Real Estate Investors and Property Taxation

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September 2023

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Abstract

This paper studies the inequality in property taxation in the U.S. single-family home market based on a property's assessed value. Comparing the assessment ratio of properties owned by investors with those of owner-occupiers, we find a 3.0%–4.7% assessment discount nationwide for properties owned by large investors (i.e., those owning more than 100 properties) relative to owner-occupied homes in the same areas. This difference translates into an estimated total annual property tax savings of $66–$104 million for large investors across the country. Further evidence based on micro-level appeals data in Cook County, Illinois, and Florida suggests that the institutional assessment discount results from a higher likelihood of appeal and more favorable outcomes upon a successful appeal for large investors. States with a fairer property taxation administration, a higher market share by large investors, and a higher property tax burden show a greater assessment discount for large investors.

Keywords: Real Estate Investors, Property Taxation, Single-Family Rentals, Inequality

JEL Codes: H20, R50

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1 Introduction

Real estate investors have become more influential in shaping the U.S. residential housing market in recent years, with increasing activity in the sector. According to a report by Stateline, investor purchases made up 24% of the total single-family home sales across the country in 2021.[1] This marks an annual growth of around 15%-16% since 2012. The percentage of purchases by investors was particularly high in certain sun-belt states such as Georgia, Arizona, California, Nevada and Texas, where approximately one third of all properties sold in 2021 were bought by investors. These investors tend to hold on to the properties for a longer period of time to generate a steady stream of rental income, rather than reselling them quickly to capture short-term capital gains. The rise in single-family rental (SFR) investment can be attributed to various factors, such as the rising prices of new construction homes, shortage of housing inventory, and the pandemic-fueled suburban growth, among others.

Institutional investment in SFR markets has also grown exponentially since the Great Recession, transforming it from a traditional mom-and-pop business into an investment asset class that offers attractive stable returns for institutional investors. The foreclosure crisis in 2008 resulted in a large number of foreclosed and bank-owned properties that were available for purchase at deep discounts. Institutional investors saw an opportunity to buy these properties at a low price, renovate them, and then rent them out for a steady stream of income. Institutional investment in SFR market has continued to grow in the recent years. A research report by MetLife Investment Management estimates that institutions own about 700,000 SFRs in 2022, or close to 5% of the nationwide market. [2] Institutional holdings have been forecasted to reach 7.6 million homes by 2030, accounting for more than 40% of all SFRs in the United States. [3]

In this paper, we examine the implications of investment in the SFR space on local municipal finance in terms of property taxation. Property taxes are one of the most important sources of revenue for local governments. Counties, school districts, municipalities, and townships are typical

[1] Source:https://www.kunc.org/news/2022-09-14/investors-not-homeowners-are-buying-more-and-more-colorado-homes-and-rents-are-going-up/

[2] Source:https://investments.metlife.com/insights/real-estate/the-future-of-housing-our-outlook-for-single-and-multi-family-investments/

[3] Source:https://www.prnewswire.com/news-releases/institutional-investment-in-single-family-rentals-is-on-the-rise-reports-yardi-matrix-301596511.html

jurisdictions that collect and rely on property taxes. In 2019, local governments in the U.S. collected $559 billion in property taxes, accounting for about 30% of local general revenue and nearly half of local own-source revenue, excluding transfers from federal and state government. [4] Property tax bills are calculated based on assessed value, local property tax rates, and other exemptions and credits when applicable. In principle, the assessed value, which local governments determine for taxation purposes, should reflect the fair market value of a property. Given an equitable property tax administration, the assessment-to-market value ratio (the assessment ratio hereafter) should be the same for all properties within a tax jurisdiction. However, recent studies have shown evidence of assessment gap from various perspectives, such as across race and between high- and low-priced homes (Avenancio-León and Howard, 2022, Berry, 2021). These papers argue that a key driver of property tax inequality is the appeals process, which allows owners to protest the government's assessed value and achieve a tax reduction if successful. [5]

We postulate that property tax inequality also exists between real estate investors and owner-occupiers. The property tax appeals process is complex and time consuming. Owner-occupiers often lack the capacity and time to understand the filing procedures of property tax appeals, and, as a result, the appeal rate is generally low for homeowners. For instance, according to the Florida Department of Revenue, the property tax appeal rate in 2021 is about 1%. Ex ante, it is unclear whether all real estate investors have an advantage or disadvantage relative to owner-occupiers in the properties' tax assessment. For instance, mom-and-pop and micro-sized investors with a small portfolio might have limited attention and resources available to effectively monitor the tax assessment of each individual property, leading to a higher assessment ratio for their properties than for owner-occupied homes on average. However, once the scale of the portfolio exceeds a certain threshold, large investors could gain an advantage over individual and micro-sized investors because of economies of scale (Ambrose et al., 2000, Bers and Springer, 1997, Gurun et al., 2022, Yang, 2001). For example, large investors can institutionalize property tax management by developing specialized in-house personnel or hiring outside management teams, practices not feasible for individual and micro-sized investors because of high fixed costs associated with such an endeavor. Lower marginal

[4] Source:https://www.urban.org/policy-centers/cross-center-initiatives/state-and-local-finance-initiative/projects/state-and-local-backgrounders/property-taxes

[5] For instance, Avenancio-León and Howard (2022) show that the tendency to appeal an assessment and the outcome of appeal are different across homeowners of different races residing within the same neighborhood, leading to racial minorities taking up a disproportionate share of the property tax burden.

cost of filing would allow large-scale investors to file tax appeal more aggressively. [6] Furthermore, large investors possess a large amount of assessment data from their own properties, many of which are located in the same area with similar property characteristics. This information allows large investors to identify overvaluation and appeal more effectively. Thus, we hypothesize that large real estate investors can achieve more favorable tax assessments on their properties than owner-occupiers, as a result of more efficient and effective property tax appealing.

To test our hypothesis, we collect property-level transaction and assessment data from 31 states in the United States between 2005 and 2016, and count the number of properties held by each owner based on the recorded owner mailing address. We classify property owners into five groups based on scale: *owner-occupiers* (with only one primary residence), *micro investors* (2–20 properties), *small investors* (21–50 properties), *medium investors* (51–100 properties), and *large investors* (more than 100 properties). For each transaction, we use the assessed value in the year after the transaction and use the sales price as the market value to calculate the assessment ratio. We then examine the relationship between a property's assessment ratio and the size category that its owner belongs to. We include county×year fixed effects to account for heterogeneity due to differences in assessment procedure and property tax policies, such as assessment scaling factor and frequency. [7]

The empirical results support our hypothesis: large investors that own more than 100 properties enjoy a significant 3.0%–3.7% discount in the assessment ratio relative to owner-occupiers in the same county. Our analysis of properties with repeated sales shows an even greater magnitude of the institutional assessment discount: large investors have a significant 4.7% assessment discount on their properties relative to the owner-occupiers who own the same properties at a different point of time. This difference translates into an estimated total annual property tax savings of $104 million for large investors across the country.[8] Another interesting finding from the empirical analysis is that not all investors have property tax advantage on their properties relative to owner-occupied

[6] Often times, property owners need to pay an appeal filing fee to the county or out-of-pocket fees to hire a specialist to file the appeal, regardless of the outcome.

[7] Each state applies a scaling factor, which ranges from 10% to 100%, to determine the assessed value based on the home's fair market value. For example, in Georgia, the scaling factor is 40%. If a county assessor in Georgia determines the fair market value for a property to be $100,000, then the assessed value is $40,000. Property assessments are most commonly conducted at the county level. See "State-by-State Property Tax at a Glance" by Lincoln Institute of Land Policy 2021.

[8] This estimation is based on a back-of-the-envelope calculation using the national median effective property tax rate of 1.4% (Avenancio-León and Howard, 2022) and 700,000 SFRs with an average home price of $225,000 owned by institutions in 2022, according to research reports by MetLife Investment Management.

homes. Specifically, the average assessment ratio for micro investors that own 2–20 properties is 0.8%–2.3% higher than that for owner-occupiers. This finding suggests that small-scale investors have property tax disadvantage relative to owner-occupiers and this is likely due to limited attention or constrained resources for property tax appeals.

Next, we examine the property tax appeals process as a potential channel through which large investors achieve favorable assessment ratios. In every state, property owners have the right to undergo some type of appeals procedure if they disagree with the property tax assessments. While nationwide data on property tax appeals are not available, we use micro-level data from Cook County, Illinois, the second-largest county in United States, to examine the differences in appealing decisions and outcomes across property-owner groups. Our analysis reveals that large investors are 77.0% more likely to appeal and 15.1% less likely to win an appeal upon filing than are owner-occupiers. Large investors can also achieve a 41.0% higher value reduction than owner-occupiers conditional on a successful appeal. We also show that the final assessment ratios are indeed lower for large investors post-appeal. Taken together, the evidence suggests that the overall effect of property tax appeals is more favorable to large investors compared to owner-occupiers. To substantiate our findings in Cook County, we also use property tax data from Florida to show that the reductions in final assessed values through tax appeals are twice as much for large investors' properties than those for owner-occupied homes.

We also consider two alternative explanations for the assessment discount enjoyed by large investors. First, local assessors' practices could systematically bias towards or against large investors relative to owner-occupiers, resulting in a lower or higher assessment ratio for their properties. Although we could not completely rule out this possibility, we find this unlikely to explain our findings for several reasons. State and local governments usually apply standardized procedures in assessing property values, mostly by using automated valuation models or computer-assisted mass appraisals. In addition, to the best of our knowledge, no open-source information is available on the size of the portfolios held by each rental home investor. Therefore, there is no evidence that the assessors would know if an owner is a professional large investor and then systematically create more favorable assessed values for their properties.

Second, the institutional discount in the assessment ratio (i.e., assessed value divided by the

most recent sales price) could be driven by the relatively higher market value (i.e., sales price) for large investors in the denominator if these investors systematically overpay for their properties. This explanation contradicts existing findings using regional samples that large investors tend to purchase properties at a discount (Mills et al., 2019, Smith and Liu, 2020). We confirm these findings by previous studies using nationwide data and show that on average large investors acquire properties at a 13.6% discount compared to owner-occupiers. Such a transaction price discount should bias the assessment ratio upward for large investors. As such, our estimate of assessment discount for large investors is likely understated.

Lastly, we explore factors that potentially contribute to the cross-state variations in the assessment discount for large investors. The Council on State Taxation (COST) publishes a scorecard on property tax administrative practices for each state. The COST scorecard evaluates the fairness of the property tax administration of each state. Our empirical evidence shows that on average large investors receive a higher assessment discount in states with a fairer property tax administration. We also find that the magnitude of the assessment discount for large investors in a state is positively correlated with their local market share, the level of local property tax burden, and the average share of votes for the Democratic candidate in presidential elections. Therefore, based on our cross-state analysis, the property taxation procedures that are deemed "fair" may not always result in fair outcomes, if not all property owners take advantage of these procedures.

The paper proceeds as follows. Section 2 discusses our contribution to the literature. Section 3 introduces the institutional background behind property taxation. Section 4 describes the data used in the empirical analysis and discusses the summary statistics. Section 5 discusses our hypotheses. Section 6 discusses the design and results of our empirical analysis. Section 7 provides the concluding remarks.

2 Contribution to the literature

Our findings contribute to two strands of literature. First, our findings add to the emerging literature on institutional SFR investors. Recent studies examine the changing landscape of the U.S. SFR markets and the social and economic impacts of institutional investors, such as on housing

prices, renters' welfare, and neighborhood stability (Allen et al., 2018, D'Lima and Schultz, 2019, Ganduri et al., 2022, Gurun et al., 2022, Lambie-Hanson et al., 2019, Mills et al., 2019, Smith and Liu, 2020). For example, activist groups, such as the ACCE Institute, Americans for Financial Reform, and the Public Advocate, have criticized "Wall Street landlords" for charging high rent and fees, poorly maintaining rentals, and ruthlessly evicting tenants, all activities that undermine renters' welfare. On the flip side, recent studies suggest that large institutional investors can play a beneficial role in improving neighborhood safety, while internalizing the cost of neighborhood amenities (Gurun et al., 2022).

Our study is the first to examine the effect of institutional SFR investment on municipal finance through property taxation. Property taxes are an important source of revenue for local governments. Additionally, property taxes, which are the single largest item of operating expenses for real estate investors, have been increasing in recent years with the booming real estate market. Gurun et al. (2022) show that institutional SFR investors achieve economies of scale by building geographically concentrated portfolios and merging with rival investors. Our study finds that the economies of scale also allow large investors to manage their property taxes more efficiently and effectively.

Second, our paper contributes to the literature on inequality in property taxation. Previous studies have examined property tax inequality from various perspectives. For example, Avenancio-León and Howard (2022) and Kahrl (2016) examine the racial gap in property taxation. Another line of research focuses on assessment regressivity, a term that refers to situations in which low-priced (high-priced) properties have higher (lower) assessment ratios (Amornsiripanitch, 2020, Atuahene and Berry, 2018, Berry, 2021, Hodge et al., 2017, McMillen and Singh, 2020). Interestingly, the institutional assessment discount documented in our study is distinct from assessment regressivity because institutional investors typically purchase properties with a deep discount relative to local market values. Hence, any assessment regressivity would bias us against finding an assessment discount for institutional investors. Issues related to property tax assessment have received relatively little attention in municipal finance research. Our findings inform policy makers about the inequality of property taxation between owner-occupiers and investors and point out the drawbacks of the current property tax appeals system that have potentially disadvantaged owner-occupiers.

3 Institutional background of property taxation

In the U.S., taxpayers from all 50 states and the District of Columbia pay taxes on real properties. For the most part, local governments (e.g., municipalities, counties, and school districts) instead of state governments levy annual property taxes on residential properties. The determination of the property tax amount for a property usually involves three steps: (1) assessing the market value of the property; (2) determining the taxable value of the property; and (3) applying the tax rate from the corresponding tax jurisdiction to the taxable value of the property. In most states, Counties take the responsibility of determining the assessment value. Each state applies a scaling factor to determine the assessed value relative to the fair market value, and this scaling factor ranges from 10% to 100%. For example, in Georgia, the scaling factor is 40%. If a county assessor determines the fair market value for a property to be $100,000, then the assessed value is $40,000.

The frequency of assessments also varies across jurisdictions. Most jurisdictions conduct assessments annually, and some do so less frequently. To determine the taxable value of a property, state and local governments apply other limits, exemptions, deductions, and credits to the assessment value when applicable.[9] Local governments, such as municipalities and school districts, calculate the annual property tax amount by multiplying the imposed tax rate by the taxable value of the property. Since the property tax system varies along many dimensions across the country, it is crucial to focus on the comparison of assessment ratios within small geographic areas that share the same property tax system. We carefully design our empirical tests to address this issue.

We focus our analysis on assessment ratios within counties for several reasons. First, variations in the fair market value due to property-level characteristics can be accounted for by the most recent transaction price in the denominator, making the comparison between houses meaningful even without explicitly controlling for home characteristics, such as size and age. Second, most local property assessments are done at the county level. The scaling factor, which is used to determine the assessed value based on appraisal value, is also the same within counties. Third, the actual tax amount is a much more complex measure because of exemptions. The reported tax bill from the county reflects the assessed values, exemptions, and tax rates. Exemptions reflect the "legislative

[9] Source:https://www.urban.org/policy-centers/cross-center-initiatives/state-and-local-finance-initiative/projects/state-and-local-backgrounders/property-taxes

intent and public administration of the tax system," and thus they have been excluded for the purpose of our study (Avenancio-León and Howard, 2022). Among the most common types of exemptions are the homestead exemption for owner-occupied residences and exemptions for senior-citizen-occupied homes. For instance, Colorado exempts seniors and qualifying veterans from paying taxes on the first 50% of the property market value up to $200,000. Florida exempts property tax up to $50,000 of the assessed value for owner-occupied properties[10] (Lincoln Institute of Land Policy, 2021). Counties also have discretion on the exemption level. It is difficult to identify the dollar amount of and the number of exemptions applied to each property to back out the preexemption tax burden. Fourth, in principle, a fair tax administration system should result in the same assessment ratio for all property owners given the same scaling factor, regardless of variations in exemptions and effective tax rates. The effective property tax rate could be different within a county because of variations in the tax rate levied at the township or school district level, and these variations largely reflect local government's financial health, budget, and the quality of local public services. These variations should not constitute a source of inequality in the assessment ratio within a county. Therefore, we consider the assessment ratio to be the most simple and transparent measure for studying the inequality of property taxation. This measure can be easily computed with little ambiguity, while controlling for potential confounding factors to a large extent.

4 Data

4.1 Data source

Our empirical analysis relies on six data sources: (1) detailed property-level transaction and assessment data from Zillow; (2) micro-level data on property tax appeals from Cook County, Illinois; (3) preliminary and final property tax assessment data from Florida; (4) state-level census data and government finance data from the U.S. Census Bureau; (5) state-level data on share of votes for the Democratic candidate at presidential elections from MIT Election Data and Science Lab; and (6) scores for state property tax administrative practices from the Council on State Taxation. We will explain each of the data sources in detail below.

[10]The first $25,000 of value is entirely exempt. The second $25,000 exemption applies to the value between $50,000 and $75,000 and does not include a benefit on school tax.

We get data on real estate transactions from Zillow's Assessor and Real Estate Database (ZTRAX). Our sample period is from 2005 to 2016. This database contains two types of data: transaction data and assessment data provided by local property tax assessors. The transaction database provides detailed transaction-level information, such as transaction date, deed type, sales price, identities, and mailing addresses of transaction parties, among others. We merge this data set with data on property characteristics as of 2016 and the historical assessment values post-transaction date from the assessment database based on a unique parcel ID. Detailed property characteristics include property type, property location, year built, building area square footage, and the number of bedrooms and bathrooms. In summary, our transaction-level data set includes three components: transaction details, property characteristics, and yearly assessment value during the owner's holding period of the property.

Our sample contains data from 31 states. There are 12 nondisclosure states in the U.S. where the sales price of the property is neither recorded nor publicly available.[11] The sales price data for these states are either missing or sparsely populated in ZTRAX. Therefore, we exclude these nondisclosure states from our sample, except for Missouri, since the nondisclosure policy only applies to certain counties in Missouri. Because of data limitations with ZTRAX, we also have to exclude the District of Columbia and the following seven states from our analysis: South Dakota, Rhode Island, South Carolina, Tennessee, Maine, Vermont, and Wisconsin. Some important data fields or files are either completely missing or sparsely populated for these states in the Zillow database. Lastly, we choose to exclude California from our analysis. California passed Proposition 13 in 1978. This amendment puts limits of any ad valorem tax on properties at 1% of their assessment value, caps the annual increase of the assessment value at 2%, and establishes a new concept of the base year value for property tax assessment. Even though base year values are supposed to be reassessed upon the sales of property, there exists different mechanisms and exceptions that owners are able to transfer the low base year assessment value to a replacement property. [12] As a result, the gap between market values and assessment values has widened since the passage of Proposition 13 in California. Therefore, the interpretation of property tax assessment values in California is significantly different from that in the other states.

[11]The current list of nondisclosure states includes Alaska, Idaho, Kansas, Louisiana, Mississippi, Missouri (some counties), Montana, New Mexico, North Dakota, Texas, Utah, and Wyoming.

[12]Source:https://assessor.saccounty.net/LowerMyTaxes/BaseYearValueTransfers/Pages/default.aspx

To count the number of property holdings of the buyer at the time of purchase, we identify each property owner by the recorded mailing address as of 2016 assessment data. We aggregate the number of properties across country held by each owner as of 2016. Since the buyer's mailing address is available for each transaction, this allows us to work backward to add or deduct the number of property holdings for each owner prior to 2016. As a result, we are able to create an annual property count for each property owner during our sample period. Then we append the property count to the transaction-level data based on buyer's mailing address and transaction date. We use the property count one year prior to the transaction year to determine the property owner size group. In our empirical analysis, we set owner-occupiers as the base group and divide investors into four groups based on the number of properties they own (Table 2): *micro investor* (with 2—20 properties), *small investor* (with 21—50 properties), *medium investor* (with 51—100 properties), and *large investor* (with more than 100 properties). For example, if a property transaction took place in June 2010, and the buyer's property count was 58 as of 2009, then the owner belongs to the *medium investor* group. Our final transaction-level sample includes 9.6 million observations in 31 states from 2005 to 2016.

We conduct our analysis on the property tax appeals process in two geographic regions: Cook County in Illinois and Florida. We obtain micro-level data on property tax appeals from the Cook County government open data source. This data set contains a unique tax pin for each property, an indicator for whether an appeal is filed, an appeal outcome, and a final adjusted assessed value post-appeal, among others. We append the property location information from ZTRAX database to each property in the Cook County appeals data set based on the unique property tax pin.

We collect property tax assessment data from the Department of Revenue in Florida. This data set provides data on final assessment values, an adjustment between the preliminary and final assessment value, the reason for the adjustment, and the property address.

Lastly, we acquire state-level data from various sources. First, we obtain the score that measures the fairness of property tax administrative practices for each state from the Council on State Taxation. This scorecard was published in 2011. Each state receives a score and a letter grade, with a lower score indicating a fairer property tax administration. Second, we collect data on income per capita and property tax per capita from the U.S. Census Bureau. Third, we use the state-level

share of votes for the Democratic candidate in presidential elections as a proxy to measure state ideology and policy preferences, which are commonly applied in the political science literature (e.g., Carson, 2005, Gailmard and Jenkins, 2005). This data set comes from MIT's Election Data and Science Lab. We calculate the ratio of votes cast for the Democratic candidate to total votes cast in each state at the 2004, 2008, and 2012 presidential elections. A larger number corresponds to a more Democratic-leaning state.

Table 1 reports summary statistics for the 31 states in our sample. This table shows the total count of observations, the average assessment ratio, and large investors' local market share in each state. It is important to note that every state has a different scaling factor to determine the assessed value based on fair market value; therefore, it is not meaningful to compare assessment ratios across states. Large investors' local market share in our full sample is about 1.3%, ranging from 0.19% to 4.21% for each state.

5 Hypothesis

The property tax appeals process is available in every state for property owners to challenge local governments' assessments. A standard annual process starts with a mail issued by a local assessor office that notifies owners of the initial proposed assessed value. Property owners that disagree with the proposed values can file an appeal before a set deadline. Typically, an appeal can be resolved informally or through a formal hearing at which owners present evidence to support an alternative value. A successful appeal results in a reduction in the assessed value and thus a lower final tax bill. The appeals process has long been seen as complicated and time consuming by property owners.[13]

Compared with investors, owner-occupiers in general make a more prudent choice when it comes to property tax appeals. Many first-time homebuyers are not even aware of the existence of the tax appeals process upon the purchase of their first home. For those who are aware of this option, they need to weigh the costs against the benefits when deciding whether to conduct the appeal. On the cost side, it takes a considerable amount of time and effort to research and collect evidence, such as comparable home values, photos to show the conditions of subject properties, and repair invoices

[13]Source:https://www.detroitnews.com/story/news/local/detroit-city/2018/06/14/detroit-tax-appeals-reveal-stark-imbalance/703650002/

to support a lower value. Appearing at a board of review or court is often required in a hearing process. This appears to be a major burden for property owners in this process. For example, the Florida Department of Revenue shows that about 41% property owners actually withdrew their filing without going to the hearings between 2010 and 2016. Additionally, substantial financial costs could be incurred from the actual filing fees and the hiring of a professional property tax or legal specialist if the owner-occupiers decide to hand over the tasks to a third party. Given the complexity of the procedure, owner-occupiers need to evaluate the likelihood of winning the appeal and potential tax savings upon successful appeal. Therefore, owner-occupiers who decide to file an appeal are those who either are more confident in receiving a favorable outcome, such as apparent mistakes like typos in the initial assessed value, or those who have help from third-party professionals.

In contrast, property tax appeals appear to be a must-do process for large investors every year as this is the only way to reduce the largest portion of their operating expenses. With a dedicated property tax team, large investors can take advantage of the economies of scale to lower the cost per appeal filing. The marginal cost of filing for large investors is very low and there is no consequence of an appeal failure (i.e., the worst-case scenario is no value reduction). Thus, it is a no-lose game for large investors to file an appeal for every property, regardless of their perceived likelihood of winning or estimated tax savings upon winning.

If a certain group of owners has a higher propensity to appeal and has better access to resources, such as lawyers and professional tax specialists, that can help with the appeals process, then these owners are more likely to generate disproportionate value reductions than are the others, leading to assessment inequality (Berry, 2021). In addition, a large portfolio gives investors abundant data on properties in the same neighborhood. This allows them to gather sufficient and compelling evidence to establish strong cases for appeals, helping to achieve higher value reductions. Therefore, we hypothesize that large investors tend to have the resources and incentives to proactively engage in property tax appeals and thereby receive assessment discounts relative to owner-occupiers.

6 Empirical analysis

6.1 Investors and inequality in assessment ratio

We estimate the following regressions to test the inequality in assessment ratio across owner size groups:

$$ln(assessed\ value_{n,t+1}/market\ value_{n,t}) = \alpha + \sum_{k=1}^{4} \beta^k Owner\ group_{n,t,k} + \gamma_1' \mathbf{X} + \theta_{c,t} + \epsilon_{n,t}, \quad (1)$$

The dependent variable is the natural logarithm of the ratio of assessed-to-market value for property n in year t. We only include property-year observations that have a transaction in year t, and use the sales price amount in year t as the market value. We then use the assessed value one year after the transaction for the numerator of the dependent variable. $Owner\ group_{n,t,k}$ in Model (1) indicates the property owner size group. Specifically, we set owner-occupiers as the base group and divide investors into four size groups as shown in Table 2.

In this subsection, we first examine whether large investors receive an assessment discount for their properties relative to owner-occupiers by testing Model (1). The fair property tax system ought to ensure that realized assessment ratios are the same for all properties, regardless of differences in property attributes and owner attributes.

Our analysis includes all property transactions in the 31 states that have available assessed values in the year after transaction and the sales price amount is more than $75,000.[14] We also exclude transactions with certain deed types that often result in abnormal sales price, such as foreclosures, distressed sales, and sheriff's deeds. We control for unobservable time-varying local characteristics using county×year fixed effects as property assessments are mostly conducted at the county level.

Column 1 of Table 3 shows the coefficient estimates for all four investor groups based on their scale. The estimates suggest that large investors with 100 or more properties have a significant 3% discount in assessment ratio relative to owner-occupiers. To show that the assessment discount is not driven by heterogeneity in property attributes, in column 2 of Table 3 we control for various property

[14] Our baseline results are robust with different cutoffs of the property value.

characteristics, including property age, building area square footage, the number of bedrooms, and the number of full bathrooms. The coefficient estimate on *Large investors* is similar after controlling for those property characteristics: the assessment ratio is 3.7% significantly lower for large investors' properties relative to owner-occupied homes.

In column 3, we apply the same analysis to a subsample of properties with repeated sales during the sample period, and compare assessment ratios of the same property held by owners that belong to different property owner size groups at different points in time. The sample size reduces to 2.8 million observations as we exclude properties with only one transaction and properties that have multiple transactions but are owned by parties from the same owner-size group. The estimates in column 3 of Table 3 show that large investors have a significant 4.7% assessment discount relative to owner-occupiers that own the same property at a different point of time. Results in Table 3 strongly support the idea that large investors receive a lower assessment ratio for their properties relative to owner-occupiers.

A natural question that arises from the preceding discussions is whether all investors, regardless of their scale, have a disproportionate advantage over owner-occupiers regarding the property tax appeals process. Separate coefficient estimates for different size groups allow us to capture any nonmonotonic relation between investor scale and assessment ratio. An interesting finding is that *Micro investors* with 2 to 20 properties, unlike large investors, have significantly higher assessment ratios on their properties relative to owner-occupied homes. Column 1 shows that the assessment premium for micro investors is 0.8% with our baseline model. This coefficient estimate in column 2 is similar after adding property-level controls. The repeated sales analysis in column 3 shows an even higher assessment premium (2.3%) for micro investors' properties compared with owner-occupied homes. These results also provide suggestive evidence that the relationship between investor scale and the assessment ratio is nonmonotonic; that is, micro investors' properties receive an assessment premium instead of a discount relative to owner-occupied homes.

To further examine the nonlinear relation between investor scale and the assessment ratio, we classify investors using a much finer grouping based on their number of property holdings. Then we reestimate our baseline model using the new 17 investor groups based on their scale. Figure 1 presents the estimated coefficients and 95% confidence intervals for each investor group based on

their number of property holdings. This figure clearly exhibits a hump shape between investor scale and the assessment ratio. Micro investors with only two properties see higher assessment ratios than do owner-occupiers. This assessment premium for micro investors increases as the scale of portfolio goes up. The assessment premium peaks at 11-12 properties and then starts to decline. Only investors with more than 100 properties show a statistically significant assessment discount on their properties relative to owner-occupied homes.

This observation is consistent with micro-sized investors being less efficient and effective in managing their property taxes, leading to a higher assessment ratio relative to that of owner-occupiers. Small-scale mom-and-pop investors with only a few income properties typically self-manage their properties. These investors may have their limited attention and resources stretched thin as they increase their number of properties. Keeping track of the filing deadlines, analyzing comparable market values, making decisions on appeal filings, and preparing documents for each filing can easily turn into a daunting task for these investors as their portfolio size increases. Any geographic diversification of their portfolio will greatly increase the complexity of property tax management as it involves multiple tax jurisdictions.

6.2 Property tax appeals

In this subsection, we explore a potential mechanism through which large investors achieve favorable assessment ratios, namely, the property tax appeals process. We show evidence in Section 6.1 of an assessment gap between large investors and owner-occupiers who hold the same property at different points in time. Hence, we surmise that any observed gap in the assessment ratio between owner size groups could be a result of dissimilarity in property tax appeals behavior and the resulting outcomes of such appeals. Although aggregate nationwide property tax appeals data are not available, we conduct our analyses in two geographic areas: Cook County in Illinois and Florida.

6.2.1 Cook County property tax appeals

Cook County, Illinois, is the second-most populous county in the United States with 5.2 million population as of 2020. According to the Lincoln Institute of Land Policy, Illinois is among the states that have the highest state and local reliance on property taxes (Lincoln Institute of Land Policy,

2021). It also has the second-highest effective tax rate on medium-value residential homes in the country. Cook County has two channels for filing appeals for residential properties: one through the county's assessor office, and the other through a county board of review. Cook County, where Chicago is located, might have the highest number of appeal filing cases of any tax jurisdiction. For example, in 2015, Cook County processed about 166,000 appeal filings, whereas San Francisco and New York City had 4,995 and 53,000 respective filings (Berry, 2021, Grotto, 2017). This micro-level property tax appeals data set has been used extensively by prior studies to examine property owners' interaction with the property tax administration regarding property tax appeals (e.g., Avenancio-León and Howard, 2022, Berry, 2021, Ross, 2017, Weber and McMillen, 2010). We perform the analysis using a sample that overlaps with our baseline analysis: 2010 to 2016. There are $4.1 million records that can be linked to owners with available property count data in our sample.

The Cook County appeals data provide both the initial proposed assessed value mailed to the property owners and the final adjusted assessed value post-appeal. This allows us to determine the reduction of the assessed value upon a successful appeal. Table 4 shows summary statistics for the Cook County appeals data. The average likelihood to appeal is about 22% for all property owners. This rate is higher for all investors in general. Large investors are 14-percentage-points more likely to appeal than owner-occupiers. The overall appeal success rate is 67%, and investors are less likely to win an appeal upon filing than owner-occupiers. The mean value reduction is 15% for the whole sample. Investors also receive a higher value reduction than do owner-occupiers regardless of their portfolio size.

We first reestimate the baseline model with the subsample from Cook County using both assessed values. Column 2 of Table 5 shows that the final assessment ratios for large investors' properties are not significantly different from those of owner-occupied homes. This is an exception to what we document using the national data. Column 3 shows that large investors purchase the properties at 10.5% discount relative to owner-occupiers. This likely explains why assessment ratios for large investors' properties are not lower than owner-occupied homes in Cook County. Cook County's assessor office states that "A home's recent purchase price is sometimes, but not always, a reflection of its true market value. Sale prices of a home depend on not just the characteristics

of the home itself, but also the individual buyer, seller, and even the time of year. To be fair to all properties, those that have sold recently, and those that haven't, the CCAO uses the same methods to estimate true market values."[15]

This standard assessment guideline suggests that, with fair practice, the assessed value should not be depressed for one property that is acquired at a discounted price compared with other properties purchased at market value with similar home characteristics in the same neighborhood. Hence, the significantly large discount (10.5%) in the denominator (i.e., sales price) still implies a discount in the final assessed value for large investors' properties relative to owner-occupied homes. Comparing columns 1 and 2 of Table 5, we observe that the coefficients for all four investor groups drop after the appeals process. Large investors, in particular, experience a notable decrease in the assessment premium of their properties, dropping from 3.3% to no premium post-appeal. These results suggest that the outcomes of the appeals are more favorable for large investors than for owner-occupiers.

Next, we examine whether property tax appeals behavior differs across property owner size groups. Specifically, we study if large investors are (a) more likely to appeal, (b) more likely to win an appeal upon filing, and (c) receiving a higher value reduction conditional on a successful appeal. Two variables in the data set indicate if a property owner files an appeal through either of the channels in a given year. We identify a property as having an appeal filing if either of these indicators equals one. Then, we define a successful appeal as one in which the final adjusted assessed value is lower than the initial proposed assessed value mailed to the property owners. The value reduction percentage is calculated as (final adjusted assessed value – initial assessed value)/initial assessed value. We merge the appeals data with the comprehensive transaction data, which includes the owners' property count based on the unique tax pin.

Table 6 presents the estimates for the likelihood to appeal, the likelihood to win upon filing, and the value reduction upon winning based on the Cook County appeals data. We control for unobservable time-varying local characteristics at the census tract level using census tract×year fixed effects. In column 1 of Table 6, the dependent variable is a binary variable that equals one if the property owner files an appeal. The estimates show that all investor groups are significantly

[15]Source:https://www.cookcountyassessor.com/appeals#

more likely to appeal than owner-occupiers. The magnitude of coefficients ranges from 5.5 percentage points to 21.2 percentage points, with 15.4 percentage points for large investors. It is worth noting that the economic magnitude is close to twice higher for large investors than that for micro investors. This evidence is consistent with our hypothesis that once investors' portfolio size becomes substantial, they can start dedicating more resources to property tax management and thereby take advantage of economies of scale.

In column 2 of Table 6, the dependent variable is a binary variable that equals one if an owner wins the appeal conditional on filing. The estimates suggest that all investor groups are significantly less likely to win an appeal than are owner-occupiers. The magnitude of the coefficients monotonically decreases as investors' portfolio size increases. Compared with owner-occupiers, large investors are 10.4-percentage-points less likely to win an appeal upon filing. As discussed in Section 5, large investors tend to file appeals on their properties more aggressively, regardless of their perceived likelihood of winning or estimated tax savings upon winning. Therefore, it is reasonable to see that large investors have less chance of winning an appeal as some appeals might be filed even when the subject properties' assessed values already correctly reflect the market value. In column 3 of Table 6, the dependent variable is the value reduction percentage upon a successful appeal. All investor groups have a significantly higher value reduction than do owner-occupiers upon winning an appeal. Large investors get a 5.4-percentage-point higher value reduction than do owner-occupiers. This translates to 41% higher value reduction than what owner-occupiers can receive on average (13.2 p.p.) upon a successful appeal. This is in line with our hypothesis that access to abundant data on properties allows large investors to obtain persuasive evidence, ultimately resulting in greater value reduction.

6.2.2 Florida property tax appeals

To substantiate our findings from Cook County property tax appeals data, we conduct a similar analysis using the Florida property tax assessment data between 2010 and 2016. Sixty-seven counties in Florida are responsible for conducting annual assessments for real properties at 100% of the market value. A property owner can challenge the initial proposed assessed value by filing a petition with the county value adjustment board or a lawsuit in circuit court. Filing an appeal

through the value adjustment board is a much more common way, with a lower cost ($15 per filing) and less complicated procedures. Property owners can sometimes resolve discrepancies in the assessed value with the appraiser prior to the hearing. If agreement cannot be reached prior to the hearing, property owners need to submit evidence to support the alternative value and appear in a scheduled hearing. [16]

The Florida Department of Revenue provides property-year panel data on changes between the preliminary appraisal value and the final certified appraisal value. This data field allows us to obtain the amount of reduction in the assessed value after a property tax appeal. However, with data limitations, we are not able to identify those properties that have filed an appeal with an unsuccessful outcome (i.e., no value reduction). Nevertheless, the Florida Department of Revenue produces statewide summary data on the number of appeals and the success rate of appeals. It shows that the average appeal filing rate is less than 1%, and the average success rate upon filing is 18.8% during our sample period.[17] Both the propensity to appeal and the appeal success rate are significantly lower in Florida than in Cook County.

With the Florida data, we focus on examining whether appeal outcomes differ among the property owner size groups. Again, we define a successful appeal as one that results in assessed value reduction post-appeal. In total, there are about 12.3 million property assessment records during the sample period. Table 7 shows that all investors can achieve a significantly higher value reduction than can owner-occupiers upon winning. The magnitude of coefficients monotonically increases with the portfolio size, ranging from 1.9% to 11.6%. The magnitude of the coefficient for *Large investors* is about five times larger than that of *Micro investors*. The value reduction for large investors' properties is twice as much as that of owner-occupied homes (11.3%). This result is consistent with our findings from Cook County data, and collectively they suggest that large investors are more effective at reducing the assessed values of their properties through appeals than are owner-occupiers.

[16] Source:https://floridarevenue.com/property/pages/Taxpayers_PropertyValueDisagree.aspx

[17] The appeal filing rate is estimated using the number of residential appeal filings and the number of residential parcels each year. The appeal success rate is reported for all real properties.

6.2.3 Discussions

Whether utilizing the appeals process could eventually lead to overall assessment discount for large investors depends on three factors: the propensity to appeal, the success rate conditional on the filing of an appeal, and the amount of value reduction upon winning. From the empirical results in Cook County, the likelihood to appeal is 77.0% higher, the success rate is 15.1% less, and the value reduction is 41.0% higher for large investors relative to owner-occupiers. In addition, we show that the assessment premium for large investors is eliminated after the appeals process in Cook County as we discussed earlier (see Table 5). Collectively, the evidence indicates that the overall effect on the appeals process is favorable for large investors, likely because of the higher likelihood to appeal and higher value reduction upon winning than owner-occupiers. Both the case studies of Cook County and Florida largely support our hypothesis that the property tax appeal is the channel through which large investors achieve a lower assessment ratio relative to owner-occupiers.

6.3 Alternative explanations

In this section, we discuss two other possible explanations for large investors' assessment discount.

6.3.1 Assessor bias

One potential explanation for the assessment discount is that assessors have a systematic bias toward large investors, meaning that they deliberately produce a lower assessed value on the properties owned by large investors. We believe this is less likely to be the case for the following reasons. First, tax jurisdictions have widely applied computer-assisted mass appraisal or automated valuation models to determine the assessed value of properties. In-person appraisal with a site visit is simply not feasible given the large number of properties to be assessed. The International Association of Assessing Officers has developed standard guidelines for mass appraisal, which applies multivariate regressions using a small number of property-level characteristics (Avenancio-León and Howard, 2022, IAAO, 2018). Therefore, whether the owner is an investor and/or the size of the owner's property holdings should not play a role in determining the assessed value. Moreover, to the best of our knowledge, assessors have no direct information related to an owner's other property

holdings in the first place; thus, they are unlikely to favor investors based on their scale. Most large investors hold properties under different entities in different regions; therefore, it is a difficult and time-consuming process to identify the exact scale of an investor.

6.3.2 Sales price gap

One could argue that the denominator (i.e., sales price) of the assessment ratio instead of the nominator (i.e., assessed value) drives the assessment discount for large investors. In other words, our findings would suggest that large investors on average pay a premium in purchase price compared with owner-occupiers. However, this contradicts the widely documented empirical results that large investors in general acquire properties at a lower price. Previous studies provide ample evidence on this. For example, Smith and Liu (2020) shows that institutional investors in Atlanta purchased houses at a significant discount of 6.3% to 11.8% compared to owner-occupiers between 2000 and 2014. Similar findings are presented by Allen et al. (2018) using data on Miami-Dade County, that investors in general purchase at a discount of 9.5% relative to owner-occupiers. We find similar results using nationwide sample. In Table 8, we show that large investors across 31 states acquire properties at a significant discount of 13.6% after controlling for property-level characteristics. A significantly lower purchase price would bias against finding an assessment discount for large investors. Hence, we can rule out the possibility that sales price gap between large investors and owner-occupiers drives the assessment discount for large investors. Given that large investors pay less for similar properties, our estimates on large investors' assessment discount are likely to be understated by over 10 percentage points.

6.4 State-level analysis

Next, we estimate Model (1) separately for each of the 31 states in the sample during the sample period. We control any unobservable time-varying local characteristics using county×year fixed effects. Table 9 reports the coefficient estimates and standard errors from these regressions. Coefficient estimates on *Large investor* are negative for 20 states, and 16 of those are statistically significant. In these 16 states, large investors have a significant assessment discount ranging from 0.5% to 14%. The highest assessment discounts are seen in New York, Indiana, and New Hamp-

shire. Other states with strong institutional investors' presence (Gurun et al., 2022) such as Georgia, Florida, and Nevada also see significant assessment discount for large investors, the discounts are 11.1%, 3.9%, and 9.2%, respectively. Among these 16 states, the mean (median) assessment discount is 7.9% (7.2%). Figure 2 plots the estimated coefficients and 95% confidence intervals for large investors by state.

6.5 Cross-state analysis

Next, we explore whether state-level variations in large investors' assessment discount can be explained by heterogeneity in the states' property tax systems, in particular the property tax appeals practices. To measure the quality of state property tax administration, we use a score published by the Council on State Taxation (COST) in 2011. The published scorecard is used to evaluate each state's property tax administration from three aspects: standardized procedures, fair property tax appeals procedures and residential property tax burdens versus business property tax burdens. A lower score indicates a fairer state property tax administration. We also include other covariates that help explain the state-level variations in the assessment discount for large investors. Large investors' local market share is calculated as the number of houses owned by large investors divided by total number of houses in the Zillow database in each state. The property tax burden is defined as the time-series average of property tax dollar amount as a percentage of medium personal income in a state during the sample period. We then use the t-value on *Large investor (100+)* from state-level estimates of Model (1) as dependent variable for the cross-sectional analysis. The t-value on *Large investor (100+)* takes into account both the estimated effect and estimation error of assessment discount for each state.

Table 11 presents the estimates from our cross-state analysis. The results show that the coefficient for property tax administration score is significantly positive, suggesting that large investors' assessment discount is significantly greater in states with "fairer" property tax administration. According to COST, one important component of a fair property tax administration is to have fair property tax appeals procedures. Typical fair property tax appeals procedures should have the following characteristics: (1) fair and reasonable deadline for the initial appeal, (2) reasonable burden of proof to sustain an appeal, (3) available of de novo review before an independent tribunal after

completion of any administrative review at both local and state levels, and (4) partial tax payment or disputed portion of the property tax in escrow in case of a dispute.[18] All these factors potentially benefit large investors disproportionately given their professional approach to tax appeal and large number of filings each year. For example, a reasonable (vs. a tight) deadline on an appeal filing allows large investors to have sufficient time to prepare for quality evidence given the large number of filings they need to complete each year. In general, a simpler and fairer property tax appeal system allows large investors to scale up the appeal filings more efficiently and effectively; it may not provide the same degree of benefit to owner-occupiers, who often lack the resources and volume of properties to take full advantage of such a system.

Table 11 also shows that several other factors are related to large investors' assessment discount. We show that large investors' assessment discount is greater for states with a higher large investors' market share and a higher property tax burden. The relationship between assessment discount and large investors' local market share could be a result of selection effect or resources allocation of large investors. On the one hand, because property tax is the largest portion of their operating expenses and inflexible, large investors have strong incentives to invest more in the states with fairer property tax administrative practices. On the other hand, large investors may choose to allocate more resources to property tax management in the areas where their portfolio is highly concentrated. In this cross-state analysis, the assessment discount for large investors is higher in the state with greater large investors' presence even after controlling for local property tax administration score. Thus, in the states with higher property tax burden, large investors may dedicate more resources to their property tax management, thus receiving more favorable appeal outcome.

To control for the state's political and economic environment, we include two control variables in our cross-state regression: income per capita and share of votes for Democratic candidate in the presidential elections. We use the median share of votes for Democratic candidate in 2004, 2008, and 2012 presidential elections. A larger number corresponds to a more Democrate-leaning state. The coefficient estimate for *Democratic presidential vote share* suggests that large investors' assessment discount is significantly greater in more Democrat-leaning states. There is no significant

[18] See "The Best and Worst Property Tax Administration - COST scorecard on state property tax administrative practices, 2011."

relationship between large investors' assessment discount and income per capita.

6.6 Robustness

Lastly, we perform several robustness tests for our baseline model. First, we reestimate Model (1) at a much finer geography level, namely, the census block-group. Tax rates can vary within a county because of different rates levied at more local levels, such as townships and school districts. In principle, the difference in local tax rates should not be a source of variation in assessment ratios. However, one may still be concerned that assessors create systematic bias in assessed values based on the quality of public services or financial health of local government. For instance, local assessors might acknowledge that properties in neighborhoods with subpar amenities are less desirable. Consequently, they might reduce the assessed values beyond the justifiable discount associated with these inferior public amenities. If the spatial distribution of large investors' properties correlates with those features that lead to systematic undervaluation, we might find similar results as our baseline results. To address this concern, we re-estimate our baseline model by adding census block-group $\times$ year fixed effect. A block group is a small geographic division of census tract, and typically has 600 to 3,000 people. Although this is not a definition of tax jurisdiction, we can reasonably assume that the local tax assessment practices, public amenities, local government financial condition and neighborhood attributes are fixed within census block-groups. The estimates in Table 12 are qualitatively the same as the baseline estimates at the county level. The magnitude of large investors' assessment discount is smaller (2%) than the baseline result (3.7%) after controlling for property-level characteristics.

Second, in our baseline models, we use the natural logarithm of the assessment ratio as the dependent variable because of the large variance in raw ratios as a result of scaling factor. To address the concern that log transformation of the assessment ratio could mechanically drive the results. We re-estimate the baseline model using raw assessment ratio as the dependent variable in Table 13. The estimates remain robust. The 1.5 p.p large investors' assessment discount in column 2 translates to 2.6% discount based on the mean assessment ratio for owner-occupied homes (0.57%). The magnitude is in line with the baseline result (3.7%).

7 Conclusion

In this study, we examine the effect of large SFR investors on municipal finance through property taxation. We measure property tax inequality between owner-occupiers and investors in terms of assessment gap between large investors' properties and owner-occupied properties. We show that large investors that own more than 100 properties have a significantly lower assessment ratio on average than do owner-occupiers. Moreover, there is a hump-shaped relation between the portfolio size of investors and the assessment ratio of their properties. Using data from Cook County, Illinois, and Florida, we identify property tax appeals as the potential mechanism that leads to the observed assessment discount for large investors. Large investors are significantly more likely to file a property tax appeal and receive a higher value reduction upon a successful appeal relative to owner-occupiers. Professional SFR investors have advantages in the economies of scale that allow them to manage property taxation more efficiently and effectively. Our state-level analysis also shows that close to two-thirds of states exhibit an assessment discount for large investors. Furthermore, states with a fairer property taxation administration, a higher market share by large investors, and a higher property tax burden see a significantly deeper assessment discount for large investors.

Our findings inform policymakers about inequalities in property taxation between owner-occupiers and investors with the drawbacks of the current property tax appeal system, owner-occupiers and micro-size investors end up taking a disproportionally larger property tax burden. Our analysis at the state level suggests that implementing a supposedly "fairer" property taxation procedure may not necessarily lead to a fair outcome. Our study suggests that local governments should take initiatives to enhance homeowners' awareness of property tax appeals. To enable owner-occupiers and micro-size investors to make the most of the property tax appeal system, local governments can provide accessible resources and support to assist them in filing appeals. By offering such assistance, homeowners can gain a better understanding of the appeals process and level the playing field with large investors who have greater access to resources and expertise in this area.

While we provide micro-level evidence on the property tax advantage of institutional SFR investors, the overall effect of institutional investments in the SFR markets on municipal finance remains unclear because they also affect the local economy through various other channels, such as

overall house prices, job creation, and the crime rate, among others. Hence, the economic and social impacts of the institutionalization of SFR markets remains an important question that demands further study.

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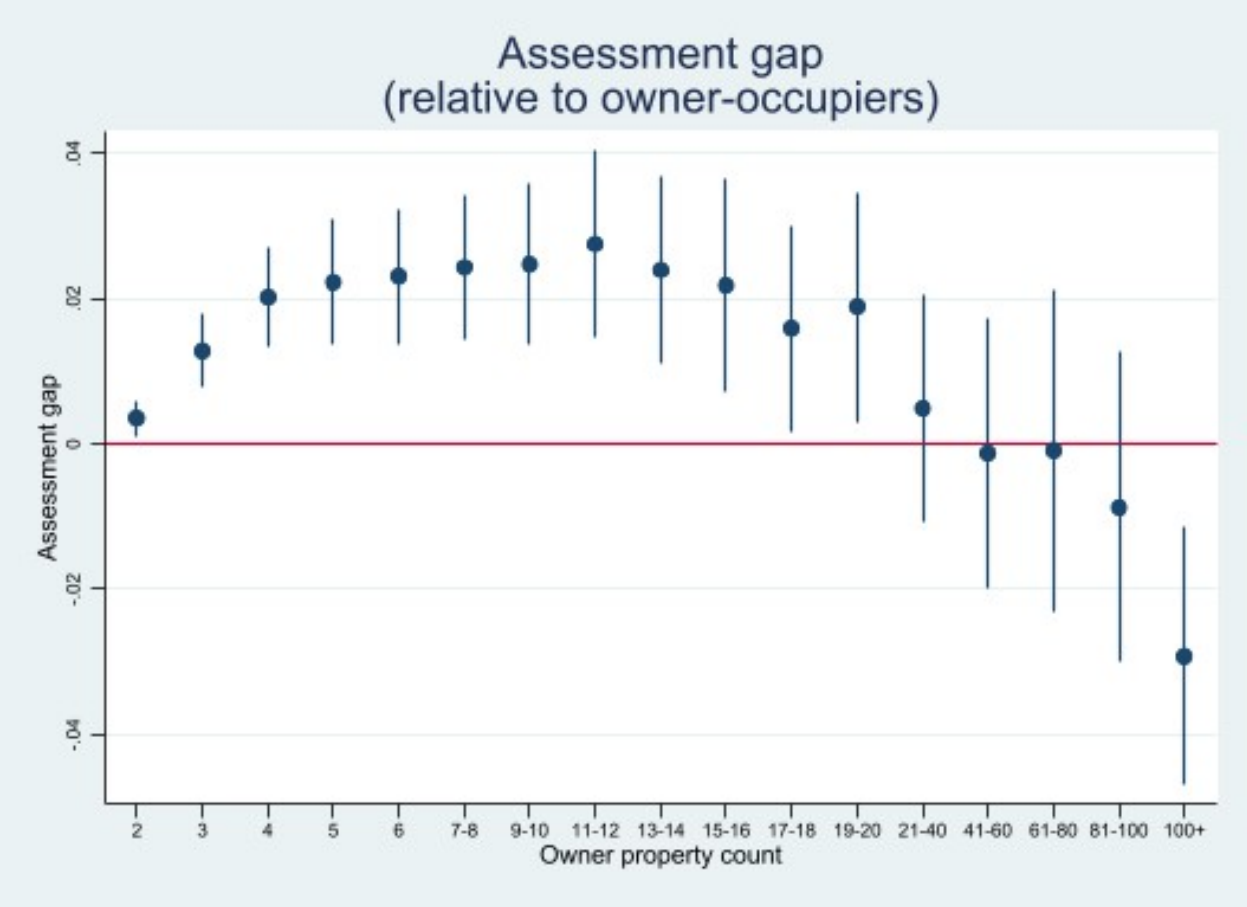

Figure 1: Assessment gap by investor scale

The graph plots the estimated coefficients and 95% confidence intervals for investors by their number of property holdings. We include county × year fixed effects in the regressions. The standard errors are clustered by county.

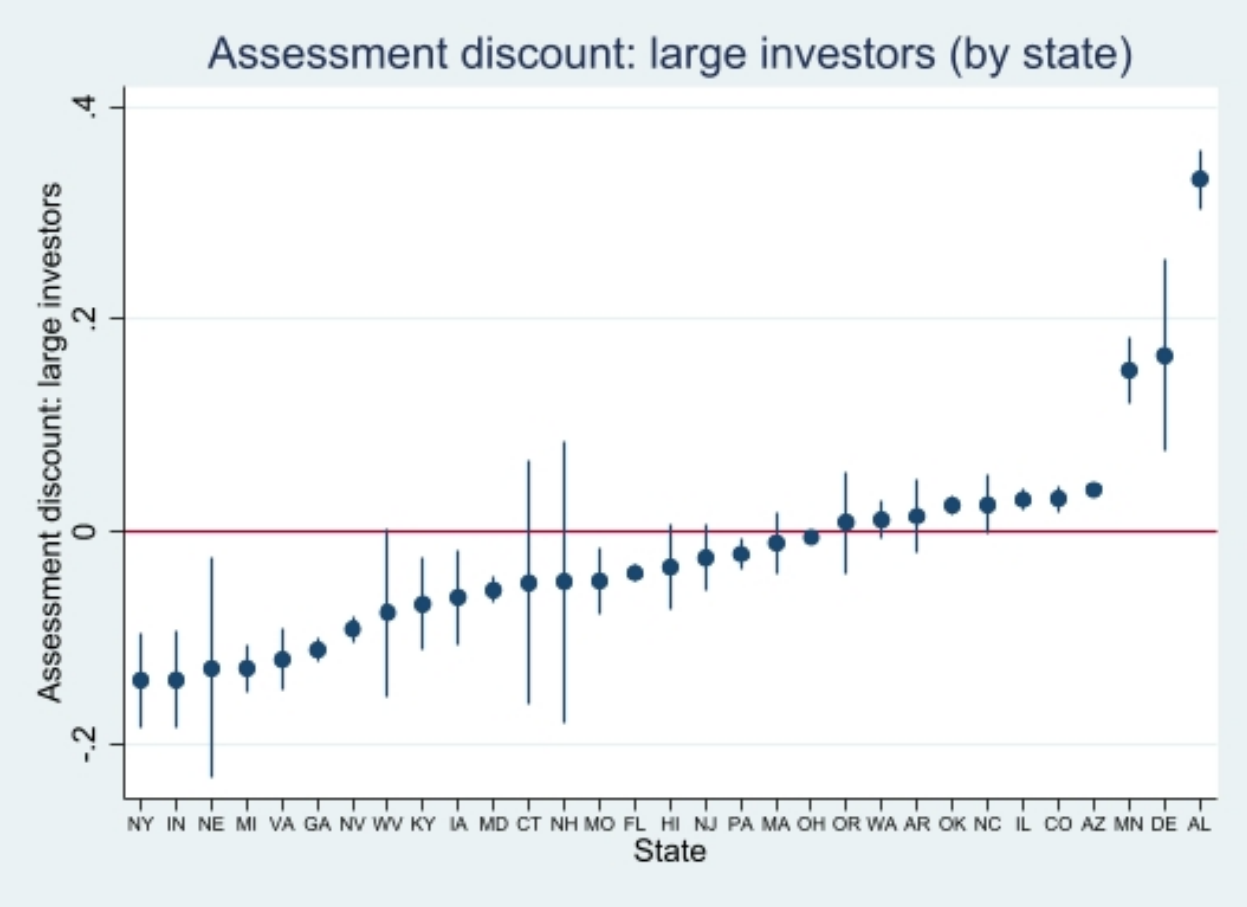

Figure 2: Assessment discount for large investors (by state)

The graph plots the estimated coefficient and 95% confidence interval for large investors by state. We include county × year fixed effects in the regressions. The standard errors are clustered by census tract.

Table 1: Summary statistics

This table reports summary statistics for the number of observations, the mean assessment ratio, and large investors' local market share percentage for each state.

	Count	Assessment ratio (mean)	Large investors' market share (%)
AL	106,397	0.17	1.48
AR	114,373	0.19	0.25
AZ	453,070	0.10	1.43
CO	670,498	0.08	0.55
CT	32,472	0.69	0.19
DE	70,346	0.29	0.52
FL	2,092,711	0.81	1.40
GA	350,705	0.41	3.90
HI	11,640	0.95	0.27
IA	114,798	0.94	0.22
IL	727,301	0.24	0.63
IN	4,486	0.94	3.50
KY	99,500	0.99	0.60
MA	19,039	0.92	0.43
MD	507,939	0.82	0.62
MI	283,245	0.50	0.61
MN	139,049	0.85	0.39
MO	110,076	0.21	0.93
NC	501,403	0.90	1.21
NE	25,185	0.93	0.42
NH	2,548	0.94	0.43
NJ	379,435	0.71	0.19
NV	545,989	0.29	1.98
NY	325,969	0.72	0.65
OH	346,153	0.34	3.78
OK	175,424	0.11	1.32
OR	364,216	0.70	0.26
PA	503,908	0.48	4.21
VA	81,935	0.92	0.56
WA	423,697	0.87	0.50
WV	7,919	0.54	2.54
Total	9,591,426	0.56	1.33

Table 2: Owner group

This table shows how we classify the property owners based on the number of their property holdings across country.

Owner group	Number of property holdings
Owner-occupiers	1
Micro investor	2–20
Small investor	21–50
Medium investor	51–100
Large investor	100+

Table 3: Assessment ratio for owner-occupiers versus investors

This table presents our baseline estimates of the assessment gap between owner-occupiers and investors (Model (1). The dependent variable is the natural logarithm of the assessment ratio. We classify investors into four groups by their number of properties one year prior to the transaction. *Micro investor (2–20)*, *Small investor (21–50)*, *Medium investor (51–100)*, and *Large investor (100+)* are binary variables that indicate the four groups of investors. The base group is the owner-occupier group. Column 1 includes only the binary variables for the four investor groups. Columns 2 adds additional control variables for property-level characteristics. Columns 3 re-estimates Model (1) by adding property fixed effects, and, thus, all time-invariant property characteristics are absorbed by the FEs and not estimated. We report t-statistics using standard errors clustered by county in parentheses. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively.

Dependent variable:	ln(assessed value/market value)		
	(1)	(2)	(3)
Micro investor (2-20)	0.008***	0.010***	0.023***
	(4.19)	(4.93)	(6.47)
Small investor (21-50)	0.004	0.004	0.024
	(0.48)	(0.46)	(1.49)
Medium investor (51-100)	-0.004	-0.004	0.022
	(-0.44)	(-0.41)	(1.40)
Large investor (100+)	-0.030***	-0.037***	-0.047***
	(-3.31)	(-3.89)	(-3.01)
Age		-0.001***	
		(-4.82)	
Building area sqft		0.000	
		(0.19)	
Number of bedrooms		0.004***	
		(3.03)	
Number of full bathrooms		0.001	
		(1.13)	
Property FE	No	No	Yes
County × Year FE	Yes	Yes	Yes
Adjusted R^2	0.932	0.931	0.979
Observations	9,591,426	7,683,825	2,806,854

Table 4: Summary statistics for Cook County appeals

This table presents summary statistics for the Cook County appeals data. It shows the total number of observations, the total number of appeals filed, the percentage of appeal filings, the total number of successful appeals, the percentage of successful appeal conditional on an appeal filing, and the average percentage of value reduction conditional on a successful appeal.

	Total count	Appeals count	Appeals rate	Successful appeals count	Successful appeals rate	Value reduction %
Owner-occupier (1)	2,906,203	569,868	0.20	395,143	0.69	-13.18
Micro investor (2–20)	1,101,643	278,569	0.25	176,166	0.63	-18.08
Small investor (21–50)	53,367	18,880	0.35	10,678	0.57	-23.95
Medium investor (51–100)	24,872	10,692	0.43	5,698	0.53	-27.01
Large investor (100+)	58,737	19,937	0.34	10,660	0.53	-21.01
Total	4,144,822	897,946	0.22	598,345	0.67	-15.08

Table 5: Cook County assessment ratio and sales price for owner-occupiers versus investors

This table presents estimates from Cook County appeals and transaction data. We classify investors into four groups by their number of property holdings one year prior to the transaction. *Micro investor (2–20)*, *Small investor (21–50)*, *Medium investor (51–100)*, and *Large investor (100+)* are binary variables that equal one if the investor belongs to the corresponding group. In column 1, the dependent variable is the natural logarithm of initial assessment ratio calculated using the initial proposed assessed value mailed to the property owners as nominator. In column 2, the dependent variable is the natural logarithm of final assessment ratio calculated using final assessed value after adjustment post-appeal as nominator. In column 3, the dependent variable is the natural logarithm of sales price for each transaction. We include census tract × year fixed effects in the regressions. We report t-statistics using standard errors clustered by census tract in parentheses. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively

Dependent variable:	ln(Initial assessed value/market value)	ln(Final assessed value/market value)	ln(Sales price)
	(1)	(2)	(3)
Investor(2-20)	0.085***	0.075***	-0.120***
	(23.61)	(19.14)	(-31.20)
Investor(20-50)	0.224***	0.212***	-0.295***
	(11.68)	(10.67)	(-16.02)
Investor(50-100)	0.212***	0.142***	-0.271***
	(7.83)	(4.30)	(-11.47)
Investor(100+)	0.033***	0.004	-0.105***
	(3.97)	(0.47)	(-10.77)
Age	-0.000***	-0.000***	-0.001***
	(-5.49)	(-5.60)	(-8.56)
Building area (sqft)	0.000	-0.000**	0.000***
	(0.33)	(-2.39)	(34.47)
Number of bedrooms	0.002	0.004**	0.025***
	(1.11)	(2.44)	(8.61)
Number of full bathrooms	-0.012***	-0.017***	0.051***
	(-5.61)	(-7.59)	(15.39)
Censustract × Year FE	Yes	Yes	Yes
Adjusted R^2	0.261	0.267	0.811
Observations	133,896	133,896	133,896

Table 6: Cook County appeals

This table presents estimates from the Cook County appeals data. We classify investors into four groups by their number of property holdings one year prior to the transaction. *Micro investor (2–20)*, *Small investor (21–50)*, *Medium investor (51–100)*, and *Large investor (100+)* are binary variables that equal one if the investor belongs to the corresponding group. In column 1, the dependent variable is a binary variable that equals one if the property owner files an appeal unconditionally. In column 2, the dependent variable is a binary variable that equals one if the property owner wins an appeal conditional on an appeal filing. In column 3, the dependent variable is value reduction percentage conditional on winning an appeal. Value reduction percentage is calculated as (final adjusted assessed value - initial assessed value)/initial assessed value. We include census tract × year fixed effects in the regressions. We report t-statistics using standard errors clustered by census tract in parentheses. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively

Dependent variable:	Appeal	Successful appeal	Value reduction
	(1)	(2)	(3)
Micro investor (2–20)	0.055***	-0.034***	-0.035***
	(28.94)	(-15.15)	(-24.18)
Small investor (21–50)	0.164***	-0.058***	-0.076***
	(18.82)	(-5.73)	(-13.34)
Medium investor (51–100)	0.212***	-0.070***	-0.103***
	(14.45)	(-5.79)	(-13.65)
Large investor (100+)	0.154***	-0.104***	-0.054***
	(18.55)	(-10.94)	(-5.32)
Census tract × Year FE	Yes	Yes	Yes
Adjusted R^2	0.120	0.106	0.159
Observations	4,144,822	897,926	598,345

Table 7: Florida appeals

This table presents estimates from the Florida property tax assessment data. We classify investors into four groups by their number of property holdings one year prior to the transaction. *Micro investor (2–20)*, *Small investor (21–50)*, *Medium investor (51–100)*, and *Large investor (100+)* are binary variables that equal one if the investor belongs to the corresponding group. In column 1, the dependent variable is value reduction percentage conditional on a successful appeal. Value reduction percentage is calculated as (final adjusted assessed value - initial assessed value)/initial assessed value. We include county × year fixed effects in the regressions. We report t-statistics using standard errors clustered by census tract in parentheses. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively

Dependent variable:	Value reduction from appeal
	(1)
Micro investor (2–20)	-0.019***
	(-12.12)
Small investor (21–50)	-0.081***
	(-10.52)
Medium investor (51–100)	-0.109***
	(-9.62)
Large investor (100+)	-0.116***
	(-5.08)
County × Year FE	Yes
Adjusted R^2	0.090
Observations	251,010

Table 8: Sales price for owner-occupiers versus investors

This table presents estimates of the sales price gap between owner-occupiers and investors. We classify investors into four groups by their number of property holdings one year prior to the transaction. The dependent variable is the natural logarithm of sales price for each transaction. *Micro investor (2–20)*, *Small investor (21–50)*, *Medium investor (51–100)*, and *Large investor (100+)* are binary variables that equal one if the investor belongs to the corresponding group. Column 1 includes only the binary variables for the four investor groups. Column 2 adds additional control variables for property-level characteristics. We include county × year fixed effects in the regressions. We report t-statistics using standard errors clustered by county in parentheses. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively

Dependent variable:	ln(Sales price)	
	(1)	(2)
Micro investor (2–20)	-0.019***	-0.009
	(-3.51)	(-1.34)
Small investor (21–50)	-0.129***	-0.095***
	(-4.96)	(-3.20)
Medium investor (51–100)	-0.151***	-0.125***
	(-5.47)	(-4.48)
Large investor (100+)	-0.179***	-0.136***
	(-12.80)	(-9.86)
Age		-0.003***
		(-6.19)
Building area (sqft)		0.000
		(1.20)
Number of bedrooms		0.055***
		(3.86)
Number of full bathrooms		0.271***
		(12.72)
County × Year FE	Yes	Yes
Adjusted R^2	0.272	0.469
Observations	9,591,426	7,683,825

Table 9: Assessment ratio for owner-occupiers versus investors (by state)

This table presents state-level estimates of assessment ratio gap between owner-occupiers and investors. The dependent variable is the natural logarithm of assessment ratio. We classify investors into four groups by their number of property holdings one year prior to the transaction. *Micro investor (2–20)*, *Small investor (21–50)*, *Medium investor (51–100)*, and *Large investor (100+)* are binary variables that equal one if the property owner is an investor that belongs to the corresponding group. The base group is owner-occupier group. We include county × year fixed effects in the regressions. We report t-statistics using standard errors clustered by census tract in parentheses. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively

	Micro investor (2–20)	Small investor (21–50)	Medium investor (51–100)	Large investor (100+)
AL	0.114***	0.430***	0.242***	0.332***
	(0.01)	(0.05)	(0.03)	(0.01)
AZ	0.020***	0.048***	0.051***	0.039***
	(0.00)	(0.00)	(0.02)	(0.00)
AR	0.009***	0.025**	0.019	0.015
	(0.00)	(0.01)	(0.03)	(0.02)
CO	0.055***	0.159***	0.146***	0.031***
	(0.00)	(0.02)	(0.03)	(0.01)
CT	-0.004	-0.040	0.061	-0.048
	(0.01)	(0.04)	(0.06)	(0.06)
DE	0.051***	0.190***	0.270***	0.166***
	(0.01)	(0.06)	(0.07)	(0.05)
FL	0.000	-0.018***	-0.029***	-0.039***
	(0.00)	(0.00)	(0.01)	(0.00)
GA	-0.001	-0.046***	-0.058***	-0.111***
	(0.00)	(0.01)	(0.02)	(0.01)
HI	-0.005*	-0.048**	-0.065**	-0.034*
	(0.00)	(0.02)	(0.03)	(0.02)
IL	0.016***	0.046***	0.056***	0.030***
	(0.00)	(0.01)	(0.01)	(0.00)
IN	-0.031***	-0.214***	-0.108***	-0.139***
	(0.01)	(0.05)	(0.03)	(0.02)
IA	-0.024***	-0.055***	-0.056**	-0.061***
	(0.00)	(0.02)	(0.03)	(0.02)
KY	-0.018***	-0.064***	-0.124***	-0.068***
	(0.00)	(0.02)	(0.04)	(0.02)
MD	-0.028***	-0.288***	-0.249***	-0.055***
	(0.00)	(0.03)	(0.03)	(0.01)
MA	-0.006**	-0.035*	-0.046	-0.010
	(0.00)	(0.02)	(0.04)	(0.01)
MI	-0.004***	0.019	-0.057***	-0.128***
	(0.00)	(0.02)	(0.02)	(0.01)
MN	-0.013***	-0.054	-0.179**	0.152***
	(0.00)	(0.04)	(0.09)	(0.02)

	Micro investor (2–20)	Small investor (21–50)	Medium investor (51–100)	Large investor (100+)
MO	-0.007	0.105***	0.047	-0.046***
	(0.01)	(0.03)	(0.03)	(0.02)
NE	-0.008***	-0.062**	-0.043	-0.129**
	(0.00)	(0.03)	(0.05)	(0.05)
NV	0.007***	0.018***	0.011	-0.092***
	(0.00)	(0.01)	(0.01)	(0.01)
NH	-0.013	-0.092**	-0.307	-0.047
	(0.01)	(0.04)	(0.24)	(0.07)
NJ	0.015***	0.030	-0.136*	-0.025
	(0.00)	(0.02)	(0.07)	(0.02)
NY	0.006	0.079*	-0.114**	-0.140***
	(0.01)	(0.04)	(0.05)	(0.02)
NC	-0.006***	-0.057***	-0.098***	0.026*
	(0.00)	(0.02)	(0.03)	(0.01)
OH	0.007***	-0.018*	0.005	-0.005*
	(0.00)	(0.01)	(0.01)	(0.00)
OK	0.015***	0.050***	0.057***	0.025***
	(0.00)	(0.01)	(0.01)	(0.00)
OR	-0.007***	-0.104***	-0.067***	0.009
	(0.00)	(0.03)	(0.02)	(0.02)
PA	0.026***	0.006	0.035***	-0.021***
	(0.00)	(0.02)	(0.01)	(0.01)
VA	-0.018***	-0.023	-0.056*	-0.121***
	(0.00)	(0.04)	(0.03)	(0.02)
WA	-0.001	-0.080***	-0.048	0.011
	(0.00)	(0.02)	(0.03)	(0.01)
WV	-0.007	0.061	-0.116	-0.076*
	(0.01)	(0.06)	(0.11)	(0.04)

Table 10: Summary statistics for the cross-state analysis

This table presents summary statistics for all state-level variables in the cross-state regression analysis.

	Property tax administration score	Large investor market share(%)	Democratic presidential vote share	Income per capita (000′$)	Property tax burden(%)
AL	25	1.48	0.38	42,411	1.47
AR	19	0.25	0.39	42,528	1.67
AZ	26	1.43	0.45	42,414	2.85
CO	20	0.55	0.51	42,607	2.92
CT	26	0.19	0.58	42,569	4.40
DE	35	0.52	0.59	42,206	1.84
FL	14	1.40	0.50	41,734	3.22
GA	13	3.90	0.46	41,757	2.89
HI	34	0.27	0.70	41,854	2.25
IA	31	0.22	0.52	42,026	3.48
IL	35	0.63	0.58	41,989	4.26
IN	25	3.50	0.44	41,923	2.71
KY	15	0.60	0.40	42,068	1.99
MA	25	0.43	0.61	42,206	3.71
MD	11	0.62	0.62	42,428	2.79
MI	20	0.61	0.54	41,874	3.53
MN	23	0.39	0.53	41,985	3.11
MO	25	0.93	0.46	42,185	2.42
NC	19	1.21	0.48	41,826	2.45
NE	20	0.42	0.38	42,436	3.76
NH	19	0.43	0.52	42,488	5.40
NJ	31	0.19	0.57	42,279	5.35
NV	26	1.98	0.52	42,407	2.72
NY	43	0.65	0.60	42,163	4.60
OH	20	3.78	0.51	41,822	2.98
OK	18	1.32	0.34	41,951	1.57
OR	13	0.26	0.54	42,060	3.35
PA	36	4.21	0.52	42,234	3.00
VA	28	0.56	0.51	43,485	3.00
WA	21	0.50	0.56	43,194	2.75
WV	28	2.54	0.43	42,976	2.37
Total	24	1.16	0.51	42,261	3.06

Table 11: Large investor assessment discount: Cross-state analysis

This table presents the cross-state analysis of the assessment discount for large investors. The dependent variable is the t-value of large investors' assessment discount from the state-level results of Model (1). *Fair property tax administration score* is a score assigned by the Council on State Taxation (COST) to each state in 2011. Lower score indicates a fairer property tax administration for a given state. *Large investors' local market share* is calculated as the number of houses owned by large investors divided by total number of houses in the Zillow database in each state. *Democratic presidential vote share* is the median share of votes for the Democratic candidate in 2004, 2006 and 2012 presidential elections. *Income per capital* is a time-series average of per capita personal income in thousands during the sample period. *Property tax burden* is a time-series average of property tax dollar amount as a percentage of personal income during the sample period. The standard errors are bootstrapped. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively

Dependent variable:	Large investor assessment discount(tvalue)
Property tax administration score	0.393**
	(2.13)
Large investors' local market share (%)	-2.951**
	(-2.03)
Democratic presidential vote share	-35.863**
	(-2.13)
Property tax burden (%)	-1.934*
	(-1.72)
Income per capita ($thousands)	-0.555
	(-0.13)
Adjusted R^2	0.298
Observations	31

Table 12: Robustness test of the assessment ratio for owner-occupiers versus investors (block-group)

This table presents the estimates of assessment ratio gap between owner-occupiers and investors (Model (1) at census block-group level. The dependent variable is the natural logarithm of assessment ratio. We classify investors into four groups by their number of properties one year prior to the transaction. *Micro investor (2–20)*, *Small investor (21–50)*, *Medium investor (51–100)* and *Large investor (100+)* are binary variables that indicates the four groups of investors. The base group is owner-occupier group. Column 1 includes only the binary variables for the four investor groups. Columns 2 adds additional control variables for property-level characteristics. We include census block-group × year fixed effects in the regressions. We report *t*-statistics using standard errors clustered by census block-group in parentheses. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively

Dependent variable:	ln(Assessed value/market value)	
	(1)	(2)
Micro investor (2-20)	0.012***	0.013***
	(44.16)	(48.82)
Small investor (21-50)	0.015***	0.015***
	(6.59)	(6.44)
Medium investor (51-100)	0.011***	0.012***
	(3.82)	(4.26)
Large investor (100+)	-0.014***	-0.020***
	(-9.82)	(-14.63)
Age		-0.001***
		(-42.18)
Building area sqft		-0.000
		(-0.40)
Number of bedrooms		0.003***
		(13.39)
Number of full bathrooms		0.002***
		(7.31)
Census × block-group	Yes	Yes
Adjusted R^2	0.956	0.956
Observations	9,485,512	7,585,206

Table 13: Robustness test of the assessment ratio for owner-occupiers versus investors (ratio)

This table presents the estimates of the assessment ratio gap between owner-occupiers and investors (Model (1) using the raw assessment ratio as the dependent variable. We classify investors into four groups by their number of properties one year prior to the transaction. *Micro investor (2–20)*, *Small investor (21–50)*, *Medium investor (51–100)*, and *Large investor (100+)* are binary variables that indicate the four groups of investors. The base group is the owner-occupier group. Column 1 includes only the binary variables for the four investor groups. Columns 2 adds additional control variables for property-level characteristics. We include county × year fixed effects in the regressions. We report t-statistics using standard errors clustered by county in parentheses. *, ** and *** indicate significance better than 10%, 5%, and 1% respectively

Dependent variable:	Assessed value/market value	
	(1)	(2)
Micro investor (2-20)	0.003***	0.004***
	(4.39)	(5.91)
Small investor (21-50)	-0.002	-0.001
	(-0.55)	(-0.21)
Medium investor (51-100)	-0.005	-0.004
	(-1.44)	(-1.06)
Large investor (100+)	-0.011***	-0.015***
	(-4.04)	(-5.99)
Age		-0.000***
		(-6.81)
Building area sqft		-0.000
		(-0.16)
Number of bedrooms		0.002***
		(2.74)
Number of full bathrooms		0.001*
		(1.72)
County × Year FE	Yes	Yes
Adjusted R^2	0.888	0.885
Observations	9,591,426	7,683,825