Are the Property Tax Burdens of Permanent Homeowners Affected by Growth in Housing Rentals and Second Homes: Evidence Based on Big Data from Florida*

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December 2021

(PRELIMINARY. COMMENTS WELCOME)

Abstract

Homeowners who make their home their primary residence have resisted the entry of rentals into their neighborhoods and cities**.** One possible reason underlying this resistance is that rentals increase the property tax burdens of homeowners. We relate the effective tax rate and the tax price that homeowners pay for public services to shifts in their city's housing units in favor of rentals, broken down by type. In addition to rentals, we also examine the fiscal impacts on homeowners from more housing units acting as second homes. Our analysis is based on an eleven-year panel of individual Florida homes, with the number of home/year observations in the millions. Our results show that single-family rentals and apartments increase effective tax rates and tax prices. Tax prices are also higher where single-family second homes are more prevalent.

Keywords: fiscal impacts, rental housing, second homes

* The authors would like to acknowledge helpful comments from Luke P. Rodgers. E-mail addresses: kihlanfeldt@fsu.edu (K. Ihlanfeldt), cynthia.yang@fsu.edu (C.F. Yang).

1. Introduction

Homeowners who make their home their primary residence have long resisted the entry of rentals into their neighborhoods and cities. Ex-President Trump offered his support for this resistance, characterizing low-income housing as a detriment to the suburbs. He dismantled the 2015 Affirmatively Furthering Fair Housing rule adopted during the Obama administration that required local governments to proactively ensure fair housing in order to receive federal housing funding. President Biden has restored the requirement and has stated a renewed commitment to increase the availability of rental units throughout the country, especially where exclusionary regulations have been an obstacle (The White House, 2021).

Attempts by homeowners to limit rental housing have taken a number of forms, including adopting exclusionary land-use regulations and NIMBY lobbying of public officials. The motivations underlying this resistance are multifaceted and not clearly understood. However, three reasons have been suggested in prior literature: racial and social prejudice, adverse effects from rentals on homeowner property values, and free-rider effects that cause rentals to increase homeowners' property tax burdens (Ihlanfeldt, 2004a).

In this paper, we focus on the fiscal effects of rental housing on homeowners, which has been under-studied in prior research. Only a few studies analyze the fiscal motivation that may underlie homeowner resistance to rental housing. To study these effects, we have constructed a unique eleven-year panel of millions of home/year observations within the State of Florida. The use of panel data with house fixed effects alleviates concerns over potential endogeneity bias that would arise from the use of aggregate cross-sectional data. Another advantage of the data is that it allows us to investigate variance in the fiscal effects on homeowners from different types of rental units, including single-family homes, condominiums, mobile homes, and apartments, which are further

divided into quality categories. We also study the impact on homeowners from second homes, which are increasingly being used as short-term rentals.[1]

Having a better understanding of homeowners' resistance to rental housing may help guide public policy toward reducing this resistance, resulting in an expansion of the national supply of rental housing. Possible benefits would include a decrease in the number of renters with excess rent burdens, which has reached crisis proportions, with some 20.4 million renters (46 percent) paying more than 30 percent of their incomes for housing and 10.5 million (24 percent) severely burdened by paying more than half of their incomes for rent (Joint Center for Housing Studies, 2021). Also, because homeowner resistance to renters is most severe in the suburbs, policies alleviating homeowner concerns could open up housing opportunities for lower-income and minority households in white neighborhoods, reducing income and racial segregation (Ihlanfeldt and Yang, 2021b).

Our results show that a shift in the mix of a city's housing units in favor of rentals and second homes and away from homes occupied by homeowners who make the home their primary residence increases the latter's effective property tax rate and the tax price they pay for public goods. However, among the types of housing units we consider, these effects are produced only by single-family homes and apartments. Further exploration suggests that these effects stem from the negative effects that these units have on neighborhood quality. The decline in neighborhood quality results in permanent homeowners enjoying less savings in property taxes from the cap that Florida has on the annual growth allowed in assessed values. Our results should be especially applicable to the other eighteen states that also have similar assessment growth caps.

[1] There is limited data on the number of second home owners who use their home as a short-term rental. Pacaso, a commercial broker for second homes, surveyed 300 owners of second homes. The survey indicated that about half (49.3%) use their home for personal use only, and 42.5% sometimes rent out their home as a short-term rental. The survey also revealed that before Covid-19, only 25.6% of second home owners used their home more than four weeks a year, implying that second homes are vacant for most of the year.

The next section describes our conceptual framework where we define the effective tax rate and the tax price of permanent homeowners and consider the various channels these variables may be impacted by rentals and second homes. Section 3 reviews the sparse literature that has previously studied these effects. Our data and methodology are described in Section 4. Estimated effective tax rate and tax price models are specified, as well as the equations used to uncover the pathways that may account for how these variables are influenced by rentals and second homes. Section 5 presents descriptive statistics. Our results are reported in Section 6, followed by a discussion of their relevance in Section 7. Conclusions and suggestions for future research are in Section 8.

2. Conceptual Framework

We study the fiscal effects on homeowners from a shift in the mix of housing units within a jurisdiction in favor of rentals and away from homes occupied full-time by their owners. The jurisdictions in our sample are all municipalities within the state of Florida. A number of alternative variables could be selected to gauge the impacts that rental housing units have on the property taxes of permanent homeowners. We choose the owner's effective property tax rate and the tax price she pays for the public services provided by her municipality. The effective tax rate is calculated as the ratio of property taxes paid by the owner to the home's market value. The tax price is the ratio of property taxes paid by the owner to the total property tax revenue of the municipality. The two variables provide different perspectives on how rental housing may disadvantage homeowners. The effective tax rate is a measure of the burden of the tax, assuming that house value reflects the homeowner's permanent income.[2] The tax price is of interest because

[2] The use of consumption-based measures of permanent income is defended by Poterba (1989), and housing consumption is used by Plummer (2003).

a higher price for a given level of public services lowers the homeowner's after-tax disposable income. More rentals may affect each variable differently; in fact, their responses to rentals may even be in opposite directions. As we outline below, rentals may affect homeowners through multiple pathways, and the pathway's importance may vary between the two measures.

Consider first the effective property tax rate (ETR) of property i in municipality c and year t. As well known, it is defined as

$$ETR_{ict} = \frac{Millage_{ct} \times TV_{ict}}{JV_{ict}}, \quad (1)$$

where $Millage_{ct}$ is the millage rate for jurisdiction c in year t, and TV_{ict} is the taxable value of property i in year t. In the case of Florida,

$$TV_{ict} = JV_{ict} - SOH_{ict} - E_{ict} = JV_{ict} - TS_{ict}, \quad (2)$$

where JV_{ict}, labeled the just value, is the estimated fair market value of property i in year t; SOH_{it} is the difference between the just and assessed value that results from Florida's Save Our Homes (SOH) cap on the annual growth in assessed value; and E_{ict} are the exemptions claimed by the homeowner. The sum of the latter two variables represents the tax savings (i.e., reduction in taxable value) provided by Florida statutes and is denoted by TS_{ict}.

To further clarify Florida property tax law, there are three values attached to each home on January 1 of each year: just value, assessed value, and taxable value. Assessed value equals just value in the first year of residence, and thereafter the two may diverge because there is an annual cap on the growth in assessed value of 3 percent or the rate of inflation, whichever is lower. The cap is only applicable to homeowners with a homestead exemption. To be eligible for the exemption, the homeowner must provide evidence that the home is her primary residence. Taxable value is obtained by subtracting exemptions from the assessed value. Many exemptions are allowed under Florida tax law. In addition to the homestead exemption, there are exemptions for

low-income seniors, disabled persons, widowers and widows, and the surviving spouses of veterans.

A unique feature of Florida's cap on the allowable annual increase in assessed value is portability. Established in 2008, when buying a new home, homesteaded homeowners are allowed to take all or a percentage of their SOH tax savings to their new home. If the new residence has a higher market value than the former residence, the portability amount is determined by subtracting the assessed value of the former home from its market value. For example, if the market value of the previous home is $250,000, but the assessed value is $150,000 because of the SOH cap, then the assessed value of the new home will be reduced by $100,000, and the 3 percent SOH cap will continue on that portion of the new home's assessed value. If the new residence has a lower market value than the previous home, only a percentage of the difference between the old home's market and assessed values can be transferred.[3]

From equations (1) and (2), it is clear that there are three pathways whereby rentals may raise ETR. First, if rentals increase property tax revenues by less than they increase the costs of providing public services, the millage rate must increase for the city to balance its budget, causing a rise in the ETR.[4] Second, ETR may rise if rentals produce negative spillover effects on homeowner property values, causing a decrease in just value.[5] Third, if rentals reduce just value by more than taxable value, total tax savings will shrink, causing a higher ETR.

[3] When downsizing the calculation of the percentage that can be transferred is complicated. It depends on the number of owners, their previous homestead status, and each owner's difference between their prior home's market and assessed value.
[4] Florida State Statue 129.01 states that city budgets must be balanced.
[5] Ihlanfeldt and Yang (2021a) describe three pathways that may cause rentals to lower neighborhood home values: rentals may create a visual negative externality from under maintenance, tenants may engage in less passive policing raising the level of neighborhood crime, and tenants may be less civically engaged.

A long literature has defined the tax price of public goods paid by the homeowner as her share in the property tax revenue of the taxing authority.[6] Since tax payment equals the product of millage rate and taxable value, we have

$$TP_{ict} = \frac{Millage_{ct} \times TV_{ict}}{Millage_{ct} \times \sum_{j=1}^{N_c} TV_{jct}} = \frac{TV_{ict}}{\sum_{j=1}^{N_c} TV_{jct}}, \quad (3)$$

where TV_{ict} is the taxable value of the home i within city c, $\sum_{j=1}^{N_c} TV_{jct}$ is the aggregate taxable value of the city, and N_c is the number of properties within the municipality c. In contrast to the effects of rentals on ETR, there is no pathway through changes in the millage rate on TP, because the millage rate enters both the numerator and the denominator of the TP expression and gets canceled out. There are two pathways moving in possible opposite directions whereby rentals may affect the homeowner's tax price. By generating negative effects on home values, TV_{ict} may decrease reducing TP_{ict}. Rentals induced changes in $\sum_j TV_{jct}$ may be either positive or negative. A negative change may result if rentals generate negative spillover effects in a sufficient number of neighborhoods to cause a citywide decrease in taxable value. A positive change may occur because a shift in housing units in favor of rentals reduces the number of properties entitled to the homestead exemption. In addition, only homesteaded properties enjoy the cap on increases in assessed value. Thus, in the case of rentals, there is no difference between taxable and just value.

In addition to rentals, we empirically explore the effects of increases in second homes on the ETR and TP of permanent homeowners. Because second homes are not eligible for the homestead exemption or the SOH cap, like rentals, their taxable and just values are identical. Holding the level of public services constant, a shift in favor of second homes and away from homesteaded

[6] This is the definition of the tax price in most empirical public expenditure demand studies going back to Bergstrom and Goodman (1973). See Crane (1990) for a critique of its usage.

homes will raise total property tax revenue, thereby reducing the millage rate and the ETR of homeowners. The increase in total property tax revenue also will cause a decrease in TP. The magnitudes of both of these reductions will depend on the impact of the shift toward second homes on the costs of providing public services. If the owners only use their second homes for part of the year, leaving the home vacant the rest of the year, there may be a corresponding decline in the need for (cost of) public services, which would further reduce the millage rate, ETR, and TP. This is an example of tax exporting. However, when owners are not using their second homes, they are increasingly offered as short-term rentals (e.g., Vrbo and Airbnb), so a possible decline in the need for public services is unclear. Second homes may also impact ETR and TP by generating similar negative effects on JV and SOH as full-time rentals. Either standing vacant or as a short-term rental, they may reduce neighborhood quality, resulting in lower homeowner property values.[7]

It should be clear from the above that there are multiple pathways whereby rentals and second homes may impact the ETR and TP of homeowners who reside in their homes. As described below in Section 6, our data allow us to estimate not only the effects of rentals and second homes on these variables but also the relative importance of the pathways we have identified in contributing to these effects. The latter may help design policies that mitigate the effects and thereby lessen homeowner resistance to rental housing.

3. Literature Review

The number of studies providing evidence on the fiscal impacts of housing rentals, or any type of land use, is surprisingly thin. In fact, we found only two studies that focus on rentals, and both limit their analysis to apartments (Ives-Dewey, 2007; Gallagher, 2016). No study has investigated

[7] Porch (2021) reports survey evidence indicating that upwards of a third of neighborhood residents oppose short-term rentals and half of them state that their opposition is based on their belief that rentals will reduce property values.

the fiscal impacts of single-family, mobile, or condominium home rentals. Other studies estimate the fiscal impacts of vacation homes (Anderson, 2004,2006) and of aggregations of commercial and industrial properties (Erickson and Wollover, 1987).

Ives-Dewey (2007) presents an empirical estimate of the fiscal impacts of apartments on local municipalities in two suburban counties surrounding Philadelphia. Using data on 51 municipalities obtained from county tax assessment data and other sources, she regresses the total local tax burden per household on apartment valuation per household, non-residential property valuation per household, median household income, and population density. Her results show that a $1,000 increase in assessed apartment valuation will lower the tax burden by $11.90 (*p*-value = .084). She concludes that positive fiscal impacts accrue from apartment uses, contrary to common beliefs that apartment uses generate disproportionately negative fiscal impacts.

Gallagher (2016) runs separate regressions for municipalities and school districts. In his preferred specification, changes in the effective tax rate are explained as a function of changes in apartments as a percentage of the total number of housing units, per capita expenditures financed by the property tax, the residential share of property value, state/year fixed effects, and a municipal level time trend. Changes are computed from decade to decade, using data from the Census of Governments covering 1760 suburban municipalities and 1830 suburban school districts. To address their endogeneity, the first two variables are instrumented using lagged levels of the variables at the beginning of the decade. His results showed that a one standard deviation increase in the apartment share decreased the effective tax of school districts by 18 percent, and a similar reduction is registered for municipalities, although the latter effect is not statistically significant at conventional levels. Gallagher's results are consistent with those of Ives-Dewey, with both suggesting that apartments provide a fiscal surplus to the community.

Anderson's two papers test the hypothesis that by exporting part of the tax base, vacation homes create a fiscal surplus for the community. In the first paper (2004), municipal budget data from the 1977 Census of Governments and US Census data on income and housing are used to regress per capita property tax revenue on an export ratio, median income, and intergovernmental transfers. The export ratio is the number of housing units used for seasonal and recreational purposes to the number of owner-occupied housing units. In three of the four states examined, the coefficient on the export ratio is significantly greater than zero, indicating that an increase in vacation housing share is associated with an increase in local per capita property tax revenue, providing support for the maintained hypothesis. The focus of Anderson's second paper (2006) is not the fiscal impact of vacation homes. Rather he uses a change in the tax price of public services paid by resident homeowners induced by a policy-induced change in the portion of the tax base coming from vacation homes to estimate the price elasticity of demand for public services. In 1996 the state of Minnesota lowered the value of vacation homes subject to property taxation, which increased the tax price, based on the idea that there would be a corresponding reduction in the amount of tax exporting. The tax price would rise only if an increase in vacation homes as a share of all homes yielded a fiscal surplus to the community (i.e., an increase in taxes larger than the increase in the costs of service provision). He concluded that permanent residents substantially increase public expenditures in response to the reduction in tax price caused by vacation homes.

The primary question addressed by Erickson and Wollover (1987) is whether local property tax burdens affect the amount of land that cities zone for commercial and industrial usage. However, they also study the factors that determine tax burdens. Using 1980 data on 77 suburban municipalities within the Philadelphia MSA, they regress taxes per household on commercial and industrial assessed values per household, along with other community descriptors. Their results

support the hypothesis that net fiscal benefits accrue to municipalities that have greater industrial and commercial activity.

4. Data and Methodology

4.1. Alternative Modelling Strategies

A number of empirical approaches could be implemented to assess the fiscal impacts of housing rentals on permanent homeowners. Given its wide availability and general interest, the most convenient variable to analyze is the millage rate.[8] Using cross-sectional or longitudinal jurisdictional level data, one could regress millage rates on land uses measured as percentages. For example, ceteris paribus, if rentals are a larger percentage of the housing units in City A than in City B, and rentals generate a fiscal deficit, then the millage rate will be higher in A than B, assuming both cities must balance their budget. However, if millage rates affect the location decisions of investors of rental housing, as is highly likely, the percentage of rental units is endogenous. Because other land uses may also be endogenous, the difficulty of identifying a multiplicity of valid instruments makes this approach unattractive.

While the millage rate is the statutory rate that is charged to balance the city's budget and therefore affects homeowners' tax liability, it only accurately captures the effective tax rate (ETR) on homeowners if the taxable value of the home reflects its fair market value. In this case, the effective tax rate equals the millage rate, and the tax payment liability equals the market value. However, in Florida and almost all other states, the taxable value of a home occupied by its owner who claims the home as her primary residence is generally not equal to the home's market value. Exemptions and caps are commonplace and create a wedge between these two values (Lincoln

[8]A mill is one one-thousandth of a dollar, and in property tax terms is equal to $1.00 of tax for each $1,000 of assessment.

Institute of Land Policy, 2017). Therefore, the ETR is a more reasonable measure of homeowners' tax burdens, but shifting the dependent variable from the millage rate to the ETR requires dealing with its variation among homeowners within the same jurisdiction.

These concerns have two implications regarding the preferred approach to studying the fiscal impacts of rentals on permanent homeowners. First, they suggest using the home as the unit of observation, and its ETR as the dependent variable, accounting for home level gaps between taxable and market values. Second, to study the impact at the home level, use a panel with home fixed effects to control for time-invariant unobservables specific to the home. This approach has the advantage that changes in the mix of land uses at the jurisdictional level can be treated as exogenous to the ETR. The idiosyncratic shocks that may affect annual changes in ETR at the house level, with high ETR variance within jurisdictions, can reasonably be treated as uncorrelated with annual changes in the jurisdictional mix of land uses.[9]

4.2. Florida Panel Data of Homes Occupied by Permanent Homeowners

Our primary data source is the county property tax rolls that must be submitted each year to the Florida Department of Revenue (FDOR). With these data, we constructed a big panel data set at the property level covering the years 2009–2019, with over nine million property/year observations. Because we wish to focus on the fiscal effects of rentals and second homes on homeowners who occupy their homes year-round, the properties included in our panel are restricted to homes that receive the homestead exemption. The homestead exemption is only available to homeowners who use the home as their primary residence. Because the exemption

[9] The average number of properties within a jurisdiction exceeds 2500 homes; hence, there is a large number of home-level idiosyncratic shocks within each city, suggesting that their aggregate is unlikely to be correlated with city-level changes (assuming the common trends/shocks have been controlled for by year fixed effects and other controls).

provides significant tax savings to eligible homeowners, we believe that we are reliably identifying permanent home-owning residents.[10]

ETR and TP of these homeowners serve as our dependent variables in the models we estimate. The data necessary to accurately compute them is provided by the FDOR. In computing the ETR, as defined by equation (1), a key variable is the JV. JV is the county tax assessor's estimate of what the home would sell for on January 1 of each year (i.e., the fair market value). In establishing their just values, counties must follow guidelines established by the FDOR. These guidelines provide in-depth information on the two acceptable methods of valuation for parcels: the sales comparison approach and the replacement-cost-less-depreciation approach. The FDOR evaluates the accuracy of each county's JV estimates each year using traditional assessment-sales ratio studies and other methods (Ihlanfeldt, 2004b). If estimates are deemed unreliable, the county must resubmit its tax roll for approval.

Many exemptions are allowed under Florida tax law. In addition to the homestead exemption, there are exemptions for low-income seniors, disabled persons, widowers and widows, and the surviving spouses of veterans. The exemptions attached to each property for each year are identified in the FDOR data. Also, in addition to the just value, the data report assessed and taxable value. SOH is the difference between just value and assessed value.

The houses in our panel are found in 375 different municipalities. The FDOR data identify the municipality, and with considerable specificity the land uses within each place. This allowed us to divide housing types into finely divided multiple categories. Our typology is first based on separating homesteaded and non-homesteaded residential units. If there is no homestead exemption, we categorize the home as either a rental or a second home. As described in Appendix

[10] In most cases the exemption reduces assessed value by $50,000, reducing the average homeowner's tax payment by between $800 and $1200 (Ihlanfeldt, 2021).

A, we use data on second homes from the American Community Survey to divide non-homesteaded homes into rentals and second homes separately for single-family, condominium, and mobile homes. The other rental group is apartments.[11]

Housing units in each group are clearly not the same and therefore may have different impacts on ETR and TP. To account for some within-group heterogeneity, we further divide the homes by their quality. The FDOR data contain a field denoting the general overall quality of the predominate structure(s) on the property. Property appraisers may use the Marshall and Swift/Marshall Valuation Service, other cost manuals, or appraisal/construction textbooks to establish general guidelines for improvement quality. After an onsite inspection, the county assessor assigns a score from 1 to 6, with 1 indicating "Minimum/Low Cost" and 6 indicating "Superior". A unit of average quality is given a 3. We subdivide our housing groups into low (values of 1 and 2), average (3), and high (4, 5, and 6) quality. This results in a total of 22 separate housing groups, which are identified in Table 1.

4.3. Estimated Models

With these data, we estimate the log of ETR and the log of TP as a function of each housing type expressed as a percentage of the total number of properties within the municipality. Total properties are the sum of those in the housing groups and non-residential properties. The latter are broken down into manufacturing, offices, retail, wholesale, and restaurants, with each entering as a control variable and also expressed as a percentage of all properties. The excluded property type serving as the reference group is the percentage of homes with a homestead exemption.[12]

[11] Apartments are measured as the number of individual units and not the number of buildings or complexes that they are a part of.
[12] Homesteaded homes are largely single-family (85%), with the rest condominiums.

Other control variables entering our models are defined at the home, block group, and municipality levels, which are listed in Appendix Table B.1. The importance of the home and block group variables stems from the fact that JV and TV can change over time as the result of changes in the home (for example, an increase in living space) or in the neighborhood (for example, racial transition), and these may be correlated with changes in the percentages of the housing types. At the municipality level, median household income is included based on the assumption that public services reflect the preferences of the median voter.[13]

Formally, our ETR and TP models can be expressed as:

$$y_{ict} = \boldsymbol{s}'_{ct}\boldsymbol{\beta} + \boldsymbol{x}'_{ict}\boldsymbol{\delta} + \alpha_i + \theta_t + \varepsilon_{ict}, \qquad (4)$$

for $i = 1,2,\cdots,N$, $c = 1,2,\cdots,G$, and $t = 1,2,\cdots,T$, where G denotes the number of municipalities. Our full sample contains $G = 375$ municipalities over $T = 11$ years. The dependent variable is ETR or TP, both in logarithmic form. $\boldsymbol{s}_{ct}$ is a vector of housing shares of primary interest based on both type and quality. $\boldsymbol{x}_{ict}$ is a vector of control variables, including time-varying house-specific characteristics, block-group level demographics and income, and municipality-level non-residential property shares and income. α_i is the unobserved house-specific effect, θ_t is the year fixed effect, and ε_{ict} is an idiosyncratic error.

4.4. Pathways Accounting for the ETR and TP Results

As outlined in Section 2, changes in the effective tax rate in response to changes in the mix of housing types can come through a just value (JV), tax savings (TS), or millage rate channel. Evidence on the relative importance of these channels may aid in designing policies to address

[13] Additional control variables that could be added are revenues obtained from user fees and intergovernmental transfers, which are the other two main revenue sources of Florida municipalities in addition to property taxes. More non-property tax revenue results in a balanced budget with a lower millage rate, which would reduce the ETR. However, there is no reason to expect that annual shifts in the share of housing units toward rentals and second homes are correlated with annual changes in revenues from these sources. Thus, their exclusion should not bias our results.

homeowners' resistance to rental housing. To formally decompose the effects, taking the log of both sides of Eq. (1) and using Eq. (2) yields

$$\ln(ETR_{ict}) = \ln(JV_{ict} - TS_{ict}) + \ln(Millage_{ct}) - \ln(JV_{ict}), \quad (5)$$

Let s_{ct} be any housing share of interest. Then taking derivatives of both sides of (5) with respect to s_{ct} leads to

$$\frac{\partial \ln(ETR_{ict})}{\partial s_{ct}} = \left(\frac{TS_{ict}}{TV_{ict}}\right)\frac{\partial \ln(JV_{ict})}{\partial s_{ct}} + \frac{\partial \ln(Millage_{ct})}{\partial s_{ct}} - \left(\frac{TS_{ict}}{TV_{ict}}\right)\frac{\partial \ln(TS_{ict})}{\partial s_{ct}}, \quad (6)$$

where $TV_{ict} = JV_{ict} - TS_{ict}$, and TS_{ict} are the tax savings provided by Florida statutes as the sum of SOH_{ict} and E_{ict}. As shown in (6), the effect of a housing share change on ETR is a weighted sum of the effects on JV, TS, and the millage rate, where the weights depend on the average ratio of the tax savings to the taxable value.[14] To investigate which pathway is dominant, we run separate regressions using JV, TS, and the millage rate as the dependent variable with the same set of covariates as in the ETR regression (Eq. (4)). The results are presented in Section 6.2.

Tax price changes can result from either a house-level change in taxable value or a change in the municipality-level taxable value. Specifically, it is straightforward to obtain

$$\frac{\partial \ln(TP_{ict})}{\partial s_{ct}} = \frac{\partial \ln(TV_{ict})}{\partial s_{ct}} - \frac{\partial \ln(\sum_{j=1}^{N_c} TV_{jct})}{\partial s_{ct}}. \quad (7)$$

To evaluate the relative contribution of the above two components, we run additional regressions using $\ln(TV_{ict})$ and $\ln(\sum_{j=1}^{N_c} TV_{jct})$ as the dependent variable in turn with the same set of covariates as in the TP regression. The results are presented in Section 6.3.

[14] The average ratio of TS to TV in our full sample is about 2.59.

5. Statistics Describing the Panel of Homes

All of the homes in our panel possess the homestead exemption each year they are in the sample. Because our models include home fixed effects, a home must be in the sample as least two years to be included. While the panel is unbalanced, the vast majority of homes are in the sample for all eleven years, with the mean duration equaling 9.9 years. Table 1 reports descriptive statistics for all of our dependent variables and each of our property types. Along with sample means, reported are the between and within standard deviations of each variable.[15] As expected, within deviations are smaller than between deviations, but generally the housing types display movement over the course of the panel that is necessary to identify their effects. Within standard deviations of the non-residential variables are comparatively smaller, which may make the estimation of their effects less reliable.

The statistics show reasonable values for all of the dependent variables. Somewhat surprising, however, is that the mean effective tax rate (without log transformation) is only .2 percent. This is explained by the large homestead exemption ($50,000) enjoyed by each homeowner in our sample, which when added to the savings from the SOH cap yields a total average reduction in taxable value of $123,535. Home appreciation was substantial in Florida over the years of our sample, with values doubling according to the Federal Housing and Finance Agency home price index. Hence, the SOH cap brought large tax savings to homesteaded homeowners. The mean tax price equals .1 percent, which is the average homeowner's share of the municipality's total property tax revenue. The quality breakdowns of each housing type show that most homes are judged of average quality by tax assessors, but there is variation in quality within each type. The largest rental type

[15] Because we are using panel data a standard deviation change can be computed between two randomly selected municipalities or between two randomly selected years within the same municipality.

is single-family homes, comprising 13.92 percent of the total number of properties, followed by apartments, condominiums, and mobile homes at 9.26, 2.77, and 1.7 percent, respectively. Second homes are largely single-family homes and condominiums.

6. Results

6.1. The ETR and TP Model Estimates

The results from estimating the ETR model are in Column 1 of Table 2. For each house type, three numbers are presented. The top number is the estimated coefficient, which yields the percentage change in ETR from increasing a type by one percentage point and decreasing homesteaded homes (the reference group) by one percentage point of the total number of properties. The number in parentheses is the estimated standard error clustered at the municipality level.[16] To gauge the magnitude of the estimated effects, the percentage change in ETR from increasing the type by one overall standard deviation is shown in brackets.

Among the rentals, what stands out is that single-family homes (regardless of quality) and apartments (except for those of high quality) show statistically significant increases in the ETR. Moreover, the effects appear to be non-trivial in magnitude. Standard deviation increases in average quality single-family rentals and apartments increase ETR by 11 and 6 percent, respectively. The results for condominium and mobile home rentals tend to be negative, but only for mobile homes of high quality is the effect statistically significant. There is little evidence that second homes affect the ETR. Only condominiums of average quality produce a significant effect (at only the ten percent level), which is negative in sign.

[16] The standard errors allows for arbitrary serial and cross-sectional correlation within a cluster (municipality), as well as heteroskedasticity of unknown form.

Column 1 of Table 3 reports the results from estimating the TP model. As in the ETR case, single-family rentals and apartments increase TP. In contrast to the ETR results, an increase in second homes is found to affect TP. However, the effects vary between single-family homes and the other housing types. Focusing on average quality units, for single-family homes the effect is positive, but for condominiums and mobile homes it is negative. Again, the estimates appear economically important. Standard deviation changes result in a 7 percent increase in the TP for single-family homes, and 3 and 7 percent reductions for condominiums and mobile homes, respectively.

Table 4 shows the results from re-estimating the ETR and TP models separately for cities at or below (small cities) and above (large cities) the median of the city size population distribution for the final year of our panel. The ETR (TP) results are in columns 1 and 2 (columns 3 and 4) of Table 4. The main rental housing findings obtained from the full sample showing that single-family homes and apartments lead to statistically significant increases in the ETR in both small and large cities, but with some differences in the quality of apartments. Overall, only a few housing types have effects on ETR that are statistically different between small and large cities. Two differences, however, are noteworthy. Low and average quality second homes produce a larger ETR increase in small cities. The difference is significant, and these homes have a statistically significant effect only within small cities, increasing the ETR. The pattern for high quality apartments is the same, with a larger positive effect within small cities that is significant there but not in large cities.

The main TP findings for the full sample are also evident for small and large cities, with single-family rentals and apartments having positive, significant effects. Paralleling the small versus large city ETR results, the majority of the housing types fail to have statistically different effects on TP by city size. However, compared to the ETR models, the TP models show that more of the effects

of the housing types are significantly different between cities. In particular, of the six types of mobile homes, rentals and second homes of low and average quality increase the TP more in small than in large cities. In fact, the effects reverse signs—positive in small cities and negative in large cities, with each effect significant, with one exception (low-quality rentals in large cities).

6.2. Estimates of the Components Driving the Effects of Rentals and Second Homes on ETR

As shown in Section 4, the effect on ETR of changing the municipality mix of housing in favor of rentals or second homes and away from homesteaded homes can be decomposed into the housing type's effects on TS, JV, and the millage rate. The results from estimating models explaining each of these variables are reported in Table 2. Covariates are identical to those included in the ETR and TP models. The numbers in parentheses and brackets are again the estimated standard error clustered at the municipality level and the effect of a standard deviation increase in the variable. As we reported in Section 6.1, the type that produces the largest increase in the ETR are average quality single-family rentals. How do these rentals affect the JV, TS, and millage rate of individual homeowners? They reduce JV (column 3), suggesting that their presence lowers neighborhood quality. A one percentage point increase in the rentals as a share of the number of total properties in the municipality reduces JV by about 2 percent. Depending on their quality, a standard deviation increase is associated with a JV decline from 6 to 16 percent. Our results are consistent with the findings of Wang et al. (1991), Coulson et al. (2002), and Coulson and Li (2013), who all find that an increase in the neighborhood share of single-family rentals reduces the values of nearby single-family homes. A very recent study by (Ihlanfeldt and Yang, 2021a) using Florida data finds that a one percentage point increase in the neighborhood share of housing units

represented by single-family rentals reduces the sale prices of single-family homes by 1.4 percent, which is similar in magnitude to our estimated JV effects.

Single-family rentals also reduce TS (column 2), suggesting that the decrease in neighborhood quality caused by more single-family rentals reduces JV by more than TV. The effect on the millage rate is positive but not significant. Plugging these results into our decomposition equation (Eq. (6)), the contributions of the three components are -.072 (JV), .008 (millage), and .088 (TS). Hence, the TS pathway is clearly dominant in explaining the positive effect of single-family rentals on ETR. For each housing type, an underscore line in Table 2 identifies the dominant component. For all single-family rentals and second homes, TS is the dominant factor. We have also highlighted the positive effect that apartments have on the ETR. An increase in the share of apartments as a percentage of the properties in the municipality reduces JV, unless they are above average in quality.[17] They are also found to increase the millage rate if they are below average in quality. Once again, however, the strongest effects are registered for TS, which suggests that, like single-family rentals, they reduce neighborhood quality and decrease tax savings. The largest increase in ETR comes from the lowest quality apartments, and for them the components equal -.025 (JV), 005 (millage), and .035 (TS).

6.3. Estimates of the Components Driving the Effect of Rentals and Second Homes on TP

The components accounting for the effects of the housing types on TP are the effects on the taxable value of the home and the total taxable value of the municipality (see Eq. (7)). The results from estimating the models explaining these values are reported in Table 3. Without exception,

[17] In comparison to single-family rentals, there is much less evidence on apartments' effects on nearby housing values. Similar to our results, Moody and Nelson (2007)'s findings for Gwinnett County, Georgia, show that apartments, especially those of low quality, reduce values.

single-family rentals, single-family second homes, and apartments raise TP by reducing the total taxable value. Share increases in these housing types all raise city property tax revenues because they are not eligible for the homestead exemption. On the other hand, they have negative spillover effects that lower the taxable values of nearby properties, reducing their taxable value, and lowering city property tax revenues. Our results show that the spillover effects dominate the loss in homestead exemptions, resulting in the housing types reducing the property tax revenues of the municipality.

Recall that the effects of second homes on TP vary between single-family homes (positive) and condominiums and mobile homes (negative). For both of the latter house types, the negative effect comes from an increase in the total taxable value. The contrasting effects on the total taxable value between single-family second homes and the other second homes reflect differences in their negative spillover effects on property values. The estimated JV models show that the negative spillover effects from single-family second homes exceed by a wide margin those from the other two types of second homes, resulting in a negative net effect on city revenue in comparison to the positive net effects for the others.[18] That is, in the case of condominium and mobile homes, when they are used as second homes, the loss of exemptions raises municipal revenues by more than their negative spillover effects reduce revenues.

We also estimated JV, TS, and millage rate models separately for small and large cities to investigate which components account for differences in effects between these cities.[19] Second homes and apartments increase ETR more in small than in large cities because within small cities they have a greater negative effect on JV relative to TV, suggesting that these homes create a

[18] In contrast to single-family second homes, condominium and mobile homes used as second homes are more spatially isolated within a city from homesteaded single-family homes, due to land use zoning. This may account for their relative absence of negative spillover effects.

[19] Because of their volume, these results tables are not included in the paper but are available upon request.

greater loss in total tax savings in small cities. Mobile home rentals and second homes increase the TP more in small than in large cities because they raise aggregate taxable value less in small cities. The estimated JV models suggest that mobile homes have greater negative spillover effects in smaller cities, which may explain their lower net impact (lower taxable value from spillovers exceeding higher taxable value from fewer properties with homestead exemptions) on total city taxable value.

6.4. Estimates on the Control Variables

The percentages of city properties represented by manufacturing, offices, retail, wholesale, and restaurants enter all of our models as control variables. Their estimated effects on ETR and TP are reported at the bottom of Tables 2 and 3, respectively. Manufacturing and office properties are statistically insignificant in all models, while the share of restaurants is negative and significant in the city taxable value model. An increase in the share of retail establishments has significant effects in 5 of the 7 models. A higher share reduces ETR and increases TS, JV, TP, and TV. All effects are consistent with more retail enhancing neighborhood quality, resulting in higher house values and less turnover. This suggests that retail activity provides a fiscal surplus to the community, yielding the expectation of a lower millage rate. A larger retail share does reduce the millage rate, with a *p*-value of .07, based on a one-tailed test. A larger share of wholesale properties reduces the millage rate but increases TP and decreases city taxable value. Apparently, wholesale activity generates a fiscal surplus to the community by reducing the cost of public services.

Other sets of control variables describe the house, neighborhood, and city. Their effects in each of our estimated models are reported in Appendix Table B.1. Generally, the variables perform as expected. A number of examples serve as illustrations. JV and TV increases for homeowners who improve the quality of their home or add interior living space, which results in a higher TP. The

neighborhood characteristic that is consistently significant is percent black. A higher percentage is associated with a lower ETR, TS, JV, TP, and TV. The city variable is median household income. Higher income raises the ETR, which is expected if higher incomes are associated with higher quality public services.

7. Discussion

Our analysis is based on making a distinction between homesteaded and non-homesteaded housing types. We make this distinction because it allows us to investigate the extent to which permanent homeowners (the homesteaded) are fiscally negatively affected by rentals and second homes (the non-homesteaded). Permanent homeowners have resisted the entry of the latter housing types into their neighborhoods and cities, and a fiscal motivation may underlie this resistance. There is a paucity of prior research on the existence and nature of these possible negative effects.

Our findings provide the first evidence on how a wide variety of non-homesteaded housing types alter the effective property tax rates and tax prices of permanent homeowners. Our use of panel data containing millions of observations at the home level, with year and property fixed effects, mitigates concerns over the possible endogeneity of our housing types. Our overarching conclusion is that shifts in the housing inventory in favor of non-homesteaded and away from homesteaded housing units raise the effective tax rate and tax price that permanent homeowners pay for public goods. Hence, there appears to be some justification on the part of these homeowners for a fiscal motivation underlying their resistance to such shifts. However, negative effects are not uniform across the housing types we analyze. We identify multiple channels whereby non-homesteaded homes may impact permanent homeowners' property taxes. The relative importance of these channels is found to vary among the housing types resulting in them having different impacts on permanent homeowners. There are three principal channels. One channel is the increase

in city tax revenue that comes from a larger percentage of homes without the homestead exemption and the cap on the annual growth in assessed value. Another channel is that a housing type may generate negative externalities that reduce the market and thereby taxable values. The third channel is that these same externalities may reduce the tax savings resulting from the cap on increases in assessed values.

Our results show that the net effect of these channels results in single-family rentals and apartments increasing the effective tax rates and tax prices of permanent homeowners. Both are found to decrease neighborhood quality resulting in lower home values. The loss in tax savings under the cap is the dominant factor explaining the rise in effective tax rates. In comparison to single-family rentals and apartments, increases in the shares of condominiums and mobile home rentals are not found to lower neighborhood quality (i.e., they do not emit negative spillover effects or induce higher neighborhood turnover). This accounts for their neutral effects on the effective tax rates of permanent homeowners.

The contrasting effects of single-family rentals and apartments versus condominium and mobile home rentals are also revealed in our tax price estimates. Larger shares of the first two types of rentals raise the homeowner's tax price, while the latter two rental types do not. For the first two types of rentals, negative spillovers are reducing the property tax revenue of cities by more than their exclusion of a homestead exemption is raising revenues. For the latter two types of rentals, these opposing effects tend to be offsetting.

The effects of second homes on tax prices also contrast between single-family rentals and condominium and mobile homes. As is true for single-family rentals, single-family second homes raise tax prices. Larger shares of condominium and mobile homes acting as second homes lower

tax prices. Again, our results suggest that these different effects reflect the larger reduction in neighborhood quality that comes from a larger share of single-family second homes.

Our findings for single-family rentals are consistent with prior studies that have found that they reduce neighborhood quality. However, the exact mechanisms that account for their negative spillover effects have not been documented. In the case of single-family second homes, prior research is less informative. To our knowledge, the evidence we provide is the first to show that these homes generate negative spillover effects that are similar in size to those emitted by single-family rentals. Neither prior research nor our findings shed light on possible mechanisms that may account for these negative effects. However, to the extent that these second homes are used as short-term rentals, a recent survey of 990 people listed as their primary reasons for opposing the entry of short-term rentals into their neighborhood the disruption of neighborhood peace and quiet and the creation of safety issues (Porch, 2021).

8. Conclusion

Our results suggest that certain housing units that are not occupied by homeowners as their primary residence lower the housing values of permanent homeowners and raise their effective property tax rates and the tax prices they pay for public goods. The principal mechanism accounting for these results is the detrimental effects these units have on neighborhood quality. Research is needed that would uncover the nature of these effects. Specifically, what is it about single-family rentals, single-family second homes, and apartments that adversely impact neighborhoods? With this knowledge in hand, policies could be implemented to preserve neighborhood quality as more of these homes increase in share within neighborhoods. Hopefully, this would lessen permanent homeowners' resistance to these units. Less opposition to rental housing may grow the supply of much-needed affordable rental housing, especially in better

neighborhoods. Less opposition to second homes that are used as short-term rentals, however, may worsen housing affordability to the extent that the homes could alternatively be used as long-term rentals (Horn and Merante, 2017; Barron et al., 2021).

In addition to research leading to a better understanding of the negative impacts of rentals and second homes on neighborhoods, there is a clear need to replicate our findings for other states. While Florida's property tax system is unique in a number of respects that may limit the external validity of our findings, the most important factor accounting for our results is the SOH cap on annual increases in assessed value. Similar caps now exist in 19 states (Walczak, 2018); hence, at least among these states, our results may have applicability.

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Table 1 Means and Standard Deviations

	Mean	Between Standard Deviation	Within Standard Deviation
Dependent Variables			
Effective Tax Rate			
Original Scale	.002	.001	.001
Log Transformation	−6.359	.724	.248
Tax Price			
Original Scale	.001	.001	.0003
Log Transformation	−7.946	1.106	.217
Millage Rate			
Original Scale	4.634	2.135	.487
Log Transformation	1.387	.582	.122
Just Value			
Original Scale	314,181	703,575	152,676
Log Transformation	12.032	.954	.178
Tax Savings (SOH+E)			
Original Scale	123,535	248,049	134,056
Log Transformation	11.265	.691	.373
Taxable Value			
Original Scale	190,646	517,094	63,122
Log Transformation	11.194	1.343	.213
Total Taxable Value of City			
Original Scale (millions)	409	514	116
Log Transformation	19.140	1.216	.132
Property Types			
Single Family			
Rent 1	2.99	4.47	1.63
Rent 2	8.64	6.34	2.21
Rent 3	2.29	2.38	1.42
Second 1	.95	1.52	.84
Second 2	4.26	4.26	1.84
Second 3	2.09	3.52	1.05
Condominiums			
Rent 1	.30	1.08	.83
Rent 2	1.68	3.05	1.57
Rent 3	.79	1.59	1.06
Second 1	.24	.91	1.23
Second 2	3.64	7.72	3.01
Second 3	1.93	5.02	2.68
Mobile Homes			
Rent 1	.38	.99	.28
Rent 2	1.12	2.26	.57
Rent 3	.20	1.00	.47

	Mean	Between Standard Deviation	Within Standard Deviation
Second 1	.15	.58	.18
Second 2	.48	1.48	.53
Second 3	.11	.69	.36
Apartments			
1	1.62	3.29	1.00
2	7.03	7.38	1.89
3	.61	1.27	.54
Manufacturing	.23	1.24	.09
Offices	1.94	1.99	.27
Retail	3.13	2.56	.39
Wholesale	.02	.09	.02
Restaurants	.37	.39	.06

Notes: Numbers 1, 2, and 3 attached to a variable name indicate low, average, and high quality, respectively. The number of observations (number of homes × number of years is in sample) = 9,388,278.

Table 2 Results: Effective Tax Rate and Components

	ln(ETR)	ln(TS)	ln(Just Value)	ln(Millage)
Single Family				
Rent 1	.0173***	−.0263***	−.0205***	.0079
	(.0061)	(.0051)	(.0033)	(.0051)
	[7.23]	[−10.96]	[−8.54]	[3.27]
Rent 2	.0211***	−.0342***	−.0280***	.0065
	(.0069)	(.0060)	(.0041)	(.0057)
	[11.86]	[−19.18]	[−15.72]	[3.63]
Rent 3	.0159**	−.0196***	−.0147***	.0100*
	(.0065)	(.0057)	(.0034)	(.0056)
	[5.44]	[−8.18]	[−6.14]	[4.16]
Second 1	.0074	−.0291***	−.0221***	.0041
	(.0094)	(.0089)	(.0068)	(.0073)
	[.82]	[−3.22]	[−2.45]	[.46]
Second 2	.0063	−.0211***	−.0174***	.0060
	(.0055)	(.0062)	(.0040)	(.0049)
	[2.28]	[−7.63]	[−6.29]	[2.17]
Second 3	.0068	−.0306***	−.0268***	−.0142***
	(.0066)	(.0068)	(.0050)	(.0050)
	[1.79]	[−8.03]	[−7.03]	[−3.72]
Condominiums				
Rent 1	−.0016	−.0017	−.0004	.0039
	(.0050)	(.0044)	(.0029)	(.0042)
	[−.34]	[−.36]	[−.08]	[.82]
Rent 2	.0063	−.0090***	−.0056**	.0001
	(.0042)	(.0031)	(.0022)	(.0029)
	[2.63]	[−3.79]	[−2.33]	[.04]
Rent 3	−.0089	−.0027	.0020	−.0090
	(.0097)	(.0056)	(.0034)	(.0069)
	[−1.74]	[−.52]	[.39]	[−1.76]
Second 1	.0016	−.0004	.0010	−.0001
	(.0046)	(.0004)	(.0033)	(.0037)
	[.23]	[−.06]	[.14]	[−.02]
Second 2	−.0061*	.0130***	.0093***	.0014
	(.0031)	(.0028)	(.0017)	(.0024)
	[−3.15]	[6.65]	[4.74]	[.70]
Second 3	.0010	.0099***	.0053**	.0040
	(.0048)	(.0037)	(.0022)	(.0035)
	[.34]	[3.29]	[1.75]	[1.33]
Mobile Homes				
Rent 1	−.0263	−.0109	.0088	−.0435
	(.0380)	(.0242)	(.0176)	(.0344)
	[−.95]	[−.40]	[.32]	[−1.56]

	ln(ETR)	ln(TS)	ln(Just Value)	ln(Millage)
Rent 2	−.0092	−.0215	−.0098	.0071
	(.0176)	(.0154)	(.0101)	(.0190)
	[−.60]	[−1.40]	[−.64]	[.46]
Rent 3	−.0499**	.0339	.0181	−.0336
	(.0232)	(.0219)	(.0152)	(.0208)
	[−1.45]	[.99]	[.53]	[−.98]
Second 1	.0041	.0212	.0084	.0465*
	(.0250)	(.0209)	(.0142)	(.0252)
	[.14]	[.73]	[.29]	[1.60]
Second 2	−.0023	−.0198	−.0128	−.0026
	(.0153)	(.0185)	(.0119)	(.0199)
	[−.14]	[−1.25]	[−.81]	[−.16]
Second 3	.0241	−.0124	−.0033	.0354**
	(.0182)	(.0249)	(.0164)	(.0142)
	[.76]	[−.39]	[−.10]	[1.12]
Apartments				
1	.0112**	−.0130***	−.0096***	.0054*
	(.0045)	(.0051)	(.0035)	(.0031)
	[4.48]	[−5.44]	[−3.81]	[2.16]
2	.0061***	−.0134	−.0093***	−.0008
	(.0023)	(.0021)	(.0014)	(.0020)
	[5.59]	[−12.26]	[−8.50]	[−.71]
3	−.0103	−.00001	.00004	−.0043
	(.0080)	(.0113)	(.0077)	(.0053)
	[−1.15]	[−.01]	[.01]	[−.48]
Manufacturing	.0386	−.0712	−.0389	.0280
	(.0364)	(.0509)	(.0384)	(.0312)
Offices	−.0008	.0368	.0070	.0077
	(.0179)	(.0237)	(.0133)	(.0116)
Retail	−.0381**	.0685**	.0401***	−.0219
	(.0188)	(.0283)	(.0132)	(.0149)
Wholesale	−.630	.187	.167	−.736**
	(.528)	(.439)	(.283)	(.351)
Restaurants	.111	−.271	−.144	−.128
	(.173)	(.183)	(.104)	(.132)
Municipalities		375		
Observations		9,388,278		

Notes: ETR = Effective Property Tax Rate. TS = Reduction in Taxable Value from Save Our Homes Assessment Growth Cap and Exemptions. Millage = City Millage Rate.

Numbers 1, 2, and 3 attached to variable names indicate below average, average, and above average quality, respectively. Number in parentheses is standard error clustered at the jurisdictional level. Number in brackets is the percentage change in dependent variable from a standard deviation change in explanatory variable. Underline identifies the dominant component accounting for the change in ETR. All regressions include house fixed effects, year fixed effects, and control variables at the home, block group, and municipality levels (reported in Appendix Table B.1). *, **, *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 3 Results: Tax Price and Components

	ln(Tax Price)	ln(Taxable Value)	ln(Total Taxable Value)
Single Family			
Rent 1	.0136**	−.0110***	−.0246***
	(.0059)	(.0037)	(.0051)
	[5.67]	[−4.58]	[−10.26]
Rent 2	.0232***	−.0133***	−.0365***
	(.0067)	(.0030)	(.0061)
	[13.02]	[−7.49]	[−20.51]
Rent 3	.0095**	−.0088**	−.0183***
	(.0048)	(.0036)	(.0041)
	[3.25]	[−3.69]	[−7.64]
Second 1	.0077	−.0189***	−.0266***
	(.0062)	(.0061)	(.0071)
	[.85]	[−2.09]	[−2.95]
Second 2	.0185**	−.0171***	−.0357***
	(.0075)	(.0045)	(.0051)
	[6.69]	[−6.19]	[−12.87]
Second 3	.0361***	−.0058	−.0418***
	(.0102)	(.0036)	(.0114)
	[9.46]	[−1.51]	[−10.98]
Condominiums			
Rent 1	.0053	−.0060***	−.0113***
	(.0036)	(.0027)	(.0037)
	[1.11]	[−1.24]	[−2.35]
Rent 2	.0063**	.0006	−.0057***
	(.0025)	(.0018)	(.0021)
	[2.65]	[.26]	[−2.38]
Rent 3	−.0042	.0022	.0063*
	(.0032)	(.0034)	(.0034)
	[−.82]	[.41]	[1.22]
Second 1	.0033	.0027	−.0006
	(.0035)	(.0027)	(.0043)
	[.48]	[.39]	[−.09]
Second 2	−.0051***	.0018	.0068***
	(.0020)	(.0017)	(.0020)
	[−2.59]	[.90]	[3.49]
Second 3	−.0012	.0023	.0035
	(.0023)	(.0019)	(.0023)
	[−.40]	[.76]	[1.16]
Mobile Homes			
Rent 1	−.0434	.0260	.0694*
	(.0420)	(.0184)	(.0415)
	[−1.55]	[.41]	[2.49]

	ln(Tax Price)	ln(Taxable Value)	ln(Total Taxable Value)
Rent 2	−.110**	−.0261***	.0843*
	(.053)	(.0100)	(.0465)
	[−7.18]	[.93]	[5.48]
Rent 3	−.0422	.0018	.0440
	(.0385)	(.0125)	(.0334)
	[−1.23]	[−1.70]	[1.29]
Second 1	−.142**	−.0340**	.108*
	(.064)	(.0152)	(.056)
	[−4.88]	[−1.17]	[3.72]
Second 2	−.117*	−.0125	.104*
	(.062)	(.0119)	(.054)
	[−7.41]	[−.79]	[6.62]
Second 3	−.0380	−.0146	.0234
	(.0447)	(.0154)	(.0371)
	[−1.20]	[−.46]	[.74]
Apartments			
1	.0105**	−.0038	−.0142***
	(.0049)	(.0028)	(.0047)
	[4.18]	[−1.50]	[−5.68]
2	.0134***	−.0024*	−.0158***
	(.0034)	(.0014)	(.0032)
	[12.32]	[−2.21]	[−14.53]
3	.0166	−.0059	−.0224*
	(.0123)	(.0042)	(.0124)
	[1.86]	[−.66]	[−2.52]
Manufacturing	−.0931	−.0283	.0648
	(.0839)	(.0235)	(.0797)
Offices	.0077	−.0015	−.0093
	(.0139)	(.0089)	(.0128)
Retail	.0323*	.0238**	−.0085
	(.0186)	(.0108)	(.0189)
Wholesale	3.525***	.273*	−3.252**
	(1.365)	(.148)	(1.350)
Restaurants	.646***	.0949	−.551**
	(.233)	(.0651)	(.219)
Municipalities		375	
Observations		9,388,278	

Notes: Numbers 1, 2, and 3 attached to variable names indicate below average, average, and above average quality, respectively. Number in parentheses is standard error clustered at the jurisdictional level. Number in brackets is the percentage change in dependent variable from a standard deviation change in explanatory variable. All regressions include house fixed effects, year fixed effects, and control variables at the home, block group, and municipality levels (reported in Appendix Table B.1). *, **, *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 4 Results: Effective Tax Rate and Tax Price for Small and Large Cities

	ln(ETR)		ln(Tax Price)	
	Small	Large	Small	Large
Single Family				
Rent 1	.0245***	.0177***	.0123**	.0101*
	(.0083)	(.0066)	(.0053)	(.0059)
Rent 2	.0198***	.0192**	.0098**	.0188***
	(.0072)	(.0078)	(.0049)	(.0057)
Rent 3	.0205**	.0167**	.0045	.0084*
	(.0088)	(.0068)	(.0047)	(.0048)
Second 1	.0291***	−.0006	.0147**	−.0016
	(.0105)	(.0105)	(.0063)	(.0071)
Second 2	.0202**	.0028	.0048	.0128**
	(.0080)	(.0056)	(.0039)	(.0064)
Second 3	.0130	.0008	.0034	.0326***
	(.0095)	(.0084)	(.0052)	(.0087)
Condominiums				
Rent 1	.0020	−.0045	−.0030	.0033
	(.0099)	(.0051)	(.0066)	(.0042)
Rent 2	−.0026	.0056	−.0024	.0059**
	(.0040)	(.0046)	(.0021)	(.0028)
Rent 3	−.0045	−.0107	.0024	−.0045
	(.0045)	(.0111)	(.0032)	(.0036)
Second 1	−.0047	.0037	.0050	.0032
	(.0063)	(.0050)	(.0038)	(.0041)
Second 2	−.0064**	−.0059*	−.0017	−.0047**
	(.0030)	(.0035)	(.0024)	(.0019)
Second 3	−.0053*	.0037	−.0012	.0013
	(.0028)	(.0063)	(.0023)	(.0026)
Mobile Homes				
Rent 1	.0150	−.0510	.0269**	−.0757
	(.0208)	(.0557)	(.0115)	(.0539)
Rent 2	.0225*	−.0304	.0143*	−.1709***
	(.0126)	(.0328)	(.0084)	(.0660)
Rent 3	.0080	−.176***	.0135	−.0101
	(.0120)	(.052)	(.0100)	(.0756)
Second 1	.0020	−.0016	.0333*	−.180**
	(.0279)	(.0318)	(.0200)	(.073)
Second 2	.0133	−.0124	.0210**	−.150**
	(.0114)	(.0245)	(.0085)	(.065)
Second 3	.0181**	−.0089	.0307	−.108
	(.0083)	(.0544)	(.0294)	(.091)
Apartments				
1	.0019	.0093*	−.0010	.0075
	(.0082)	(.0052)	(.0044)	(.0052)

	ln(ETR)		ln(Tax Price)	
	Small	Large	Small	Large
2	.0046	.0057**	.0052**	.0127***
	(.0036)	(.0025)	(.0021)	(.0033)
3	.0219**	−.0123	.0117*	.0082
	(.0109)	(.0083)	(.0069)	(.0100)
Municipalities	187	188	187	188
Observations	465,398	8,922,880	465,398	8,922,880

Notes: Standard error clustered at the city level is in parentheses. Underline indicates the difference in effect between small and large cities is statistically significant at the 10% level or lower. Numbers 1, 2, and 3 attached to variable names identify properties of low, average, and high quality, respectively. All regressions include house fixed effects, year fixed effects, and control variables at the home, block group, and municipality levels. *, **, *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Appendix A: Estimates of Second Homes and Rentals

To partition non-homesteaded housing units into rentals and second homes, we drew upon data from the American Community Survey's 5-year estimates for block groups. We first computed the fraction (p) of vacant units that are for seasonal, recreational, or occasional use within each block for each year of our panel. The number of non-homestead housing units among each type of housing unit (single-family, condominium, and mobile home) in the block group was then multiplied by p and $(1 - p)$ to obtain for each type estimates of the number of second homes and rentals in the block group, respectively. City totals were then obtained by summing across block groups.

Appendix B: Estimates of Second Homes and Rentals

Table B.1 Estimates of Home, Neighborhood, and City Control Variables

	ln(ETR)	ln(TS)	ln(Just Value)	ln(Millage)	ln(Tax Price)	ln(Taxable Value)	ln(Total Taxable Value)
Lot Size (sq ft)	2.0e-10	−2.1e-10	5.4e-12	5.5e-11	−3.4e-11	1.5e-10	1.9e-10
	(5.3e-10)	(3.8e-10)	(1.6e-10)	(2.0e-10)	(1.1e-10)	(3.3e-10)	(3.2e-10)
Quality	−.0166***	.0238***	.0223***	−.0029	.0098*	.0086*	−.0012
	(.0056)	(.0074)	(.0057)	(.0030)	(.0058)	(.0046)	(.0024)
Home Age	−.0033***	−.0002	−.0029***	−.0002	−.0058***	−.0060***	−.0002
	(.0007)	(.0004)	(.0006)	(.0004)	(.0011)	(.0012)	(.0003)
Interior Space (sq ft)	−.00002	.00009***	.00009***	−.00001	.00012***	.00008***	−.00004**
	(.00002)	(.00002)	(.00001)	(.00001)	(.00002)	(.00001)	(.00002)
Income BG ($1,000s)	.0004***	.0004***	.00003	.00003	.0003***	.0004***	.00006
	(.0001)	(.0001)	(.00005)	(.00006)	(.0001)	(.0001)	(.00006)
% Black BG	−.0009***	−.0010***	−.0008***	−.00001	−.0015***	−.0016***	−.0001
	(.0003)	(.0003)	(.0002)	(.00017)	(.0003)	(.0003)	(.0001)
% Hispanic BG	−.0009***	.0001	.00003	−.0005	−.0007***	−.0004*	.0003**
	(.0004)	(.0002)	(.00015)	(.0004)	(.0002)	(.0002)	(.0001)
Income City ($1,000s)	.0024**	.0003	−.0011	.00004	−.0029**	.0013**	.0042***
	(.0012)	(.0011)	(.0008)	(.0010)	(.0011)	(.0006)	(.0011)
Municipalities	375						
Observations	9,388,278						

Notes: This table complements Tables 2 and 3 in the main paper and presents the estimates on additional control variables.
ETR = Effective Property Tax Rate; TS = Reduction in Taxable Value from Save Our Homes Cap and Exemptions; Millage = City Millage Rate.
BG stands for block group. Quality takes on values 1-6, with 6 being the highest quality.
Standard error clustered at the municipality level is in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.