Property Taxes and Housing Allocation Under Financial Constraints*

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Abstract

Property taxes impact the housing distribution across generations. Low property taxes lead to concentrated ownership among elderly empty-nesters, limiting housing for financially constrained young families. Conversely, high property taxes act as a "forced mortgage," reducing upfront down payments and enabling greater homeownership among younger households. We show in an overlapping generations model of housing and location choices that raising property taxes in low-property-tax California to match those in higher-property-tax Texas increases homeownership in California by 4.6% and among younger households by 7.4% in steady state. Asset taxes can reallocate housing to higher-valuation households in the presence of financial constraints, providing an independent rationale for property taxes.

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1 Introduction

Property taxes are a significant source of revenue for local governments in the United States, accounting for nearly half of all local tax revenue raised. As housing constitutes half of total household wealth, property taxes represent a directly assessed form of wealth taxation (Guvenen et al., 2023). While it is well known that asset taxes can affect equilibrium prices, the implications of these taxes for the allocation of assets across different groups are not fully understood. Therefore, our key question is: How do property taxes affect house prices and the allocation of housing? In this paper, we examine the role of property taxes in shaping housing choices across different age groups by affecting financial constraints and explore the potential welfare consequences of changes in property taxes. Addressing our question requires moving in the direction of putting the finance into public finance as articulated by Aguiar et al. (2024) and broadly reconciling macroeconomics with finance—specifically for the housing sector—in the spirit of Atkeson et al. (2024).

We develop an overlapping generations (OLG) model with heterogeneous agents, incomplete markets, and housing tenure choices to analyze the impact of property taxes on housing decisions over the life cycle. Our calibrated model matches a key feature of the U.S. housing market: older, wealthier households predominantly own and occupy the housing stock, while younger households struggle to afford housing due to down payment constraints. We then use the model to examine policy counterfactuals to quantify the role of property taxes on housing allocations.

We find, perhaps surprisingly, that raising property tax rates from 0.8% of market values in low-property tax California to the 2% value that prevails in higher-tax Texas would substantially raise homeownership among Californian households by 4.6% and increase homeownership rates among young households by 7.4% in steady state. Housing consumption is also redistributed from older to younger households, and California sees net in-migration as a result of the tax change. These findings suggest that property taxes can affect housing allocations while entailing broadly progressive transfers, at least when rates are increased from a low level. The key mechanism driving our results is the capitalization of higher property taxes into lower purchase prices, which relieves down payment constraints faced by financially constrained buyers. These results suggest that property taxes can be viewed as a form of a "forced mortgage" 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.

This paper starts by developing a theoretical model highlighting the key economic channels by which property taxes affect housing choices. In an incomplete market framework, households accumulate real estate for precautionary savings and bequests, leading to a concentration of homeownership among elderly people. Property taxes affect this allocation through four main channels: (1) migration across areas, (2) intensive margin changes in housing choice within areas due to location-specific amenities and characteristics, (3) housing substitution effects from higher housing costs, and (4) capitalization effects that reduce house prices and increase the quantity of housing demanded by financially constrained young agents. Regarding financial constraints, we focus on the role of down payments required to enter into homeownership.

We then provide empirical support for the basic assumptions and predictions of this framework. We highlight the basic lifecycle mismatch of housing demand: 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 considerably more crowded housing situations. We next show how these allocations differ across high- and low-property-tax regimes. Our findings challenge the common view that property taxes, like income or sales taxes, merely increase living costs. Instead, we demonstrate that higher property tax regimes tend to result in more progressive housing allocations. Areas with higher property taxes feature more young households and higher homeownership among these families. Such areas also feature fewer empty bedrooms and are home to more children as a fraction of the local population.

These trends may be partially explained by the strength of the capitalization effect: house prices and price-to-rent ratios are substantially lower in areas with higher property tax rates, indicating greater upfront housing affordability in these areas despite higher ongoing expenses. Consistent with this explanation, the increase in homeownership in high-property-tax areas is highest among households with low wealth but higher income streams. These are precisely the households that are able to make property tax payments in the future but that struggle to come up with down payments for housing purchases.

In the quantitative exercise that follows, we show the relevance of property taxes in shaping housing allocations through a structural OLG model focusing on housing tenure choices. We build a complex but tractable model featuring six state variables across two geographies, a full set of age groups over the lifecycle, with households living up to 60 years (35 working, 25 in retirement). We include a full set of housing choices including location, housing tenure (rent vs own), housing quantity, savings, and consumption. We also accommodate financial frictions based on down payment constraints and minimum house size requirements. The model calibration matches numerous empirical moments related to homeownership, wealth, income, and migration patterns. We focus on a model calibration based on a comparison of California, which 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), and Texas, which has comparatively high property taxes and greater housing affordability. The highest migration flows from California are to Texas, indicating the suitability of an analysis focused on these two states to illustrate the effects of starkly contrasting property tax policies.

Our model explains the higher homeownership access in high-property-tax Texas compared to California. In California, young households face expensive purchases and are constrained by down payment requirements, resulting in low young homeownership rates. Older households accumulate housing over the life cycle due to strong income growth and investment motives. As a result, the gradient between homeownership and age is relatively steep. Most homes are owned by the elderly who enjoy a low carrying cost for the property and can age in place during retirement. By contrast, Texas features a much weaker gradient between homeownership and age. Higher property prices are capitalized into lower purchase prices, making homeownership more appealing for younger households. Higher carrying costs, by contrast, make homeownership less appealing for the elderly. The resulting housing allocations, therefore, favor younger households.

We show that property taxes are a major factor behind these cross-sectional differences in homeownership profiles. We do so through a counterfactual policy experiment in which we raise California property tax rates to mirror those of Texas and adjust house prices in California due to the the capitalization effect. In the new steady state, we observe a 4.6% increase in homeownership among all Californians. This is especially concentrated among younger Californians, whose homeownership rates rise by 7.4%. Older California residents, by contrast, downsize and reduce their housing consumption. Overall wealth increases due to higher homeownership, while incomes slightly rise as a result of net in-migration to higher-wage California by previously financially constrained households. Importantly, our results are not driven by the imposition of higher property taxes on existing residents. Instead, we abstract away from transition dynamics and focus on the difference in welfare and housing allocations by comparing existing policy to a separate counterfactual featuring higher taxes and lower property prices.

Our results highlight the significant impact of property taxes on housing and asset accumulation decisions across the lifespan, especially when considering financial constraints. The use of property taxes is widespread in many developed countries. We find that these taxes have important effects on resource allocation, primarily through their impacts on property values.

Our results also provide an independent justification for the use of property taxes. Common rationales for property taxes include Georgist arguments about the inelasticity of land supply (George, 1884), the role of such taxes in the funding of local public goods (Zodrow and Mieszkowski, 1986; Stiglitz, 1977), and their impact on housing wealth inequality (Bonnet et al., 2021; Rognlie, 2016). By contrast, taxes in our framework have allocative effects that alleviate down payment affordability constraints among younger generations. While our paper does not take a stance on the normative desirability of such policies, we suggest several plausible motives for the state and local policymakers who typically implement property tax policies to support such a reallocation. One motive may be to provide families with housing suitable for raising children, an important consideration in the context of rapidly declining fertility rates worldwide, and the value of housing conditions for the human capital formation of the next generation. Another possible motivation to support housing reallocation is to reduce spatial mismatch: alleviating down payment affordability constraints on homeownership in expensive areas with agglomerative economies would attract more young working residents, raising total income.

We show that our results are robust to natural extensions in Section 6. We verify that our results hold under inelastic housing supply and general equilibrium in the housing market, alternate specifications of who receives the benefits of property taxes, and alternate down payment constraints. We also acknowledge several limitations and potential extensions of the baseline model in Subsection 2.5. These include the fact that it focuses on owner-occupied housing, does not account for liquidity considerations among homeowners facing property tax shocks, lacks explicit modeling of family formation and fertility decisions, and abstracts from inequality in real estate assessment as well as other taxes. We address some of these limitations by augmenting our model with a rental market in the quantitative calibration and argue in this section that our modeling framework can accommodate additional extensions. Finally, another limitation is our focus on the increases in property taxes from a relatively low base. Larger property tax increases than the ones we model likely have negative welfare impacts due to their impact on housing demand.

Our paper relates to several strands of literature. Many papers have examined the role of property taxes, arguing for biases or costs in the tax assessment process (Amornsiripanitch, 2020). Avenancio-León and Howard (2022) argue for racial biases in property tax assessments. In the context of our work, racial differences in assessments reflecting racial differences in granting appeals constitute bias, but the matching of minority households to high-property-tax areas may reflect the sorting of financially constrained households into high-property-tax areas featuring low house prices. 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) explore 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.

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. Guvenen et al. (2023) argue for wealth taxes over capital gains taxes on the grounds of allocative efficiency. While we do not model capital gains taxes explicitly, we do find allocative benefits of asset taxes in the form of property taxes. Positive property taxes, in our framework, may be valuable even when the money raised is rebated lump-sum to households and the basis of taxation—housing—is neither a negative externality itself nor a productive asset. 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) argue for taxing dividends rather than corporate income in the presence of financial constraints at the firm level. Our framework focusing 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, this work also relates to the literature examining housing choice. Seko et al. (2023) emphasize housing utilization in the context of aging societies. Housing choices under misallocation have also been studied in the context of rent control (Glaeser and Luttmer, 2003) and lock-in due to negative equity and interest rates (Ferreira et al., 2010; Fonseca and Liu, 2023); 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 a different mechanism—the role of housing as a saving vehicle—and can, therefore, be important even in fully liquid housing markets. We show how this mismatch can be addressed using more standard property tax instruments. We also build on a growing body of work that studies the implications of public policy for homeownership and housing choice (Sommer and Sullivan, 2018; Attanasio et al., 2012; Chambers et al., 2009a; Floetotto et al., 2016; Chambers et al., 2009b). We differ by focusing on a local policy variable, in the form of property taxes, rather than federal policies. 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 for the purpose of motivating our exercise and validating key mechanisms.

The paper is organized as follows: Section 2 presents our baseline model and illustrates the mechanisms. Section 3 presents stylized facts on the effect of property taxes on housing choice. Section 4 presents the calibration of the full quantitative model, and Section 5 performs a policy analysis investigating the impact of changes in property tax rates. Section 6 provides additional robustness around our results, and Section 7 concludes the paper.

2 Intensive Margin and Migration Effects of Property Taxes

In this section, we develop a simplified version of our full model to illustrate the mechanisms through which property taxes affect the allocation of housing and welfare. Our conceptual framework is an OLG model in which households live for two periods (working age and old age) and make location and housing quality choices under financial frictions.

2.1 Environment

The economy consists of households who live for two periods, working age t and old age $t+1$. In the first period, starting from location i_t, they choose their housing quantity in one of two locations, $l \in \{TX, CA\}$, which represent Texas and California. The two locations differ in their house prices, property tax rates, housing amenities, and income processes. A key feature of the model is financial constraints: households are required to make a down payment when purchasing a home and can borrow only up to a fraction of the value of their house.

Preferences. In working age, households have a utility function for non-durable consumption C_t and housing consumption H_t. The value H_t corresponds to the size of a house or, more broadly, its quality. Additionally, households obtain location-specific homeownership benefits so that their utility depends on their location i_t, i.e., $U_{i_t}(C_t, H_t)$. In working age, households choose their location, consumption, housing, and savings in a risk-free asset A_{t+1} at interest rate r. In old age, households derive utility from bequeathing their total wealth W_t, which consists of both housing and non-housing wealth

$$W_{t+1} = P_i(1 - \delta - \tau_i)H_{t+1} + (1 + r)A_{t+1} \tag{1}$$

according to a bequest function given by $B(W_{t+1})$.

Housing costs and property taxes. Housing wealth is subject to a location-specific property tax rate τ_i and depreciates at a rate δ. In both regions, the collected taxes are distributed to all households each period through a lump-sum transfer T_i. House prices in both regions are time-independent and respond to property taxes in equilibrium according to the function $P_i(\tau_i)$. We microfound such an expression in Section 4 with an equilibrium condition with a rental market.[1]

Assets and financial constraints. We focus on borrowing constraints in the form of down payment requirements as the key financial constraints. We assume, without loss of generality, that, at the beginning of the period, households use all their wealth to make a down payment on their initial home.[2]

$$Y_t + (1+r)A_t = \theta P_i H_t \tag{2}$$

In addition, homeowners can borrow against their house value, subject to the borrowing constraint

$$A_{t+1} \geq -(1-\theta)\frac{1-\delta}{1+r}P_i H_t, \tag{3}$$

where θ determines the minimum down payment.[3]

Income. During working age, household income $Y_t(i_t, z_t)$ is a function of the location i_t and a random variable z_t.

Household problem. We model households' location decisions $l \in \{TX, CA\}$ in working age as a discrete choice problem. The household problem is given by

$$V(A_t, H_t, Y_t, i_t, \zeta_t) = \max_{l \in \{TX, CA\}} V^l(A_t, H_t, Y_t, i_t) + \zeta_t, \tag{4}$$

where ζ_t are i.i.d. extreme value (EV) type-1 shocks. Household utility V^l, given a location choice, the budget constraint, the down payment constraint, the borrowing constraint, and the tax revenue

[1]With a production side to the housing market, this expression can be interpreted more broadly as the general equilibrium response of house prices to the property tax.

[2]Note that this is technically a restriction on the initial state of the households rather than a constraint. This restriction is one way in which we capture the fact that agents need to have some savings to afford "initial housing" in a static model. An alternative would have been to assume that households have no housing initially i.e. $H_t = 0$. The down payment constraint will be embedded in the combination of the borrowing constraint ant the household budget in our dynamic model.

[3]We do not additionally deduct the property tax from the total housing value in the borrowing constraint because we assume that property taxes have no independent impact on housing collateral value or borrowing ability aside from their impact on prices. Our results would be very similar if we simply assumed a fixed down payment θ_{LTV} applied against the total current market value of the property.

constraint, is:

$$
\begin{aligned}
V^l(A_t, H_t, Y_t, i_t) = \max_{C_t, A_{t+1}, \tilde{H}_t} & U_l(C_t, \tilde{H}_t) + \beta \mathbb{E} B(W_{t+1}) \,, \\
\text{s.t.} \quad & A_{t+1} + P_l \tilde{H}_t + C_t = (1+r)A_t + Y_t(z_t, i_t) + T_l + (1-\delta)P_{i_t} H_t - \tau_{i_t} P_{i_t} H_t \,, \\
& Y_t + (1+r)A_t = \theta P_i H_t \,, \\
& A_{t+1} \geq -(1-\theta)\frac{1-\delta}{1+r} P_l \tilde{H}_t \,, \\
& \mathbb{E}_t[T_i - \tau_i P_i H_i | i] = 0 \text{ for } i \in \{TX, CA\}.
\end{aligned}
\tag{5}
$$

Social welfare in location i. We denote by μ the density of the steady-state distribution of (A, H, Y, i, ζ). Then, we define welfare in location i as the steady-state average utility

$$
\mathcal{W}_i \equiv \mathbb{E}[V(A, H, Y, i, \zeta)|i] = \frac{\int \int V(A, H, Y, i, \zeta)\mu(A, H, Y, i, \zeta) dA dH dY d\zeta}{\int \int \mu(A, H, Y, i, \zeta) dA dH dY d\zeta}. \tag{6}
$$

2.2 Marginal Welfare Effects of a Property Tax Change

Households respond to any policy change τ_i by endogenously updating their policy choices in Equation 5. The following lemma decomposes the marginal welfare effect of a change in property taxes in region i.

Lemma 1. *Denote as μ_i the marginal density of $\mu_i(A, H, Y, \zeta)$ given i and as $\varepsilon_{\mu_i, \tau_i}(A, H, Y, \zeta)$ the endogenous elasticity of the population density in region i with respect to the property tax. Then, the welfare effect of a change in property taxes in region i is, to a first order,*

$$
\frac{d\mathcal{W}}{d\tau_i} = \underbrace{\mathbb{E}\left[\frac{dV(A, H, Y, i, \zeta)}{d\tau_i}|i\right]}_{\textit{intensive channel}} + \underbrace{\mathbb{E}\left[\frac{V(A, H, Y, i, \zeta)}{\tau_i} \varepsilon_{\mu_i, \tau_i}(A, H, Y, \zeta)|i\right]}_{\textit{migration channel}}. \tag{7}
$$

The first term, the intensive margin channel, corresponds to the utility change resulting from endogenous consumption, asset, and housing quantity responses conditional on households' staying in the region i. Absent any endogenous location choice, this would be the only effect of property tax changes on welfare. The second term is the extensive margin or migration channel, which captures how the cross-sectional distribution of assets, consumption, and housing changes as a result of households' moving decisions. The magnitude of this effect is proportional to the derivative of the population density in region i with respect to its property tax. At the optimal property tax, these two effects offset each other.

In what follows, we further characterize the intensive and migration channels.

2.3 Intensive Channel

The following proposition, derived from an application of the envelope theorem, provides further insight into the intensive margin effects of a property tax increase in location i on welfare.

Proposition 2. *The marginal effect of an increase in property taxes in location i on household utility is:*

$$\begin{aligned} \frac{dV(A,H,Y,i,\zeta)}{d\tau_i} &= \underbrace{\left.\frac{\partial U_i}{\partial C}\right|_{(C^*,\tilde{H}^*)} \times \left[-P_i H - \frac{dP_i}{d\tau_i}\left(\tilde{H}^* I\{l^*=i\} - (1-\delta-\tau_i)H\right)\right] - P_i\lambda_i^{*T}\mathbb{E}[H|i] - \frac{dP_i}{d\tau_i}\lambda_i^{*T}\tau_i\mathbb{E}[H|i]}_{\textit{housing substitution effect}} \\ & \quad \underbrace{-\left(\theta H\lambda^{*DC} - \lambda^{*BC}(1-\theta)\frac{1-\delta}{1+r}\tilde{H}^* I\{l^*=i\}\right)\frac{dP_i}{d\tau_i}}_{\textit{capitalization effect}} + \beta\mathbb{E}\left[\frac{dB(W)}{d\tau_i}\right] \end{aligned} \tag{8}$$

and

$$\frac{dB(W)}{d\tau_i} = B'(W^*)\underbrace{I\{l^*=i\}\left(-P_i\tilde{H}^* + (1-\delta-\tau_i)\tilde{H}^*\frac{dP_i}{d\tau_i}\right)}_{\textit{stayers' old-age wealth effect}}, \tag{9}$$

where λ^{*DC},λ^{*BC} and λ_i^{*T} are, respectively, the Lagrangian on the down payment constraint, borrowing constraint, and the tax revenue constraint of location i.

We highlight three effects that arise from the optimal choice of households. First, an increase in property tax rates leads to a mechanical increase in the assessed property taxes paid, but this effect is dampened by the reduction in house prices and lump-sum transfers of collected taxes. These combined forces lead to a housing substitution effect with an ambiguous impact on welfare. Second, the capitalization effect from house price reductions affects the financial constraints of working-age households in two ways. It makes initial housing more affordable and increases welfare. Households who choose to stay in location i, however, lose in borrowing capacity. Given the importance of down payment constraints at a young age, the capitalization effect can be expected to increase welfare. Third, an increase in property taxes reduces old-age wealth in two ways for households that do not relocate from the area with the increased property taxes. They pay high property taxes, receive lower housing wealth from the lower house prices, and therefore have lower total wealth absent relocation.

We next characterize the migration channel.

2.4 Migration Channel

The most elementary moving decision, for a given state (A, H, Y, ζ), is a binary decision with probability $\mu(i|A, H, Y, \zeta)$. We know from the properties of EV-1 shocks that

$$\mu(i|A, H, Y, \zeta) = \frac{\exp(V(A, H, Y, i, \zeta)))}{\exp(V(A, H, Y, i, \zeta)) + \exp(V(A, H, Y, -i, \zeta))}. \tag{10}$$

The total migration channel captures how the cross-sectional distribution of assets, consumption, and housing changes with household moving decisions $\frac{d\mu_i(A,H,Y,\zeta)}{d\tau_i}$. This is affected by flows both into and out of the location where the tax change occurred and can be expressed as a function of the change in the binary choice distribution in Equation (10). We see, therefore, that the effects of housing substitution, capitalization, and old-age wealth will affect migration. How the combination of all these effects impacts welfare at a given property tax level requires a quantitative analysis of our model. We turn to this exercise in Section 4 after providing empirical evidence for these channels.

2.5 Limitations and Extensions

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

1. **Payment-to-income constraints.** In our analysis, we do not explicitly account for the

payment-to-income (PTI) constraint, which is a point of focus in Greenwald (2018). For Fannie Mae and Freddie Mac loans, a conventional PTI requirement is that total monthly debt payments must be less than 50% of gross monthly income. Monthly debt payments include both mortgage payments and property tax obligations. Consequently, there are two opposing effects: (a) an increase in property taxes raises the total debt payment, thereby making the constraint more binding, while (b) a decline in property prices reduces the required mortgage payment, mitigating the constraint. The net effect of these two forces is ambiguous, though it is unlikely to be substantial in quantitative terms.

2. **Rental markets.** The first limitation relates to our focus on owner-occupied housing: our simplified theoretical model includes only owner-occupied housing and considers only property taxes levied on this segment of the housing stock. This is potentially an important limitation because household substitution toward or away from rental housing may be an important margin of adjustment.

   To address this issue, we augment our basic model in Section 4 with a rental market. We match rents in the model based on a user cost model applied to average house prices in the relevant regions. This addition tends to amplify our results: when households have access to both rental and owner-occupied housing, changes in house prices have additional impacts on housing allocations by increasing homeownership among financially constrained agents—those not able to purchase a house at the specified point in their life cycle because of a limited ability to make a down payment.

   The analysis focuses on the impact of higher property taxes on owner-occupied rather than multifamily housing. This is because residential property taxes make up the majority of property tax revenue, and our focus is on housing allocations within the owner-occupied housing stock. Although property taxes can also be applied to commercial properties in multifamily housing, the literature offers mixed evidence on whether these taxes are passed on to renters (Watson and Ziv, 2021; Löffler and Siegloch, 2021). The framework used in this study can be extended to include property taxes on multifamily properties, but doing so would require additional assumptions about the degree of tax pass-through.

3. **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 steady state) face higher flow expenses of property taxes, 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 and Yale, 2022), and the importance of transitional effects for optimal policy more broadly (Dyrda and Pedroni, 2023). For these reasons, many local governments limit the incidence of reassessment shocks on low-income or elderly residents in various ways: by either reducing property taxes for those demographics (by lowering assessments or offering tax credits) or deferring the realization of the taxes 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.

4. **Housing supply and transition dynamics.** In our simplified model, housing is supplied elastically at a given price, which we match in the calibration based on local values. Therefore, an increase in housing supply can lead to welfare gains in the new steady state after an increase in property taxes, while over the transition, housing should be more inelastically supplied. In principle, this may affect our results because lower housing prices resulting from

higher property tax values may reduce the profits to builders from producing more housing units. The gains in housing units for younger families, as a result, may be overstated to the extent that new housing production may be lower in such areas. Such costs to supply can be mitigated, as is well understood, through land value taxes, which tax only the land rent, not the incremental value of new construction (George, 1884). We conduct robustness around this point in Section 6, finding that our results continue to hold even under the assumption of completely inelastic housing markets.[4]

In practice, it is also worth noting that housing supply elasticities are often *higher* in high-property-tax regimes, even when implemented without the land value tax dimension. Krimmel (2021) highlights that, in our focus state of California, school finance equalization reforms drove tax revolts (ultimately resulting in the passage by referendum of Proposition 13, which capped property tax increases across the state). Californian municipalities that are unable to increase property taxes rely instead on quantity controls in the form of housing regulation to reduce congestion and attract wealthy residents. Additionally, municipalities receive little incremental property tax revenue from allowing new development while they are still liable for producing new infrastructure and public goods for these housing units. By contrast, housing regulation is far laxer, and housing supply is substantially more elastic in high-property-tax Texas, where municipalities stand to gain substantially from allowing new construction. This suggests that fully modeling the supply side may actually amplify our results to the extent that housing supply expands more in high-property-tax areas because of local fiscal considerations.

5. **Public goods.** Our paper focuses on the liability side of property taxes—the impact that tax levies have on household decisions. In addition, property taxes help fund important local goods such as infrastructure and, especially, schools (Brueckner, 1982), which have been the focus of prior literature. We model this expenditure side indirectly by rebating revenues back to households lump-sum.

   A more realistic modeling of the expenditure side would potentially further amplify our results across generations to the extent that younger families with children (who value schools) are

[4]The main difference is quantitative as the capitalization effect of property taxes in house prices is lower when housing is inelastic.

also more likely to be financially constrained. We consider robustness around this point in Section 6, in which we rebate property tax revenues only to the young and find increased homeownership as a result.

6. **Notions of welfare.** Our analysis focuses on average welfare as the primary metric for evaluating the impact of property tax changes, especially in Section 5. This approach, while standard in the public finance literature, has some limitations worth acknowledging:

   (a) Aggregation: we use average welfare rather than the sum of welfare or alternative aggregation methods. This choice avoids arbitrary conversions between consumption and housing units, which can be problematic because of the multidimensionality of choices in our model. However, it is important to note that different aggregation methods could yield different conclusions.

   (b) Alternative welfare metrics: recent literature has proposed various welfare metrics, such as the Marginal Value of Public Funds (Hendren, 2016). While these approaches are beyond the scope of our current analysis, they represent valuable avenues for future research.

   (c) Intergenerational considerations: our model does not explicitly account for the welfare of future unborn generations. Some research, such as Farhi and Werning (2007), suggests that considering future generations might lead to different policy prescriptions, potentially favoring wealth subsidies rather than taxes.

   (d) Steady-state focus: our welfare analysis focuses on steady-state outcomes and does not consider transition dynamics. The welfare implications during the transition period between tax regimes could differ significantly from the steady-state results and represent an important area for future investigation.

   While we acknowledge these limitations, we believe that the utilitarian approach based on average welfare provides valuable insights into the effects of property taxes on housing allocation across generations. Additionally, we show the impact of property tax changes on allocations directly to show the impacts in a transparent manner with fewer assumptions about welfare.

7. **Children.** While our analysis is partially motivated by the presence of young families with children facing constraints in accessing the single-family owner-occupied housing stock, we do not model family formation or fertility decisions directly. To the extent that homeownership or housing space are inputs in marriage or fertility decisions (Lafortune and Low, 2023), we expect that reallocating ownership of larger housing units toward younger households may also affect the number of families with young children.

8. **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 rising in popularity (Acolin et al., 2024). This may alleviate housing burdens on the young while bringing additional complications such as the location lock induced by working-age people being 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.

9. **Inequality in property assessments.** We abstract away from assessment inequality (Amorn-

siripanitch, 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.

10. **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.

11. **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).

12. **Income taxes and other forms of taxation.** In practice, real estate is subject to additional taxes beyond property taxes. These include transaction or transfer taxes that only apply at the point of sale, sometimes also known as stamp duties. These taxes typically make up a larger share of the overall tax burden on real estate in Europe. Other transaction taxes include capital gains taxes on real estate, also levied only at the time of capital gains realization, and mortgage recording taxes in certain areas. Our full quantitative model of Section 4 incorporates these and other transaction frictions through a parameter capturing the utility cost of moving and is calibrated based on realized moving rates.

    Another possible extension of the model would be to investigate the optimal design of real estate taxes between these different structures. While all real estate taxes raise the user cost of housing consumption and, therefore, should impact house prices through the capitalization channel, taxes based only on transactions may increase lock-in among owners, in contrast to standard property taxes, which increase reallocation.

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. Our results should, therefore, be seen as conservative by focusing only on the role of aggregate tax burdens.

We also abstract from differences in state income taxes and other forms of local taxation such as sales taxes between California and Texas. These differences can have quantitative implications for life cycle decisions (Farhi and Werning, 2013; Ndiaye, 2018). This is an important simplification in light of classic results such as that of Samuelson (1958), who shows, in an OLG framework, that a social security system that transfers income from the young to the old can lead to Pareto improvements under certain conditions. By restricting our attention to property taxes, we exclude the potential welfare effects that might arise from a broader set of tax and transfer policies. Future research could explore how property taxes interact with other tax instruments and intergenerational transfer systems to affect housing allocation and overall welfare.

3 Stylized Facts on Property Taxes and Housing Allocation

In this section, we present empirical results to support the basic assumptions and predictions of the theoretical model. In addition to descriptive facts about the allocation of housing across generations, we emphasize the relationship between the cross-sectional variation in property tax rates and housing allocations and prices. These effects likely reflect a combination of selection and treatment effects, which we use a structural model to disentangle.

3.1 Data

We create a dataset to analyze individual-level variables with respect to the sale-based property tax rate 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 in the publicly available microdata is the public use microdata area (PUMA), which typically contains 100,000 to 200,000 people. In many regions of the country, PUMAs are similar in size to counties. The microdata contain individual-level variables, including age, household size, and the number of bedrooms.

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 all the 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 details are in the data appendix. We aggregate these 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%). Combining tax-paid data alongside sales data provides local estimates of property tax rates with respect to the actual market value. County-level realized rates and amounts are shown in Appendix Figure A1.

3.2 Concentration of Homeownership among Elderly People

We begin by highlighting a key stylized fact: ownership of the bulk of the housing stock is concentrated among elderly people. Most bedrooms within owner-occupied housing units are owned by people between 50 and 70 years old, as shown in Panel A of Figure 1. Such people are near the end of or past their child-rearing years, suggesting that empty-nesters own many of the bedrooms in the U.S. This lopsided allocation toward those without children and away from those with children results in heterogeneity in bedroom utilization by age group. We plot the distribution of each age group's number of people per bedroom in Figure 1 Panel B. People aged 30–50 have the largest fraction with more than one person per bedroom. The data presented in these plots suggest a potential mismatch in the allocation of bedrooms across age groups. The majority of bedrooms are owned by individuals aged 50–70, who tend to utilize each bedroom less than those in the 30–50 age range.

The age-biased character of homeownership may have broader negative economic consequences through several possible mechanisms. First, families may be limited in accessing job markets in high-income areas because of 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 have a higher valuation for the same space. This could be the case under complementarities between the number of children and 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. Third, areas with aging households may have limited local labor pools of workers to perform essential old-age care functions. Our paper is focused primarily on the housing allocation impacts of different property tax regimes, and our model considers the first channel (income effects) only as a broader outcome of these housing decisions. However, our framework can be potentially extended to incorporate broader impacts of housing choice.

3.3 Spatial Allocation of Housing Across Generations

We next show how housing allocations differ across areas with higher and lower property tax rates. Higher property taxes are associated with shifts in this distribution toward more bedrooms and less crowding for those ages 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 should be examined as a policy that shifts the utilization of housing by different age groups.

We next examine the relationship between property taxes and housing outcomes in a regression context, which enables us to consider 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 individual income, age, and dividend income, along with state fixed effects. Standard errors are clustered at the PUMA level. Because this specification has state fixed effects, the identifying variation is primarily the local property tax variation across different municipalities within a state. We find a statistically and economically significant increase, ranging between 1.2 and 2.3 percentage points increase in homeownership among young households (those under 65) for a one percentage point increase in the property tax rate. The association between property taxes and homeownership for elderly people, by contrast, is always smaller in magnitude and is of the opposite sign in some specifications. Appendix Figure A2 shows a nonparametric association between age and homeownership across high- and low-property-tax areas.

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. This suggests greater housing efficiency in areas with higher property tax rates.

3.4 Financial Constraints and Property Taxes

There are two 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). Differences in income and wealth by age would, therefore, result in a heterogeneous impact for each of these channels. Appendix Figure A3 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 in age. These statistics illustrate a mismatch in income streams, indicating 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 at the minimum size. These distributions also highlight the possibility of both the capitalization channel and the flow cost channel to redistribute housing from elderly to middle-aged people.

We show descriptive evidence that property taxes are associated with lower home values in Table 2 Panel A, illustrating the quantitative significance of the capitalization channel. We regress the value of a house on a PUMA's property tax rate, building characteristic fixed effects, bedroom fixed effects, and state fixed effects. In the three specifications in the first three columns, higher property tax rates are associated with lower home values. In the specification with state fixed effects, a doubling of the property tax rate is associated with a 22.2% decrease in property value. For a property tax move from 1 percentage point to 2, this implies a discount rate of 4.5%.[5]

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 may 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 4–6 of Table 2 at the impact of property tax rates on the price-to-rent ratio.[6] The standard user cost model predicts that housing prices relative to rent should be lower in areas with higher property tax rates, and this is precisely what we find. The fact that property tax rates primarily lower valuation ratios for house prices relative to rents indicates the relevance of the capitalization effect. These descriptive evidence will guide the assumption we make in our quantitative model of Section 4. In particular, the reaction of house price to rent ratios in our policy experiment aligns with our estimates in Table 2.

We also examine the associations of high property taxes with the age distribution within Zip codes in Table 3. In Panel A, we regress the fraction of a Zip code's population in a certain age group on the Zip code's property tax rate, with county fixed effects. A 1-percentage-point higher property tax rate is associated with 4.5% more of the population being less than 35 years old and 5.3% less of the population being 65 or more years old. In Panel B, we regress the fraction of the Zip code population with children under age 17 and under age 6 on the Zip code-level property tax rate. A one percentage point higher property tax rate is associated with 2.5% more of the population having children under 17 years old and 3.8% more of the population having children under 6 years old. These results suggest sorting of families with young children into areas with high

[5]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 do generally go together with lower housing values.

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

property taxes.

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 Table 2 Panel B, 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 groups with low income, we observe that property tax rates are not associated with an increased likelihood of 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.

4 Quantitative Model

In this section, we augment our OLG location and housing tenure choice model from Section 2 to account for a rental market and empirically relevant adjustment costs to quantify the impact of property taxes on housing allocation across different age groups. The model is calibrated to match key features of the housing markets in Texas and California, which have distinct property tax regimes. 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.

4.1 Model Specification

The economy consists of overlapping generations of households that live for a maximum of J periods, working for J_y periods and then retiring for J_o periods (so $J = J_y + J_o$). In each period t, they choose between renting and owning a home, denoted by $S_t \in \{R, O\}$. In addition, they start from an initial location $i_t \in \{TX, CA\}$ and choose whether to move or stay as a result of shocks.

Households have a Cobb-Douglas utility function for non-durable consumption C_t and housing consumption H_t. The dependence of household utility on location and homeownership is captured by location-specific amenity benefits Ξ_i^R and location-specific homeownership benefits Ξ_i^O. We normalize Ξ_{TX}^R without loss of generality. Additionally, when households move to a new location l, they incur a utility cost of moving, denoted by m. Overall, the utility function of a household is given by

$$U_{i_t,l}^{S_t}(C_t, H_t) = \frac{1}{1-\sigma}(C_t^{\alpha} H_t^{1-\alpha})^{1-\sigma} + \Xi_l^R + 1_{\{S_t=O\}}\Xi_l^O - 1_{\{i_t \neq l\}} m, \tag{11}$$

where α is the preference for non-durable consumption and σ the coefficient of relative risk aversion. The term $1_{\{S_t=\mathrm{O}\}}$ is an indicator function that equals 1 if the household owns a home in period t and 0 otherwise. In addition, the term $1_{\{i_t \neq l\}}$ equals 1 if the household moves to a new location l (i.e., $i_t \neq l$) and 0 if they stay in the same location. In each period t, households face a probability of death $1 - p_t$, and their bequests after death are a function of total wealth:

$$B(W_{t+1}) = \Psi \frac{1}{1-\sigma} W_{t+1}^{1-\sigma}, \tag{12}$$

where Ψ is the intensity of the bequest motive.

House and rental prices are time-independent in both regions and denoted by P_i and R_i. We capture housing affordability constraints in the following way. For owner-occupied housing, there is a minimum house size $\underline{H}$, whereas renters can choose an arbitrary house size. Because owners must purchase housing of a given size, they are also constrained to pay a minimum down payment. Renters pay rent R_i proportional to the house price and in accordance with the user cost model:

$$R_i = \phi_i P_i = (\tau_i + r + \delta) \cdot P_i. \tag{13}$$

Here, ϕ_i represents the location-specific user costs that capture the endogenous factors. In addition, each house sale pays a transaction cost at a rate of F percentage of the house value.

The process for household income during working age is given by

$$Y_t = \exp(\mu(i_t) + \chi(j_t) + z_t), \tag{14}$$

where $\mu(i_t)$ is a location-specific component, $\chi(j_t)$ is an age-dependent component, and $z_t = \rho_z z_{t-1} + \varepsilon_t$ is an AR(1) process. Pension payments during retirement are specified following Guvenen and Smith (2014).

Household problem. Let $s_t = (A_t, H_t, Y_t, i_t, j_t)$ denote the state vector and $\mathcal{C}_{i_t} = \{(adjust, i_t), (noadjust, i_t), (rent, i_t), (adjust, i'), (rent, i')\}$ be the set of discrete housing tenure and location choices, where $i' \in \{TX, CA\}$ with $i' \neq i_t$ denoting the alternative location. Then, the household problem is given by

$$V(s_t, \varepsilon) = \max_{(h,l)\in\mathcal{C}_i} V^{h,l}(s_t) + \varepsilon^{h,l}(s_t)\,, \tag{15}$$

where $\varepsilon^{h,l}(s_t)$ are i.i.d. type 1 EV distributed taste shocks with location parameter 0 and scale parameter 1, and the recursive problem of the household is

$$V^{adjust,l}(s_t) = \max_{C_t, A_{t+1}, \tilde{H}_t} U^O_{i_t,l}(C_t, \tilde{H}_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1 - p_t)B(W_{t+1}))\,, \tag{16}$$

$$\begin{aligned}
\text{s.t.}\quad & A_{t+1} + P_l \tilde{H}_t + C_t = (1 + r)A_t + Y_t + T_l + (1 - F)(1 - \delta)P_{i_t} H_t - \tau_{i_t} P_{i_t} H_t\,,\\
& A_{t+1} \geq -(1 - \theta)\frac{1 - \delta}{1 + r} P_l \tilde{H}_t\,,\\
& \tilde{H}_t \geq \underline{H}\,, \quad s_{t+1} = (A_{t+1}, \tilde{H}_t, Y_{t+1}, l, j_{t+1})\,,
\end{aligned}$$

$$V^{noadjust,i_t}(s_t) = \max_{C_t, A_{t+1}} U^O_{i_t,i_t}(C_t, H_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1 - p_t)B(W_{t+1}))\,, \tag{17}$$

$$\begin{aligned}
\text{s.t.}\quad & A_{t+1} + C_t = (1 + r)A_t + Y_t + T_{i_t} - (\delta + \tau_{i_t})P_{i_t} H_t\,,\\
& A_{t+1} \geq -(1 - \theta)\frac{1 - \delta}{1 + r} P_{i_t} H_t\,, \quad s_{t+1} = (A_{t+1}, H_t, Y_{t+1}, i_t, j_{t+1})\,,
\end{aligned}$$

$$V^{rent,l}(s_t) = \max_{C_t, A_{t+1}, \tilde{H}_t} U^R_{i_t,l}(C_t, \tilde{H}_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1 - p_t)B(W_{t+1}))\,, \tag{18}$$

$$\text{s.t.} \quad A_{t+1} + C_t + \phi_l P_l \tilde{H}_t = (1+r)A_t + Y_t + T_l + (1-F)(1-\delta)P_{i_t}H_t - \tau_{i_t}P_{i_t}H_t\,,$$

$$A_{t+1} \geq 0\,, \quad s_{t+1} = (A_{t+1}, 0, Y_{t+1}, l, j_{t+1})\,.$$

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.

Local government budget constraint. Denote by $s(l) = (A, H, Y, i = l, j)$ the steady vector of allocations in location l. In the steady state, property taxes are redistributed to all households in location l with location-specific lump-sum transfers T_l, that is:

$$\mathbb{E}[T_l - \tau_l P_l H_{s(l)} | l] = 0 \text{ for } l \in \{TX, CA\}. \tag{19}$$

We solve for the stationary distribution of the OLG model (15)-(19) 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 stationary equilibrium, the collected taxes and the rebated taxes equal each other.

4.2 Calibration

The model is calibrated by means of a combination of externally estimated parameters and internally calibrated parameters to match key moments in the data. Table 4 presents the calibrated parameter values and their sources or targets.

We assume that households start with zero initial housing wealth and financial assets at age 25. They live for a maximum of $J = 60$ years, with $J_y = 35$ spent working and $J_o = 25$ years in retirement.

For the coefficient of relative risk aversion, we use $\sigma = 2$, a standard value. The interest rate

r is based on the target interest rates from 1990 to 2000, as reported in Berger et al. (2018). We calibrate the depreciation rate to match the depreciation rate in Bureau of Economic Analysis (BEA) data from 1960 to 2014, again following Berger et al. (2018). We set the loan-to-value (LTV) limit to $\theta = 0.2$, consistent with Berger et al. (2018), although this value could be slightly high. However, values of 0.05, 0.1, and 0.2 are frequently used in the literature, as noted by Davis and Van Nieuwerburgh (2015). We conduct robustness around the down payment requirement in Section 6, finding that $\theta = 0.2$ is a conservative choice. The minimum house size is set to $\underline{H} = 1$, which corresponds to \$100,000 in Texas and \$244,000 in California. The bequest motive intensity is set to $\Psi = 2,550$, as calibrated in Berger et al. (2018). House prices and property taxes are based on our assessment data. We set the location-specific rent–price ratio ϕ_i equal to the user costs, which are the sum of the property tax, interest rate, and depreciation rate.

For the internal values, we target a rent-to-income ratio of 0.30, a reasonable value for the U.S. specifically for Texas and California. The wealth-to-income ratio is set to 4.4 for the bottom 80% of the population, based on the findings from Mabille (2023). The share of the population in California is 0.57, according to our dataset. Homeownership rates are 0.66 in Texas and 0.61 in California, also based on our dataset. We set income levels to 0.87 for Texas and 1.20 for California, again using our dataset. Finally, we target a moving rate of 1.7%, as reported in Mabille (2023).

4.3 Results

The calibrated model generates differences in homeownership status and location choice across age groups, as shown in Table 5. Households aged 25–44 are more likely to rent, especially in California, while households aged 45–84 are more likely to own, particularly in California.

Figure 2 further illustrates the model's predictions for the optimal housing tenure and location choice over the life cycle. We plot in this figure both model-implied and empirical rates of homeownership and renting in both California and Texas by age. The fraction of agents plotted in each age bin sums to one. The model results in Panel B suggest that agents are more likely to rent in California when young but more likely to own in California when old. This pattern indicates that the asset accumulation choices of elderly people lead to concentrated ownership in low-property-tax regimes, resulting in shifts in ownership and migration patterns.

The model results are consistent with the empirical distribution of homeownership by age, as demonstrated in Figure 2 Panel A, which compares the model's predictions to data from Texas and California. We are able to match key aspects of the relationship between age and homeownership across states—in particular, the steep gradient between age and ownership for California, in contrast to the flatter gradient between age and ownership for Texas. A limitation of the model, as discussed in Subsection 2.5, is that we focus on the lower aggregate tax burden in California as a result of Proposition 13 but do not model the detail that property tax increases are limited during a resident's tenure in the housing unit. Perhaps for this reason, we do not fully capture, in our framework, the extent of elderly homeownership in California that we see in the data, though we are able to capture the overall relationship between age and homeownership in the state.

By calibrating the model to match key features of the Texas and California housing markets, we demonstrate that property taxes play a significant role in shaping housing allocation across age groups. The model suggests that low-property-tax regimes lead to a concentration of homeownership among elderly people, while high-property-tax areas have greater homeownership among younger households. These findings provide a foundation for further exploring the implications of property taxes for housing markets, migration patterns, and demographic trends.

5 Policy Experiment

In this section, to understand the implications of property taxes for housing allocations, we examine a policy experiment in which we raise the property tax rate in California to the level in Texas. This counterfactual can be seen as a policy that eliminates Proposition 13 in California and so raises property tax rates in the state to a level similar to the ones prevailing in high-property-tax regimes.

To implement this policy experiment, we adjust the property tax rates for California in the model from 0.8%, the current average, to 2%—the value in Texas. We also adjust, as per a standard user cost model (Himmelberg et al., 2005), house prices in California, reflecting the capitalization effect. We calibrate rents in California, in our baseline specification, to be consistent with house prices and the user cost model (Equation 13). Recall that the resulting revenues raised by property taxes are rebated to individuals lump-sum within the region. We then solve for a new steady state in the model under this calibration. Given the increase in tax rates, we estimate an 18% decline in house prices in California. This quantitatively large change in house price is consistent with the substantial capitalization effect we find across municipalities in Section 3.

5.1 Impact of Property Taxes on Welfare

We begin by highlighting the effect of the policy experiment on total welfare, or $\frac{d\mathcal{W}}{d\tau_i}$. We estimate that welfare in California increases after the reform.[7]

We also show the change in welfare across age in Figure 3. While welfare is generally higher across age groups in California, the gains are more pronounced for younger age groups, indicating that they benefit more from the higher property tax regime. These results indicate possible welfare benefits from the increase in property taxes, at least in the context of an already low-property-tax state such as California. In the next sections, we decompose this increase in welfare into the underlying changes in housing consumption and location choice.

5.2 Extensive Margin Responses

We next decompose the effects driving this change in welfare, beginning with the extensive margin responses captured by the migration elasticity $\varepsilon_{\mu_i,\tau_i}$. We find large shifts in migration in response to changes in property tax policy. Under current property tax rates, we find that 2% of households from Texas move into California each year on average, while 1.5% of households from California move to Texas. After the reform, 3% of households from Texas move into California while 1% of households from California move out yearly in the new steady state.

This suggests that property tax changes have large impacts in terms of both increasing migration inflows into the state and lowering population outflows. Higher property taxes are associated with lower property values but higher flow expenses in the future. Ex ante, it is not necessarily obvious whether the shift toward lower property prices attracts more residents, given the accompanying

[7] Welfare in California goes from $V_{0.8} = -4.83$ to $V_2 = -4.04$. Because of moving costs, it is not straightforward to convert welfare measures into a consumption-equivalent metric. Therefore, we prefer to present these indicative results in utils. For context, we decompose the effects driving this change in welfare below.

higher expense obligations. In California, the effect of lower property prices in keeping current residents in the state and drawing in new residents is more significant than the impact of other factors. This is because many financially constrained individuals find that lower purchase prices make buying a property more feasible as the required down payment becomes less of a binding constraint on their ability to purchase a home in the state.

We show the migration responses over age in Figure 4. Consistent with the financial friction explanation, the bulk of the increase in in-migration and the reduction in out-migration occurs among younger and more financially constrained agents. In the very oldest age groups, above age 80, net migration into California actually falls by a small amount. In Appendix Figure A4, we also show the welfare changes among people moving into California by age, finding larger increases among the very young. This illustrates the benefit of relaxing down payment constraints for these younger populations, who have not yet built large wealth buffers.

5.3 Intensive Margin Responses

We now highlight the changes in housing allocations among residents who stay in California along the intensive margin, $\mathbb{E}\left[\frac{dV}{d\tau_i}|i\right]$. Average housing consumption rises slightly as a result, increasing in California from 1.34 to 1.36.

Because of the capitalization impact in lowering house prices and increasing the ability of financially constrained agents to purchase, homeownership increases substantially in California, rising from 61.1% before the reform to 64.0% after it (a 4.6% increase). The increase is more substantial for households aged 25–44, which have a large increase of 7.4% in homeownership. We show the entire distribution of homeownership changes in Figure 5. The quantitatively substantial homeownership effect highlights one of the central contributions of the paper: property taxes have large effects on housing allocations, especially along the ownership dimension. While the effects are larger among younger households, consistent with more binding financial constraints faced by that population, we still observe persistent increases in homeownership even among older Californians, despite the higher flow costs. This is due to the persistence of homeownership decisions outweighing the higher flow costs, which represent a force pushing against homeownership among elderly people.

We also highlight the effects on quantities of housing consumed across age in both the owner-occupied housing stock (Figure 6 Panel A) and the rental stock (Figure 6 Panel B). In these results, we observe more of a shift in housing consumption when contrasting older and younger residents. Younger Californians see an increase in housing quantities and a decline in rental quantities, implying that they substitute toward increasing housing quantities consumed in the ownership stock relative to the rental stock. By contrast, older Californians downsize: they decrease their housing stock consumption. These findings illustrate how property taxes can reallocate housing away from older toward newer residents. Younger households benefit because they can more easily purchase housing, while older households are more likely to reduce housing consumption because of the higher flow expenses to continue consumption.

5.4 Distributional and Wealth Effects

Finally, we investigate the consequences of the property tax increase for wealth both in the aggregate and across individuals. Despite the decrease in housing prices, average housing wealth actually increases from 1.92 to 2.08, reflecting greater ownership and housing consumption across the life-cycle. Total wealth is similar, changing from 5.55 to 5.57 after the increase in property taxes, while the share of housing wealth in total wealth increases slightly from 35% to 37%.

We show the change in the distribution of wealth in Figure 7. Income, however, rises slightly by 0.063% as individuals, on average, reallocate from Texas to higher-income California. Appendix Figure A5 shows the income gains for movers to California across ages—the gains accrue largely during working years and average 22.4% among movers. These results highlight the benefits of property taxes in alleviating spatial mismatch: financially constrained households are able, with higher property taxes, to own houses in California at a lower purchase price and thereby gain access to superior job markets. While such households were always able to enter California through the rental market, their preferences for homeownership pushed them to own in worse labor markets like those in Texas.

6 Robustness

We also consider additional robustness in our main specification. Subsection 2.5 contains additional points of limitations and other potential extensions of our baseline specification.

6.1 Housing Supply

Our baseline model assumes elastic housing supply provided at a fixed price, and we use a standard user cost model to estimate the change in house price resulting from changes in property tax rates. In practice, as mentioned in Subsection 2.5, housing supply may be more inelastic. This means, in turn, that house prices may change by less than the amount that we assume in our baseline specification.

To conduct some robustness around this point, we adopt the stark opposite assumption as our baseline specification: that housing supply is provided completely inelastically in California, while it remains elastic in Texas.[8]

That is, we solve for the stationary distribution of the OLG model (15)–(19) augmented with the California housing market equilibrium condition

$$\mathbb{E}\left[H\left(s(l)\right)\big|\{l = \mathrm{CA}\}\right] = \overline{H}_{\mathrm{CA}}. \tag{20}$$

We fix total housing consumption in California in the model $\overline{H}_{\mathrm{CA}}$ and then conduct our main counterfactual policy evaluation of increasing property tax rates while now allowing house prices to adjust the necessary amount to ensure that California housing consumption is fixed. We find that California house prices decline by 7.75% in this counterfactual, a smaller amount than in the baseline, though still representing a substantial drop.

We find that our key outcomes, such as homeownership, also increase in California in this alternate policy counterfactual, shown in Appendix Figure A6. Panel A of this figure shows the

[8] This is motivated by the empirical fact that housing supply is less regulated and appears much more elastic in Texas compared with California (Hsieh and Moretti, 2019; Glaeser and Gyourko, 2018). For instance, in 2023, Texas had more than twice as many building permits as California despite a smaller population (232,373 units in Texas compared to 111,760 according to the U.S. Census Building Permits Survey). We discuss in Subsection 2.5 the political economy constraints that might result in higher housing elasticities in high-property-tax areas.

changes in owing and renting choices across the life cycle in both states, while Panel B shows the resulting change in welfare across ages. The key mechanisms remain the same: even with inelastic supply, housing demand is lower at any given purchase price point, given that houses now come with a higher stream of future liabilities. This lowers the up-front price but also changes the composition of buyers, skewing this distribution towards younger buyers who are now able to purchase the property given more limited financial wealth.

Given that our results connecting property taxes and housing allocations hold with both a completely elastic supply (the baseline model) as well as a completely inelastic supply (this alternate robustness), we conclude that our results are generally robust to alternate specifications around housing supply.

6.2 Public Goods

Another 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, the valuation of public services may differ across the population. Given the nature of local government services financed by property taxes (local schools and infrastructure), we might be concerned that young families particularly value these services relatively to 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 Appendix Figure A7 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, 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. However, the resulting increase in homeownership is persistent even into old age as a consequence of adjustment frictions in moving and the low user costs in the form of property taxes in California.

We also examine the welfare shifts under this alternate counterfactual in Panel B of Appendix Figure A7. We find, perhaps unsurprisingly, that younger residents receive an increase in welfare under the change in property tax receipt policy, while older residents experience a decline in welfare.

6.3 Different Down Payment Constraint

Our main model assumes a 20% down payment requirement for properties. While this is a standard assumption in the literature and the modal down payment choice among buyers, in principle, buyers can obtain lower down payment mortgages. 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, that borrowers have higher credit scores, or that borrowers 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 resulting from higher property taxes, may either be smaller or larger compared to our baseline. Essentially, the effect size hinges on whether there are more households constrained by the 20% down payment requirement compared to the number of households constrained around other thresholds.

To address this issue, in Appendix Figure A8 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 substantially higher, especially for younger age groups. A large fraction of this increase appears to be driven by a corresponding decrease in the number of owners in Texas. 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, in fact, a conservative choice with respect to our key outcome of homeownership.

7 Conclusion

Property taxes play a more powerful role in shaping housing allocations than is conventionally realized. We first document a possible mismatch in housing: the bulk of the housing stock is owned and occupied by empty-nester households aging in place, while young families instead occupy crowded housing quarters. We argue that such housing allocations and steep gradients between age and homeownership can arise in low-property-tax regimes, under which households accumulating assets for the purposes of precautionary saving and bequests crowd out housing access for younger families.

We show, both empirically and in the context of a structural model, that higher property taxes can affect these allocations by redistributing the housing stock to the young and away from elderly people. This happens primarily through a capitalization effect, which lowers the upfront cost of houses in exchange for ongoing flow payments of taxes, resulting in areas with higher property tax showing higher housing occupancy and ownership among younger, more financially constrained households. Property taxes function, in this context, as a "forced mortgage," reducing the upfront purchase cost in exchange for regular flow payments, a tradeoff that is particularly attractive for agents primarily financially constrained by down payments.

Our results have three main implications. First, in the context of tax design, we show that asset taxes, such as those on real estate, can have large implications for equilibrium prices and allocations, particularly in the presence of financial constraints. Second, we provide an independent justification for property taxes. Relative to conventional rationales centered on the value of local control of public goods and the inelasticity of land supply, this rationale instead highlights the role of property taxes in reallocating housing to financially constrained agents. To the extent that such agents have a higher valuation of properties because of agglomerative spillovers on the production side or consumption value in raising young children, this allocation may also increase aggregate welfare and output. Third, we show that policies such as California's Proposition 13, intended to protect homeowners from rising taxes, may have the unintended effect of making it harder for young families to enter the housing market.

In our quantitative analysis, we have taken initial steps to link our model and stylized findings to both positive and normative questions surrounding property taxation and lifecycle choices. We have abstracted from several key aspects of lifecycle housing decisions, such as payment-to-income constraints and state income tax variations, as discussed in Section 2.5. Property taxation may also have important implications for urban development, agglomeration dynamics, and fertility choices. While a comprehensive examination of these complex issues lies beyond the scope of this paper, they offer promising opportunities for future research and further refinement of our analysis.

References

Acolin, Arthur, Desen Lin, and Susan M Wachter, "Why do young adults coreside with their parents?," *Real Estate Economics*, 2024, *52* (1), 7–44.

Aguiar, Mark A, Benjamin Moll, and Florian Scheuer, "Putting the" Finance" into" Public Finance": A Theory of Capital Gains Taxation," Technical Report, National Bureau of Economic Research 2024.

Aiyagari, S Rao, "Optimal capital income taxation with incomplete markets, borrowing constraints, and constant discounting," *Journal of political Economy*, 1995, *103* (6), 1158–1175.

Amornsiripanitch, Natee, "Why are residential property tax rates regressive?," Technical Report 2020.

Atkeson, Andrew, Jonathan Heathcote, and Fabrizio Perri, "Reconciling Macroeconomics and Finance for the U.S. Corporate Sector: 1929 - Present," Working Paper, UCLA and Minneapolis Fed June 2024.

Attanasio, Orazio P, Renata Bottazzi, Hamish W Low, Lars Nesheim, and Matthew Wakefield, "Modelling the demand for housing over the life cycle," *Review of Economic Dynamics*, 2012, *15* (1), 1–18.

Avenancio-León, Carlos F and Troup Howard, "The assessment gap: Racial inequalities in property taxation," *The Quarterly Journal of Economics*, 2022, *137* (3), 1383–1434.

Benetton, Matteo, Marianna Kudlyak, and John Mondragon, "Dynastic home equity," Technical Report, Working Paper 2022.

Berger, David, Veronica Guerrieri, Guido Lorenzoni, and Joseph Vavra, "House prices and consumer spending," *The Review of Economic Studies*, 2018, *85* (3), 1502–1542.

Bilal, Adrien and Esteban Rossi-Hansberg, "Location as an Asset," *Econometrica*, 2021, *89* (5), 2459–2495.

Bonnet, Odran, Guillaume Chapelle, Alain Trannoy, and Etienne Wasmer, "Land is back, it should be taxed, it can be taxed," *European Economic Review*, 2021, *134*, 103696.

Brockmeyer, Anne, Alejandro Estefan, Karina Ramírez Arras, and Juan Carlos Suárez Serrato, "Taxing property in developing countries: Theory and evidence from mexico," Technical Report, National Bureau of Economic Research 2021.

Brueckner, Jan K, "A test for allocative efficiency in the local public sector," *Journal of Public Economics*, 1982, *19* (3), 311–331.

Card, David, Jesse Rothstein, and Moises Yi, "Location, location, location," Technical Report, National Bureau of Economic Research 2023.

Chambers, Matthew, Carlos Garriga, and Don E Schlagenhauf, "Accounting for changes in the homeownership rate," *International Economic Review*, 2009, *50* (3), 677–726.

_ , _ , and _ , "Housing policy and the progressivity of income taxation," *Journal of Monetary economics*, 2009, *56* (8), 1116–1134.

Conesa, Juan Carlos, Sagiri Kitao, and Dirk Krueger, "Taxing capital? Not a bad idea after all!," *American Economic Review*, 2009, *99* (1), 25–48.

Dávila, Eduardo and Benjamin Hébert, "Optimal corporate taxation under financial frictions," *The Review of Economic Studies*, 2023, *90* (4), 1893–1933.

Davila, Julio, Jay H Hong, Per Krusell, and José-Víctor Ríos-Rull, "Constrained efficiency in the neoclassical growth model with uninsurable idiosyncratic shocks," *Econometrica*, 2012, *80* (6), 2431–2467.

Davis, Morris A and Stijn Van Nieuwerburgh, "Housing, finance, and the macroeconomy," in "Handbook of regional and urban economics," Vol. 5, Elsevier, 2015, pp. 753–811.

Díaz, Antonia and María José Luengo-Prado, "The wealth distribution with durable goods," *International Economic Review*, 2010, *51* (1), 143–170.

Dray, Sacha, Camille Landais, and Stefanie Stantcheva, "Wealth and property taxation in the United States," Technical Report, National Bureau of Economic Research 2023.

Dyrda, Sebastian and Marcelo Pedroni, "Optimal fiscal policy in a model with uninsurable idiosyncratic income risk," *The Review of Economic Studies*, 2023, *90* (2), 744–780.

Fagereng, Andreas, Matthieu Gomez, Emilien Gouin-Bonenfant, Martin Holm, Benjamin Moll, and Gisle Natvik, "Asset-price redistribution," 2023.

Farhi, Emmanuel and Ivan Werning, "Inequality and social discounting," *Journal of political economy*, 2007, *115* (3), 365–402.

_ **and Iván Werning**, "Insurance and taxation over the life cycle," *Review of Economic Studies*, 2013, *80* (2), 596–635.

Fehr, Hans and Fabian Kindermann, "Taxing capital along the transition—Not a bad idea after all?," *Journal of Economic Dynamics and Control*, 2015, *51*, 64–77.

Ferreira, Fernando, "You can take it with you: Proposition 13 tax benefits, residential mobility, and willingness to pay for housing amenities," *Journal of Public Economics*, 2010, *94* (9), 661–673.

_ **, Joseph Gyourko, and Joseph Tracy**, "Housing busts and household mobility," *Journal of Urban Economics*, 2010, *68* (1), 34–45.

Floden, Martin and Jesper Lindé, "Idiosyncratic risk in the United States and Sweden: Is there a role for government insurance?," *Review of Economic Dynamics*, 2001, *4* (2), 406–437.

Floetotto, Max, Michael Kirker, and Johannes Stroebel, "Government intervention in the housing market: Who wins, who loses?," *Journal of Monetary Economics*, 2016, *80*, 106–123.

Fonseca, Julia and Lu Liu, "Mortgage Lock-In, Mobility, and Labor Reallocation," Technical Report 2023.

Fraenkel, Rebecca, "Property Tax-Induced Mobility and Redistribution: Evidence from Mass Reappraisals," Technical Report 2022.

George, Henry, *Progress and poverty: An inquiry into the cause of industrial depressions, and of increase of want with increase of wealth, the remedy*, W. Reeves, 1884.

Giesecke, Oliver and Haaris Mateen, "Local Governments' Response to Fiscal Shocks: Evidence from Connecticut," Technical Report 2022.

Glaeser, Edward and Joseph Gyourko, "The economic implications of housing supply," *Journal of Economic Perspectives*, 2018, *32* (1), 3–30.

Glaeser, Edward L and Erzo F P Luttmer, "The misallocation of housing under rent control," *American Economic Review*, 2003, *93* (4), 1027–1046.

Greenwald, Daniel, "The mortgage credit channel of macroeconomic transmission," 2018.

Guvenen, Fatih and Anthony A Smith, "Inferring labor income risk and partial insurance from economic choices," *Econometrica*, 2014, *82* (6), 2085–2129.

—, Gueorgui Kambourov, Burhan Kuruscu, Sergio Ocampo, and Daphne Chen, "Use it or lose it: Efficiency and redistributional effects of wealth taxation," *The Quarterly Journal of Economics*, 2023, *138* (2), 835–894.

Hendren, Nathaniel, "The policy elasticity," *Tax Policy and the Economy*, 2016, *30* (1), 51–89.

Himmelberg, Charles, Christopher Mayer, and Todd Sinai, "Assessing high house prices: Bubbles, fundamentals and misperceptions," *Journal of Economic Perspectives*, 2005, *19* (4), 67–92.

Høj, Anne Kristine, Mads Rahbek Jørgensen, and Poul Schou, "Land Taxes and Housing Prices," *De Economiske Rad*, 2017, *1* (1), 1–21.

Hsieh, Chang-Tai and Enrico Moretti, "Housing constraints and spatial misallocation," *American Economic Journal: Macroeconomics*, 2019, *11* (2), 1–39.

İmrohoroğlu, Ayşe, Kyle Matoba, and Şelale Tüzel, "Proposition 13: An equilibrium analysis," *American Economic Journal: Macroeconomics*, 2018, *10* (2), 24–51.

Jiang, Erica Xuewei, Baiyun Jing, and Anthony Lee Zhang, "The Pricing of Property Tax Revenues," Technical Report 2024.

Kragh-Sørensen, Kasper, "Winners and Losers from Property Taxation," Technical Report 2022.

Krimmel, Jacob, "Reclaiming local control: School finance reforms and housing supply restrictions," Technical Report, FRB Working Paper 2021.

Lafortune, Jeanne and Corinne Low, "Collateralized marriage," *American Economic Journal: Applied Economics*, 2023, *15* (4), 252–291.

LaPoint, Cameron and SOM Yale, "Property tax sales, private capital, and gentrification in the us," Technical Report 2022.

Livy, Mitchell R, "Intra-school district capitalization of property tax rates," *Journal of Housing Economics*, 2018, *41*, 227–236.

Löffler, Max and Sebastian Siegloch, "Welfare effects of property taxation," Technical Report 21-026, ZEW-Centre for European Economic Research Discussion Paper 2021.

Mabille, Pierre, "The missing homebuyers: Regional heterogeneity and credit contractions," *The Review of Financial Studies*, 2023, *36* (7), 2756–2796.

Ndiaye, Abdoulaye, "Flexible Retirement and Optimal Taxation," Technical Report, Workin Paper 2018.

Posner, Eric A and E Glen Weyl, "Property is only another name for monopoly," *Journal of Legal Analysis*, 2017, *9* (1), 51–123.

Rognlie, Matthew, "Deciphering the fall and rise in the net capital share: accumulation or scarcity?," *Brookings papers on economic activity*, 2016, *2015* (1), 1–69.

Ross, Robert, "The impact of property tax appeals on vertical equity in Cook County, IL," Technical Report, Univerity of Chicago, Harris School of Public Policy Working Paper 2017.

Samuelson, Paul A, "An exact consumption-loan model of interest with or without the social contrivance of money," *Journal of Political Economy*, 1958, *66* (6), 467–482.

Seko, Miki, Kazuto Sumita, and Jiro Yoshida, "Underutilized housing in an aging society: How bequest motives affect housing choices," Technical Report 2023.

Sommer, Kamila and Paul Sullivan, "Implications of US tax policy for house prices, rents, and homeownership," *American Economic Review*, 2018, *108* (2), 241–274.

Stiglitz, Joseph E, "The theory of local public goods," in "The Economics of Public Services: Proceedings of a Conference Held by the International Economic Association at Turin, Italy" Springer 1977, pp. 274–333.

Wasi, Nada and Michelle J White, "Property tax limitations and mobility: the lock-in effect of California's Proposition 13," Technical Report, National Bureau of Economic Research 2005.

Watson, C Luke and Oren Ziv, "Is the Rent Too High? Land Ownership and Monopoly Power," Technical Report, CESifo Working Paper 2021.

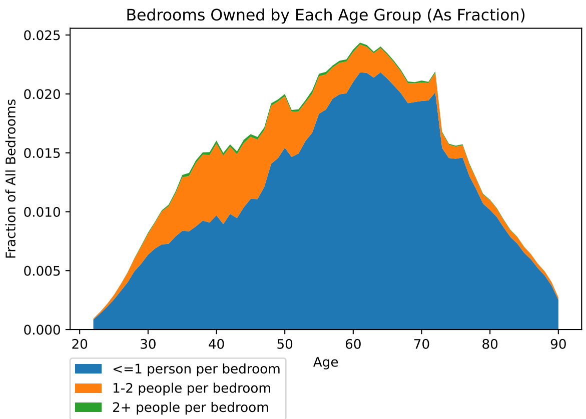
Wong, Francis, "Taxing Homeowners Who Won't Borrow," Technical Report 2023.

Zodrow, George R and Peter Mieszkowski, "Pigou, Tiebout, property taxation, and the underprovision of local public goods," *Journal of Urban Economics*, 1986, *19* (3), 356–370.

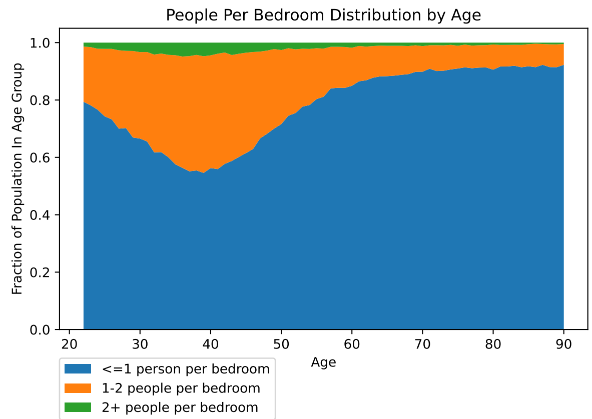
Figures

Figure 1: Housing Allocation Across the Life Cycle

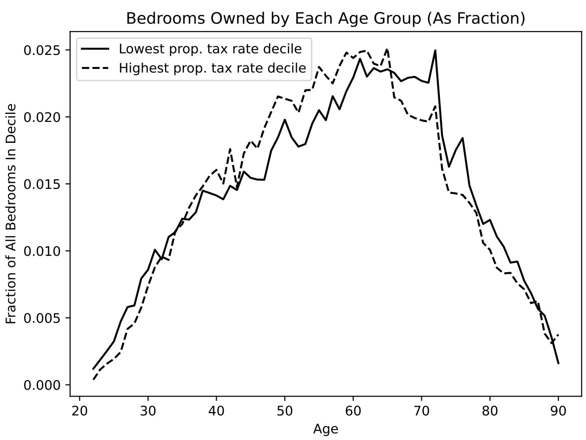
Panel A: Bedroom Ownership Distribution



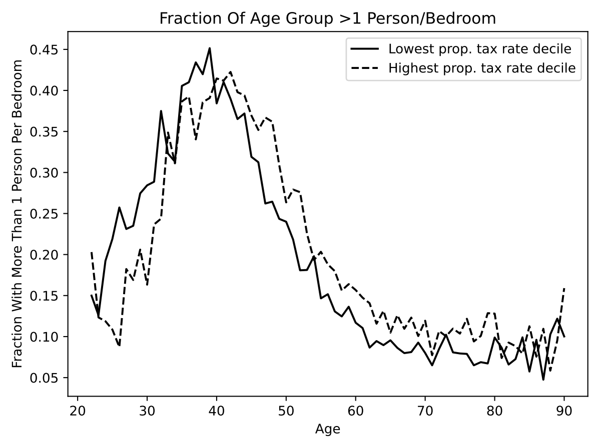
Panel B: Crowding



Panel C: Bedroom Ownership Distribution



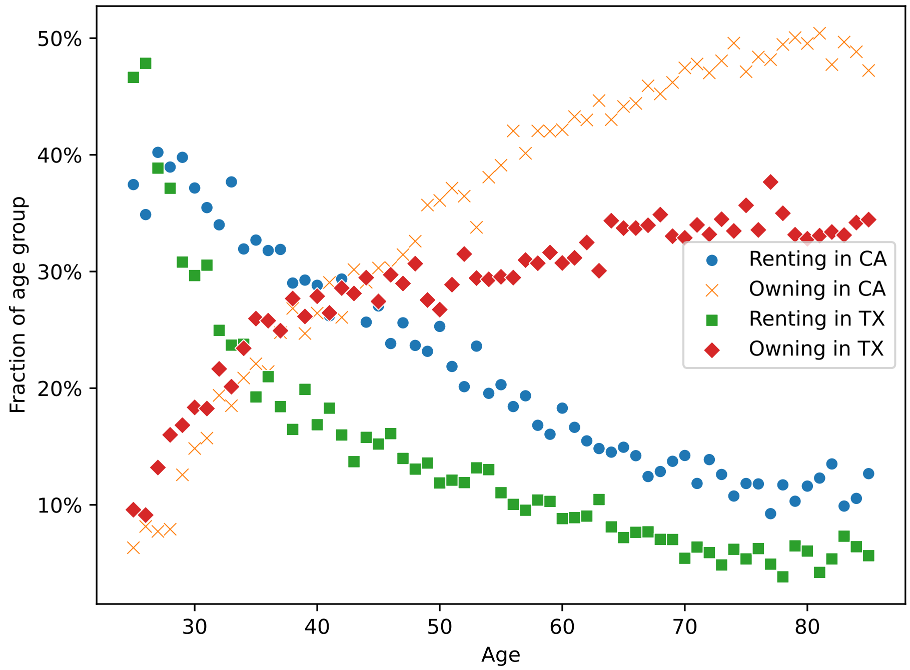
Panel D: Crowding



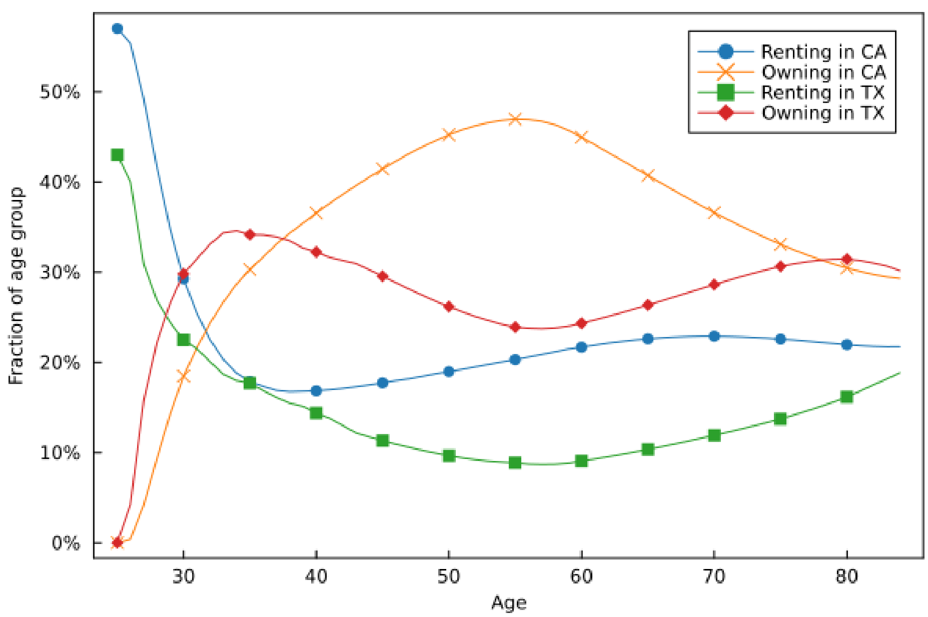
Notes: Data for this figure are drawn from the individual-level variables from the ACS 1-year publicly available microdata merged with PUMA-level property tax rates from Verisk/Infutor sale records. Panel A shows the fraction of all bedrooms in the U.S. owned by each age group. This is the weighted sum 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 comes from the variable for the number of people in the household divided 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 derived 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, split by the top and bottom property tax deciles.

Figure 2: Homeownership Across the Life Cycle in California and Texas

Panel A: Empirical Data on Homeownership by Age

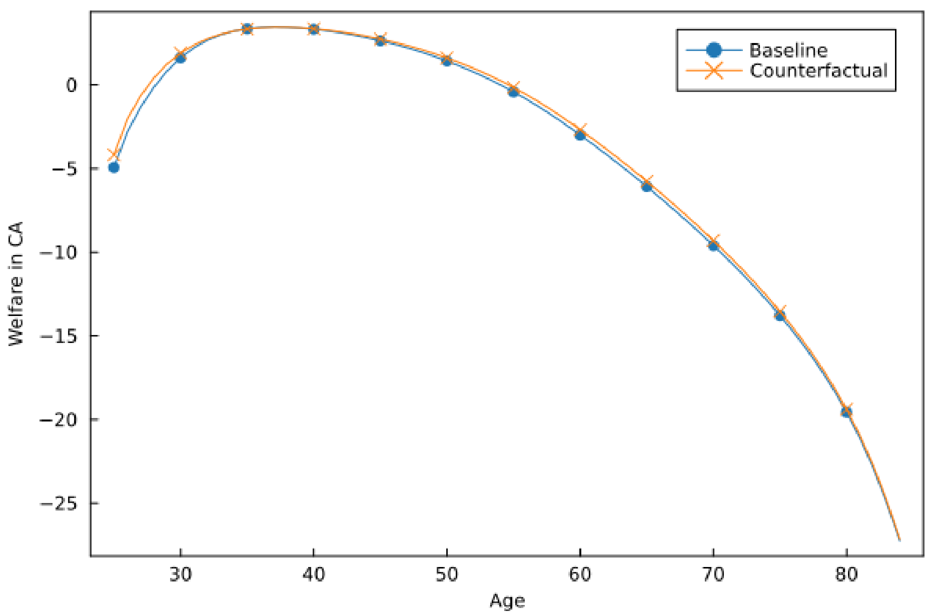


Panel B: Model-Implied Homeownership by Age



Notes: Data for Panel A of this figure are drawn from the individual-level variables from the ACS 1-year publicly available 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 microdata 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.

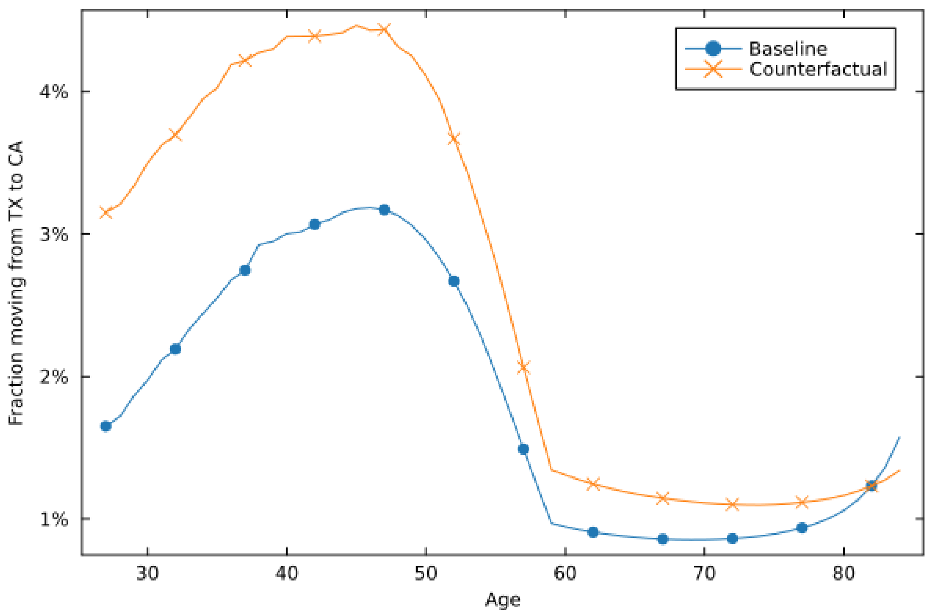
Figure 3: Welfare by Age Group Before and After a Property Tax Rise in California



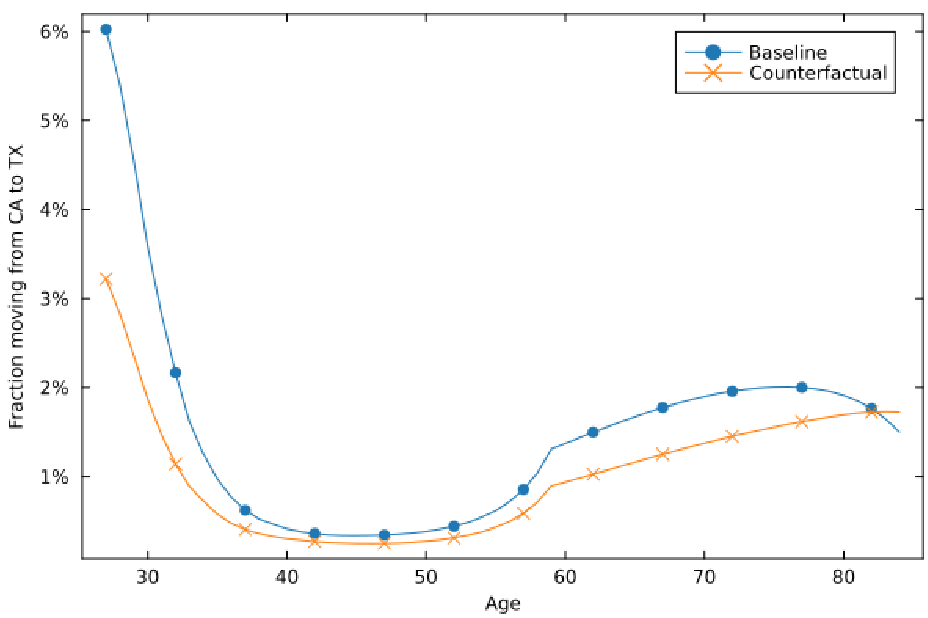
Notes: This figure shows the change in welfare by comparing our baseline model (discussed in Section 4) to the policy counterfactual in Section 5 in which we increase property tax rates in California (CA) to match those in Texas. Here, we show the welfare by age group in California. Welfare is estimated in the model as in Equation 11.

Figure 4: Migration Impacts of a Property Tax Rise in California

Panel A: Fraction Moving into California by Age

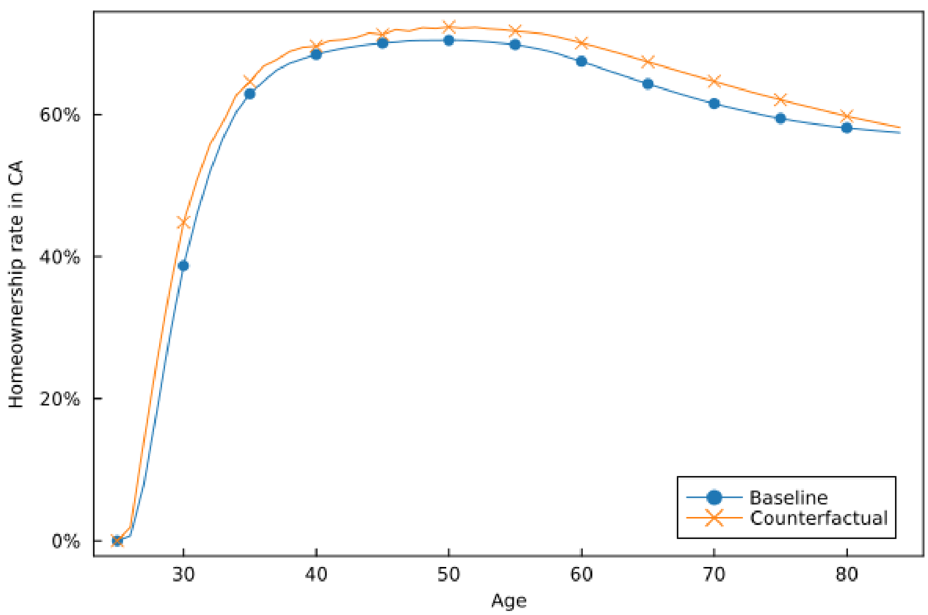


Panel B: Fraction Moving out of California by Age



Notes: This figure shows the change in migration by comparing our baseline model (discussed in Section 4) to the policy counterfactual in Section 5 in which we increase property tax rates in California (CA) to match those in Texas (TX). We show here the fraction of individuals who move annually into California in each age group (Panel A) and the fraction of individuals who move annually out of California (Panel B) when we solve for the steady state in each model.

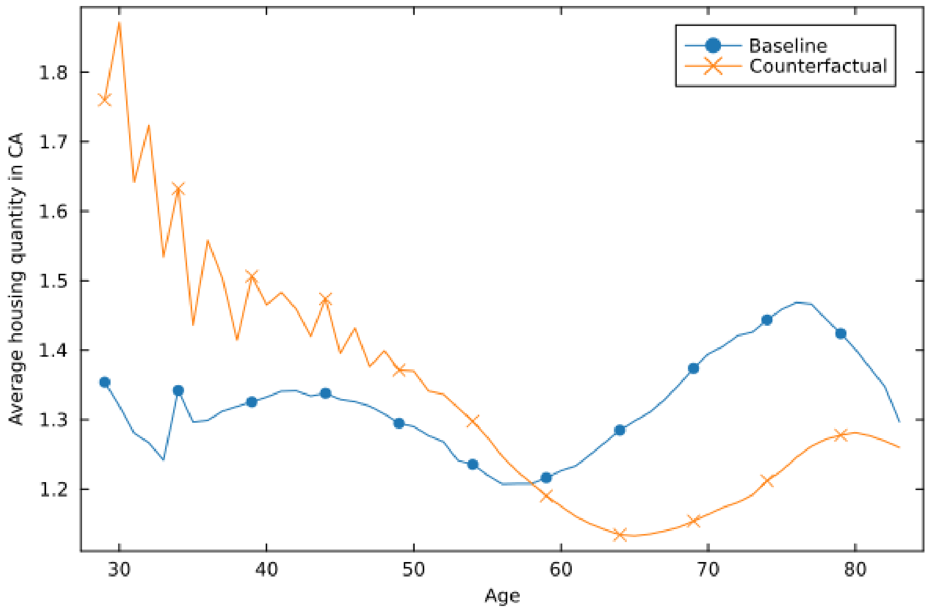
Figure 5: Impact of Property Taxes on Homeownership



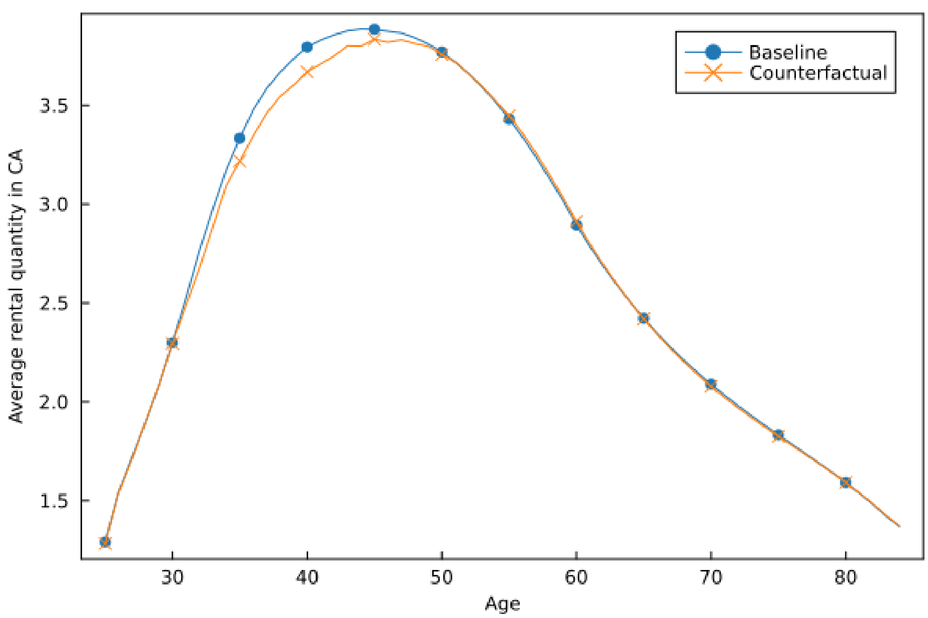
Notes: This figure shows the change in homeownership by comparing our baseline model (discussed in Section 4) to the policy counterfactual in Section 5 in which we increase property tax rates in California (CA) to match those in Texas. We plot the homeownership rate in the baseline calibration and in the policy counterfactual by age in California.

Figure 6: Impact of Property Tax Increases on Housing Quantities

Panel A: Average Housing Quantity of Homeowners in California by Age

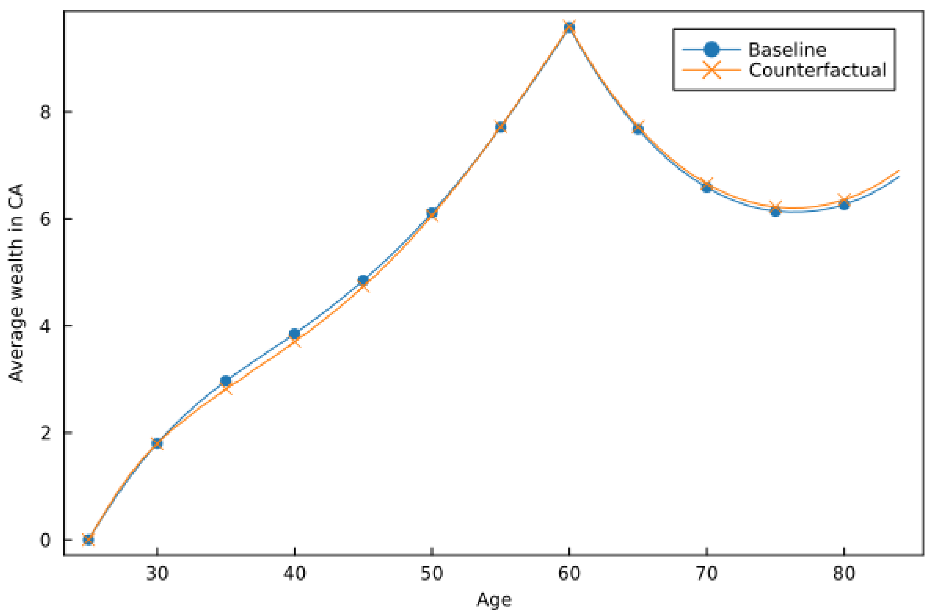


Panel B: Average Rental Quantity of Renters in California by Age



Notes: This figure shows the change in housing quantity by comparing our baseline model (discussed in Section 4) to the policy counterfactual in Section 5 in which we increase property tax rates in California (CA) to match those in Texas. We show the quantity of owner-occupied housing consumed in California by age (Panel A) and the amount of rental quantity consumed in California by age (Panel B).

Figure 7: Impact of Property Taxes on Wealth



Notes: This figure shows the change in wealth by comparing our baseline model (discussed in Section 4), to the policy counterfactual in Section 5 in which we increase property tax rates in California (CA) to match those in Texas. We show here the total wealth of agents (including both housing wealth and holdings in a risk-free asset) across ages in California.

Tables

Table 1: Residential Occupancy and Property Taxes

Panel A: Homeownership and Property Taxes

	Dependent variable: homeowner					
	Under 65	Under 65	Under 65	65+	65+	65+
Prop. Tax Rate	1.22**	0.50	2.27***	-0.83***	-0.99***	1.05
	(0.48)	(0.41)	(0.85)	(0.28)	(0.27)	(0.68)
log(HH Income)		0.14***	0.14***		0.09***	0.09***
		(0.00)	(0.00)		(0.00)	(0.00)
Age, Income, Div Income Controls	N	Y	Y	N	Y	Y
State FE	N	N	Y	N	N	Y
Clusters Level	PUMA	PUMA	PUMA	PUMA	PUMA	PUMA
Observations	2,325,247	2,325,247	2,325,247	1,256,700	1,256,700	1,256,700

Panel B: Crowding and Property Taxes

	Dependent variable: log(people per room)					
	Under 65	Under 65	Under 65	65+	65+	65+
	(1)	(2)	(3)	(4)	(5)	(6)
Prop. Tax Rate	1.00***	1.17***	-3.53***	0.91***	0.81***	-3.19***
	(0.36)	(0.34)	(0.54)	(0.33)	(0.31)	(0.64)
log(HH Income)		0.03***	0.02***		0.11***	0.11***
		(0.00)	(0.00)		(0.00)	(0.00)
Age, Income, Div Income Controls	N	Y	Y	N	Y	Y
State FE	N	N	Y	N	N	Y
Clusters Level	PUMA	PUMA	PUMA	PUMA	PUMA	PUMA
Observations	2,325,247	2,325,247	2,325,247	1,256,700	1,256,700	1,256,700

Notes: *p<0.1; **p<0.05; ***p<0.01. Data for both panels are drawn from the individual-level variables from the ACS 1-year publicly available microdata 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 and controls. Columns (1), (2), and (3) present estimates from a sample of individuals under 65 years old. Column (1) has no controls, and Column (2) controls for an individual's income and dividend income and includes an age fixed effect. Column (3) adds state fixed effects. Columns (4), (5), and (6) present estimates from a sample of individuals aged 65 and older. Column (4) has no controls, and Column (5) controls for income and dividend income and includes an age fixed effect. Column (6) adds state fixed effects. All specifications have standard errors clustered at the PUMA level and are shown in parentheses. All specifications are estimated with weighted least squares, where each observation is weighted by the variable housing unit weight from the ACS. 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.

Table 2: Financial Constraints and Property Taxes

Panel A: Capitalization Effect of Property Taxes

	log(price)	log(price)	log(price)	$\log\left(\frac{\text{price}}{\text{rent}}\right)$	$\log\left(\frac{\text{price}}{\text{rent}}\right)$	$\log\left(\frac{\text{price}}{\text{rent}}\right)$
	(1)	(2)	(3)	(4)	(5)	(6)
Prop. Tax Rate	-9.45***	-13.70***	-25.12***	-14.52***	-20.32***	-27.18***
	(1.69)	(1.40)	(2.15)	(0.89)	(0.81)	(1.46)
Percent Difference	-9%	-13%	-22%			
Bldg and Bdrms Controls	N	Y	Y	N	Y	Y
State FE	N	N	Y	N	N	Y
Observation Level	Indiv.	Indiv.	Indiv.	PUMA	PUMA	PUMA
Clusters Level	PUMA	PUMA	PUMA	PUMA	PUMA	PUMA
Observations	2,621,757	2,621,757	2,621,757	6,834	6,834	6,834

Panel B: 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	4.80***	4.02***	-0.61	0.50
	(0.92)	(0.76)	(0.78)	(0.71)
log(HH Income)	0.14***	0.03***	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
State FE	Y	Y	Y	Y
Clusters Level	PUMA	PUMA	PUMA	PUMA
Observations	1,391,739	418,863	1,505,584	265,761

Notes: *p<0.1; **p<0.05; ***p<0.01. Data for both panels are drawn from the individual-level variables from the ACS 1-year publicly available microdata from 2017 to 2019 merged with PUMA-level property tax rates from Verisk/Infutor sale records. Panel A Columns (1), (2), and (3) present results from a regression of the property tax value as reported by the individual on the PUMA-level tax rate. Column (1) has no controls; Column (2) controls for a housing unit's number of bedrooms and bathrooms, where both are categorical controls; and Column (3) adds state fixed effects. Columns (4), (5), and (6) are aggregated to the PUMA×year level. They are a regression of the log price-to-rent ratio on no controls (Column (4)), bedroom and lot size controls for both rental units and owner-occupied units (Column (5)), and previous controls plus state fixed effects (Column (6)). Panel B 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. 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.

Table 3: Property Taxes and Demographics

Panel A: Property Tax and Age Distribution

	Pop. 15–34	Pop. 15–34	Pop. 35–64	Pop. 35–64	Pop. 65+	Pop. 65+
	(1)	(2)	(3)	(4)	(5)	(6)
Prop. Tax Rate	-0.67***	0.79***	1.26***	0.56***	-0.59***	-1.35***
	(0.09)	(0.21)	(0.08)	(0.16)	(0.08)	(0.18)
Percent Difference	-3.8%	4.5%	2.2%	1.0%	4.9%	-5.3%
County and Year FEs	N	Y	N	Y	N	Y
Observations	41,774	41,774	41,774	41,774	41,774	41,774

Panel B: Property Tax and Presence of Children

	Frac. kids <17	Frac. kids <17	Frac. kids <6	Frac. kids <6
	(1)	(2)	(3)	(4)
Prop. Tax rate	0.35***	0.54***	0.02	0.26***
	(0.05)	(0.13)	(0.02)	(0.05)
Percent Difference	1.6%	2.5%	0.3%	3.8%
County and Year FEs	N	Y	N	Y
Observations	41,774	41,774	41,774	41,774

Notes: *p<0.1; **p<0.05; ***p<0.01. Data for these panels are drawn from the census ACS 5-year aggregated tables at Zip code level for 2016–2020. The Zip code-level property tax rates come from Verisk/Infutor sales data from 2016–2020. Panel A shows regressions of the fraction of the Zip code population in a given age range on the property tax rate of the Zip code, with county and year fixed effects. Panel B shows regressions of the fractions of the population with children under 17 or under 6 from the census ACS5 at Zip code level. Fixed effects are at the county and year levels. Property tax rates come from Verisk/Infutor in 2018 and are measured at the Zip code level. They are calculated as the property tax amounts divided by the sale price of the property that year. Zip codes with fewer than 20 sales with tax data in the same year are excluded. Standard errors are shown in parentheses.

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 limit	0.200	See text
F	Transaction cost selling	0.050	Díaz and Luengo-Prado (2010)
ρ_z	Autocorrelation income	0.910	Floden and Lindé (2001)
σ_z	Standard deviation income	0.210	Floden and Lindé (2001)
$\underline{H}$	Minimum house size	1.000	See text
Ψ	Bequest motive intensity	2,550	Berger et al. (2018)
P_1	House price Texas	1.000	Normalized
P_2	House price California	2.440	Verisk Marketing Solutions
τ_1	Property tax Texas	0.020	Verisk Marketing Solutions
τ_2	Property tax California	0.008	Verisk Marketing Solutions
ϕ_1	Rent–price ratio Texas	0.066	User cost model
ϕ_2	Rent–price ratio California	0.054	User cost model
		Internal	
α	Preference for non-durable consumption	0.637	Rent/Income=0.30
β	Discount factor	0.879	Wealth/Income=4.4
Ξ_2^R	Amenity benefit California	0.358	Share in California=0.57
Ξ_1^O	Homeownership benefit Texas	0.448	Homeownership Texas=0.66
Ξ_2^O	Homeownership benefit California	0.379	Homeownership California=0.61
μ_1	Income shifter Texas	0.148	Income Texas=0.87
μ_2	Income shifter California	0.382	Income California=1.20
m	Utility cost of moving	3.471	Moving rate=1.7%

Notes: This table shows the calibrated model parameters. The top panel presents external parameters derived from different sources, while the bottom panel lists internally calibrated parameters targeted to empirical moments.

Table 5: Homeownership Status and Location Choice Across Age Groups

	25–44 Years Old	45–84 Years Old
Renting in Texas	0.19	0.11
Owning in Texas	0.29	0.28
Renting in California	0.25	0.20
Owning in California	0.28	0.39

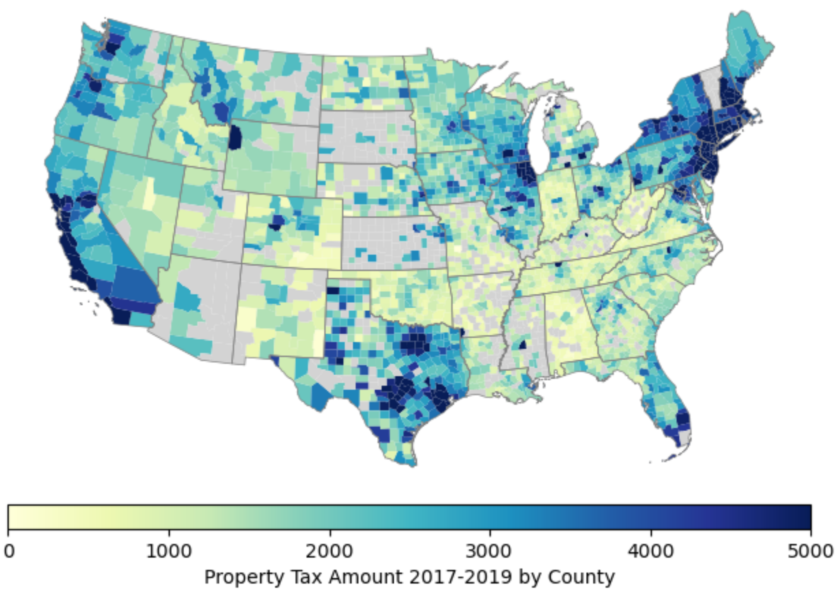
Notes: This table displays homeownership status and location choice across age groups, as generated by the calibrated OLG model. Each column shows the fraction of households within the respective age group that are renting or owning in California and Texas.

Internet Appendix

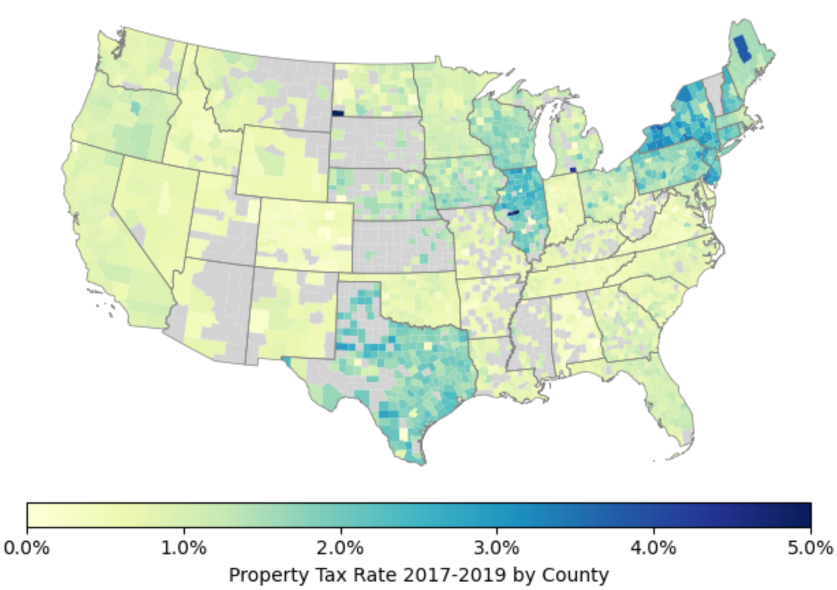
A Additional Results

Figure A1: Regional Variation in Property Taxes

Panel A: Property Tax Amounts by County

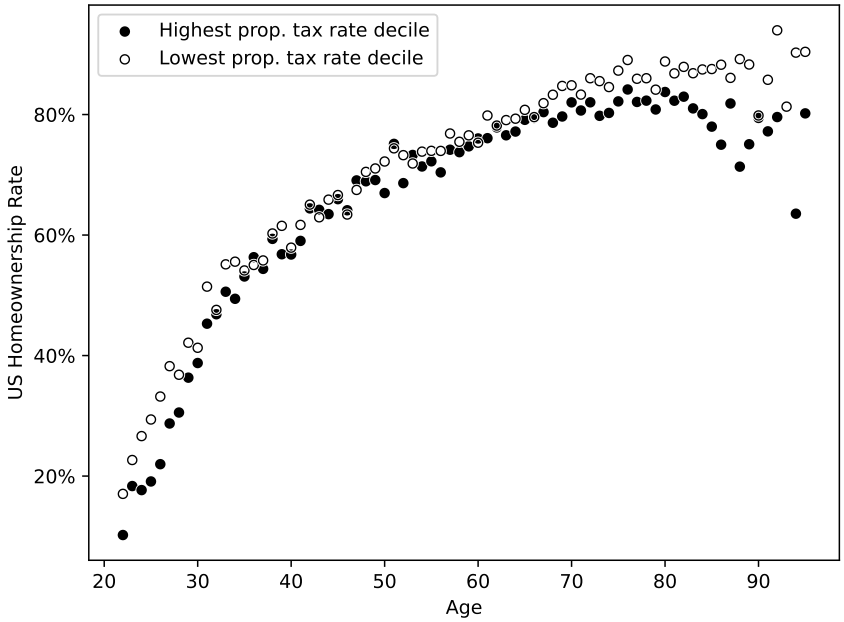


Panel B: Property Tax Rates by County



Notes: Both panels above contain tax rate data drawn from the Verisk/Infutor property sales data from 2017 to 2019. Each property's tax rate is the tax amount for that year divided by the sale amount. These tax amounts and rates are aggregated to the county level in both panels. Panel A shows the mean property tax amount in each county. Panel B shows the mean property tax rate in each county.

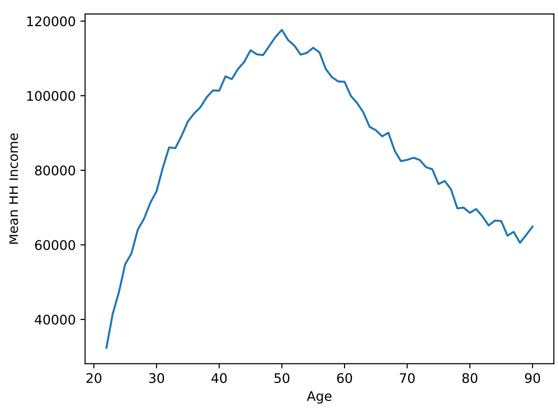
Figure A2: Homeownership Rate By Property Tax Rate Decile



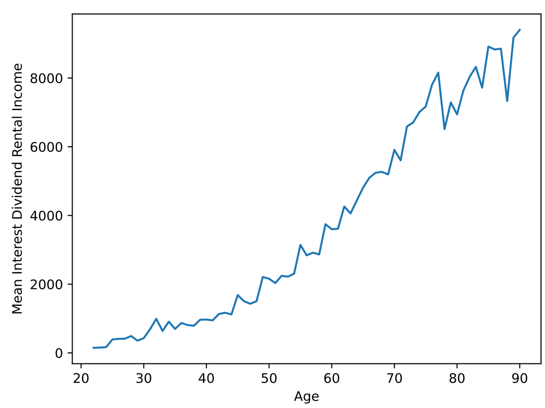
Notes: Data for this plot are drawn from the individual-level variables from the ACS 1-year publicly available microdata from 2017 to 2019. The plot shows the homeownership rate for each age, split by the highest property tax decile and the lowest property tax decile in the US. Property tax rates for each PUMA come from the Verisk/Infutor sales record data.

Figure A3: Income and Wealth Distributions By Age

Panel A: Income Distribution

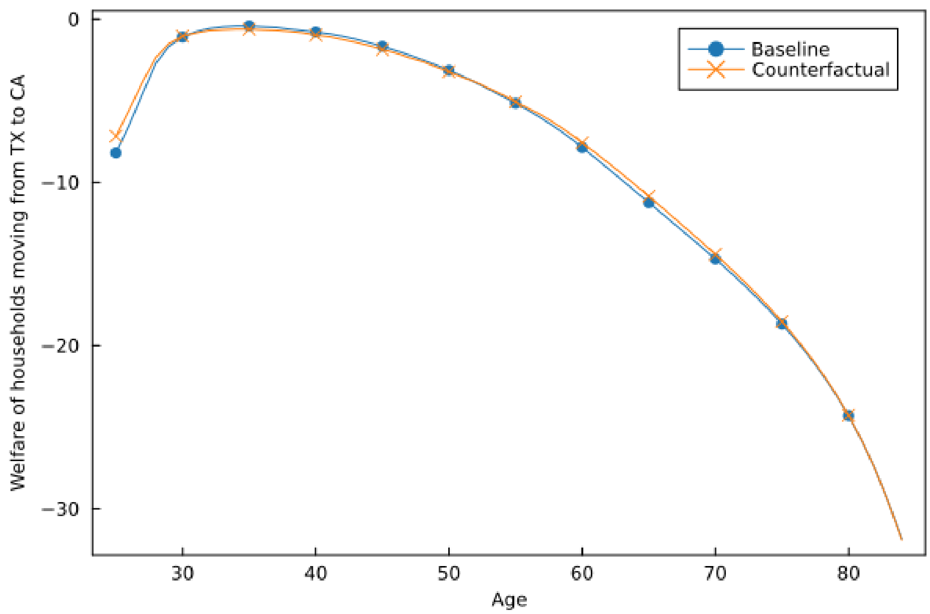


Panel B: Interest Dividend Rental Income Distribution



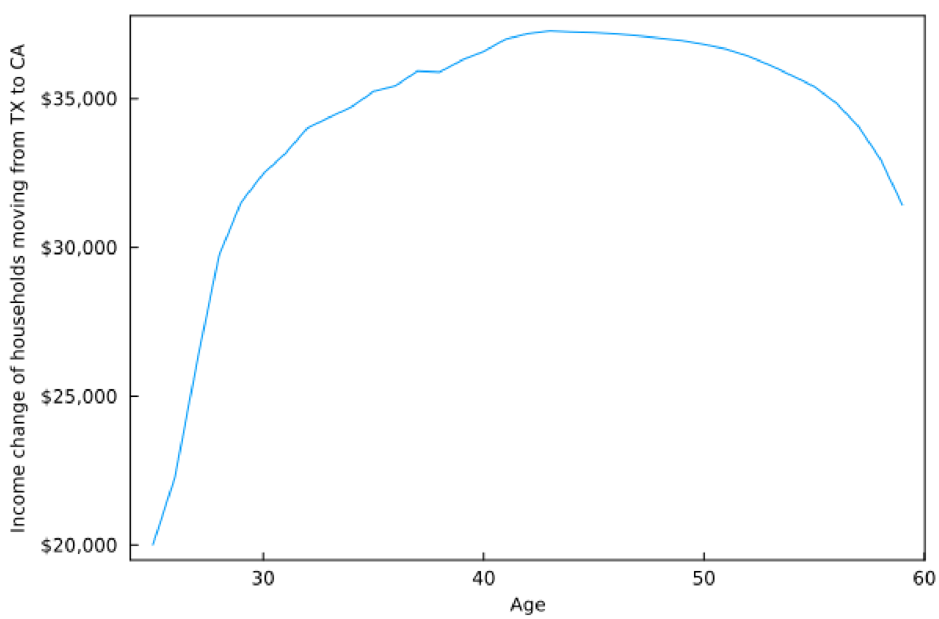
Notes: Data for Figure 1 come from the individual-level variables from the ACS 1-year publicly available microdata merged with PUMA-level property tax rates from Verisk/Infutor sale records. Panel A shows the mean household income for each age. Panel B shows the mean interest, dividend, and rental income for each age. Both panels use data from the whole US.

Figure A4: Average Welfare of Movers to California by Age



Notes: This figure plots the welfare of households moving from Texas (TX) to California (CA) for the baseline economy and the counterfactual economy featuring higher property taxes in California as modeled in Section 5.

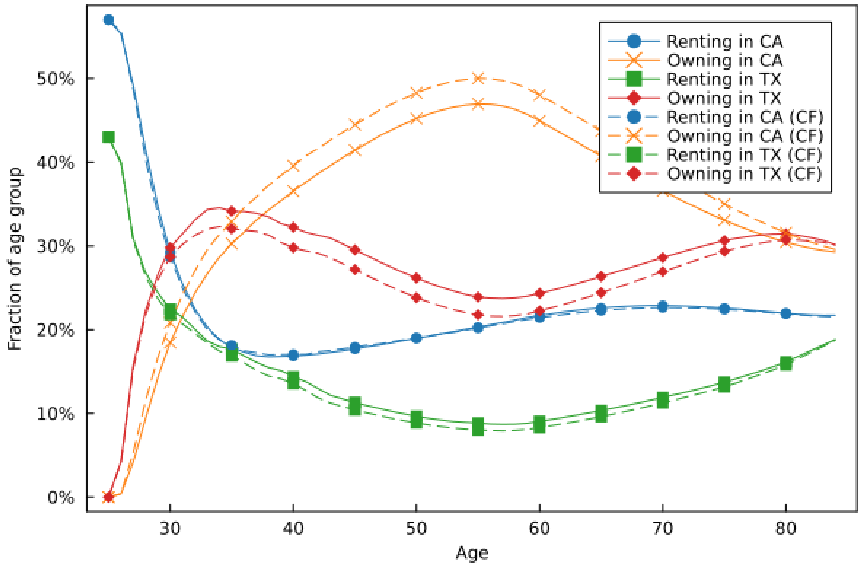
Figure A5: Income Change of Movers to California



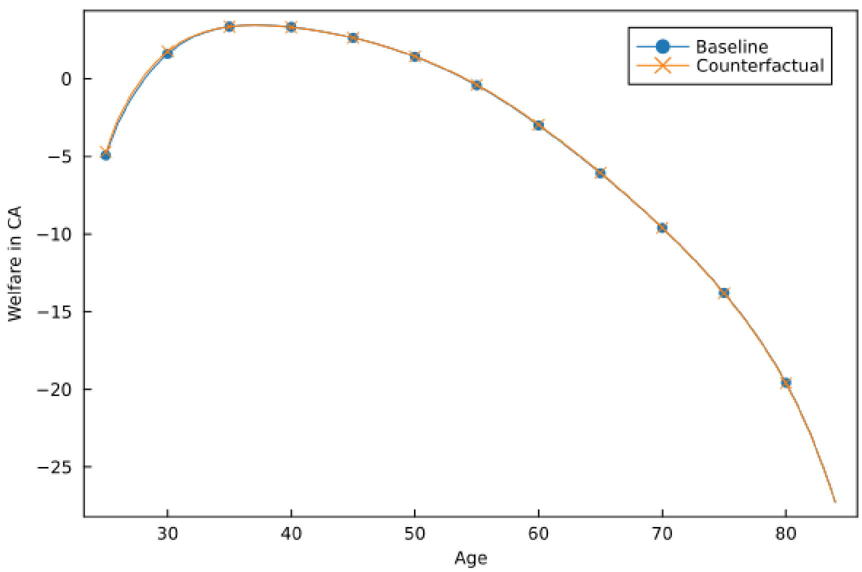
Notes: This figure plots the income change of households who move from Texas (TX) to California (CA) as a result of the policy counterfactual modeled in Section 5, featuring higher property taxes in California. The y-axis represents the average income gained upon moving.

Figure A6: Counterfactual with Fixed Housing Supply

Panel A: Homeownership Changes by State



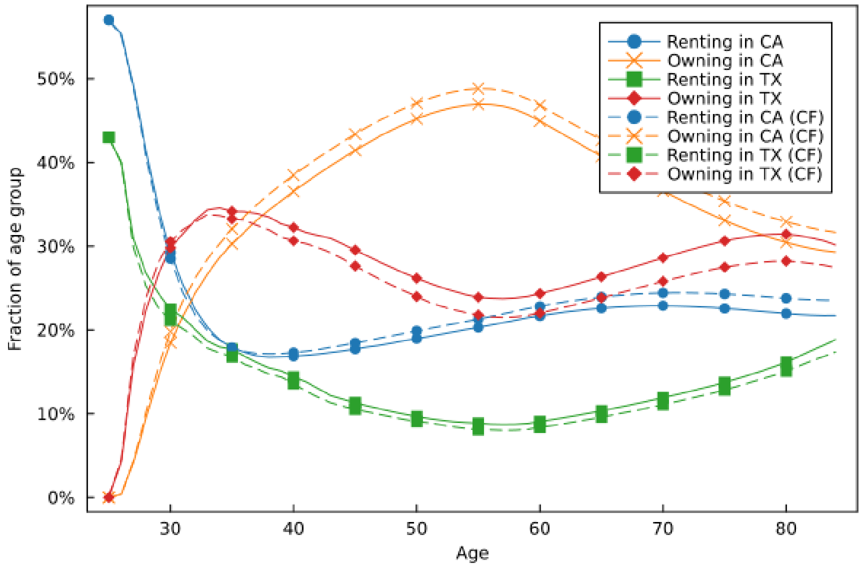
Panel B: Welfare Change under Counterfactual



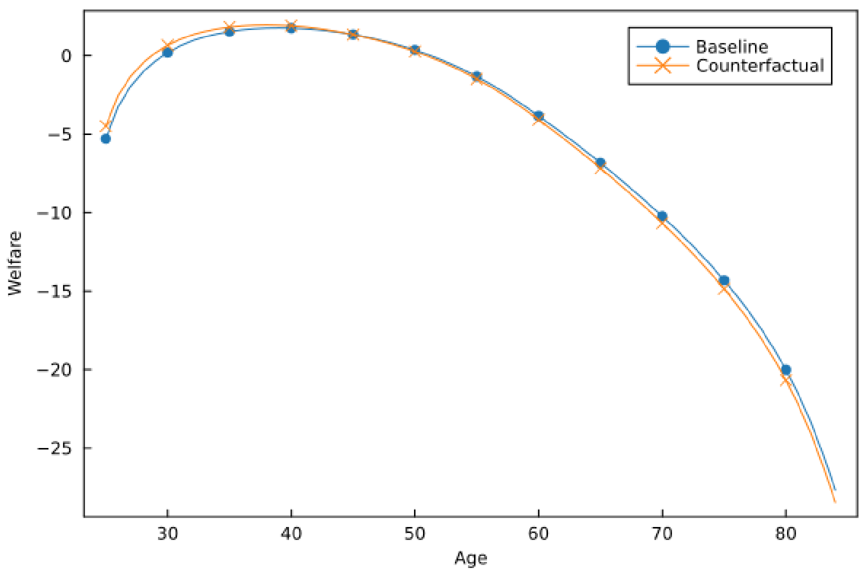
Notes: These figures show changes in our core model outcomes under an alternative calibration of inelastic housing supply in which house prices adjust to maintain total housing quantity as fixed. Panel A shows homeownership and renting by age across both states of California (location 2) and Texas (location 1) in the initial state, as well as under the counterfactual featuring higher property tax rates in California to match the values in Texas. Panel B shows the difference between welfare by age under the baseline calibration as well as the alternate counterfactual by age, again assuming the same level of housing quantity in both scenarios.

Figure A7: Counterfactual with Property Tax Transfer Only to Young

Panel A: Homeownership Changes by State



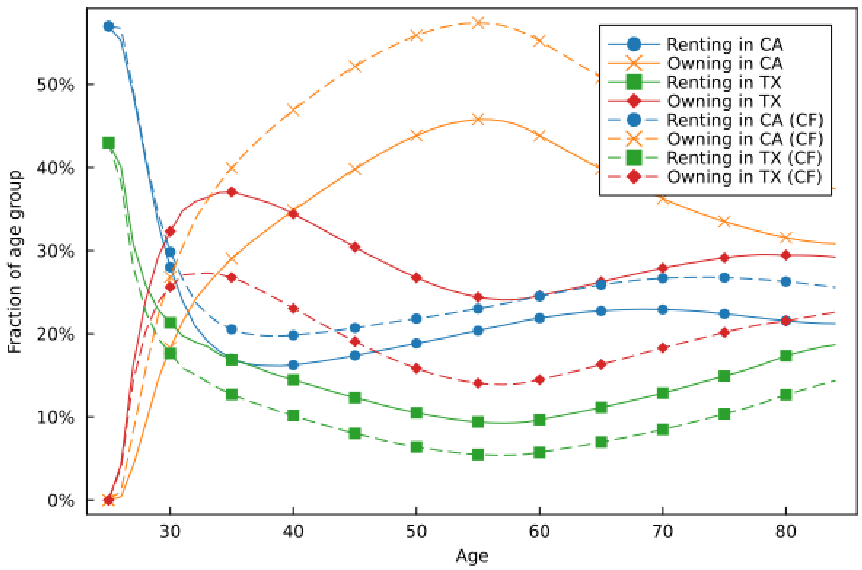
Panel B: Welfare Change under Counterfactual



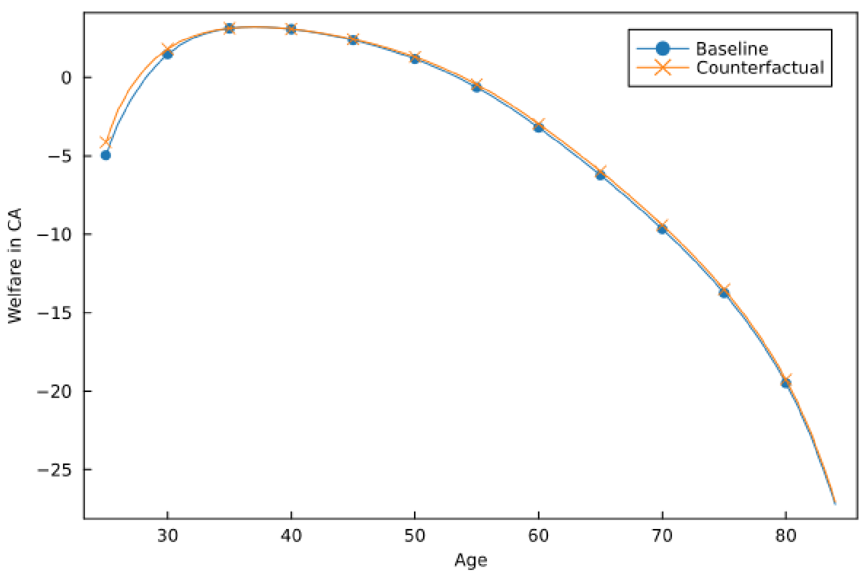
Notes: These figures show changes in our core model outcomes under an alternative calibration in which property tax receipts are rebated only to the young (those aged 25–44) in order to proxy for public goods which are particularly valued by young residents (i.e., schools or infrastructure). Panel A shows homeownership and renting by age across both states of California and Texas under the baseline calibration, as well as under the alternate calibration featuring the different property tax rebating rule. Panel B shows the difference between welfare by age under the baseline calibration as well as the alternate counterfactual by age.

Figure A8: Counterfactual with 10% Down Payment Requirement

Panel A: Homeownership Changes by State



Panel B: Welfare Change under Counterfactual



Notes: These figures show changes in our core model outcomes under an alternative calibration in which the down payment requirement is calibrated to 10% instead of 20% as in the baseline. We plot here the resulting changes in homeownership and renting (Panel A) by age and across both states as a result of the increase in property tax rates in California (location 2) to match those in Texas (location 1). Panel B shows the difference between welfare by age, comparing the specification (with the 10% down payment requirement) against the counterfactual with higher property tax rates in California.

B Data Appendix

Sale-Based 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.