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Introduction

The past few years have been difficult ones for public education in the U.S. For the country as a whole, total revenue per pupil devoted to public elementary and secondary education, adjusted for inflation, fell by 3.2 percent between 2008/09 and 2010/11.[1] Although 2010/11 is the latest year for which comprehensive revenue data are available from the National Center for Education Statistics, there is little doubt that real per pupil education revenues have continued to decline over the past couple years.

At the federal level, sequestration resulted in a 5.2 percent cut in both Title I and special education appropriations for fiscal year 2013 (U.S. Department of Education, 2013). At the state level, a survey conducted by the Center on Budget and Policy Priorities found that in 26 states, real per student state aid to elementary and secondary schools declined between the 2011-12 and the 2012-13 school years (Oliff, Mai, and Leachman 2012). At the local level, property taxes accounted for 81.2 percent of the locally-raised revenues used to finance public elementary and secondary education in 2010-11 (McGuire, Papke, and Reschovsky, forthcoming). Although more recent data on school property tax revenues are not yet available, data from the Census Bureau's *Quarterly Summary of State and Local Tax Revenue* indicate that per capita real local government property tax revenues (for school and non-school purposes) declined by 2.8 percent between fiscal years 2011 and 2013.[2]

The future prospects for substantial increases in federal or state financial support for education are dim. Federal government programs in support of education are classified as *domestic discretionary* expenditures. The fiscal year 2014 budget agreement signed into law by President Obama in December 2013 places strict limits on the growth of these expenditures. The Congres-

[1] Authors' calculation based on revenue data from the National Center for Education Statistics (2014).
[2] Authors' calculation using property tax revenue data from U.S. Census Bureau (2013b).

sional Budget Office (2013) predicts that as a share of GDP, domestic discretionary spending will decline through the budget window (ending in 2023). Given competition from other pressing domestic needs and continued controversy over the appropriate federal role in education funding, it is highly unlikely that federal funding for education will rise in the coming decade.

Predicting future levels of state education support is difficult. The prospects for robust future growth of state education aid are however diminished by several long-run structural problems facing many state governments. On the revenue side, many states have narrow sales tax bases that exclude many services. As a result, the tax base fails to grow proportionally to the economy. The revenue problems are exacerbated by the inability of states to collect sales taxes on many internet and mail order purchases. Also, in the past couple years, a number of states have enacted individual income tax cuts, generally with no offsetting source of revenue. A recent report issued by the State Budget Crisis Task Force (2012) argues that for many states, spending on Medicaid will grow faster than state tax revenue, a trend that is influenced in part by the aging of the population. Many states are also facing large and growing unfunded pension liabilities. Unless these states substantially increase their pension contributions, many state pension systems will eventually run out of money (Rauh, 2010; Munnell, et al., 2011). Cutting state spending on Medicaid and on pensions faces both legal and political constraints. As a result, spending in other areas, including public education, may be crowded out.[3]

With diminished prospects for growth in funding from federal and state governments, local school districts will play an increasingly important role in funding public education. As on average four out of every five dollars of locally-raised school revenue come from property taxes, the willingness of Americans to pay higher school property taxes will in large part determine whether as a nation we can provide adequate funding for public education.

[3] A more detailed discussion of the fiscal pressures facing state governments can be found in Reschovsky (2014).

Despite the fact that the property tax is an unpopular tax, or in the words of Cabral and Hoxby (2012), a "hated" tax, it has proved to be a remarkably stable source of revenue for public education. McGuire, Papke, and Reschovsky (forthcoming) provide data that show that since the early 1980s the share of total public school revenue from the property tax has remained more or less unchanged at or close to 35 percent. One reason for the enduring role of the property tax may be that there remains considerable support for the local provision of education, and in most states, local school districts rely quite heavily on property taxation.

In many states, a countervailing force to increases in property tax revenues are limits on property taxes imposed by statute, e.g. Massachusetts' Proposition 2½, or by popular vote, e.g. California's Proposition 13. In a comprehensive review of the research on the impact of tax and expenditure limits on school funding and school quality, Downes and Figlio (forthcoming) conclude that there is ample evidence that shows that tax and spending limits both reduced revenue available to schools and result in lower academic performance by students.

One of the most popular ways in which states have chosen to limit property taxes is by imposing property tax levy limits. In 2012, 38 states utilize some type of property tax levy limit (Lincoln Institute of Land Policy, 2014). Levy limits generally operate by placing a dollar or percentage cap on the amount that property tax levies can change from one year to the next. In some states, the caps are defined as the minimum of a fixed percentage change, say 2 percent, or the rate of inflation. In some cases, levy limits can be augmented by the ratio of the value of net new construction to the previous year's total valuation.

In 21 of the states applying levy limits, an important feature of the limits is the ability of local voters to override the limit by utilizing a referendum process. Better understanding the ref-

erendum process and the reasons why referenda are held and are passed will help up assess the role that the property tax will play in school funding going forward.

While the use of direct democracy, through the referendum process, is likely to increase the chance that school district spending will be more closely aligned with the preferences for education of local voters, the referenda process may have unintended consequences from a statewide perspective. If, for example, high-income communities turn out to be more likely to enact revenue-limit overrides than school districts educating students from low-income households, the result is likely to be an increase in inequality of education opportunity across school districts and an inability by the state to meet a goal of ensuring that all local school districts have access to sufficient revenue to provide their students with an adequate education (with adequacy defined by the state).

Although there is a fairly extensive literature on the impacts of tax and expenditure limitation on education revenue and student performance, there are only a few studies focused explicitly on revenue limit override referenda. The primary purpose of this paper is to contribute to the existing literature by investigating the factors that lead to successful override elections in the state of Wisconsin.

In 1993, the Wisconsin legislature enacted school district revenue limits that applied to the sum of each school district's state General Aid and property tax levy. In most years, legislation authorized a fixed dollar per student increase in the revenue limits. School districts that want to exceed their revenue limits are allowed to hold override referenda. Approval by a majority of those voting is needed to successfully override the school district's revenue limit.

We will use Wisconsin data to estimate a model that attempts to explain both local school board decisions to hold override referenda, and local voter decisions to approve override referen-

da. We will also use simulation techniques to try to determine whether the referendum process has overtime undermined or enhanced equity in the funding of public education in Wisconsin.

In the next section, we review the literature on property tax referenda. We then briefly describe the school funding system in Wisconsin with a focus on the state's revenue limit. In the following section, we present descriptive data on both attempted and successful revenue limit override referenda. We then describe our empirical approach for explaining both decisions to hold override referenda and for predicting successful overrides. After briefly describing the data, we discuss our econometric results. In the next section, we use several standard measures of school funding equity to describe Wisconsin's current school funding system. To assess the impact of successful revenue limit overrides on these measures of school funding equity, we simulate school funding patterns in the absence of override referenda. In the final section, we summarize the results and discuss future directions for research.

Literature Review

Although there is a quite large literature on the impacts of property tax limitations on school funding, there have been relatively few studies on levy limit override elections. Piele and Hall (1973) provide an example of an early study of property tax rate decisions under state-imposed revenue constraints. Several papers have explored the override referenda associated with Proposition 2½, the property tax rate and levy limitation enacted by the Massachusetts legislature in 1980 (Bradbury, 1991; Cutler, Elmendorf, and Zeckhauser, 1999; Bradbury, Mayer, and Case, 2001; Wallin and Zabel, 2011). These papers explore both the decisions of school boards to hold override referenda and the outcomes of these referenda.

There have been only three previous studies of revenue limit override referenda in Wisconsin. Maher and Skidmore (2009) explore the factors influencing voter approval of override

referenda using Wisconsin override election results through 2004.[4] Meredith (2009) used Wisconsin data on the results of both bond and override referenda occurring between 1990 and 2006 to analyze the impact of the timing of elections on the probability of success. In a study that also included an analysis of referenda results in California, Colorado, and Minnesota, Shober (2011) used the results from both Wisconsin bond and revenue limit override referenda between 2000 and 2005 to explore the role of political ideology in referenda results.

School Finance in Wisconsin

In Wisconsin, the state government and independent local school districts share approximately equal roles in funding K-12 education, each providing about 45 percent of total public school revenues. As shown in Table 1, local funding for the state's 424 school districts comes primarily from the property tax. In 2010-11, the property tax contributed 41.1 percent of total public school revenues in Wisconsin, a substantially higher reliance on the property tax than the 35.3 percent of revenue coming from the property tax nationally.

In 2012-13, the state government provided nearly $5 billion in state aid to local school districts. Eighty-seven percent of this total was allocated to school districts using a foundation aid formula supplemented by a guaranteed tax base formula. The formula is designed to achieve taxpayer equity by assuring that school districts that choose similar school property tax mill rates will be able to raise approximately similar amounts of money.[5] The remaining state aid was distributed through over 25 separate categorical aid programs, the largest of which funded special education.

In 1993, concerned that school districts were using state aid to increase spending rather than reduce property taxes, the state legislature imposed an annual revenue limit on all school

[4] In an earlier paper, Maher and Skidmore (2008) used Wisconsin data to study the determinants of bond referenda for capital projects.
[5] For a detailed description of Wisconsin's state General Aid formula, see Reschovsky (2002).

districts. The revenue cap applies to the sum of General Aid from the state and property taxes levied in each school district.[6] Even though categorical aid and federal grants are not included under the revenue cap, for most school districts over 80 percent of their total revenue is covered by the revenue limits.

Each district's base revenue limit was defined as the sum of their General Aid and property tax levy in 1993. Each year after that, the legislature determined a fixed dollar amount per student by which the revenue limit was allowed to rise. In the first year (1993-94) that amount was set at $190 per student. In subsequent years, the annual per student revenue limit adjustment was increased, usually by approximately the rate of inflation. In 2008-09 it was equal to $275 per student. In response to a large budget gap attributable to the Great Recession, Wisconsin reduced state education aid, and in an effort to prevent local school districts from completely replacing lost state aid with increased property tax revenue, reduced the annual revenue limit adjustment for fiscal years 2010 and 2011 to $200 per pupil. For the 2011-12 school year, the legislature coupled large cuts in state aid with a 5.5 percent reduction in each school districts revenue limit. In 2012-13, revenue limits were again allowed to increase, but by only $50 per pupil.

Every year each school district determines the amount it can levy through the property tax by subtracting its current year General Aid allocation from the current value of its revenue limit. We refer to this amount of property taxes as each district's *allowable levy*. Data available from the Wisconsin Department of Revenue show that since the imposition of revenue limits, the vast majority of school districts have chosen to levy up to their allowable levies. Amiel, Knowles, and Reschovsky (2013) provide data that shows that in each year between 2002 and 2009, only around five percent of school districts chose a property tax levy that was below their allowable levy, i.e. they *underlevied*. In 2010 and 2011, when cuts in state aid increased the size

[6] For a comprehensive description of the revenue limits see Kava and Olin (2013).

of many districts' allowable levies, there was a jump in the number of districts that chose to underlevy. In those two years about 17 percent of school districts underlevied. In 2012, the incidence of underlevying declined, with about 90 percent of all school districts levying up to their allowable levies.

The fact that over time most school districts in Wisconsin chose to levy property taxes up to their allowable levies suggest that the revenue limits imposed on school districts by the state legislature may be binding on many school districts. Almost the only way that school districts can increase revenues, and hence spending, above the state-imposed limits is to successfully pass a referendum that allows the district to override their revenue limit.[7] To be successful, a majority of those voting must approve the revenue limit override.

Revenue Limit Overrides in Wisconsin

Although the first revenue limit override referendum was held in September 1994, the analysis in this paper covers referenda that were held in the years 2004 through 2012.[8] Over this 9-year period 472 separate override referenda were held and of these 247, or 52.3 percent passed. These numbers overstate the number of school districts that hold referenda because some school districts held multiple referenda during a year. As the focus of our econometric analysis will be on school districts, rather than on individual referenda, our unit of analysis will be school district-years. In other words, we will analyze the number of school districts that hold one or more override referenda in any given year. Defined this way, between 2004 and 2012 there were 393 revenue limit override referenda held. Of these, 60.3 percent passed (237).

[7] In a recent paper, Downes and Killeen (forthcoming) provide evidence that across the country, despite declines in school property tax revenue following the Great Recession, there has been no substantial increase in the use of non-property tax local revenue, and especially user fees.

[8] For an analysis of referendum outcomes covering year years through 2004, see Maher and Skidmore (2009).

The analysis in this paper is conducted using data on 419 of the state's 424 school districts. As illustrated by Table 2, 48 percent of school districts never held an override referendum during the 9-year period. Of those school districts that held referenda, a referendum (or possibly multiple referenda) were held only one of the years between 2004 and 2012 in 104 districts. Only 27.2 percent of school districts held referenda in multiple years.

Figure 1 illustrates both the number of school districts that held at least one referendum in each year, and the pass rate in each year. In six of the nine years, 12 percent or less of the school districts held referenda. Only in 2007 and 2009 did the number of districts holding referenda approach 15 percent of all districts. The success rate for referenda exceeded 50 percent in every year, with the modal pass rate being between 50 and 60 percent. Only in 2006 and in the two most recent years, 2011 and 2012, was the pass rate near 70 percent.

Our data set includes information on the dollar magnitude of all successful override referenda. We used this information to calculate the average size of successful referenda relative to their revenue limits. These statistics, displayed in Table 3, show that in the four most recent years, successful referenda have allowed school districts to raise their revenue limits by approximately 10 percent. By overriding their revenue limits, districts are authorized to raise school property taxes up to their newly augmented limits.

Model Specification

Overriding property tax revenue limits involves two separate, but related, actions. First, elected school boards must make a decision to hold a referendum. As the data in the previous section illustrated, holding override referenda are relatively infrequent events. Once a decision to hold an override referendum has been made, the voters of each school district must decide to approve or reject the proposed revenue limit override. How closely these two decisions are related

to each other depends in large part on the factors that explain the decisions of elected school boards to hold elections. Two views dominate the literature. In deciding whether or not to hold an override referendum, school board members may attempt to reflect as closely as possible the preferences of the electorate. Building on the median or decisive voter model, variables that reflect voters' preferences for education spending financed through higher property taxes should explain decisions about whether to hold override elections.

Alternatively, school board members may base their decisions about holding referenda on their own agendas and/or preferences. Theories of agenda-setting by school boards suggest that strategic decisions about the timing of referenda, the size of overrides, or the frequency of referenda may influence the outcome of override elections (Meredith, 20009; Ehrenberg, et al, 2004).

We model the outcomes of override elections, i.e. whether the override passes or not, as a function of variables reflecting the school funding preferences of the voters in each school district. If we assume that local school boards' choices of whether to hold an override election reflects, at least in part, school board members' perceptions about voters preferences, then the modeling of referenda outcomes should involve a two-stage probit model with sample selection. In the first stage we model the decision of school boards to hold one or more override referenda in each given year, while in the second stage we model the decision of voters to approve or not approve the override referenda.

Equation 1 represents the decision process followed by local school boards in deciding to hold at least one referendum in each year (*ref_attempts)* while equation 2 represents the factors that may influence voters to approve or not approve the override referenda (*ref_wins)*.

We assume that in stage one, school boards choose to hold a referenda based on a number of community, economic and school district variables, denoted by X_{it}. The selection equation is a probit regression:

$$P\left(ref\_attempt_{it}=1\right)=\sum \beta_k X_{it}+u_{1it} \qquad u_{1it}\sim N\left(0,1\right) \tag{1}$$

such that u_1 are the residuals from the selection stage.

In stage two, voters in districts that hold a referendum must vote on whether to override the revenue limit. The second stage "outcome equation" and can be modeled by:

$$\mathrm{P(ref\_wins}=1)_{it}=\alpha_0+\sum \alpha_k Z_{it,k}+u_{2it} \qquad u_{2it}\sim N(0,\sigma) \tag{2}$$

where Z are variables representing the demographic and economic environment characteristics of the voting population and u_2 are the residuals.

The Heckman selection model differs from the maximum likelihood model because it permits the residuals in stage one (u_1), to be correlated with the residuals is stage two (u_2). The correlation between u_1 and u_2 is given by ρ. If ρ is not significant, the two equations are not related and a simple probit model for each stage individually is sufficient. However, if ρ is significant, then a simple probit or logit model of our dependent variables (*ref_attempts and ref_wins*) would result in biased estimates.

Explanatory Variables

Given voter antithesis to the property tax, we assume that school boards will only propose an override referendum when they face significant fiscal challenges in maintaining the quality of education within their district's schools. One clear indicator of the fiscal condition of school districts is the size of their fund balance per student. School districts with large balances

in the previous year would find it hard to convince voters that they should vote for an increase in school property taxes. We thus assume that per student fund balances (*fund_balance*) will have a negative sign in the first stage regression.

The major determinant of differences across districts in the annual change in revenue limits is the change in each district's student population. In calculating their revenue limits, school districts are allowed to phase in changes in student enrollment over a three year period. Even with this provision, districts whose enrollment is falling face more severe fiscal challenges than growing school districts. Especially for small school districts, declining enrollment does not readily translate into reduced costs, especially if the enrollment decline comes from students at a range of different grade levels. We define *enrollment_change* as the percentage change in enrollment between year t-2 and t-1. We expect school districts with declining enrollment to be more likely to ask voters to support higher property taxes than districts with increasing enrollment.

If school board members are more likely to hold an override referendum if they believe that local voters will support paying additional property taxes in support of public education, then variables associated with higher demand for education should be included in our first stage regression. We consider several types of variables, economic, demographic, and political.

Studies of demand for education generally find positive income elasticities. Thus, we expect that the probability of holding override referendum will increase with income. Using information on the school district of each filer from state income tax returns, the Wisconsin Department of Revenue calculates income statistics, including median income (*median_income*) for each school district. Studies of Proposition 2½ find that the frequency of override referenda rises with community income (Bradbury, 1991; Wallin and Zabel, 2011).

Based on the median or decisive voter model, we expect that the demand for education is a function of tax-prices.[9] The equalization aid formula used to allocate General aid in Wisconsin, generates significant tax-price effects. The property tax is the marginal source of school district revenue in Wisconsin. For the small number of high-property wealth school districts that receive no state equalization aid, a decision to increase spending by one dollar per student requires a property tax increase of one dollar per student, and hence implies a tax price equal to one. For all other districts, a decision to raise spending by one dollar per student (in year t) will result in either more or less aid in year t+1. The net result is that districts that receive more aid will need less than one dollar per student in additional property tax revenue to increase spending by one dollar, meaning that those districts face tax-prices equal to less than one. The aid formula is structured so that for most districts with above-average property wealth per student, a decision to raise spending by one dollar per student will result in a reduced aid allocation in the next year. The result is that property taxes will need to be increased by more than one dollar per student in order to finance a one dollar per student increase in spending, implying a tax-price greater than one. We assume that lower values of *taxprice* will encourage school districts to hold override referenda.

One would expect the probability of both holding override referenda and passing them to be higher in school districts with homogeneous public good preferences. Imperfect Tiebout sorting suggests however that in a number of school districts substantial numbers of voters will have education funding preferences that vary from those held by the median voter. Temple (1996) cites Buchanan and Tullock's (1962) contention that residents of communities with heterogeneous preferences are more likely to prefer tax or expenditure limitations than residents of homo-

[9] For a well-known early study, see Bergstrom, Rubinfeld, and Shapiro (1982). More recent papers include Brokaw, Gale, and Merz (1990) and Maher and Skidmore (2008, 2009).

geneous communities. As individual preferences are unobservable, variation in measurable community characteristics must proxy for preference heterogeneity. Temple uses data on within-community variation in age and income as measures of heterogeneity. In a study of local governments in Illinois, she finds that homogeneous communities are indeed more likely to vote to remove state-imposed fiscal constraints.

Because we currently do not have data on the income or age heterogeneity of Wisconsin school districts, we measure heterogeneity in terms of racial composition. *White* indicates the percentage of each school district's population that is white. We note that in a recent study focusing on the elderly, Figlio and Fletcher (2012) find that the support for increased education funding is lower in more racially heterogeneous communities. Bradbury (1991) and Wallin and Zabel (2011) both found the override elections were more frequent in small, and presumably more homogeneous communities. We measure the size of the school district using data on the district's population over eighteen (*pop_over18*). We hypothesize that school districts with a smaller voting population are more likely to hold and pass referenda.

The literature includes a number of studies that have investigated the relationship between the share of elderly in a community and the support for education. Although many of these studies focus on education spending, at the local level decisions about increased spending are usually linked to support for higher school property taxes. To date, the evidence is mixed. Several studies using state-level data, including Poterba (1997), found a strong negative relationship between per student spending on education and the percentage of the population age 65 and over. Harris, Evans, and Schwab (2001), using district- and county-level data, found that elderly populations had a small but negative impact on educational funding. Poterba (1998) and Ladd and Murray (2001) discuss several reasons why the elderly may support higher public education

spending. First, future Social Security and Medicare funding may depend on having an educated labor force. Second, the elderly may recognize that high-quality schools will be capitalized into higher home values. Third, the elderly might believe in the value of public education or feel altruistic toward future generations. Finally, Tiebout sorting may lead those elderly with a low demand for K–12 education to move to low-spending school districts, thereby leaving educational spending unchanged.

Berkman and Plutzer (2004) presented evidence that the support of the elderly for local public education spending was stronger the longer they have resided in a community. Gradstein and Kaganovich (2004) find evidence that a growing elderly population increases support for education. Fletcher and Kenny (2008), using a median voter framework, found that the elderly are associated with only a very small drop in the support of education. Conversely, Brunner and Balsdon (2004) conclude on the basis of survey data that there is less support for school bond initiative among the elderly than among the young. In a recent study, Figlio and Fletcher (2012) focus on aging in place. They find that as people age they reduce their support for public education. We define our variable *elderly* as the percentage of each school district's population that is age 65 or older. We remain uncertain about the sign of its coefficient.

We include two other voter characteristics in the model: the percent of school district residents over the age of 25 with at least a bachelor's degree (*education*), and the percent of housing that is owner occupied (*owner*). The average level of education in the community could affect both the demand for educational services as well as the willingness to financially support education spending. Parents with higher education might be more likely to demand greater educational opportunities and more willing to increase property taxes than less educated voters. Consequently, we expect a positive coefficient on the percent of college graduates.

There are several reasons why support for property tax increases may be weaker among homeowners than among renters. Renters may face a fiscal illusion and underestimate the property tax burdens that they bear. Property taxes and property tax increases may be more salient for homeowners as compared to renters. In a recent paper, Brunner, Ross, and Simonsen (2013) present evidence that renters are more likely to support property tax increases than homeowners. They argue that this finding is attributable to the salience of property taxes among owners rather than fiscal illusion by tenants. We hypothesize that our *owner* variable will have a negative coefficient.

A number of authors have found that political ideology, measured by partisan election results or survey responses, is a good measure of willingness to support property tax increases to fund education (Chew, 1992; Shober (2011). We define a political ideology variable (*Republican*) as the percent of the population of each school district voting for the Republican candidate during either the latest gubernatorial or presidential election. To obtain the Republican vote share for a school district, statewide ward level election returns from the relevant presidential and gubernatorial elections were obtained from the state's Government Accountability Bureau. The ward level data was aggregated to the municipality level. Then, using a crosswalk between municipalities and school districts from the Department of Revenue, a share of voters from each municipality was assigned to their corresponding school district based on the proportion of property wealth in each municipality belonging to each school district. We hypothesize that school districts with higher Republican vote totals are more fiscally conservative, and thus less willing to approve override referenda.

In a study of the probability of passing revenue limit override elections, Maher and Skidmore (2009) find that the prior passage of bond referenda for school construction projects

was a good predictor of the approval of revenue limit override referenda. We assume that the prior willingness to approve bond referenda provides a good indicator of unobserved preferences for education. We expect *debt_ref* to have a positive coefficient.

Finally, we also include the variable *underlevy*. This indicator variable has a value of one in school districts that chose a property tax levy in the year t-1 that was below its maximum allowable levy. We assume that any school district that chose a property tax levy below the amount that was allowed under the property tax cap is providing a powerful signal that it has no interest in exceeding its revenue limit.

Two additional variables, the equalized value of property per pupil and the share of equalized value that is residential, were included in the analysis, but do not appear in the regression results presented here. Although a higher per student property tax base is generally associated with low property tax mill rates, high property value districts receive little state aid and must rely much more heavily on local property taxes to fund their schools than lower property wealth school districts. The residential share of property is often used as a measure of the tax price faced by the median voter under the assumption that the incidence of the property tax on non-residential property is not borne by residents. Both these variables were rejected from the final model on the basis of a likelihood ratio test.

Our stage two analysis examines which characteristics of a school district contribute to the passage of a referendum to override the revenue limit. Therefore, in stage two, we include all the variables that describe the characteristics of the voting population: the median income, the percent white, the population over the age of 18, the percent elderly, the percent with at least a bachelor's degree, and the percent of the population who are homeowners. Because we are assuming that school board members are making decisions about whether to hold referenda based

largely on their perception of the preferences of the median voter, our analysis of the variables in stage two reflects those in stage one. Therefore, we expect *median_income*, *white*, *owner*, and *education* to have a positive sign. We hypothesize that *pop_over18* will be negative. The sign of *elderly* is indeterminate.

Data

In order to examine our hypothesis, we have constructed a panel of data for 419 of Wisconsin's 424 school districts for the 9 years period from 2003-2004 to 2011-12.[10] Most of the data we use comes from either the Wisconsin Department of Public Instruction or from the Wisconsin Department of Revenue. U.S. Census data were used to measures demographic characteristics of school districts. As the census data were generally available only for 2000 and either 2007 or 2010, we used linear interpolations for the non-census years. The summary statistics for all of the variables for the year 2012 are displayed in table 4.

To explore whether school districts that never proposed an override referendum during the 2004-2012 period are different from school districts that held at least one override referendum, we calculated the 2012 mean values for each of our explanatory variable for each group. The top panel of Table 5 includes all the variables in the first stage of our model. An indication of whether the means of the two groups are statistically different from each other is provided in the last column.

Although there appear to be some difference between the two groups of school districts, the differences are relatively modest. Among the most significant differences, the fund balances in 2012 were nearly $1,100 larger in school districts that held no override referenda in the 2004 to 2012 period. Also, school districts that held no override elections voted more heavily Republi-

[10] Four districts were excluded because they were involved in recent consolidations, and one because it is a state-run residential school.

can than districts that held at least one referendum. On average, the populations of school districts that never held a referendum were somewhat less white and had a smaller proportion of elderly residents. The table also shows that school districts with larger enrollment declines in the years prior to 2012 were more likely to have never held a referendum, a result counter to our expectations.

The bottom panel of Table 5 shows the means of the explanatory variables in the regression predicting the success of override referenda. Overall the mean values for districts in which referenda always failed, and those with some successes is relatively small. Districts with at least one successful referendum appear to be somewhat less Republican, more elderly, and more white**.**

Results

The results for both the two-stage Heckman probit model as well as the one-stage models, where each dependent variable is modeled in a separate probit equation, can be found in Table 6. All of the models were calculated with robust standard errors to account for potential heteroscedasticty. The one stage models were also calculated with random effects. We calculated the models using random effects because most of the independent variables change slowly over time. In order to use fixed effects, there must be greater within district variability in the independent variables. Because the variability of the independent control variables is small within the school districts, the standard errors from the fixed effects model were too large to tolerate. Unfortunately, there is no easy way to account for the panel data set in the Heckman two-stage probit model. We ran a version of the model with year dummies; however, the results did not significantly change and an LR-Test of nested models rejected the inclusion of the year dummy variables.

The one-stage probit results are provided as a comparison for the two-stage Heckman selection model. As discussed earlier, ρ is the correlation between the residuals in stage one and the residuals in stage two. If ρ is statistically significant, then the Heckman selection model is an improvement over the simple probit specification where each stage is modeled separately. ρ is one component of the likelihood function. However, due to the complexity of the likelihood function, as well as the necessity of constraining the value of ρ such that $-1 \leq \rho \leq 1$, $\text{atanh}\rho = \frac{1}{2}\ln\left(\frac{1+\rho}{1-\rho}\right)$ is directly estimated during the maximum likelihood process instead of ρ. ρ is then calculated from the estimates of atanhρ and the standard errors are derived using the delta method. As shown in Table 6, ρ=.8806, atanhρ=1.379 and is statistically significant at the 99 percent confidence level. Since testing for atanhρ=0 is the same as testing for ρ=0, we can infer that ρ is positive and statistically different from zero. The Wald test of independence between the selection and outcome equations also confirms that the Heckman selection model is preferable to a simple probit specification.

The results in Table 6 show that the two stage results are similar to the single stage probit results. The magnitude of the statistically significant coefficients are generally larger (either more positive or more negative) in the single stage than the two stage results. Therefore, using a one-stage analysis rather than a two-stage sample model may overestimate the impact of the independent variables.

As expected, the results show that the average fund balance per student is negative and statistically significant. Larger fund balances tend to provide direct evidence that there is no need to hold a referendum to raise property taxes. With a large fund balance school districts would most likely find it hard to convince voters to support a revenue limit override.

The percent elderly is positive and statistically significant in both stages of the model. Given the cold Wisconsin winters, perhaps those elderly that choose to stay in Wisconsin are particularly committed to the future prosperity of the state and thus tend to support additional spending for education.[11]

The coefficient of *white* and the *pop_over18* are both positive and statistically significant in the first stage of the model, but not in the second stage. This indicates that the size and homogeneity of the school district might influence a school board's decision to hold a referendum, but that it does not impact whether the referendum is successful. Racial homogeneity does appear to increase the probability of a school board choosing to hold an override referendum. On the other hand, the results also show that school boards are more willing to hold a referendum as the voting population increases. The size of the voting population does not appear to impact the success of a referendum election.

The Republican variable and the cumulative debt referenda attempts variable are both statistically significant. *Republican* is negative implying that the larger the percentage of the population who voted Republican in the last elections, the less likely school boards will hold or pass a referendum to override the revenue limit. The positive coefficient on the debt referenda variable corresponds with the results found by Maher and Skidmore (2009). School boards that are more willing to attempt a debt referendum are also more willing to attempt a referendum to override the revenue limit.

A significant number of our variables, in both the first and second stages of the model, proved to be statistically insignificant. Somewhat surprisingly, school districts with higher median incomes were not more likely to hold or to pass override referenda. Similarly, a more highly

[11] Our results with respect to the elderly appear to correspond to those of Gradstein and Kaganovich (2004).

educated population was not associated with a higher probability of holding or passing override referenda.

The Impact of Override Referenda on Equity in School Funding

The ability of local voters to override the state-imposed revenue limits should enhance allocative efficiency by allowing a closer link between voter preferences and actual per pupil revenues. At the same time, over time the outcome of override referenda can have a substantial impact on the distribution of revenues across school districts. In this section, we use several standard measures of school funding equity to assess whether the ability of voters to override the revenue limits has increased or decreased school funding equity in Wisconsin.

As discussed in detail by Berne and Stiefel (1984), there are several distinct concepts of equity in school funding. Lacking measures of cost differences across districts, we calculate the coefficient of variations as a measure of the equality of per pupil education revenue. As a measure of the fiscal neutrality of the school funding system, we also calculate the property wealth elasticity of per pupil revenue. An elasticity close to zero would indicate that the distribution of state aid results in only small difference in the per pupil revenue of high-wealth and low-wealth school districts.

Although Wisconsin's school funding system has been criticized for not adequately taking into account differences across school districts in the costs of providing education (Reschovsky and Imazeki, 2001), it has, relative to many other states, done a quite good job in reducing the variation across school districts in per pupil revenues. If the state provided no funding for education, local school districts would have to rely on the property tax. Each district's capacity to raise property tax revenue would depend on the size of its property tax base per student. As in most states, equalized property values per student vary tremendously across school districts. In

2012, the pupil-weighted coefficient of variation of the equalized value of property per student equaled 1.8.[12] After accounting for the impact of state General Aid, the coefficient of variation of revenue per pupil under the revenue limits was only 0.09.[13]

The annual revenue limits applied to each school district reflect in part any past approvals of override referenda. To compare the impact of successful overrides, each year we compare each district's revenue limit to the revenue limit the district would have had if it had never approved an override referendum. The most frequent type of override referendum is "non-recurring." This means that the revenue limit is increased for one or more years by amounts specified in the referenda. By contrast, the approval by voters of a "recurrent" referendum results in a permanent increase in the district's revenue limit. For example, if a district approves a $250,000 override referendum, the revenue limit will be raised by that amount in every subsequent year. If the same district passes another $250,000 recurrent referendum in the following year, the district's revenue limit will be increased a total of $500,000 in each subsequent year.

To explore whether the approval of override referenda over the period from 2005 through 2012 have had an impact on the equity of school funding, we compare actual revenue limits per pupil with a set of revenue limits that would have applied if no referenda had been approved. We calculate the latter set of revenue limits by reducing the value of each school district's annual revenue limit by the dollar amount of approved overrides in each year.

Table 7 displays coefficients of variation, a measure of school funding equity, and the wealth elasticity of revenue, a measure of fiscal neutrality. We calculate each measure for both

[12] The coefficient of variation of equalized property values has been growing steadily over the eight year period for which we have data. In 2005, it was 1.62.

[13] A similar picture of the impact of state aid is provided by comparing the *restricted range* (defined as the 10th and 90th percentiles) of equalized property values per pupil and the revenue limit per pupil. Ten percent of Wisconsin students live in districts with per pupil property values below $318,000, while ten percent live in districts with property values above $900,050. By contrast, the 10th percentile revenue limit is $8,975, while the 90th percentile is $10,757. This implies that four out of five Wisconsin students are educated in districts with per pupil revenue limits within this relatively narrow range.

the actual revenue limit per pupil in each year, and the revenue limit net of all override referenda. As indicated previously, the coefficients of variation for all years are quite small, indicating relatively little variation in per pupil revenue limit across school districts. For every year, the coefficients of variation in the third column are smaller than the coefficients of variation in the second column. This indicates that the passage of override referenda has made the school funding system in Wisconsin slightly less equal. However, the increases in inequality are quite negligible.

The wealth elasticities of revenue in the fourth and fifth columns of Table 7 show the relationship between changes in school district property wealth and district revenue. For example the wealth elasticity of actual revenue in 2012 indicates that a one percent increase in property values per pupil (an increase of roughly $5,232 at the median property value) is associated with a 0.706 percent increase in the revenue limit per pupil, or an increase of $68 at the median revenue limit per pupil.[14] A comparison of the elasticities in the fourth and fifth columns demonstrates that the passage of override referenda did almost nothing to change the degree of wealth neutrality of the school funding system in Wisconsin.

Conclusions

With the prospects dim for substantial increases in federal and state funding for public elementary and secondary education, local revenue sources will likely grow in importance. In the average state about 80 percent of locally-raised school revenue come from property taxes. The willingness of Americans to continue to pay school property taxes, perhaps at higher rates, will help determine whether as a nation we can provide adequate funding for public education.

Despite the important role of the property tax in funding both education and other local government services, most states have pursued policies to limit the growth of property tax revenues. In a substantial number of states, local voters are provided with an option to collectively

[14] Wealth elasticities for other years will be added to Table 7 in a revised version of this paper.

decide to weaken state-imposed property tax limits by voting in a local referendum to override tax limitations.

This paper focuses on the state of Wisconsin, which has for the past 20 years imposed limits on annual increases in the sum of state General Aid and school property tax revenue. Local school boards are however allowed to hold referenda to override the dollar amount of the revenue limits. We explore the factors that lead school boards to hold referenda and voters to approve these referenda.

Using data for the period from 2004 through 2012, we observed that nearly half of all school districts have never proposed a single override referendum over this nine-year period. This is true even though in recent years, the annual increase in school district's revenue limits has been quite dramatically reduced. For most school districts that have held override referenda, they are rare events, with 48 percent of school districts that held a referendum between 2004 and 2012, holding only a single referendum. One might imagine that with the relative infrequency of referenda, most would be approved by local voters. In fact, only about 60 percent of referenda were approved.

Research conducted on the revenue limit override provision included as part of Proposition 2½ in Massachusetts tends to show that high-income, small, and homogeneous communities are most like to propose override referenda, and most likely to approve the referenda that are held. We found no evidence of this pattern in Wisconsin, with the probability of both proposing referenda and approving referenda unrelated to median income or to level of residents' education. One consequence of this finding is that that the passage of referenda over the years has not markedly changed the equity and fiscal neutrality of Wisconsin's school funding system.

This paper represents our initial investigation of school revenue limit override referenda in Wisconsin. Our ability to predict the approval of referenda was quite limited. In future work, we plan to investigate whether school boards act strategically in an attempt to increase the probability of any override referendum passing. We will draw on detailed data about individual referenda to see if the timing of referenda, the frequency of referenda, or their specific wording influences their passage.

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Table 1

Public School Revenue by Source, Wisconsin and the U.S., 2010/11

	Wisconsin		United States	
	Amount ('000s)	% of Total	Amount ('000s)	% of Total
Federal	$1,002,909	8.8%	$73,706,695	12.3%
State	5,226,954	45.8%	265,948,594	44.4%
Local	5,175,978	45.4%	259,490,389	43.3%
Property taxes	4,686,084	41.1%	211,651,391	35.3%
Total Revenue	$11,405,841	100.0%	$599,145,678	100.0%

Source: Authors' calculations from U.S. Census Bureau (2013a). Total U.S. property tax revenue calculated from National Center for Education Statistics (2014).

Table 2

Number of School Districts by Frequency of Revenue Limit Override Referenda between 2004 and 2012

Number of Years Referenda Held	Number of School Districts	Percentage of School Districts
No referenda	201	48.0%
Once	104	24.8%
Twice	72	17.2%
Three times	29	6.9%
Four times	10	2.4%
Five times	2	0.5%
Six times	0	0.0%
Seven times	0	0.0%
Eight times	1	0.2%
Total	419	100.0%

Figure 1

Number of School Districts Holding Override Referenda (bars) and Percentage that Passed (line), 2004 to 2012

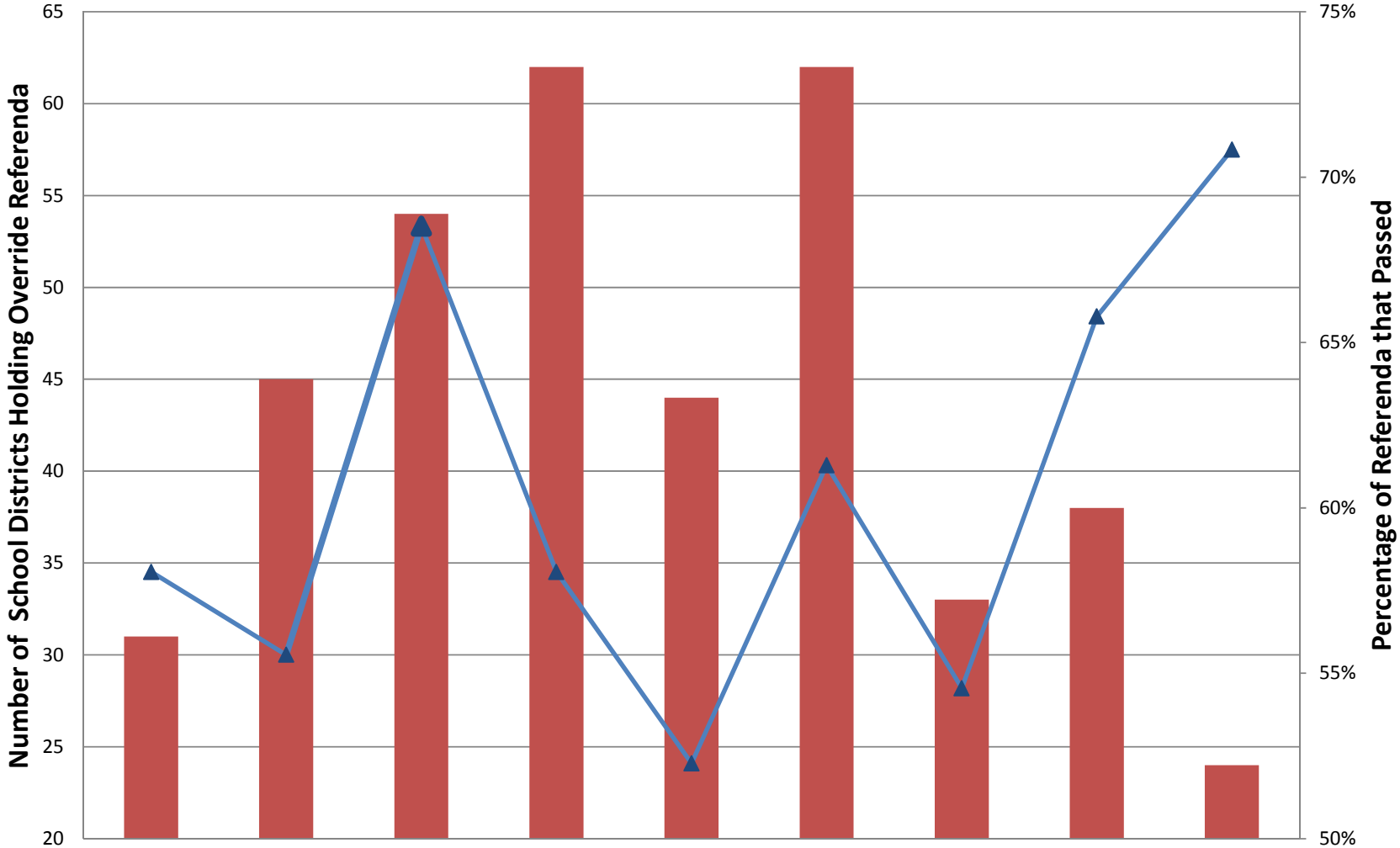

Table 3

Size of Average Successful Override Referendum as a Percentage of School District Revenue Limits by Year, 2004 to 2012

Year	Dollar Amount of Overrides as a Percentage of School District Revenue Limits-- Average Among Districts with Successful Overrides
2004	8.9%
2005	5.7%
2006	9.4%
2007	7.3%
2008	7.9%
2009	10.8%
2010	10.0%
2011	10.1%
2012	11.3%

Table 4

Summary Statistics for Fiscal Year 2012

	Mean	Standard Deviation	Minimum Value	Maximum Value
fund_balance (per pupil)	$5,274	$3,550	$260	$26,610
enrollment_change	-0.72%	2.92%	-13.68%	12.20%
median_income	$33,760	$8,990	$2,790	$105,440
taxprice	1.008	0.483	0.311	3.087
owner	66.9%	13.5%	26.5%	100.0%
white	94.1%	7.8%	10.3%	99.0%
pop_over18	10,897	26,099	623	434,953
elderly	15.9%	4.6%	7.0%	36.6%
education	15.8%	7.4%	2.3%	42.6%
Republican	51.4%	10.8%	13.1%	81.3%
underlevy	0.110	0.313	0	1
debt_ref	2.732	2.517	0	18

Table 5

Mean Values for Fiscal Year 2012

School Districts with No Override Referenda Between 2004 and 2012 and Districts with At Least One Attempted Override Referendum

Equation 1 Variables	No Referenda Attempted	At Least One Referenda Attempted	Difference in Means (Standard Error)
fund_balance (per pupil)	$5,838	$4,755	-$1,082 **
			(345)
enrollment_change	-1.00%	-0.45%	0.55% *
			(0.29%)
median_income	$34,190	$33,350	-$840
			($880)
taxprice	1.012	0.998	-0.021
			(0.047)
owner	67.0%	67.0%	0.35%
			(1.30%)
white	93.0%	95.0%	2.0% **
			(0.8%)
pop_over18	10,975	10,825	-150
			(2,555)
elderly	15.4%	16.3%	0.9% **
			(0.4%)
education	16.4%	15.3%	-1.1%
			(0.7%)
Republican	52.9%	50.0%	-2.9% **
			(1.1%)
underlevy	0.120	0.100	-0.021
			(0.031)
debt_ref	2.667	2.793	0.127
			(0.247)

Equation 2 Variables	No Successful Override Referenda	At Least One Successful Referenda Attempted	Difference in Means (Standard Error)
median_income	$34,270	$32,880	-$1,390
			($1,200)
owner	67.0%	66.7%	-0.30%
			(1.37%)
white	93.6%	94.9%	1.3% *
			(0.8)
pop_over18	11,208	10,357	-851
			(2,651)
elderly	15.5%	16.5%	1.0% **
			(0.46%)
education	16.2%	15.3%	-0.9%
			(0.75)
Republican	53.4%	47.9%	-5.5% ***
			(1.1)

Table 6

Regression Results: Holding Override Referenda and Success of Override Referenda

	Two-Stage Heckman Selection Probit	Probit - Random Effects and Robust S.E.	Probit - Random Effects and Robust S.E.
Stage 1: Holding Referenda			
fund_balance (per pupil - $'000)	-.0395***	-.0948***	
	-0.0593	-0.0241	
enrollment_change	-0.798	-0.5998	
	-0.858	-1.87	
median_income ($'000)	-0.0066	-0.0127	
	-0.0075	-0.0129	
taxprice	0.0609	0.0975	
	-0.0578	-0.1373	
owner	0.2098	0.1974	
	-0.377	-0.742	
white	2.938***	6.037**	
	-0.8225	-2.0313	
pop_over18	.0229**	.00575**	
	-0.0015	-0.00261	
elderly	2.599**	5.394**	
	-0.984	-2.061	
education	0.308	1.009	
	-0.6978	-1.347	
Republican	-1.593***	-3.012***	
	-0.3017	-0.5702	
debt_ref	.0344**	.0444*	
	-0.0108	-0.024	
underlevy	-.1556**	-.269**	
	-0.0593	-0.129	
constant	-3.579***	-6.828***	
	-0.816	-1.929	
Stage 2: Referenda Success			
median_income ($'000)	-0.0044		-0.0072
	-0.0122		-0.0184
owner	0.410		0.79
	-0.5949		-0.877
white	1.2979		-1.341
	-1.4998		-1.769
pop_over18	0.00083		-0.0028
	-0.00319		-0.0043
elderly	4.163**		4.823**
	-1.631		-2.009
education	0.5467		0.879
	-0.526		-1.688
Republican	-2.662***		-2.364**
	-0.5262		-0.74
constant	-2.0906		1.552
	-1.582		-1.91
Athrho	1.379**		
	-0.576		
Rho	0.8806		

R test of independent equations (rho = 0): $\chi^2 = 5.64 \quad \text{Prob} > \chi^2 = .0176$

Significance at: p<.10*, p<.05** p<.01***

Table 7

The Impact of Revenue Limit Override Referenda on School Funding Equality and Fiscal Neutrality

	Pupil-Weighted Coefficients of Variation		Wealth Elasticity of Revenue	
Fiscal Year	Actual Per Pupil Revenue Limit	Per Pupil Revenue Limit w/ No Overrides	Actual Revenue Limit	Revenue Limit w/ No Overrides
2005	0.085	0.081		
2006	0.082	0.078		
2007	0.081	0.077		
2008	0.083	0.077		
2009	0.081	0.075		
2010	0.087	0.076		
2011	0.088	0.075		
2012	0.090	0.074	0.706	0.716