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Property tax limits, local fiscal behavior, and property values: evidence from Massachusetts under Proposition $2\frac{1}{2}$

Katharine L. Bradbury[a], Christopher J. Mayer[b,*], Karl E. Case[c]

[a]*Federal Reserve Bank of Boston, Boston, MA, USA*
[b]*Wharton School, University of Pennsylvania, 314 Lauder-Fischer Hall, 256 South 37th Street, Philadelphia, PA 19104-6330, USA*
[c]*Wellesley College and Federal Reserve Bank of Boston, Boston, MA, USA*

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Abstract

This paper examines the impact of a specific property tax limit, Proposition $2\frac{1}{2}$ in Massachusetts, on the fiscal behavior of cities and towns in Massachusetts and the capitalization of that behavior into property values. Proposition $2\frac{1}{2}$ places a cap on the effective property tax rate at 2.5% and limits nominal annual growth in property tax revenues to 2.5%, unless residents pass a referendum allowing a greater increase. The study analyzes the 1990–1994 period, a time when Massachusetts municipalities faced significant fiscal stress because of a 30% cut in real state aid and a demographically driven increase in school enrollments. The findings include the following: (1) Proposition $2\frac{1}{2}$ significantly constrained local spending in some communities, with most of its impact on school spending; (2) constrained communities realized gains in property values to the degree that they were able to increase school spending despite the limitation; and (3) changes in non-school spending had little impact on property values.

Keywords: Proposition $2\frac{1}{2}$; Tax limitations; Capitalization; Educational spending

JEL classification: H2; H3; H7

*Corresponding author.
E-mail address: mayerc@wharton.upenn.edu (C.J. Mayer).

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1. Introduction

Beginning with California's passage of Proposition 13 in 1978, an increasing number of states have enacted measures that limit the ability of municipalities to tax their residents to pay for local services. In most cases, the political support for these tax limits comes from voters who are concerned about local officials' lack of responsiveness to the electorate; voters fear that officials will impose taxes to pay for services whose cost exceeds their value to local residents.

This paper looks at the impact of a specific tax limit, Proposition $2\frac{1}{2}$, on the fiscal behavior of cities and towns in Massachusetts and the effects of that behavior on property values.[1] Proposition $2\frac{1}{2}$ places a cap on the effective property tax rate at 2.5% and limits nominal annual growth in property tax revenues to 2.5%, unless residents pass a referendum (an override) allowing a greater increase. The empirical work that follows explores whether towns that face larger barriers to raising additional tax revenue spend less on local services and thereby become less attractive to potential home buyers. Differences across communities in pre-Proposition $2\frac{1}{2}$ tax rates and conditions allow a comparison of the fiscal decisions (expenditure patterns) of more and less constrained communities and the capitalization of that behavior into house prices. If movers in any period find one town more attractive than another, they will bid up the price of housing in the more attractive town. To the extent that cutting local public spending makes a community less desirable, increases in local spending will be associated with rising housing prices.

We begin by estimating the relationship between town spending and constraints imposed by Proposition $2\frac{1}{2}$ between 1990 and 1994, a time when Massachusetts cities and towns faced strong budget pressures because of the coincidence of two factors: a steep decline in real state aid and a sizable increase in school enrollments. The estimates indicate that cities and towns that faced tighter Proposition $2\frac{1}{2}$ budget constraints reduced their expenditures relative to communities that faced fewer constraints. Furthermore, these relative reductions were not proportional across all spending categories; the evidence shows that Proposition $2\frac{1}{2}$ had a more profound impact on local school spending than on the rest of the local budget.

Reductions in spending could represent undesirable service cuts forced by the constraint or exactly the kind of change that backers of Proposition $2\frac{1}{2}$ wanted. The original premise behind Proposition $2\frac{1}{2}$ was that local officials had a tendency to spend 'too much' unless checked by the voters (Ladd and Boatright Wilson,

[1] See Oates (1969), Edelstein (1974), Rosen and Fullerton (1977), Brueckner (1982), Roback (1982), Rosen (1982), Yinger et al. (1988), Black (1997), Yinger (1982) and a host of other tests of tax capitalization and the Tiebout hypothesis. Ross and Yinger (2000) provide an excellent review.

1982). Thus, the second part of the paper correlates changes in house prices with changes in spending. To the degree that the premise behind Proposition $2\frac{1}{2}$ is correct, towns that reduce their spending should see their house prices rise faster than those of other communities. Alternatively, if Proposition $2\frac{1}{2}$ makes it more difficult for communities to achieve residents' preferred level of spending, house prices should fall in towns that reduce their expenditures.

The evidence indicates that Proposition $2\frac{1}{2}$ did affect local house prices through changes in town spending: house prices performed worse in communities that had slower increases in spending, suggesting that Proposition $2\frac{1}{2}$ led communities to spend 'too little' on services. Communities also did not appear to optimize their spending mix; increases in school spending have a strong positive effect on house prices, while the coefficient on the nonschool spending variable is not statistically different from zero. These results are robust over different specifications, including an interactive specification that allows capitalization to vary with the nature of the constraint in each community.

Interpreting these results from a policy perspective depends on assumptions about the extent to which the preferences of those who determine the level of public spending (such as the median voter or government officials) differ from those of the marginal homebuyer, who sets the level of house prices. In this context, the findings can be interpreted as an indication that the marginal homebuyer prefers more school services than most constrained communities were providing in 1990. Apparently Proposition $2\frac{1}{2}$ affected the political balance of power so as to cut local school spending and reduce property values in communities constrained by its strict revenue limits.

This paper uses a different methodology than most previous research, focusing on changes in spending and house prices, rather than levels of those variables, using first differences controls for the omitted variable problems that can bias cross-sectional regressions. In addition, we address the possibility that the values of some fixed attributes change over time. Controlling for changes in the value of attributes such as town location and school quality is important because these attributes may be correlated with factors related to Proposition $2\frac{1}{2}$. Furthermore, because of the endogeneity of contemporaneous local spending with house prices, the regressions use community characteristics and measures of Proposition $2\frac{1}{2}$ from the date of its original passage as instruments for spending changes 10 years later.

The paper proceeds as follows: Section 2 describes the mechanics of Proposition $2\frac{1}{2}$. Section 3 discusses the theory behind local price determination and public choice and reviews previous research that investigates the capitalization of local fiscal outcomes into house prices. Section 4 summarizes the data. The effects of Proposition $2\frac{1}{2}$ on school and nonschool spending are estimated in Section 5. Section 6 looks at the effects of changes in local spending on house price changes. Section 7 concludes the paper.

2. The constraints of Proposition $2\frac{1}{2}$

Massachusetts citizens passed Proposition $2\frac{1}{2}$ in November 1980, reducing effective property tax rates to 2.5% and limiting future nominal growth in annual property tax revenues (the levy limit) to 2.5% plus an allowance for new growth. Voters can raise the levy limit faster than this by passing an override or exclusion, but an override can never raise the effective property tax rate above 2.5%.[2] These provisions, are represented in the following equations for fiscal year t:

$$(\text{levy limit})_t = 1.025(\text{levy limit})_{t-1} + (\text{new growth})_t(\text{tax rate})_{t-1} + \text{overrides}_t \tag{1}$$

$$(\text{total tax levy})_t \leq \min((\text{levy limit})_t, (0.025(\text{taxable property value})_t)). \tag{2}$$

While the limits imposed by Proposition $2\frac{1}{2}$ apply equally to each city and town,[3] variations in local economic and fiscal conditions at the time of its passage have led the measure to have very different impacts on individual communities in Massachusetts.

The initial result of Proposition $2\frac{1}{2}$ in many municipalities was to reduce effective property tax rates to 2.5%; 191 of the 351 cities and towns in the Commonwealth (54%) had effective tax rates in fiscal year 1980 that were higher than 2.5%. Jurisdictions could lower their tax rates in two ways: by reducing their tax levy and by raising the estimated market value of local property.[4] While moving to full-value assessment helped some municipalities cut tax rates, about 45% of the Commonwealth's cities and towns also had to reduce their levies to bring their tax rate down. Just over one-third of the communities (124 of 351) needed only 1 year of property tax reductions; another 9% needed to cut their levies for 2 (24) or even 3 (9) years to bring their rates down to the 2.5% tax rate ceiling.[5]

[2] An override raises the levy limit for a specific fiscal year, and that increase becomes a permanent part of the levy limit (going into the base for calculating the next year's levy limit). An exclusion is a temporary increase in a community's levy limit to pay for an 'excluded' capital expenditure. Exclusions can temporarily raise the property tax rate above 2.5%, but overrides (not being temporary) cannot.

[3] Virtually all local revenue-raising and spending decisions are made at the municipal (city and town) level in Massachusetts; every area in the state is part of a municipality.

[4] Previously, local governments benefited if the state underestimated their market values because aid was distributed in inverse proportion to the state's estimate of market value. Most communities were not assessing property at its full market value in 1980; state law, however, required them to move to full-value assessment.

[5] Proposition $2\frac{1}{2}$ required communities to reduce their levy by 15% per year until the effective rate was down to 2.5%. A community is counted as being required to make 1 year of reductions if two conditions were met: its levy declined in only 1 fiscal year between 1981 and 1984 and its 1980 effective property tax rate was over 2.5%. Similarly, towns are characterized as needing 2 years of reductions if their levy fell in 2 fiscal years and their 1980 effective tax rate was between 2.9 and 3.5%.

After the first few years when it mandated actual revenue reductions, Proposition $2\frac{1}{2}$ had a limited effect on local budgets because the state government anted up considerable increases in general purpose aid to municipalities to help them avoid possible budget shortfalls. As shown in Fig. 1, real state aid to municipalities increased more than 70% between 1981 and 1988. In addition, school expenses, which typically constitute about one-half of local budgets, declined because of significant declines in the number of school-aged children (Fig. 2). Furthermore, a region-wide real estate boom in the mid 1980s meant that the new growth provisions added considerably to towns' levy limits. Finally, communities increased their reliance on non-property tax revenues, although such sources are limited in Massachusetts. As result of all of these factors, effective property tax rates declined precipitously in most municipalities, and many communities raised taxes at a slower pace than that allowed under Proposition $2\frac{1}{2}$.

In the late 1980s, however, the New England economy soured, reducing real estate values and new construction. Furthermore, lower revenues led the state to reduce its local aid. Local aid fell 12% in real terms in fiscal year 1990 alone and over 30% between fiscal years 1989 and 1992 (Fig. 1). At the same time, favorable demographic trends came to an end as baby-boomers' children reached school-attending ages; school enrollments began to rise after 1989 (Fig. 2). Even without the recession, Proposition $2\frac{1}{2}$ would have become more binding over time because it operates in purely nominal terms, allowing no adjustment for changes in

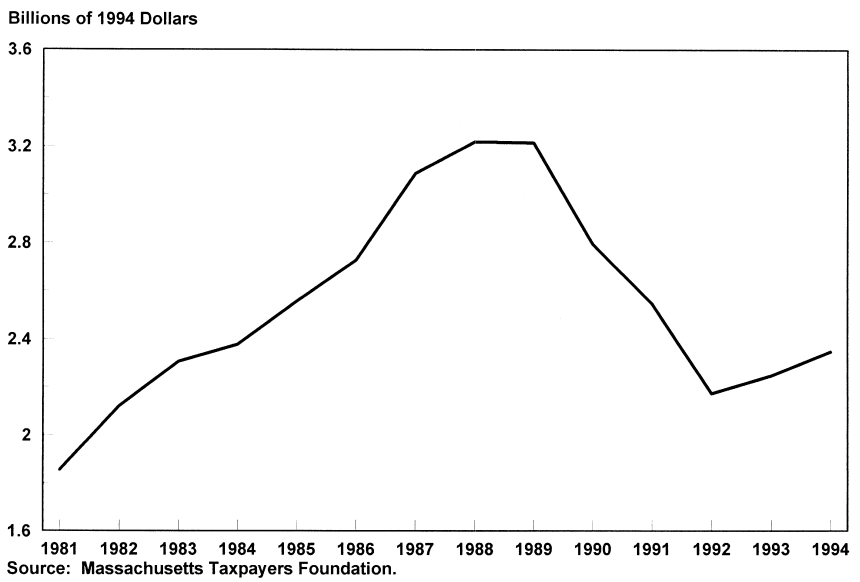

Fig. 1. Massachusetts State Government expenditures on local aid.

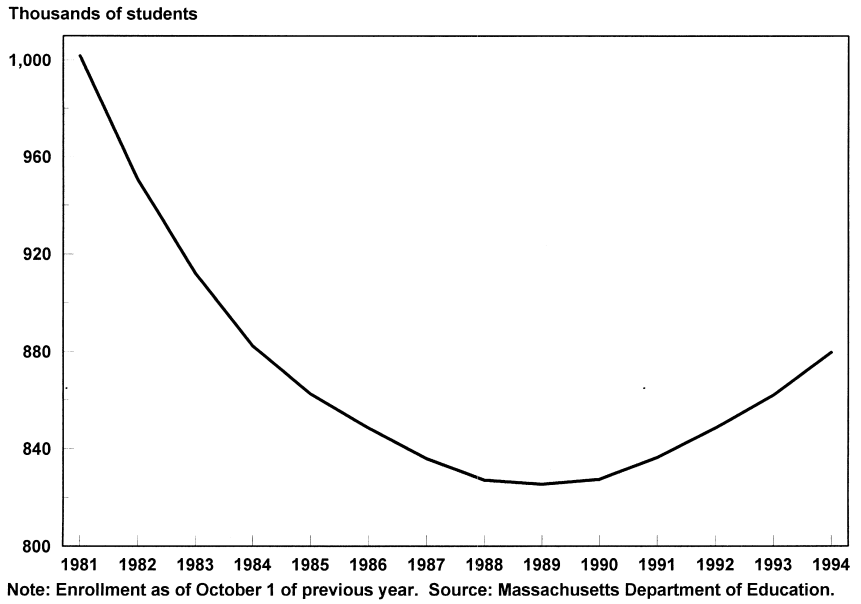

Fig. 2. Massachusetts K-12 public school enrollments.

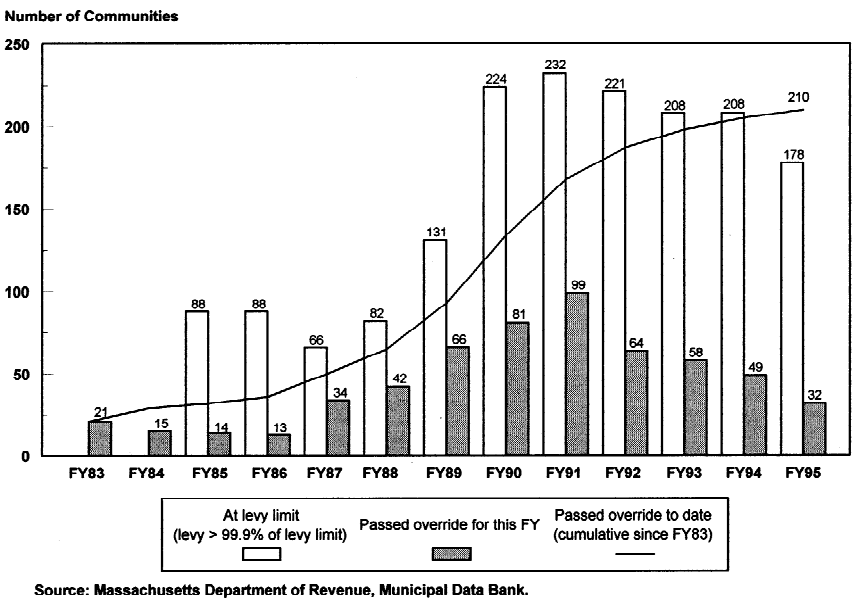

Fig. 3. Proposition $2\frac{1}{2}$ constraints and overrides.

prices, costs, or spending needs. As a result of all these factors, an increasing number of cities and towns bumped against their levy limits toward the end of the decade.

Fig. 3, using a fairly stringent indicator of constraint (a community is considered to be 'at its levy limit' if its property tax levy is within one-tenth of 1% of its levy limit), shows fewer than one-quarter of the 351 cities and towns at their levy limits in fiscal year 1988, almost 40% in 1989, and almost two-thirds in 1990. A few communities, however, remained well below their levy limits even in the 1990s. As more communities bumped up against their levy limits, the number of communities passing overrides rose steadily from the low teens in the mid 1980s to peak at 99 for fiscal year 1991 (see Fig. 3).[6] Some communities passed overrides repeatedly, others only once, and others not at all. The remainder of the paper focuses on the 1990–1994 period when the provisions of Proposition $2\frac{1}{2}$ became binding in most communities for the first time since the beginning of the 1980s.

3. Determinants of house prices and local public service levels

Following Tiebout (1956), most research on local public finance models house prices as the equilibrium outcome of a process in which mobile households choose among a set of communities with varying locational amenities, public service levels, and tax rates. Consistent with this research, the equilibrium price of housing can be represented as:

$$P^* = \alpha_0 + \alpha_1(\text{fixed amenities}) + \alpha_2(\text{public services}) + \alpha_3(\text{housing stock}) \tag{3}$$

where α_1 is the value to the marginal homebuyer of fixed amenities such as location and community characteristics, α_2 represents the value of the level of public services, net of taxes needed to finance them, and α_3 is the coefficient on the size of the housing stock. This latter coefficient reflects the responsiveness of price to increased supply, which is expected to be negative as long as the supply of new units is not perfectly elastic. Zoning rules that fix minimum lot sizes and limit higher density redevelopment or restrictions on creating new towns ensure an upward sloping supply curve within a metropolitan area, even in the long run.[7]

[6] Increasing numbers of communities also passed capital or debt exclusions. Because they do not raise the levy limit permanently and do not reflect operating expenditures, these exclusions are not included in our analysis.

[7] See Fischel (1990) for a summary of the literature on zoning. Hamilton (1975) shows that under a series of restrictive assumptions, including perfectly elastic supply and zoning ordinances that control the exact quantity of housing consumption, there is no capitalization of local amenities and thus α_1, α_2, and α_3 are equal to zero. As noted in Fischel, these assumptions are not satisfied empirically. Nonetheless, because new supply's dependence on zoning makes it endogenous when residents choose zoning policies that maximize their private benefits, most models ignore new supply in Eq. (3).

3.1. Capitalization of spending in house prices (the coefficient α_2)

In a simple model with a proportional property tax and homogeneous consumers, the first order conditions imply that the ratio of the after (property) tax price of housing divided by the price of a composite good equals the representative consumer's marginal rate of substitution between housing and the composite good. (See Ellickson (1971) for example.) This model thus implies that taxes and public services are capitalized into house prices as the marginal willingness to pay of the representative consumer.

More recently, Wheaton (1993) and Epple et al. (1984, 1993) generalize this simple model by adding heterogeneous households and a variable quantity of housing. Ross and Yinger (2000) provide a complete summary of the literature that considers both a housing market and the market for local public services. With heterogeneous households, this more complicated model can be solved to obtain an equilibrium condition known as 'matched sorting', in which similar types of households sort according to their willingness to pay for the public service. In this equilibrium, the capitalized value of public services in house prices is determined by the willingness to pay of the marginal homebuyer in the closest adjacent income/preference group.

However, as Epple et al. note, public service levels are endogenous; unlike fixed amenities, they can be altered by local action. Following Bradbury (1994), within any community, desired levels of local government services can be modeled as a function of how much those services are valued, the costs of producing the services, and the jurisdiction's ability to raise revenue:

$$(\text{school, nonschool spending}) = F\ (\text{preferences, costs, revenue capacity}). \tag{4}$$

This specification is consistent with models that link the behavior of municipalities in choosing the level of public services with the preferences of the median voter.[8] It is also consistent with other models when the preference variables are broadly defined to reflect preferences (valuations of spending) of government bureaucrats and local interest groups.

With public service levels set by local voters, the specification in Eq. (3), which makes house prices a function of spending on public services, is subject to the critique of Brueckner (1982). He argues utility-maximizing voters will choose a spending level such that the marginal benefit of an extra dollar of spending will be exactly offset by the marginal cost of the taxes needed to finance that spending. In

[8] See Bergstrom and Goodman (1973) and Wildasin (1986). Romer and Rosenthal (1979) provide a critique of the median voter model.

this case, net spending would have a zero coefficient ($\alpha_2 = 0$) in Eq. (3).[9] Yinger (1985) criticizes this efficiency result from a theoretical basis, noting that the existence of property taxes that apply to both capital (the value of the housing structure) and land drives a wedge between the first order conditions that govern the spending choice of communities and housing consumption of individuals. As a result, local spending choices are always second best.

Adding in the general equilibrium issues of mobility and sorting, voting outcomes can affect the sorting equilibrium across communities, and vice versa, as a town's attractiveness to movers changes with its public service package and new residents join the voter rolls.[10] In this context, the zero capitalization result is further undermined by heterogeneity, if the median voter's preferences, which determine spending, differ from the marginal buyer's, which determine house prices. Thus, if a higher fraction of new home buyers than existing residents are young and have children, the new buyers will be more concerned about schools. As a result, voters may decide to increase school spending in order to attract movers (and see their house prices bid up) even though they are otherwise indifferent between holding steady and raising spending along with the taxes to pay for it.

Finally, as noted above, voters may not have direct control of spending if governments or public officials have independent authority. Cutler et al. (1999), for example, find some support for the hypothesis that public officials in Massachusetts before Proposition $2\frac{1}{2}$ chose higher public spending than voters would choose themselves. They hypothesize that this could occur either because the officials' preferences differ from those of the voters or because the officials yield to pressure from outside groups or from their own employees.

Whether voters directly choose spending levels or not, however, a finding that house price changes respond positively to spending changes implies that increases in spending raise the relative attractiveness of a community. By contrast, the reverse result suggests that the marginal buyer judges the average town to be spending too much and prefers towns that reduce spending.

3.2. Tax limitations and house prices

Tax limitations introduce an additional possible source of discrepancy between

[9] Brueckner also does empirical work to demonstrate such a finding. However, the empirical work is subject to a number of problems, including endogeneity, measurement error of house prices, and omitted variables bias.

[10] Because of the difficult nature of this problem, many theoretical papers make simplifying assumptions such as myopic voters, the public provision of private goods, or a fixed housing size/stock. Even with these assumptions, the existence of a unique equilibrium is not guaranteed. Such an equilibrium is complicated by the types of sorting that are necessary for sorting equilibrium and thus positive capitalization (i.e. $\alpha_2 > 0$). Others (e.g. Case and Grant, 1991) use simulations to solve for an equilibrium.

the spending outcomes of communities and what the median voter, marginal homebuyer, or local public officials might otherwise choose. Spending on local services is limited by a community's budget constraint:

$$\text{total spending} = \text{property tax levy} + \text{state aid} + \text{other revenue}. \tag{5}$$

Thus, revenue availability, and fiscal limitations in particular, may alter voters' choices regarding their community's package of public services and taxes. Poterba and Rueben (1995), Dye and McGuire (1997), and Figlio (1998) have recently examined local decision-making in the context of tax limitations, generally finding that public spending is lower or grows more slowly in jurisdictions facing binding limits. In Massachusetts communities after 1981, the property tax component of the revenue stream in Eq. (5) may be constrained by either the growth limit or rate limit provisions of Proposition $2\frac{1}{2}$ as defined in Eqs. (1) and (2). Given the uneven impact of Proposition $2\frac{1}{2}$, cities and towns that are bound by these constraints may make different budgetary choices than unconstrained communities do.

While a consensus exists that Proposition $2\frac{1}{2}$ has made it more difficult for many communities to increase local government revenues in the decade and a half since it was enacted, it is not clear whether that restraint has moved communities toward or away from what residents and potential buyers prefer. Proponents argue that without Proposition $2\frac{1}{2}$, cities and towns would be overspending. Detractors say that local governments have been constrained to spend less than their residents actually want, notwithstanding the possibility for overrides.

4. The data

The analysis below includes a large number of community characteristics, school indicators, and fiscal variables. These variables are summarized in Table 1. During the 1990–1994 period, communities show significant variation in all of these variables. For example, despite an average increase in school spending of 15%, individual towns had significant positive and negative changes over the relatively short 4-year time period.

The house price indexes presented in this paper are obtained from Case, Shiller, and Weiss, Inc. The indexes are estimated using a variation on the weighted repeat sales methodology first presented in Case and Shiller (1987).[11] Because the indexes involve repeat sales of the same property, they are not affected by the mix

[11]The method uses arithmetic weighting described by Shiller (1991) and is based on recorded sales prices of all properties that pass through the market more than once during the period. The Massachusetts file contains over 135,000 pairs of sales drawn between 1982 and 1995. First, an aggregate index was calculated based on all recorded sale pairs. Next, indexes were calculated for individual jurisdictions.

Table 1
Variable list and means; $N = 208$

Variable	Mean	Standard deviation	Minimum	Maximum
Endogenous variables:				
Percent change in house prices, FY1990–1994	−0.077	0.057	−0.208	0.071
Percent change in school spending, FY1990–1994	0.15	0.09	−0.15	0.54
Percent change in nonschool spending, FY1990–1994	0.083	0.158	−0.323	0.680
Percent change in number of students, 1990–1994	0.070	0.080	−0.372	0.402
Percent change in population, 1990–1994	0.023	0.043	−0.098	0.166
Single family permits, 1990–1994, per 1990 housing unit	0.046	0.038	0.001	0.230
Fiscal variables:				
Effective property tax rate, FY1980	0.031	0.009	0.012	0.086
Dummy, 1 year of initial levy reductions, FY1982	0.46	0.50	0	1
Dummy, 2 years of initial levy reductions, FY1982–1983	0.12	0.32	0	1
Dummy, 3 years of initial levy reductions, FY1982–1984	0.034	0.181	0	1
Excess capacity as percentage of levy limit, FY1989	0.018	0.036	0.000	0.200
Education reform law's school spending rise, FY1993–1994[a]	0.12	0.12	0.00	0.48
Dummy variable, at levy limit and no overrides, FY1989[b]	0.44	0.50	0	1
Dummy variable, passed override(s) prior to FY1990	0.11	0.31	0	1
Dummy variable, 'unconstrained' in FY1989[c]	0.46	0.50	0	1
Equalized property value per capita, 1990 (000)	73.9	27.8	27.3	186.9
Equalized property value per capita, 1980 (000)	16.4	6.2	6.3	44.1
Nonresidential share of property value, FY1990	0.19	0.10	0.01	0.47
Nonresidential share of property value, FY1980	0.19	0.09	0.04	0.60
Percentage of revenue from state aid, FY1984	0.26	0.10	0.05	0.52
Percentage of revenue from state aid, FY1981	0.19	0.08	0.05	0.43
Percentage increase in state aid, FY1981–1984	0.43	0.31	−0.44	3.38
Community characteristics:				
School test scores, 1990[d]	2690	168	2160	3080
Fraction of 1990 resident work force in manufacturing	0.23	0.07	0.09	0.42
Fraction of 1990 population aged 35–60	0.32	0.04	0.23	0.47
Fraction of 1990 population under age 5	0.070	0.011	0.046	0.102
Fraction of 1980 population under age 5	0.062	0.013	0.032	0.112
Dummy variable, in Boston metro area (PMSA)	0.45	0.50	0	1
Dummy variable, in Boston suburban ring[e]	0.19	0.40	0	1
Developable land per housing unit, 1984[f]	0.66	0.41	0.04	2.17
Single family permits per 1990 housing unit, 1989	0.008	0.007	0.000	0.038
Enrollment/population ratio, 1990	0.15	0.03	0.07	0.36
Enrollment/population ratio, 1981	0.20	0.04	0.08	0.42
Median family income, 1990 (000)	44.5	12.8	22.1	95.1
Median family income, 1980 (000)	21.0	5.6	11.5	47.6
Dummy variable, member of regional district	0.26	0.44	0	1
Dummy variable, member of regional high school	0.19	0.39	0	1
Percent of adult residents with college education, 1990	0.27	0.13	0.08	0.65
Percent of adult residents with college education, 1980	0.20	0.12	0.05	0.60

[a] Education reform law's school spending rise is FY1993–1994 required percentage increase in education spending.
[b] 'At levy limit' is defined as levy within 0.1% of levy limit.
[c] 'Unconstrained' communities are not at levy limit in FY1989 and have passed no overrides prior to FY1990.
[d] School test scores is combined math and reading MEAP test score for 8th graders in 1990.
[e] Boston suburban ring is defined as within MSA but outside PMSA.
[f] Developable land is defined as open, non-public acres plus land in residential use. Sources: Massachusetts Department of Education; Massachusetts Department of Revenue, Division of Local Services, Municipal Data Bank; US Department of Commerce, Bureau of the Census.

of properties sold in a given time period or differences in average housing quality across communities. In Massachusetts, indexes are available for 214 of the 351 cities and towns, with the remaining communities having too few sales to generate reliable indexes. Other data limitations reduced the sample to 208 jurisdictions, most of which are located in the Boston metropolitan area.

Two types of measures of Proposition $2\frac{1}{2}$ constraints are included: one set indicates the degree of initial constraint, marked by a community's 1980 tax rate and the number of years of initial levy reductions required to lower that rate to 2.5%. The second set, because the analysis focuses on the 1990–1994 period, indicates the degree of constraint as of the preceding fiscal year, 1989. Gauges of the FY1989 constraint include how close a community was to its levy limit and whether the town had passed any overrides raising the levy limit for that or an earlier year as in Bradbury (1991). We use these variables to divide communities into three groups reflecting the extent to which Proposition $2\frac{1}{2}$ limited each town's expenditures relative to what they might have been without the tax limitation: towns whose spending is below their levy limit in 1989 without having passed an override ('unconstrained' communities), localities whose FY1989 spending level is within 0.1% of their levy limit and have never passed an override ('constrained' communities), and towns that have passed one or more overrides prior to fiscal year 1990.

In addition to Proposition $2\frac{1}{2}$, this analysis incorporates one other policy instrument that potentially explains differences in spending across communities. In 1993, Massachusetts adopted an educational reform plan that provided additional resources to many communities. In return for the increased school aid, the plan mandated a minimum local contribution to the school budget and increases in spending toward the 'foundation' level for low-spending communities. These mandates were binding on 227 of the 351 cities and towns in the first year, with an average mandated spending increase among those communities of 15.6% in FY1994.

5. Municipal budgets: empirical results for spending changes

The factors that influence local residents' demand for local public services are summarized in Eq. (4). If local spending decisions are instead made by local public officials, they are likely to be responsive to voter preferences, plus the strength of lobbying groups with a stake in local decisions. Demand factors are subject to the budget constraint (Eq. (5)) and local revenue raising may be limited by Proposition $2\frac{1}{2}$ in some communities.

A simple first-differencing of Eq. (4) suggests that changes in school and nonschool spending should be a function of changes in preferences, changes in cost factors, and changes in revenue capacity. Similarly, changes in the strength of various pressure groups may alter spending outcomes.

Modeling changes rather than levels has the advantage of removing a considerable degree of 'fixed effect' differences among communities, especially for nonschool spending, which serves businesses, commuters, and visitors, as well as residents. Most explanatory variables related to preferences, pressure groups, costs, and revenue capacity would not change noticeably over a 4-year time span. Some independent variables that remain fixed over time, however, may still influence spending changes if their effects on spending levels (their coefficients in the levels equations) change during the period. Thus the empirical equations include levels variables for preference (or pressure group) indicators, such as percent college-educated and median family income, and for resource availability, including the per capita property tax base and the marginal tax price to residents of raising additional revenue via the property tax (the commercial share of property values), plus other indicators of community and school district attributes.

One key element of demand and costs is the number of users of the service: students for education services and population for other services. Changes in the number of service users are endogenous to the process that determines house prices; that is, they result from the operation of the housing market that also leads to house price changes. They are treated as endogenous variables in the estimation. Additional instruments for the change in students and population include variables that measure the desirability of housing in a given community and the percentage of the population below age 5 in 1990 (a measure of the number of children who will be of school age in the next 4 years).[12]

In analyzing spending changes during the 1990–1994 period, two approaches are taken with regard to the constraints that each community faces at different points in time. The first specification includes all of the Proposition $2\frac{1}{2}$ variables described in the data section, including indicators of the degree of initial constraint and the degree of constraint and override history through 1989, as well as the FY1994 increase in school spending that the education reform bill mandated. The second approach excludes any measure of constraint that occurs substantially after the passage of Proposition $2\frac{1}{2}$ as endogenous to the process that determines house price changes and spending changes. The argument that the latter variables are endogenous is based on the view that these measures reflect some degree of past voter choice. Thus even though the 1989 variables reflect community choices made prior to the time period being analyzed, the coefficients on these variables might reflect community attributes that help to determine spending choices rather than the impact of Proposition $2\frac{1}{2}$ on community spending. A similar argument applies to the mandated 1994 school spending increases.

Table 2 reports estimates of the equations for percentage changes in school and nonschool spending between fiscal years 1990 and 1994 in the 208 Massachusetts cities and towns with available data. Columns 1 and 2 report equations that include

[12]The additional instruments include the exogenous variables in the housing equation in Table 3. These factors such as town location do not influence spending changes directly.

Table 2
Spending regression results. Dependent variable: percent change in school or nonschool spending, fiscal years 1990–1994[a]

Explanatory variable	School spending (1)	Nonschool spending (2)	School spending (3)	Nonschool spending (4)
Dummy variable, required 1 year	−0.0084	0.027	−0.017	0.017
of initial levy reductions, FY1982	(0.0155)	(0.027)	(0.016)	(0.029)
Dummy variable, required 2 years	−0.077**	−0.0094	−0.083**	−0.0035
of initial levy reduction, FY1982–1983	(0.028)	(0.0487)	(0.029)	(0.0510)
Dummy variable, required 3 years	−0.15**	0.057	−0.16**	0.051
of initial levy reductions, FY1982–1984	(0.05)	(0.086)	(0.05)	(0.091)
Effective property tax rate, FY1980	1.8	−1.4	2.4*	−0.23
	(1.2)	(2.2)	(1.2)	(2.23)
Excess capacity as a percentage	0.40*	−0.17		
of levy limit, FY1989	(0.21)	(0.37)		
Dummy variable, at levy limit	0.043**	0.043		
and no overrides, FY1989	(0.016)	(0.028)		
Dummy variable, passed override(s)	0.061**	0.15**		
prior to FY1990	(0.021)	(0.04)		
Percentage increase in school spending	0.030	−0.33**		
required by education reform law, FY1993–1994	(0.074)	(0.12)		
Percent change in number of students, 1990–1994	0.64**		0.71**	
	(0.17)		(0.16)	
Percent change in population, 1990–1994		1.1**		1.1*
		(0.5)		(0.5)
Equalized property value per capita, 1990 ($000)	0.00088*	0.00059	0.00096**	0.0012
	(0.00047)	(0.00083)	(0.00048)	(0.0009)
Ratio, enrollment to population, 1990	0.52*	−0.37	0.69**	−0.16
	(0.27)	(0.44)	(0.27)	(0.44)
Nonresidential share of property value, 1990	−0.020	−0.048	−0.062	−0.096
	(0.076)	(0.136)	(0.075)	(0.137)
Median family income, 1990	−0.0027**	−0.000081	−0.0032**	−0.000065
	(0.0011)	(0.001961)	(0.0011)	(0.002060)
Percent of adult residents with college education, 1990	0.16	−0.15	0.16	−0.073
	(0.11)	(0.19)	(0.11)	(0.202)
Percentage increase in state aid, FY1981–1984	−0.0078	0.035	0.00087	0.056*
	(0.0204)	(0.036)	(0.02097)	(0.038)
Percentage of revenue from state aid, FY1984	0.22*	−0.0047	0.23**	−0.15
	(0.12)	(0.1886)	(0.11)	(0.19)
Dummy variable, member of regional school district	0.052*	−0.026	0.053*	−0.059
	(0.031)	(0.054)	(0.030)	(0.055)
Dummy variable, member of regional high school	−0.019	−0.016	−0.022	0.024
	(0.030)	(0.052)	(0.029)	(0.053)
Constant	−0.097	0.15	−0.087	0.061
	(0.084)	(0.14)	(0.086)	(0.140)
Adjusted *R*-squared	0.10	0.15	0.03	0.05
Number of observations	208	208	208	208

[a] Numbers in parentheses are heteroskedicity robust standard errors as in White (1980). **Bold** variables are endogenous. Instruments include the fraction of a community's population under age 5, developable land in 1984, housing permits in 1989, dummy variables for inside the Boston PMSA and suburban ring, fraction of residents in manufacturing in 1990, fraction of the population aged 35–60 in 1990, and average eighth grade reading and math test score in 1990.

* Significantly different from zero with 90% confidence.

** Significantly different from zero with 95% confidence.

the broader set of constraint variables. The equations generally have fairly low explanatory power, but in both, some of the fiscal variables related to Proposition $2\frac{1}{2}$ and education reform are found to significantly affect spending changes in Massachusetts communities. As a group, the coefficients on these variables are significantly different from zero at the 99% confidence level in both the school and nonschool equations, as indicated by *F*-tests. However, the size and significance of individual coefficients vary across the two equations.

In the school spending equation (column 1), the Proposition $2\frac{1}{2}$ variables are almost all individually statistically different from zero, and in all but one case ('at levy limit, no overrides') have the anticipated sign. The magnitude of the coefficients suggests that constraints imposed by Proposition $2\frac{1}{2}$ limited school spending to a great extent in many communities. While the average community increased educational spending by 15%, towns that had previously passed an override increased spending by another 6 percentage points. Communities with leeway to raise revenue without an override (ample 'excess capacity') typically did so: other things equal, a town whose levy was 5% below its levy limit raised spending 2 percentage points more than a town 0.1% below.

Putting all of the 1989 Proposition $2\frac{1}{2}$ variables together, towns with no overrides that were close to but not 'at' their levy limit had the slowest growth of spending, while communities with a history of passing overrides or with a buffer of 10% or more under their levy limit had the fastest spending growth. Initial Proposition $2\frac{1}{2}$ conditions also mattered during the 1990–1994 period.[13] Other things equal, cities and towns that were required to cut revenues for the first 2 or 3 years of Proposition $2\frac{1}{2}$ (the communities that faced the largest initial constraints under Proposition $2\frac{1}{2}$) increased their education spending by 8 and 15 percentage points less, respectively, than communities with zero or 1 year of initial cuts.

For nonschool spending, by contrast, only two constraints variables are individually statistically significant. Towns that had ever passed an override increased spending by 15 percentage points more than other communities. Also, the education reform bill had a marked effect on nonschool spending. The coefficient implies that for every 1% that a community was required to increase school spending in FY1994, nonschool spending fell by 0.33% between FY1990 and FY1994. Thus, some of the school spending increases mandated by education reform came at the expense of nonschool town services. None of the initial Proposition $2\frac{1}{2}$ variables appear to affect nonschool spending.

In both equations, the measures of (quantity) demand for services are important in explaining variations in spending. For schools, the coefficient on the change in the number of pupils is 0.64 and statistically different from both 1 and 0, suggesting that spending changes were responsive to the number of pupils, but less

[13] Using a measure of Proposition $2\frac{1}{2}$'s impact that focuses similarly on the size of initial property tax cuts, Cutler et al. (1999) also find revenue changes in the early 1990s still depending on that initial impact.

than one for one. Nonschool spending appears to increase in proportion to local population. The variables in levels form, such as per capita property value, enrollment/population ratio, median family income, state aid as a percentage of local revenue, and membership in a regional school district, are statistically significant in the school equation, suggesting that the importance of such community attributes and resources in explaining school spending shifted in this time period.[14] None of these levels variables are individually significant in the nonschool spending equation.

Columns 3 and 4 repeat the regressions in the first two columns without the constraints variables from the late 1980s. Overall, the coefficients on the remaining variables are remarkably stable. In the school spending equation, the coefficients on the initial Proposition $2\frac{1}{2}$ constraint variables are highly significant, both statistically and economically, while these variables explain little of the variation in nonschool spending. As in the previous specification, most of the impact of Proposition $2\frac{1}{2}$ appears to have occurred on the school side of the budget.

6. House price changes — empirical results

The next question is how the changes in spending as a result of Proposition $2\frac{1}{2}$ affected local house prices. First differencing Eq. (3) and following the framework in Case and Mayer (1996) yields the following model of changes in single-family house prices:

$$\Delta P = \beta_0 + \beta_1(\text{location, characteristics}) + \beta_2(\Delta \text{ spending}) + \beta_3(\Delta \text{ housing stock}). \quad (6)$$

Regressions for house price changes between 1990 and 1994 are estimated using two-stage least squares and include the amount of developable land in 1984 and lagged permits as instruments for change in housing stock, and additional instruments for spending changes as described below.

The estimating equation also contains a number of levels variables to account for possible changes over time in the capitalized value of selected town characteristics as a result of aggregate shocks ($\alpha_1^{1990} \neq \alpha_1^{1994}$ in Eq. (3)).[15] For example, the aging of the baby boom and the associated echo baby boom has led to an increase in public school enrollments in Massachusetts since 1990. The resulting increase in the number of households with children in public schools has

[14]This could occur because of shifts in the preferences or identity of the median voter or shifts in the balance of political power among bureaucrats, pressure groups, and voters.

[15]Using a similar data set, but an earlier time period, Case and Mayer (1996) find that the capitalized values of good schools, of proximity to Boston, and of other town attributes vary significantly over time.

raised the demand for houses in towns with good quality schools. Similarly, a town's initial age mix may be an indicator of certain amenities that are attractive to specific age groups.[16] Finally, the initial percentage of manufacturing workers proxies the importance of manufacturing jobs to town residents at a time when this sector was losing jobs.

Two alternative strategies are undertaken in using Proposition $2\frac{1}{2}$ to identify the impact of spending changes on house prices. The most conservative approach is to limit the instruments for spending changes to variables from the time immediately surrounding 1980 when the tax limit was passed. One group of such instruments comes directly from Proposition $2\frac{1}{2}$ and includes the 1980 property tax rate and dummy variables indicating the number of years of initial tax cuts required by Proposition $2\frac{1}{2}$. The second group of instruments captures resource and cost factors that might affect future spending changes and includes exogenous variables from columns (3) and (4) of the spending equations in Table 2 such as per capita income, nonresidential share of property value, and growth in state aid. Theory suggests that such public resource and cost variables should not independently affect the demand for housing other than through the fiscal (spending) channel. To ensure that these variables are exogenous, we use 1980 levels for all except state aid. The resource and cost variables reflect the political and economic landscape prior to Proposition $2\frac{1}{2}$ and thus are immune from any shocks that affect the housing market after its adoption. For state aid, we use state aid through 1984 to include the state government's immediate response to Proposition $2\frac{1}{2}$. These changes in state aid are indicative of the increases in state aid in subsequent years, but were clearly known prior to our sample period in 1990. House prices are forward-looking asset prices and as such should incorporate past changes in state aid and other resource factors, especially changes that occurred 6 to 10 years earlier.

While this conservative strategy ensures that the instruments are exogenous, the results from the spending equations suggest that changes in nonschool spending may not be well-identified using this limited set of instruments.[17] Thus a second set of estimates are also reported, utilizing additional instruments from the late 1980s, including the degree of constraint and override history in 1989, the FY1994 percentage increase in school spending that the education reform bill mandated, and the percentage of the 1990 population under 5 years old (an indicator of future changes in school enrollments).

Results for the basic house price equations in Table 3 suggest that the spending changes induced by Proposition $2\frac{1}{2}$ had a significant impact on changes in local

[16]The age range of baby boomers increased from 26 to 44 years old in 1990 to 30 to 48 in 1994, raising demand for amenities typically valued at those higher ages, such as day care, after-school programs, parks, and playgrounds.

[17]Also, to the extent that the late 1980s variables are exogenous, excluding them from the analysis reduces the efficiency of the estimates.

Table 3
House price regression results. Dependent variable: percent change in house prices, fiscal years 1990–1994[a]

Explanatory variable	(1)	(2)	(3)	(4)
Percent change in school spending, FY1990–1994	0.23**	0.16**	0.23**	
	(0.09)	(0.07)	(0.08)	
Percent change in school spending, FY1990–1994, communities at levy limit, no overrides				0.57**
				(0.22)
Percent change in school spending, FY1990–1994, communities passing overrides prior to FY1990				0.25
				(0.29)
Percent change in school spending, FY1990–1994, unconstrained communities				−0.18
				(0.28)
Percent change in nonschool spending, FY1990–1994	0.13	−0.012	0.10	
	(0.11)	(0.047)	(0.07)	
Percent change in nonschool spending, FY1990–1994, communities at levy limit, no overrides				0.097
				(0.154)
Percent change in nonschool spending, FY1990–1994, communities passing overrides prior to FY1990				−0.13
				(0.46)
Percent change in nonschool spending, FY1990–1994 unconstrained communities				0.29*
				(0.15)
Single family permits, 1990–1994, per 1990 housing unit	−0.57**	−0.32**	−0.51**	−0.42
	(0.20)	(0.13)	(0.16)	(0.28)
Combined math and reading MEAP test score, 8th grade students, 1990	0.000080**	0.00011**	0.000073**	0.000079*
	(0.000034)	(0.00003)	(0.000030)	(0.000042)
Fraction of population aged 35–60, 1990	0.25*	0.19*	0.28**	0.12
	(0.14)	(0.11)	(0.13)	(0.30)
Dummy variable, in Boston metro area	0.078**	0.081**	0.078**	0.071**
	(0.009)	(0.007)	(0.008)	(0.011)
Dummy variable, in Boston suburban ring	0.056**	0.056**	0.056**	0.056**
	(0.009)	(0.008)	(0.009)	(0.014)
Fraction of resident work force in manufacturing, 1990	0.070	0.0092	0.0085	0.034
	(0.066)	(0.0466)	(0.0505)	(0.071)
Dummy variable, at levy limit and no overrides, FY1989			−0.019**	0.11*
			(0.007)	(0.06)
Dummy variable, passed override(s) prior to FY1990			−0.036**	−0.029
			(0.016)	(0.103)
Constant	−0.45**	−0.48**	−0.42**	−0.34**
	(0.07)	(0.05)	(0.06)	(0.11)
Adjusted *R*-squared	0.38	0.54	0.46	−0.03
Number of observations	208	208	208	208

[a] Numbers in parentheses are heteroskedacity robust standard errors as in White (1980). **Bold** variables are endogenous. Instruments in column (1) include effective tax rate in 1980, dummy variables for the number of years required to reduce spending due to Proposition $2\frac{1}{2}$, 1980 levels of resource variables from Table 2 (equalized property value per-capita, non-residential share of property value, median family income, and percentage of adults with a college degree), percentage increase in state aid 1981–1984, percentage of revenue from state aid in 1984, and dummies for regional school district or high school. Instruments in columns (2)–(4) include those in column (1) plus 1989 constraint variables (excess capacity as a percentage of the levy limit, dummy indicating the community is at its levy limit, and a dummy indicating the community had previously passed an override) and the increase in education spending from 1993–1994 required by the education reform bill.

* Significantly different from zero with 90% confidence.

** Significantly different from zero with 95% confidence.

house prices across Massachusetts. In column (1), the coefficient on changes in school spending is positive and significantly different from zero. The coefficient is moderately large in magnitude: a town that raised its school spending one standard deviation (8.6%) more than average saw its house prices increase about 2% more than a community with the average increase in school spending (the average community experienced a decline in house prices of 7.7%).

Coefficients on other variables are consistent with those in Case and Mayer (1996) and provide support for the hypothesis that aggregate trends can change the capitalized value of school quality and other characteristics over time. Controlling for changes in spending, houses appreciated faster from 1990 to 1994 in towns with good schools (as measured by 1990 test scores) at the same time that aggregate school enrollments were rising in Massachusetts. House prices also grew faster in towns with higher 1990 percentages of middle-aged residents, suggesting that this variable proxies for excluded town characteristics that appeal to middle-aged households, a group that expanded in the 1990s. New construction also matters, as towns with more (endogenous) housing permits saw significantly steeper declines in house prices in the 1990–1994 period. Finally, a relatively strong economy in the Boston metropolitan area led house prices there to appreciate 6 to 8% faster than in other areas of Massachusetts. And within the area, communities closer to downtown experienced relative gains in house prices.

Nonschool spending changes do not have a statistically significant effect on house prices. As noted earlier, this could reflect poor identification of nonschool changes with the smaller set of instruments. *F*-tests of the first-stage equation for both school and nonschool spending reject the hypothesis that the coefficients on the new instruments are jointly equal to zero.[18] Nonetheless, a broader set of instruments, if exogenous, may provide more efficient estimates.

When the larger set of instruments is included, shown in column (2), the differences between the estimated coefficients for school and nonschool spending become even more pronounced. The coefficient on school spending falls from 0.23 to 0.16, but is still significantly different from zero, while the coefficient on nonschool spending becomes slightly negative and remains indistinguishable from zero in a statistical sense at conventional confidence levels. While the coefficients appear to change somewhat between column (1) and column (2), a Hausman test fails to reject the equality of the coefficients ($P=0.87$) between these two equations.

A third alternative takes an intermediate approach. Rather than ignore the late 1980s Proposition $2\frac{1}{2}$ constraint variables, column (3) includes two of the indicators directly as independent variables. The theoretical argument is that these indicators (whether a community passed an override previously and whether the town is at or near its levy limit) are observed by potential home buyers as

[18]The significance levels are 0.02% for nonschool spending and less than 0.001% for school spending.

indicators of community flexibility and voter discretion (or the lack thereof) and thus have an independent effect on house prices. Column (3) indicates that the effects of both these 1989 variables are statistically different from zero, but that their inclusion has little impact on the spending coefficients relative to the base results in column (1). The negative sign on both variables indicates that, controlling for spending changes, unconstrained communities (the omitted category) are more attractive to potential home buyers than the most constrained cities and towns, or even communities that passed overrides to loosen the constraint.

6.1. Differential effects by degree of constraint and override behavior

Given the original rationale behind the passage of Proposition $2\frac{1}{2}$, one might expect the impact of an increase in spending on house prices to vary according to the degree of constraint facing a community. Thus the next step is to investigate differential effects of spending changes across communities by estimating separate house-price-change coefficients on spending changes for the three groups of communities categorized earlier by degree of constraint.

The group of communities whose spending was below their levy limit in 1989 without having passed an override were unconstrained by Proposition $2\frac{1}{2}$ and therefore had been free to choose their spending level at will. To the extent that unconstrained communities have a tendency to 'over-spend' on services — the view of backers of Proposition $2\frac{1}{2}$ — spending increases should make them less attractive and hence have a negative effect on house prices. At the other extreme, communities whose FY1989 levy is at their levy limit and who have never passed an override are the most tightly constrained by the tax limit and hence the places where one might expect to find spending increases having the greatest positive effect on house prices. In towns that have passed one or more overrides, direct voter oversight on revenue increases should have moved them closer to voter-preferred levels of spending; thus one might expect spending changes to have very little impact on house prices.

The results in column (4) are mixed, but generally support the hypotheses just described in the case of school spending. The coefficient on school spending for constrained towns is positive, more than twice as large as in the earlier equations, and highly statistically significant, suggesting that this effect of school spending increases in the most constrained towns is driving the positive coefficients in columns (1)–(3). The coefficient on school spending in override towns is also positive, but smaller in size, and the coefficient on school spending for unconstrained towns is negative, although neither of these latter two coefficients is individually statistically different from zero. While an F-test rejects the joint hypothesis that all three coefficients equal zero ($P=0.05$), it cannot reject that all three coefficients are equal ($P=0.20$).

As with columns (1)–(3), the nonschool coefficients in column (4) are weaker and more difficult to interpret than the school coefficients. None of the nonschool

coefficients is statistically different from zero at the 5% level and an F-test fails to reject the joint hypothesis that all three nonschool spending coefficients are equal to zero ($P=0.27$). However, the nonschool coefficient for unconstrained towns is positive and significantly different from zero with 90% confidence, suggesting that additions to nonschool spending make these towns more attractive to potential home buyers, not less.

Both the constraint dummies retain their negative signs from column (3), but only the 'at levy limit, no overrides' intercept term is significantly different from zero. Thus, the most constrained towns are less attractive in the housing market even controlling for the effect of constraint on contemporaneous spending changes, presumably because the constraint limits discretion in local decision-making.

6.2. Comparison of school and nonschool results

Whether total revenue is constrained or not, one would expect towns to allocate expenditures among functions to equalize the marginal impact of a dollar spent for each purpose. However, the coefficients in Table 3 do not support this hypothesis. The estimated coefficients on nonschool spending changes in columns (1) and (3) are about one-half the size of the school spending coefficients and the differences are even more pronounced in columns (2) and (4).[19] Not only did Proposition $2\frac{1}{2}$ have its greatest impact on the school side of the budget, but the resulting cuts in school spending had larger and more significant effects on house prices than did cuts in nonschool spending.[20]

One explanation for the asymmetry in the estimated effects of school and nonschool spending is that the pivotal voter or influential local pressure groups value school spending less than the marginal home buyer does. Only one-third of all households in the average Massachusetts community contain children. Voters without school-age children, while paying the taxes associated with school spending, may not believe that such spending yields them any direct benefits and may thus rationally veto school spending increases. This voting problem does not extend to those nonschool services that are seen as benefiting all residents to some extent. Alternatively, unions or other interest groups may be stronger for police, fire protection, and public works services than for education. The additional barriers to increased spending that resulted from Proposition $2\frac{1}{2}$ may have shifted the balance of political power toward those who oppose school spending.

[19] In other regressions (not shown), the analysis was repeated using several more detailed nonschool spending categories (such as expenditures on police and fire protection). The results were similar to those reported here.

[20] Initial levels of school and nonschool spending reinforce this result. School spending is smaller than nonschool spending in the average town, so a dollar added to school spending represents a bigger percentage increase than the same budget dollar added to nonschool spending.

Meanwhile, growth in the number of baby boomers with children means that a large percentage of the families that are moving, and thus bidding for housing, do value public schools. This phenomenon results in higher bids for housing in communities that are raising their school spending. Even controlling for a town's existing quality of schools, movers are apparently willing to pay more to live in communities that are maintaining and expanding their fiscal commitment to schools.[21]

An alternative explanation for differences in the effect of school and nonschool spending is that rising enrollments during the 1990–1994 period imply a greater need for 'action' on the school side of the budget, action that is hampered by the constraints of Proposition $2\frac{1}{2}$. Even towns with a fixed number of households saw enrollments rise during the early 1990s. Thus, the need for school spending rose while the need for police or fire protection remained more stable. Proposition $2\frac{1}{2}$ constraints, by making it more difficult for communities to adapt to current conditions (which are changing more rapidly for schools), are more likely to move constrained towns away from preferred levels of school spending than nonschool spending.

7. Conclusions

Massachusetts voters enacted Proposition $2\frac{1}{2}$ in November 1980 to lower high property tax rates and to limit the subsequent growth in property taxes. During fiscal years 1982 through 1984, levies were reduced in high-tax-rate communities, bringing their effective property tax rates down to 2.5%. In the later 1980s, Proposition $2\frac{1}{2}$ levy limits rose 2.5% per year plus an allowance for new growth, and a statewide real estate boom brought effective property tax rates down markedly.

The initial cuts and subsequent constraints of Proposition $2\frac{1}{2}$ did not bind all communities to the same degree. Some cities and towns had to cut their property taxes for several years, while those with lower 1980 tax rates did not have to cut at all. Later, some communities bumped up against their Proposition $2\frac{1}{2}$ levy limits in the late 1980s; among those at their limits, some loosened the constraint by passing overrides while others did not. Despite some offsets from state aid, cities

[21]These results also suggest that home buyers believe that increases in school spending have positive educational value, a finding that appears at odds with the conclusions of Hanushek (1986), who argues that research has demonstrated little relationship between increases in school inputs such as spending and educational outcomes such as test scores and college attendance. One possibility is that increased spending is believed to improve the quality of life of students through greater spending on after-school programs, the arts, athletics, or other programs that have little impact on test scores. In addition, parents may use information on changes in school spending as an indicator of a community's commitment (or lack of commitment) to maintaining or increasing the quality of local schools.

and towns constrained by Proposition $2\frac{1}{2}$ increased their spending on schools measurably less than did unconstrained communities.[22]

Proposition $2\frac{1}{2}$'s proponents and skeptics disagree about whether the restraints were needed to rein in runaway taxes and spending that local voters apparently were unable to control on their own, or prevented residents from obtaining services they desired and for which they would have been willing to pay. The research results presented here support the latter view. House price data indicate that potential residents of constrained cities and towns (but not unconstrained communities) were willing to pay a premium for increases in school spending. These findings imply constrained communities were spending too little on schools by the end of the 1980s.[23] Put another way, potential home purchasers considered the attraction of increases in school spending during the 1990–1994 period to outweigh the costs of increased taxes to pay for them. Thus, Proposition $2\frac{1}{2}$ had negative consequences for housing demand, and hence home prices, in the communities in which it was binding through its effect on school spending.

The house price equations also show that the level of school quality (proxied by 1990 school test scores) is a significant and positive influence on 1990–1994 house price appreciation, presumably because rising enrollments in Massachusetts during the period raised the average home buyer's valuation of good schools. That both the level of school quality and changes in school spending are significant influences on house prices reflects an important side effect of Proposition $2\frac{1}{2}$. By constraining school spending, the property tax limitation measure may have added a scarcity premium to the demand for housing in communities that were willing and able to raise their school spending. Communities faced an additional barrier to raising revenue for their schools at a time when demographic shifts led to increased demand for high-quality schools.

Future research should expand these results to look at how fiscal limitation measures in other states have affected the ability of communities to provide local services. While Proposition $2\frac{1}{2}$ limits the discretion of municipalities in raising revenue to fund local services, other states have gone in different directions, mandating virtually fixed spending levels across communities (with or without state government commitment to fund that level) or allowing students greater mobility in choosing public schools. These measures limit the ability of communities to respond to local signals, thereby changing the dynamics of sorting described by Tiebout 40 years ago.

[22]Lang and Jian (1996) obtain roughly similar results for the 1984–88 time period looking at overall spending and property values.

[23]Similarly, Cutler et al. (1999) report strong support for a 'mission accomplished' hypothesis, finding that the most constrained communities were more likely to vote to increase their revenues in the 1990–1995 period.

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