Property Taxes and Housing Allocation Under Financial Constraints*

Joshua Coven
NYU Stern School of Business

Sebastian Golder
University of Hamburg

Arpit Gupta
NYU Stern School of Business

Abdoulaye Ndiaye
NYU Stern School of Business

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Abstract

Low property taxes amplify lock-in effects for elderly homeowners, limiting housing access for young families. Higher property taxes function as "embedded leverage," reducing required down payments through a capitalization effect and enabling greater homeownership among younger households. Our overlapping generations model shows that raising California's property taxes to Texas levels would increase homeownership by six percentage points and young household ownership by eight percentage points. Conversely, higher capital gains taxes worsen lock-in effects and reduce young homeownership. Asset taxes can effectively reallocate housing to higher-valuation households when financial constraints exist, providing an independent justification for property taxation policies.

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1 Introduction

Housing markets are shaped fundamentally by mobility—the ease with which households can relocate to meet changing employment, family, or lifestyle needs. However, mobility may be constrained by lock-in effects, which result in households remaining in housing that no longer suits their circumstances due to barriers to reallocation. These frictions stem from multiple sources, including transactions costs, preferences (Andersen et al. 2022), mortgage design (Quigley 1987; Fonseca and Liu 2024), regulation (Glaeser and Luttmer 2003), and notably tax considerations (Kopczuk and Munroe 2015; Ferreira et al. 2010; Hilber and Lyytikäinen 2017). Persistent challenges with housing affordability and tight vacancy make it important to understand which policies may alleviate or amplify housing misallocation through lock-in effects.

The tax treatment of homeownership influences lock-in motives through various policy instruments, each with distinct incentives and distributional consequences. Property taxes, levied annually on the stock of housing value, generate continuous ownership costs that affect both purchasing and long-term tenure decisions. By contrast, capital gains taxes are triggered only upon the sale of property, resulting in different behavioral responses. While prior literature has extensively examined the role of these different tax instruments on government revenue and house prices, their differential impacts on residential mobility and homeownership have received comparatively little attention.

Our paper explores the role for real estate taxes in the allocation of housing. We develop an overlapping generations (OLG) model with heterogeneous agents, incomplete markets, and tenure choices to analyze the impact of different taxes on housing decisions over the life cycle. We find, perhaps surprisingly, that raising property tax rates from 0.8% of market value in low-property tax California to the 2% rate in higher-tax Texas would substantially raise homeownership among Californian households by six percentage points and increase homeownership rates among young households by nine percentage points in steady state, while also increasing migration into the state.

The key mechanism driving this result is the capitalization of higher property taxes into lower purchase prices, which relieves down payment constraints faced by financially constrained buyers, alongside higher user costs for existing homeowners. The combination of these forces reduces lock-in effects for households, enabling younger individuals to achieve greater homeownership. Our results suggest that property taxes can be viewed as a form of "embedded leverage" in the sense that they reduce the upfront, out-of-pocket cost borne by buyers in exchange for a series of ongoing property tax payments. By contrast, higher capital gains taxes amplify lock-in effects and reduce housing access. Therefore, a budget-neutral counterfactual that holds government revenue constant, but raises property taxes and reduces capital gains taxes, can further increase housing mobility.

We first provide empirical support for the basic assumptions and predictions of this framework. We highlight the basic lifecycle mismatch of housing demand induced by housing lock-in: housing is predominantly owned and occupied by older and wealthier households, who—at this stage in their life cycle—are typically empty nesters aging in place without younger, cohabiting family members (Figure 1). By contrast, younger households with children face a considerably more crowded housing situation. These housing allocations are even more skewed towards the elderly in low-property tax regimes. By contrast, high-property tax areas feature both younger homeowners and more young residents in general, as well as shorter housing tenures.

We provide empirical support for capitalization effects being a key differentiating feature of high-property tax areas. We find that house prices and price-to-rent ratios are substantially lower in areas with higher property tax rates. This would indicate a trade-off between greater upfront housing affordability in high-property tax areas and higher ongoing expenses. To further support a causal interpretation of this result, we analyze a quasi-experimental experiment in North Carolina, where staggered assessments lead to pre-determined shocks to property tax rates, which we estimate result in lower property values.

We then examine the quantitative role of property taxes in shaping housing allocations through a structural overlapping generations (OLG) model, focusing on housing tenure choices. We build a complex yet tractable model featuring six state variables across two geographies and a lifecycle that spans working years and retirement. We include a full set of choices, including location, tenure (rent vs. own), housing quantity, savings, and consumption. Our focus is on financial frictions based on down payment constraints, but we also incorporate realistic payment-to-income constraints. We allow for general equilibrium in housing markets, allowing house prices to adjust based on local supply elasticities and rental prices to shift in accordance with a no-arbitrage condition for the user cost. The model features lock-in effects resulting from preferences as well as transaction costs. The preference drivers of housing lock-in include a precautionary savings motive, resulting from an incomplete markets environment with income risk. Additionally, households have a bequest motive, which increases housing demand. These factors, along with the costs associated with moving, push up housing demand and, therefore, house prices, thereby constraining housing accessibility for younger households.

We focus on a model calibration comparing California and Texas. California has unusually low property taxes as a result of statewide mandates imposed by Proposition 13 (İmrohoroğlu et al. 2018; Ferreira 2010; Wasi and White 2005), while Texas is distinctive in having high property taxes. The highest migration flows from California are to Texas, further justifying our analysis focused on these two states. We account for other relevant state differences, such as differential state income tax rates. Our model calibration matches numerous empirical moments related to homeownership, wealth, income, and migration patterns across states. In particular, we match an important feature of cross-sectional variation in the homeownership-age gradient: homeownership is lower at young ages in low-property tax states, such as California, but rises quickly with age and remains higher among elderly residents compared to high-property tax states, like Texas.

Our first policy counterfactual examines the effects of raising California's average property tax rate from its current 0.8% to 2%, matching the rate in Texas. The increased property tax revenue is rebated in a lump sum to households. This results in a substantial capitalization effect, whereby higher property taxes result in an 11.2% decline in California house prices. This policy change would increase overall homeownership in California by six percentage points from 61% to 67% (an 11.1% increase), with particularly large gains of eight percentage points among households aged 25–44 (35% to 43%). The mechanism operates through the capitalization effect: lower house prices make homeownership more accessible to financially constrained young families, while higher ongoing tax obligations encourage elderly homeowners to downsize. The policy also generates net in-migration to California as previously constrained households can now afford to purchase homes in the higher-wage state, leading to slight increases in average income. Welfare also rises in California as a result. Our findings suggest that property taxes serve to alleviate lock-in effects by reallocating housing from elderly empty nesters to younger families, thereby addressing generational mismatches in housing consumption.

We next contrast the role of property taxes with capital gains taxes, which represent an alternative method of raising revenue on real estate. Capital gains taxes differ from property taxes in that they are collected at the time of realization, rather than annually, and are also typically applied nationally, as opposed to the more local implementation of property taxes. We consider a counterfactual in which capital gains taxes of 15% are lowered to 0% in both states in our model. As in the real world, bequests are not subject to taxation (due to step-up basis), and so households with capital gains taxes face an additional form of housing lock-in due to tax considerations. Reducing these capital gains taxes, therefore, alleviates lock-in, resulting in more housing turnover, churn, and therefore homeownership (an increase from 61% to 62%), especially among younger households (for whom it increases from 35% to 37%).

Finally, we consider a balanced revenue policy which eliminates capital gains taxes of 15% nationally, and increases property taxes in California by a proportionate amount necessary to remain budget neutral (from 0.8% to 1.13%). Importantly, this counterfactual therefore has no impact on the aggregate taxation stream received by the government. Consistent with our two prior sets of results, this policy strongly increases homeownership from 61% to 64%, particularly of younger households (from 35% to 39%).

We consider several points of robustness around these results. Our focus is on housing taxes, which play a significant role as a liability on household balance sheets. However, these taxes also typically fund public goods, such as schools and local infrastructure. Our baseline framework accommodates such spending by allowing tax revenue to be rebated lump sum to households, effectively assuming that households all value such goods at their financial cost. However, in practice, some families may value these goods—such as schools—more than others. To account for this possibility, we conduct a robustness check in which only younger families receive property tax transfers, as a proxy for their greater valuation of public goods. We find that property taxes have a stronger association with the sorting of young families as a result. Additionally, we also consider robustness with respect to the precise amount of the down payment requirement and find that our results are robust to this choice. We also point to limitations in our framework, which can be addressed in future work. Most notably, we abstract from additional lock-in effects stemming from Proposition 13, based on tenure-based taxation (which would further amplify our effects), and abstract from liquidity shocks faced by elderly households. We focus on two regions for tractability.

Our paper relates to several strands of literature. First, we relate to a literature that has focused on various dimensions of homeownership. Seko et al. (2023) emphasizes housing utilization in the context of aging societies. Housing choices under misallocation have also been studied in the context of housing regulation (Glaeser and Luttmer 2003); lock-in due to negative equity and interest rates (Ferreira et al. 2010; Fonseca and Liu 2024); and lock-in due to preferences (Badarinza et al. 2024). We focus on property taxes as a mechanism for addressing possible housing mismatch. Posner and Weyl (2017) argue that housing misallocation results from a holdup problem and advocate self-assessed valuation and Harberger taxes to address housing lock-in. Housing mismatch arises in our framework through different lock-in mechanisms and can, therefore, be important even in fully liquid housing markets. We also build on a growing body of work that studies the implications of public policy for homeownership and housing choice (Attanasio et al. 2012; Chambers et al. 2009a; Floetotto et al. 2016; Chambers et al. 2009b). Closely related is work by Sommer and Sullivan (2018), who focus on the ownership implications of interest rate deductions. We differ by focusing on a local policy variable, specifically property taxes. This introduces novel spatial variation in prices, rents, and homeownership, as well as migration between regions. It also results in cross-sectional variation in property tax rates, which we use to motivate our exercise and validate key mechanisms. We also compare the local policy variable with national policies, such as capital gains taxes.

We are also closely linked to papers considering the role of property taxes generally. In the theoretical literature, public finance thought on property taxation has focused on its efficiency and distortionary effects. George (1884) argues that land taxes are efficient as they are non-distortionary, an idea generalized to urban settings with public goods by Arnott and Stiglitz (1979). Conversely, applying Diamond and Mirrlees (1971)'s production efficiency theorem to property taxation highlights its distortionary effect on housing improvements. This paper introduces a novel rationale for property taxes by treating homeownership as an endogenous state and showing how property taxes can mitigate housing lock-in.

Other research has explored empirical consequences of property taxes in practice. Research has examined the role of property taxes, arguing that there might be biases or costs in the tax assessment process (Amornsiripanitch 2020; Avenancio-León and Howard 2022). Other papers highlight the potential for liquidity shocks resulting from tax changes (Wong 2023; Brockmeyer et al. 2021). These are transition costs arising from the dynamic adjustment across property tax regimes; our work differs in that we focus on the steady-state differences between regimes and highlight that property taxes yield reallocation effects through the capitalization channel. Dray et al. (2023) explores the history of property taxes in the United States. The papers most closely related to ours document capitalization effects of property taxes on housing values (Fraenkel 2022; Jiang et al. 2024; Livy 2018; Høj et al. 2017) and effects of changes in property tax rates on migration (Giesecke and Mateen 2022). We build on these mechanisms and explore the broader implications of the capitalization channel for household choices, such as homeownership and housing tenure. We also connect to work that has examined capital gains taxes in housing on turnover (Shan 2011), and differ by investigating the ultimate effects on home ownership and housing allocation.

Our paper is also related to a broader literature on taxation. Closely related is work by Guvenen et al. (2023) and Aguiar et al. (2024), who contrast wealth and capital gains taxes. Our work differs by focusing on housing assets which introduce novel lock-in motives which do not exist for financial assets. The basis of taxation in our framework—housing—is also also neither a negative externality itself nor a productive asset, generating a distinct motive for asset taxation. Kragh-Sørensen (2022) focuses on the distributional and transitional dynamics of property taxes, highlighting that optimal taxation would raise property taxes while lowering capital gains taxes. Dávila and Hébert (2023) argues for taxing dividends rather than corporate income in the presence of financial constraints at the firm level. Our framework, which focuses on the distributional consequences of high house prices, is also consistent with other work on the redistributive effects of asset price shocks, such as Fagereng et al. (2023).

Finally, our paper is also related to the literature on optimal capital taxation in lifecycle economies with uninsurable idiosyncratic risk (Conesa et al. 2009; Fehr and Kindermann 2015; Aiyagari 1995; Davila et al. 2012). We contribute to this literature by highlighting the importance of property taxes as a tool for redistributing housing wealth across generations.

The rest of the paper is organized as follows. Section 2 documents the concentration of housing ownership among older households and provides empirical evidence that higher property taxes are associated with increased homeownership among younger households and substantial house price capitalization effects. Section 3 develops an overlapping generations model with housing tenure choice, financial constraints, and location decisions to analyze how property taxes affect housing allocation through capitalization mechanisms. Section 4 calibrates the model to California and Texas housing markets and validates its ability to reproduce key empirical patterns, including lifecycle homeownership profiles. Section 5 examines the effects of a counterfactual that raises California property taxes to Texas levels, finding substantial increases in homeownership and welfare through improved affordability. Section 6 analyzes capital gains taxation, showing that these taxes create lock-in effects that prevent efficient housing reallocation and that their elimination increases homeownership. Section 7 presents revenue-neutral reforms combining property tax increases with capital gains tax elimination. Section 8 provides robustness checks and discusses limitations, including sensitivity to parameter choices and extensions for future research, and Section 9 concludes. Appendix A contains additional results, and Appendix B provides more detail on sample creation.

2 Empirical Analysis

In this section, we present empirical results to support the basic assumptions and predictions of our structural model. We highlight descriptive facts about the allocation of housing across generations and emphasize the relationship between the cross-sectional variation in property tax rates, housing allocations, and prices. These effects likely reflect a combination of selection and treatment effects. To further disentangle these, we present quasi-experimental evidence on the causal impact of property taxes on property values in this section, and use structural estimation to examine the broader implications in the subsequent analysis.

2.1 Data

We create a dataset to analyze individual-level variables in relation to the effective property tax rates corresponding to each observation. The individual-level data are drawn from the American Community Survey (ACS) 1-year public use microdata. The most granular geography we use is the Public Use Microdata Area (PUMA), which typically contains between 100,000 and 200,000 people. In many regions of the country, PUMAs are similar in size to counties. The ACS data contain individual-level variables, including homeownership, age, household size, and housing characteristics. We also connect this data to test score data, to account for public goods such as school quality (from 2013, provided by Opportunity Insights Lab, from the Stanford Education Data Archive), housing supply elasticity (Baum-Snow and Han 2024), as well as distance to the nearest city center to account for urban character.

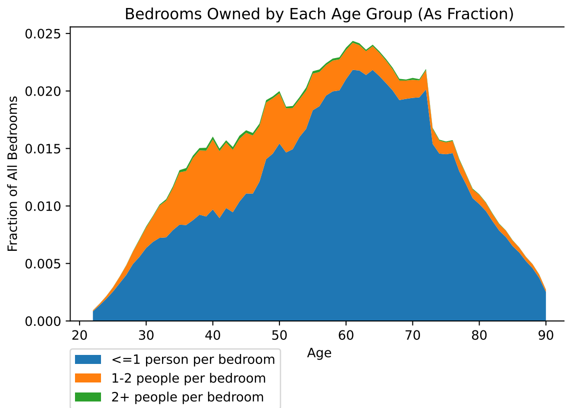
We also measure property tax assessments at the individual level using data from Verisk Marketing Solutions (previously known as Infutor). Its tax assessment panel contains a yearly cross-section of tax lots in the U.S. from 2016–2021. To create our panel of property taxes, we clean the data to include only residential properties. We include sales from 2016–2021 with a sale price greater than $25k. Full sample selection details are in Appendix B. We connect tax assessment data on property tax paid to transaction prices for the same properties to create local estimates of effective property tax rates. We aggregate these estimates up to three different geographic levels: Zip code, PUMA, and county. We exclude Zip codes and PUMAs with too few sales or abnormally high tax rates (e.g., PUMAs with tax rates greater than 5%). County-level realized rates and amounts are shown in Figure A1 in the Appendix. We observe considerable variation in property tax rates both across and within states, and we exploit both sets of variation below.

2.2 Concentration of Homeownership among Elderly People

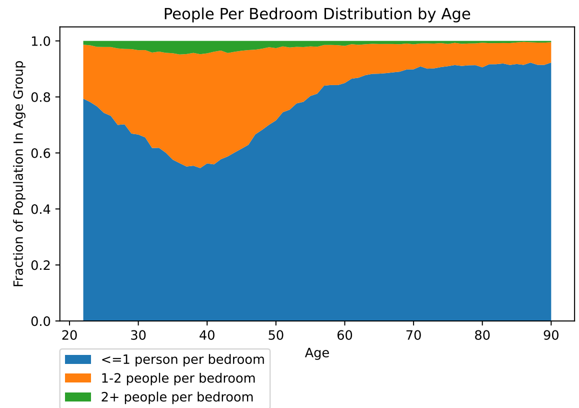
We begin our empirical analysis by documenting a key stylized fact: housing stock ownership is heavily concentrated among older households. As shown in Panel A of Figure 1, most bedrooms in owner-occupied units are owned by people aged 50–70, who are typically past their peak child-rearing years. This concentration of homeownership among empty nesters creates heterogeneity in bedroom utilization across age groups. Panel B shows that households aged 30–50 have the highest rates of housing crowding, with the largest fraction living with more than one person per bedroom. In contrast, the 50–70 age group that owns the majority of bedrooms tends to underutilize their housing space relative to younger households. This pattern suggests a potential mismatch in the allocation of housing across the lifecycle, with older households holding more bedrooms than they need while younger families face space constraints.

Figure 1: Housing Allocation Across the Life Cycle

Panel A: Bedroom Ownership Distribution

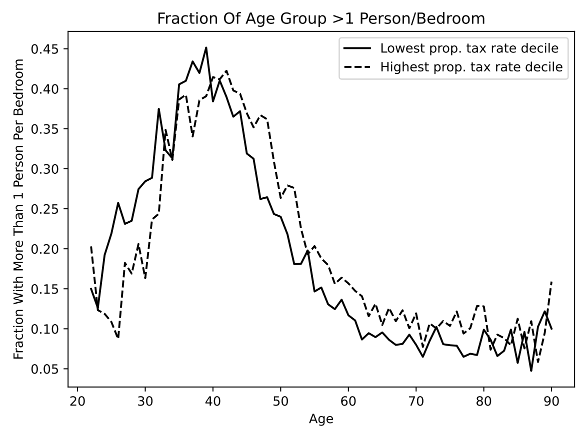


Panel B: Crowding



Panel C: Bedroom Ownership Distribution

Panel D: Crowding



Notes: This figure measures housing ownership and crowding across the age distribution using ACS 1-year data from 2019 matched with PUMA-level property tax rates from Verisk/Infutor sale records measured from 2017–2019. Panel A shows the fraction of all bedrooms in the U.S. owned by each age group. This is the weighted sum of all bedrooms in the microdata for each age group, divided by the weighted sum of all bedrooms in the sample. Within each age group, the fraction is bucketed by the number of people per bedroom, which is calculated by dividing the number of people in the household by the number of bedrooms. Panel B shows what fraction of each age group lives in housing with a certain number of people per bedroom. Panel C shows Panel A split between the top decile of PUMA-level property tax rates, as drawn from the Verisk/Infutor property assessment records, and the bottom decile. Panel D shows the fraction of each age group living with more than one person per bedroom, similarly split by the top and bottom property tax deciles.

This age-biased character of homeownership may be driven by lock-in mechanisms that keep households in housing units beyond the point at which reallocation would make sense (i.e., elderly households might be expected to downsize as they age), which is an economic channel we explore later in the analysis. Regardless of the source, challenges in younger households accessing larger housing sizes and homeownership may have broader negative economic consequences through several possible mechanisms. First, families may be limited in accessing job markets in high-income areas due to a scarce available owner-occupied housing stock, resulting in spatial mismatch and lower aggregate incomes in the presence of agglomerative economies. Second, younger families with children may place a higher valuation for the same space. This could be the case due to complementarities between the number of children and the number of bedrooms. To the extent that family formation and childbearing decisions are themselves impacted by housing availability, limited housing stock for younger families may have broader demographic consequences (van Doornik et al. 2024). Third, areas with aging households may have limited local labor pools of workers to perform essential care functions for the elderly. Our paper focuses primarily on the housing allocation impacts of different property tax regimes, and our model considers the first channel (income effects) as a broader outcome of these housing decisions.

2.3 Spatial Allocation of Housing Across Generations

We next examine how housing allocations vary between areas with different property tax rates. Higher property taxes are associated with shifts in the homeownership distribution toward more bedrooms and less crowding for those aged 30 to 50. Figure 1 Panel C compares the distributions of bedrooms owned by age for the decile of PUMAs with the highest and lowest property tax rates. In high-property tax PUMAs, more bedrooms are owned by younger age groups. Panel D of this figure shows the fraction of each age group with more than one person per bedroom. In PUMAs with higher property taxes, people aged 20–40 live in less crowded housing, and people aged 50–80 utilize each bedroom more. Both associations suggest that property taxes have potential implications for the ownership and utilization of housing.

We then examine the relationship between property taxes and housing outcomes within a regression framework, which allows us to incorporate additional controls for local characteristics. In Table 1 Panel A, we regress an indicator for whether an individual is a homeowner on PUMA-level property tax rates and include controls for a battery of fixed effects (including income, age, local housing supply elasticities, test scores, and distance to the nearest city center). We find a statistically and economically significant increase in homeownership among younger households, those under 45, of 5.6 percentage points in response to a one percentage point increase in the state's property tax rate. This contrasts with a smaller increase of 3.2 percentage points in homeownership among elderly households aged 65 and above. The presence of test score controls, in particular, helps to partially rule out competing mechanisms based on the sorting of individuals into areas with high-quality public schools (funded substantially through property taxes); however, we decompose these channels more carefully in our structural estimation.

We also examine the relationship between property taxes and household crowding in Table 1 Panel B. We find that higher property tax rates are associated with lower household crowding as measured by the number of people per room across age ranges. This also suggests greater housing affordability or access in areas with higher property tax rates.

2.4 Property Taxes and Capitalization

We focus on two potential mechanisms through which changes in property taxes could result in the reallocation of housing across age groups. Property taxes can be capitalized into housing prices, lowering down payment constraints for households with low wealth (the capitalization effect). Property taxes also raise the flow cost of holding housing, which could affect those with low incomes (a housing substitution effect).

We show descriptive evidence that property taxes are associated with lower home values in Panel A of Table 2 , illustrating the quantitative significance of the capitalization channel. We regress the value of a house on a PUMA's property tax rate, controlling for a battery of controls based on the characteristics of the building and local area (including housing supply elasticities, test scores, and distance to city center). In the specification with state fixed effects, a one percent increase in the property tax rate is associated with a 23% decrease in property value, indicating a substantial capitalization effect.[1]

Of course, because these results are descriptive cross-sectional associations, they do not necessarily establish a causal relationship between property taxes and housing values. In particular, a key concern might be that areas with lower housing costs adopt higher property tax rates to ensure a minimum level of government services. To partially address this concern, we look in columns 3–4 of Panel A Table 2 at the impact of property tax rates on the price-to-rent ratio.[2] The standard user cost model predicts that house prices should be lower relative to rents in areas with higher property tax rates, which is exactly what we observe. If property taxes primarily operated through higher-quality public amenities, we would instead expect both house prices and rents to be higher in high-tax areas, since renters would also benefit from better schools and services. However, a potential concern with this interpretation is that owner-occupied and rental housing may serve different market segments—for instance,

[1] In principle, higher property taxes used to fund valuable local public goods could offset the capitalization effect (Brueckner 1982). This possibility is premised on the assumption that local government spending is efficiently spent on local goods valued by residents. Our results suggest that, at least in the cross-section, higher property taxes generally go hand in hand with lower housing values.

[2] Because this specification relies on aggregate rent data, this estimation is run at the PUMA level, resulting in fewer observations.

Table 1: Residential Occupancy and Property Taxes

Panel A: Homeownership and Property Taxes

	Dependent variable: homeowner					
	Under 45	Under 45	45–64	45–64	65+	65+
	(1)	(2)	(3)	(4)	(5)	(6)
Prop Tax Rate	2.99***	5.62***	2.24***	4.23***	0.55**	3.24***
	(0.40)	(0.63)	(0.30)	(0.52)	(0.25)	(0.56)
log(HH Income)	0.15***	0.15***	0.13***	0.14***	0.09***	0.10***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Supply Elasticity	0.45***	0.41***	0.32***	0.29***	0.23***	0.21***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age, Income, Div Income Controls	Y	Y	Y	Y	Y	Y
Math Scores, Dist. to City Controls	Y	Y	Y	Y	Y	Y
State FE	N	Y	N	Y	N	Y
Clusters Level	PUMA	PUMA	PUMA	PUMA	PUMA	PUMA
Observations	742932	742932	1074707	1074707	931385	931385

Panel B: Housing Crowding and Property Taxes

	Dependent variable: log(people per room)					
	Under 45	Under 45	45 to 64	45 to 64	65+	65+
	(1)	(2)	(3)	(4)	(5)	(6)
Prop. Tax Rate	0.08	-3.96***	-0.06	-5.24***	-0.27	-4.96***
	(0.38)	(0.56)	(0.38)	(0.57)	(0.33)	(0.59)
log(HH Income)	-0.01***	-0.01***	0.05***	0.05***	0.11***	0.11***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age, Income, Div Income Controls	Y	Y	Y	Y	Y	Y
Math Scores, Dist. Controls	Y	Y	Y	Y	Y	Y
Supply Elast. Control	Y	Y	Y	Y	Y	Y
State FE	N	Y	N	Y	N	Y
Clusters Level	PUMA	PUMA	PUMA	PUMA	PUMA	PUMA
Observations	742932	742932	1074707	1074707	931385	931385

Notes: *p<0.1; **p<0.05; ***p<0.01. This table displays the cross-sectional relationships between property taxes, homeownership, and housing crowding. Data for both panels are drawn from individual-level variables in the ACS 1-year data from 2017 to 2019, merged with PUMA-level property tax rates from Verisk/Infutor sale records. Panel A shows a regression of an indicator variable for whether the individual is a homeowner on the property tax rate of the PUMA, along with controls. Panel B presents results from the same specifications, except that the dependent variable is the log of the fraction of people per bedroom in the individual's housing unit. Columns (1) and (2) focus on homeownership by households under 45, columns (3) and (4) focus on homeownership among households 45–64, and columns (5) and (6) focus on homeownership among the elderly. Controls in all specifications include the log of household income, housing supply elasticity (Baum-Snow and Han 2024), a fixed effect for individual age of the oldest member of each household in the ACS, the log of dividend interest and rental income, local math scores (from 2013, provided by Opportunity Insights Lab, from the Stanford Education Data Archive), and distance to city center (the distance within each CBSA to the centroid of the ZIP code with highest population density). State fixed effects are included in columns (2), (4), and (6). Standard errors are clustered at the PUMA level, and all specifications are estimated with weighted least squares, where each observation is weighted by the variable housing unit weight from the ACS.

Table 2: Financial Constraints and Property Taxes

Panel A: Capitalization Effect of Property Taxes

	log(price)		$\log\left(\frac{\text{price}}{\text{rent}}\right)$		$\log\left(\frac{\text{price}}{\text{sf rent}}\right)$	
	(1)	(2)	(3)	(4)	(5)	(6)
Prop. Tax Rate	-22.94***	-26.41***	-20.16***	-21.37***	-19.80***	-21.52***
	(1.38)	(2.06)	(0.87)	(1.39)	(0.79)	(1.43)
Percent Difference	-20%	-23%	-18%	-19%	-18%	-19%
Bldg and Bdrms Controls	Y	Y	Y	Y	Y	Y
Math Scores, Dist. Controls	Y	Y	Y	Y	Y	Y
Supply Elasticity	Y	Y	Y	Y	Y	Y
State FE	N	Y	N	Y	N	Y
Observation Level	Indiv.	Indiv.	PUMA	PUMA	PUMA	PUMA
Clusters Level	PUMA	PUMA	PUMA	PUMA	PUMA	PUMA
Observations	1973136	1973136	5505	5505	5501	5501

Panel B: Quasi-Experimental Evidence on Capitalization

	Property Tax Amount			log(price)		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated × Post	87.7***	130.3***	101.6***	-0.011**	-0.010**	-0.012**
	(22.9)	(31.0)	(16.7)	(0.005)	(0.005)	(0.005)
log(Prev. Sale Amt.)				0.365***	0.364***	0.365***
				(0.011)	(0.012)	(0.011)
DiD Specification	TWFE	Stacked	Sun and Abraham	TWFE	Stacked	Sun and Abraham
Implied Disc. Rate				3.16%	5.09%	3.3%
Property FE	Y	Y	Y	N	N	N
Unit-Level Controls	N	N	N	Y	Y	Y
ZIP FE	N	N	N	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Clusters Level	ZIP	ZIP	ZIP	ZIP	ZIP	ZIP
Observations	376250	659830	376250	92708	325454	92708

Notes: *p<0.1; **p<0.05; ***p<0.01. This table highlights evidence of capitalization effects on housing values. Data for panel A are drawn from the individual-level variables from the ACS 1-year microdata from 2017 to 2019, merged with PUMA-level property tax rates from Verisk/Infutor sale records. Panel A columns (1) and (2) present results from a regression of the property tax value as reported by the individual on the PUMA-level tax rate. Columns (3), (4), (5), and (6) are aggregated to the PUMA×year level and are regression of local price-to-rent ratios on PUMA-level property tax rates. Price-to-rent ratios are measured in columns (3) and (4) based on reported rents in ACS data among all renters; these are further subset on single-family renters in columns (5) and (6). Controls in all specifications include: housing unit's number of bedrooms and bathrooms, where both are categorical controls; math test scores (from 2013, provided by Opportunity Insights Lab, from the Stanford Education Data Archive), distance to city center, and housing supply elasticity (Baum-Snow and Han 2024). Columns (2), (4), and (6) additionally control for state fixed effects. Standard errors are estimated with weighted least squares, where each observation is weighted by the variable housing unit weight from the ACS. Panel B shows a quasi-experimental strategy on the impact of mass property tax reassessment on property tax amounts and house prices. The empirical design is described in more detail in Section 2, and the sample design is discussed in Appendix B. For columns (1), (2), and (3), the dependent variable is the property tax amount. The sample includes assessments conducted 2 years before and after treatment for treated properties, as well as for all years for the untreated properties. For columns (3), (4), and (5), the dependent variable is the log of the sale price of a property. Columns (1) and (4) run a standard two-way fixed effects specification, Columns (2) and (3) use a stacked DiD estimator following Cengiz et al. (2019), and Columns (3) and (6) use a saturated DiD estimator following Sun and Abraham (2021). All specifications in Panel A have standard errors clustered at the PUMA level and are shown in parentheses. Standard errors for Panel B are clustered at the ZIP code level.

homeowners may be more likely to have school-age children and may place greater value on education-related amenities than renters.

To address this segmentation concern, we also explore the price-to-rent ratio in columns 5–6 of Table 2 subsetting on rental rates paid by single-family renters, and also find similar effects in this specification. This descriptive evidence informs the assumptions we make in our quantitative model, as presented in Section 4.[3]

2.5 Quasi-Experimental Evidence on Property Tax Incidence

A potential challenge in interpreting the results from the previous section on capitalization effects is the possibility of selection effects in sorting individuals into different regions. While the comparison of house prices vs. rents adds some support to a user cost-based interpretation of the impact of house prices, we provide more direct evidence in this section based on a quasi-experimental analysis of property tax changes on housing values.

To do so, we analyze the impacts of mass assessments of property taxes, which take place at predetermined intervals. Local jurisdictions manage the property assessment process differently; we follow the empirical approach of (Fraenkel 2022) and (Giesecke and Mateen 2022) applied to North Carolina, where we are able to identify systematic reassessments that affect entire areas. Appendix B defines the sample selection in more detail, which isolates reassessment episodes that generate plausibly exogenous variation in property tax burdens. With these treatments in hand, we run the regression

$$Y_{it} = \alpha + \beta \cdot \mathrm{Treat}_i \times \mathrm{Post}_{it} + \gamma_i + \delta_t + \mathbf{X}'_{\mathbf{it}}\theta + \varepsilon_{\mathbf{it}}$$

where we compare outcomes Y, which include property tax amounts and sale prices, against an indicator for whether the area was in a treated jurisdiction after the property tax assessment cycle. We control for year and ZIP code fixed effects, as well as individual property controls. For outcomes related to property tax, we examine all property tax assessments and control for a property fixed effect. For outcomes on sale price, we include a control for the last sale price to mimic a repeat-sales approach.

Our results, shown in Panel B of Table 2, highlight large capitalization effects of property taxes on housing values. Because our approach entails staggered difference-in-differences, we show robustness of the TWFE approach with respect to the method of (Sun and Abraham 2021) and the stacking method of (Cengiz et al. 2019). Our estimates suggest a substantial pass-through of property tax assessment shocks to increases in aggregate property tax

[3] Appendix Table A2 also shows comparable capitalization estimates when focusing on the states of California and Texas, the key focus of our subsequent analysis.

revenues, as well as decreases in property values, consistent with capitalization effects. The implied discount rates, comparing the future stream of property tax payments against the upfront reduction in property values, vary based on the specification but range from 3.2% to 5%.

While we view these results as compelling causal evidence for the direction of capitalization effects, there are two challenges in interpreting these estimates. First, the capitalization effects are estimated over a short-term window, during which we can measure their effects before they are contaminated by the impacts of subsequent tax changes. Second, the effects we estimate are local to North Carolina, which has a distinct regulatory and housing supply environment from the other states we focus on. To support this interpretation, we show in Appendix Table A1 that the strength of the capitalization effect depends critically on the local housing supply elasticity. Especially when we focus on the variation in supply elasticities across states, we find considerably more evidence for capitalization in more inelastic environments (i.e., changes in housing demand can result in larger shifts in quantities, rather than prices, in more elastic areas). This channel is consistent with basic economic frameworks (such as DiPasquale and Wheaton (1992)) and suggests one reason why estimates of capitalization drawn from different settings may yield somewhat distinct estimates. For all of these reasons, we use the evidence in this section to motivate the direction of the capitalization effect, and calibrate the precise magnitude using local supply elasticities in Section 4.

2.6 Embedded Leverage Interpretation of Property Taxes

The trade-off between property taxes, which entail lower upfront costs in exchange for a higher ongoing stream of future property tax payments, suggests that property taxes can be viewed as a form of "embedded leverage." This is true in the sense that other leverage products, such as mortgages, also lower up-front prices paid by equity-holders in exchange for promises of future payments. A natural question in this setting is to ask what the implied interest rate is for the leverage entailed by property taxes. Our baseline cross-sectional capitalization estimates imply a discount rate of around 4.5%. One way to think about this estimate is that households that are able to borrow for less than this rate generally dislike the role of property taxes, as they could lever the property themselves for a cheaper cost than the market-implied discount for property taxes overall. However, financially constrained households—those who borrow at a higher rate than this, or are unable entirely to borrow—may prefer properties with property tax streams.

To further illustrate the significance of the capitalization force for our understanding of housing values, we show the impact of property taxes on housing value in Figure 2. Panel

A of this figure shows the average house price across counties based on market transactions. However, a challenge in interpreting house prices drawn from market values is the drastically different stream of future property taxes faced by properties across the country. To provide a more consistent benchmark, we consider a counterfactual in which property taxes across the country are assumed to be zero. To derive new prices under that benchmark, we draw on our estimates of the capitalization effect as well as the cross-county variation in property tax rates.

The difference in house prices between the two figures can be thought of as precisely quantifying the embedded leverage in existing house prices. Appendix Table A3 highlights the empirical sale distribution in each state, along with our estimate of the hypothetical value under zero property taxes, as well as the magnitude of the embedded leverage component. Several states conventionally regarded as cheap, such as Texas or Illinois, look considerably more expensive when taking into account the substantial property tax liability. Other states, such as California, remain expensive—but relatively not as expensive when incorporating low property tax liabilities. This distinction between high-tax Texas and low-tax California forms a key part of our subsequent analysis. Finally, other high-cost areas, such as those in the Northeast, are even more expensive when incorporating the value of the property tax liability stream.

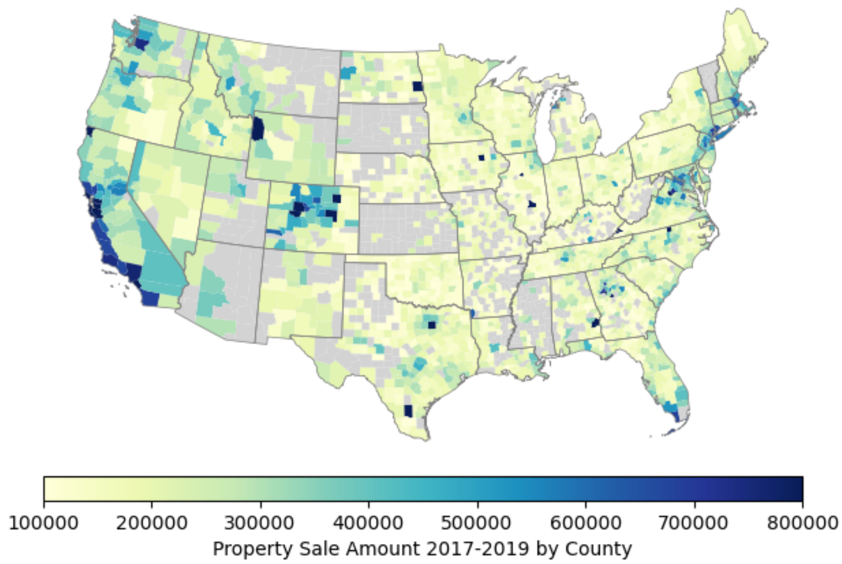
2.7 Demographic Implications of Property Taxes

How do households trade off the implications of property taxes as an additional leverage component? Heterogeneous differences in income and wealth by age could result in differential preferences for distinct property tax liabilities. Appendix Figure A2 Panel A shows the income distribution by age in our sample, and Panel B shows the interest, dividend, and rental income by age, which we use to highlight the wealth distribution. Income peaks in the 40s–50s, while capital income is increasing with age. These statistics illustrate a mismatch in income streams, indicating a potential role for financial constraints: many households have the flow labor income to pay for a mortgage before they have the capitalized stream of capital income (wealth) to afford the down payment on a house, even a starter house.

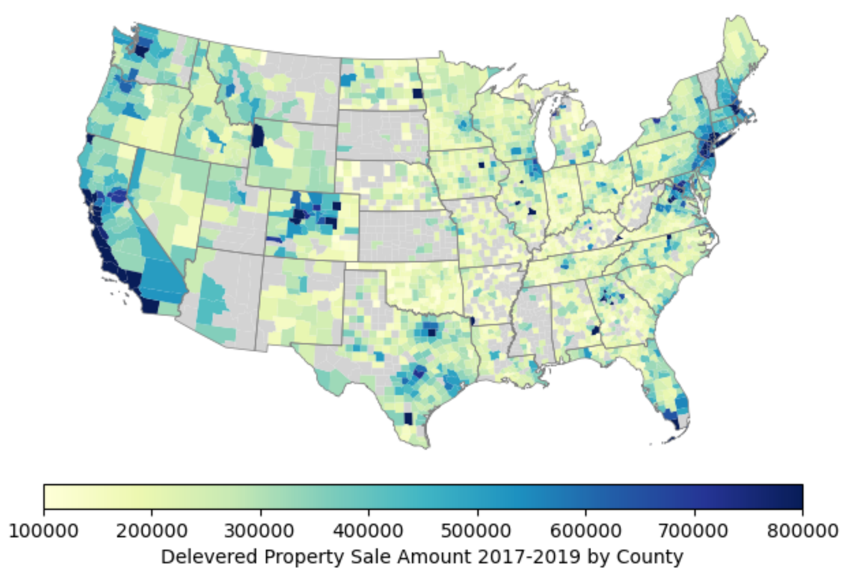
Consistent with these demographic implications, we show in Table 3 the broader age distribution implications of property taxes. Panel A of this table shows that areas with higher property taxes have a greater population of middle-aged households between the ages of 45–64, and a lower presence of households above the age of 65. These age implications are also linked to differences in housing tenure. Panel B of this table shows that higher property tax areas have fewer households with a length of residence higher than twenty

Figure 2: House Prices Under Property Taxes

Panel A: Empirical House Price Distribution



Panel B: House Prices Under Zero Property Taxes



Notes: These figures show the empirical house price distribution across counties in the United States (Panel A), as well as the imputed distribution under a zero-property tax hypothetical (Panel B). The empirical distribution is taken as the average house sale from 2017–2019 in housing transactions Deeds records from Verisk/Infutor To estimate the counterfactual property values, we draw on our estimates of capitalization (Table 2, column 2) along with county-level estimates of property taxes (Figure A1). Appendix Table A2 shows the averages at the state level.

years, but instead have more households with lengths of residence lower than this. This is additional evidence consistent with a mechanism by which property taxes combat lock-in forces, reducing housing tenure and thereby opening up more housing stock for younger households.

Table 3: Property Taxes and Demographics

Panel A: Property Tax and Age Distribution

	Pop. 0–44	Pop. 0–44	Pop. 45–64	Pop. 45–64	Pop. 65+	Pop. 65+
	(1)	(2)	(3)	(4)	(5)	(6)
Prop. Tax Rate	-0.38***	0.18	0.55***	0.45***	-0.17**	-0.63***
	(0.11)	(0.19)	(0.06)	(0.10)	(0.07)	(0.13)
Percent Difference	-0.7%	0.3%	2.0%	1.6%	3.4%	-3.9%
PUMA Level Controls	N	Y	N	Y	N	Y
County and Year FEs	N	Y	N	Y	N	Y
Observations	28770	28770	28770	28770	28770	28770

Panel B: Property Tax and Length of Residence (LOR)

	LOR < 5 Years	LOR 5–9 years	LOR 10–20 years	LOR 20+ years
	(1)	(2)	(3)	(4)
Prop. Tax Rate	-0.20	0.38***	1.14***	-1.32***
	(0.21)	(0.11)	(0.19)	(0.33)
Individual, Bldg, Bdrms Controls	Y	Y	Y	Y
PUMA Level Controls	Y	Y	Y	Y
State FE	Y	Y	Y	Y
Observations	1973136	1973136	1973136	1973136

Notes: *p<0.1; **p<0.05; ***p<0.01. This table looks at the relationship between property taxes and demographics. Data are drawn from the ACS 5-year estimates from 2017–2019 at the ZIP level merged with property tax rates calculated from the Verisk/Infutor assessment and transactions data from 2016–2020. Panel A estimates the relationship between changes in local tax rates on the presence of households of different demographic groups (household respondents aged 0–44 in columns (1)–(2), aged 45–64 in columns (3)–(4), and 65+ in columns (5)–(6)). Controls in columns (2), (4), and (6) include county fixed effects, year fixed effects, supply elasticity (Baum-Snow and Han 2024), and math test scores (from Opportunity Insights lab, derived from the Stanford Education Data Archive). Standard errors are clustered at the ZIP code level. Panel B shows the relationship between property taxes and the length of residence of the household, for less than five years (column 1), 5–9 years (column 2), 10–20 years (column 3), and more than 20 years (column 4). Controls include the log of household income, a fixed effect for age of the oldest member of the household in the ACS, distance to city center (the distance within each CBSA to the centroid of the ZIP code with highest population density), housing supply elasticity (Baum-Snow and Han 2024), and math test scores (from Opportunity Insights lab, derived from the Stanford Education Data Archive), a fixed effect for the number of units in the structure, a fixed effect for the number of bedrooms in the unit, and a state fixed effect. Standard errors, shown in parentheses, cluster at the PUMA level.

We also find evidence that the increase in homeownership in high-property tax areas is concentrated precisely among the set of financially constrained households. In Appendix Table A4, we regress homeownership on property tax rates for the households with above-sample-median income and below-median interest, dividend, and rental income. These are households with income above $63,000 and interest, dividend, and rental income of 0 or less.

This group has high income but low wealth. For this population, property tax rates are associated with a greater likelihood of homeownership. For the high-income and high-wealth groups, we also observe a positive but smaller association. For both low-income groups, we observe a positive but even smaller association with homeownership. This evidence suggests that property tax rates may make it easier for those with high incomes and low wealth to become homeowners, possibly through the capitalization channel. Such households are likely to be the most financially constrained by down payment requirements in their ability to purchase housing.

3 Model

In this section, we present a quantitative model of housing choice in the presence of housing taxes, including property and capital gains taxes. We develop an overlapping generations framework that incorporates housing tenure decisions, ownership choices, location choice between two regions, and realistic financial constraints. The model enables us to examine how various tax policies impact housing allocation across different age groups and geographic areas.

3.1 Main Mechanism in a Toy Model

To understand the key forces at work in our analysis, we begin with a simplified two-period model that illustrates how property taxes can affect housing accessibility through capitalization effects.

Consider a household that begins with initial assets A_1 but does not yet own a house. This household purchases a home in period 1 and seeks to maximize utility across two periods by choosing consumption levels C_1 and C_2, housing quantity H, and second-period assets A_2. The household's optimization problem is:

$$\max_{C_1,C_2,H,A_2} U(C_1) + \beta\mathbb{E}\left[U\left(C_2, H\right)\right]$$

where β is the discount factor and the expectation accounts for uncertainty in second-period outcomes. The household faces standard budget constraints in each period:

$$C_1 + PH + A_2 \leq (1+r)A_1 + Y_1 \tag{1}$$

$$C_2 \leq (1+r)A_2 + Y_2 - (\delta+\tau)PH$$

Where P is the house price, r is the interest rate, Y_t is income in period t, δ is the depreciation rate, and τ is the property tax rate.

The household also faces a financial borrowing constraint that limits leverage:

$$A_2 \geq -(1-\theta) \cdot P \cdot H \tag{2}$$

where θ represents the collateral constraint constraining the required down payment fraction. Combining the first-period budget constraint (1) with the borrowing constraint (2) yields a down payment affordability constraint:

$$(1+r)A_1 + Y_1 \geq \theta \cdot P(\tau) \cdot H.$$

The key insight is that if property taxes are capitalized into house prices such that higher taxes lead to lower prices, then households become less financially constrained through the down payment channel. This "embedded leverage" effect allows more households to afford homeownership, particularly those with sufficient income to cover ongoing tax payments but limited wealth for down payments. Thus, property taxes can generate non-Ricardian effects similar to those highlighted by Woodford (1998), improving household decisions set by directly relaxing financial constraints.

3.2 Setup

To build on the core mechanism in subsection 3.1, we augment the model along the following dimensions, which we describe in detail below. First, we account for a rental market and empirically relevant adjustment costs, which help us to quantify the impact of property taxes on housing allocations across different age groups.

Second, we account for a spatial dimension and consider two states in our framework, which allows us to incorporate migration as one possible margin of adjustment. Additionally, we allow for a much richer process for income, which produces a precautionary savings motive, which is one of the main motives for lock-in effects in the model. We also include other lock-in components, such as bequest motives for the elderly (which can be achieved by accumulating housing assets) and migration adjustment costs.

Finally, we allow for equilibrium in the housing markets. We build a model in general equilibrium for property markets based on aggregating housing demand and housing supply elasticities. We impose a no-arbitrage condition in the form of a user cost model to obtain the resulting implications for rental prices.

3.3 Model Framework

Economic Environment The economy consists of overlapping generations of households that live for a maximum of J periods. Households work for J_y periods and then retire for J_o periods, so that $J = J_y + J_o$. In each period, households make two key decisions. First, they choose their housing tenure, deciding between renting and owning a home, denoted by $S_t \in \{R, O\}$, as well as desired housing quantity H_t. In addition, they choose their location i_t from two available regions.

Preferences and Moving Costs Households derive utility from non-durable consumption C_t and housing consumption H_t according to a standard Cobb-Douglas utility function. Location and ownership decisions also directly affect utility through location-specific amenities and ownership benefits, with households incurring a utility cost of m when relocating to a new location. The complete utility function is given by:

$$U^{S_t}_{i_t,l}(C_t, H_t) = \frac{1}{1-\sigma}\left(C_t^{\alpha} H_t^{1-\alpha}\right)^{1-\sigma} + \Xi^R_l + \mathbb{1}_{\{S_t=O\}}\Xi^O_l - \mathbb{1}_{\{i_t\neq l\}}m, \tag{3}$$

where α represents the preference weight for non-durable consumption relative to housing, σ is the coefficient of relative risk aversion, Ξ^R_l captures location-specific amenity benefits available to all residents, and Ξ^O_l represents additional benefits from homeownership in location l. We normalize the amenity in one region to zero without loss of generality, allowing the other amenity benefits to be identified relative to this baseline.

Bequest Motives A key driver of housing demand is for bequests. To capture this component, households face a probability of death $1 - p_t$ in each period. Upon death, their utility depends on the bequests they leave, which are a function of total wealth:

$$B(W_{t+1}) = \Psi \frac{1}{1-\sigma} W_{t+1}^{1-\sigma}, \tag{4}$$

where Ψ is the intensity of the bequest motive. This generates an incentive for households to accumulate wealth, including housing wealth, particularly as they age.

Financial Markets Households have access to a risk-free asset, which accumulates interest at a rate r. Additionally, they can purchase housing, which provides a utility stream of housing consumption (which can also be accessible through renting), but depreciates each period at a rate δ, and also carries a user cost in the form of annual property taxes τ, and is subject to a capital gains tax τ_k if the asset is sold while the agent is alive.

If households purchase a home, they can finance it with a mortgage. The terms of the mortgage incorporate an interest rate, which is also set to r for convenience, and are subject to a loan-to-value (LTV) constraint θ_{LTV} as well as a payment-to-income (PTI) constraint θ_{PTI} at the time of origination. To evaluate the PTI constraint, we use an amortization rate a to compute implied payments at origination. After purchase, however, households are not subject to any constraints on the pace of mortgage repayment.

Housing Markets House prices P_i and rental prices R_i are subject to aggregate trends and vary across regions. Homeowners face a minimum house size constraint $\underline{H}$, reflecting the indivisible nature of housing and the fact that very small housing units may not be available for purchase. This requirement amplifies the role of the down payment constraint in ensuring that households must accumulate a sufficient down payment to purchase the smallest available house in each region. Renters face no such constraint and can choose arbitrary house sizes.

Housing markets are determined in general equilibrium through the interaction of housing demand and supply. In each region i, aggregate housing demand includes both owner-occupied and rental units and is shaped by household choices given prevailing prices.

Housing supply in region i is governed by a location-specific supply function:

$$H_i^{\text{supply}} = c_i \cdot P_i^{\rho_i} \tag{5}$$

where c_i is a region-specific construction cost shifter and ρ_i is the local housing supply elasticity.

Housing markets clear in each region:

$$H_i^{\text{demand}} = H_i^{\text{supply}}. \tag{6}$$

Rental prices are determined from house prices via a user cost relationship that imposes a no-arbitrage condition between renting and owning:

$$R_i = \phi_i P_i = (\tau_i + r + \delta - \gamma) \cdot P_i \tag{7}$$

where ϕ_i denotes the location-specific user cost of housing, τ_i is the local property tax rate, r is the real interest rate, δ is the depreciation rate of housing, and γ is the expected house price growth rate.

Each house sale incurs transaction costs equal to a fraction F of the house value, creating an additional source of adjustment costs which can contribute to housing lock-in effects.

Income Process During working years, household income follows a rich stochastic process that generates the income uncertainty responsible for generating precautionary saving behavior:

$$Y_t = \exp(\mu(i_t) + \chi(j_t) + z_t) \tag{8}$$

where $\mu(i_t)$ captures location-specific income differences, $\chi(j_t)$ represents the deterministic age-income profile, and $z_t = \rho_z z_{t-1} + \varepsilon_t$ is a persistent AR(1) process with autocorrelation ρ_z and innovation variance determined by ε_t. Income is subject to both national and location-specific labor taxes. We use a tax function based on Bénabou (2002) and Heathcote et al. (2017), extended to include location-specific labor tax rates. The tax paid on labor income y is given by:

$$T(y) = y - \lambda \cdot y^{1-\phi} + \delta_i \cdot y \tag{9}$$

where λ and ϕ govern the level and progressivity of national income taxation, respectively, and δ_i captures regional variation in income tax rates.

After retirement, households receive pension payments that we specify following Guvenen and Smith (2014), ensuring realistic replacement rates and income profiles for elderly households.

Aggregate Trends In a stationary environment, house prices are constant each period in the absence of shocks to property taxes, depreciation rates, or interest rates. This generates zero capital gains revenue against which capital gains taxes would apply. To generate a balanced growth path, producing nominal gains in housing investment, we allow for a consistent growth rate γ applied to income and house prices over time. All nominally growing variables, such as income, house prices, and rents, are normalized by $(1 + \gamma)^t$ so that the model is solved in stationary form.

3.4 Household Decision Problem

State Variables and Choice Set Let $s_t = (A_t, H_t, Y_t, i_t, j_t, d_t)$ denote the household's state vector, where A_t represents liquid assets, H_t is the current housing stock, Y_t is the current income (a combination of location, age, and random components), i_t is the current location, j_t is age, and d_t is the number of consecutive years the household has lived in an owner-occupied home.

In each period, households choose from the set

$$\mathcal{C}_{i_t} = \{(adjust, i_t), (noadjust, i_t), (rent, i_t), (adjust, i'), (rent, i') \tag{10}$$

where $i' \neq i_t$ denoting the alternative location. The "adjust" option means purchasing a new home, "noadjust" means remaining in the current home (only available to current owners), and "rent" means renting housing.

Value Function The household's problem incorporates idiosyncratic taste shocks, which create smooth choice probabilities and realistic mobility patterns. The value function for adjusters, no-adjusters, and renters is given by, respectively:

$$V(s_t, \varepsilon) = \max_{(h,l) \in \mathcal{C}_i} V^{h,l}(s_t) + \varepsilon^{h,l}(s_t)\,, \tag{11}$$

where $\varepsilon^{h,l}(s_t)$ are i.i.d. Type 1 Extreme Value distributed taste shocks with location parameter zero and scale parameter 1. The recursive housing problem varies depending on the chosen housing and location options. For adjusting homeowners, i.e., those who are purchasing a new home, it is given by:

$$\begin{aligned}
V^{adjust,l}(s_t) = \max_{C_t, A_{t+1}, \tilde{H}_t} \; & U^O_{i_t,l}(C_t, \tilde{H}_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1-p_t)B(W_{t+1}))\,, \qquad (12)\\
\text{s.t.} \quad & A_{t+1} + P_l \tilde{H}_t + C_t = (1+r)A_t + Y_t - T(Y_t) + T_l + (1-F)(1-\delta)P_{i_t}H_t \\
& \qquad - \tau_{i_t} P_{i_t} H_t - \tau_k (1-(1+\gamma)^{-d_t}) P_{i_t} H_t\,, \\
& A_{t+1} \geq -(1-\theta_{LTV}) \frac{1-\delta}{1+r} P_l \tilde{H}_t\,, \\
& (r+a)(-A_{t+1})^+ + \tau_{i_t} P_t \tilde{H}_t \leq \theta_{PTI} Y_t\,, \\
& \tilde{H}_t \geq \underline{H}\,, \quad s_{t+1} = (A_{t+1}, \tilde{H}_t, Y_{t+1}, l, j_{t+1}, 1)\,,
\end{aligned}$$

$$\begin{aligned}
V^{noadjust,i_t}(s_t) = \max_{C_t, A_{t+1}} \; & U^O_{i_t,i_t}(C_t, H_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1-p_t)B(W_{t+1}))\,, \qquad (13)\\
\text{s.t.} \quad & A_{t+1} + C_t = (1+r)A_t + Y_t - T(Y_t) + T_{i_t} - (\delta + \tau_{i_t}) P_{i_t} H_t\,, \\
& A_{t+1} \geq -(1-\theta_{LTV}) \frac{1-\delta}{1+r} P_{i_t} H_t\,, \quad s_{t+1} = (A_{t+1}, H_t, Y_{t+1}, i_t, j_{t+1}, d_t + 1)\,,
\end{aligned}$$

$$V^{rent,l}(s_t) = \max_{C_t, A_{t+1}, \tilde{H}_t} U^R_{i_t,l}(C_t, \tilde{H}_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1-p_t)B(W_{t+1}))\,, \tag{14}$$

$$\begin{aligned} \text{s.t.} \quad & A_{t+1} + C_t + \phi_l P_l \tilde{H}_t = (1+r)A_t + Y_t - T(Y_t) + T_l + (1-F)(1-\delta)P_{i_t}H_t \\ & \qquad\qquad\qquad\qquad - \tau_{i_t} P_{i_t} H_t - \tau_k(1-(1+\gamma)^{-d_t})P_{i_t}H_t\,, \\ & A_{t+1} \geq 0\,, \quad s_{t+1} = (A_{t+1}, 0, Y_{t+1}, l, j_{t+1}, 0)\,. \end{aligned}$$

Households decide each period whether to purchase a new house ("adjust"), remain in their current home if they already own one ("noadjust"), or rent a home ("rent"), and choose between the two locations, Texas and California. These decisions are influenced by taste shocks, which represent the unobserved utility of each option.

Importantly, the utility maximization problem for households is subject to three financial constraints. A down payment constraint requires that households have sufficient assets in place to provide a down payment; a payment-to-income constraint on having sufficient cash flow to pay each period's mortgage and property tax; and a minimum housing requirement. This last requirement ensures that the down payment requirement is binding, limiting the household's ability to purchase very low-cost housing.

3.5 Equilibrium Definition

Definition 1 (Stationary Recursive Competitive Equilibrium)**.** *a* stationary recursive competitive equilibrium *is a collection of objects*

1. Prices*: house–price vector* $\mathbf{P} = \{P_1, P_2\}$ *and corresponding rents* $\mathbf{R} = \{R_1, R_2\}$*;*
2. Value functions*:* $V(s, \varepsilon)$ *and option–specific values* $V^{adj,\ell}(s)$*,* $V^{noadj,i}(s)$*,* $V^{rent,\ell}(s)$*;*
3. Policy rules*:*

$$\Big\{C(s),\ A'(s),\ \tilde{H}(s),\ S'(s) \in \{adj, noadj, rent\},\ i'(s) \in \{1,2\}\Big\};$$

together with the implied discrete–choice probabilities $\pi^{adj,\ell}(s),\ \pi^{noadj,i}(s),\ \pi^{rent,\ell}(s)$*;*

4. Stationary distribution*:* $\Lambda(s)$ *over the household state space* $s = (A, H, Y, i, j, d)$*.*

These objects satisfy:

1. ***Household optimization.*** *For every state s and taste–shock vector* ε*, the policy rules maximize the RHS of* (11) *subject to the budget and borrowing constraints described with value functions.*

2. ***Law of motion / stationarity.*** *The distribution* Λ *is invariant under the induced transition operator* $\mathcal{T}$*:*

$$\Lambda = \mathcal{T}\big(\Lambda, \mathbf{P}, \mathbf{R}, \textit{policies}\big).$$

3. ***Market clearing.*** *For each region* $i \in \{1, 2\}$

$$H_i^{demand}(\Lambda) = H_i^{supply}(P_i), \qquad H_i^{supply}(P_i) = c_i P_i^{\rho_i}, \tag{15}$$

$$R_i = \phi_i P_i = (\tau_i + r + \delta - \gamma) \cdot P_i; \tag{16}$$

where total demand aggregates owner-occupied and rental units chosen under the policy rules.

3.6 Government Budget Constraint

Let Λ be the stationary distribution of households over the individual state space $s = (A, H, Y, i, j, d)$, and write $\mathbb{1}_{\{i=l\}}$ for the indicator that a household resides in region $l \in \{1, 2\}$. The local government in each region rebates all property–tax revenue back to its residents as an equal lump-sum transfer T_l. The balanced-budget condition is therefore

$$\int_{\mathcal{S}} \mathbb{1}_{\{i=l\}} \big(T_l - \tau_l P_l H\big)\, d\Lambda(s) \;=\; 0, \qquad \text{for each } l. \tag{17}$$

4 Calibration

In this section, we describe how we calibrate our OLG model to match key features of housing markets and household behavior in California and Texas. Our calibration strategy combines externally set parameters from the literature with internally calibrated parameters chosen to match specific empirical targets. We then validate the model's performance by examining how well it reproduces observed patterns in homeownership across age groups.

4.1 Geographic Calibration

We calibrate the model to match key features of housing markets in Texas and California, which provide an ideal contrast in property tax policies. Because of the passage of Proposition 13, California has low effective property tax rates on average, especially for households with longer housing tenures. By contrast, local governments in Texas, which do not charge local income taxes, are unusually reliant on property tax revenue. Additionally, bilateral migration flows between the two states are quite high, suggesting that these states can be modeled jointly. We also take into account other institutional differences between the two states, including distinct state income taxes. Both states are large, economically diverse regions with substantial urban centers and well-developed housing markets. California offers higher average wages but also higher housing costs, while Texas provides more affordable housing but generally lower wages. This wage-cost trade-off is central to understanding how property tax differences interact with broader economic factors to influence household location and housing decisions.

4.2 External Model Parameters

We divide model parameters into two categories: externally calibrated parameters that we set based on existing literature and data sources, and internally calibrated parameters that we choose to match specific empirical targets generated by our model. Calibration targets are shown in Table 4.

Demographic and Lifecycle Parameters: We assume households enter the model at age 25, retire at age 65, and live until age 85. Given that one model period corresponds to four years, this implies a total of 15 model periods: 10 working periods and 5 retirement periods. This structure captures the key phases of the lifecycle while keeping the model computationally tractable.

Financial Market Parameters: We set the real interest rate $r = 2.4\%$, consistent with long-run averages for real returns on safe assets. This rate applies to both returns on risk-free assets and mortgage interest rates. The housing depreciation rate is set to $\delta = 2.2\%$ annually, to account for both physical depreciation and obsolescence.

Financial Constraints: We calibrate financial constraints to match institutional features of U.S. mortgage markets. The loan-to-value limit is set to $\theta_{LTV} = 80\%$, corresponding to the typical down payment requirement of 20% for conventional mortgages. We also include a payment-to-income constraint $\theta_{PTI} = 36\%$ following Greenwald (2018), which captures lenders' requirements that mortgage payments not exceed a certain fraction of borrower income. The mortgage amortization rate follows Greenwald et al. (2021) at $a = 1.73\%$ and is used to compute implied mortgage payments at the time of origination.

Transaction Costs: We set the transaction cost for selling a home to $F = 5\%$ of the property value, based on estimates from Díaz and Luengo-Prado (2010) that include realtor commissions, legal fees, and other costs associated with property sales.

Table 4: Calibration

Parameter	Description	Value	Source/Target
		External	
σ	Relative risk aversion	2.000	Standard value
r	Interest rate	0.024	See text
δ	Depreciation rate	0.022	See text
θ_{LTV}	LTV limit	0.200	See text
θ_{PTI}	PTI limit	0.360	Greenwald (2018)
a	Mortgage amortization rate	0.0173	Greenwald et al. (2021)
F	Transaction cost selling	0.050	Díaz and Luengo-Prado (2010)
ρ_z	Autocorrelation income	0.910	Floden and Lindé (2001)
γ	Balanced growth rate	0.044	See text
σ_z	Standard deviation income	0.210	Floden and Lindé (2001)
$\underline{H}$	Minimum house size	1.000	See text
β	Discount factor	0.950	See text
P_1	House price Texas ($100k)	1.700	See text
P_2	House price California ($100k)	5.000	See text
ϕ_1	Rent–price ratio Texas	0.045	Verisk Marketing Solutions
ϕ_2	Rent–price ratio California	0.030	Verisk Marketing Solutions
τ_1	Property tax Texas	0.020	Verisk Marketing Solutions
τ_2	Property tax California	0.008	Verisk Marketing Solutions
τ_k	Capital gains tax	0.150	See text
ρ_1	Housing supply elasticity Texas	0.320	Baum-Snow and Han (2024)
ρ_2	Housing supply elasticity California	0.232	Baum-Snow and Han (2024)
ϕ	Income tax progressivity rate	0.181	Heathcote et al. (2017)
λ	Income tax level	0.775	See text
δ_{TX}	Income tax difference Texas	-0.0214	See text
δ_{CA}	Income tax difference California	0.0088	See text
		Internal	
α	Preference for non-durable consumption	0.713	Rent to Income Ratio = 20%
Ψ	Bequest motive intensity	7.653	Wealth of the elderly (65–74) = 4.1
Ξ_2^R	Amenity benefit California	1.021	Share in California = 57%
Ξ_1^O	Homeownership benefit Texas	0.875	Texas Homeownership Rate = 66%
Ξ_2^O	Homeownership benefit California	1.928	California Homeownership Rate = 61%
μ_1	Income shifter Texas	-0.344	Texas Median Income = $60.4k
μ_2	Income shifter California	-0.161	California Median Income = $76k
m	Utility cost of moving	5.198	Moving rate = 0.37%
c_1	Construction cost shifter Texas	0.525	Implied from equilibrium at P_1
c_2	Construction cost shifter California	0.399	Implied from equilibrium at P_2

Notes: This table presents the parameter values used in the calibration of the overlapping generations model described in Section 4. External parameters are set based on existing literature or empirical estimates, while internal parameters are chosen to match specific model-generated moments to empirical targets. One model period corresponds to four years, and all parameters and targets are annualized.

Income Process: The stochastic income process parameters are set to $\rho_z = 0.910$ for the autocorrelation and $\sigma_z = 0.21$ for the standard deviation of innovations, following estimates from Floden and Lindé (2001) for the U.S. economy.

Tax System: We incorporate progressive federal income taxation using the parameterization from Heathcote et al. (2017), with a progressivity parameter $\phi = 0.181$ and level parameter $\lambda = 0.775$. State income tax differences are set to $\delta_{TX} = -2.14\%$ and $\delta_{CA} = 0.88\%$ based on average marginal tax rate differences between the states. Capital gains taxes are set at $\tau_k = 15\%$ applied to housing gains.

Housing Supply: We parameterize housing supply elasticities using estimates from Baum-Snow and Han (2024), letting $\rho_{TX} = 0.32$ for Texas and $\rho_{CA} = 0.232$ for California. These parameters capture the different regulatory and geographic constraints on new housing construction in the two states. In particular, the elasticities capture lower housing supply elasticity in California, which plays a role in our analysis in resulting in larger capitalization effects from property taxes.

Property Taxes and Housing Markets: We set property tax rates in our baseline specification to $\tau_{TX} = 2.0\%$ and $\tau_{CA} = 0.8\%$ based on our analysis of property tax assessment data from Verisk Marketing Solutions. House prices are normalized with Texas as the baseline, and the California price level is set to reflect the observed price differences between the states. Rent-to-price ratios are set using the user cost model to ensure consistency with the no-arbitrage condition.

Balanced Growth Path: We set $\gamma = 4.4\%$ each year, so that house prices and income grow at this rate to stay on a balanced growth path. We draw on the growth rate of the FHFA nominal price index from 1991–2024. We take the national increase in this value, although the estimate is similar for California as well, over this period.

4.3 Internally Calibrated Parameters

We choose the internally calibrated parameters to match specific empirical moments that are central to our analysis of housing allocation and property tax effects.

Consumption-Housing Trade-off: The preference parameter for non-durable consumption $\alpha = 0.558$ is calibrated to match observed rent-to-income ratios of 20% used on prior research (Mabille 2023). This ensures that our model generates realistic spending patterns between housing and other consumption.

Bequest Motives: The bequest motive intensity $\Psi = 62.755$ is calibrated to match the wealth holdings of elderly households aged 65–74, targeting a wealth-to-income ratio of 4.1. This parameter is crucial for generating realistic wealth accumulation patterns over the lifecycle and ensuring that elderly households have appropriate incentives to hold housing wealth.

Location Preferences: We calibrate location-specific amenity benefits to match observed population distributions and homeownership rates. The California amenity benefit $\Xi^R_{CA} = 0.495$ is set to generate the observed 57% population share in California. The homeownership benefits are set to $\Xi^O_{TX} = 0.299$ and $\Xi^O_{CA} = 0.688$ to match homeownership rates of 66% in Texas and 61% in California, respectively.

Income Differences: Location-specific income shifters $\mu_{TX} = -0.316$ and $\mu_{CA} = -0.148$ are calibrated to match median annual wages of \$60.4k in Texas and \$76k in California, capturing the wage premium associated with California's high-productivity economy.

Moving Costs: The utility cost of moving $m = 8.089$ is calibrated to match the observed annual interstate migration rate of 0.37% between California and Texas. This parameter is critical for determining how responsive households are to policy changes that affect the relative attractiveness of different locations.

Construction Cost Shifters: The construction cost shifters $c_1 = 0.525$ and $c_2 = 0.399$ are implicitly determined from the calibrated model equilibrium to ensure that housing supply clears at the fixed house prices and supply elasticities. They determine the level of the regional housing supply functions and are used in the counterfactual analysis when house prices become endogenous.

4.4 Equilibrium and Solution Method

We solve for the stationary distribution of the OLG model (11)-(17) numerically in the following way. First, we fix a lump-sum property tax transfer. We then determine the value functions $V^{h,l}$ of the individual housing options using backward induction. Given an initial distribution for the newborn generation, the policy functions, and the probabilities of selecting each option, we calculate the distribution over the state space by forward induction.

We repeat this process until, in a stationary equilibrium, the collected taxes and the rebated taxes equal each other.

4.5 Model Fit and Validation

A key test of our model is its ability to reproduce the distinctive lifecycle homeownership patterns observed in California and Texas. Figure 3 shows both the model-generated and empirical homeownership rates by age for both states. Our model explicitly targets the homeownership rate on average in both California and Texas, but we use as an out-of-sample moment the ability of the model to target the age gradient of homeownership, which is a key focus of our analysis. The model successfully captures several important features of the data.

First, the model reproduces the fact that homeownership rates start lower in California than in Texas for young households. This reflects the higher house prices and down payment barriers faced by young Californians, which delay their entry into homeownership despite the state's higher wages.

Second, the model captures the steeper increase in homeownership rates with age in California compared to Texas. This pattern reflects the gradual wealth accumulation that enables California households to eventually overcome down payment constraints, combined with the lock-in effects created by low property taxes, which encourage elderly homeowners to remain in their properties.

Third, the model generates higher homeownership rates among elderly households in California compared to Texas, consistent with the "aging in place" phenomenon documented in our empirical analysis. This occurs because low user costs, in the form of low property taxes, amplify lock-in forces, keeping aging California households in place.[4]

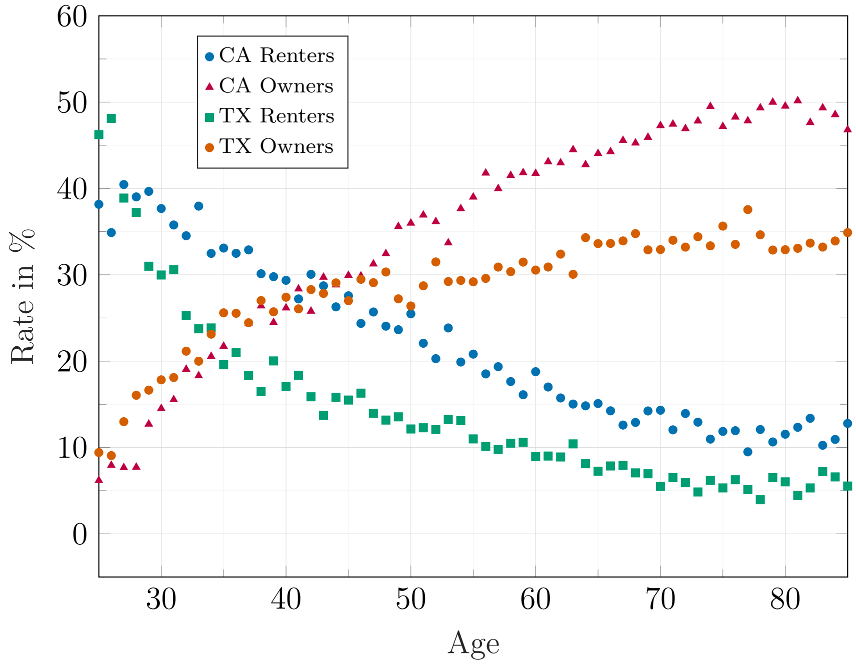
5 Implications of the Capitalization of Property Taxes on Homeownership

In this section, we use our calibrated model to examine how property tax changes affect housing allocation through the capitalization mechanism. Our primary policy experiment increases California's property tax rate to match Texas levels, enabling us to quantify the

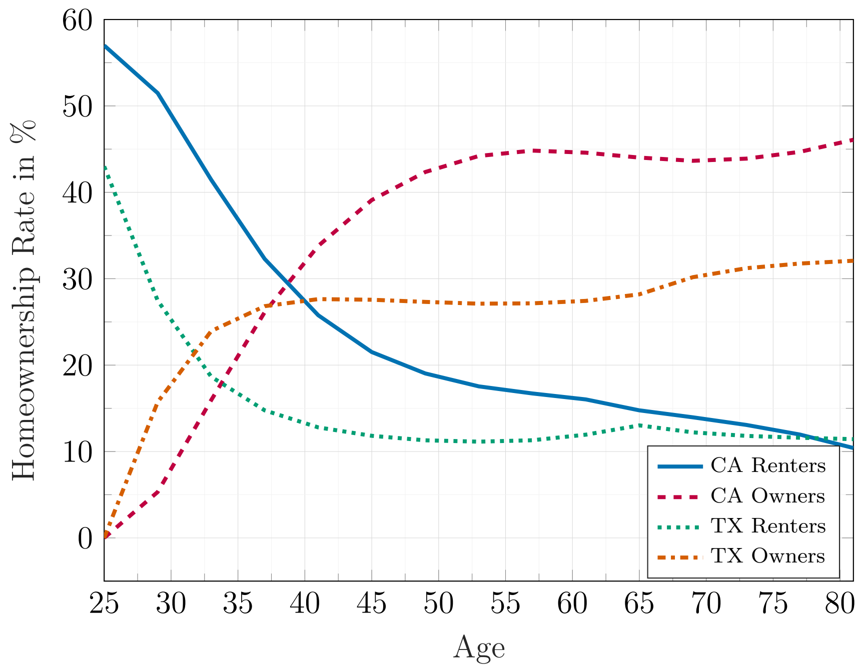
[4] While the model matches high rates of elderly homeownership in California, empirical homeownership rates are even higher. This is possibly due to the additional lock-in features of Proposition 13, which extend beyond the features we model here, making our estimate relatively conservative. We discuss this issue more in Section 8.

Figure 3: Homeownership Across the Life Cycle in California and Texas

Panel A: Empirical Data on Homeownership and Renting Rate by Location and Age



Panel B: Model-Implied Homeownership and Renting Rate by Location and Age



Notes: Data for Panel A of this figure are drawn from the individual-level variables from the ACS 1-year microdata merged with PUMA-level property tax rates from Verisk/Infutor sale records. Each dot is the fraction of the corresponding age group living in a given state and owning or renting out of the universe of all people in the ACS who live in either Texas (TX) or California (CA). Panel B shows the result of the model calibration, discussed in Section 4, showing the fraction of agents who own and rent in each age and location. Across both plots, the fractions of agents in each age bin sum to 1.

effects of property tax capitalization on homeownership patterns, housing consumption, and welfare across various demographic groups.

5.1 Counterfactual Design

Our primary counterfactual examines the elimination of California's low property tax regime by raising rates from 0.8% to 2.0%, matching the level prevailing in Texas. We allow house prices and rental rates to adjust endogenously to reflect the capitalization of higher property taxes into lower property values. The model incorporates housing supply elasticities that determine how much prices decline in response to higher user costs. Rental prices adjust according to the user cost relationship to maintain no-arbitrage between owning and renting.

The additional property tax revenue generated by higher rates is redistributed to California residents through lump-sum transfers. This approach maintains revenue neutrality while allowing us to focus on the allocative effects of property taxation rather than the effects of changing the overall tax burden. In our baseline specification, transfers are distributed equally among all California residents, effectively modeling property taxes as a funding mechanism for public goods that all residents value equally.

We solve for the new steady-state equilibrium under the higher property tax regime, allowing all household decisions to adjust fully. This includes homeownership choices, housing consumption, location decisions, savings behavior, and portfolio allocation. The new equilibrium reflects the complete adjustment of all economic agents to the changed policy environment.

5.2 Capitalization Effects and Price Responses

The property tax increase generates substantial capitalization effects that form the foundation for all subsequent behavioral responses. When California's property tax rate increases from 0.8% to 2.0%, average house prices in California decline by 11.2%, falling from \$500,000 to \$444,000. This represents a significant reduction in the upfront cost of homeownership, directly addressing the down payment constraints faced by financially constrained households.

The magnitude of this price response is consistent with our empirical estimates of capitalization effects and reflects the substantial increase in annual carrying costs associated with homeownership. Higher property taxes increase the user cost of housing, leading to lower equilibrium property values as buyers adjust their willingness to pay for housing services.

Texas experiences a smaller price adjustment, with average home values declining by 3.5% from \$170,000 to \$164,000. This modest response reflects the general equilibrium effects of

California's policy change, including changes in migration patterns and shifts in relative demand between the two states.

5.3 Homeownership Responses

The property tax increase generates substantial changes in homeownership patterns, demonstrating the power of the capitalization mechanism to affect tenure choice. California's overall homeownership rate increases by six percentage points, rising from the baseline level of 61% to approximately 67% of households (a 10.5% increase). This represents a substantial policy impact, placing California's homeownership rate closer to national averages and demonstrating that property tax policy has important implications for homeownership.

The homeownership effects are concentrated among younger households who face the most severe financial constraints. Households aged 25–44 see an eight percentage point increase in homeownership from 35% at baseline to 43%, substantially higher than the overall population response. This concentration among younger households confirms our hypothesis that down payment constraints are the primary mechanism driving the results.

Figure 4 shows homeownership rates by age under both the baseline and counterfactual scenarios. The results reveal that the property tax increase shifts the entire age-homeownership profile upward, with the largest effects occurring during the prime years for home buying. Young households become homeowners earlier in their lifecycles, while the effects diminish among older households.

5.4 Migration and Spatial Reallocation

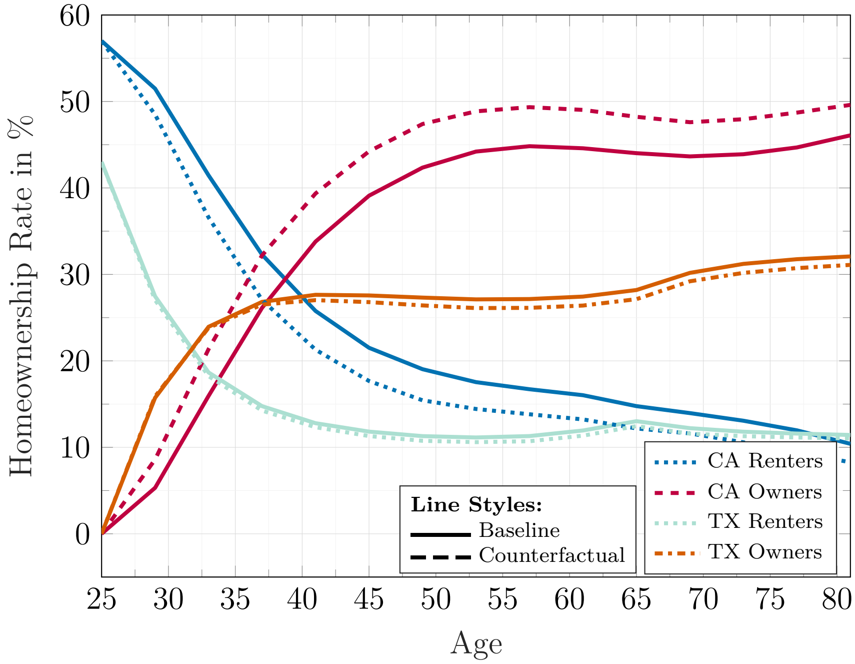
The property tax increase generates significant migration responses, illustrating the consequences of property tax policy on spatial equilibrium and labor market access. Migration flows between the two states are shown in Figure 5.

Migration Flows: California experiences substantial net in-migration following the property tax increase. The fraction of Texas households migrating to California annually increases from 2% to 3%, while the fraction of California households migrating to Texas decreases from 1.5% to 1%. This represents a fundamental shift in migration patterns, reflecting the improved attractiveness of homeownership in California.

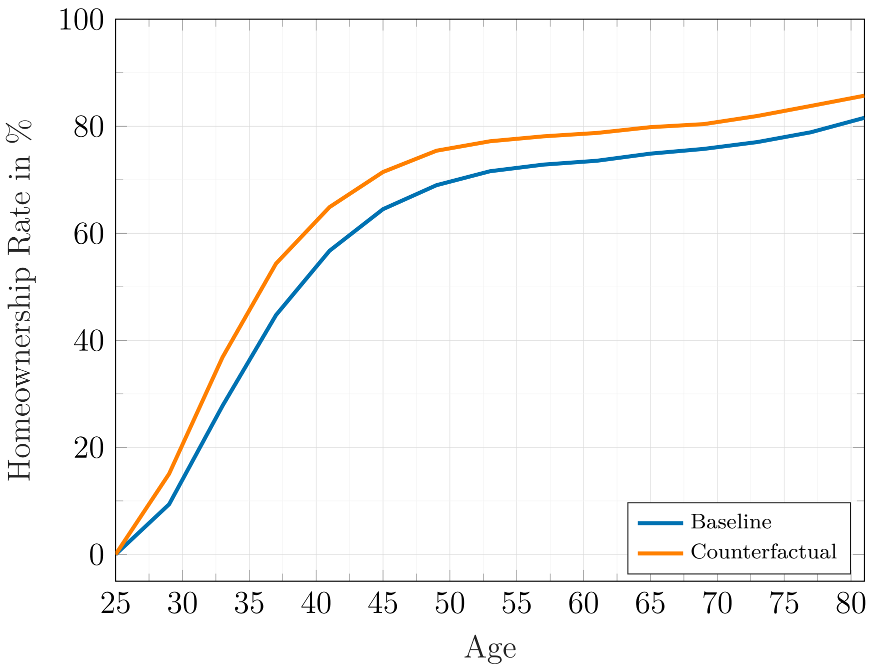
The migration responses are concentrated among younger households, consistent with our financial constraints explanation. Figure 5 shows migration rates by age, revealing that the largest increases in California in-migration occur among households in their twenties and thirties who benefit most from the capitalization-induced price reduction.

Figure 4: Impact of Property Tax Change on Homeownership

Panel A: Counterfactual Change in Homeownership and Rental by Location and Age



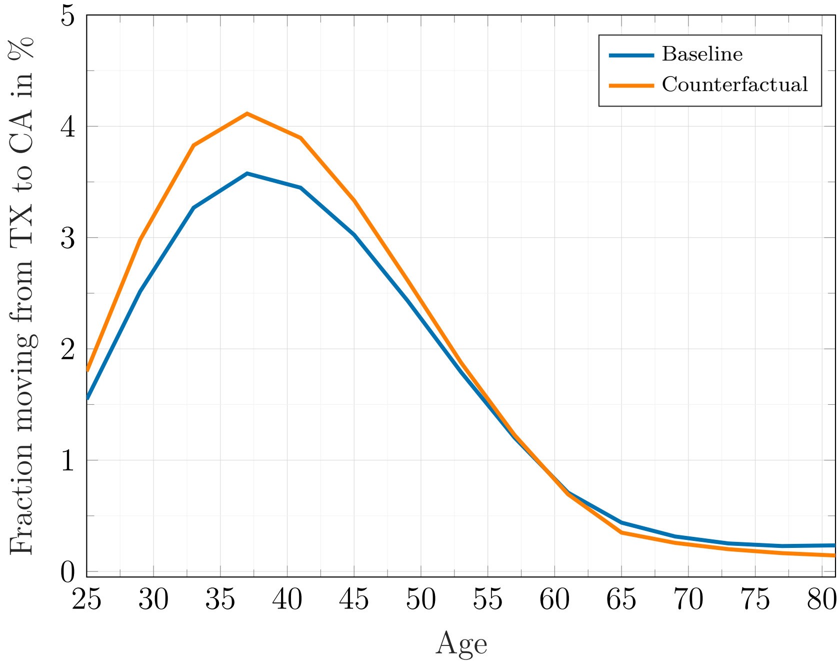
Panel B: Counterfactual Change in Homeownership in California by Age



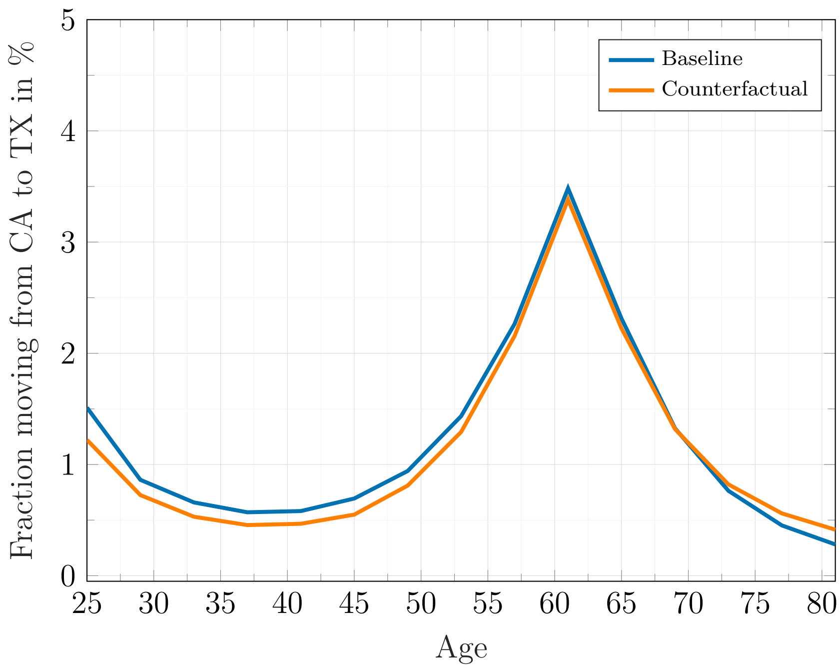
Notes: Panel A of this figure shows the housing residence choice (i.e., owning and renting by state) before and after a counterfactual shift in the property tax rate in California from 0.8% to 2%, matching the level in Texas, discussed in Section 5. Results are calculated as the difference between baseline and counterfactual steady-state equilibria. Age groups are defined in 5-year intervals from ages 25–30 through 65–70. Panel B focuses on the change in homeownership in California.

Figure 5: Impact of Property Tax Change on Migration

Panel A: Migration from Texas to California by Age Group



Panel B: Migration from California to Texas by Age Group



Notes: This figure shows migration rates across states before and after a counterfactual shift in the property tax rate in California from 0.8% to 2%, matching the level in Texas, discussed in Section 5. Results are calculated as the difference between baseline and counterfactual steady-state equilibria. Age groups are defined in 5-year intervals from ages 25–30 through 65–70. Panel A shows the migration from Texas to California, and Panel B shows the migration from California to Texas.

Migration to California generates substantial income gains for households who can now access the state's high-wage labor markets. Average income in California increases modestly as the composition of residents shifts toward younger, more productive workers. Among households migrating to California, the average income gain is substantial, highlighting the importance of spatial mismatch in our baseline scenario.

5.5 Welfare Analysis

These resulting shifts in homeownership and migration have substantial implications for aggregate income and welfare in our model. Figure A4 shows model-implied welfare before and after the property tax reform. Welfare increases substantially in the model, particularly for younger age groups.

Figure A5 shows other outcomes, including housing quantity (Panel A). This represents a major source of welfare costs in our framework: lower prices reduce housing supply, lowering the aggregate housing stock. The increase in homeownership in our framework, therefore, is primarily the result of a repurposing of the rental housing stock to owners. The negative impacts of property taxes on housing construction could potentially be mitigated through land value taxes or other tools that tax land rents without presenting negative disincentives to housing construction. Panel B of this figure shows the impact on aggregate wealth, which rises across age groups.

6 The Lock-in Effects of Capital Gains Taxes

While the previous section demonstrated how property taxes can reduce housing lock-in through capitalization effects, capital gains taxes operate through a fundamentally different mechanism that can amplify lock-in effects. In this section, we examine how capital gains taxation affects housing allocation by creating incentives that discourage housing turnover and mobility. We analyze a counterfactual elimination of capital gains taxes to quantify their lock-in effects and compare these results with those from the property tax analysis.

6.1 Capital Gains Taxation and Housing Lock-in

Capital gains taxes on housing create lock-in effects through an asymmetric treatment that rewards holding assets until death rather than realizing gains. Under current U.S. tax law, capital gains on housing are taxed upon realization (sale) but are forgiven entirely upon death through the "stepped-up basis" provision. This creates a powerful incentive for older homeowners to remain in their current homes rather than sell and downsize, even when their housing needs have changed substantially.

While property taxes are collected annually on the stock of housing wealth, capital gains taxes are collected only upon realization. This difference in timing creates opposite incentives: property taxes encourage efficient allocation by penalizing excess housing consumption, while capital gains taxes discourage reallocation by penalizing transactions. The stepped-up basis provision further amplifies this effect by creating a tax advantage for holding assets until death.

The interaction between capital gains taxation and bequest motives creates particularly strong lock-in effects for older homeowners. Households with bequest motives face a choice between consuming their housing wealth during their lifetimes (triggering capital gains taxes) or preserving it for their heirs (avoiding taxes entirely). This creates incentives for older homeowners to remain in large homes even when their consumption needs suggest downsizing would be optimal.

6.2 Counterfactual Design

We examine the effects of capital gains taxation by analyzing the counterfactual scenario of eliminating capital gains taxes on housing in both California and Texas. This experiment enables us to isolate the lock-in effects created by capital gains taxation and compare them with the capitalization effects of property taxation, as analyzed in the previous section. Specifically, we reduce the capital gains tax rate in the model from 15% to 0% in both states, eliminating the tax on housing capital gains. This represents a substantial policy change that removes both the lock-in incentives created by taxation upon realization and the asymmetric treatment of gains relative to losses.

Unlike property taxes, which generate ongoing revenue streams that we redistribute through lump-sum transfers, capital gains taxes generate revenue only upon realization. For comparability with our property tax analysis, we do not replace the foregone capital gains tax revenue with alternative taxes, allowing us to focus on the pure efficiency effects of removing lock-in incentives.

6.3 Price and Market Responses

We allow house prices to adjust endogenously to the elimination of capital gains taxes. The removal of lock-in effects increases housing turnover and can affect both supply and demand in housing markets. Higher turnover increases the effective supply of housing available for purchase, while the removal of tax penalties on realization can increase demand for housing transactions. House prices increase slightly in both states following the elimination of capital gains taxes, with Texas experiencing a $2,000 increase and California experiencing a $2,000 decrease. These modest price changes reflect the complex general equilibrium effects of removing capital gains taxation: increased turnover raises the effective supply of housing available for transactions, but removing tax penalties on realization increases demand for housing transactions.

The smaller magnitude of price responses compared to property tax changes reflects the different nature of capital gains taxation. While property taxes affect the annual user cost of housing and therefore have large capitalization effects, capital gains taxes primarily affect transaction incentives and therefore have more modest effects on equilibrium valuations.

6.4 Homeownership and Housing Allocation Effects

The elimination of capital gains taxes leads to significant changes in homeownership patterns and housing allocation, highlighting the importance of lock-in effects in housing markets.

Figure 6 shows homeownership rates by age under both the baseline scenario (with 15% capital gains taxes) and the counterfactual scenario (with 0% capital gains taxes). The elimination of capital gains taxes increases homeownership rates across most age groups, with particularly large effects among younger households. The overall homeownership among all households in California increases from 61% to 62% (a 2.2% increase), while the homeownership rate among young households in California increases from 35% to 37% (a 6.5% increase).

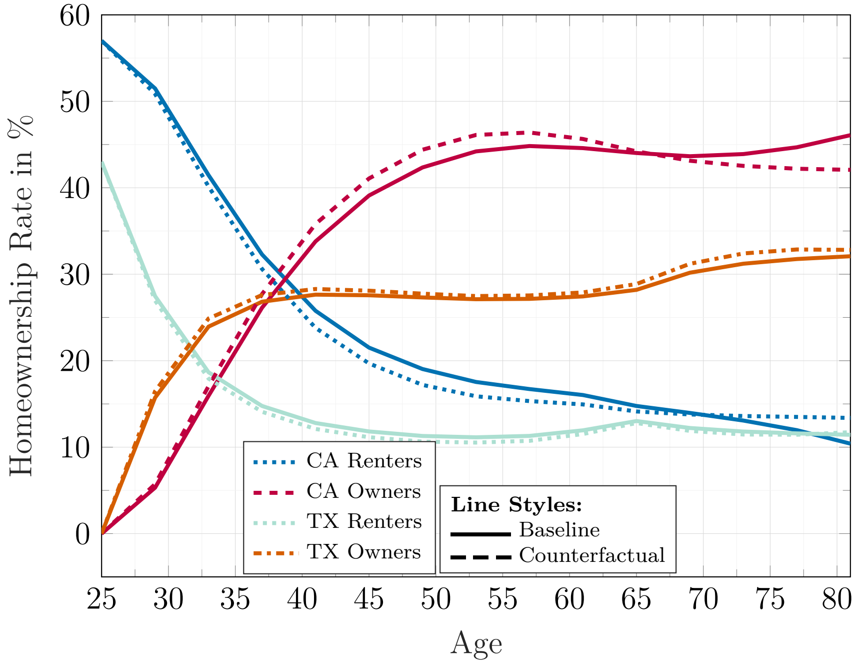
The homeownership increases occur through several channels. First, increased turnover by older homeowners creates more housing opportunities for younger households. Second, the removal of transaction penalties makes homeownership more attractive relative to renting for households who anticipate future mobility. Third, the elimination of lock-in effects allows households to adjust their housing consumption more efficiently over their lifecycles. The homeownership responses vary systematically across age groups in ways that reflect the different mechanisms through which capital gains taxation affects housing decisions:

7 Revenue Neutral Housing Policy

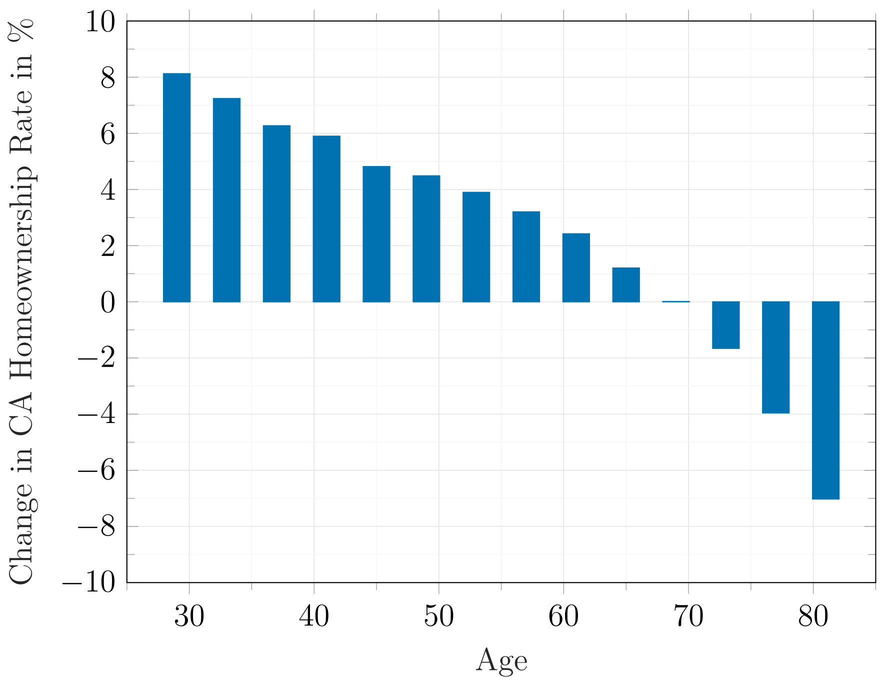
The previous sections demonstrated that property taxes and capital gains taxes affect housing allocation through distinct but complementary mechanisms. Property taxes improve housing affordability through capitalization effects that reduce down payment constraints, while capital gains taxes create lock-in effects that prevent efficient housing reallocation over

Figure 6: Counterfactual of Capital Gains Tax Change

Panel A: Counterfactual Change in Homeownership and Rental by Location and Age



Counterfactual Change in Homeownership in California by Age



Notes: Panel A of this figure shows the housing residence choice (i.e., owning and renting by state) before and after a counterfactual shift in the capital gains tax from 15% to 0%, discussed in Section 6. Results are calculated as the difference between baseline and counterfactual steady-state equilibria. Age groups are defined in 5-year intervals from ages 25–30 through 65–70. Panel B focuses on the change in homeownership in California by age.

the lifecycle. This section examines revenue-neutral policy reforms that simultaneously adjust both tax instruments to maximize welfare gains while maintaining constant government revenue.

7.1 Counterfactual Design

Our revenue-neutral reform eliminates capital gains taxes on housing nationwide, reducing the rate from 15% to 0%. We simultaneously increase property taxes in California to offset the revenue loss. This design leverages the distinct geographic scopes of the two instruments: the elimination of capital gains tax provides national efficiency benefits, while property tax increases in California address state-specific challenges to housing affordability.

We calculate the property tax increase required to maintain revenue neutrality by equating the present value of lost capital gains tax revenue with the present value of additional property tax revenue. This calculation accounts for the different timing of revenue collection (capital gains taxes collected upon realization vs. property taxes collected annually) and the behavioral responses that affect both tax bases.

The reform increases California's property tax rate from 0.8% to 1.11%, representing a 39% increase that is smaller than the increase to Texas levels analyzed in Section 5. The capital gains tax elimination applies nationwide, benefiting residents of both California and Texas. Texas property tax rates remain unchanged, resulting in differential treatment across states that reflects their varying baseline housing market conditions.

We solve for the new general equilibrium that incorporates both policy changes simultaneously. House prices adjust to reflect both the capitalization of higher property taxes in California and the elimination of capital gains taxes nationwide. Migration patterns adjust to reflect the changed relative attractiveness of different locations. All household decisions adjust to the new tax environment.

7.2 Housing Market and Price Effects

California house prices decline somewhat under the revenue-neutral reform, falling by approximately 4.2% from baseline levels. This decline primarily reflects the capitalization of higher property taxes, partially offset by the beneficial effects of eliminating the capital gains tax on housing demand. The net effect remains strongly negative, providing substantial affordability benefits for potential homebuyers. Texas prices, by contrast, remain flat. These price increases are smaller than those observed under capital gains tax elimination alone, reflecting general equilibrium effects as some demand shifts toward California due to improved affordability there.

7.3 Homeownership and Allocation Effects

Figure 7 shows homeownership rates by age under the revenue-neutral reform compared to the baseline scenario. The results show substantial homeownership increases across all age groups, with the largest effects concentrated among younger households. California homeownership rates increase three percentage points from 61% to 64% under the counterfactual (a 5.7% increase). The homeownership rate among young households increases four percentage points from 35% to 39%, a 13.3% increase.

These results demonstrate that revenue-neutral reforms can exhibit welfare gains by exploiting complementarities between different tax instruments. The elimination of capital gains taxes removes mobility barriers that prevent efficient reallocation over the lifecycle, while higher property taxes in California address the state's unique affordability challenges through price capitalization.

8 Robustness and Extensions

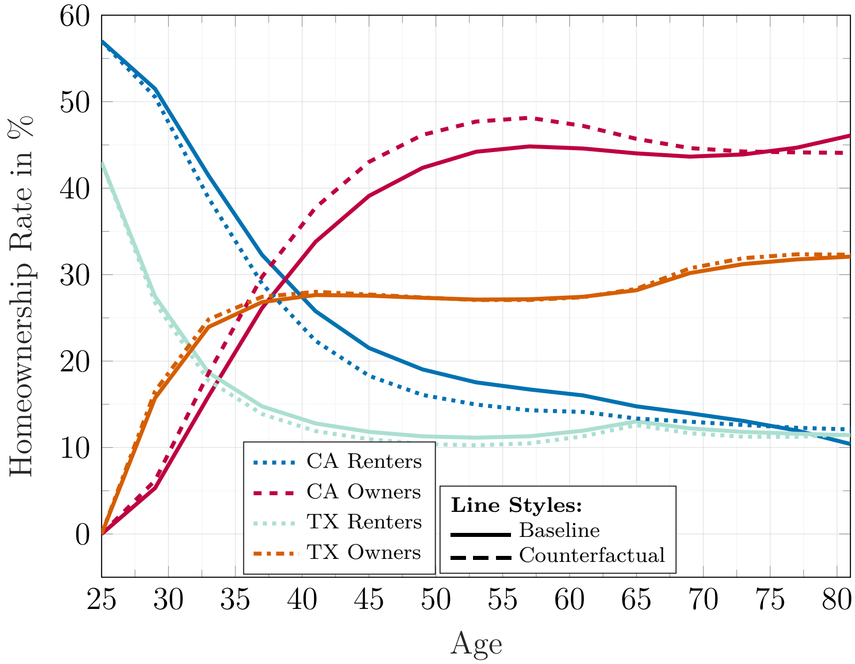
8.1 Property Taxes and Public Goods

One potential limitation of our framework, discussed in this section, is the treatment of property tax revenues. We model the revenue side of property taxes indirectly by assuming they are rebated to individuals as lump-sum transfers, which could be interpreted as a cash equivalent to the value of public services. However, households may value public services differently. Given the nature of local government services, which are financed by property taxes (such as local schools and infrastructure), we might be concerned that young families value these services relatively more than the elderly. The lump-sum transfer assumption, therefore, may not capture these age-varying valuations of government services.

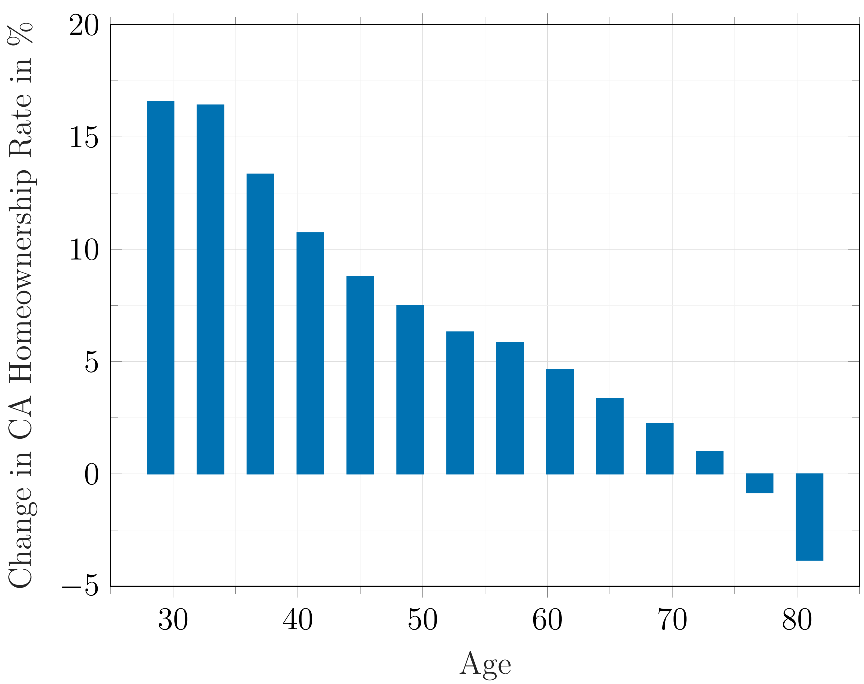
To test the robustness of our results on this point, we conduct an alternate counterfactual shown in Figure 8, Panel A, in which property taxes are rebated *only* towards the young (aged 25–44), to starkly illustrate the impact of differential age-based valuation of property tax receipts. Panel A of this figure shows the changes in ownership and renting across states under these counterfactuals. We find substantially higher ownership in California as a result (a 16% increase, from 61% to 71%), driven by decreases in ownership in Texas and renting in both states. This increase begins among younger residents, who find it more valuable to live in California as a result of the shift in property tax receipts (an increase in homeownership to 55% among at group), which is intuitive as they now have an additional motive for moving into the state, based on the higher valuation of public goods services. However, the resulting increase in homeownership is persistent even into old age, a consequence of adjustment

Figure 7: Counterfactual of Revenue-Neutral Tax Policy

Panel A: Counterfactual Change in Homeownership and Rental by Location and Age

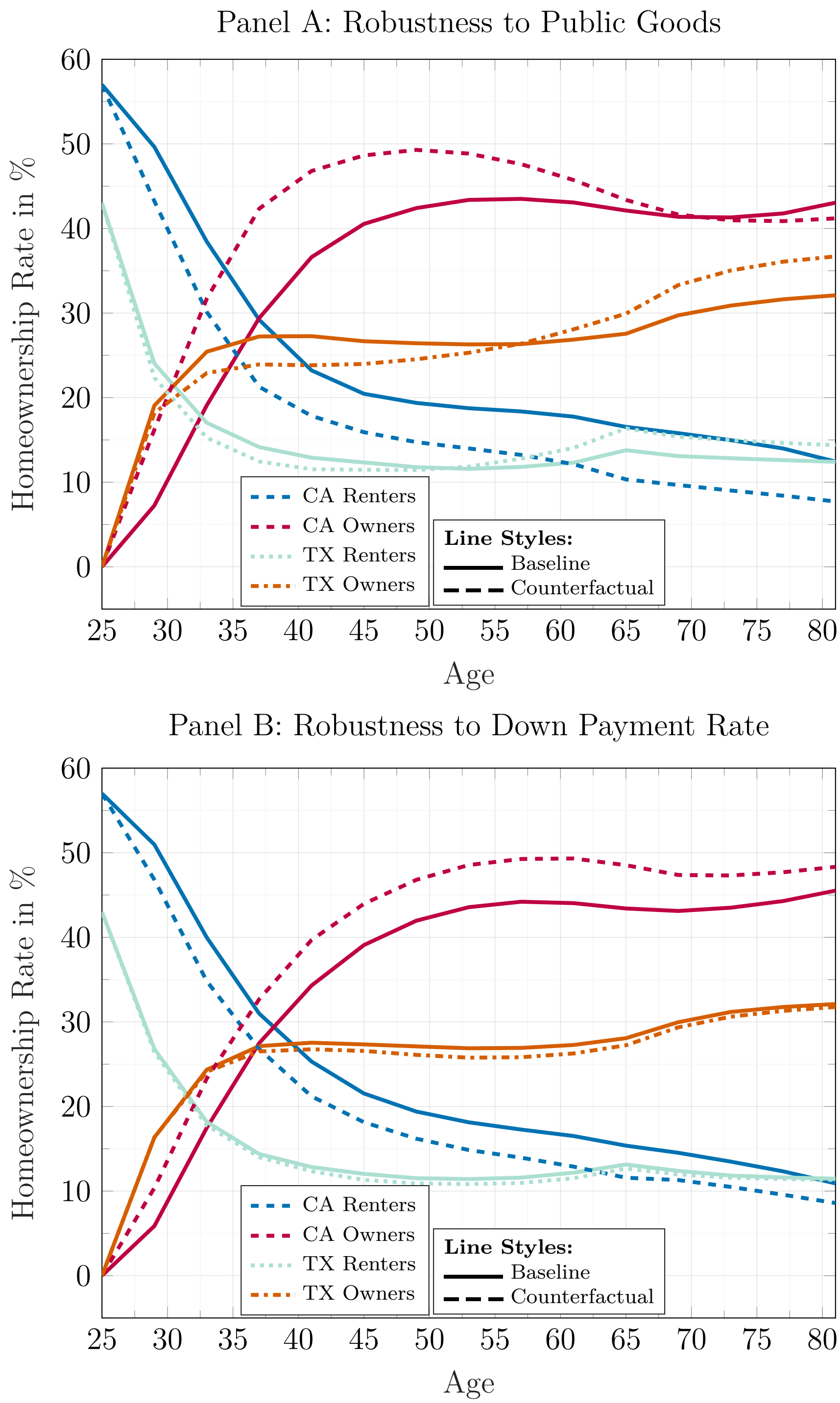


Panel B: Counterfactual Change in Homeownership in California by Age



Notes: Panel A of this figure shows the housing residence choice (i.e., owning and renting by state) before and after a counterfactual shift in the capital gains tax from 15% to 0%, alongside an increase in property tax in California to maintain constant lump-sum payments, discussed in Section 7. Results are calculated as the difference between baseline and counterfactual steady-state equilibria. Age groups are defined in 5-year intervals from ages 25–30 through 65–70. Panel B focuses on the change in homeownership in California by age.

Figure 8: Change in Homeownership and Rental by Location and Age for Different Robustness Exercices



Notes: This figure illustrates the robustness of our property tax counterfactual (increasing the property tax rate in California from 0.8% to 2%, matching the rate in Texas) to alternate assumptions. In Panel A, we rebate increased property tax revenue only to young residents aged 25–44, to mimic the role of public goods particularly valued by younger residents (i.e., public schools). In Panel B, we change the background assumption on down payment requirements, shifting θ_{LTV} from a 20% down payment requirement to a 10% requirement. These counterfactuals are discussed in Section 8.

frictions in moving and the low user costs, in the form of property taxes, in California.

This counterfactual helps illustrate that the key prediction of our framework—the greater sorting of financially constrained agents into high property tax regimes—is actually strengthened under plausible assumptions about how the property tax revenue is spent. The raw demographic associations in Section 2, therefore, likely reflect a mix of property tax impacts both through the capitalization effect, as well as through differential valuation of public goods.

8.2 Alternative Down Payment Assumptions

Our main model assumes a 20% down payment requirement for properties. While this is a standard assumption in the literature and the most common down payment choice among buyers, some buyers can obtain mortgages with lower down payment requirements. Such mortgage products may feature additional requirements—they may be restricted in total amount by the conforming mortgage or Federal Housing Administration (FHA) loan caps, may require additional mortgage insurance, or may require borrowers to have higher credit scores or pay higher interest rates. The key question for our framework is whether the possibility of lower down payments affects the impact of property taxes.

Ex ante, the answer to this question is ambiguous. On the one hand, lower down payment requirements imply that households can more easily come up with the equity upfront to purchase a home. However, the resulting change in households able to come up with a down payment, as a result of a decrease in price due to higher property taxes, may be either smaller or larger compared to our baseline. Essentially, the effect size hinges on whether the 20% down payment requirement constrains more households compared to the number of households constrained around other thresholds.

To address this issue, in Figure 8, Panel B, we first calibrate the entire model based on a lower down payment requirement of 10%, and then compare the changes in housing allocations with the same shift in property tax rates in California to match those in Texas. Relative to the property tax shift in our baseline model, we find that increases in homeownership in California are comparable (homeownership in California increases from 61% to 67%, an 11.08% increase). The homeownership rate among young households in California increases from 37% to 45%.

A large fraction of this increase appears to be driven by a corresponding decrease in the number of owners in Texas, compared to our baseline experiment in which transitions to homeownership were substantially driven by renters in California. This result suggests that these are homeowners who have enough of a down payment to purchase a house in Texas and who are now able to purchase in California instead, given the combination of lower down payments and lower house prices (resulting from the capitalization effect of property taxes).

This robustness check confirms that our baseline assumption of 20% down payment requirements is not a central driver for the results we obtain, through it matters for the precise quantification of estimates.

8.3 Limits and Open Questions

We simplify various aspects of property tax systems to derive our core insights into their impacts on housing allocation. In this section, we discuss various limitations of our approach and possible extensions of the baseline model.

Proposition 13. We simplify our treatment of California's Proposition 13. In practice, this ballot initiative limits not only average tax rates but also the extent to which property taxes can increase during a resident's tenure. This results in a substantial increase in lock-in effects. While our approach attempts to approximate these lock-in features, our results should be viewed as conservative since we focus only on aggregate tax burdens. A more comprehensive analysis of the lock-in effects of Proposition 13 would likely magnify the impacts of property tax reform.

Liquidity considerations. Property tax changes lead to shifts in housing allocation in our framework through two main channels. First, upfront housing purchase prices are lower because of a capitalization effect. This affects new homebuyers. Second, existing homeowners (in a steady state) face higher property tax expenses, and these user costs are particularly binding in old age when households no longer receive locational income advantages from sorting into regions.

The second channel implies that homeowners will face heavy ongoing income burdens to pay property taxes, and in transition dynamics, these homeowners will face a combination of wealth and liquidity shocks resulting from property tax changes. Prior literature has emphasized possible consequences of such tax shocks, including on consumption (Wong 2023) and property tax delinquencies (LaPoint 2022), and the importance of transitional effects for optimal policy more broadly (Dyrda and Pedroni 2023). For these reasons, many local governments limit reassessment shocks on low-income or elderly residents. They may reduce property taxes for these demographics through lower assessments or tax credits. In principle, they could defer tax realization until the time of sale.

A possible extension of our model is to consider the effectiveness of property tax policies under the constraint of limiting assessment shocks for households with certain demographics. There is, of course, a natural tension between these two sets of objectives: policies that aim to keep elderly residents in place necessarily limit the extent of turnover of such housing units to younger families. However, as long as property taxes are higher for *new* residents, a capitalization effect will impact the market valuation of such properties, and so a version of our results will still hold.

Bequests. Housing bequests play a role in our analysis because intergenerational transfer motives are a key reason why elderly households accumulate and retain real estate. In principle, elderly households (either while alive or after death) could pass their housing stock to the next generation to help alleviate housing needs directly. However, there are a few challenges with this possibility. First, with life expectancies in the United States around 78 years old, the typical household can expect to lose a parent when the household members are in their 50s. This is generally past the point at which individuals are raising young children and in need of space; indeed, many households are empty-nesters at this point in the life cycle themselves. Thus, the typical age of housing transfer at the point of inheritance is mismatched with the timing of the greatest housing needs. Of course, young individuals can also cohabit with their parents, a trend that is rising in popularity (Acolin et al. 2024). This may alleviate housing burdens on the young while introducing additional complications, such as the location lock that can occur when working-age individuals are forced to live in the same place as their parents, and other well-known challenges associated with intergenerational co-residence.

Another complication beyond the vertical inequity of housing wealth differences across generations is the horizontal inequity in wealth levels within a cohort. Intergenerational transfers will obviously benefit families with greater housing wealth in their lineage, resulting in important group differences in wealth accumulation through this channel (Benetton et al. 2022; Mabille 2023). We abstract from these considerations, but incorporating them more fully into our framework will still leave an important role for financially constrained young households without dynastic support.

Inequality in property assessments. We abstract away from assessment inequality (Amornsiripanitch 2020; Avenancio-León and Howard 2022; Ross 2017), whereby property tax assessments reflect racial or other biases. Because our model incorporates substantial heterogeneity across agents, it can accommodate bias or variation in property tax assessments and can be used to quantify the welfare loss in such contexts.

Multiple regions. For simplicity and tractability of exposition, our analysis focuses on two regions, California and Texas, because these are two large states with starkly different property tax policies. Some 10.8% of California's out-migration is to Texas, which is the most popular destination for leavers of California. Some 5.6% of Texas's out-migrants go to California, making it their 4th most popular destination. However, the analysis can easily be generalized to more regions and locations.

Spatial income effects. In our baseline calibration, we make the simplifying assumption that individuals who move locations receive a spatial income shifter matched against local income differences. Our main results, however, are unlikely to differ in sign under the more empirically plausible assumption that one component of the income differences between regions reflects treatment while another component reflects selection (Card et al. 2023; Bilal and Rossi-Hansberg 2021).

9 Conclusion

Our paper makes three key contributions to a broader understanding of housing allocation in the presence of taxes. First, we highlight the consequences of housing lock-in mechanisms, which lead to a concentration of housing ownership among aging-in-place empty nesters. The consequence of this allocation is to exacerbate the affordability challenges faced by young households with families. Second, we show how various tax instruments impact this generational trade-off. Higher property taxes induce a capitalization effect, lowering up-front prices, while raising the user costs of ongoing residence. Through counterfactual experiments that raise tax rates in California to the higher levels in Texas, we show the impact of the resulting tax shifts can result in shifts in migration and homeownership, which advantage younger households. By contrast, capital gains taxes can amplify lock-in motives, and balanced budget policies that increase property taxes while reducing capital gains taxes can further increase homeownership among the young.

We highlight how our results therefore point to an alternative interpretation of property taxes in their role as embedded or operational leverage. Because of the capitalization effect, observed market prices are an incomplete measure of the true cost of homeownership, which also includes embedded payments in the future, in ways that mirror the role of other leveraged instruments such as mortgages. We arrive, therefore, at a very different view of house prices and housing affordability when considering the role of the property tax stream.

Our results suggest a novel rationalization or role for property taxes within the broader set of tax instruments. Conventional analyses of property taxes emphasize the potential optimality under conditions of low land elasticity, particularly when the negative impacts on incentives to build structures can be mitigated (i.e., through land value taxes). The general role of the capitalization effect is also well-understood, though the precise quantities differ in the literature. We highlight the impact of capitalization channels on housing allocation and migration in the presence of financial constraints, and show how it can address some aspects of housing crowding and affordability induced by lock-in pressures in housing markets.

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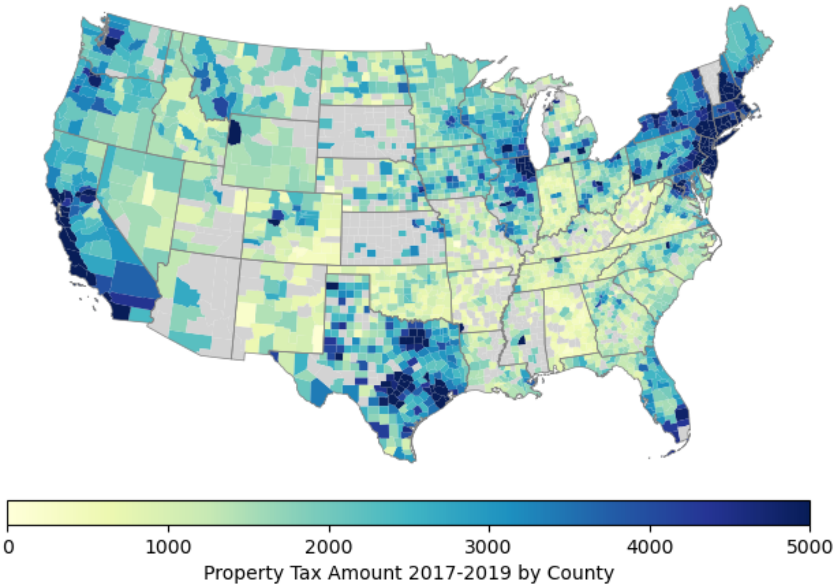
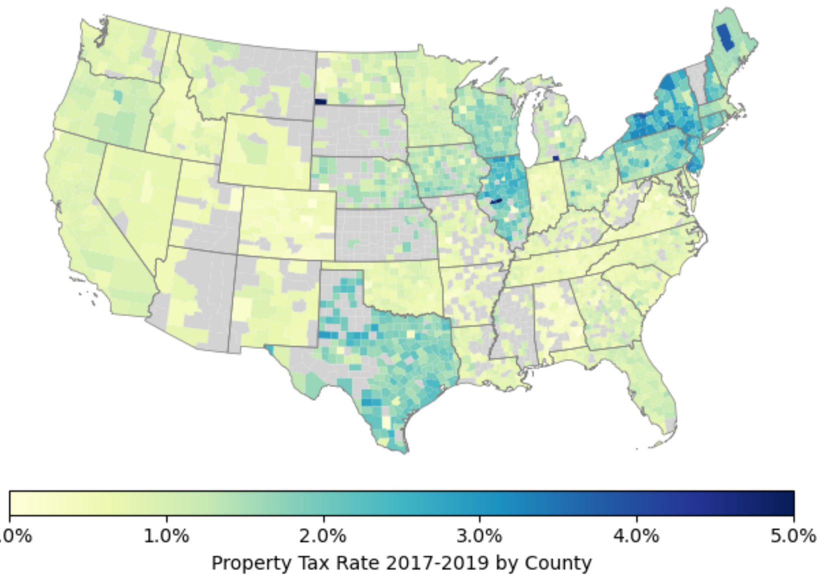
A Appendix: Additional Results

Figure A1: Regional Variation in Property Taxes

Panel A: Property Tax Amounts by County

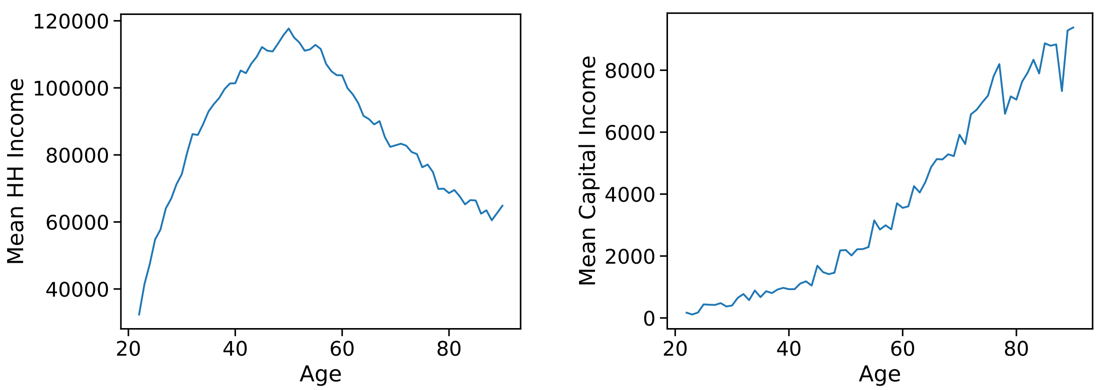


Panel B: Property Tax Rates by County



Notes: This figure highlights residential property tax variation across the United States using assessment and property sales records provided by Verisk/Infutor over the period 2017–2019. We calculate effective property tax rates by dividing annual property tax payments by sale prices for each property transaction, then aggregate these measures to the county level. Panel A shows average property tax amounts (in dollars) by county, while Panel B shows average property tax rates (as percentages of property value) by county.

Figure A2: Income and Wealth Distributions By Age

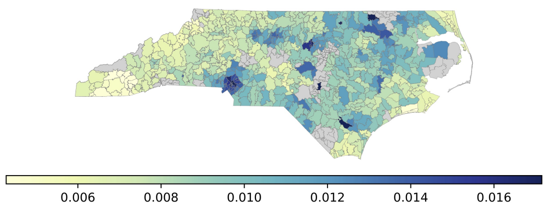


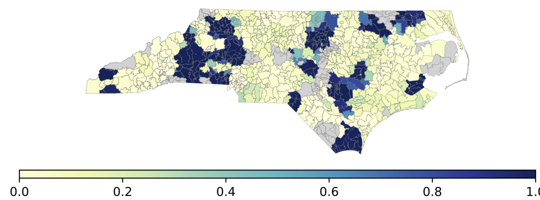
Panel A: Labor Income

Panel B: Capital Income

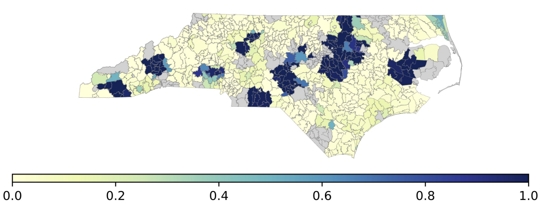
Notes: Data for this figure is drawn from ACS 1-year data from 2017–2019. Panel A shows the mean household income for each age. Panel B shows the mean capital income for each age, where capital income is interest, dividend, and rental income.

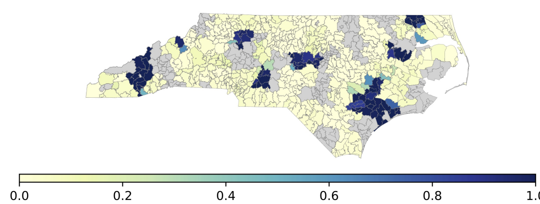
Figure A3: North Carolina Assessment Changes by ZIP Code



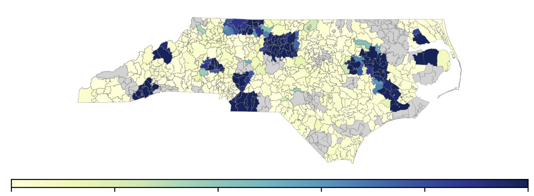


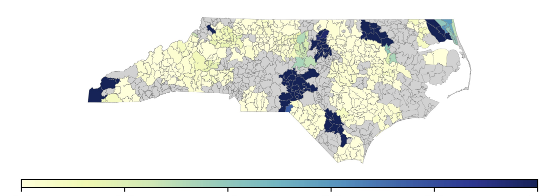
Panel A: Average Property Tax Rate *Panel B: Fraction Reassessed Feb. 2021*





Panel C: Fraction Reassessed Nov. 2019 *Panel D: Fraction Reassessed Nov. 2018*

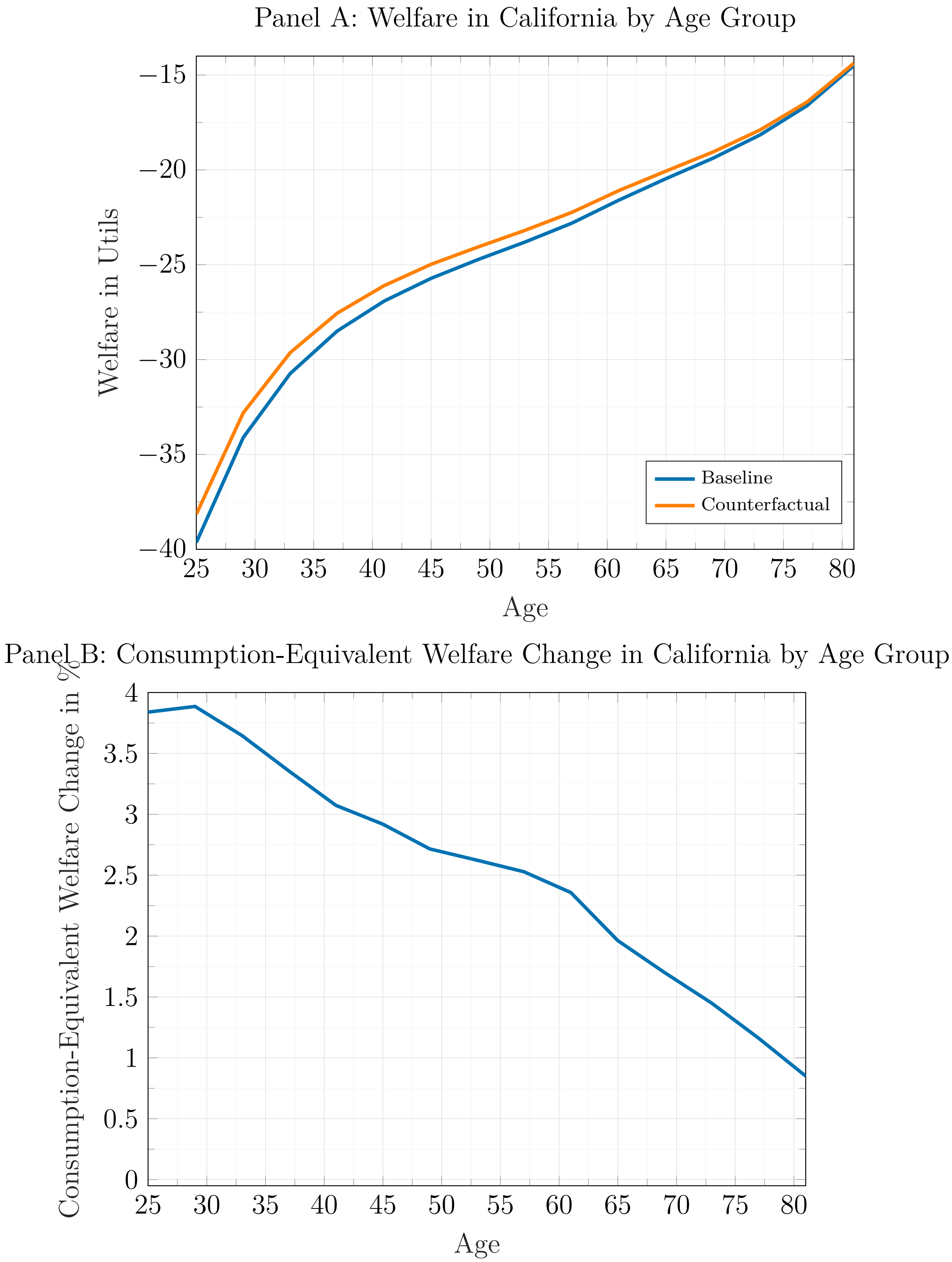




Panel E: Fraction Reassessed Nov. 2017 *Panel F: Fraction Reassessed Nov. 2016*

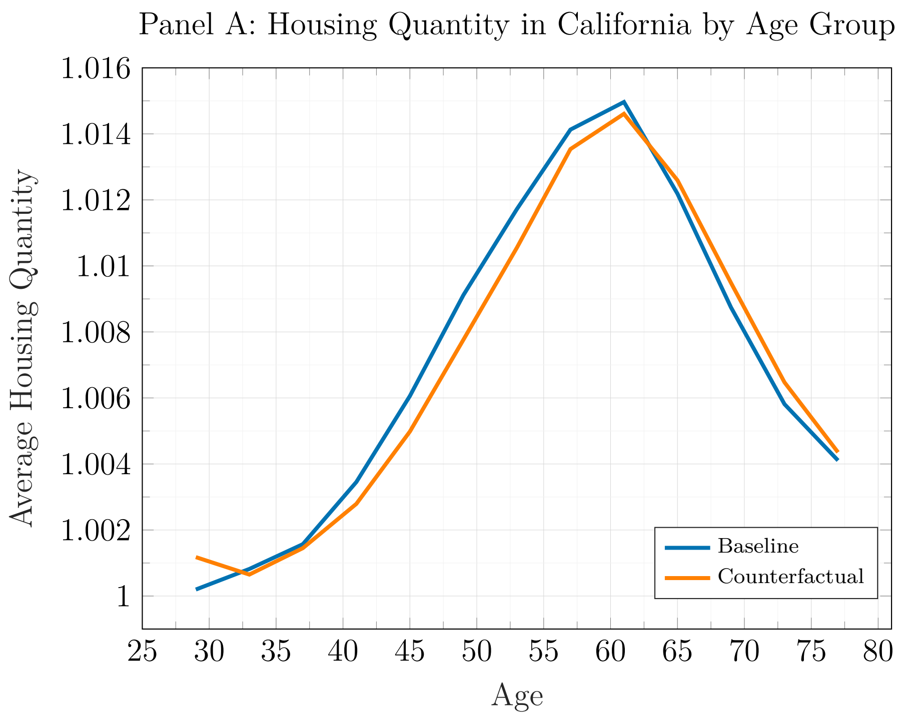
Notes: Data for this figure is drawn from Verisk property tax assessment data for the cross sections of Nov. 2015–2019 and Feb. 2021. Panel A shows the average property tax rate based on assessment values in each ZIP code. Panels B through F show the fraction of properties in a ZIP code that have new assessment values from the previous year. ZIP codes with a high fraction of treated properties constitute our treatment areas in that period, as outlined in Appendix B. Grey geographies are missing data for either or both of the present and or previous assessment.

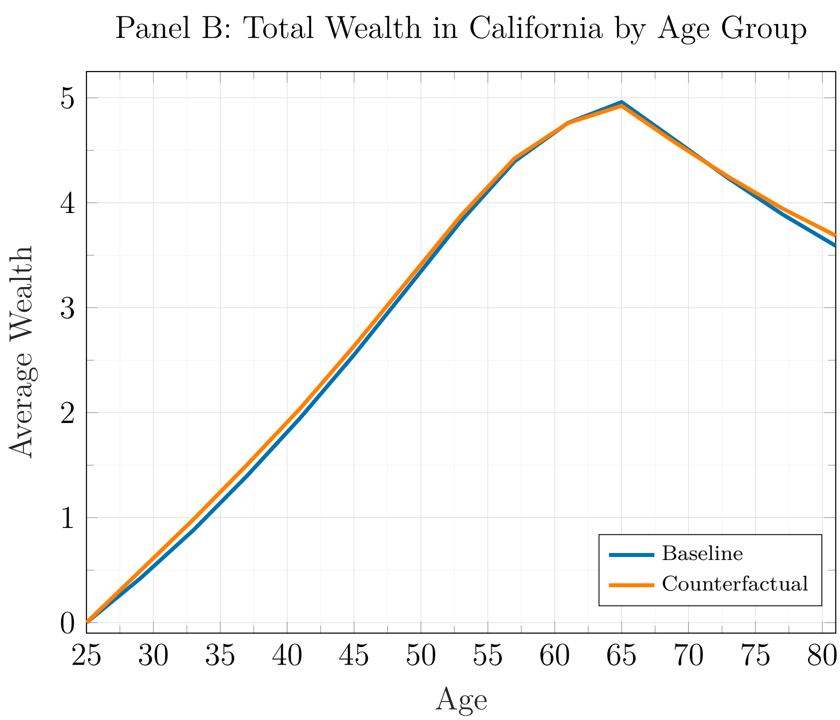
Figure A4: Impact of Property Tax Change on Welfare



Notes: This figure shows model-implied welfare before and after a counterfactual shift in the property tax rate in California from 0.8% to 2%, matching the level in Texas, discussed in Section 5. Results are calculated as the difference between baseline and counterfactual steady-state equilibria. Age groups are defined in 5-year intervals from ages 25–30 through 65–70. Panel A shows the the welfare in California across ages, and Panel B highlights the consumption-equivalent change in welfare by age group.

Figure A5: Impact of Property Tax Change on Other Outcomes





Notes: This figure displays the percentage change in housing quantity (Panel A) and total wealth (Panel B) by age group a counterfactual shift in the property tax rate in California from 0.8% to 2%, matching the level in Texas, discussed in Section 5. Housing quantity is measured in housing service units and includes both owned and rented housing consumption. Total wealth encompasses a risk-free asset and housing wealth. Results represent the difference between baseline and counterfactual steady-state equilibria. Age groups are defined in 5-year intervals. Negative values indicate reductions relative to baseline levels.

Table A1: Capitalization Effect Interacted With Supply Elasticity

	log(price)	log(price)	$\log\left(\frac{\text{price}}{\text{rent}}\right)$	$\log\left(\frac{\text{price}}{\text{rent}}\right)$	$\log\left(\frac{\text{price}}{\text{sf rent}}\right)$	$\log\left(\frac{\text{price}}{\text{sf rent}}\right)$
	(1)	(2)	(3)	(4)	(5)	(6)
Prop. Tax Rate	-36.59***	-21.53***	-25.09***	-15.69***	-26.29***	-18.11***
	(2.87)	(2.72)	(1.74)	(1.78)	(1.56)	(1.81)
Supply Elast.	-1.50***	-0.37***	0.02	0.62***	-0.19***	0.39***
	(0.12)	(0.10)	(0.08)	(0.07)	(0.07)	(0.07)
Prop. Tax Rate × Supply Elast.	37.12***	-14.63***	14.90***	-18.26***	19.33***	-10.91***
	(6.43)	(5.63)	(3.74)	(3.45)	(3.34)	(3.34)
Percent Difference	-31%	-19%	-22%	-15%	-23%	-17%
Bldg and Bdrms Controls	Y	Y	Y	Y	Y	Y
Math Scores, Dist. Controls	Y	Y	Y	Y	Y	Y
State FE	N	Y	N	Y	N	Y
Obvservation Level	Indiv.	Indiv.	PUMA	PUMA	PUMA	PUMA
Clusters Level	PUMA	PUMA	PUMA	PUMA	PUMA	PUMA
Observations	1973136	1973136	5505	5505	5501	5501

Notes: *p<0.1; **p<0.05; ***p<0.01. This Figure modifies Table 2 in the paper with the addition of an interaction between property taxes and housing supply elasticities drawn from Baum-Snow and Han (2024).

Table A2: Capitalization Effect in CA and TX

	log(price)	log(price)	$\log\left(\frac{\text{price}}{\text{rent}}\right)$	$\log\left(\frac{\text{price}}{\text{rent}}\right)$	$\log\left(\frac{\text{price}}{\text{sf rent}}\right)$	$\log\left(\frac{\text{price}}{\text{sf rent}}\right)$
	(1)	(2)	(3)	(4)	(5)	(6)
Prop. Tax Rate	-77.35***	-26.85***	-48.85***	-9.02***	-42.40***	-12.66***
	(3.32)	(5.01)	(2.39)	(3.47)	(2.57)	(3.89)
Supply Elasticity	-0.85***	-0.54***	0.28**	0.38***	0.06	0.11
	(0.09)	(0.08)	(0.11)	(0.10)	(0.10)	(0.09)
Percent Difference	-54%	-24%	-39%	-9%	-35%	-12%
Bldg and Bdrms Controls	Y	Y	Y	Y	Y	Y
Math Scores, Dist. Controls	Y	Y	Y	Y	Y	Y
State FE	N	Y	N	Y	N	Y
Obvservation Level	Indiv.	Indiv.	PUMA	PUMA	PUMA	PUMA
Clusters Level	PUMA	PUMA	PUMA	PUMA	PUMA	PUMA
Observations	351907	351907	1134	1134	1134	1134

Notes: *p<0.1; **p<0.05; ***p<0.01. This Figure modifies Table 2 in the paper by subsetting only on California and Texas.

Table A3: Quantifying Embedded Leverage in Property Taxes

State	Prop. Tax Amt.	Price	Prop. Tax Rate	De-levered Price	Embedded Leverage
Alabama	$1,077	$212,284	0.51%	$241,148	$28,864
Alaska	$4,049	$335,663	1.21%	$454,478	$118,814
Arizona	$1,824	$312,315	0.58%	$361,676	$49,361
Arkansas	$1,347	$191,134	0.70%	$228,139	$37,004
California	$5,247	$655,318	0.80%	$801,328	$146,009
Colorado	$2,361	$431,386	0.55%	$494,955	$63,569
Connecticut	$6,496	$326,270	1.99%	$538,015	$211,745
Delaware	$1,858	$278,206	0.67%	$329,013	$50,807
District of Columbia	$4,838	$733,942	0.66%	$866,106	$132,164
Florida	$3,605	$320,814	1.12%	$425,440	$104,626
Georgia	$2,483	$284,511	0.87%	$354,244	$69,733
Hawaii	$2,219	$668,177	0.33%	$726,311	$58,134
Idaho	$2,152	$273,240	0.79%	$333,027	$59,787
Illinois	$5,710	$276,077	2.07%	$464,163	$188,086
Indiana	$1,508	$196,847	0.77%	$238,619	$41,771
Iowa	$2,801	$185,745	1.51%	$271,276	$85,531
Kansas	$2,949	$246,878	1.19%	$333,287	$86,408
Kentucky	$1,719	$200,383	0.86%	$248,558	$48,175
Louisiana	$2,040	$235,677	0.87%	$292,919	$57,242
Maine	$3,660	$256,899	1.42%	$367,436	$110,537
Maryland	$3,869	$368,067	1.05%	$479,292	$111,225
Massachusetts	$5,467	$480,031	1.14%	$639,010	$158,979
Michigan	$2,610	$207,763	1.26%	$284,845	$77,083
Minnesota	$3,090	$280,267	1.10%	$369,687	$89,420
Mississippi	$1,529	$207,245	0.74%	$249,439	$42,193
Missouri	$2,590	$230,250	1.12%	$305,444	$75,194
Montana	$2,707	$295,768	0.92%	$372,231	$76,462
Nebraska	$3,614	$215,071	1.68%	$328,034	$112,963
Nevada	$1,919	$333,758	0.58%	$385,632	$51,874
New Hampshire	$6,059	$305,008	1.99%	$502,363	$197,355
New Jersey	$9,224	$411,193	2.24%	$722,368	$311,174
New Mexico	$2,200	$260,083	0.85%	$321,645	$61,562
New York	$6,344	$372,441	1.70%	$571,339	$198,898
North Carolina	$2,161	$267,600	0.81%	$327,777	$60,177
North Dakota	$3,088	$252,471	1.22%	$343,267	$90,796
Ohio	$3,178	$192,215	1.65%	$291,164	$98,948
Oklahoma	$1,940	$197,897	0.98%	$253,163	$55,266
Oregon	$3,779	$375,173	1.01%	$483,200	$108,027
Pennsylvania	$4,351	$251,552	1.73%	$388,459	$136,907
Rhode Island	$5,208	$325,976	1.60%	$486,931	$160,955
South Carolina	$1,588	$253,360	0.63%	$296,550	$43,190
South Dakota	$2,591	$211,767	1.22%	$287,962	$76,195
Tennessee	$1,676	$245,019	0.68%	$290,965	$45,946
Texas	$5,866	$282,256	2.08%	$475,726	$193,470
Utah	$1,797	$312,088	0.58%	$360,661	$48,573
Virginia	$3,647	$388,726	0.94%	$492,046	$103,320
Washington	$4,048	$476,956	0.85%	$590,291	$113,336
West Virginia	$1,291	$191,013	0.68%	$226,356	$35,343
Wisconsin	$3,665	$232,599	1.58%	$345,532	$112,933
Wyoming	$1,581	$262,435	0.60%	$305,303	$42,868

Notes: This table illustrates the implications of property taxes on housing prices across states. Property tax and sales information are drawn from 2017–2019 Verisk/Infutor data. The first column shows state-level average property tax amounts from assessor data. The second column highlights the average transactions value over this period, and the third column shows the implied property tax rate as a fraction of market value. The next column produces an estimate of the “de-levered” price, i.e. a counterfactual or hypothetical value under a zero-property tax world. To produce this estimate we draw on our estimates of capitalization (Table 2, column 2) along with the state-level average property price. The final column, illustrating the embedded or implied leverage, is the price difference between the actual transactions price and the implied de-levered price.

Table A4: Association of Tax and Homeownership by Income and Wealth

	Dependent variable: homeowner			
	High I Low W	High I High W	Low I Low W	Low I High W
	(1)	(2)	(3)	(4)
Prop. Tax Rate	6.66***	4.81***	2.95***	2.21***
	(0.69)	(0.64)	(0.51)	(0.65)
log(HH Income)	0.15***	0.04***	0.09***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
log(Int. Div. Rent Income)		0.00		0.01***
		(0.00)		(0.00)
Age and Income Controls	Y	Y	Y	Y
PUMA Level Controls	Y	Y	Y	Y
State FE	Y	Y	Y	Y
Clusters Level	PUMA	PUMA	PUMA	PUMA
Observations	1117511	338161	1101274	192078

Notes: *p<0.1; **p<0.05; ***p<0.01. Data are drawn from the individual-level variables from the ACS 1-year microdata from 2017 to 2019 merged with PUMA-level property tax rates from Verisk/Infutor sale records. This table shows a regression of an indicator variable for whether the individual is a homeowner on the PUMA-level property tax rate. Each column presents results from a regression on a different quartile of individuals partitioned by median individual income (High or Low I) and median interest, dividend, and rental income (High or Low W). Columns (1) and (3) do not control for the level of interest dividend and rental income within the group because these values are 0 or negative for those below the median. All columns control for the household income and include age fixed effects and state fixed effects. PUMA level controls include math test scores (from 2013, provided by Opportunity Insights Lab, from the Stanford Education Data Archive), distance to city center, and housing supply elasticity (Baum-Snow and Han 2024). All specifications in both panels have standard errors clustered at the PUMA level and are shown in parentheses. Standard errors are estimated with weighted least squares, where each observation is weighted by the variable housing unit weight from the ACS.

B Data Appendix

Generating Effective Tax Rates (Zip code, PUMA)

To measure property taxes, we use property assessment data from Verisk Marketing Solutions (previously known as Infutor). The assessment panel contains a yearly cross-section of all the tax lots in the U.S. from 2016 to 2021. Each tax lot observation has variables detailing the address, census geography of the property, property characteristics, tax assessment and payment information, and information about the most recent sale of the property.
To create our panel of property taxes, we perform the following data-cleaning steps:

1. Keep properties with non-null owner (PID_prop).
2. Keep properties with non-null address ID ($ADDRID\_prop$).
3. Keep only residential properties ($PROP\_IND \in \{10, 11, 21, 22\}$).
4. Exclude mobile homes ($PROP\_MOBHOME$).
5. Keep properties with non-null street info ($STREET$).
6. Exclude unbuilt land ($PROP\_LANDUSE$ not null and not 460).
7. Drop duplicate property IDs each year; keep one with higher $PROP\_VALCALC$.
8. Keep owner-occupied properties ($PROP\_OWNEROCC$ S, O).

To calculate tax rates from sale values, we apply the following additional filters:

1. Keep sales 2016–2021.
2. Keep sales where the price was $25k or higher.
3. Drop duplicates on the address and sale date.
4. Keep only properties with one sale.
5. Keep properties with property tax data.
6. Keep properties with property tax $< 10\%$.
7. Group up to sale year and Zip code or PUMA level.
8. Keep Zip code years with more than 20 sales or PUMAs with more than 100 sales.

9. Keep geographies with average realized property tax rates below 5%

We link the sales-based tax rates at the PUMA level to the Census ACS 1-year public use microdata sample for our empirical analysis at the PUMA level. We link the sales-based tax rates at the Zip code level to the ACS 5-year tables for the empirical analysis at the Zip code level.

Quasi-Experimental Sample for Capitalization Effects

To identify plausibly exogenous variation in property taxes for our difference-in-differences analysis, we construct a sample of systematic local property tax shocks. Appendix Figure A3 shows a map of the fraction of properties which receive reassessment shocks in each year. Areas with a small fraction of reassessment changes reflect ordinary reassessments; areas with a large fraction associate with systematic reassessments of properties within jurisdictions. We identify property tax assessment shocks that satisfy four key criteria designed to isolate genuine reassessment events from other confounding policy changes, following Fraenkel (2022) and Giesecke and Mateen (2022):

1. **Widespread Assessment Changes.** We require that more than 90% of properties within a ZIP code experienced assessment value changes in a given year. This condition ensures we capture systematic reassessment events rather than isolated property-specific adjustments that might be correlated with unobserved property characteristics or improvements.

2. **Infrequent Previous Assessment Activity.** To identify discrete reassessment episodes, we require that fewer than 50% of properties in the jurisdiction had assessment value changes in the previous year. This criterion helps distinguish genuine reassessment cycles from areas with continuous assessment updates that might reflect ongoing market trends rather than administrative policy changes.

3. **Substantial Tax Rate Variation.** We impose a minimum threshold requiring the interquartile range of property tax rate changes within the jurisdiction to exceed 0.005 percentage points. This condition eliminates jurisdictions that primarily adjust assessment ratios (the fraction of market value used for tax purposes) rather than conducting true reassessments of underlying property values. Changes in assessment ratios typically generate uniform proportional changes across all properties, whereas genuine reassessments create heterogeneous impacts based on how individual property values have evolved since the last assessment.

4. **Assessment-Driven Tax Changes.** Finally, we decompose the total change in property tax amounts into components attributable to assessment value changes versus tax rate changes. We require that more than 90% of the variation in tax amount changes stems from assessment value changes rather than rate adjustments. This ensures our identification strategy captures the effects of reassessment rather than concurrent changes in local tax policy that might be endogenously determined by local economic or political conditions.

These criteria collectively identify reassessment events that provide plausibly exogenous variation in property tax burdens forming the foundation for our causal identification strategy. The sample includes data from Verisk/Infutor from November 2015 to February 2021. We keep only properties with one clean observation in the post-treatment window to avoid contamination in cases of multiple transactions, and follow properties for two years around treatment to avoid contamination with other assessment cycles, which are typically three years in this state.