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ABSTRACT

Property tax revenues – the largest discretionary source of revenue for local governments - adjust at a pace that is inconsistent with property values in the US. We show that this form of revenue smoothing may be rooted in the political economy of municipalities. Measures of local budget stressors are positively related to upward assessments of a property's value. Moreover, municipalities are significantly more likely to reassess in up markets as opposed to down – consistent with maximizing tax base and revenue collected. Using micro-level evidence from just-passing school referenda in Illinois, these shocks to municipal liabilities lead to significant increases in property assessments without any associated increases in market values or transactions. Passing a referendum over the prior 3 years increases the probability that a house is reassessed upward by 23%. This flexible form of revenue smoothing creates avenues for personal rent extraction. We find that local tax assessors: 1) have tax assessments on their own properties significantly lower than neighboring properties; and 2) these tax assessments grow significantly slower than neighbors – lowering their tax bills. We further document a significant connection between the underassessment of tax assessors' own properties and the tax-maximizing assessment gaps documented in the districts they operate.

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I. Introduction

Outside of federal and state transfers, property taxes are the largest source of revenue for local governments (US Census Bureau, 2023). These annual taxes are collected in proportion to individual property values - scaling to the price of a taxpayer's real estate asset. In principle, this is meant to proxy for a large component of the average taxpayer's wealth, and exposes public budgets to the fluctuations of the housing market, where prices are inherently volatile. During the 2008 Financial Crisis that coincided with a housing market downturn, for instance, the financial media and many economic analysts speculated on the potential waves of municipal bankruptcies that would materialize from the implicit effect of declining housing prices on property taxes.[1]

In this analysis, we first evaluate the connection between the financial fluctuations of the housing market and local property tax revenues. We show that, despite the prevailing mandate to mark to fair market valuations, municipally assessed property prices — the precise values used to determine tax burdens — are resistant to economic fluctuations captured in the corresponding real estate indices and regional transaction prices. In multivariate regressions, a 1% implied market return on house values translates to no more than a 0.15% change in assessed values. The standard proxies of property returns can only explain 8% of the variation in property assessment growth. This pattern is robust to controlling for policies that may restrict assessment values and total property tax revenue across states.

The unresponsiveness of assessment valuation to market shocks insulates local budgets and tax rates from having to adjust to the market fluctuations in prices. This may not be surprising, as public goods provision is a central mandate of municipal governments. Schooling, police and fire, clerical functions, etc. all are examples of publicly administered goods and services supported through

[1] In an April 2009 speech to the Bank of International Settlements, the former Federal Reserve Chair, Ben Bernanke, implied that absent these key local property tax revenues, "States and municipalities are scrambling to find the funding to provide critical services." (https://www.bis.org/review/r090415a.pdf). However, as far as we are aware, only Jefferson County (AL) and Harrisburg (PA) had defaults on their general obligation bonds surrounding this crisis period.

property tax revenue. It is clear why stability of these goods and services would be preferred, and in some cases necessary (i.e., significant proportional contraction of indivisible goods such as roads, parks, etc. might be impossible in the short-run). Thus, municipalities prefer a stable revenue stream to offset these liability claims.[2] However, as house prices and values do fluctuate – sometimes in dramatic fashion due to prevailing market conditions – matching to fair market value (which is typically state-constitutionally mandated) would introduce fluctuations to the taxable property base. This mismatch could be undone through an annually fluctuating tax rate, allowing the rate to vary in proportion needed to smooth public goods provision. However, from a political economy standpoint, large fluctuations in tax rates are often legally intractable and empirically limited.[3] This limited band of feasible tax rates results in assessment values that do not fully respond to market shocks, in order to generate a revenue stream to match smooth public goods provision.

As evidence for this, using state reported tax rates from Illinois, we find that a 1% decrease in market valuation of county level property results in no detectable change in total property tax collected. The way this is accomplished is through a muted 0.1% increase in the county level tax rates, coupled with a buffered 0.1% decrease in total assessed taxable property value.

Given that assessment values disagree with commercial estimates of market values, we investigate the political economy of the property tax institutions as a source of this disagreement. We find that changes in the total property tax revenue correlate significantly more with changes in per-capita income than with actual property market returns. This difference is large – with the elasticity to changes in per-capita local income being roughly 3 times larger than local property price movements

[2] While this could be done through municipal debt, eventually, from a Ricardian equivalence perspective, that debt would need to be repaid with municipality-generated revenue. Further, municipal debts are substantially used for infrastructure purposes, and untenable as a source of funding for ongoing services.

[3] Residential tax rates are explicitly capped in 36 states (Alabama, Illinois, Indiana, Massachusetts, and many others), limiting the band of allowable tax rates. Such caps are present even as the same authorities are required to mark to fair market values *and* pre-calculating the total necessary revenue in determining the final effective tax rate.

(F=25.76). This is consistent with the property tax assessment problem being a public goods provision problem, and so varying much more with demand that stems from income levels, while then positioned institutionally back into a wealth tax through the guise of property assessments.

To provide further corroborating evidence to this end, we find that the differences between market and assessment values can be explained by constraints in local government finances. Specifically, property sales for amounts significantly below tax roll assessment values (market value < assessed value) are the largest in areas of high local deficits, allowing artificially high assessment values to aid in propping up budgetary demands of the municipal authorities. For instance, a local budget deficit of 10% is associated with home transaction prices 9.96% (t=-10.04) below assessment value.

To explore this association further, we provide quasi-experimental evidence using micro-level data on shocks to local expenditures. In particular, we attempt to identify local shocks to budgetary needs that can lead to commensurate increases in assessment values, without substantially affecting underlying market price dynamics (and so their transaction prices). We do this using a panel of local bond referenda from 2006 to 2014 in Illinois. First, we find that the odds of passing one of these local referenda are roughly 50-50 in the data (and that observed votes are typically quite close, between 40%-60%). Moreover, if a referendum does pass in a municipality, passing at least one referendum in the past 3 years leads to an increase in the probability of upward assessments of properties in the municipality by 5.77% (t=2.31), which is 23% of the average. Importantly, this referendum-passing does not accompany increases in the market values of real estate properties. In fact, passing referenda leads to an insignificant decline in the median transaction price, and a significant decline in the number of residential transactions. Consequently, referenda result in an increased gap between assessed values vs. sales values in these municipalities with their correspondingly shocked increase in budgetary needs.

As noted, smooth tax revenues can be a boon to municipal, county, and school district governing bodies - insulating their budgets against the volatility of financial market fluctuations. Beyond the benefit of avoiding bankruptcies, which can be costly (Warner, 1977), property tax revenues afford public goods that may be viewed as having been under-provisioned (Pigou, 1947; Cellini, Ferreira, and Rothstein, 2010). We find that the revenue mechanism utilized (property taxes) can become divorced – and sometimes substantially so – from the underlying foundational and legal tenets that explicitly govern its application. This flexibility in application and a lack of enforced benchmarking could allow costs in the form of local public officials engaging in rent-seeking behavior.

In order to explore this rent-seeking behavior in more detail, we collect micro-level evidence on the identity and behaviors of local tax assessment officials. As initial evidence in line with the tax assessment office and position allowing scope for rent-extraction, a number of high-profile cases have centered around tax assessors trading significant tax benefits in terms of lower assessments for quid pro quo benefits such as campaign donations, cash bribes, etc.

Take the example of John Noguez, the former tax assessor for Los Angeles County – the largest county by population in the United States. Noguez was removed from office, and faces criminal charges (along with his chief appraiser Mark McNeil) for fixing appraisals at far below their true values to lower tax bills, in exchange for campaign donations.[4] The reductions were sizable – amounting to 172 million dollars across properties in Beverly Hills, Brentwood and Pacific Palisades.[5] Relatedly, a tax assessor from New York City, Joseph Marino, pled guilty for accepting 4.1 million dollars in bribes for lowering the values of Manhattan properties including skyscrapers, condos, and factories.[6]

[4] https://lamag.com/news/defendant-in-l-a-real-estate-scandal-asks-high-court-to-force-plea-deal
[5] https://www.cbsnews.com/losangeles/news/ex-county-appraiser-arrested-for-allegedly-lowering-property-values/
[6] https://www.nytimes.com/2002/01/14/nyregion/grand-jury-examines-allegations-tax-assessors-took-bribes.html

More closely linked to what we find across the universe of tax assessors is the example of Justin Champlin: a tax assessor in Ascension Parish in Louisiana, located in the Metropolitan Statistical Area of Baton Rouge. Champlin was removed from his position and arrested for unlawfully lowering the assessment of two separate properties that he owned to lower his personal tax bill.[7]

Inspired by these examples, we benchmark property assessment flexibility using the personal residential properties of assessment officials. Principally, we hand-collect tax assessor identities and their respective property ownership for a sample of the largest municipalities in our data. In particular, sourcing from county websites and public databases, along with accessing public records data parsed from LexisNexis, we collect the personal property addresses of our panel of assessors, along with several predetermined sets of comparable neighboring properties. We find that while the properties appear similar to neighboring properties in hedonic characteristics, they nevertheless have significantly lower tax assessments, resulting in significantly lower tax bills.

In particular, we find that during the contemporary period, assessors' primary properties experience an average of 0.712% lower growth (t=3.06) in assessment values compared to their LexisNexis defined neighbors and 0.955% (t=5.77) lower growth compared to other single household properties in the same county of their authority. These differences are quantitatively large - composing 18% to 24% of the average assessment growth for this sample of assessor matched properties. We further use hedonic regressions of changes in yearly assessment value on assessor ownership indicators. These regressions: controlling for nearby property values sold, square footage, number of living rooms, and other available property characteristics – deliver the same results regarding significantly lower assessment values for tax assessors' properties.

[7] https://www.theadvocate.com/baton_rouge/news/deputy-assessor-tampered-with-his-own-tax-assessment-police/article_8bb5d80c-01b5-11ef-a866-eb3ea56fdbb0.html

Finally, we relate the individual property tax benefits accruing to tax assessors to the average county level assessment markups in their counties. Counties managed by assessors who obtain the most personal tax benefits typically also have the highest assessment markup against market values (i.e., generating the most tax benefits for their county). In doing so, our results indicate a tradeoff mechanism between allowing for this flexible revenue source for the public goods provision problem, and potential avenues for rent-extraction.

II. Relevant Literature and Institutional Details

Our work primarily links the expanding literature on local taxes and real estate assessments - particularly the inaccuracies in this central discretionary tax source founded on assessed values - to the traditional literatures on public finance, public auditing, and the foundations of political economy.

A large literature ranging from academic studies and to popular press investigations examine the microdata of municipal property assessments. These works conclude that assessment offices typically place regressive burdens on the taxpayer (Paglin and Fogarty, 1972; Engle, 1975; Black, 1977; Clapp, 1990; Berry, 2021; and Amornsiripanitch, 2021), manifest in racial gaps (Kahrl, 2016; Atuahene and Berry, 2019; and Avenancio-León and Howard, 2022), and are associated with cases of quid pro quo corruption (Newman, 2002; and Lagunes and Huang, 2015).

This body of evidence suggests that assessment offices have flexibility in influencing property assessment values and distributing tax burdens. Our paper expands the frontier of this literature by linking such a system to public financing. 1) We show the key benefit of this form of taxing mechanism is that it gives high degrees of discretion to the tax authority, and consequently smooths out the fluctuations and pricing shocks that are inherently associated with financial assets. 2) We show that district level liabilities can lead to changes in assessment values, without substantially affecting

transaction values (and that these fluctuations are more associated with income changes than the property value changes they are meant to tax). 3) We provide a novel benchmark for analysts and policy makers to assess assessors- the valuation of an assessor's own homes as a measurable proxy of assessor flexibility.

Given our findings on distributive effects and measurable assessor influence, the key contribution is to link the flexibilities of these offices to the foundations of political economy. Assessors, while mandated to assign market prices, are implicitly hired and funded to increase the property tax base for local governments (Geoffrey, 2022). We show that there is a tradeoff between the costs in allocating authority to these offices, allowing for the accrual of personal gains to the assessor, and the benefits that these offices provide in terms of local revenue for budgets.

Public finance and political economy, due to the limited availability of data and the lack of comparability between different governmental backgrounds, have focused on the national setting and the institutional divisions of power within a federal regime (Persson, Roland, and Tabellini, 2000; Acemoglu, Johnson, and Robinson, 2001; and Acemoglu, Johnson, and Robinson, 2002). Similarly, the study of corruption and red tape (Leff 1965; Shleifer and Vishney, 1993; and Mauro, 1995) have also focused on international settings where unobservable cultural and institutional characteristics may be difficult to disentangle. In our setting of local property assessments by municipal governments, our focus is the deviation between assessment and transaction-implied market values. This markup of assessment values is manifestly simple to calculate and straightforward to compare. Therefore, our setting allows the use of large panels of property values and numerous local governments to test theories of political economy - in particular, the role of bureaucracy and its trade-offs to public efficiency. By analyzing the prime source of local government revenue in property taxes, we contribute by enlarging the frontier of tools useful for the analysis of public finance and political economy.

While social scientists have long argued that property taxes as an institution are a relic of history (Hale, 1985), and are susceptible to potential corruption and inefficiencies (Whitten, 1897), our contribution is an assessment of the political economy of this institution and providing quantitative and measurable evaluations of its trade-off in benefits and costs to public finance.

We are also the first study that links a sizeable dataset of local public officials – assessors- to the measurable efficacy and characteristics of their public office. This is akin in spirit to the literature on corporate executives, board members, and their rich characteristics (Bertrand and Schoar, 2003; Malmendier and Tate, 2005; Adams and Ferreira, 2009; Faccio, Marchica, and Mura, 2016; Smith, Yagan, Zidar, and Zwick, 2019). We use SmartLinx from LexisNexis to identify personal backgrounds and owned properties, similar to the extraction of asset manager and corporate CEO backgrounds (Pool, Stoffman, and Yonkers, 2015; Yonkers, 2017a; and Yonkers, 2017b).

Finally, our paper provides a fuller picture of local governmental finances. Recent literature in finance examines the micro-characteristics of municipalities by analyzing the dynamics of the municipal bond market. These papers compare the yields and the realized returns of municipal bonds as related to individual government and other local characteristics (Butler, Fauver, and Mortal, 2009; Gao, Lee, and Murphy, 2019; Gao, Lee, and Murphy, 2020; Chen, Cohen, and Liu, 2024). Given Ricardian Equivalence (Barro, 1974; Buchanan, 1976), that debt and tax revenues are substitutes, our examination of the prime source of local tax revenue complements this existing literature by describing a central source of tax revenue that supports local expenditures.

III. Main Results

A. Property Tax Revenue and Market Value Growth

To begin our analysis, in Figure 1, we plot the Zillow US Home Value Index and the total property tax revenues of a balanced panel of US local governments between 2000 and 2020. The Zillow US Home Value Index (ZHVI) is the time series of monthly changes in home values that are estimated by the Zillow corporation, which has considerable access to the U.S. housing market.[8] The US local government panel is derived from the US Census and contains all identifiable US local governments that have annual observations between 2000 and 2020. We provide the summary statistics of the county level data in Panel A of Table 1.[9]

In Figure 1, we see that the main feature of the Zillow Home Value Index is the growth and decline in property value between 2006 and 2012. This feature, driven by the boom and bust of the US housing market, can also be observed in other similar value indices, such as the Case-Shiller U.S. National Home Pricing Index or the US Federal Housing Finance Agency's Transaction Price Index. This pattern is ostensibly absent from the aggregate property tax revenues collected by local municipalities.

In order to reconcile the total property tax revenues with the secular decline in prices, the quantity of taxable properties must have increased dramatically to compensate. However, an immediate survey of the conditions of the housing market indicates that the quantity of taxable properties grew only modestly or even declined during this period. In Figure 2, FRED's New One Family Home Sales in the United States (Series: HNFSEPUSSA) followed the same pattern of rise and decline as the price indices. That is, the quantity and prices, at least for this sample period, were

[8] This time series is based on the monthly changes in the levels of Zestimate, which is the proprietary "market" value estimates of individual homes by the Zillow Corporation. In describing the Zestimate, Zillow states that these estimated individual home values are within 10% of the transaction values 95% of the time at any moment in time.
[9] Part of this panel was derived from the census, while other variables were derived using aggregation of the ZTrax database which we will describe in the following section.

positively related. The smooth pattern of property tax revenue remains seemingly unexplained by the market conditions of both price and quantity.

This aggregate pattern of tax revenues repeats across individual states - operating within a wide spectrum of legal and institutional frameworks. In Figure 3, we decompose the aggregate property tax revenue into states with and without explicit assessment limits (Panel A), and to states with and without levy limits (Panel B), highlighting states with and without explicit limits in their assessment process. The smoothness of property tax revenues exhibits itself in each one of these decompositions of the US property market.

Specifically, we first decompose the aggregate trend to states with and without explicit limits to the growth rate of assessment values. There are 19 states that limit possible changes in property assessment values. For instance, California's proposition 13 limits the yearly change in assessment values to 2% for non-transacted properties. It is possible that these assessment limits accumulate excess undervaluation that cushions the declines in assessment values during market corrections.

Panel A of Figure 3 plots the growth of property tax revenues for states with (blue) and without (orange) assessment limits separately. It appears that legal limits on assessment value growth have very little to do with the relatively smooth upward trend on property tax revenue itself. Somewhat to the contrary, states with assessment limits (presumably smoothing) have revenue levels that modestly stagnate when property prices decline. States without such limits then tend to have smoother upward trends in property tax revenues, indicating that these limits are likely not responsible for the disconnect between property tax revenue and property market values.

Similarly, there are 37 states that implement some form of levy limits - the total tax revenue growth that can occur annually within a local government may be capped. These limits are not placed on individual properties but are on the total tax revenue that a local tax authority may collect. For

example, the Property Tax Extension Law Limit (PTELL) in Illinois limits total tax revenue growth to the greater of 5% and the CPI inflation rate per annum for certain counties (Illinois Department of Revenue, 2024). In Arizona, Levy limits allow for a cap on tax revenues to grow at 2% within the intensive margins. While this may seem restrictive, in 2024, no county, in aggregate, hit their maximum allowable levies (Arizona Department of Revenue, 2024).

In aggregate, levy limits as well do not seem to be the cause - nor do they prevent - the time series pattern of property tax revenue smoothing. Panel B of Figure 3 decomposes the aggregate tax revenues into states with (blue) and without (orange) levy limits. Both time series both show a pattern of revenue smoothing. Again, the constrained set of states show a greater reflection of the aggregate real estate market conditions than the unconstrained states; indicating that these limits are likely not responsible for overall smoothness of property tax revenues. Collectively, these decompositions show that aggregate smoothing of property tax revenues is likely not rooted in a restriction in the legal framework of the state governments.

We further provide evidence of this revenue smoothing pattern by conducting multivariate regression analyses of the growth of property assessment values at the county level. Table 2 regresses the growth of the average single-family home aggregated at the county level against various sets of proxies on county level growth in property values. We include various lags, and winsorize both the left-hand side and the right-hand side variables at the 2.5% and 97.5% levels, respectively, to give the regression models their best chance at explaining the variation in property assessment values uninfluenced by single-property outliers.

Columns 1 through 3 of Table 2 regress growth in assessment values using a simple univariate specification with the prior annual market value growth with varying lags as the explanatory variables. Column 4 includes all the lags of housing market returns to account for possible reporting delays.

Columns 5 and 6 then include year- and county-level fixed effects to benchmark the explanatory power absorbing any common time series variation (e.g., housing market decline beginning in 2007), along with county specific characteristic or growth trend. In explaining the growth of property tax assessment values, market values have limited explanatory power over our sample period. Market returns explains no more than 8% of the variation (all lags included) in assessment values. This is despite the legal mandate to capture market variation in assessment values in every state within the union.

Further, the economic magnitudes of the relationship between market returns and property assessment growth are modest, as well. A 1% contemporaneous market return implies only a 0.05% change in assessed property value. The explanatory power is slightly stronger at 1 and 2 year lags, where a market return of 1% translates to between a 0.12% to 0.14% change in taxable value. However, for property tax evaluation schemes that are mandated to capture fair market prices, there is a distinctive disconnect between the foundational source of property tax revenue and property returns.

The divorce between market and assessed values buffers local property taxes from market driven fluctuations in property values. In principle, such buffering can be accomplished by using tax rates that adjust on a needs-basis, and indeed this is typically one of the stated principles of local tax authorities.[10] However, such adjustments are constrained by other rules that cap property tax rates. For instance, Indiana limits individual residential property tax rates to 1%, while Illinois limits the rate of certain school districts to 0.61%. Beyond these hard limits, it may also be politically infeasible for local authorities to indiscriminately increase rates as opposed to assessment values.

[10] For instance, most local authorities state that local budgets are determined alongside the cumulative taxable assets, before a tax rate is determined.

Table 3 dissects the variable buffering of tax revenue and tax rates specifically for the state of Illinois.[11] We find that, in this state during our sample period, for a 1% decrease in market values, there are no visible changes in total collected tax revenue. A leveled 0.1% (t=3.00) decrease in assessment value, and a buffered 0.1% (t=4.66) increase in tax rates. The assessment valuation mechanism insulates changes in total property tax revenues and tax rates from the market fluctuations in residential property values.

Why do tax authorities insulate property tax revenues? We argue that although these revenues are positioned institutionally as a wealth tax (tied to property values), they provide persistent public goods that are associated with income levels, rather than wealth. Table 4 focuses on the change in total tax revenue for the panel of all US counties and runs a horse race between market price changes and income level changes as the main explanatory variables. If public goods are determined by the wealth of a local district, then we should see market returns as being the primary driver of changes in total tax revenue.

Instead, Table 4 shows that changes in total and per capita income consistently outperform market returns in explaining changes in tax revenues. In bivariate regressions, a 10% change in 3 year per capita income is associated with a 1.63% change in total tax revenue, far larger that implied by property returns, at only 0.57%. This difference is significant in almost all specifications- the only regression where market returns have comparable power over changes in average income is one in which both location and time variation are removed (in which case per capita income is still larger in point estimate, but not significantly so). The local tax revenues, although positioned institutionally

[11] This is a setting where the effective tax (millage) rate is available directly from the state authority, whereas that for many other locations are often implicitly calculated using the median house assessment value.

through property assessments as a wealth tax, empirically as a whole appear to respond much more to income than to property values.

In summary, we find that the changes in property assessment values appeared disjointed from market returns and fluctuations. This disconnect cannot be explained by state-level restrictions of assessments and property tax levies. Such a disconnect insulates total property tax revenue as well as tax rates from the fluctuations of market values that accompany the housing market. In the rest of the paper, we will provide evidence that this disconnect can be explained by county level budgetary characteristics, biases in the frequency of reassessments, and shocks to local liabilities. Furthermore, we will show that at the county level, assessment offices have considerable flexibility in the determination of assessment values and the levels of this assessment gap.

B. Assessment Values and Transaction Values

We next join the panel series of property taxes to individual transactions and assessment values. Micro data on U.S. properties capture the actual gap between a property's assessment value and its potential transaction value. We use this data to provide evidence that the disconnect in assessment values is rooted in the budgetary characteristics of local governments.

The micro data on property values and transactions consist of the tax roll and transactions of US properties from the Zillow ZTrax database. This database contains historic assessment values, house characteristics, and sales transactions across all 50 states. This database was provided by the Zillow corporation on an as-is basis for academic research. Specifically, it contains tax roll assessment values between 2000 and 2015 (in the historic version of this panel.) and 2017 to 2020 (using the corporation's contemporaneous version of the data). Additionally, the transaction dataset contains property sales - with the acting parties, the dollar value of the sale, and the conditions of the property

at the time of the sale over its available history. We provide summary statistics on this dataset in Panel A of Table 1.

To capture the degree of over or under valuation by local assessment offices, we take all single-family home transactions and match these transactions to the latest assessment values from the tax roll dataset. This enables us to calculate a property's transaction deviation to the assessment values at the individual level. A property that was assessed at $400,000, but sold for $500,000, has an assessment deviation of 25% ($100,000/$400,000). Likewise, a similar property that was assessed at $400,000, but sold for only $300,000, has a transaction deviation of -25% (-$100,000/$400,000). We aggregate these numbers to the county-year level: all properties that were sold for prices between $100,000 and $800,000 are averaged yearly within each county to provide the average transaction deviation (*% Diff Between Sales and Assessed Value*). Similarly, we also calculate the percentage of properties that undersold their assessment values by more than 10% of the assessment price as *% Sold 10% Below the Assessed Value* each year.

In Table 5, we regress *% Diff Between Sales and Assessed Value* and *% Sold 10% Below the Assessed Value* against a variable that captures the budgetary constraints facing each county. *Local Government Deficit* - the primary explanatory variable - is the ratio between total expenditure and the total revenue of local governments aggregated at the county level. Columns 1 through 4 use *% Diff Between Sales and Assessed Value* as the dependent variable, while columns 5 through 8 uses *% Sold 10% Below the Assessed Value*. Columns 1 and 5 regress these against county level deficits. Columns 2 and 6 add local county-level fixed effects as well as two additional controls for population and the importance of property tax revenue. Columns 3 and 7 add year fixed effects. Finally, in the most saturated models in Columns 4 and 8, we use the entirety of controls and fixed effects.

From Table 5, we observe a strong relationship whereby counties with the highest deficits have the highest average over-assessments (i.e., buoying collected tax revenue and budgets with assessed values greater than market values). In the fully specified multivariate setting (Columns 4 and 8), a 10% increase in county level expenses against revenue indicates a 3% lower average property sales price, and a 1.03% greater chance that a property will be sold at least 10% below its assessed value. This relationship is more significant without year fixed effects as the 2007 through 2009 financial crisis provides the most dramatic change in county-level market values. Without year fixed effects, which allows for the capture of the systematic shock to the property market (Columns 2 and 6), such a 10% increase translates into a 9.5% lower property sales price, and a 6.89% greater chance that the property will be sold at least 10% below its assessed value.

Going further, we examine the frequency of reassessments of properties outside of sales or other in-kind transfers. In Table 6, we regress the proportion of existing non-transferred properties that were reassessed (had changes in assessment values) against proxies of market returns. We primarily use the current, and two lags of market returns to be consistent with Table 2, although as can be seen from Table 6, market returns lagged by two or more years do not have significant explanatory power on reassessment probability.

For Table 6, we observe that counties typically increase reassessments significantly when market returns are high, however significantly less so when market returns are low. Using the specification in Column 1, one standard deviation increase (14%) in our proxy of current market returns indicates a 5% of the mean (48%) increase in the fraction of residential properties reassessed within a county when returns are good, and a resultant 5% decrease in re-assessing properties when returns fall. This association persists using lagged market returns, and is robust to the inclusion of year and location fixed effects (Columns 2 and 3). Furthermore, despite the decrease in power, this pattern is repeated in both capped and non-capped states in Columns 4 and 5, respectively.

In the large sample analysis of counties and residential properties, we show that the reassessment process, on average, mutes negative market returns from entering into tax valuations by relegating property reassessments to occur more frequently during periods of market booms. It remains a question as to why this system of institutions has evolved to even attribute and grant local officials the power (if any) to evaluate and determine property values. We argue that this form of revenue smoothing allows for increased flexibility by local authorities to meet liability shocks.

As the assessment valuation process may differ between properties across counties and states, we will focus on a specific micro-setting to show how local liabilities determine the assessment valuation process.

C. Evidence from Local Referenda

Do local liabilities lead to changes in real estate valuations? This section provides micro-level evidence that property assessment values are adjusted in accordance with imperfectly predicted shocks to local expenses. In particular, using a panel of local school referenda appearing on Illinois ballots between 2006 and 2014, we show that passing such a referendum significantly increases the likelihood that local authorities will reassess properties upwards without substantial changes in median transaction prices.

This panel of data is hand collected from the Illinois public revenue website, and consists of total proposed referendum dollar size, the geographic district affected by the referendum, and whether the referendum was passed by the voter base (along with vote by which it passed or failed). Table 1 Panel D provides summary statistics on these referenda. Examples of these referenda are recorded in Appendix A. The outcomes of these referenda are typically close, with an average passing rate of 57%, financing projects with a median value of $8,000,000.

A local district referendum, once passed, typically allocates funding toward an immediate investment project, such as constructing a new school building, upgrading existing equipment, or making repairs to existing school-wide infrastructure. After passing the referendum, the local district then issues a general obligation (GO) bond to finance the project in question. Such a bond then is paid off over the course of many years using the full tax levying powers of the local district, which are determined directly from property valuations. The bonds financing these referenda projects differ from revenue bonds. For instance, bonds financing sewage systems, utilities, and stadium projects are typically not determined by referendum votes, not supported by property levies, and are instead backed by the revenues associated with these specific projects.

We examine the consequences of these referenda at the district level. Each of the school districts is matched to a single zip code. We then calculate the percent of single home properties within the district zip code re-assessed upwards in the years before, on, and after each referendum vote. Figure 3 Panel A shows the difference in the likelihood of an upward assessment between counties that narrowly pass a referendum versus counties that fail the referendum. At the aggregate level, a passed referendum leads to a higher fraction of properties having been reassessed upward in 3 years including on and after its passing. This pattern also coincides with the average growth of property values within the district. Figure 3 Panel B shows that the average growth rate in assessment values is also higher for properties in the districts that pass a referendum, concentrating in the 3-years immediately following the referendum passage.

To statistically assess this visual pattern, Panel A of Table 7 conducts standard regression analysis to recover the economic effects of referendum passage on the assessment values of single-family homes. In this regression, the panel of data consists of single-family residential homes within the zip codes of the referenda for all of the years between 2006 and 2014. The primary explanatory variables are whether at least a single referendum was passed and the number of referenda passed in

the past 3 years of the observed date in the observed local municipality. We observe that these shocks to local liabilities significant increase the assessment values of single-family homes. A passing referendum increases the annual assessment growth rate of properties by 1.24% (t=2.51). Similarly, these referenda increase the probability that a property will be reassessed upward. The indicator of a passed referendum increases the probability by 5.77% (t=2.31), a magnitude that is 23% of the mean likelihood that the yearly assessment value will be revised upward.

These assessment changes cannot be justified by increases or expectation of increases in actual transaction prices. Panel B of Table 7 regresses the yearly change in the median market property transaction prices (Columns 1 and 2) and the volume of transactions for residential properties (Columns 3 and 4) within these same zip codes passing referenda. Since not every property is transacted every year and therefore there is an absence of actual market valuations for these properties, we calculate the median transaction value of single-family homes in each zip code within every given year, and then we measure the year-on-year market returns according to this average transaction value. In these regressions, unlike assessment values, we do not find any significant increases in market prices or transactions for homes in these areas following the passage of referenda. In fact, the pricing effects estimates are even negative in point estimate, and negative and marginally significant for the impact on transaction volume. These suggest a decline for demand (and value) of homes in the area, in sharp contrast to the significant upward assessed value for tax purposes.

Similarly, referenda lead to a gap between the actual transaction and assessment values. For all the transacted residential properties in Illinois during the same period, we measure the gap between transaction and assessment values in Table 8. Using the same *% Diff Between Sales and Assessed Value* and *% Sold 10% Below the Assessed Value* dependent variables as Table 5, but disaggregated at the property level using all locations, we find that a single passed referendum leads to 16.7% (t=-3.94)

lower transaction prices on average relative to the last assessment value, and 3.68% (t=-2.29) higher likelihood that the property will be sold at more than a 10% discount.

In our sample of school referenda in Illinois, narrowly voted-in shocks to municipal liabilities increase property assessment values without significantly increasing their market-level values. These close referenda offering shocks to municipal budget stressors identify a plausibly causal link between local budgetary expenses and the assessment valuations used to finance these expenses. Discretionary assessment valuation, our primary channel in which property prices relate to local budgets, contributes to the investment of public services, in which school investments constitute a large component. Given this discretion, are their potential costs to this form of assessment flexibility? Section III.D examines individual assessment offices and their officers to explore the variation in the degree of budgetary assessment.

D. Local Assessment Offices

We focus on the local assessment offices to examine the cost of financial flexibility in terms of potential avenues for individual rent extraction. These institutions hold considerable sway and have flexibility over the attribution of real estate wealth (and so tax bills) to individuals and to businesses. To explore this evidence, we hand collect a panel of assessor identities from county websites and public databases of the largest municipalities in our data. In this process, we collect the names and locations of available county officials from numerous public sources.[12] For the next part of our analysis, we move to a natural setting to measure the flexibility and discretion afforded to assessors through their political offices – namely the valuation of their own homes.

[12] For smaller counties, we rely on scraping the First Connect website for assessment officials. Such data collection mainly focuses on recent officials as historic rolls of tax authority identities are often not available. To evaluate their properties, we use the ZTrax Contemporaneous database, which limits our sample of officials to between 2017 and 2020.

E. Assessing Assessment Officer Properties

We use the setting of assessment value assignments comparing personal and nonpersonal properties to identify the interaction of private and public incentives in the municipal political economy. We ask, given the role of providing a form of public service - by attributing taxes across individuals - do assessors internalize certain benefits? Is this a space highlighting the trade-off between a flexible revenue collection system and pecuniary benefits arising from it?

To join our data on assessment identities and property prices, we use the LexisNexis SmartLinx Comprehensive Persons Report Database. We query this database for information on the owned properties, employment history, first 5 digits of the social security number, criminal arrests, immediate relatives, possible business associates, licenses, business registrations, and a number of other available public records of the assessors that we had hand collect.

Specifically, for each assessor-county pair, we query the database using the assessor's first name, last name, and county location. If the system returns more than a single unique match, we parse the first 10 results for information that directly identify the individual's role as a property assessor.[13]

The SmartLinx system also helps us match individuals with possible alternative names and other data noise to the appropriate public records - hereby handling identification issues with using name and locations alone. For example, a query of Mike Pence from Indianapolis, Indiana gives – as the first-person report - a Michael R. Pence who currently resides in Zionsville, Indiana, actively registered as a Republican Absentee voter, having a history of addresses that span 1987 to 2023.

[13] These identifying keys are 1) email addresses associated with the municipal government – that is, emails ending in .gov and .us domains and 2) the person's job title(s) which include either appraiser or assessor as keywords. The first record that contains such an identifying requirement or the only unique recorded individual is matched as the public record of the assessor-county pair.

Name and social security number, along with other possible identifiers, link an individual's public records together in the SmartLinx database, thereby stitching the history of records such as multiple deeds, licenses, and addresses. A common problem with using individual public records is identifying whether multiple deeds with the same name actually belong to the same individual or multiple individuals with the same name. Appropriately, because of the SmartLinx algorithm, our data is able to detail an individual's current address information, their collection of possible secondary properties, and their prior addresses. In the prior example, Mike Pence's previously designated address was a 4-digit P.O. Box in Washington DC.

We then match these properties to the ZTrax dataset to obtain their recent assessment history and their recent (if any) transaction prices. We find that assessor properties have assessment values (and tax burdens) that tend to grow at a slower pace than 1) their LexisNexis defined neighbors, 2) the average single-family home within their county, and 3) the average single-family home within their county after controlling for house-related characteristics. We tabulate these results in Tables 9-11.

In Table 9, we record the average yearly change in: assessment values, the average change in dollar property tax, and the actual assessment values - between the homes owned by assessors, the comparable homes within their neighborhood, and other single-family homes within their county. We find that there is a difference of 0.712% ($t = 3.063$) in the appreciation rates of assessors and their LexisNexis designated neighbor, and a 0.955% ($t = 5.769$) difference between assessor properties and other single-family homes within his county. These differences are economically meaningful - during our sample period, assessor properties had tax-related assessment values that grew 20% to 24% slower than comparable properties.

The difference in assessment values is also directly related to the reported data on tax burdens.[14] There is a 0.496% (t = 2.187) difference between the growth of tax amounts for assessor properties and their LexisNexis designated neighboring properties, and 0.539% (t = 3.062) difference between assessor properties and other single-family homes within his county. In terms of proportional magnitudes, assessor properties had property tax amounts that again grew 16% to 17% slower than comparable properties.

Table 10 assesses these differences using hedonic regression models that account for property level characteristics (e.g., square footage). From Table 10, in the multivariate setting, properties owned by assessors experience a roughly 1.19% (t = 4.546) slower growth rate in assessment values and 1.46% slower (t = 4.430) growth rate in dollar taxed amounts than those owned by non-assessors. These differences can also be seen in the levels of assessment valuation. Assessor properties generally have a lower level of assessment values - a difference of $4,270 (t = 3.750) – relative to comparable properties within the same county.

In Table 11, we further decompose assessor properties into ones within the county of the assessor's authority and ones located outside of the county. *Within County* is an indicator for whether a property is associated with an assessor and located within the county of the assessor's influence. *Outside County* are all other properties associated with the assessors in our data. We observe that the primary effect occurs in areas that the assessor has jurisdiction in terms of property assessments. *Within County* is associated with 1.23% (*t*=4.676) lower assessment value growth, 1.46% (*t*=4.481) lower tax value growth, and $4,353 (*t*=3.829) lower assessment values. Assessor properties located outside of his county have no statistically significant association with the left-hand side variables.

[14] When present, the ZTrax tax roll dataset reports both assessment values and the actual taxed amount in the. The tax amount is populated less than assessment values in the ZTrax contemporaneous data, and significantly less in the ZTrax historic data; therefore, we focus primarily on assessment values but report both variables in the cases they're available.

The properties owned by local assessors experience lower growth rates in assessment values and have lower resulting tax burdens. This systematic difference is economically meaningful for an individual assessor and will be used in the next section as markers of flexibly-gained personal benefit to dissect the tradeoffs in the political economy of local government.

F. Assessor Benefits and the Average Assessment Markup

Lastly, we relate the findings between an assessor's own pecuniary benefits and the average assessment valuation markup of the assessor's served municipality. We show that there is a positive and significant association between the two: with municipalities that have larger over-assessment gaps (buoying tax revenue by having tax assessments > market values) are also those places where assessors appear to have the most discretion over their personal properties – significantly under-assessing them relative to neighboring households resulting in lower tax bills for themselves. We argue that this fact provides evidence of a tradeoff between an assessor's ability to accrue private benefits and contributing to the fiscal health of the local government.

In Table 12, we regress the average markup of assessment values in the panel of county-year observations against the average gap in property growth rates of assessor related properties relative to neighboring properties. In Column 1, we relate an assessor's slower growth in personal home value to the markup in assessment values of their county served. We find that the slower an assessor is to evaluate their own property upwards relative to neighboring properties, the more likely homeowners in that county will sell their properties below their county assigned assessment values. These two metrics are negatively related, even after including county and time fixed effects in Columns 2 and 3. The more flexibility that an assessor has to accrue a slower increase in their own tax burden, the more

likely that properties will be overvalued against their eventual transaction prices (buoying their relative tax contribution for the county as a whole).

This is consistent with there being a tradeoff in the power structure of local political economy. Namely, the results show that the degree of assessors' internalizing certain private benefits is positively and significantly related to the municipality-wide overvaluation of properties relative to market prices.

IV. Conclusion

We provide large sample evidence that local property taxes - municipalities' single largest source of discretionary revenue - do not grow in line with property values that they statutorily aim to track. In particular, we find that revenues are "overly" smooth and upward sloping, nearly independent in some instances of fundamental housing price dynamics. We provide evidence that this revenue smoothing may be rooted in the political economy of these municipalities, in that there is a marked asymmetry of property tax re-assessments based on their implication for bottom-line county revenue. They spike during positive markets - increasing tax revenue for the municipality, but fail to show the same sensitivity to negative markets - which would decrease tax revenue collected.

We find that measures of local municipal budget constraints are further positively related to amount taxed per unit value – finding a significant relation between municipal budget stressors and a need for tax revenue, and a property's total dollar assessment value relative to its eventual transaction price.

Using referenda from the state of Illinois between 2006 and 2014, we show that these shocks to local liabilities lead to increases in the assessed values of zip-code level properties, without affecting their actual market prices or valuations. The flexibility that endows the institutions that make

assessment valuations can be interpreted as a means to provide public goods and services without having to be susceptible to the adverse financial pricing shocks of the real estate market.

Turning to the costs of this form of tax revenue smoothing, we examine the individual tax assessors and their offices directly. We hand-collect detailed data on assessor's backgrounds along with each property they own (both within and outside their purview). We find that they appear to hold sway in the property assessment process, assessing their own personal properties at significantly lower values than neighbors (which are otherwise hedonically identical); and having tax bills that grow significantly slower than these neighbors. Furthermore, we find a link between this individual assessor behavior and that of the municipalities they serve, in that the tax assessment gap between their properties and neighbors is significantly positively associated with the tax-maximizing municipality behaviors observed.

Overall, we contribute to the nexus between local political economy and real estate finance. While theory dictates that market pricing shocks can adversely affect numerous real economy outcomes, we find that - in the realm of municipal financing – institutions build-in flexibility to smooth out these shocks in order to solve their public goods problem. Our primary marker of rent-seeking and extraction within assessment offices - the pricing of an assessor's own home - however, indicate that the flexibility does not come cost-free. This central trade-off in political economy could allow opportunities for rent-extraction across the municipal chain, with further potential avenues exhibited for opportunistic behavior.

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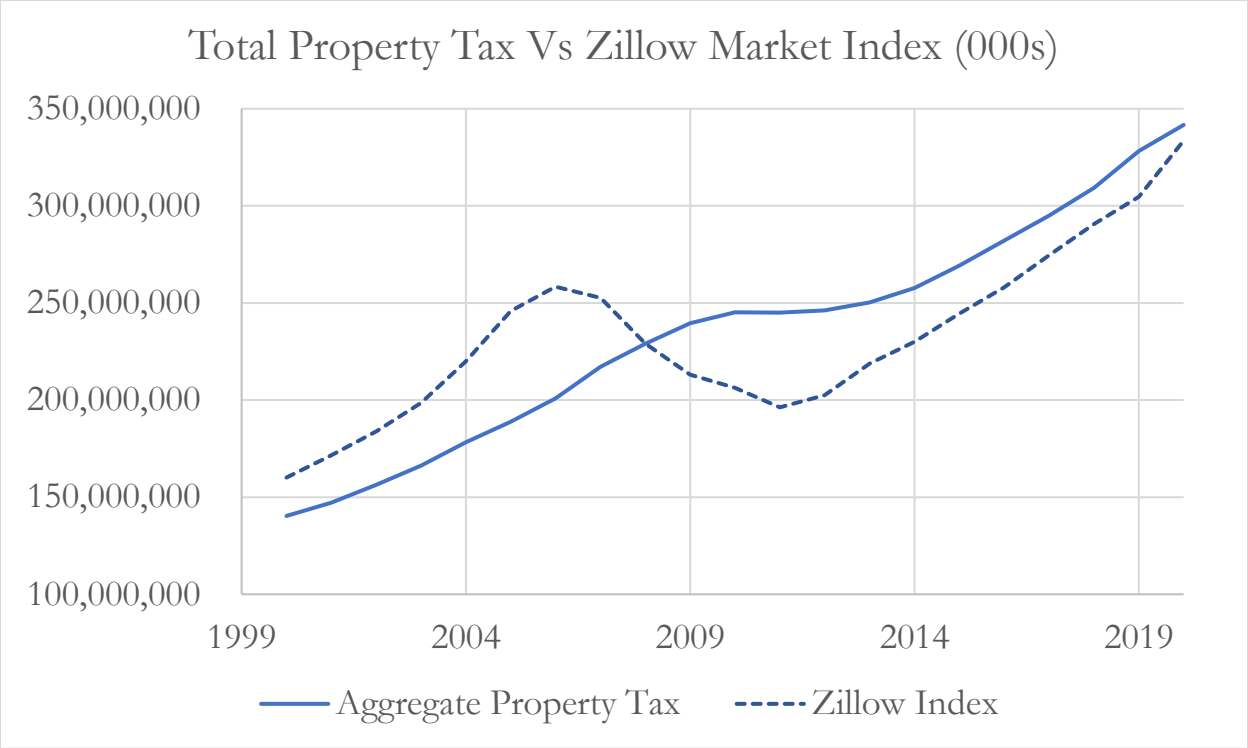


Figure 1. The Aggregate Property Tax revenue and the Zillow US Home Index. The Aggregate Property Tax time series, in blue, is calculated as the sum of all property tax revenues from local US governments that are observed annually (in a balanced panel) in the U.S. Census. The Zillow US Home Index is plotted in the dash-blue, and is normalized by the 2008 aggregate property tax revenue.

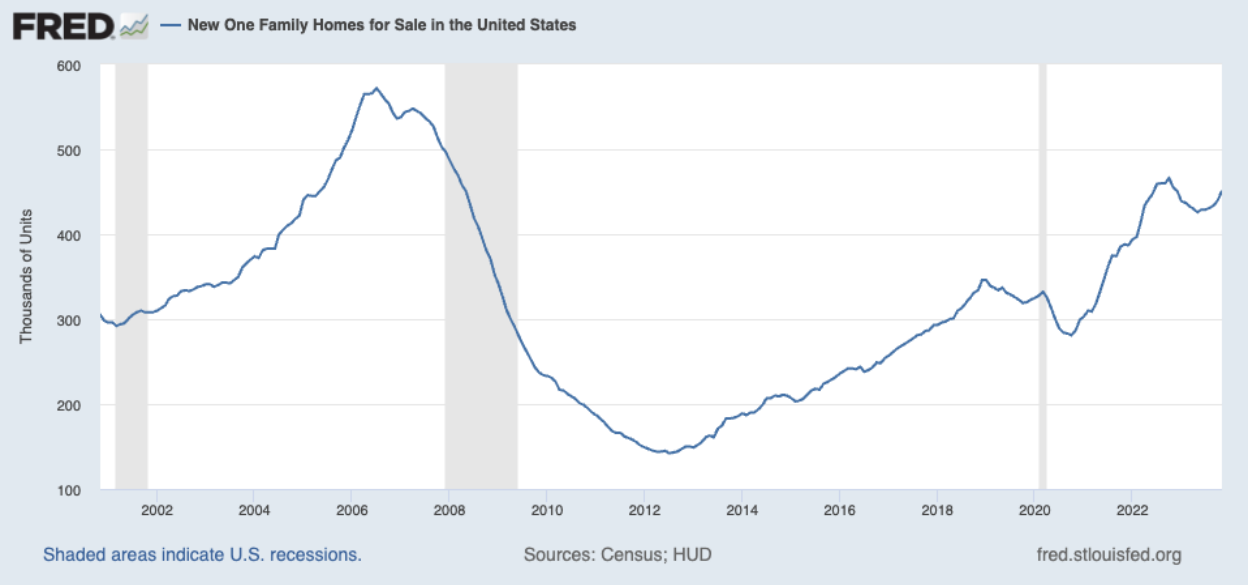
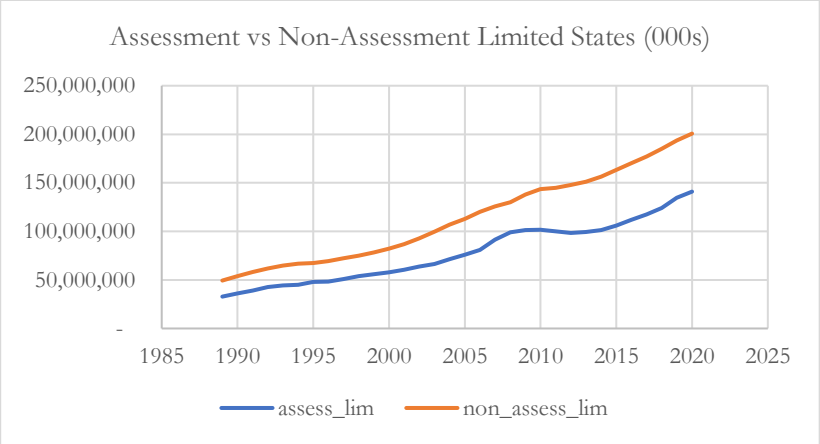
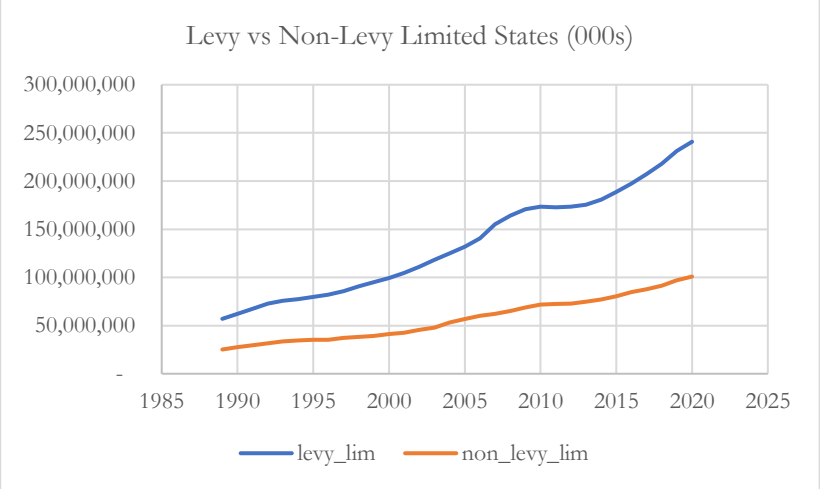


Figure 2. Federal Reserve Economic Data's New Family Homes for Sales in the United States Time Series.



Panel A: Assessment and Non-Assessment Limited States

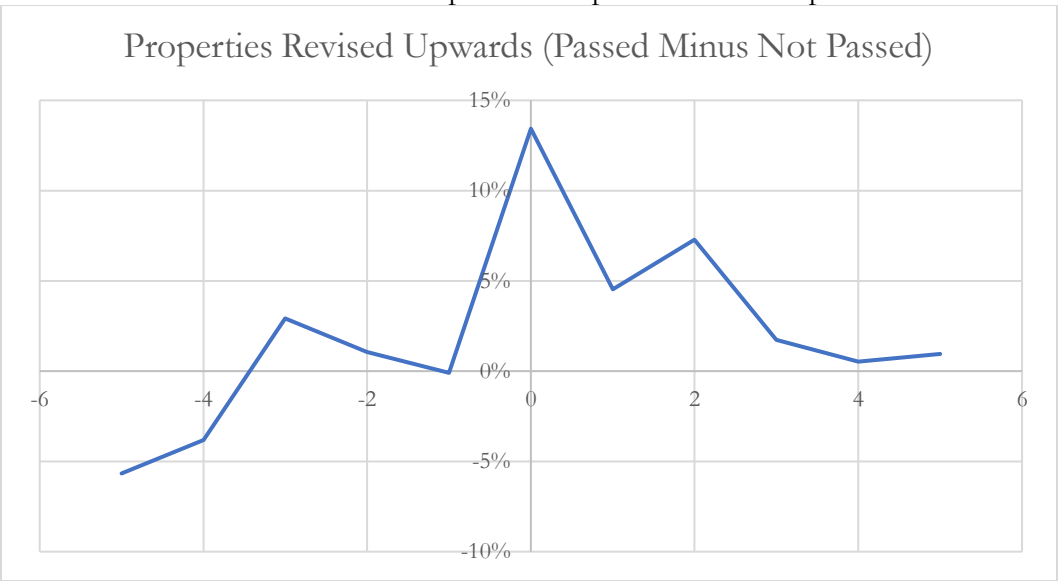


Panel B: Levy and Non-Levy Limited States

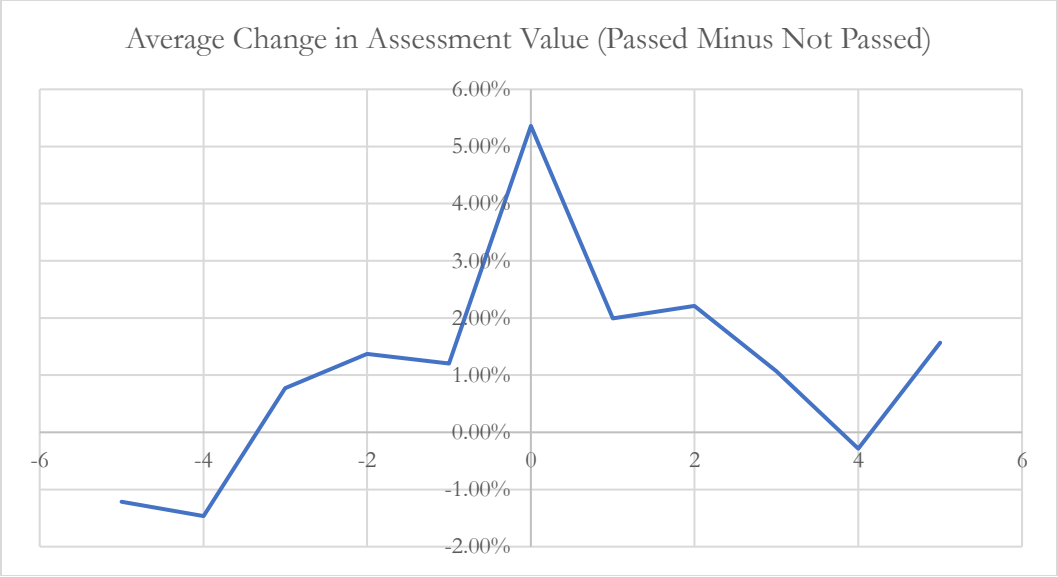
Figure 3. Decomposing the dollar of property tax revenue into (Panel A) assessment and non-assessment limited states, and (Panel B) levy and non-levy limited states.

Figure 4. Event Time Change in Assessment Levels Around Passing a School District Referendum

Panel A. Fraction of Zip Code Properties Revised Upwards



Panel B. Average Change in Assessment Value



The figures plot the event time characteristics around passing a school district referendum in Illinois between 2006 and 2015. Panel A is the average fraction of single-family residential properties re-assessed upward at the zip code level for districts passing a referendum minus that of districts rejecting the referendum. Panel B is the average growth in the assessment values of single-family residential properties at the zip code level for districts passing a referendum minus that of districts rejecting the referendum.

Table 1. Summary Statistics

	Local Government Level					
	10th P.	Median	90th P.	Mean	Std.	N
% Diff Between Sales and Assessed Value	-13.3%	16.3%	97.1%	29.0%	48.3%	6,559
% of Properties Over Assessed	4.36%	16.5%	58.9%	24.8%	22.0%	6,559
Deficit	-5.73%	1.86 %	11.1%	2.38%	6.61%	6,559
Population	101,941	274,339	977,6950	493,325	771,318	6,559
Property Tax as % of Total Tax	58.2%	79.0%	98.06%	78.3%	15.4%	6,559

Panel A.

	Property Transactions					
	10th P.	Median	90th P.	Mean	Std.	N
Sales Price	$43,500	$165,000	$516,000	$276,083	$498,998	119,425,837
Transaction Year	1998	2008	2018	2008	7.5	119,425,837
Sellers Per Transaction	1	1	2	1.54	0.90	119,005,541
Buyer Per Transaction	1	1	2	1.47	0.68	118,975,012

Panel B.

	Property Characteristics					
	10th P.	Median	90th P.	Mean	Std.	N
Assessment Value (Contemporary)	$136,980	$282,635	$676,000	$369,146	$360,153	16,895,963
Assessment Year	2018	2019	2020	2019	0.62	16,895,963
YoY % Change in Assessed Value	0%	2.00%	13.49%	5.43%	24.25%	16,895,963
Tax Amount	$2,059	$4,655	$10,852	$6,140	$8,321	16,895,963
YoY % Change in Tax Amount	-1.74 %	2.31 %	12.91%	7.24%	54.28%	16,895,963
Year Built	1940	1978	2006	1975	25	16,440,858
Square Footage	1,004	1,681	3,080	2,047	3,189	15,729,806

Panel C.

	Referenda					
	10th P.	Median	90th P.	Mean	Std.	N
Passed Indicator	0	1	1	0.57	0.50	497
Referendum Year	2006	2008	2014	2009	3	497
Dollar Amount	$400,000	$8,000,000	$54,900,000	$22,500,000	$39,200,000	497

Panel D.

This table summarizes the main variables used in the study. Panel A contains county-year characteristics. *% Diff Between Sales and Assessed Value* is the average deviation between sales and assessed values at the county-year level for the transacted properties. *% Sold 10% Below the Assessed Value* is the percent of transacted properties that are sold at least 10% below their assessed values in the county-year. *Non-Property Tax Decline* is an indicator for a nominal decline in the aggregate non-property tax revenues collected by all local governments within a county. *Log Population* is the natural log of the last available census population survey. *Number of Tax Authorities* is the number of different independent local governments operating in a county. *Assessment Capped* is whether there is a limit to assessment prices increases in the state of a county. The data on property transactions and assessment values are provided using Zillow ZTRAX. The sample period is from 2000 to 2020. Panel B contains the summary statistics on the transaction characteristics in the historic transaction roll. Panel C contains characteristics of individual properties as derived from the contemporaneous assessment data. *Sales Prices* are the transaction prices of an individual sale. *Assessment Prices* are the observed residential property assessment values per year. *Over Assessed* is an indicator for whether a property is sold at a 10% discount to the previous year's *Assessment Price*. Panel D summarizes bond referenda in Illinois between 2006 and 2015. *Passed Indicator* represents whether the referendum was passed. Referendum Year is the year of the referendum. *Dollar Amount* is the total value of the bond construction.

Table 2. Average Changes in Assessment Value Against Property Market Returns

	(1)	(2)	(3)	(4)	(5)	(6)
	Value Weighted Average Growth in Assessment Value$_t$					
Market Return$_t$	0.0483***			0.0321***	0.0329***	0.0378***
	(6.341)			(4.036)	(4.042)	(4.482)
Market Return$_{t-1}$		0.121***		0.122***	0.0737***	0.0718***
		(12.69)		(14.09)	(8.117)	(7.471)
Market Return$_{t-2}$			0.142***	0.139***	0.0600***	0.0530***
			(14.77)	(16.60)	(7.565)	(6.416)
Year FE	No	No	No	No	Yes	Yes
County FE	No	No	No	No	No	Yes
Observations	8,221	7,528	6,819	6,813	6,813	6,679
Adj. R^2	0.005	0.033	0.045	0.080	0.175	0.243

This table regresses changes in property assessment values against property market returns for all counties within the ZTrax database. The Value Weighted Average Growth in Assessment Value is aggregated at the county level. *Market Return* is measured using the Zillow US Home Value Index at the county level. This index uses Zillow's proprietary Zestimates, which capture individual home values within 10% of their transaction values 95% of the time at any moment in time. The t-statistics reported in parentheses are clustered by county. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 3. Changes in Total Property Tax, Property Tax Rate, and Total Assessment Values for Illinois

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	% Change in Total Property Tax			% Change in Tax Rate			% Change in Assessed Assets		
% Market Return	-0.001	-0.009	-0.010	-0.107***	-0.068***	-0.084***	0.104***	0.058***	0.072*
(3 Year)	(-0.065)	(-0.373)	(-0.373)	(-4.657)	(-3.246)	(-2.991)	(3.000)	(1.730)	(1.675)
Year FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
County FE	No	No	Yes	No	No	Yes	No	No	Yes
Observations	837	837	837	837	837	837	837	837	837
Adj. R^2	-0.001	0.195	0.116	0.190	0.306	0.327	0.012	0.202	0.131

This table regresses changes in total property tax revenue at the county level and its components against property market returns within the state of Illinois between 2005 and 2020. *% Change in Total Property Tax* is the percentage change in annual property tax collected at the county level. *% Change in Tax Rate* is the percentage change in county level property tax rate as reported by the state of Illinois. *% Change in Assessed Assets* is the percentage change in the dollar value of the total levy base as implied by the county level property tax and the respective property tax rate. *Market Return* over the past 3 years are measured using the Zillow US Home Value Index at the county level. The t-statistics reported in parentheses are clustered by county. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 4. Income Growth vs Market Returns as Determinant of Property Tax Revenue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	% Change in Total Property Tax Revenue						
% Market Return (3 Yr)	0.0782***			0.0363***	0.0568***	0.0428***	0.0515***
	(12.57)			(5.600)	(8.618)	(4.770)	(5.753)
% Income Growth (3 Yr)		0.261***		0.234***		0.104***	
		(19.10)		(16.21)		(4.936)	
% Income Growth Per Cap (3 Yr)			0.209***		0.163***		0.0680***
			(12.47)		(9.209)		(3.081)
Year FE	No	No	No	No	No	Yes	Yes
County FE	No	No	No	No	No	Yes	Yes
Difference in Beta				0.198***	0.106***	0.061**	0.017
F-Statistic				124.90	25.76	6.18	0.43
P-Value				0.000	0.000	0.013	0.510
Observations	21,215	21,215	21,215	21,215	21,215	21,143	21,143
Adjusted R-squared	0.008	0.022	0.009	0.023	0.013	0.141	0.140

This table regresses changes in total property tax revenue at the county level between 2005 and 2020. *% Change in Total Property Tax* is the percentage change in annual property tax collected at the county level. *Market Return* 3 years is measured using the Zillow US Home Value Index at the county level. *Income Growth* is the 3-year change in the county level total personal income from the Bureau of Economic Analysis (series CAINC1). *Income Growth Per Cap* is the 3-year change in the per capita personal income. The *Difference in Beta* calculates the difference in the values of the regression coefficients of *Income Growth*/*Income Growth Per Cap* against that of *Market Returns*. The t-statistics reported in parentheses are clustered by county. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 5. Public Finance and Deviation from Market Values

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	% Diff Between Sale and Assessed Value				*% Sold 10% Below the Assessed Value*			
% Local Government Deficit	-0.996***	-0.953***	-0.418***	-0.311***	0.680***	0.689***	0.101**	0.103***
	(-10.04)	(-9.464)	(-3.564)	(-3.699)	(11.48)	(10.86)	(2.256)	(2.639)
Log Population		0.152*	0.115***	0.197*		0.0828*	-0.0130**	-0.00810
		(1.963)	(3.929)	(1.828)		(1.827)	(-2.283)	(-0.154)
Property Tax as % of Tax Revenue		-1.057***	0.0866	-0.590***		0.645***	0.0160	0.214***
		(-5.340)	(1.126)	(-3.847)		(5.461)	(0.524)	(3.448)
County Fixed Effect	No	Yes	No	Yes	No	Yes	No	Yes
Year Fixed Effect	No	No	Yes	Yes	No	No	Yes	Yes
Observations	5,582	4,973	5,017	4,973	5,582	4,973	5,017	4,973
Adjusted R-squared	0.418	0.427	0.215	0.573	0.213	0.216	0.551	0.706

This table regresses the average percentage difference between the sale price of properties and their prior public assessment value against local characteristics. The panel consists of county-year observations between 2005 and 2020 with at least one thousand properties transactions in the *ZTrax* database. *% Diff Between Sale and Assessed Value* is the average percentage difference between the sale price of homes and their prior assessed value within a county. *% Sold 10% Below the Assessed Value* is the percentage of homes sold for 10% less than their assessed market values. The sample of homes sold consists of those with between $100,000 and $2,000,000 in assessed market value, and are aggregated at the county level. *Local Government Deficit* is the percentage difference between the total expense and total revenue expressed as a percentage of the total revenue over the county. The local governments used for the county level aggregation consist of County, Municipal, Townships, and School Districts. *Log Population* is the natural log of a county's population. *Property Tax as % of Tax Revenue* is total property tax divided by the total observed tax. The t-statistics reported in parentheses are clustered by county. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 6. Reassessment Tendency

	(1)	(2)	(3)	(4)	(5)
	% of Observed Properties Reassessed$_t$				
	All States			Capped States	Non-Capped
% Market Return$_t$	0.184***	0.215***	0.0719**	0.289***	0.124**
	(6.021)	(5.859)	(2.128)	(5.678)	(2.392)
% Market Return$_{t-1}$	0.209***	0.237***	0.0794**	0.262***	0.172***
	(6.509)	(6.139)	(2.412)	(4.804)	(3.170)
% Market Return$_{t-2}$	0.0142	0.0344	-0.0333	0.0512	-0.0104
	(0.444)	(0.935)	(-1.070)	(1.054)	(-0.196)
Time FE	No	Yes	Yes	Yes	Yes
County FE	No	No	Yes	No	No
Observations	6,813	6,679	6,679	3,445	3,368
Adjusted R-squared	0.008	0.473	0.485	0.027	0.014

This table regresses the year-county panel of % of observed non-transacted properties that were reassessed against current and lagged market returns between 2006 and 2015. *% of Observed Properties Reassessed* is the percentage of residential properties valued between $100,000 and $2,000,000 whose assessment value changed in each county. *Market Returns* is the yearly percentage change in the average transaction price of properties within the county last year. Columns (1), (2), and (3) conducts the regression across all states. Column (4) conducts the regression on states that explicitly limit changes in a property's assessment value. Column (5) conducts the regression on states with no explicit limits. The t-statistics reported in parentheses are clustered by county. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 7. School Referenda: Assessment Value vs. Market Value Response

Panel A: Response of Assessment Values to the Close Passing of Local Referenda

	(1)	(2)	(3)	(4)
	% Growth		% Reassessed Upward	
Passed Referendum	1.24**		5.77**	
	(2.510)		(2.312)	
# of Passed Referenda		0.913**		4.46**
		(2.366)		(2.282)
Year FE	Yes	Yes	Yes	Yes
Observations	5,522,044	5,522,044	5,522,044	5,522,044
Adjusted R-squared	0.177	0.177	0.328	0.327

This Panel regresses the assessed property value growth (*% Growth*) and the indicator of upward reassessment (*Reassessed Upward*) on a panel of single-family homes in Illinois between 2006 and 2014. The panel of properties consists of homes located in zip codes of school districts that had initiated but not necessarily passed a referendum ballot measure. *Passed Referendum* indicates that at least one referendum was passed in the past 3 years including the contemporaneous one. # *of Passed Referenda* are the number of years with referenda passing in the same period. The t-statistics reported in parentheses are clustered at the zip code level. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Panel B: Response of Market Values and Market Transactions to the Close Passing of Local Referenda

	(1)	(2)	(3)	(4)
	% Price Return		% Change in Transactions	
Passed Referendum	-0.604		-4.79*	
	(-0.431)		(-1.879)	
# of Passed Referenda		-0.511		-4.38**
		(-0.434)		(-2.188)
Year FE	Yes	Yes	Yes	Yes
Observations	578	578	578	578
Adjusted R-squared	0.042	0.042	0.333	0.333

This panel regresses the market conditions in the panel of zip codes from Illinois between 2006 and 2014. The panel of properties consists of the zip code characteristics of school districts that had initiated but not necessarily passed a referendum ballot measure. Only zip codes with more than 100 transactions are included in the sample. *Passed Referendum* indicates that at least one referendum was passed over the past 3 year including the contemporaneous one. # of *Passed Referenda* is the number of years with passed referenda in the same period. The first two columns regress the percentage change in the median transaction price (*% Price Return*). Columns 3 and 4 regress the percentage growth in the number of property transactions (*% Transaction Growth*). The t-statistics reported in parentheses are clustered at the zip code level. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 8. School Referenda and the Growth in Gap between Assessment and Market Prices

	(1)	(2)	(4)	(5)
	% Diff Between Sale and Assessed Value		% Sold 10% Below the Assessed Value	
Passed Referendum	-16.7***		3.68**	
	(-3.940)		(2.290)	
# of Passed Referenda		-14.0***		3.59**
		(-4.223)		(2.637)
Year FE	Yes	Yes	Yes	Yes
Observations	343,703	343,703	343,703	343,703
Adjusted R-squared	0.064	0.064	0.061	0.061

This panel regresses the difference between sales and assessment values for all residential property transactions from Illinois between 2006 and 2014. *Passed Referendum* indicates that at least one referendum was passed over the past 3 year including the contemporaneous one. # *of Passed Referenda* is the number of years with passed referenda in the same period. The first two columns regress the % deviation between the sales transaction price and the last assessment value (*% Diff Between Sale and Assessed Value*). Columns 3 and 4 regress the indicator of whether the house was sold 10% below the last assessment value (*% Sold 10% Below the Assessed Value*). The t-statistics reported in parentheses are clustered at the zip code level. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 9. Assessment Official Properties (Sample Averages)

Panel A. Assessor Primary Address Comparison with Lexis Nexis Neighbors

	% Change in Assessed Value	% Change in Tax Amount	Total Assessed Value
Assessor Properties	2.762%	2.642%	$391,251
Neighbor Properties	3.475%	3.138%	$400,121
Difference	-0.712%	-0.496%	-$8,870.01
T-Stat	(-3.063)	(-2.187)	(-1.071)
N	422	397	422

This panel compares the yearly assessment characteristics of an assessor's primary legal address with that of his Lexis-Nexis defined neighbors. The sample is between 2018 and 2020 using the ZTrax Contemporaneous dataset.

Panel B. Assessor Primary Address Comparison with Residential Properties Within a County

	% Change in Assessed Value	% Change in Tax Amount	Total Assessed Value
Assessor Properties	2.995%	2.926%	$400,726
Neighbor Properties	3.951%	3.465%	$381,245
Difference	-0.955%	-0.539%	$19,481
T-Stat	(-5.769)	(-3.062)	(2.306)
N	603	567	603

This panel compares the yearly assessment characteristics of an assessor's primary legal address with that of all single-family homes within the same county. The sample is between 2018 and 2020 using the ZTrax Contemporaneous dataset.

Table 10. Assessment Officials (Hedonic Regressions)

	(1)	(2)	(3)	(4)	(5)	(6)
	% Change in Assessed Value		% Change in Tax Amount		Total Assessed Value	
Assessor	-1.21***	-1.19***	-1.69***	-1.46***	-3,348	-4,270***
	(-5.257)	(-4.546)	(-4.770)	(-4.430)	(-0.415)	(-3.750)
Prior Assessed Value		-6.70e-06***		-3.53e-06**		1.012***
		(-7.740)		(-2.511)		(128.1)
Square Footage		8.71e-03		1.39e-04		-30.64
		(0.939)		(0.00916)		(-1.221)
Other Hedonic Controls	No	Yes	No	Yes	No	Yes
County X Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,895,963	15,573,810	16,895,963	15,573,810	16,895,963	15,573,810
Adjusted R-squared	0.183	0.209	0.080	0.093	0.320	0.939

This table regresses indicators of a property owned (including non-primary homes) by local assessment official on growth in assessed property value (*% Change in Assessed Value*), yearly changes in tax value (*% Change in Tax Value*), and dollar levels of total assessed property value (*Total Assessed Value*). Other hedonic controls are property level characteristics- the number of rooms, bathrooms, and effective year built. The t-statistics reported in parentheses are clustered by county x year. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 11. Assessor Administration

	(1)	(2)	(3)	(4)	(5)	(6)
	% Change in Assessed Value		% Change in Tax Amount		Total Assessed Value	
Within County	-1.28***	-1.23***	-1.72***	-1.47***	-2,565	-4,353***
	(-5.596)	(-4.676)	(-4.877)	(-4.481)	(-0.316)	(-3.829)
Outside County	0.244	0.653	-3.89*	-3.42*	82,726**	3,248
	(0.133)	(0.353)	(-1.857)	(-1.776)	(2.511)	(0.568)
Prior Assessed Value		-6.70e-06***		-3.53e-06**		1.012***
		(-7.740)		(-2.511)		(128.1)
Square Footage		8.71e-03		1.39e-04		-30.64
		(0.939)		(0.00918)		(-1.221)
Other Hedonic Controls	No	Yes	No	Yes	No	Yes
County X Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,895,963	15,573,810	16,895,963	15,573,810	16,895,963	15,573,810
Adjusted R-squared	0.183	0.209	0.080	0.093	0.320	0.939

This table regresses indicators of a property owned (including non-primary homes) by local assessment official on growth in assessed property value (% Change in Assessed Value), yearly changes in tax value (% Change in Tax Value), and dollar levels of total assessed property value (Total Assessed Value). The table splits the indicator of property owned by an assessor into *Within County* and *Outside County* variables. *Within County* indicates that the property is located in the same county as the assessor's jurisdiction. *Outside County* indicates all other assessor properties. Other hedonic controls are property level characteristics- the number of rooms, bathrooms, and effective year built. The t-statistics reported in parentheses are clustered by county x year. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Table 12. Assessor Undervaluation and the Assessment Gap.

	(1)	(2)	(3)
	% Diff Between Sale and Assessed Value		
Assessor Property Undervaluation	-2.239**	-9.238***	-8.298***
	(2.095)	(3.159)	(2.978)
County FE	No	Yes	Yes
Year FE	No	No	Yes
Observations	135	102	102
Adjusted R-squared	0.010	0.875	0.881

This table correlates the degree to which assessor properties under appreciate their peers with county level overassessment measure. *Assessor Property Undervaluation* is the growth difference between an assessor's own home and his neighboring properties (Higher means lower growth). *% Diff Between Sale and Assessed Value* is the average percentage difference between the sale price of homes and their prior assessed value within a county (Lower means homes are sold for lower than assessed values). The t-statistics reported in parentheses are clustered by county. *, **, *** indicates statistical significance at the 90%, 95%, and 99% level respectively.

Appendix A.

Example of referenda in Illinois.

State	County	Area	Year	Month	Passed	Dollar Amount	Zip Code
Illinois	DeKalb, Kane	Central CUSD 301	2006	3	1	34,000,000	62054
Illinois	St. Clair	Central School District 104	2006	3	1	4,500,000	62269
Illinois	Multiple	Centralia City Schools District 135	2006	3	0	3,400,000	62872
Illinois	Champaign	Champaign CUSD 4	2006	3	0	65,940,000	61821
Illinois	Lake	Fox Lake Grade School District 114	2006	3	1	3,750,000	60020
Illinois	Lake	Fremont School District 79	2006	3	1	22,000,000	60060
Illinois	Tazewell	Tremont CUSD 702	2006	3	1	9,500,000	61568
Illinois	Madison	Triad CUSD 2	2006	3	1	44,136,283	62294
Illinois	Multiple	Barrington CUSD 220	2006	3	0	107,100,000	62054
Illinois	Madison	Edwardsville CUSD 7	2006	3	0	45,800,000	62025
Illinois	Cook, DuPage	Elmhurst CUSD 205	2006	3	1	41,000,000	60189
Illinois	Will	Fairmont School District	2006	3	0	1,650,000	60441

This appendix table contains a sample of 12 referenda that were voted on in Illinois in 2006.