 1973.

[5] Bergstrom, Theodore C., Daniel L. Rubinfeld and Perry Shapiro, "Micro-Base Estimates of Demand Functions for Local School Expenditures," Econometrica, September, 1982.

[6] Barlow, Robin, "Efficiency Aspects of Local School Finance," Journal of Political Economy, September-October 1970.

[7] Black, Duncan, "On the Rationale of Group Decision-Making," Journal of Political Economy, February, 1948.

[8] Charney, Alberta H., "Intraurban Manufacturing Location Decisions and Local Tax Differentials," Journal of Urban Economics, 1983.

[9] Cutler, David M., Douglas W. Elmendorf and Richard J. Zeckhauser, "Demographic Characteristics and the Public Bundle," NBER Working Paper 4281, February, 1993.

[10] Feldstein, Martin S., "Wealth Neutrality and Local Choice in Public Education," American Economic Review, March, 1975.

[11] Fox, William F., "Fiscal Differentials and Industrial Location: Some Empirical Evidence," Urban Studies, 1981.

[12] Goldin, Claudia and Lawrence F. Katz, "The Origins of State-Level Differences in the Public Provision of Higher Education: 1890:1940," American Economic Review, May, 1998.

[13] Gramlich, Edward M., "Intergovernmental Grants: A Review of the Empirical Literature," in The Political Economy of Fiscal Federalism, Ed.: W. Oates (Lexington, MA: DC Heath and Company, 1977)

[14] Gramlich, Edward M. and Daniel L. Rubinfeld, "Micro Estimates of Public Spending Demand Functions and Tests of the Tiebout and Median Voter Hypotheses," Journal of Political Economy, June, 1982.

[15] Harris, Amy Rehder, William N. Evans and Robert M. Schwab, "Education Spending in an Aging America," Journal of Public Economics, 2001.

[16] Heidelmark, William J., "Exemptions from Real Property Taxation in New York State: 1997 County, City and Town Assessment Rolls," New York State Office of Real Property Services Report, 1997.

[17] Hoxby, Caroline, "How Much Does School Spending Depend on Family Income? The Historical Origins of the Current School Finance Dilemma," American Economic Review, May, 1998.

[18] Hoxby, Caroline, "All School Finance Equalizations Are Not Created Equal," Quarterly Journal of Economics, November, 2001.

[19] Inman, Robert P., "The Fiscal Performance of Local Governments: An Interpretative Review," in Current Issues in Urban Economics, Ed.: P. Mieszkowski and M. Straszheim

(Baltimore: The Johns Hopkins University Press, 1979)

[20] Ladd, Helen F., "Local Education Expenditures and the Composition of Property Tax Base," Nationa Tax Association - Tax Institute of America, Proceedings of Sixty-Seventh Annual Conference, 1974.

[21] Lankford, R. Hamilton, "Preferences of Citizens for Public Expenditures on Elementary and Secondary Education," Journal of Econometrics, 1985.

[22] McGuire, Therese, "Are Local Property Taxes Important in the Intrametropolitan Location Decisions of Firms? An Empirical Analysis of the Minneapolis-St. Paul Metropolitan Area," Journal of Urban Economics, 1985.

[23] Moomau, Pamela H. and Rebecca B. Morton, "Revealed Preferences for Property Taxes: An Empirical Study of Perceived Tax Incidence," Review of Economics and Statistics, February, 1992.

[24] Poterba, James, "Demographic Structure and the Political Economy of Public Education," NBER Working Paper 5677, July, 1996.

[25] Romer, Thomas and Howard Rosenthal, "Beureaucrats Versus Voters: On the Political Economy of Resource Allocation by Direct Democracy," Quarterly Journal of Economics, November, 1999.

[26] Romer, Thomas, Howard Rosenthal and Vincent G. Munley, "Economic Incentives and Political Institutions: Spending and Voting in School Budget Referenda," Journal of Public Economics, 1992.

[27] Rothstein, Paul, "The Algebra of a Class of Transformations with Applications to Log-Log Models of School Spending," Public Finance Quarterly, October, 1991.

[28] Rubinfeld, Daniel L., "Voting in a Local School Election: A Micro Analysis," The

Review of Economics and Statistics, February, 1977.

[29] Thaler, Richard, "The Flypaper Effect," Journal of Economic Perspectives, Fall, 1995.

[30] Wasylenko, Michael J., "Evidence of Fiscal Differentials and Intrametropolitan Firm Relocation," Land Economics, August, 1980.

A Calculation of Group Tax-Prices for Elderly and Non-Elderly Homeowners

Group tax-price is specified as the amount of money a group as whole must pay when educational spending rises by one dollar. Since property taxes are distributed proportionally based on property value, the group tax-price is equivalent to the fraction of taxable property owned by group members. I do not have data on the total amount of property owned by elderly and non-elderly homeowners and therefore estimate these measures using data from the 2000 census School District Demographics data, the 2000 IPUMS 5% sample for New York and the New York State Office of Real Property Services.

The total amount of property owned by a particular group will be equal to the mean amount of property owned by group members multiplied by the size of the group. For reasons enumerated below, it is easier to estimate the mean amount of taxable property for group members. The mean taxable property for a group of homeowners is a function of the value of their homes, applicable exemptions, and the total amount of taxable property in the school district.[64] This function is shown by equation A1.

$$\text{(A1) } \overline{P}_{gjt} = \frac{1}{I_{gjt}} \left(\sum_{i \in g} \frac{property\, value_{it} - X_{it}}{total\, property\, value_{jt}} \right)$$

Aggregate property value is known and is constant within districts, but the property values and applicable exemptions for groups are not known and must be calculated. This is done in several steps. In the first set of calculations, I estimate the distribution of home values for elderly and non-elderly homeowners in each district and in each year. Next, I estimate the number of elderly and non-elderly homeowners across several income categories. Finally, I calculate the mean taxable property for each group by matching homeowners with houses, applying exemptions based on (in the case of the elderly) the income of the household, the statutory exemption amounts, and variation in takeup within the district over time.

The 2000 census school district tabulations give estimated counts of owner-occupied home values across 25 categories, ranging from \$0-\$10,000 to \$1 million or more. I assume, as is

[64] I focus only on taxes paid on owner-occupied homes because data on ownership of other property is unavailable. This will ignore the fact that some homeowners face higher tax-prices because they also own other property. Nationwide, about 17% of homeowners also owned other residential property (e.g. secondary residences or rental property) and 15% possessed equity in non-residential property (2001 Survey of Consumer Finances).

done in the IPUMS, that homes are worth the median value in their category (e.g., homes in the \$0-\$10,000 range are worth \$5,000), and then use this data to create a distribution of home values for each district.[65] Data is not available separately for elderly and non-elderly households, so I also assume that the distribution of home values within school districts is the same for both groups.

Evidence from the IPUMS suggests that elderly homeowners' property values may be slightly lower than on average. A regression of the log of house value on a dummy variable for whether the head of household is 65 years old or older shows elderly homeowners' properties are about 13% smaller on average.[66] This difference can be also seen in the statewide cumulative distributions of home value for elderly and non-elderly homeowners, shown in figure A.2.

If the statewide pattern also held within districts, then my calculations will overestimate home values for the elderly. This is likely to lead to an underestimate of the (percentage) change in taxable property for the elderly, and an overestimate of the marginal impact of tax relief for the elderly relative to non-elderly.[67] At least part of the statewide pattern is caused by sorting of elderly and non-elderly across geographic areas: adding fixed effects for Public Use Microdata Areas (PUMAs) to the regression mentioned above reduces the elderly home value gap from 13% to 11%.[68] However, this issue can only be resolved with richer data on property values for elderly and non-elderly homeowners within school districts.

I do not have information on how districts' home value distributions changed over time, and I therefore use the 1999 distribution of owner-occupied home values (along with aggregate property value in 1999) to calculate taxable property in each school year from 1995-1996 to 2001-2002.[69] Variation over time will only reflect property tax exemptions. One potential problem with this omission is that NYSTAR exemptions may be capitalized into home values, and cause the value of owner-occupied homes to rise relative to other district properties. If so, then true taxable property would have fallen by less than my calculations imply, and this would lead me to underestimate the impact of NYSTAR on spending. On the other hand, I may overestimate the impact of NYSTAR changes to the extent that demand for school spending rises through increases in home equity. It is unclear however, whether these biases would be stronger or weaker for elderly versus non-elderly homeowners.[70]

The distribution of home values must be matched with a distribution of income for

[65] Top-coded homes are assigned a value of \$1 million.

[66] A Kolmogorov-Smirnov test for equality of the two distributions is also rejected.

[67] In the case of very inexpensive homes where all taxes are paid by the NYSTAR program, assigning home values to the elderly that are larger than their true values has the opposite effect: overestimating tax-price changes and underestimating the impact of tax-relief. However, there is no significant difference between elderly and non-elderly home values in the IPUMS when the sample is restricted to homes worth less than \$50,000. In fact, a regression of home value on a dummy variable for elderly indicates that, within this range, elderly homeowners' houses are 5% greater on average than non-elderly homeowners.

[68] PUMAs contain at least 100,000 residents. The median school district, by contrast, has about 10,000 residents.

[69] Because home values are taken from the 2000 census, I use aggregate district property value in 1999 in my tax-price calculations.

[70] Note that although NYSTAR tax benefits are generally greater for elderly homeowners, what matters for the value of their home is the value of tax benefits to homebuyers, and these are likely to be non-elderly households.

homeowners. The income distribution is really only relevant for elderly homeowners, because property tax exemptions for the elderly depend on their income on the value of an NYSTAR exemption depends on home value. The 2000 census tabulations supply counts of households by age and homeownership, by income and age, but not by income, age and homeownership. I therefore estimate the cross tabulations of income, age, and homeownership for each district using districts' two-way tabulations and state-wide microdata from the IPUMS.

First, I break up the IPUMS sample by the age categories used in the district tabulations, then I run linear regressions (for each age group) of homeownership on dummy variables for the income categories used in the census tabulations. This regression specification is shown in equation A3. H_{iay} is a dummy variable for whether person i in age category a and income category y is a homeowner, δ_a is an age specific intercept and β_{ay} is an age specific income effect.

$$(A3)\ H_{iay} = \delta_a + \beta_{ay} + \varepsilon_{iay}$$

I combine the regression coefficients with the number of households in each income-age cell to to get an initial estimate the number of homeowners in each income-age cell. This calculation is shown in equation A4.

$$(A4)\ H^0_{ay} = I_{ay}(\delta_a + \beta_{ay})$$

Since the coefficients reflect statewide averages, these initial values (H^0_{ay}) will be too low in some districts and too high in others. I adjust the initial estimates using a simple scaling algorithm which guarantees that the total estimated homeowners across all income categories for each age group equals the age group homeowner count in the census tabulation.

Equation A5 describes the adjustment process.

$$(A5)\ H^1_{ay} = \max(I_{ay}, \frac{\sum H^0_{ay}}{H_a})$$

H_a is the total number of homeowners in age category a (known from the census tabulation), I_{ay} is the total number of households in age category a and income category y (also known) and H^1_{ay} is the adjusted income-age-homeownership count. The adjustment process scales my estimates up or down, capping the number of homeowners in the age-income cells at the number of households counted in the census. I then repeat the scaling process until $\sum H^n_{ay}$ converges to H_a.[71]

Once a distribution of home values and a distribution of homeowners are calculated, exemptions can be applied and the mean taxable property for each group can be calculated. Variation in the incidence of NYSTAR exemptions arises through the structure of the program (figure 1) and program takeup. Exemptions are available to most elderly homeowners in 1998-1999, but not available to other homeowners until 1999-2000. This difference in timing generates much of the variation identifying the effects of elderly and non-elderly tax relief, but also makes the issue of takeup important. If elderly homeowners' takeup of (Enhanced) NYSTAR exemptions grows after 1998-1999, then changes in spending in later years may be driven partly by tax relief for the elderly. If takeup were ignored, the overlap in

[71] I.e., $H^2_{ay} = \max(I_{ay}, \frac{\sum H^1_{ay}}{H_a})...H^n_{ay} = \max(I_{ay}, \frac{\sum H^{n-1}_{ay}}{H_a})$.

tax relief for the two groups would lead to an overestimate of the effect of tax relief for the non-elderly relative to the elderly.

I find evidence of growth over time in takeup within districts for both Enhanced and Basic NYSTAR exemptions. I regress the natural log of the number of exemptions on year dummy variables and district fixed effects show significant growth after the first year of availability for both types of exemptions, but not thereafter (results not reported). My measure of takeup does not capture variation across districts, but does capture exemption growth within districts, which is my concern. I calculate a district specific takeup ratio for each type of exemption by dividing the number given in each year by the maximum given over this time period. This is shown by equation A6, where $\#\,exemptions^x_{jt}$ are the number of exemptions of type x given out in district j in year t.

$$(A6)\ takeup^x_{jt} = \frac{\#\,exemptions^x_{jt}}{\max_t\left(\#\,exemptions^x_{jt}\right)}, x \in \{basic, enhanced\}$$

I assume that all eligible households received exemptions in the year when the takeup ratio equals 1, and that in other years a randomly selected fraction of eligible households (i.e., a fraction equal to the takeup ratio, $takeup^x_{jt}$) received exemptions. I cannot distinguish between elderly and non-elderly households receiving Basic NYSTAR exemptions and therefore assume that takeup of Basic NYSTAR was the same across the two groups.

The size of an NYSTAR exemption for non-elderly homeowners does not depend on income, so it does not matter which non-elderly homeowners own which homes. The mean taxable property for non-elderly homeowners can therefore be found by assigning exemptions to home values, taking into account variation in takeup, and then averaging taxable property over the distribution of homes. This is shown by equation A7, where $\overline{P}_{njt}$ is the mean taxable property for non-elderly homeowners in district j and year t, $property\,value_h$ is the value of a particular home, X^{basic}_t is the statutory value of Basic NYSTAR in year t, and b_{ht} is a random binary variable that allocates exemptions with probability $takeup^{basic}_{jt}$.

$$(A7)\ \overline{P}_{njt} = \frac{1}{H}\left(\sum_h \frac{property\,value_h - b_{ht}X^{basic}_t}{total\,property\,value_j}\right),\ b_{ht} = \begin{cases} 1 \text{ if } u^b_{ht} \leq takeup^{basic}_{jt} \\ 0 \text{ if } u^b_{ht} > takeup^{basic}_{jt} \end{cases},\ u^b_{ht} \sim U(0,1)$$

The calculation of taxable property for the elderly is more complicated. Enhanced NYSTAR is only available for elderly homeowners with income lower than $60,000, and the definition of income for purposes of eligibility changed in the 1999-2000 school year. Second, poor elderly households who own their own homes are eligible for a property tax exemption through another state program, the Senior Citizens' Exemption (SCE) program. I take account of the SCE program because recipience of SCE changes the impact of NYSTAR on taxable property. SCE reduces the taxable value of an owner-occupied home by 50% for elderly households with income below a certain level, and gives smaller reductions (as low as 5%) for households with incomes near the cutoff.[72] The NYSTAR exemption is placed onto property after all other exemptions have been applied, so recipience of SCE increases the relative value of the NYSTAR exemption. For example, a NYSTAR exemption of $50,000

[72] Exemptions can range from 5% to 50%.

decreases the taxable property of a $100,000 home by 50%, but if that home had already received a 50% reduction from SCE (leaving it with $50,000 in taxable value), then the NYSTAR exemption would reduce its taxable property by 100%.[73]

A further complication is that the senior citizens exemption is an optional program; each local government is free to set its own income limits (up to a state maximum), and can adjust them annually. I do not yet have data on the use of SCE by individual school districts. However, according to a 1997 state publication (Heidelmark, 1997), 98% of school districts used the SCE program in 1997, 40% used the maximum income cutoff of $18,500, and 80% used a cutoff of $11,000 or more.

I must make an assumption regarding the use of this program by school districts. For simplicity, I assume that all districts used the most generous provisions allowed by the state in 1999: a limit of $19,500 for the full (50%) exemption and a phaseout range ending with a 5% exemption at $27,900.[74] Varying this assumption does not noticeably alter my results. This should not be surprising, since the census tabulations only capture income variation across categories (e.g. less than $10,000, $10,000 to $15,000, etc.) and small variations in income limits only cause minor changes in measured taxable property.

I do not have data on how many of these exemptions were given to residents of each school district and therefore must make an assumption regarding takeup. Aggregate data on SCE show that about 90,000 homes in New York State were granted an exemption from school district taxes in 1999. Using the 2000 IPUMS, I find that approximately 340,000 elderly households would have been eligible if all districts used the most generous provisions of SCE. This would imply a lower bound on takeup of about 25%. A nationwide survey of elderly homeowners conducted by the AARP in 1997 found somewhat lower takeup rates: only 17% of surveyed households eligible for property tax exemption programs applied for them. In my analysis I assume a takeup rate of 50%, however my results are not noticeably different if I assume takeup of 25% or even 100%.

In determining eligibility, both the NYSTAR program and the SCE program have definitions of income that differ from total household income. I approximate these income measures using data from the IPUMS on household income and income from social security, supplemental security income (SSI) and welfare. The income definition for SCE eligibility excludes SSI and welfare and several other categories that are not measured in the IPUMS, such as payments for the care of grandchildren. The income definition for Enhanced NYSTAR exemptions in 1998-1999 was the same as SCE. However, for 1999-2000 and thereafter, income for NYSTAR was defined as federal adjusted gross income minus any IRA distributions. The major difference between federal AGI and total income that is measurable in the IPUMS is the exclusion of some or all of social security benefits. The effect of this change was to make some households eligible for Enhanced NYSTAR exemptions in later years that were ineligible in 1998-1999.

Taking the definitions of "eligibility income" described above, I calculate what fraction of

[73] Note however that it can decrease the absolute value of NYSTAR. For example, suppose the owners of a $60,000 house already receive a senior citizen's exemption of 50%, reducing the assessed value to $30,000. NYSTAR reduces the assessment to zero, and the absolute savings are the taxes on that final $30,000 of home value. In absence of the senior citizen's exemption, NYSTAR reduces the assessment by $50,000, but the owners are left paying taxes on the final $10,000.

[74] The maximum was raised to $19,500 in 1998 and to $20,500 in 2000.

elderly homeowners in each category of household income category had "eligibility income" below $20,000, $20k-$25k, and $25k-$30k—the levels relevant to the SCE. These three groups are eligible for SCE exemptions of 50%, 35%, and 10%, respectively, reflecting the phase-out of SCE between $19,500 (50% reduction) and the $28,900 (5%).[75] For NYSTAR, I calculate the fraction of households in each household income category with "eligibility income" under $60,000.

Elderly households are then assigned exemptions using calculated measures of income eligibility and takeup rates. This is shown by equations A8 to A11. P_{iyjt} is the taxable property of household i, in income category y, district j, and year t. q^x_{yt} represents the fraction of homeowner households in income group y that have "eligibility income" lower than x. (E.g., if q^{60k}_{yt} was .5, then half of the homeowners in the income group had "eligibility income" below $60,000.) In essence, both SCE and NYSTAR exemptions are assigned randomly based on the income eligibility and takeup rate calculations described above.

$$(A8)\ P_{iyjt} = \frac{SCE_{it} * property\,value_i - nystar_{it}}{total\,property\,value_j}$$

$$(A9)\ nystar_{it} = m_{it} b_{it} X_t^{basic} + (1 - m_{it})\, e_{it} X_t^{enhanced}$$

$$(A10)\ b_{it} = \begin{cases} 1 \text{ if } u^b_{it} \leq takeup^{basic}_{jt} \\ 0 \text{ if } u^b_{it} > takeup^{basic}_{jt} \end{cases}, e_{it} = \begin{cases} 1 \text{ if } u^e_{it} \leq takeup^{enhanced}_{jt} \\ 0 \text{ if } u^e_{it} > takeup^{enhanced}_{jt} \end{cases}, u^b_{it}, u^e_{it} \overset{i.i.d.}{\sim} U(0,1)$$

$$(A11)\ SCE_{it} = \begin{cases} .5 \text{ if } u^{sce}_{it} \leq q^{20k}_{it} \\ .65 \text{ if } q^{20k}_{it} < u^{sce}_{it} \leq q^{25k}_{it} \\ .9 \text{ if } q^{25k}_{it} < u^{sce}_{it} \leq q^{30k}_{it} \\ 1 \text{ otherwise} \end{cases}, u^{sce}_{it} \sim U(0,1)$$

Unlike the non-elderly, the average taxable property faced by elderly homeowners depends on the relation between household income and home value. There are many ways one could assign home values to households. One mechanism would be to randomly assign homes, essentially allowing no correlation between income and home value. A second mechanism would be to take each household's percentile in the income distribution (of elderly homeowners) and give it the home that corresponds to that percentile in the distribution of home values; creating a close correlation between income and home value.

Among elderly homeowners in the IPUMS data I find a correlation between home value and income of roughly .5. I therefore calculate taxable property in a way that approximates an equally weighted average of the "random assignment" and "percentile assignment" mechanisms.[76] First, I calculate the mean taxable property over all homes in the district using the exemption eligibility for a particular income group. Using all homes approximates

[75] More information about the phase-out, and how it changed over time, see New York Real Property Law Section 467.

[76] Much of the variation in home value is between districts and much of the variation in tax-price is generated by NYSTAR exemptions, so variation in these weights (e.g., to 70/30 or 30/70) have a negligible impact on my results.

random assignment, and is shown by equation A12.

$$(A12)\ \overline{P}^{rnd}_{eyjt} = \left(\frac{1}{H} \sum_{h} \frac{SCE_{eyt} * property\,value_h - nystar_{eyt}}{total\,property\,value_j} \right)$$

Second, I calculate the mean taxable property over just the homes whose percentiles in the home value distribution are equal to the homeowners' percentiles in the household income distribution (i.e., approximating percentile assignment). This is shown by equations A13a and A13b, where p_h is the percentile in the distribution of home values for home h, $\underline{p_y}$ ($\overline{p_y}$) is the lowest (highest) percentile in the distribution of income for elderly homeowners for elderly homeowners in income group y.

$$(A13a)\ \overline{P}^{pct}_{eyjt} = \left(\frac{1}{H_{ey}} \sum_{h} D_{hey} \frac{(SCE_{eyt} * property\,value_h - nystar_{eyt})}{total\,property\,value_j} \right)$$

$$(A13b)\ D_{hey} \begin{cases} 1 \text{ if } \underline{p_y} < p_h \leq \overline{p_y} \\ 0 \text{ otherwise} \end{cases},\ H_{ey} = \sum_{h} D_{hey}$$

I then take an equally weighted average of the "random" and "percentile" taxable property for each income group, and then take a weighted average of the income group measures over all income groups, where the weights are the fraction of homeowners in each income group.[77] This is shown by equation A14, where I_e is the number of elderly homeowners, and I_{ey} is the number of elderly homeowners in income category y.

$$(A14)\overline{P}_{ejt} = \frac{1}{I_e} \sum_{y} I_{ey}(.5\overline{P}^{rnd}_{eyjt} + .5\overline{P}^{pct}_{eyjt})$$

This is the final step in the calculation of elderly homeowners' mean taxable property.

[77] I also repeat my analysis using 70/30 or 30/70 weights on the "random" and "percentile" tax-prices. This does not change the character of my results.

Figure 1: The Structure of NYSTAR Property Tax Exemptions

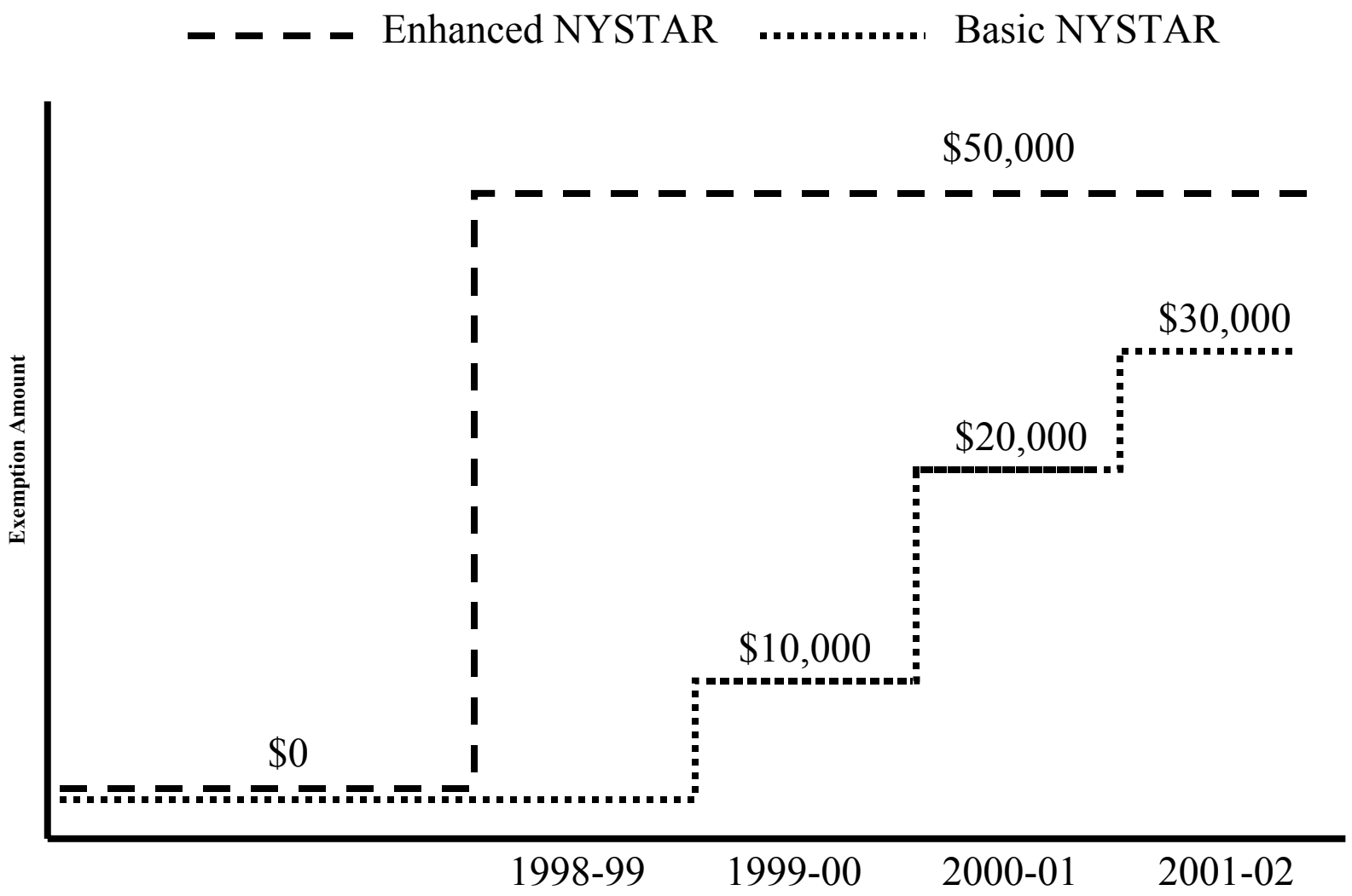


Figure 2a: The Percentage of Owner-Occupied Home Value Exempt by NYSTAR

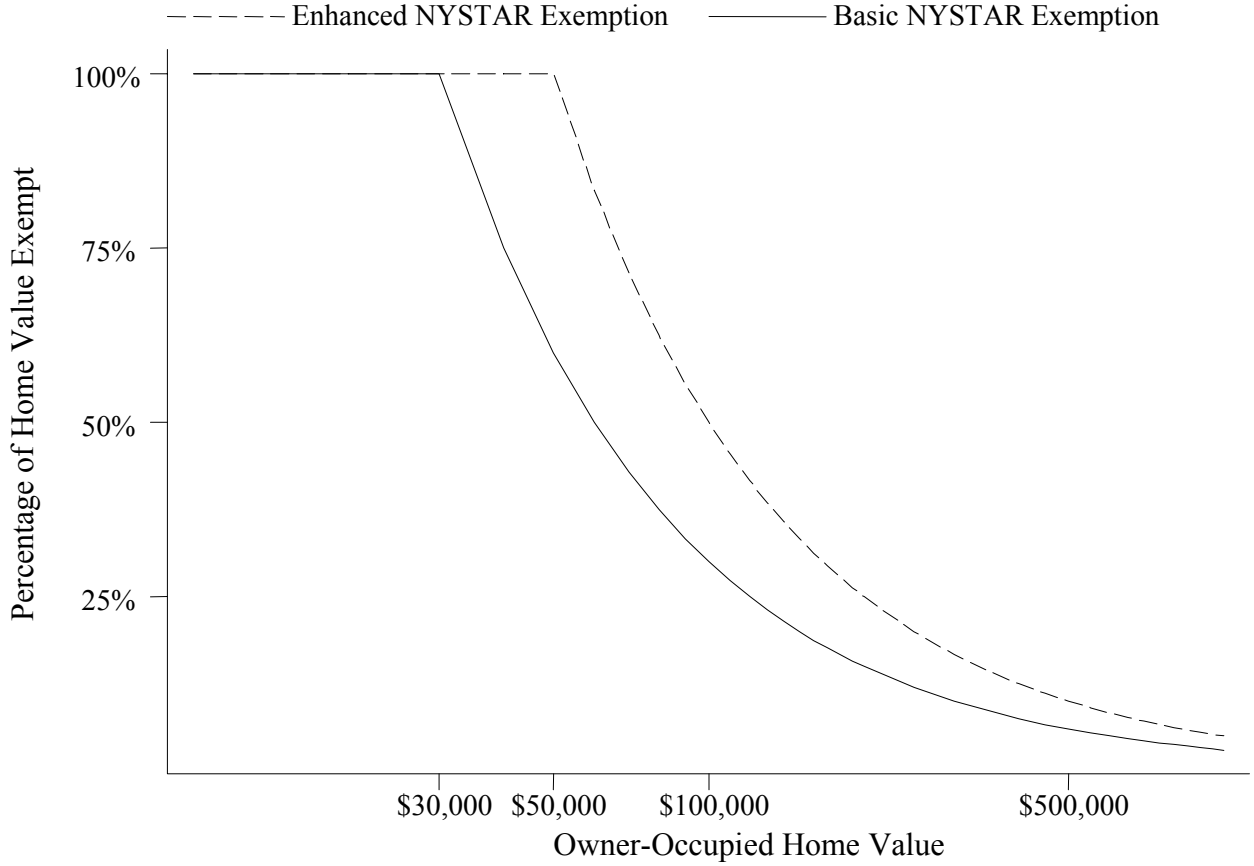
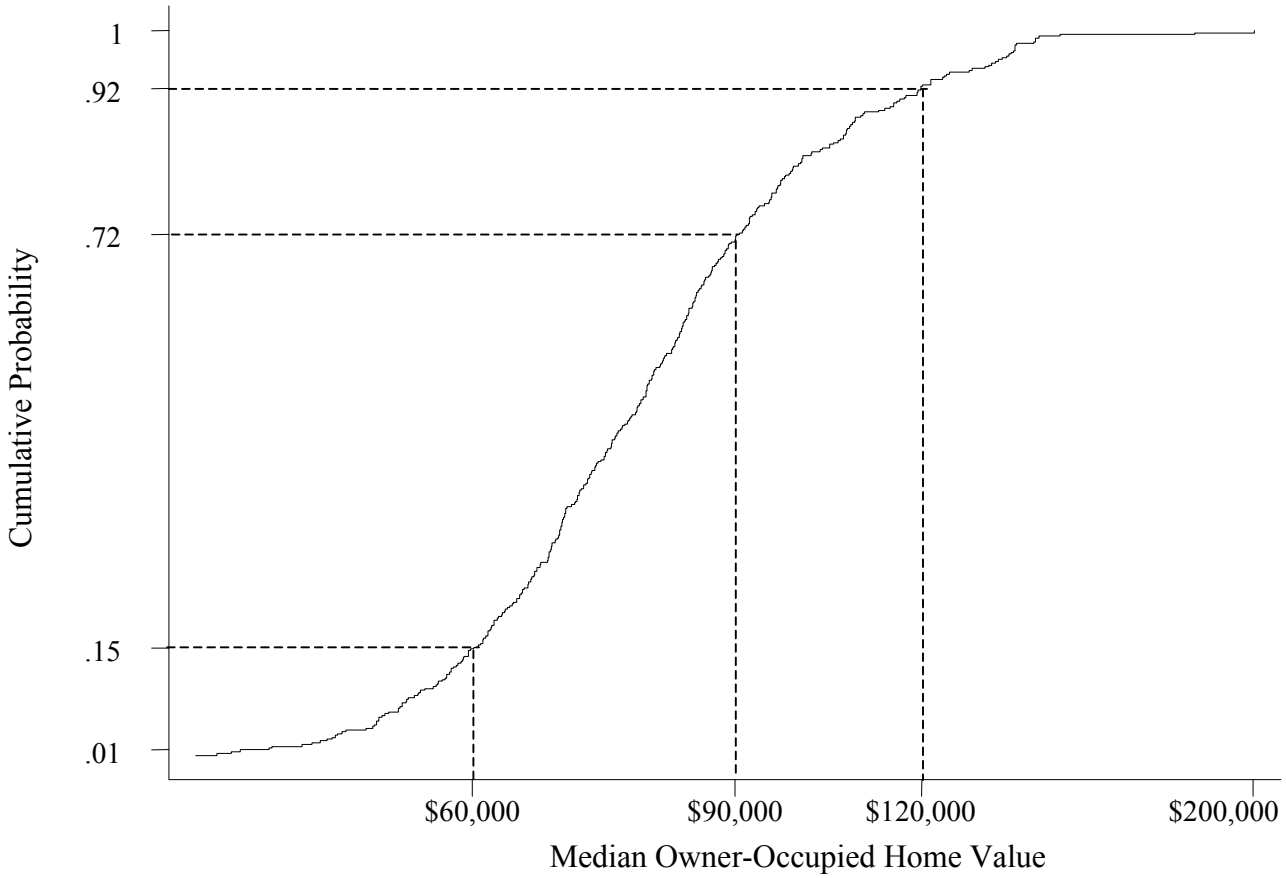


Figure 2b: Cumulative Distribution of District Median Home Values



Source: 2000 School District Demographics

Figure 3a: The Community Budget Constraint

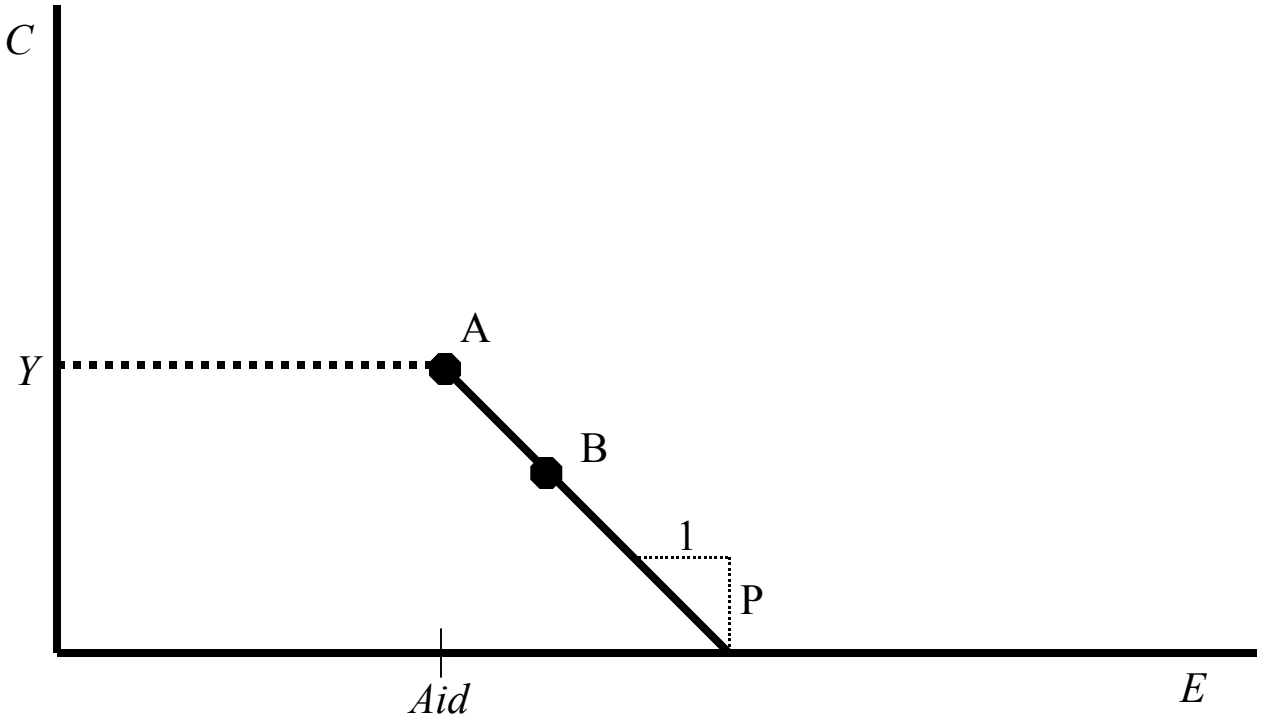


Figure 3b: Tax-Price Changes and Virtual Income

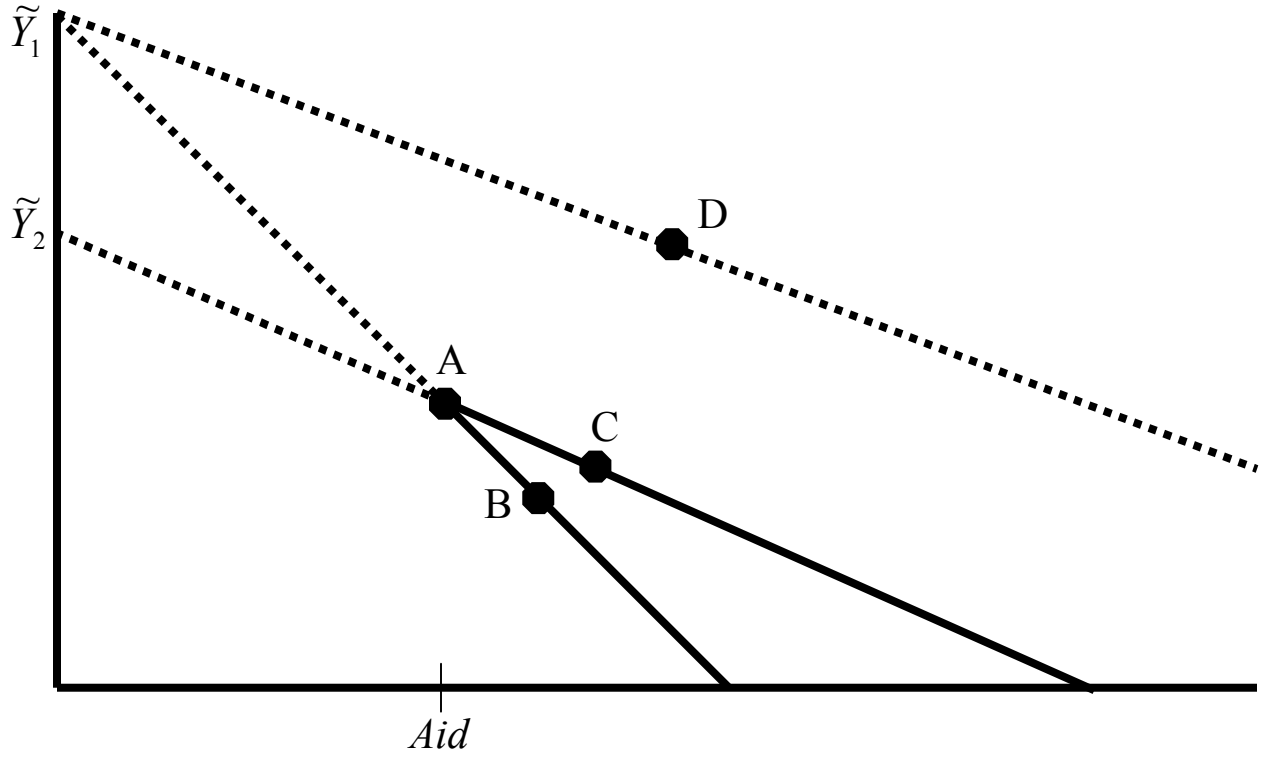


Figure 4: Elasticity of Expenditure with Respect to Group Tax-Price

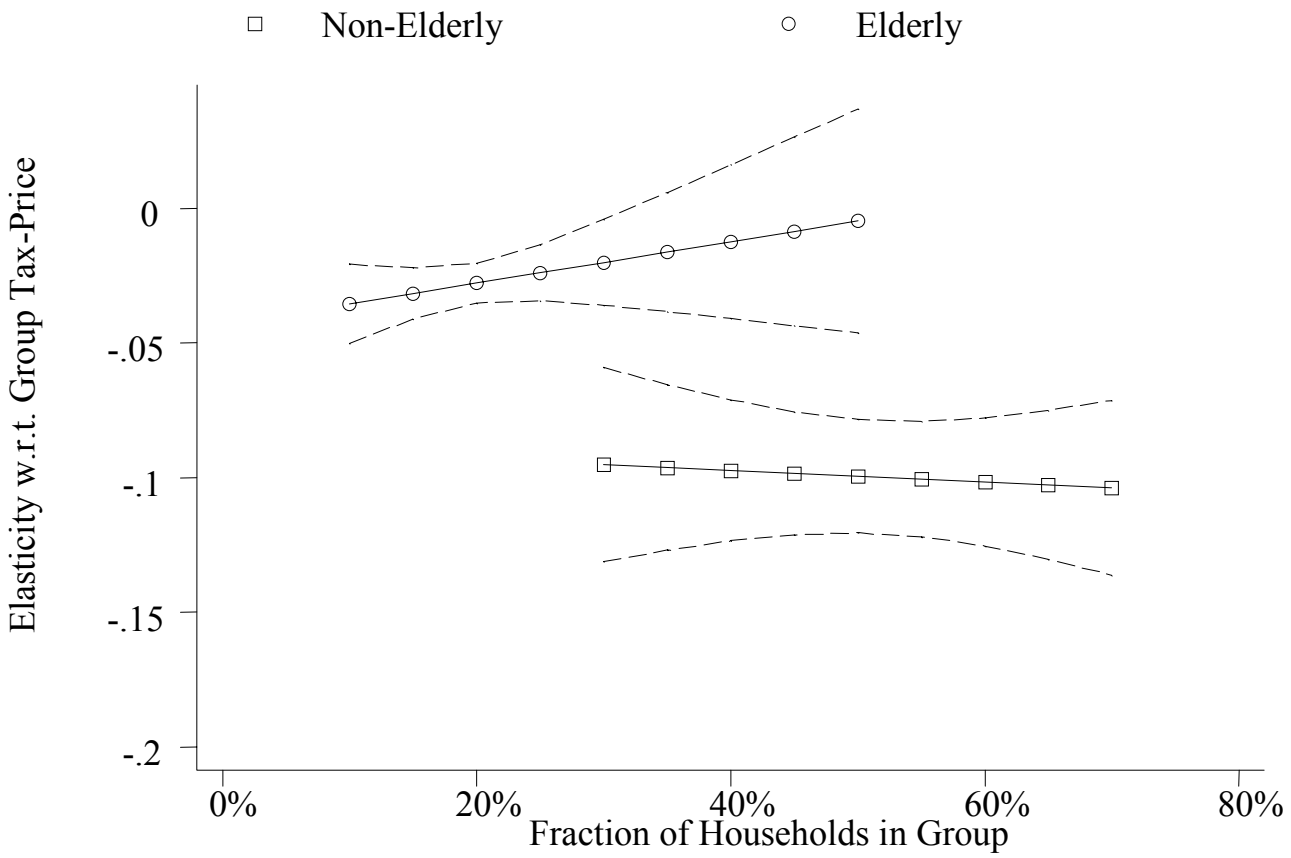


Table 1: Variation in NYSTAR Exemptions by County

Panel A: Typical NY County

School Year	Basic NYSTAR	Enhanced NYSTAR
1998-1999	$0	$50,000
1999-2000	$10,000	$50,000
2000-2001	$20,000	$50,000
2001-2002	$30,000	$50,000

Panel B: Westchester County

School Year	Basic NYSTAR	Enhanced NYSTAR
1998-1999	$0	$118,130
1999-2000	$24,254	$121,270
2000-2001	$46,612	$116,530
2001-2002	$70,386	$117,310

Table 2: Summary Statistics for Sample of NY School Districts (N=619)

	Mean	Standard Deviation
Expenditure per Pupil 1997-1998	$10,362	$2,799
Operational Exp. Per Pupil 1997-1998	$9,235	$2,664
Operational State Aid per Pupil 1997-1998	$3,356	$1,451
Federal Aid per Pupil 1997-1998	$368	$243
% Property Taxes Paid by NYSTAR 1998-1999	6.0%	2.9%
% Property Taxes Paid by NYSTAR 1999-2000	11.3%	4.6%
% Property Taxes Paid by NYSTAR 2000-2001	16.2%	6.4%
% Property Taxes Paid by NYSTAR 2001-2002	21.0%	8.3%
% Households Elderly Homeowners, Census 2000	19.5%	4.6%
% Households Non-Elderly Homeowners, Census 2000	56.2%	10.0%
Grant Aid/Aggregate Income 1997-1998	4.9%	3.6%
Avg. Residential Share of Property Taxes 1991-1995	64.2%	13.0%
Avg. "Immobile" Share of Property Taxes 1991-1995	7.4%	9.1%
Avg. "Semi-Mobile" Share of Property Taxes 1991-1995	17.9%	8.6%
Avg. "Industrial" Share of Property Taxes 1991-1995	3.1%	5.2%
Avg. "Public Service" Share of Property Taxes 1991-1995	9.9%	10.1%
Variation in Owner-Occupied Home Values	0.533	0.146

Notes: 1) Expenditure and Aid figures are in nominal dollars.

2) "Immobile" property consists of the classes "Vacant Land," "Wild, Forested, Conservation Lands and Public Parks," and "Recreation and Entertainment"; "Semi-Mobile" property consists of the classes "Commercial," "Agricultural," and "Community Services." A full description of property classification in New York is given in table A.2.

3) Variation in owner-occupied home values is specified as the difference in value between the 75th percentile and the 25th percentile divided by the median.

Table 3: The Average Impact of NYSTAR on Educational Expenditure

	OLS	Naïve OLS
Community Tax-Price Elasticity	**-0.178**	**-0.145**
Ln (1- nystar%)	**(0.021)****	**(0.018)****
Ln (Mean Income)	-0.003	0.012
	(0.011)	(0.011)
Ln (# Tax Returns)	0.207	0.225
	(0.036)**	(0.035)**
$\text{Ln}\left(1+\frac{(1-\text{nystar\%})*\text{Aid}}{\text{Aggregate Income}}\right)$	0.638	
	(0.198)**	
$\text{Ln}\left(1+\frac{\text{Aid}}{\text{Aggregate Income}}\right)$		1.356
		(0.175)**
Ln (Enrollment)	0.161	0.163
	(0.037)**	(0.035)**
ΔLn (Enrollment)	-0.113	-0.106
	(0.033)**	(0.033)**
District Fixed Effects	Yes	Yes
Region Trends, City Trend	Yes	Yes
Observations	4333	4333
R-squared	0.9988	0.9988

Notes: 1) The dependent variable in all regressions is the natural log of operational expenditure.

2) Estimates from column 2 are referred to as naïve because they ignore the interaction between tax-prices and lump-sum grants in the determination of educational expenditure.

3) Calculations of effects for a typical district assume a tax-price of 1 and ratio of grant aid to aggregate income of .05.

4) Standard errors (in parentheses) are clustered by school district.

5) * significant at 5%; ** significant at 1%.

Table 4: The Average Impact of NYSTAR on Educational Expenditure: Checks for Robustness

	OLS	2SLS	OLS	OLS	OLS
Community Tax-Price Elasticity	**-0.178**	**-0.172**	**-0.122**	**-0.269**	**-0.089**
Ln (1- nystar%)	**(0.021)****	**(0.024)****	**(0.023)****	**(0.021)****	**(0.034)****
Ln (Mean Income)	-0.003	-0.004	0.012	0.109	0.010
	(0.011)	(0.011)	(0.012)	(0.014)**	(0.014)
Ln (# Tax Returns)	0.207	0.206	0.231	0.348	0.198
	(0.036)**	(0.036)**	(0.037)**	(0.037)**	(0.038)**
$\text{Ln}\left(1+\frac{(1-\text{nystar\%})*\text{Aid}}{\text{Aggregate Income}}\right)$	0.638	0.615	0.536	1.155	0.431
	(0.198)**	(0.210)**	(0.199)**	(0.219)**	(0.250)
Ln (Enrollment)	0.161	0.161	0.280	0.259	0.169
	(0.037)**	(0.037)**	(0.030)**	(0.033)**	(0.038)**
ΔLn (Enrollment)	-0.113	-0.113	-0.163	-0.176	-0.124
	(0.033)**	(0.033)**	(0.033)**	(0.034)**	(0.034)**
District Fixed Effects	Yes	Yes	Yes	Yes	Yes
Region Trends, City Trend	Yes	Yes	No	No	No
No SFE States' Trend	No	No	Yes	No	No
Neighboring States' Trend	No	No	No	Yes	No
Region*Year Effects, City*Year Effects	No	No	No	No	Yes
Observations	4333	4333	4333	4333	4333
R-squared	0.9988	0.9988	0.9987	0.9987	0.9988

Notes: 1) The dependent variable in all regressions is the natural log of operational expenditure.

2) Variables containing NYSTAR% are instrumented in 2SLS with variables of equivalent functional form based on predicted values of NYSTAR%.

3) Standard errors (in parentheses) are clustered by school district. * significant at 5%; ** significant at 1%

Table 5: Local Response and the Distribution of Tax Relief

Panel A: Coefficient Estimates	(1)	(2)	(3)
Community Tax Price Elasticity	-0.058	-0.043	0.010
	(0.053)	(0.054)	(0.058)
Community Tax-Price Interacted with:			
Fraction of Households Who Rent Homes	-0.063	-0.072	-0.119
	(0.044)	(0.043)+	(0.102)
Variation in Owner-Occupied Home Values	-0.215	-0.155	-0.103
	(0.083)**	(0.089)+	(0.092)
Non-residential Property Share	-0.042	-0.290	-0.266
	(0.098)	(0.151)+	(0.156)+
"Immobile" Property Share		-0.506	-0.448
		(0.271)+	(0.284)
Industrial Property Share		0.467	0.480
		(0.255)+	(0.256)+
Public Utility Property Share		0.469	0.426
		(0.196)*	(0.204)*
District Fixed Effects	Yes	Yes	Yes
Region Trends, City Trend	Yes	Yes	No
Region*Year Effects, City*Year Effects	No	No	Yes
Panel B: Change in Tax-price Elasticity for 10% Increase in Non-residential Property Share			
"Immobile" Property		-0.080	-0.071
		(.026)**	(.027)**
"Semi-mobile" Property		-0.029	-0.027
		(.015)+	(.016)+
Industrial Property		0.018	0.021
		(.020)	(.021)
Public Utility Property		0.018	0.016
		(.014)	(.015)

Notes: 1) The dependent variable in all regressions is the natural log of operational expenses.
2) All regressions include controls for income and enrollment measures. Full results given in table A.1.
3) Variation in owner-occupied home values is specificied as the difference between the 75th and 25th percentile home values divided by the median home value.
4) "Immobile" property consists of the classes "Vacant Land," "Wild, Forested, Conservation Lands and Public Parks," and "Recreation and Entertainment"; "Semi-Mobile" property consists of the classes "Commercial," "Agricultural," and "Community Services." A full description of property classification in New York is given in table A.2.
5) Average values for the interaction terms are 36% non-residential property, 25% renters, and a ratio of the interquartile range to the median home value of .53.
6) Standard errors (in parentheses) are clustered by school district.
7) + significant at 10%; * significant at 5%; ** significant at 1%.

Table 6: The Relative Effects of Tax Relief for Elderly and Non-Elderly Homeowners

	(1)	(2)	(3)
Group Tax-Price Elasticity			
Elderly Homeowners	**-0.043**		
	(0.014)**		
Non-Elderly Homeowners	**-0.089**		
	(0.037)*		
Interactions of Group Tax-Price with Group Size:			
Elderly Homeowners	**0.077**	**-0.116**	**-0.071**
	(0.068)	**(0.020)****	**(0.035)***
Non-Elderly Homeowners	**-0.022**	**-0.165**	**-0.106**
	(0.069)	**(0.020)****	**(0.042)***
Ln (Mean Income)	0.016	0.007	0.014
	(0.013)	(0.013)	(0.015)
Ln (# Tax Returns)	0.184	0.186	0.188
	(0.036)**	(0.036)**	(0.038)**
$\text{Ln}\left(1+\frac{(1-\text{nystar\%})*\text{Aid}}{\text{Aggregate Income}}\right)$	0.860	0.774	0.557
	(0.227)**	(0.230)**	(0.274)*
Ln (Enrollment)	0.208	0.206	0.194
	(0.037)**	(0.037)**	(0.038)**
ΔLn (Enrollment)	-0.141	-0.132	-0.133
	(0.033)**	(0.034)**	(0.034)**
District Fixed Effects	Yes	Yes	Yes
Region Trends, City Trend	Yes	Yes	No
Region*Year Effects, City*Year Effects	No	No	Yes
Observations	4333	4333	4333
R-squared	0.9988	0.9988	0.9988

Notes: 1) The dependent variable in all regressions is the natural log of operational expenditure.
2) Group tax-prices are defined as the amount of money a group as a whole must pay when expenditure rises by one dollar.
3) Standard errors (in parentheses) are clustered by school district. * significant at 5%; ** significant at 1%.

Figure A.1: New York State Comptroller Regions

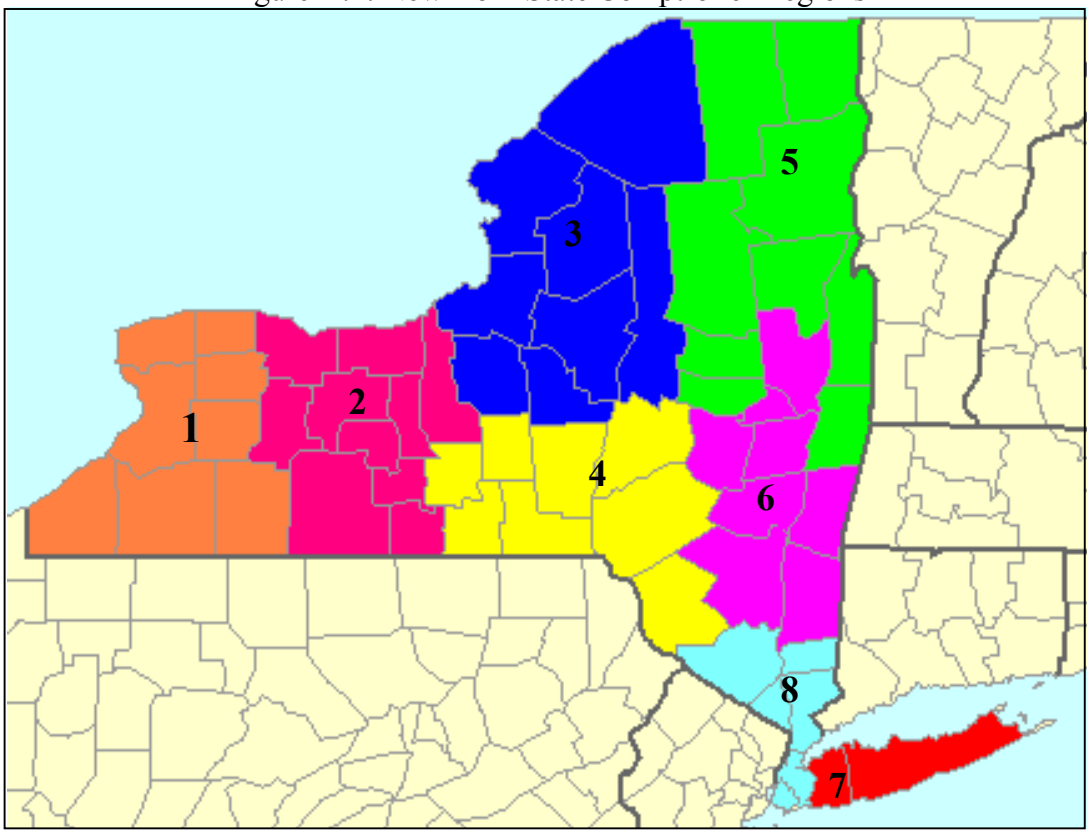
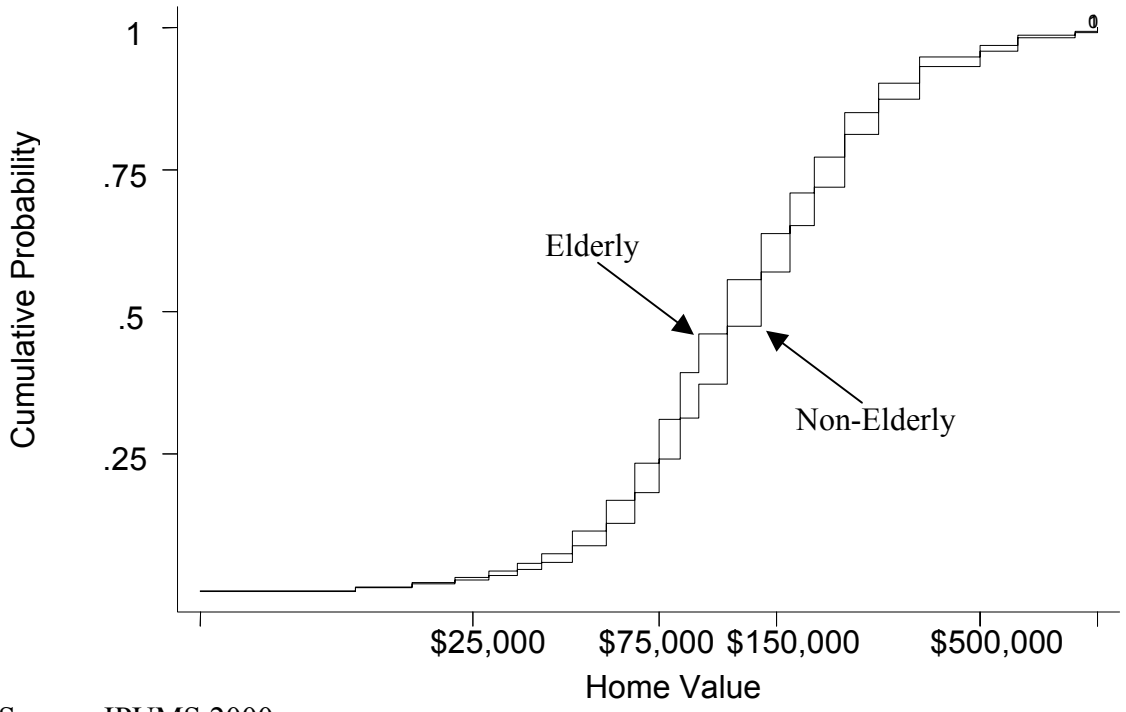


Figure A.2: The Cumulative Distribution of Home Values for Elderly and Non-Elderly Homeowner Households, 1999



Source: IPUMS 2000

Table A.1: Local Response and the Distribution of Tax Relief, Full Results

	(1)	(2)	(3)
Community Tax Price Elasticity	-0.058	-0.043	0.010
	(0.053)	(0.054)	(0.058)
Community Tax-Price Interacted with:			
Fraction of Households Who Rent Homes	-0.063	-0.072	-0.119
	(0.044)	(0.043)+	(0.102)
Variation in Owner-Occupied Home Values	-0.215	-0.155	-0.103
	(0.083)**	(0.089)+	(0.092)
Non-residential Property Share	-0.042	-0.290	-0.266
	(0.098)	(0.151)+	(0.156)+
"Immobile" Property Share		-0.506	-0.448
		(0.271)+	(0.284)
Industrial Property Share		0.467	0.480
		(0.255)+	(0.256)+
Public Utility Property Share		0.469	0.426
		(0.196)*	(0.204)*
Ln (Mean Income)	-0.007	-0.002	0.019
	(0.011)	(0.012)	(0.015)
Ln (# Tax Returns)	0.205	0.185	0.192
	(0.036)**	(0.037)**	(0.039)**
$\text{Ln}\left(1+\frac{(1-\text{nystar\%})*\text{Aid}}{\text{Aggregate Income}}\right)$	0.741	0.813	0.668
	(0.203)**	(0.214)**	(0.276)*
Ln (Enrollment)	0.173	0.183	0.182
	(0.037)**	(0.038)**	(0.039)**
ΔLn (Enrollment)	-0.119	-0.123	-0.129
	(0.033)**	(0.033)**	(0.034)**
District Fixed Effects	Yes	Yes	Yes
Region Trends, City Trend	Yes	Yes	No
Region*Year Effects, City*Year Effects	No	No	Yes
Non-Residential Property Share Trends	No	No	No
Observations	4333	4333	4333
R-squared	0.9988	0.9988	0.9988

Notes: 1) The dependent variable in all regressions is the natural log of operational expenses.

2) All regressions include controls for income and enrollment measures. Full results given in table A.1.

3) Variation in owner-occupied home values is specificied as the difference between the 75th and 25th percentile home values divided by the median home value.

4) "Immobile" property consists of the classes "Vacant Land," "Wild, Forested, Conservation Lands and Public Parks," and "Recreation and Entertainment"; "Semi-Mobile" property consists of the classes "Commercial," "Agricultural," and "Community Services." A full description of property classification in New York is given in table A.2.

5) Average values for the interaction terms are 36% non-residential property, 25% renters, and a ratio of the interquartile range to the median home value of .53.

6) Standard errors (in parentheses) are clustered by school district.

7) + significant at 10%; * significant at 5%; ** significant at 1%.

Table A.2: Property Classification in New York State

Code	Name	Code	Name	Code	Name
100	AGRICULTURAL	400	COMMERCIAL	700	INDUSTRIAL
110	Livestock and Products	410	Living Accommodations	710	Manufacturing and Processing
120	Field Crops	411	Apartments	720	Mining and Quarrying
130	Truck Crops - Mucklands	420	Dining Establishments	730	Wells
140	Truck Crops - Not Mucklands	430	Motor Vehicle Services	740	Industrial Product Pipelines
150	Orchard Crops	440	Storage, Warehouse and Distribution Facilities	800	PUBLIC SERVICES
160	Other Fruits	450	Retail Services	810	Electric and Gas
170	Nursery and Greenhouse	460	Banks and Office Buildings	820	Water
180	Specialty Farms	470	Miscellaneous Services	830	Communication
190	Fish, Game and Wildlife Preserves	480	Multiple Use or Multipurpose	840	Transportation
200	RESIDENTIAL	500	RECREATION AND ENTERTAINMENT	850	Waste Disposal
210	One Family Year-Round Residence	510	Entertainment Assembly	860	Special Franchise Property
220	Two Family Year-Round Residence	520	Sports Assembly	880	Electric and Gas Transmission Facilities
230	Three Family Year-Round Residence	530	Amusement Facilities	900	WILD, FORESTED, CONSERVATION LANDS AND PUBLIC PARKS
240	Rural Residence with Acreage	540	Indoor Sports Facilities	910	Private Wild and Forest Lands except for
250	Estate	550	Outdoor Sports Activities		Private Hunting and Fishing Clubs
260	Seasonal Residences	560	Improved Beaches	920	Private Hunting and Fishing Clubs
270	Mobile Home	570	Marinas	930	State Owned Forest Lands
280	Residential - Multi-Purpose/Multi-Structure	580	Camps, Camping Facilities and Resorts	940	Reforested Land and Other Related Conservation Purposes
300	VACANT LAND	590	Parks	950	Hudson River and Black River Regulating District Land
310	Residential	600	COMMUNITY SERVICES	960	Public Parks
311	Residential Vacant Land	610	Education	970	Other Wild or Conservation Lands
320	Rural	620	Religious	980	Taxable State Owned Conservation Easements
330	Vacant Land Located in Commercial Areas	630	Welfare	990	Other Taxable State Land Assessments
340	Vacant Land Located in Industrial Areas	640	Health		
350	Urban Renewal or Slum Clearance	650	Government		
380	Public Utility Vacant Land	660	Protection		
		670	Correctional		
		680	Cultural and Recreational		
		690	Miscellaneous		

Source:New York Office of Real Property Services Assesor's Manual, http://www.orps.state.ny.us/assessor/manuals/vol6/ref/prclas.htm