Federal Tax Deductions and the Demand for Local Public Goods[*]

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Abstract

Property taxes are the primary funding mechanism by which local governments pay for public goods. In the United States, the federal income tax system provides a subsidy to this cost by allowing taxpayers to deduct property taxes on their federal income tax returns. Using local referendum approval rates, we confirm a positive relation between the demand for public goods and the share of residents deducting property taxes. Based on this evidence, we develop a theoretical model that accounts for the ability of residents to deduct their property taxes to demonstrate the capitalization of public goods into house values. We empirically support the model's predictions using cross-sectional variation in educational spending. Thus, our results suggest that the 2017 Tax Cut and Jobs Act (TCJA), which increased the standard deduction and reduced the share of taxpayers who deduct property taxes, has the potential to restore equity in the property tax system.

JEL classification: H2, H3, H4, H8, R1, R3.
Keywords: Local Public Finance, Tax Deductibility, Fiscal Policy, Capitalization, TCJA.

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In 2017, cities, townships, counties, school districts, and special districts spent $1.64 trillion for delivering public goods. These local governments must balance the benefits of those public goods with the tax burden they impose. In financing the costs of public goods, United States (U.S.) local jurisdictions rely heavily on property tax revenues ($509 billion collected in 2017), which the federal tax code partially subsidizes via the deductibility of property taxes.[1] This federal tax deduction effectively reduces the costs associated with the delivery of local public goods for the taxpayers who itemize their deductions. Because these taxpayers are primarily concentrated in wealthier and high cost of living urban areas, the federal tax code introduces a spatially heterogeneous subsidy (Figure A1). Using both cross-sectional and temporal variation in the incidence of property tax deductions, this paper demonstrates that the demand for local public goods increases with the share of residents deducting property taxes.

The variation in the rate of taxpayer itemization suggests that revisions to the federal tax code can have profound effects on the demand for local public goods. For example, changes in the federal tax code introduced in the Tax Cut and Jobs Act (TCJA) resulted in a 61% decline in residents filing property tax deductions from 2017 to 2018 – in effect increasing the costs and reducing the demand for local public goods for those residents. As evidence of this effect, Figure 1 shows that the approval rate for bond referendums in California

[1] In the United States, taxpayers can deduct from their taxable incomes a lump-sum amount (called the standard deduction) or the sum of allowable deductions, which are itemized on Schedule A of their income tax return. The 2017 Tax Cut and Jobs Act (TCJA) increased the standard deduction from $12,700 in 2017 to $24,000 in 2018 for married taxpayers filing jointly and from $6,500 to $12,000 for single taxpayers. In addition, the TCJA imposed a $10,000 limit on the amount of state and local taxes (SALT) the can be deducted. See Ambrose et al. (2022) for an in-depth discussion of the TCJA changes in the federal tax treatment of housing expenses.

school districts plummeted following the TCJA. This decrease in the approval rate for predominately property tax funded expenditures stands in contrast to the approval rate for other local tax referendums, such as sales taxes, that are more difficult to deduct.[2]

We begin by showing that this decrease in local referendum approval rates is driven by the change in the number of taxpayers who itemize. Specifically, using a within school district identification strategy and the exogenous shock to the rate of itemization introduced by the TCJA, we show that a 10 percentage point decline in the share of taxpayers who deduct their property tax in a district is associated with a 5.1 percentage point decline in "Yes" votes. Consequently, our analysis provides causal evidence linking federal tax policy with the demand for local public goods.

To aid in interpreting our results, we introduce the ability to deduct property taxes into a theoretical framework that depicts the trade-off between local public goods and property taxation. Our theory draws on models showing the capitalization of public goods into property values (Brueckner, 1979; Cellini et al., 2010; Hilber and Turner, 2014; Lang, 2018). In our model, a community becomes more attractive if the benefits of additional public spending are greater than the consumption forgone by the property tax increase. This implies that local governments should provide goods up to the point where the marginal increase of spending has zero effect on local housing prices. By contrast, under-provision (over-provision) of local public goods may occur if housing values increase (decrease) with marginal increases in local spending. Our model shows

[2]In California, only 15% of households who itemized their deductions deducted state and local general sales taxes.

that, regardless of the current level of local public goods, capitalization of public goods into housing values is systematically greater in areas with a higher share of taxpayers who itemize their property taxes.

We test the model's predictions using cross-sectional variation in educational spending in the school year 2016-2017: pre-TCJA. We focus on education because property taxes are the largest revenue source for U.S. public schools. Combining data from a variety of sources on income taxes, housing prices, school district budgets, test scores, and demographic data, we show that prior to the TCJA, public goods were on average provided efficiently as the marginal effect of school spending on housing values is not different from zero. However, this result is not spatially uniform. The marginal effect is negative in school districts with few or no residents who deduct their property taxes, suggesting that public goods are over-provided in these areas. But the marginal effect is positive in school districts where more than 18% of the residents itemize their expenses and deduct their property taxes. Specifically, we find that a one standard deviation increase in educational spending corresponds to a 2.7% decrease in house values in school districts where residents do not deduct property taxes but with a 0.7% increase in property values in school districts where at least 25% of the residents file a an IRS Schedule A to take advantage of the property tax deduction. Hence, the traditional capitalization model, which does not factor in tax transfers, fails to capture the heterogeneity created by the ability of residents to deduct their property taxes.

Our results are robust to the inclusion of county fixed effects, different measures of educational spending, and also to other public goods, such as policing.

We also confirm the main results of the paper by exploiting the exogenous decrease in the share of residents deducting property taxes emerging from the enactment of the TCJA. In states where residents were impacted the most by the loss of property tax deductibility benefits, the capitalized value of local public goods declined.

We further examine possible channels that could either magnify or dampen the effect confirming that the capitalization parameter in school districts with a higher share of residents who itemize is greater in school districts that (1) have a greater reliance on property taxes to fund expenses, (2) have a higher percentage of residents with high federal tax rates, (3) have a large share of pupils enrolled in public schools, and (4) have a lower share of commercial properties. These results are consistent with the predictions from the theoretical model.

Our study contributes novel insights concerning the efficient allocation of local public goods (Samuelson, 1954; Tiebout, 1956; Oates, 1969). Since the proposed capitalization test of Brueckner (1979), which relies on the co-determination of property tax and level of public goods, many studies have investigated whether public goods are provided efficiently with mixed findings. For instance, Brueckner (1979) and Heintzelman (2010) show that local public goods are over provided, Barrow and Rouse (2004), Cellini et al. (2010), and Lang (2018) show they are under provided, while Brueckner (1982), Bradbury et al. (2001), and Bayer et al. (2020) find no evidence of under or over provision. Our model provides a mechanism to reconcile these conflicting results.

We also provide new evidence describing the real effects of federal tax policy regarding the itemization of expenses. Many research papers have investigated the effects of the mortgage interest deductions on both the mortgage (Hanson, 2012a; Rappoport, 2016; Valentin, 2021) and real estate markets (Poterba et al., 1991; Hanson, 2012b; Sommer and Sullivan, 2018), establishing demand and price responses. Likewise, a lengthy literature focuses on the positive effects of deducting charitable contributions on both the extensive and intensive margins (Taussig, 1967; Feldstein, 1975; Feldstein and Taylor, 1976; Reece and Zieschang, 1985; Randolph, 1995; Auten et al., 2002; Almunia et al., 2020; Meer and Priday, 2020). Despite the volume of work in this field, no paper, to our knowledge, has linked demand for local public goods to property tax deductibility.

Finally, we provide new insights into the debate about the equity of the property tax system (Oates and Fischel, 2016; Brueckner, 2021). In theory, the valued-based property tax is a mechanism to collect taxes as a percent of residents' resources. However, many recent studies cast doubt on the progressivity of the property tax system specifically because of assessments regressivity and the non-homothetic preferences over housing consumption (Avenancio-León and Howard, 2019; McMillen and Singh, 2020; Amornsiripanitch, 2020; Berry, 2021; Fleck et al., 2021). We suggest that the existence of property tax deductions is another key aspect of the property tax system that also leads to regressivity. As property tax deducters are wealthier, deductibility breaks the proportionality between tax obligations and resources. Thus, we enrich the scholarly and public debate on property taxation by shedding light on the unintended consequences of property tax deductibility.

Our paper is organized as follows. In Section 1, we provide motivating evidence relating property tax deductibility benefits to residents' willingness to spend on local public goods using voting outcomes from school bond referendums. In Section 2, we generalize this finding by developing a theoretical framework that introduces property tax deductibility in a model of the capitalization of public goods. In Section 3, we present the cross-sectional empirical setting and data. In Section 4, we show our cross-sectional results. In Section 5, we conclude by discussing the implications of our results for the provision of local public goods.

1 Institutional Background and Motivating Evidence

In this section, we provide motivating evidence that property tax deductions are related to residents' willingness to pay for local public goods. Our empirical analysis uses changes in approval rates for local referendums in California as a proxy for resident willingness to pay for public goods. To achieve identification, we rely on changes in the federal income tax code introduced by the 2017 TCJA that altered taxpayer incentives to deduct expenses on their federal income tax returns.[3] California provides an excellent empirical setting as residents were highly impacted by the change in property tax deductibility subsidy and many localities hold annual referendums.

[3]The TCJA substantially reduced the share of taxpayers who deduct property taxes on their federal income tax returns (Ambrose et al., 2022). Figure A2 shows substantial heterogeneity across U.S. counties in the change in the share of tax returns deducting property taxes using data from the Internal Revenue Service (IRS) Statistics of Income (SOI).

1.1 Referendum Data

The main source of data is the School District Ballot Measure Election Results that contains results on local referendums in California School districts. The data comprises the number of *Yes* votes, the number of total votes, the type of referendum (parcel levy, property tax, or general obligation [GO] bond), the dollar amount for the proposed bond, and the date of the election for all referendums from 2008 to 2020. We manually merge the data with school district demographics from the American Community Survey (ACS), and with the share of residents that deduct property tax from their taxable income from the Internal Revenue Service (IRS) Statistics of Income (SOI).

The dependent variable is the referendum approval rate defined as the ratio of yes votes over the number of votes total ($WinningMargin_{j,t}$). As various referendums require different thresholds to be approved, we subtract the passing threshold from the share of yes votes to facilitate comparison across referendums. We construct the explanatory variable of interest, $ChangeDed_j$, to capture the extent to which residents of a school district were impacted by the TCJA changes to the standard deduction and property tax deduction limits:

$$ChangeDed_j = DedShare_{j,2017} - DedShare_{j,2018} \tag{1}$$

where $DedShare_{j,t}$ is the share of property tax deducters in the school district j in fiscal year t. Hence, greater $ChangeDed_j$ is associated with a greater loss of deductibility subsidy in a school district.[4] We also consider intensive mar-

[4]Figure A3 shows the distribution of winning margins in 2016 and 2020 for school districts that score high and low on $ChangeDed_j$ (above or below the median of 13.9%).

gin measures of the loss of deductibility subsidy including the change in the amount of State And Local Taxes (SALT) deducted, or the share of wasted SALT deductions due to the new cap on these deductions (Li and Yu, 2020).The summary statistics of the variable used in the section are shown in Table A1.

1.2 Empirical setting

To test whether a change in property tax deductibility subsidy changes the support for local public goods, we estimate the following regression:

$$WinningMargin_{j,t} = \alpha_j + \alpha_t + \gamma(ChangeDed_j \times Post_t) + X'_{j,t}\beta + \epsilon_{j,t} \quad (2)$$

where $WinningMargin_{j,t}$ is the winning margin in school district j at election t, α_j is a school district fixed effect, α_t is an election fixed effects, $Post_t = 1$ for elections happening after 2019 inclusive, and $X_{j,t}$ are additional controls (election turnout, referendum type, and a dummy for recently rejected referendum). Although the TCJA was enacted in the fiscal year 2018, the first year residents filed income tax documents under the new regime was 2019. The underlying identification assumption is that, absent the fiscal change, residents' votes in favor of additional local public goods are similar pre- and post-TCJA. This methodology removes endogeneity concerns regarding the timing of elections and proposed referendum characteristics (Romer and Rosenthal, 1979; DeBartolo and Fortune, 1982; Cellini et al., 2010). Hence, the coefficient of interest γ captures the marginal change in approval rate resulting from a marginal change in the loss of property tax deductibility subsidy holding the school district constant.

1.3 Results

The results are presented in Table 1. Column (1) does not include the interaction term nor election fixed effects. The negative coefficient on $Post_t$ indicates that the winning margin decreased in recent elections conditional on the school districts that proposed a referendum. Thus, the decrease in approval rates is not driven by differences in the set of school districts. In Column (2), we add the interaction term. The coefficient γ is negative and significant at the 5% level while the coefficient on $Post_t$ becomes insignificant. These results indicate that the observed decrease in approved referendums is therefore driven by the loss in property tax deductibility subsidy. In Column (3), we add election fixed effects to control for potential timing endogeneity that may influence election outcomes (Kogan et al., 2018). The coefficient γ is negative and remains significant at the 5% significance level. In Column (4), we show the preferred specification that restricts the sample to close elections (within 25 percentage points to the passing thresholds) to remove referendums that had strong or weak a priori support. The results are robust to this selection. The estimate of -51.0 suggests that a 10 percentage point decrease in the number of residents deducting property taxes is associated with a 5.1 percentage point reduction in approval rates. The magnitude is quite substantial given the usually narrow margins of wins. Because the average $ChangeDed_j$ in California is 14 percentage points, the loss of property tax deductibility alone can explain most of the defeated referendums. In Column (5), we keep only bond referendums allowing us to control for the proposed cost of the initiative by dividing the bond amount by the number of housing units from the ACS. The coefficient γ remains negative and significant at the 10% significance level.

Parallel trends.

Biasi and Sarsons (2021) find that over the last 20 years, there have been a decrease in capital expenditure for public schools throughout the United States specifically in high-income school districts. Hence, a pre-trend could explain our results as the share of property tax deducters is correlated with income. In order to rule out this possibility, we run placebo tests using different years for *Post*. The results are shown in Table 2. The coefficient γ on the interaction between $Post_t$ and $ChangeDed_j$ is insignificant for all placebo years chosen. Additionally, Figure A4 shows the parallel trends for school districts that score high or low on $ChangeDed_j$. There is no evidence of a prior diverging trend.

Local governments' margins of adjustment.

The results presented in Table 1 may be caused by a change in the number or nature of the referedums proposed after the TCJA in those schools district impacted by the loss of deductibility subsidy. To rule out this explanation, and also to document other potential margin of adjustment of local governments, we estimate equation (2) with alternative dependent variables. The results are shown in Table 3. In Column (1), we consider the number of referendums proposed each year estimated with Poisson model. The insignificant coefficient on the interaction term shows that the occurrence of referendums have not changed after the TCJA. Next, we consider the value of the proposed bond standardized by the number of housing units (Column [2]), and the proposed parcel levy amount (Column [3]).[5] If anything, local governments have put forward smaller bond proposals as indicated by the marginally significant coefficient in Column (2), which would play against us finding a significant result in the main regression. Hence, a change in the type of referendum proposed cannot explain the results presented here. Additionally, Column (4) shows that there have been no changes in voter turnout.

Intensive margin effects.

After the TCJA, many taxpayers stopped itemizing their deductions. Additionally, for the residents who keep itemizing, the TCJA imposed a cap of $10,000 on SALT deductions. Hence, on top of the extensive margin effect, there might be an additional intensive margin effect. We include a triple interaction to test whether the intensive loss of the deductibility subsidy further reduces referendum approval rates:

$$\begin{aligned} WinningMargin_{j,t} &= \alpha_j + \alpha_t + X'_{j,t}\beta + \gamma^{ex}(ChangeDed_j \times Post_t) \\ &\quad + \gamma^{in}(ChangeDed_j \times LossDed_j \times Post_t) + \epsilon_{j,t} \end{aligned} \tag{3}$$

We report the results in Table 4 using four different measures for $LossDed_j$. In column (1), we use the change in SALT deductions amount between 2017 and 2018 standardized by the number of houses in the school district. In column (2), we use the percentage change of SALT deductions between 2017 and 2018. In column (3), we use the sum of the SALT deductions that is wasted due to the

[5] Note that there is not enough property tax referendums in the Post period to perform similar tests with the proposed property tax increase.

cap, standardized by the number of houses. And, in Column (4), we use the ratio of wasted SALT deductions on the total SALT deductions that could have been deducted. The insignificant coefficients on the triple interaction terms (except for the coefficient in Column [1], which is significant at the 10% level) indicate that the decrease in approval rates are driven by the extensive margin loss of deductibility benefits rather than the intensive margin.

Covid-19 crisis and willingness to spend locally.

The analysis covers mostly referendums that took place in 2020 as most referendums occur in even years. Hence, the results could be driven by reluctance to increase local public spending because of the uncertainty related to the Covid-19 pandemic. To rule out this potential explanation, we collected answers to the Californian PPIC Statewide Survey that ask respondents about their intention to vote in favor of a school bond referendum (Brunner and Sonstelie, 2003).[6] This survey is valuable because it includes respondents from all parts of California and therefore does not restrict the willingness to support local public goods to residents of school districts that had a referendum. Figure 2 shows that the decrease in support for local bonds is apparent from 2019. Hence, despite not having many referendums in 2019, these surveys provide additional suggestive evidence of the effect of the TCJA on local public spending support.

[6]The PPIC, provided by the Public Policy Institute of California, conducts this survey of 1,500 representative California residents every April since 2007. PPIC bears no responsibility for the interpretations presented or conclusions reached based on analysis of the data.

2 Theoretical Framework

In this section, we present a theoretical model to generalize the results of the previous section and aid interpreting the causal connection between federal tax policy and provision of local public goods. Following the framework developed in Brueckner (1979, 1982), Barrow and Rouse (2004), and Cellini et al. (2010), we assume that an individual's utility depends on the level of local public goods ($g_{i(j)}$), housing consumption (h_i), and the consumption of the numeraire good (x) such that $u(g_{i(j)}, h_i, x)$ is quasi-concave, where i denotes the individual's house in location j. All residents in j consume the same level of public goods $g_{i(j)}$, and housing service flow is a function of housing and neighborhood characteristics Z_i such that $h_i = h(Z_i)$. Residents are fully mobile so that those with the same income y achieve the same utility level $f(y)$. Through urban sorting, house rents, denoted as R_i, adjust to ensure that residents are indifferent between houses.

To finance public goods, local governments collect ad-valorem property taxes at rate τ_j.[7] Because the property tax rate is commonly applied to both land and improvements at market value (Glaeser, 2013), housing rent and property tax payments are capitalized into house i's value (v_i):

$$v_i \quad = \quad \frac{1}{\theta}\left[R(g_{i(j)}, h_i; y) - \tau_j v_i + \mathbb{I}_i(\tau_j v_i \cdot mtr)\right] \tag{4}$$

where θ is the discount rate, and $\mathbb{I}_i$ equals 1 if the household owns house i and

[7]For simplicity, we assume that local public goods are exclusively financed by ad-valorem residential property taxes. In the empirical section, we relax this assumption to consider other sources of revenue including grant transfers from higher-level governments, and commercial property taxation.

takes advantage of the deduction of property taxes on their federal income tax and 0 if the household rents or uses the standard deduction. Assuming that j is comprised of n houses, the aggregate housing value of j is $V_j = \sum_{i=1}^{n} v_i$, which serves as the jurisdiction's tax base. Since local governments must balance their budgets (Glaeser, 2013), the local government's budget is

$$V_j \cdot \tau_j = C(g_j), \tag{5}$$

where $C(g_j)$ is a convex cost function for providing g_j. Since local jurisdictions comprise a combination of residents who itemize expenses and residents who use the standard deduction, we note that the aggregate housing value is a function of public goods (g_j), the stock of housing ($\mathcal{H}_j$), and the share of residents who deduct their property taxes ($DedShare_j$):

$$\begin{aligned} V(g_j, \mathcal{H}_j, DedShare_j) \approx & \frac{1}{\theta}\Bigg[\sum_{i=1}^{n} R(g_{i(j)}, h_i; y) - C(g_j) \\ & + DedShare_j \cdot C(g_j) \cdot \text{mtr}\Bigg]. \end{aligned} \tag{6}$$

In order to conceptualize the impact of the federal income tax deduction for property taxes, we consider two extreme cases characterizing the extent that residents itemize their property taxes on their federal income tax returns. We first examine the case where no residents deduct property taxes from their taxable income ($Dedshare_j = 0$). Thus, we can rewrite (6) as:[8]

$$V^{ND}(g_j, \mathcal{H}_j) \;=\; \frac{1}{\theta}\Bigg[\sum_{i=1}^{n} R(g_{i(j)}, h_i; y) - C(g_j)\Bigg]. \qquad (7)$$

Equation (7) shows that aggregate housing value depends on rents and the cost of providing local public goods. As both elements increase in g, the net effect of an increase in public goods on housing value is uncertain. Differentiating (7) with respect to the level of public goods (g) yields the capitalization parameter:

$$\begin{aligned}\frac{\partial V^{ND}}{\partial g} &= \frac{1}{\theta}\Bigg[\sum_{i=1}^{n}\frac{\partial R_i}{\partial g} - \frac{\partial C(g)}{\partial g}\Bigg]\\ &= \frac{1}{\theta}\Bigg[\sum_{i=1}^{n}\frac{u_g(g, h_i, y-R)}{u_x(g, h_i, y-R)} - \frac{\partial C(g)}{\partial g}\Bigg]. \qquad (8)\end{aligned}$$

If $\frac{\partial V^{ND}}{\partial g} = 0$, then the sum of the marginal rate of substitution between public goods and the numeraire equals the marginal cost of providing the public goods and indicates that public goods are provided efficiently (Samuelson, 1954). Hence, for any $\frac{V^{ND}}{\partial g} \neq 0$, the level of public goods provision is not efficiently provided.[9] Given the concavity of $R(g_{i(j)}, h_i; y)$ and the convexity of $C(g_j)$, we note that $V^{ND}(g_j, \mathcal{H}_j)$ is concave in g with a maximum value at g^*, which is the efficient level of public goods provision. Panel A of Figure 3 illustrates this trade-off. For any level of g below g^*, public goods are under-provided ($\frac{\partial V^{ND}}{\partial g} > 0$) while values above g^* imply that public goods are over-provided ($\frac{\partial V^{ND}}{\partial g} < 0$).

[8]We use the superscripts D and ND to denote the extreme cases where residents do and do not deduct local taxes, respectively.

[9]Note that the under- or over-provision of public goods may result either from productive or allocative inefficiencies. We only consider the extent to which local governments deviate from the efficient level.

We now consider the opposite case where all residents take full advantage of deducting property tax payments from their federal taxable incomes. With full deductibility, the net-of-tax housing cost for individual i becomes $R_i - v_i\tau(1-\text{mtr})$, where mtr is the marginal tax rate on federal income. Thus, the tax base where all residents deduct their property taxes (V^D) is:

$$V^D(g_j, \mathcal{H}_j) \;=\; \frac{1}{\theta}\left[\sum_{i=1}^{n} R(g_{i(j)}, h_i; y) - C(g_j)(1-\text{mtr})\right] \tag{9}$$

Equation (9) shows that the trade-off between the benefits of additional public goods (through higher rents) and property taxation is attenuated by the property tax deduction. As a result, the capitalization of public goods into aggregate house values when residents deduct their property taxes implies that:

$$\frac{\partial V^D}{\partial g} \;=\; \frac{1}{\theta}\left[\sum_{i=1}^{n} \frac{u_g(g, h_i, y-R)}{u_x(g, h_i, y-R)} - \frac{\partial C}{\partial g}(1-\text{mtr})\right]. \tag{10}$$

Thus, regardless of the level of public goods provision and as long as local governments finance a share of their budget through property taxation, we note that $\frac{\partial V^D}{\partial g} > \frac{\partial V^{ND}}{\partial g}$. Panel B of Figure 3 shows the relationship between public goods provision and housing value for the two extreme cases. Since the federal property tax deduction provides a subsidy for the costs of providing public goods, we note that V^D lies above V^{ND} for all positive levels of public goods.

We now consider the case of jurisdictions having a combination of residents who do and do not take advantage of the federal deduction for property taxes on their federal tax returns. In doing so, we develop a series of testable hypotheses that capture the cross-sectional heterogeneity in the share of taxpayers who itemize expenses on their federal tax returns. As $0 \leq DedShare_j \leq 1$, V from equation (6) lies within the curves of the extreme cases as we show in Panel B of Figure 3. Since property tax deductibility is capitalized into house values through a reduction in the cost of providing public goods, we expect housing values to increase with the share of residents who deduct their property taxes: $\frac{\partial V}{\partial DedShare} > 0$.

Taking the partial derivative of (6) with respect to g leads to insights into whether public goods are on average efficiently provided:

$$\frac{\partial V}{\partial g} \begin{cases} > 0 & \text{if g is under-provided} \\ = 0 & \text{if g is efficiently provided} \\ < 0 & \text{if g is over-provided} \end{cases} \tag{11}$$

Given the longstanding debate regarding whether local public goods are efficiently allocated (Tiebout, 1956; Samuelson, 1954; Brueckner, 1979; Arnott and Stiglitz, 1979) and the mixed empirical findings (Barrow and Rouse, 2004; Cellini et al., 2010; Lang, 2018; Bayer et al., 2020), the sign on this derivative (11) is an empirical question.

Finally, we test whether valuation of local public goods varies based on the share of residents who itemize by looking at:

$$\frac{\partial^2 V}{\partial g \, \partial DedShare} > 0 \tag{12}$$

which is positive. In contrast to models that do not consider the ability of residents to deduct property taxes, our model predicts that a higher share of residents who deduct their property taxes corresponds to a higher capitalization parameter regardless of the efficiency conclusion drawn from the sign of $\frac{\partial V}{\partial g}$.

3 Empirical Framework and Data

3.1 A cross-sectional test of capitalization

Our identification strategy relies on a cross-section of local governments' housing values, local public goods provision, and share of property tax deducters. Because the theoretical predictions are derived in a comparative statics framework, the cross-sectional analysis is ideal since regressions allow isolation of ceteris paribus effects (Barrow and Rouse, 2004; Brueckner, 1979, 1982). Additionally, it alleviates sorting issues that can emerge from time-series identification (Kuminoff and Pope, 2014). We specifically test the theoretical model's predictions using data at the school district level. We focus on educational spending because it represents the largest local spending share (policing being second), and property taxes are the largest revenue source supporting it. For instance, according to the Annual Survey of School System Finances (ASSSF), in the school year 2016-2017, 45.6% of public school revenues came from local taxation, out of which 64.5% came from property taxes. The well-documented relationship between residential choice and local public school spending reinforces the link between local spending and housing values (Black, 1999; Barrow and Rouse, 2004; Bayer et al., 2007).

We estimate the following equations:

$$log(V_j) = \alpha_{m(j)} + \bar{\delta} Exp_j + \phi DedShare_j + X_j' \beta + \epsilon_j \quad (13)$$

and

$$\begin{aligned} log(V_j) &= \alpha_{m(j)} + \delta^{ND} Exp_j + \delta^{D}(Exp_j \times DedShare_j) \\ &\quad + \phi DedShare_j + X_j' \beta + \epsilon_j \end{aligned} \quad (14)$$

where V_j is median house value in school district j, $\alpha_{m(j)}$ are CBSA fixed effects, Exp_j is the educational spending per pupil, $DedShare_j$ is the share of residents in school district j that deduct their property taxes, and X_j are demographics controls (income, education, age distribution, etc.).[10] We control for school district average test score in X_j, which alleviates concerns regarding the use of input versus output level variables when discussing residents' preferences for schools (Turnbull and Zheng, 2019; Downes and Zabel, 2002). Thus, all the results are conditional on school district performance. We estimate equations (13) and (14) in parallel to show the impact of introducing heterogeneity in the share of residents who deduct their property taxes in drawing conclusions about the efficiency provision of local public goods. Figure 3 intuitively shows the empirical strategy where each point depicts a jurisdiction for which we observe its conditional mean house value and current level of public goods.

From the theoretical model, we expect ϕ to be positive because the property tax deduction subsidy is capitalized into housing values (Poterba et al., 1991).

[10]We use public goods spending $C(g)$ as a proxy for public goods output g which offers the same efficiency interpretations (Brueckner, 1979).

In equation (13), $\bar{\delta}$ is the average capitalization parameter and its sign provides information about the average efficiency of public goods provision (Brueckner, 1979). In equation (14), the coefficient δ^{ND} depicts the capitalization parameter for school districts with no residents benefiting from property tax deductions while δ^{D} depicts the capitalization heterogeneity for school districts with higher shares of residents that deduct their property taxes. The theoretical model suggests that the latter parameter should be positive.

3.2 Data

We collect housing statistics from Zillow's home value index (ZHVI) for January 2017 provided at the zip code level. Zillow estimates the median value of single-family houses within zip codes based on recent sales applying hedonic adjustments for property characteristics. The series are seasonally adjusted and averaged using a 6-month moving average removing endogeneity concerns regarding the timing of sales. We then match the zip code level ZHVI to school districts using the 2014 School District Geographic Reference Files developed by the U.S. Census Bureau's Education Demographic and Geographic Estimates program.

We use the SOI from the IRS to collect the number of taxpayers who deduct their property taxes from their taxable income available for each zip code (z) with more than 100 tax returns, scaled by the number of returns in z:

$$DedShare_z = \frac{\text{\# of tax returns with property tax deductions}_z}{\text{\# of tax returns}_z}. \tag{15}$$

We then cross-walked $DedShare_z$ to the school district level using the School District Geographic Reference Files to calculate the share of residents in district j that deduct their property taxes.[11]

We obtain school district spending information from the Census Annual Survey of School System Finances (ASSSF). For each public school district, we collect the revenue source (federal, state, local, or property taxes) and expense items (such as educational expenses, support services expenses, or library expenses). We adjust the ASSSF monetary statistics using the American Community Survey Comparable Wage Index for Teachers (CWIFT) to facilitate comparison of educational spending across school districts.[12] Adjusting the school districts' spending for the local cost of living is necessary because we analyze the capitalization of local public good spending $C(g)$ as opposed to local public goods g.[13] In the main analysis, we keep school districts that provide elementary education to have non-overlapping school districts and comparable per-pupil spending.

We collect demographic information from the ACS at the school district level (including income, racial composition, level of school attainment of the population, and age distribution). We additionally collect the share of households within income groups from the SOI of the IRS. We obtain school districts'

[11]To illustrate the significant heterogeneity in $DedShare_j$, Figure A5 shows the spatial distribution of *DedShare* for Pennsylvania school districts. We note significant variation across urban and rural areas, with inner-city areas having lower $DedShare_j$ values.

[12]CWIFT is a measure of the regional variations in the wages and salaries of college graduates who are not PK-12 educators. A dollar spent in schools with a score of one (e.g. Boulder Valley School District, CO or New Bedford School District, MA) is therefore worth the same as $1.40 spent in San Francisco Unified School districts (highest CWIFT) and $0.65 spent in Vaughn Municipal Schools, NM (lowest CWIFT).

[13]Our results remain consistent without such adjustment.

employment data from the Annual Survey of Public Employment and Payroll - School Systems. We measure school performance by the *pooled across subjects test-based achievement score* of The Stanford Education Data Archive. Lastly, we collect land use data from the National Land Cover Database computed at the school district level.

Table 5 shows the summary statistics. We separate school districts into high property tax deducting areas and low property tax deducting areas (those with $DedShare$ greater or less than the median share (23.0%), respectively). We note that school districts with a greater share of property tax deducters have higher housing values, incomes, and home-ownership rates. Additionally, the summary statistics show that the adjusted school expenses per pupil are larger for school districts with higher shares of deducters (about $1,230 more per pupil). Despite obvious correlations between $DedShare$ and other variables, our econometric framework relies on equilibrium relationships, which alleviates endogeneity concerns.

4 Results

Main results

We present the estimated coefficients from equations (13) and (14) in Table 6.[14] Consistent with the theory predictions and the housing user-cost literature (Poterba et al., 1991), the estimated coefficient for the share of residents who deduct their property taxes ($DedShare$) from Equation (13) is positive and sig-

[14] The full set of coefficients are presented in Table A3. We also present, in Table A4, the results using the log of expenses per pupil. The results are qualitatively and quantitatively similar.

nificant at the 10% level, regardless of the spatial fixed effects included. The estimated coefficient indicates that a ten percentage point increase in the share of residents who deduct property taxes corresponds to about a 6.0% increase in house values, an economically meaningful impact. Considering that the top federal marginal tax rate in 2017 was 39.60%, a full capitalization of housing expense deductibility should result in a 65.5% housing value premium.[15]

The estimated coefficient for $\bar{\delta}$ in equation (13), the average capitalization parameter, is not significant in (1a) or (2a) indicating that the provision of public goods is on average provided efficiently across school districts. However, when we allow for heterogeneity in the share of residents who itemize deductions, the coefficient on the capitalization parameter (δ^D) is positive and significant at the 1% level (Column (1b). This indicates that in areas with higher shares of residents taking advantage of the property tax deduction, the capitalization of public goods into housing value is greater. However, we note that the estimated coefficient for δ^{ND} is negative and significant, suggesting that the cost of providing local public goods outweighs their benefits in school districts that have low shares of residents deducting property taxes (less than 18%). Specifically, the coefficients of Column (1b) imply that a one standard deviation increase in per-pupil spending is associated with a 2.7% reduction in housing value in a school district where residents do not deduct their property taxes. However, property values increase by 0.67% in school districts having the median share of residents that deduct their property taxes (23.0%).

In Columns (2a) and (2b), we further add state fixed effects to mitigate en-

[15]Under complete and perfect pass-through of housing expenses deductibility $\phi = \frac{1}{1-mtr} - 1$.

dogeneity concerns that can arise within CBSAs that span different states. Although the magnitude of the estimated coefficients are smaller, the results are qualitatively and quantitatively unchanged. In Columns (3a) and (3b), we set the spatial fixed effects to the county level. Identification is thus reduced to counties with multiple school districts which further increases the fit of the regressions (Adjusted R^2 is 0.93). In this specification, the estimated coefficient for $\bar{\delta}$ is positive and significant (Column [3a]) indicating under-provision of public goods on average. Nevertheless, the results in Column (3b) confirm that the positive capitalization is driven by school districts with residents deducting property taxes as δ^D is positive and statistically significant (at the 1% level) while δ^{ND} is negative (statistically significant at the 10% level).

The main results have implications regarding the provision of local public goods. They show that, on average, public goods are provided efficiently as the marginal effect of public goods spending on housing value is not statistically different from zero. However, when controlling for school districts within counties (column [3a]), we see that school spending is generally under provided, on average. Consistent with our theoretical model, introducing heterogeneity in the share of residents who take advantage of the federal property tax deduction changes the inference about whether local public goods are efficiently provided. To provide greater clarity on this trade-off, Figure 4 shows the effects of including heterogeneity vis-à-vis deductibility benefits into a model of capitalization of local public goods. At the margin, the property tax burden outweighs the utility from local public goods in districts where residents do not deduct their property taxes. However, as the share of the residents who deduct their property taxes increases, the benefits of public goods outweigh the associated tax burden. Hence, local public goods appear to be under-provided in communities where residents benefit from the federal tax subsidy but they seem to be over-provided for school districts with few residents who deduct property taxes.

Robustness checks

As a robustness check, we report the coefficient estimates for $\bar{\delta}$, δ^{ND} and δ^{D} using different educational public goods spending measures in Table 7. We observe that δ^{D} is positive and significant for all variables except one, ranging from 0.074 to 0.261. The non-significant coefficient of Columns (2b), indicates that additional *Instructional Expenses* are not capitalized in housing value. Because we control for average school district test scores, the results suggest that additional spending in instruction is not valued except through the effects on test scores. We also examine the external validity of our main findings addressing the concern that the value residents place in public schools is different than other local public goods. For example, Table 8 shows that the qualitative pattern of results is robust to spending on police. Interestingly, the negative coefficient $\bar{\delta}$ suggests that spending on policing, on average, outweighs its benefits.[16]

We further exploit the exogenous decrease in the share of property tax deducters due to the TCJA to identify the effects of $DedShare$ on the rate of local public goods capitalization. Using school districts house prices and 4th graders

[16] This result contrasts with the findings in Brasington (2021) showing that cities where residents vote to cut police funding become less attractive for households with children. However, Figlio and O'Sullivan (2001) provide evidence that local governments may manipulate police service levels in response to cuts in funding.

mean test scores in each school district, we compute the rate of capitalization ($\frac{\partial V}{\partial g}$) before and after the tax. We show in Figure 5 the relationship between the decrease in $DedShare$ and the change in capitalization at the state level. We observe that as the state residents loss of deductibility increases, the value they place in local school quality decrease. This result is consistent with the theoretical model and the results of the cross-sectional tests above.[17]

5 Channels that may magnify or mitigate the capitalization effects

Having established an equilibrium relationship between public goods capitalization and the benefits associated with itemization of property taxes, we now investigate potential channels that could magnify or mitigate the effect. Specifically, we focus on differences in school districts across (1) their dependency on local revenue, (2) their residents' average income tax rates, (3) their share of children enrolled in public schools, (4) their land available for housing development, (5) their share of commercial property, and (6) whether the state engaged in a school equalization reform.

School districts reliance on local taxation and capitalization.

The way schools are financed varies significantly across the United States. For example, in eight states, school districts do not directly levy taxes, relying

[17]In Table A5, we additionally show the results exploiting the panel nature of the dataset. The results are qualitatively and quantitatively similar even with the inclusion of school district and year fixed effects.

entirely on state and federal funding. Thus, a larger share of higher-level government transfers should reduce the school spending capitalization because the link between property taxation and housing value is less clear. We test this hypothesis by splitting the sample into school districts with property taxes above and below the median of 41% of revenue from local taxation and report the results in Figure 6, Panel A.[18] The results show that the theoretical predictions only hold in school districts that depend heavily on local taxation. In school districts that have a low reliance on property tax revenue, the capitalization of public goods is insignificant. Thus, the main mechanism shown in the theoretical framework holds only in school districts that have autonomy in taxing residents.

Mean income federal tax rate

All the predictions of the theoretical model are enhanced by the tax rate on income because residents with higher tax rates benefit more from the ability to itemize deductions. In Panel B of Figure 6, we show the results by splitting school districts based on residents' mean federal tax rates (above and below the median of 16.20%).[19] As expected, the capitalization of local public goods for property tax deducters is prevalent only in the subset of school districts where residents have a high mean federal tax rate. In the other districts, δ^D is insignificant.

[18]Coefficient estimates for the tests discussed in this section are provided in details from Table A6 to Table A11.

[19]Mean federal tax rate is computed by dividing the total income federal tax revenues in a school district by the total adjusted gross income from the SOI.

Does private schools enrollment reduce capitalization?

Since the availability of private schools likely affects residential and educational choices (Cheshire and Sheppard, 2004; Fack and Grenet, 2010; Schwartz et al., 2014), we examine whether the marginal effect of educational spending on housing values is lower in areas with greater public/private school choice. To test this hypothesis, we split the sample between school districts with high and low levels of public school penetration. As this can only be measured for unified school districts, we remove districts with only elementary schools from this analysis. We construct the public school penetration as the ratio of pupils enrolled in the public school districts divided by the number of people less than 19 years old. Panel C of Figure 6 shows the results. As expected, in areas with high public schools penetration δ^D is positive and significant. However, the estimated coefficients are not significant in school districts with lower public school penetration, consistent with the rationale that residents' housing bids incorporate the value residents' place in local public goods.

Does land supply elasticity mitigate capitalization?

The effects of school spending on housing values may vary depending on the availability of land for development. In school districts where land is scarce, the capitalization of public goods into housing values should be greater than in areas with high land availability because an increase in housing supply can mitigate the price effect (Cheshire and Sheppard, 2004; Hilber and Mayer, 2009; Lutz, 2015). To test this, we split the sample based on the share of land that is available for development in each school district. We rely on the satellite imagery provided by the National Land Cover Database, which provides nationwide data on the land cover at a 30-meter resolution. For each school district, we compute the ratio of developed land area over the developable land area as a proxy for land availability.[20] Panel D of Figure 6 presents the results. Consistent with previous work (Lutz, 2015), the mean capitalization estimates ($\bar{\delta}$) is significantly different from zero only in school districts with high land scarcity. In school districts that are less developed, the coefficient is insignificant. The coefficients δ^D are however not different from each other.

Commercial properties taxation and capitalization.

Local governments usually collect property taxes on both commercial and residential properties. Thus, the higher the share of commercial properties in the community, the lower the tax burden for residents (Brueckner, 1983). We expect different capitalization in school districts that contain a large share of commercial properties compared to school districts solely composed of residential properties. To test this hypothesis, we compute the share of the developed land that is considered as either *medium* or *high intensively developed* as defined by the NLCD to proxy for the share of commercial property in a school district and report the results in Figure 6, panel E. The positive and significant difference between the coefficients ($\bar{\delta}$) indicates that, all else equal, the capitalization of school spending is greater in school districts with a larger share of commercial properties suggesting that the incidence of taxation is lower for residents of school districts containing large amounts of commercial real estate develop-

[20]In contrast to *The Wharton Residential Land Use Regulatory Index*, this methodology allows us to compute the variable for school districts instead of relying on larger and sparser spatial areas.

ment. The heterogeneous capitalization coefficient (δ^D) is also greater in the school districts with a larger share of commercial properties, though not statistically different from δ^D computed for school districts with a lower share of commercial properties.

Capitalization in states that reformed their school systems.

Previous studies have investigated the impact of statewide school financial equalization reforms on school spending (Bradbury et al., 2001), residents' sorting (Chakrabarti and Roy, 2015), housing price (Bradbury et al., 2001), zoning (Krimmel, 2021), housing supply (Lutz, 2015), and the capitalization of local public goods (Bayer et al., 2020). In states that have enacted equalization tax reforms, public goods are generally under-provided because of the inability of local residents to raise revenue independently (Bradbury et al., 2001; Bayer et al., 2020). Thus, we split the sample between reformed and non-reformed states.[21] We present the mean results in Panel F of Figure 6, and also the capitalization effects along the $DedShare$ axis in Figure 7. The similarity between the capitalization function for non-reformed states and the function shown in Figure 4 is evident. The main results are therefore driven by school districts that have fiscal autonomy. For school districts within states that passed an equalization reform, the capitalization function is qualitatively different showing a decreasing relationship between $DedShare$ and capitalization. Interestingly, in these states, the capitalization of educational spending in school districts with a high level of property tax deducters is negative; suggesting that deducters would

[21] As per (Bayer et al., 2020), states that passed school reforms include CA, KS, NJ, WI, WA, CT, WV, WY, AR, MT, TX, KY, MO, AL, NH, TN, MA, AZ, VT, OH, MI, ID, NY, SC, and OR.

pay for a reduction of public goods provision. The mechanism depicted in the theoretical model is therefore broken if more affluent school districts must compensate less affluent districts through recapture (Bayer et al., 2020; Giertz et al., 2021).

To summarize, we show that the capitalization of school spending into house value is greater for school districts that have greater fiscal independence, have residents facing higher federal tax rates, have a large share of pupils enrolled in public schools, have lower land available for development, and have a larger share of commercial properties. These results confirm that local public goods that are financed by property taxes are valued differently by residents that pay the full costs versus residents who deduct part of the costs on their federal taxable income.

6 Conclusion

This paper explores the relationship between taxpayer ability to deduct property taxes at the federal level and the provision of local public goods. We first show that, because of the change in the share of taxpayers who take advantage of the property tax deduction that was introduced by the TCJA, support for local public spending declined. Then, using a model of public goods capitalization, we show that the demand for local public goods is enhanced by the benefits associated with the deduction of property taxes. Both sets of findings suggest a causal link between federal tax policy and the provision of local public goods. As a result, our analysis suggests that local governments may see a reduction in the demand for public spending in response to the recent changes in the itemization rules embedded in the federal tax code.

Our results have important implications regarding the property tax system. In theory, a valued-based property tax is a mechanism to collect taxes as a percent of the residents' resources, which incentivizes individuals to sort into locations that provide the optimal amount of public goods that maximizes their utility (Tiebout, 1956). Yet, introducing a federal income tax deduction for property taxes creates a discrepancy across residents in the costs of local public goods. Because the incentive to itemize expenses for federal income taxes increases with income and wealth, the provision to deduct property taxes breaks the proportionality between tax obligations and resources. Thus, our results provide an explanation for why wealthier communities expend more resources on public goods than would be indicated if residents had to bear the full costs. As a result, our analysis suggests that the provisions in the 2017 TCJA that reduced the incentives for many taxpayers to take advantage of the property tax deduction may potentially help restore the progressivity nature of the property tax system.

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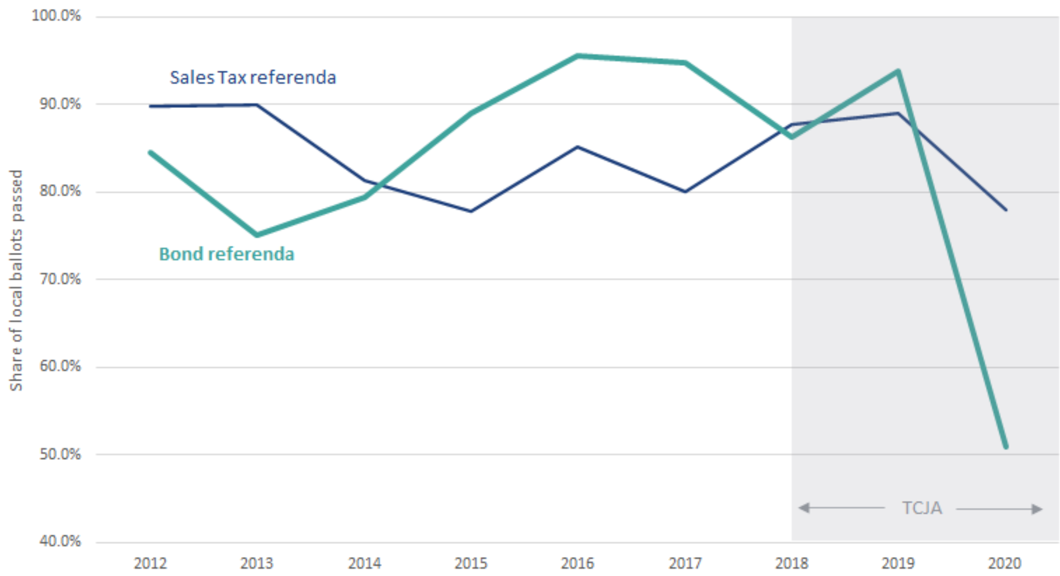
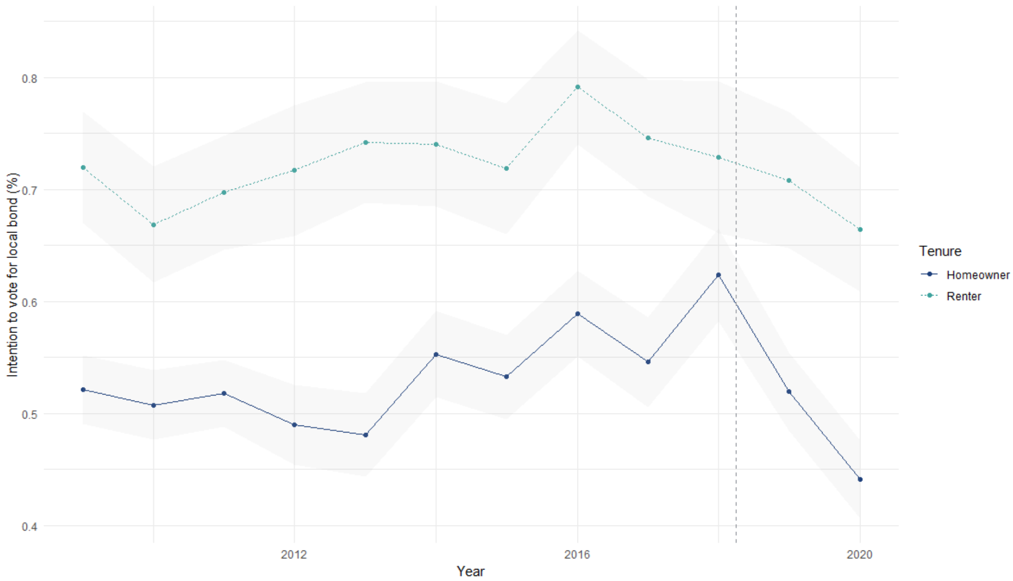
Figure 1: Californian sales tax and school bond referendums approval rates (2012-2020)



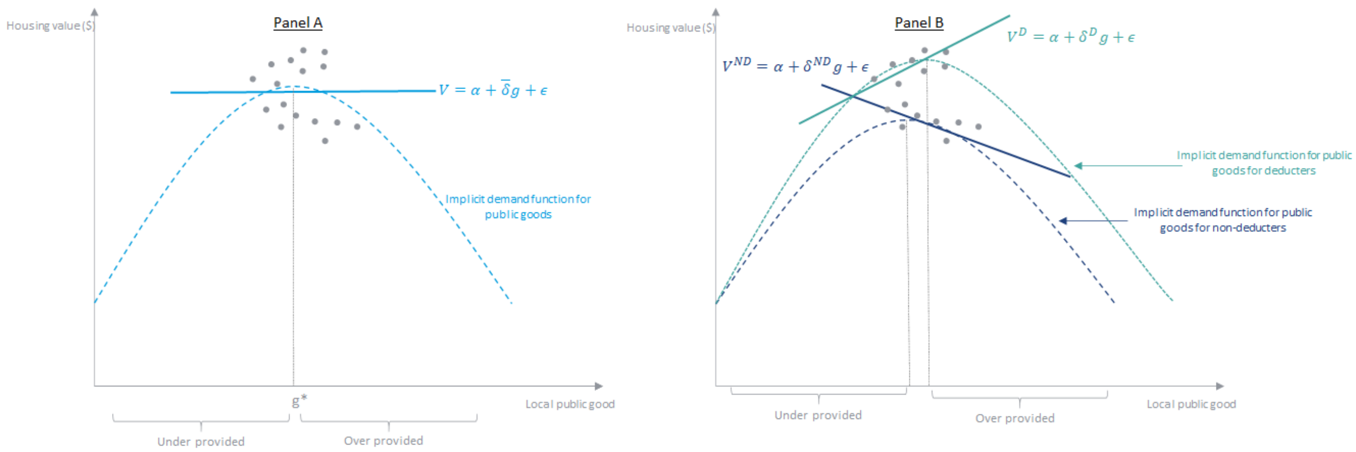
Note: The line graphs show the share of approved sales tax referendums and school bond referendums in California.

Figure 2: Intention to vote in favor of school bond referendums - survey data



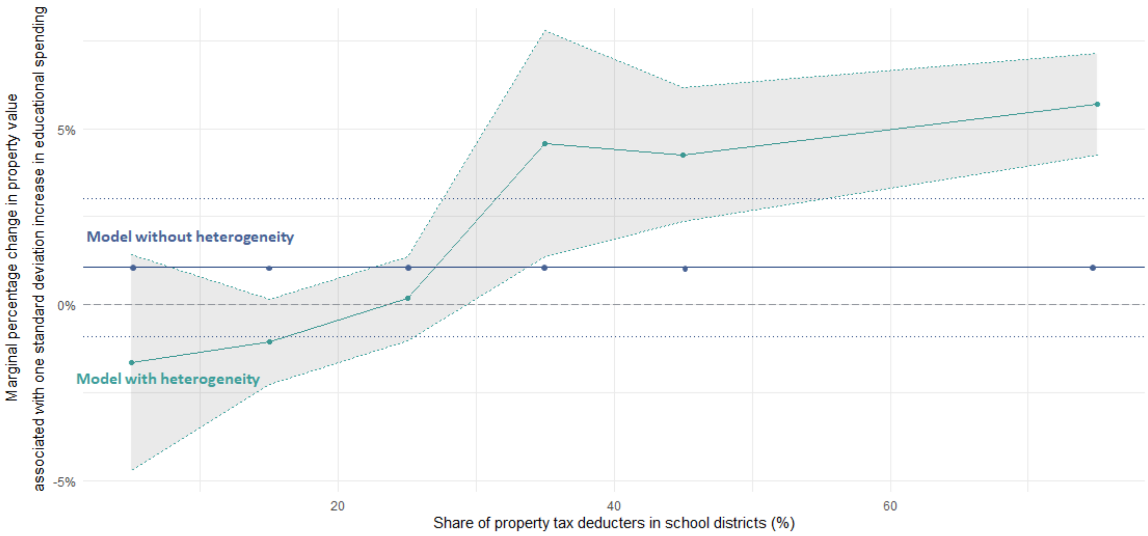
Note: This line graphs shows the percentage of respondents who stated that they would vote in favor of a school bond referendum should there were one in their respective school districts. The data is compiled from the annual PPIC Statewide Survey. The data is split between homeowners and renters respondents. The grey area shows the 95% confidence interval.

Figure 3: The implicit demand function for local public goods



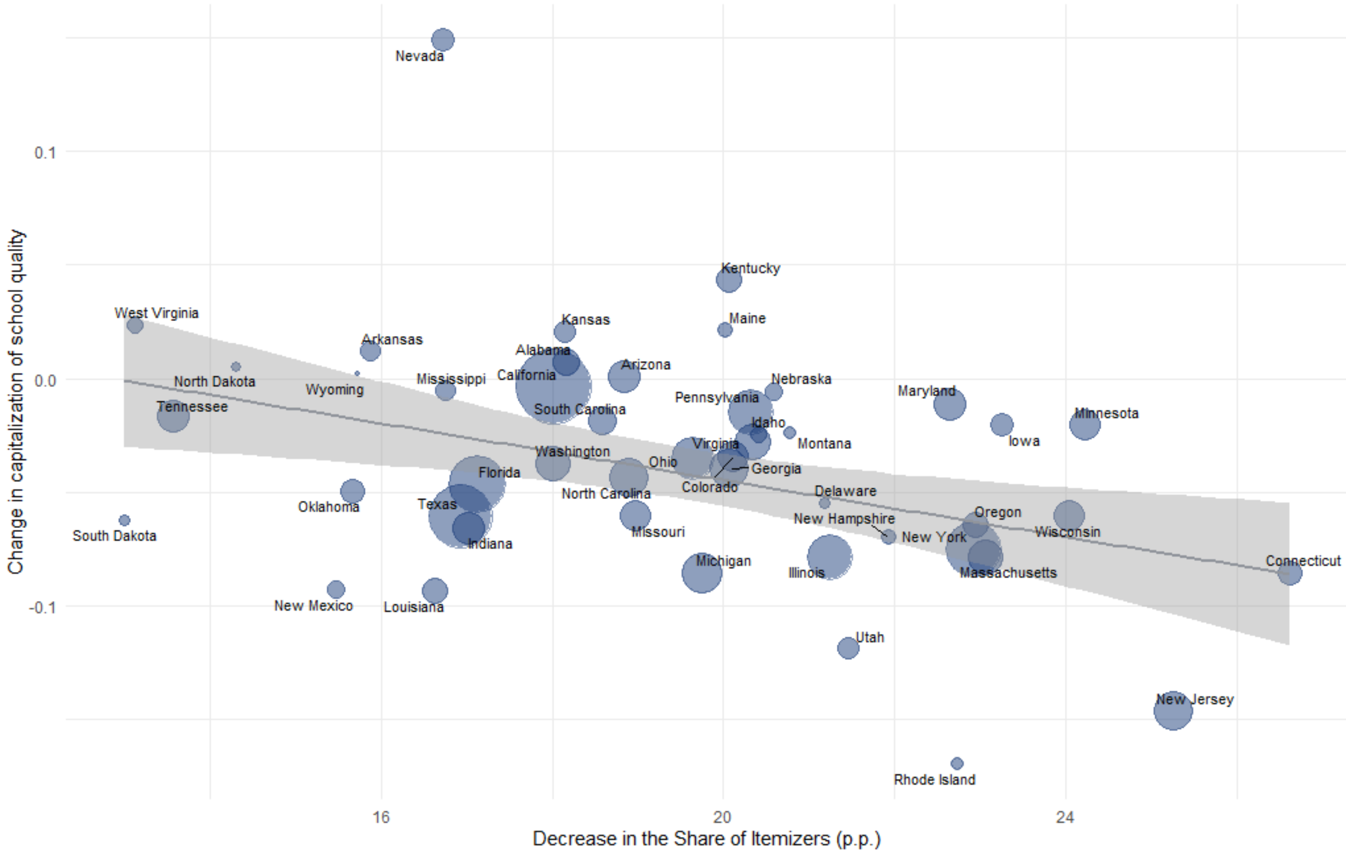
Note: The charts show the relationship between the provision of public goods (x-axis) and aggregate house value (y-axis) conditional on housing and neighborhood quality level. Panel A shows the standard model developed by Brueckner (1982). Panel B shows the demand function for jurisdiction composed of property tax deducters (green line) and for non-deducters (dashed blue line). In addition, the dots and the lines illustrates the empirical strategy used in the paper to test for the heterogeneous demand for local public goods (i.e. the effect of a marginal increase of public goods on housing value).

Figure 4: The implied housing value response to marginal increase in local public good



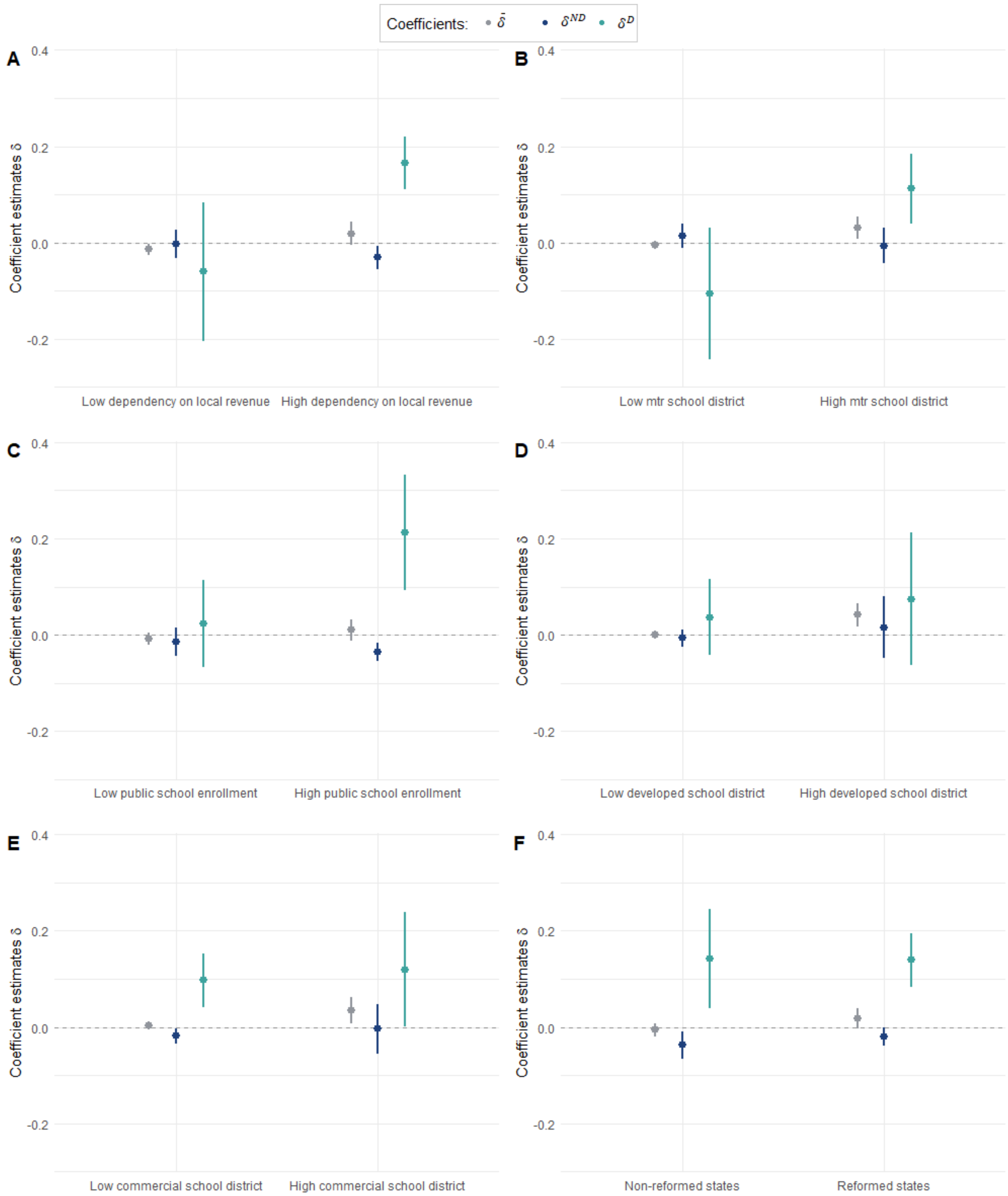
Note: The dotted line chart shows the implied marginal housing value response to a one standard deviation increase in per pupil adjusted educational spending for school districts with heterogeneous level of share of property tax deducters. The shaded area shows the 95% confidence interval. The horizontal red line with corresponding dotted confidence interval shows the the coefficient if no heterogeneity is included in the model.

Figure 5: Change in capitalization of local public goods due to exogenous decrease in itemization



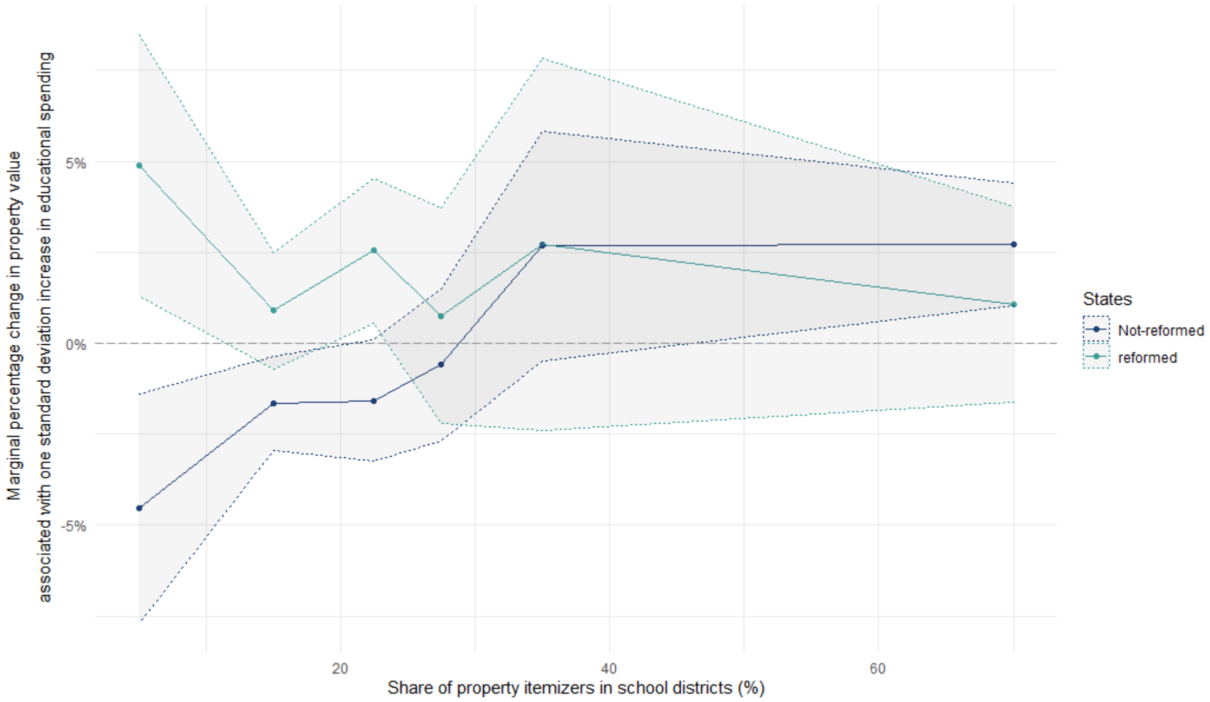
Note: The scatter plot shows the relationship between the decrease in the share of residents deducting property taxes (x-axis), and the change in the rate of capitalization of school quality into house value before and after the TCJA. School quality is measured by the mean pooled test score at the school district level. House prices is the Zillow ZHVI in January 2017 (pre-TCJA) and in January 2020 (post-TCJA. The decrease in the share of itemizers is computed from the SOI of the IRS in fiscal year 2017, and 2019. The line shows the best linear approximation of the relation between the two variables weighted by the state population (bubble size).

Figure 6: Testing the intensity of the mechanism



Note: The points, along with their 90% confidence intervals, show the coefficient estimates $\bar{\delta}$ of Equation (13), and δ^{ND} and δ^{D} of Equation (14) for different sub-samples of school districts. Panel A shows the coefficients for school districts with high and low level of dependency on local property taxes, Panel B shows the coefficients for school districts with high and low residents' mean federal tax rate on income, Panel C shows the coefficients for school districts with high and low level of public enrollment, Panel D shows the coefficients for school districts with high and low level of land availability, Panel E shows the coefficients for school districts with high and low level of highly developed land, and Panel F shows the coefficients for school districts within states that passed or did not pass a school equalization reform.

Figure 7: Capitalization of school spending, share of deductions, and state school finance reforms



Note: The dotted lines show the implied marginal housing value response to a one standard deviation increase in per pupil adjusted educational spending for school districts with heterogeneous level of share of property tax deducters for (1) school districts in states that passed a school system financial equalization reform in dark blue, and (2) school district in states that did not in turquoise. The shaded area shows the 90% confidence intervals.

Table 1: Approval rates of local referendums and property tax deductibility subsidy.

This table reports the estimates of the regression $WinningMargin_{j,t} = \alpha_j + \alpha_t + \gamma(ChangeDed_j \times Post_t) + X'_{j,t}\beta + \epsilon_{j,t}$. *The sample comprises of all school districts local referendum results from 2008 to 2021.* $WinningMargin_{j,t}$ *is the share of Yes votes minus the threshold for the referendum to be approved in percentage point,* α_j *is a school district fixed effect,* α_t *is an election fixed effects,* $Post_t = 1$ *for elections happening after 2019 inclusive,* $ChangeDed_j$ *is the change in the ratio of property tax deducters, and* $X_{j,t}$ *are additional control. In Columns (1) and (2), the election fixed effects are omitted and replaced by indicators for presidential elections and elections occurring in odd years. Results in Column (4) used a subsample by keeping only close election (within 25 percentage points of winning/losing) which is the preferred specification. In Column (6), only GO bond referendums are used. Standard errors, presented in parentheses, are clustered at the school district level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable:				
	Winning Margin (%)				
	(1)	(2)	(3)	(4)	(5)
Post	-6.74^{***}	2.14			
	(0.97)	(3.94)			
Post x $ChangeDed$ - γ		-67.09^{**}	-62.32^{**}	-51.02^{**}	-45.64^{**}
		(31.26)	(30.79)	(21.93)	(22.16)
Presidential election	4.03^{***}	4.01^{***}			
	(0.96)	(0.95)			
Odd year election	-0.51	-0.57			
	(1.06)	(1.06)			
Voters' turnout	6.78^{**}	6.98^{**}	7.64^{**}	5.42^{*}	4.38
	(3.00)	(3.00)	(3.47)	(2.89)	(4.25)
Recently defeated referendum	3.74^{***}	3.74^{***}	3.74^{***}	2.63^{***}	1.95^{***}
	(0.73)	(0.75)	(0.72)	(0.59)	(3.39)
GO Bond indicator	7.57^{***}	7.52^{***}	7.38^{***}	7.00^{***}	
	(0.83)	(0.83)	(0.84)	(0.80)	
Bond value per housing unit					5.91
					(7.47)
School district FE	X	X	X	X	X
Election FE			X	X	X
Tight election results				X	X
Only bonds referendums					X
Observations	1,525	1,524	1,524	1,476	1,151
R^2	0.66	0.66	0.68	0.71	0.75
Adjusted R^2	0.41	0.41	0.43	0.47	0.42

Table 2: Testing for parallel trends in approval rates of referendums

*This table reports the estimates γ of the regression $WinningMargin_{j,t} = \alpha_j + \alpha_t + \gamma(ChangeDed_j \times Post_t) + X'_{j,t}\beta + \epsilon_{j,t}$. $Post_t = 1$ for elections happening after year t, indicating in the column names. The sample comprises of all school districts local referendum results from 2008 to 2018 with winning margins within 25 percentage points of the passing threshold. $WinningMargin_{j,t}$ is the share of Yes votes minus the threshold for the referendum to pass in percentage point, α_j is a school district fixed effect, α_t is an election fixed effects, $ChangeDed_j$ is the change in the ratio of property tax deducters in the school district, and $X_{j,t}$ are additional control. Standard errors, presented in parentheses, are clustered at the school district level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable:									
	Winning Margin									
Post =	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Post x $ChangeDed$	−25.41	−21.25	−19.20	−26.24	−19.41	−12.79	−14.31	−16.91	13.61	8.57
	(35.38)	(30.88)	(21.35)	(18.22)	(16.14)	(16.53)	(19.55)	(19.57)	(27.98)	(29.14)
School district FE	X	X	X	X	X	X	X	X	X	X
Election FE	X	X	X	X	X	X	X	X	X	X
Additional controls	X	X	X	X	X	X	X	X	X	X
Tight election results	X	X	X	X	X	X	X	X	X	X
Observations	1,243	1,243	1,243	1,243	1,243	1,243	1,243	1,243	1,243	1,243
R^2	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Adjusted R^2	0.43	0.43	0.43	0.44	0.43	0.43	0.43	0.43	0.43	0.43

Table 3: Has the loss of deductibility benefits triggered a change in local referendums

*This table reports the estimates γ of the regression $Y_{j,t} = \alpha_j + \alpha_t + \gamma(ChangeDed_j \times Post_t) + \epsilon_{j,t}$. The sample comprises of all school districts local referendums results from 2008 to 2020. $Y_{j,t}$ is an indicator that equals one if a school district held a referendum in a given year (Column [1]), the number of yearly referendums (Column [2]), the bond amount (Column [3]), the parcel levy amount (Column [4]), and the voters' turnout (Column [5]). α_j is a school district fixed effect, α_t is an election fixed effects, and $ChangeDed_j$ is the change in the ratio of property tax deducters in the school district. Standard errors in Columns (3-5), presented in parentheses, are clustered at the school district level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable:				
	Referendum on ballot	Number of referendums	Bond amount per house ($)	Parcel levy amount ($000's)	Voters' Turnout
	Logit	*Poisson*		*OLS*	
	(1)	(2)	(3)	(4)	(5)
Post x $ChangeDed$	1.37	0.506	-0.05^{*}	-6.09	0.38
	(6.36)	(1.861)	(0.03)	(8.98)	(0.29)
School district FE	X	X	X	X	X
Time FE	Year	Year	Election	Election	Election
Observations	12,779	12,779	1,158	296	1,524
Log Likelihood	-656.96	$-3,554.323$			
R^2			0.85	0.69	0.79
Adjusted R^2			0.66	0.32	0.63

Table 4: Does the cap on SALT deductions magnify the decrease in approval rates?

This table reports the estimates of the regression $WinningMargin_{j,t} = \alpha_j + \alpha_t + \gamma^{ex}(ChangeDed_j \times Post_t) + \gamma^{in}(ChangeDed_j \times LossDed_j \times Post_t) + X'_{j,t}\beta + \epsilon_{j,t}$. *The sample comprises of all school districts local referendum results from 2008 to 2020 with winning margins within 25 percentage points of the passing threshold.* $WinningMargin_{j,t}$ *is the share of Yes votes minus the threshold for the referendum to be approved in percentage point,* α_j *is a school district fixed effect,* α_t *is an election fixed effects,* $Post_t = 1$ *for elections happening after 2019 inclusive,* $ChangeDed_j$ *is the change in the ratio of property tax deducters in the school district, and* $X_{j,t}$ *are additional control.* $LossDed_j$ *are different measures aim at capturing the intensive loss of deductibility benefits due to the cap on State and Local Taxes (SALT) deductions. Column (1) uses the change in SALT deduction between 2017 and 2018 standardized by the number of houses in the school district, Column (2) uses the percentage change in SALT deduction between 2017 and 2018, Column (3) uses the dollar amount per house of wasted SALT deduction, and Column (4) uses the ratio of the wasted SALT deduction over the total SALT deduction claimed. Standard errors, presented in parentheses, are clustered at the school district level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable:			
	Winning Margin (%)			
	(1)	(2)	(3)	(4)
Post x $ChangeDed$	-41.36^{*}	-61.23	-44.62^{**}	-55.49^{**}
	(22.65)	(55.25)	(22.38)	(26.67)
.. x SALT change per house	-0.46^{*}			
	(0.27)			
.. x Change in SALT		13.21		
		(69.28)		
.. x Wasted SALT per house			-0.56	
			(0.40)	
.. x Share of SALT wasted				7.67
				(30.73)
Controls	X	X	X	X
School district FE	X	X	X	X
Election FE	X	X	X	X
Tight election results	X	X	X	X
Observations	1,476	1,476	1,476	1,476
R^2	0.71	0.71	0.71	0.71
Adjusted R^2	0.47	0.47	0.47	0.47

Table 5: Summary statistics

*This table reports the summary statistics of the main variables used in this study. All urban school districts providing elementary education with more than 100 pupils are included (n=8,916). The first three columns show the mean, standard deviation and median of the entire sample. The data is equally split between school districts with high share of property itemizers and school districts with low level of itemizers. The means for the two groups are presented in Columns (4) and (5). The difference in mean is shown along the t-statistics of difference in means. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Mean	Std. dev.	Median	High $DedShare$	Low $DedShare$	Difference	t-statistics
Main variables:							
Median house value (000's)	227.17	228.28	162.69	323.45	130.88	192.57	43.92***
Share of property deducters (%)	25.40	12.12	22.96	35.17	15.63	19.53	128.58***
Adjusted expenses per pupil (000's)	16.56	6.39	14.88	17.18	15.95	1.23	9.16***
Control variables:							
Income median (000's)	62.69	24.38	57.08	76.61	48.76	27.85	65.72***
Home ownership (%)	63.55	13.45	64.63	67.40	59.70	7.71	28.23***
Share of population less than 19 (%)	25.36	4.55	25.16	24.73	25.98	−1.25	-13.10***
Share of population more than 65 (%)	23.40	6.21	23.05	23.59	23.21	0.38	2.87***
Share of minority (%)	12.95	15.51	7.00	11.95	13.96	−2.01	−6.14***
Share population with bachelor degree (%)	28.18	15.64	23.72	37.24	19.13	18.12	67.10***
Poverty rate (%)	1.07	2.50	0.41	0.52	1.62	−1.10	−21.25***
School score (standardized)	0.05	0.34	0.05	0.21	−0.10	0.31	48.32***
Variables used for heterogeneity analyses:							
Public school penetration (%)	63.77	13.34	62.58	63.02	64.42	−1.40	−4.57***
Share of land developed (%)	28.38	31.33	11.39	36.43	20.26	16.17	25.01***
Share of revenue from local sources (%)	44.08	20.28	41.01	52.98	35.19	17.79	46.09***
Reformed dummy	0.66	0.47	1	0.71	0.62	0.09	8.62***
Developed land highly developed (%)	18.85	17.11	13.63	21.57	16.11	5.46	15.12***
Mean federal income tax (%)	16.92	2.90	16.21	18.48	15.36	3.12	60.21***

Table 6: Capitalization of local public goods with heterogeneous deductibility subsidy

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta} Exp_j + \phi DedShare_j + X_j' \beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND} Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j' \beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* Exp_j *is the total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. The coefficients* β *are reported in Appendix Table A3. Standard errors, presented in parentheses, are clustered at the CBSA level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.656*	0.589	0.669**	0.610*	0.655**	0.592**
	(0.359)	(0.383)	(0.327)	(0.338)	(0.289)	(0.295)
Expenses per pupil (standardized) - $\bar{\delta}$	0.011		0.004		0.013**	
	(0.010)		(0.005)		(0.006)	
Expenses per pupil (standardized) - δ^{ND}		−0.027***		−0.024**		−0.021*
		(0.010)		(0.011)		(0.013)
Expenses per pupil x DedShare - δ^{D}		0.147***		0.113***		0.134***
		(0.032)		(0.039)		(0.039)
Demographics	X	X	X	X	X	X
Spatial FE	CBSA	CBSA	+ State	+ State	County	County
Observations	8,890	8,890	8,890	8,890	8,890	8,890
Adjusted R^2	0.914	0.914	0.918	0.919	0.932	0.932

Table 7: Capitalization of school spending and property deductions subsidy by types of school expenses

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta} g_j + \phi DedShare_j + X_j'\beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND} g_j + \delta^{D}(g_j \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* g_j *are different measures of public goods all at the per pupil level and deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) for monetary measures and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Standard errors, presented in parentheses, are clustered at the CBSA level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)							
	All expenses		Instructional		Support		Others	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
Share of property deducters - ϕ	0.656*	0.589	0.680*	0.653*	0.636*	0.579	0.563	0.509
	(0.359)	(0.383)	(0.358)	(0.366)	(0.362)	(0.375)	(0.383)	(0.372)
Public good (standardized)- $\bar{\delta}$ or δ^{ND}	0.011	−0.027***	0.027*	0.008	−0.0001	−0.027**	−0.019**	−0.080***
	(0.010)	(0.010)	(0.015)	(0.024)	(0.007)	(0.011)	(0.008)	(0.016)
Public good x DedShare - δ^D		0.147***		0.066		0.094***		0.261***
		(0.032)		(0.045)		(0.031)		(0.036)
Demographics	X	X	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X	X	X
Observations	8,890	8,890	8,890	8,890	8,890	8,890	8,890	8,890
Adjusted R^2	0.914	0.914	0.914	0.914	0.914	0.914	0.914	0.916

	Non-school		Capital expenditure		Employees		All but non-deflated	
	(5a)	(5b)	(6a)	(6b)	(7a)	(7b)	(8a)	(8b)
Share of property deducters - ϕ	0.647*	0.655*	0.636*	0.628*	0.870**	0.828**	0.670*	0.637*
	(0.355)	(0.356)	(0.368)	(0.368)	(0.406)	(0.410)	(0.357)	(0.368)
Public good (standardized)- $\bar{\delta}$ or δ^{ND}	0.014***	−0.005	−0.0002	−0.024***	−0.006	−0.030***	0.021	0.001
	(0.006)	(0.007)	(0.003)	(0.007)	(0.004)	(0.010)	(0.013)	(0.016)
Public good x DedShare - δ^D		0.077**		0.105***		0.094**		0.074**
		(0.034)		(0.028)		(0.042)		(0.032)
Demographics	X	X	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X	X	X
Observations	8,890	8,890	8,890	8,890	8,102	8,102	8,890	8,890
Adjusted R^2	0.914	0.914	0.914	0.914	0.912	0.912	0.914	0.914

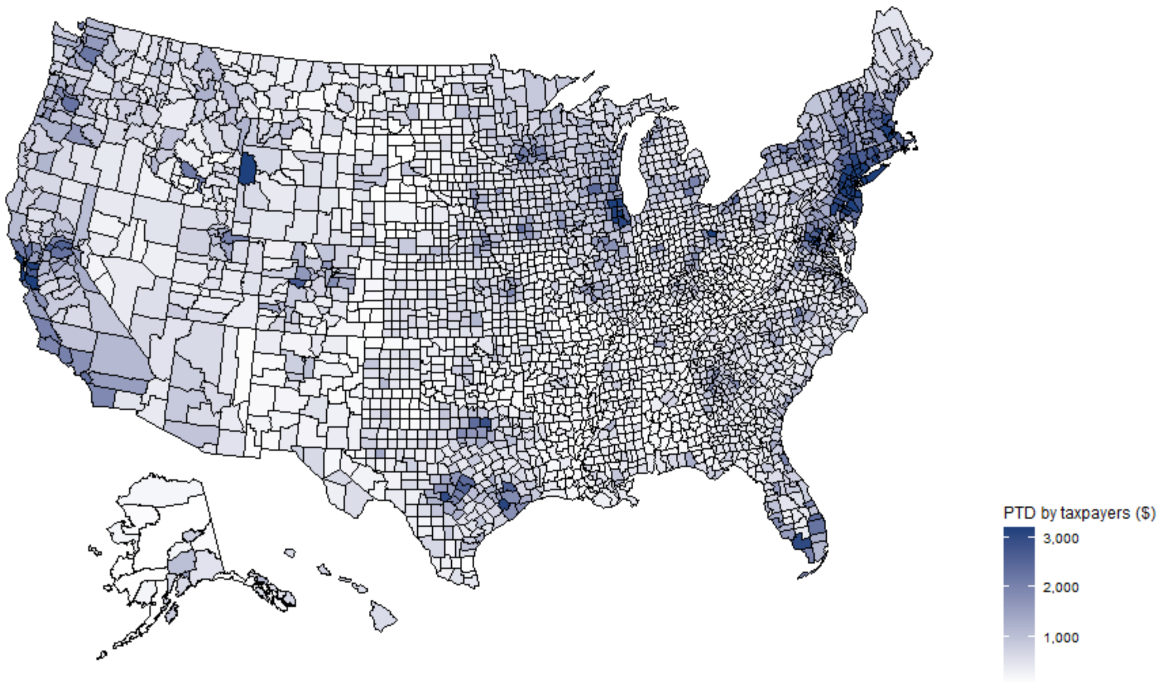
Table 8: Capitalization of police funding and property deductions subsidy

*This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta} Exp_j + \phi DedShare_j + X_j' \beta + \epsilon_j$ and $log(V_j) = \alpha_{m(j)} + \delta^{ND} Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j' \beta + \epsilon_j$ in Columns ending with a, and b respectively. The sample comprises of all urban US counties and equivalent. $DedShare_j$ is the share of taxpayers deducting property tax on their federal taxable income in year 2017 in the county from the Statistics of Income of the Internal Revenue Service. Exp_j is the total policing expenses per inhabitant for all the entities falling within a county in fiscal year 2017. X_j include demographics control (poverty rate, education achievements, homeownership rate, the share of minority, and the population density), income quartile fixed effects, and income distribution share. Standard errors, presented in parentheses, are clustered at the spatial fixed effects level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	2.917***	2.893***	1.447***	1.453***	1.765***	1.772***
	(0.165)	(0.165)	(0.210)	(0.211)	(0.235)	(0.235)
Expenses per resident (standardized) - $\bar{\delta}$	−0.027***		−0.024***		−0.029***	
	(0.008)		(0.008)		(0.008)	
Expenses per resident (standardized) - δ^{ND}		−0.064***		−0.037**		−0.043**
		(0.016)		(0.018)		(0.017)
Expenses per resident x DedShare - δ^{D}		0.181**		0.058		0.068
		(0.072)		(0.073)		(0.072)
Demographics	X	X	X	X	X	X
Income Decile FE	X	X	X	X	X	X
Spatial FE	State	State	CBSA	CBSA	Both	Both
Observations	1,758	1,758	1,758	1,758	1,758	1,758
Adjusted R^2	0.881	0.882	0.925	0.925	0.930	0.930

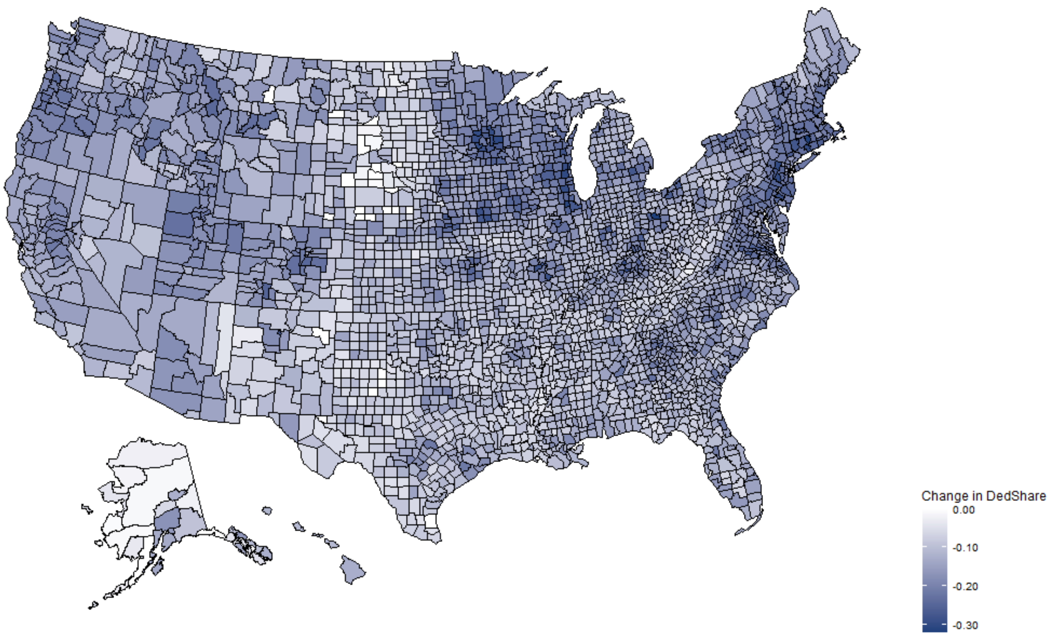
Appdendix: Additional Figures & Tables

Figure A1: Property tax deductions per taxpayers by U.S. counties in 2017



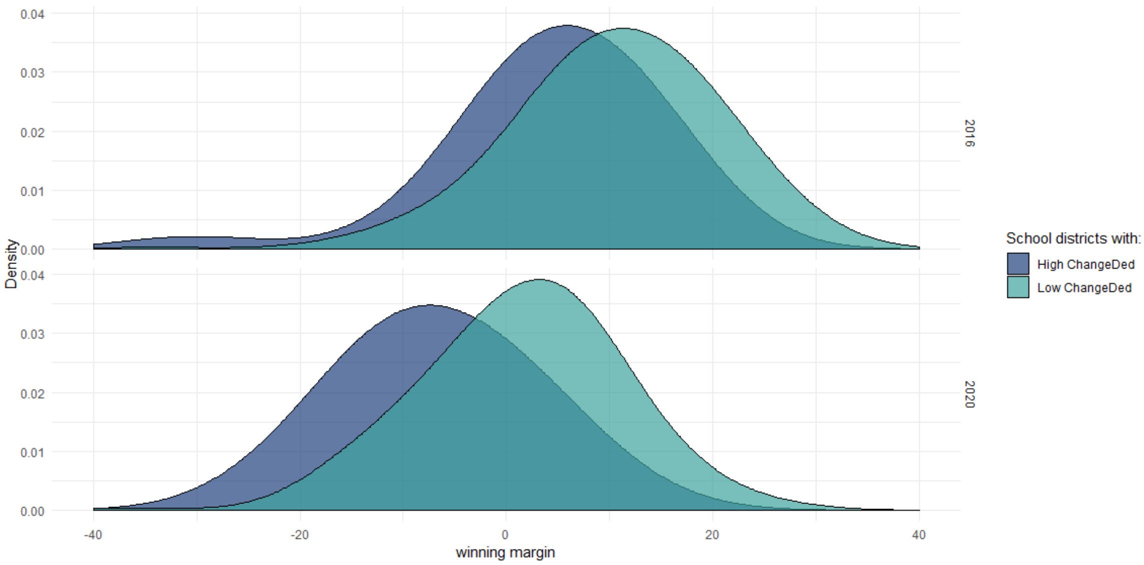
Note: This map shows the sum of the property tax deductions claimed by U.S. taxpayers divided by the number of taxpayers for each U.S. county in 2017. Authors' computations using data from the Statistics of Income of the Internal Revenue Service.

Figure A2: Change in the share of deducters by county pre/post TCJA



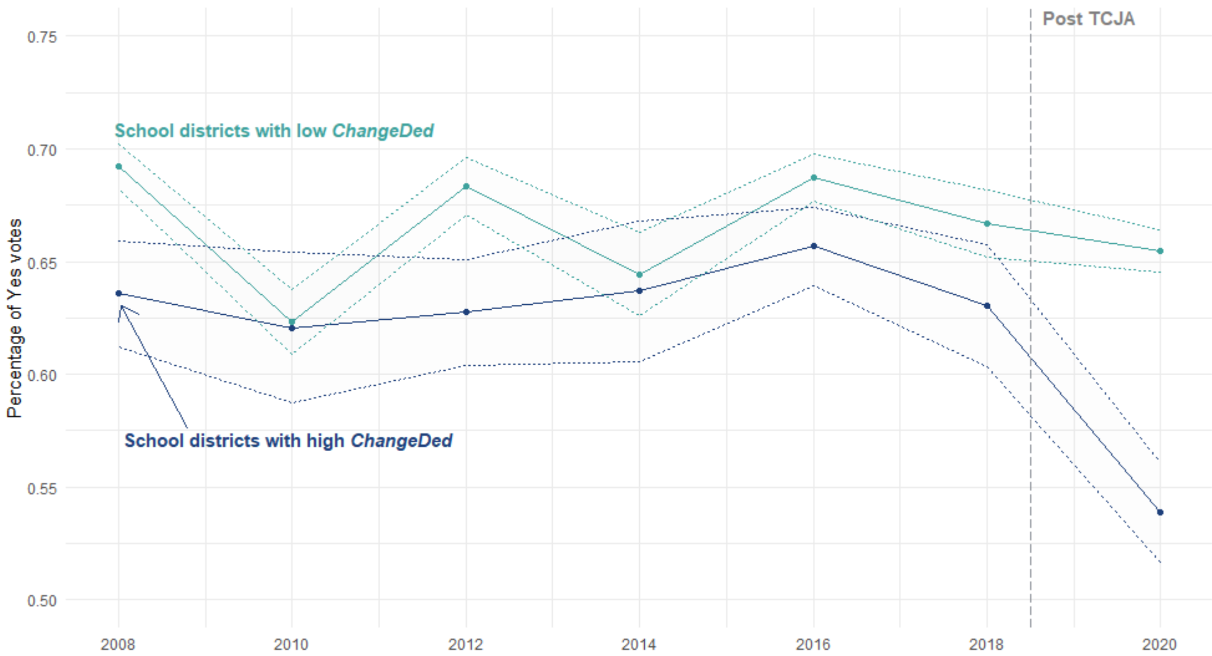
Note: This map shows the change in the share of property tax deducters between 2017 (pre-TCJA) and 2018 (post-TCJA). Authors' computations using data from the Statistics of Income of the Internal Revenue Service.

Figure A3: Distribution of school districts ballot results in 2016 and 2020



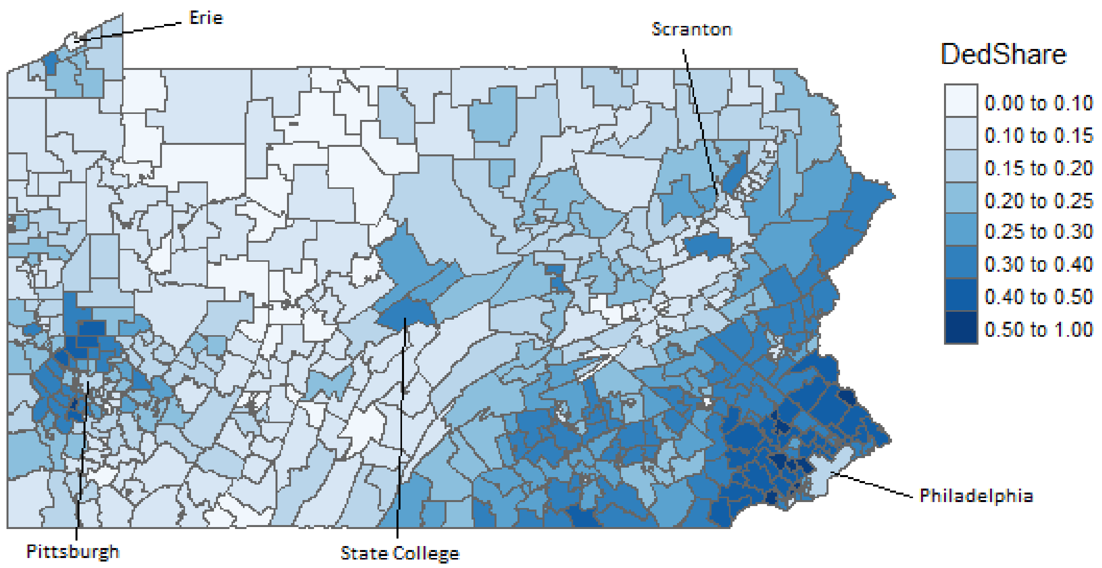
Note: This Figures show the distribution of school districts bond ballot results for all ballots in 2016 and 2020. The dark blue distributions represent school district with $ChangeDed_j > 0.18$ *(i.e. school districts that were impacted the most by the TCJA). The turquoise distribution shows the school districts with low (*$Change_Ded_j$*). The x-axis show the Yes Votes minus the threshold for the referedum to pass. All results above zeros are therefore approved local ballots.*

Figure A4: Percentage of Yes votes on local ballot measures by types of school districts.



Note: These line graphs show the aggregated percentage of Yes votes on local referendums in California school districts. School districts with high DedShare, greater than the mean of 14%, (blue) show the results for the school district that were highly impacted by the TCJA while those with low DedShare (turquoise) show the results for all other school districts. The shaded area represents the 95% confidence interval.

Figure A5: Share of property tax deducters in Pennsylvanian school districts in 2017



Note: This map shows the share of property tax deducters for Pennsylvanian school districts computed from Statistics of Income of the Internal Revenue Service cross-walked into school district with the School District Geographic Reference Files.

Table A1: Summary statistics of referendum study

This table reports the summary statistics of the variables used in the referendum study. All school districts referendums results from 2008 to 2020 are matched with data from the Statistics of Income of the IRS and with the American Community Survey. WinningMargin is the share of Yes votes minus the threshold for the referendum to be approved in percentage point, ChangeDed is the change in the ratio of property tax deducters, Post is an indicator for elections occurring after 2019 inclusive, Presidential election is an indicator for referendums occuring on a U.S. presidential election day, odd year elections is an indicator for referendums occurring on odd years, Bond amount is the proposed bond amount on the referendum for bond referendums, Parcel levy the the dollar amount of proposed increase in parcel levy tax, Recently defeated is an indicator if the preceding referendum within the same school districts was defeated, Voters' turnout is the number of cast votes over the population over 18 years collected from the ACS, SALT change per house is the change in SALT deduction between 2017 and 2018 standardized by the number of housing units, Change in SALT is the percentage change in SALT deduction between 2017 and 2018, Wasted SALT per house is the dollar amount per housing unit of SALT deduction not claimed because of the 10,000$ cap introduced with the TCJA, and Share of SALT wasted is the ratio of the wasted SALT deduction over the total SALT deduction claimed.

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Winning Margin (%)	1,548	5.38	11.13	−55.00	0.00	6.46	12.37	45.00
ChangeDed (%)	1,547	13.46	3.72	2.70	11.06	13.30	15.99	25.37
Post indicator	1,548	0.16	0.37	0	0	0	0	1
Presidential election	1,548	0.33	0.47	0	0	0	1	1
Odd year election	1,548	0.10	0.31	0	0	0	0	1
Bond amount (Million $)	1,170	96.82	318.92	0.05	12.00	35.00	98.00	7,000.00
Bond amt per housing unit (0.001 $)	1,159	6.48	34.44	0.004	2.09	3.45	5.69	978.26
Parcel levy ($)	306	177.16	236.47	2.20	76.50	99.00	189.00	2,763.00
Recently defeated indicator	1,548	0.14	0.34	0	0	0	0	1
Voters' turnout (%)	1,525	36.58	20.34	0.002	21.91	36.22	49.42	100.00
SALT change per house (000's $)	1,524	7.75	12.52	0.03	1.58	3.53	8.24	220.60
Change in SALT (%)	1,547	0.76	0.09	0.55	0.70	0.75	0.80	0.96
Wasted SALT per house (000's $)	1,524	4.34	8.38	0.00	0.40	1.40	4.16	122.71
Share of SALT wasted (%)	1,547	0.53	0.19	0.00	0.39	0.50	0.67	0.95

Table A2: Correlation table

This table reports the correlation coefficients of the main variables used the main analysis. All variables are at the school district level in 2017.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) Median house value (000's)	1	0.551	0.081	0.121	0.647	0.022	-0.076	0.029	0.115	0.633	-0.111	0.381	-0.018	0.321	0.418	0.180	0.265	0.693
(2) Share of property deducters - DedShare (%)	0.551	1	0.018	0.154	0.803	0.408	-0.111	0.040	-0.085	0.774	-0.257	0.635	-0.046	0.331	0.580	0.109	0.141	0.752
(3) Number of pupils	0.081	0.018	1	-0.085	0.007	-0.116	0.057	-0.146	0.199	0.096	-0.099	-0.033	-0.075	0.164	-0.001	-0.039	0.208	0.127
(4) Adjusted expenses per pupil (000's)	0.121	0.154	-0.085	1	0.163	-0.060	-0.226	0.210	-0.050	0.176	0.061	0.151	-0.086	0.111	0.305	0.048	0.011	0.157
(5) Income median (000's)	0.647	0.803	0.007	0.163	1	0.515	0.020	-0.043	-0.106	0.809	-0.190	0.708	0.065	0.271	0.595	0.105	0.081	0.770
(6) Home ownership (%)	0.022	0.408	-0.116	-0.060	0.515	1	0.034	0.062	-0.391	0.227	-0.155	0.487	0.155	-0.164	0.207	-0.067	-0.311	0.211
(7) Share of population less than 19 (%)	-0.076	-0.111	0.057	-0.226	0.020	0.034	1	-0.680	0.166	-0.106	0.048	-0.120	-0.136	-0.042	-0.265	-0.012	0.005	-0.087
(8) Share of population more than 65 (%)	0.029	0.040	-0.146	0.210	-0.043	0.062	-0.680	1	-0.321	0.037	0.079	0.133	0.186	-0.184	0.205	-0.005	-0.280	0.047
(9) Share of minority (%)	0.115	-0.085	0.199	-0.050	-0.106	-0.391	0.166	-0.321	1	0.011	-0.033	-0.390	-0.161	0.413	-0.134	-0.018	0.430	0.017
(10) Share population with bachelor degree (%)	0.633	0.774	0.096	0.176	0.809	0.227	-0.106	0.037	0.011	1	-0.225	0.701	-0.066	0.412	0.624	0.083	0.202	0.835
(11) Poverty rate (%)	-0.111	-0.257	-0.099	0.061	-0.190	-0.155	0.048	0.079	-0.033	-0.225	1	-0.182	0.298	-0.217	-0.141	0.009	-0.211	-0.213
(12) School score (standardized)	0.381	0.635	-0.033	0.151	0.708	0.487	-0.120	0.133	-0.390	0.701	-0.182	1	0.094	0.143	0.574	-0.018	-0.053	0.600
(13) Public school penetration (%)	-0.018	-0.046	-0.075	-0.086	0.065	0.155	-0.136	0.186	-0.161	-0.066	0.298	0.094	1	-0.150	-0.065	0.026	-0.162	-0.044
(14) Share of land developed (%)	0.321	0.331	0.164	0.111	0.271	-0.164	-0.042	-0.184	0.413	0.412	-0.217	0.143	-0.150	1	0.281	0.050	0.753	0.372
(15) Share of revenue from local sources (%)	0.418	0.580	-0.001	0.305	0.595	0.207	-0.265	0.205	-0.134	0.624	-0.141	0.574	-0.065	0.281	1	-0.001	0.111	0.615
(16) Reformed dummy	0.180	0.109	-0.039	0.048	0.105	-0.067	-0.012	-0.005	-0.018	0.083	0.009	-0.018	0.026	0.050	-0.001	1	0.074	0.088
(17) Developed land highly developed (%)	0.265	0.141	0.208	0.011	0.081	-0.311	0.005	-0.280	0.430	0.202	-0.211	-0.053	-0.162	0.753	0.111	0.074	1	0.178
(18) Mean federal income tax (%)	0.693	0.752	0.127	0.157	0.770	0.211	-0.087	0.047	0.017	0.835	-0.213	0.600	-0.044	0.372	0.615	0.088	0.178	1

Table A3: Capitalization of local public goods with heterogeneous deductibility subsidy - all coefficients

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta}Exp_j + \phi DedShare_j + X_j'\beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND}Exp_j + \delta^D(Exp_j \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* Exp_j *is the total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Standard errors, presented in parentheses, are clustered at the CBSA level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.656*	0.589	0.669**	0.610*	0.655**	0.592**
	(0.359)	(0.383)	(0.327)	(0.338)	(0.289)	(0.295)
Expenses per pupil (standardized) - $\bar{\delta}$	0.011		0.004		0.013**	
	(0.010)		(0.005)		(0.006)	
Expenses per pupil (standardized) - δ^{ND}		−0.027***		−0.024**		−0.021*
		(0.010)		(0.011)		(0.013)
Expenses per pupil x DedShare - δ^D		0.147***		0.113***		0.134***
		(0.032)		(0.039)		(0.039)
Share Bachelor degree	0.391***	0.386***	0.361***	0.358***	0.315***	0.311***
	(0.056)	(0.057)	(0.063)	(0.063)	(0.058)	(0.058)
Share minority	0.005	0.023	0.003	0.016	−0.046	−0.034
	(0.059)	(0.064)	(0.062)	(0.064)	(0.079)	(0.080)
Share young	−0.411***	−0.398***	−0.437***	−0.426***	−0.322**	−0.313**
	(0.128)	(0.128)	(0.122)	(0.121)	(0.136)	(0.135)
Share old	−0.282*	−0.299*	−0.290*	−0.302*	−0.149	−0.164
	(0.161)	(0.156)	(0.160)	(0.159)	(0.165)	(0.162)
Ownership rate	−0.442***	−0.441***	−0.462***	−0.459***	−0.440***	−0.436***
	(0.112)	(0.113)	(0.129)	(0.129)	(0.125)	(0.125)
School test score	0.086***	0.086***	0.109***	0.106***	0.106***	0.102***
	(0.017)	(0.016)	(0.022)	(0.022)	(0.019)	(0.019)
Income - quartile 2	0.124***	0.123***	0.119***	0.119***	0.111***	0.111***
	(0.024)	(0.024)	(0.020)	(0.021)	(0.019)	(0.019)
Income - quartile 3	0.192***	0.192***	0.186***	0.187***	0.166***	0.165***
	(0.042)	(0.043)	(0.038)	(0.038)	(0.034)	(0.034)
Income - quartile 4	0.206***	0.206***	0.196***	0.197***	0.178***	0.180***
	(0.066)	(0.066)	(0.057)	(0.057)	(0.053)	(0.054)
Share household < 25K	2.518***	2.477***	2.407***	2.381***	2.178***	2.143***
	(0.468)	(0.477)	(0.454)	(0.456)	(0.482)	(0.484)
Share households < 50K	1.504***	1.537***	1.508***	1.526***	1.377***	1.391***
	(0.368)	(0.366)	(0.357)	(0.357)	(0.354)	(0.352)
Share households < 75K	1.240***	1.259***	1.307***	1.327***	1.370***	1.373***
	(0.395)	(0.391)	(0.410)	(0.407)	(0.430)	(0.427)
Share households < 100K	1.877***	2.005***	1.813***	1.924***	1.738***	1.861***
	(0.337)	(0.347)	(0.316)	(0.327)	(0.406)	(0.422)
Share households > 100K	4.454***	4.415***	4.357***	4.332***	4.098***	4.051***
	(0.293)	(0.291)	(0.303)	(0.306)	(0.319)	(0.311)
Spatial FE	CBSA	CBSA	+ State	+ State	County	County
Observations	8,890	8,890	8,890	8,890	8,890	8,890
Adjusted R^2	0.914	0.914	0.918	0.919	0.932	0.932

Table A4: Capitalization of school spending and deductibility benefits - log-log specification

*This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta} log(Exp_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ and $log(V_j) = \alpha_{m(j)} + \delta^{ND} Exp_j + \delta^{D}(log(Exp_j) \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017. $DedShare_j$ is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service. $log(Exp_j)$ is the log of total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT). X_j include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Standard errors, presented in parentheses, are clustered at the CBSA level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.645*	−0.368	0.657**	−0.057	0.650**	−0.296
	(0.361)	(0.544)	(0.327)	(0.509)	(0.292)	(0.525)
log(Expenses per pupil) - $\bar{\delta}$	0.013		−0.006		0.030*	
	(0.024)		(0.016)		(0.016)	
log(Expenses per pupil) - δ^{ND}		−0.077**		−0.068		−0.053
		(0.039)		(0.045)		(0.049)
log(Expenses per pupil) x DedShare - δ^{D}		0.349***		0.244		0.325*
		(0.121)		(0.190)		(0.181)
Demographics	X	X	X	X	X	X
Income Decile FE	X	X	X	X	X	X
Spatial FE	CBSA	CBSA	+ State	+ State	County	County
Observations	8,890	8,890	8,890	8,890	8,890	8,890
Adjusted R^2	0.914	0.914	0.918	0.918	0.931	0.932

Table A5: Capitalization of school spending and deductibility benefits - Panel specification

This table reports the estimates of the paired regressions $log(V_{j,t}) = \alpha_{m(j,t)} + \bar{\delta} log(Exp_j) + \phi DedShare_{j,t} + X'_{j,t}\beta + \epsilon_{j,t}$ *and* $log(V_{j,t}) = \alpha_{m(j,t)} + \delta^{ND} Exp_j + \delta^{D}(log(Exp_j) \times DedShare_{j,t}) + \phi DedShare_{j,t} + X'_{j,t}\beta + \epsilon_{j,t}$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils from 2015 to 2020.* $log(V_{j,t})$ *is the natural log of house prices in the month of January from Zillow ZHVI.* $DedShare_{j,t}$ *is the share of taxpayers deducting property tax on their federal taxable income in the previous fiscal year computed from the Statistics of Income of the Internal Revenue Service.* $log(Exp_j)$ *is the log of total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT).* $X_{j,t}$ *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Standard errors, presented in parentheses, are clustered at the CBSA level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.546***	0.530***	0.454***	0.446***	0.167***	0.131***
	(0.170)	(0.179)	(0.154)	(0.162)	(0.035)	(0.030)
log(Expenses per pupil) - $\bar{\delta}$		0.010				
	(0.004)		(0.007)			
log(Expenses per pupil) - δ^{ND} log(Expenses per pupil) - δ^{ND}		−0.024***		−0.018**		
		(0.004)		(0.009)		
log(Expenses per pupil) x DedShare - δ^{D}		0.167***		0.143***		0.078***
		(0.013)		(0.029)		(0.010)
Demographics	X	X	X	X	X	X
Income Decile FE	X	X	X	X	X	X
CBSA x year FE	X	X				
County x year FE			X	X		
School District FE					X	X
Year FE					X	X
Observations	53,300	53,300	53,300	53,300	53,300	53,300
Adjusted R^2	0.913	0.914	0.932	0.932	0.995	0.995

Table A6: The effects of local taxation reliance on the capitalization of local public goods

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta}Exp_j + \phi DedShare_j + X_j'\beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND}Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* Exp_j *is the total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Columns (1) show the baseline analysis, and Columns (2) (3) show the coefficients for school districts with high and low level of dependency on local property taxes (above/below median). Standard errors, presented in parentheses, are clustered at the CBSA fixed effects level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	all		High reliance		Low reliance	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.656*	0.589	0.055	$-$0.024	1.260***	1.269***
	(0.359)	(0.383)	(0.378)	(0.399)	(0.316)	(0.314)
Expenses per pupil (standardized) - $\bar{\delta}$	0.011		0.018		$-$0.014**	
	(0.010)		(0.015)		(0.007)	
Expenses per pupil (standardized) - δ^{ND}		$-$0.027***		$-$0.030**		$-$0.003
		(0.010)		(0.015)		(0.018)
Expenses per pupil x DedShare - δ^{D}		0.147***		0.164***		$-$0.060
		(0.032)		(0.033)		(0.088)
Demographics	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X
Observations	8,890	8,890	4,445	4,445	4,445	4,445
Adjusted R^2	0.914	0.914	0.919	0.920	0.894	0.894

Table A7: The effects of residents' federal tax rate on the capitalization of local public goods

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta} Exp_j + \phi DedShare_j + X_j'\beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND} Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* Exp_j *is the total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Columns (1) show the baseline analysis, and Columns (2) (3) show the coefficients for school districts with high and low residents' mean federal tax rate on income (above/below median). Standard errors, presented in parentheses, are clustered at the CBSA fixed effects level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	all		High tax rate		Low tax rate	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.656*	0.589	−0.506	−0.559	1.649***	1.687***
	(0.359)	(0.383)	(0.353)	(0.363)	(0.340)	(0.332)
Expenses per pupil (standardized) - $\bar{\delta}$	0.011		0.031**		−0.005	
	(0.010)		(0.015)		(0.005)	
Expenses per pupil (standardized) - δ^{ND}		−0.027***		−0.006		0.014
		(0.010)		(0.023)		(0.016)
Expenses per pupil x DedShare - δ^{D}		0.147***		0.112**		−0.106
		(0.032)		(0.045)		(0.083)
Demographics	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X
Observations	8,890	8,890	4,445	4,445	4,445	4,445
Adjusted R^2	0.914	0.914	0.918	0.918	0.843	0.843

Table A8: The effects of private school availability on the capitalization of local public goods

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta} Exp_j + \phi DedShare_j + X_j'\beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND} Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* Exp_j *is the total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Columns (1) show the baseline analysis, and Columns (2) and (3) show the coefficients for school districts with high and low level of public enrollment (above/below median). Standard errors, presented in parentheses, are clustered at the CBSA fixed effects level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	all		High penetration		Low penetration	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.982***	0.939***	1.420***	1.382***	0.502	0.492
	(0.301)	(0.323)	(0.323)	(0.345)	(0.330)	(0.336)
Expenses per pupil (standardized) - $\bar{\delta}$	0.001		0.010		−0.009	
	(0.008)		(0.013)		(0.008)	
Expenses per pupil (standardized) - δ^{ND}		−0.030***		−0.035***		−0.014
		(0.011)		(0.012)		(0.017)
Expenses per pupil x DedShare - δ^{D}		0.142***		0.212***		0.024
		(0.053)		(0.073)		(0.055)
Demographics	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X
Observations	7,358	7,358	3,679	3,679	3,679	3,679
Adjusted R^2	0.910	0.910	0.911	0.912	0.909	0.909

Table A9: The effects of land supply availability on the capitalization of local public goods

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta}Exp_j + \phi DedShare_j + X_j'\beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND}Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* Exp_j *is the total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Columns (1) show the baseline analysis, and Columns (2) and (3) show the coefficients for school districts with high and low level of land availability (above/below median). Standard errors, presented in parentheses, are clustered at the CBSA fixed effects level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	all		High developed		Low developed	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.651*	0.589	−0.500	−0.529	2.140***	2.132***
	(0.368)	(0.390)	(0.469)	(0.470)	(0.223)	(0.224)
Expenses per pupil (standardized) - $\bar{\delta}$	0.012		0.041***		−0.0001	
	(0.010)		(0.015)		(0.004)	
Expenses per pupil (standardized) - δ^{ND}		−0.025**		0.015		−0.007
		(0.011)		(0.039)		(0.011)
Expenses per pupil x DedShare - δ^{D}		0.142***		0.075		0.037
		(0.033)		(0.083)		(0.048)
Demographics	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X
Observations	8,732	8,732	4,366	4,366	4,366	4,366
Adjusted R^2	0.915	0.915	0.920	0.921	0.901	0.901

Table A10: The effects of commercial properties taxation on the capitalization of local public goods

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta} Exp_j + \phi DedShare_j + X_j' \beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND} Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j' \beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* Exp_j *is the total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Columns (1) show the baseline analysis, and Columns (2) (3) show the coefficients for school districts with high and low level of highly developed land (above/below median). Standard errors, presented in parentheses, are clustered at the CBSA fixed effects level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(house value)					
	all		High commercial		Low commercial	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.651*	0.589	0.088	0.037	1.579***	1.542***
	(0.368)	(0.390)	(0.406)	(0.425)	(0.278)	(0.286)
Expenses per pupil (standardized) - $\bar{\delta}$	0.012		0.035**		0.003	
	(0.010)		(0.016)		(0.005)	
Expenses per pupil (standardized) - δ^{ND}		−0.025**		−0.004		−0.018*
		(0.011)		(0.031)		(0.010)
Expenses per pupil x DedShare - δ^{D}		0.142***		0.120*		0.097***
		(0.033)		(0.072)		(0.034)
Demographics	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X
Observations	8,732	8,732	4,366	4,366	4,366	4,366
Adjusted R^2	0.915	0.915	0.918	0.918	0.915	0.916

Table A11: The effects of state finance reforms on the capitalization of local public goods

This table reports the estimates of the paired regressions $log(V_j) = \alpha_{m(j)} + \bar{\delta}Exp_j + \phi DedShare_j + X_j'\beta + \epsilon_j$ *and* $log(V_j) = \alpha_{m(j)} + \delta^{ND}Exp_j + \delta^{D}(Exp_j \times DedShare_j) + \phi DedShare_j + X_j'\beta + \epsilon_j$ *in Columns ending with a, and b respectively. The sample comprises of all urban school districts providing elementary education with at least 100 pupils in school year 2016-2017.* $DedShare_j$ *is the share of taxpayers deducting property tax on their federal taxable income in 2017 computed from the Statistics of Income of the Internal Revenue Service.* Exp_j *is the total expenses of the school district per enrolled pupil in school year 2017-2018 deflated across space by the American Community Survey Comparable Wage Index for Teachers (CWIFT) and standardized.* X_j *include demographics control including median income quartile fixed effects, income distribution share, education achievements, homeownership rate, the share of minority, the share of people less than 19 years old, the share of people of 65 years old or more, and a measure of school districts educational score. Columns (1) show the baseline analysis, and Columns (2) and (3) show the coefficients for school districts within states that passed or did not pass a school equalization reform, respectively. Standard errors, presented in parentheses, are clustered at the CBSA fixed effects level. Estimates followed by ***, **, and * are statistically significant at the 1%, 5%, and 10% level, respectively.*

	Dependent variable: log(value)					
	all		reformed		Not-reformed	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Share of property deducters - ϕ	0.656*	0.589	0.117	0.047	1.618***	1.581***
	(0.359)	(0.383)	(0.416)	(0.441)	(0.234)	(0.236)
Expenses per pupil (standardized) - $\bar{\delta}$	0.011		0.018		−0.006	
	(0.010)		(0.013)		(0.009)	
Expenses per pupil (standardized) - δ^{ND}		−0.027***		−0.020*		−0.038**
		(0.010)		(0.011)		(0.017)
Expenses per pupil x DedShare - δ^{D}		0.147***		0.140***		0.142**
		(0.032)		(0.034)		(0.063)
Demographics	X	X	X	X	X	X
CBSA FE	X	X	X	X	X	X
Observations	8,890	8,890	5,896	5,896	2,994	2,994
Adjusted R^2	0.914	0.914	0.921	0.922	0.890	0.891