# Property Taxes and Housing Allocation Under Financial Constraints*

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June 29, 2024

**Abstract**

Property taxes significantly 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 costs and enabling greater homeownership among younger households. We show in a calibrated lifecycle structural model that raising property taxes in low-tax California to match those in higher-tax Texas would increase overall homeownership by 4.6% and homeownership among young households by 7.4%. Asset taxes play a crucial role in reallocating housing to higher-valuation households in the presence of financial constraints, providing an independent rationale for property taxes.

JEL-Classification: H71, R21, H24, J11
Keywords: property taxes, housing affordability, housing inequality

*This paper has benefited from conversations with Caitlin Slattery (discussant), David Argente, Bence Bardoczy, Salome Baslandze, Gideon Bornstein, Ashley Craig, Walter D'Lima, Dan Greenwald, Irem Güçeri, Hugo Hopenhayn, Troup Howard, Brandon Kaplowitz, Paolo Martellini, Konstantin Milbradt, Michaela Paffenholz, Facundo Piguillem, Liyan Shi, Venky Venkateswaran, Gianluca Violante, Daniel Waldinger, Conor Walsh, Nathan Zorzi and comments from conference and seminar participants at the 116th National Tax Association Conference, the Syracuse-Chicago Webinar Series on Property Tax Administration and Design, the CESifo Public Economics Week, and Pizzanomics at EIEF.

# 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, and are a common form of asset tax across developed countries. While it is well known that asset taxes can influence equilibrium prices, the implications of these taxes for the allocation of assets across different groups are not fully understood. In this paper, we examine the role of property taxes in shaping housing choices across different age groups and explore the potential welfare consequences of changes in property tax policy.

We develop an overlapping generations model with heterogeneous agents, incomplete markets, and housing tenure choice to analyze the impact of property taxes on housing decisions over the life cycle. A calibration of this model is able to match a key feature of the U.S. housing market: older, wealthier households predominantly own and occupy the housing stock, while housing affordability is a challenge for younger, financially constrained households. We then use the model to examine policy counterfactuals to quantify the role of property taxes housing allocations.

We find that raising property taxes in low-property tax California to the level in higher-tax Texas would substantially raise homeownership among Californian households by 4.6%, and increase homeownership rates among young households by 7.4%. Housing consumption is also redistributed from older toward younger households. These findings suggest that property taxes can affect housing utilization while entailing broadly progressive transfers, at least when rates are increased from a low level.

This paper starts by developing a theoretical model highlighting the key economic forces behind property taxes and housing choices. In an incomplete markets framework, households accumulate real estate for precautionary savings and bequests, leading to concentration of housing ownership among elderly people. Property taxes affect this allocation through four main channels: (1) migration across areas, (2) intensive changes in housing choice within areas due to location effects, (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.

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. In contrast to the standard intuition that higher property taxes simply reflect an additional cost or burden on the standard of living, similarly to other taxes such as income or sales tax, we show that housing allocations are skewed in broadly progressive dimensions in high-property-tax regimes. 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 lifecycle model. We calibrate a lifecycle consumption choice model to match important moments of homeownership across the lifecycle as well as house prices. 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 than in California. California features a relatively strong gradient between homeownership and age: because houses are expensive in California and young agents are constrained by down payment requirements, few young households are able to purchase a home. However, because income trends are relatively

high and households have strong saving motives (due to precautionary saving and bequests), households steadily accumulate housing over the life cycle, resulting in a sizable gradient between age and homeownership. As a result, the bulk of homes are held by elderly people for investment purposes—these agents age in place on properties where they enjoy a low carrying cost due to low tax rates. In contrast, the higher property taxes in Texas result in lower housing purchase prices, enabling higher homeownership rates among younger agents. The gradient between homeownership and age is much flatter in Texas: homeownership is a less attractive proposition for elderly agents in Texas, especially after retirement, because of the higher ongoing user cost expenses from taxes. The resulting housing allocations, therefore, favor younger households.

We demonstrate 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 accordingly to reflect the capitalization effect. In the new steady state, we observe large changes in homeownership among all Californians by 4.6%, which 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 declines, reflecting the capitalization effect, while incomes slightly rise, reflecting net in-migration to California by financially constrained households now able to purchase housing.

Our results highlight the quantitative importance of considering property taxes for lifecycle housing and asset accumulation decisions in the context of financial frictions. While wealth taxes are comparatively rare across developed countries, property taxes are commonly found across many countries, and our results highlight these taxes' important allocative consequences running primarily through a capitalization channel.

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 financial constraints among younger generations. While our paper does not take a stance on the normative desirability of such

policies, one plausible motive for policymakers to support such a reallocation may be to provide young 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 financial constraints on homeownership in expensive areas with agglomerative economies would attract more young working residents, raising total income.

We acknowledge several limitations and potential extensions of the baseline model in Section 2.5. These include that it focuses on owner-occupied housing, fails to account for liquidity considerations among homeowners facing property tax shocks, assumes that housing supply is elastic, models the public goods funded by property taxes only indirectly, lacks explicit modeling of family formation and fertility decisions, and abstracts from inequality in real estate assessment as well as other taxation. 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.

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 that reflect tax appeals constitute bias, but the matching of minority households to high-property-tax areas may reflect 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.

We also connect to a literature on taxation more broadly. Our paper is 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 misallocation. 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 be 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 on the implications of public policy for homeownership and housing choice (Sommer and Sullivan, 2018; Attanasio et al., 2012; Chambers et al., 2009; Floetotto et al., 2016).

The paper is organized as follows: Section 2 presents our baseline models 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 structural model, and section 5 performs a policy analysis investigating the impact of changes in property tax rates. Last, Section 6 concludes the paper.

# 2 Intensive Margin and Migration Effects of Property Taxes

In this section, we develop an overlapping generations model where households live for two periods (working age and old age) and make location and housing quality choices under financial frictions. The purpose of this benchmark model is to illustrate the mechanisms through which property taxes affect the allocation of housing and welfare.

## 2.1 Environment

The economy consists of overlapping generations of households who live for 2 periods, working age and old age. In each period $t$, they choose their housing quantity in one of two locations, $i_t \in \{TX, CA\}$, that is, Texas or California. The two locations differ in their house prices, property tax rates, housing amenities, and income processes. A key feature of the model is the borrowing constraint, which allows households to borrow only 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

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

according to a bequest function given by $B(W_t)$.

*Housing costs and property taxes:* Housing wealth is subject to a location-specific property tax rate $\tau_i$ and depreciates at a rate $\delta$. 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 condition with a rental market.[1]

*Financial assets and borrowing constraints:* We focus on down payment constraints as the key financial constraint. Homeowners can borrow against their house value, subject to the borrowing constraint

$$A_{t+1} \geq -(1-\theta)\frac{1-\delta}{1+r}P_i H_t, \tag{2}$$

where $\theta$ determines the minimum down payment.

*Income:* During working age, household income $Y_t(z_t, i_t)$ is a function of 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

$$V(A_t, H_t, Y_t, i_t, \zeta_t) = \max_{l \in \{TX,CA\}} V^l(A_t, H_t, Y_t, i_t) + \zeta_t, \tag{3}$$

where $\zeta_t$ is i.i.d. extreme value (EV) type-1 shocks and household utility given a location choice, the budget constraint, the borrowing constraint, and the tax revenue constraint is

$$\begin{aligned} V^l(A_t, H_t, Y_t, i_t) = \max_{C_t, A_{t+1}, \tilde{H}_t} & U_l(C_t, \tilde{H}_t) + \beta \mathbb{E}B(W_t)\,, \\ \text{s.t.} \quad & A_{t+1} + P_l \tilde{H}_t + C_t = (1+r)A_t + Y_t(z_t, i_t) + T_l + (1-\delta)P_{i_t}H_t - \tau_{i_t}P_{i_t}H_t\,, \\ & A_{t+1} \geq -(1-\theta)\frac{1-\delta}{1+r}P_l\tilde{H}_t\,, \\ & \mathbb{E}_t[T_i - \tau_i P_i H_i | i] = 0 \text{ for } i \in \{TX, CA\}. \end{aligned} \tag{4}$$

*Social welfare in location i:* We denote by $\mu$ the density of the steady-state distribution of

[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.

$(A, H, Y, i, \zeta)$. Then, we define welfare in location $i$ as the steady-state average utility

$$\mathcal{W}_i \equiv \mathbb{E}[V(A, H, Y, i, \zeta)|i] = \frac{\int\int V(A, H, Y, i, \zeta)\mu(A, H, Y, i, \zeta)dAdHdYd\zeta}{\int\int \mu(A, H, Y, i, \zeta)dAdHdYd\zeta}. \tag{5}$$

## 2.2 Marginal Welfare Effects of a Property Tax Change

Households respond to any policy change $\tau_i$ by endogenously updating their policy choices in equation 4. The following lemma decomposes the marginal welfare effect of a change in property taxes in region $i$.

**Lemma 1.** *Denote as $\mu_i$ 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,*

$$\frac{d\mathcal{W}}{d\tau_i} = \underbrace{\mathbb{E}\left[\frac{dV(A, H, Y, i, \zeta)}{d\tau_i}|i\right]}_{intensive\ channel} + \underbrace{\mathbb{E}\left[\frac{V(A, H, Y, i, \zeta)}{\tau_i}\varepsilon_{\mu_i,\tau_i}(A, H, Y, \zeta)|i\right]}_{migration\ channel}. \tag{6}$$

The first term, the intensive channel, corresponds to the utility change resulting from endogenous consumption, asset, and housing quantity responses conditional on households' staying in 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, and we obtain the tax rate equal to:

$$\tau_i = -\frac{\mathbb{E}\left[V(A, H, Y, i, \zeta)\varepsilon_{\mu_i,\tau_i}(A, H, Y, \zeta)|i\right]}{\mathbb{E}\left[\frac{dV(A,H,Y,i,\zeta)}{d\tau_i}|i\right]}. \tag{7}$$

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 first order effect of an increase in property taxes in location $i$ on household utility is:*

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

*and*

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

*where $\lambda^{*FC}$ and $\lambda_i^{*T}$ are, respectively, the Lagrangian on the financial 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 relaxes the financial constraints of the working-age households and increases 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 $(A, H, Y, \zeta)$, 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 housing substitution, capitalization, and old-age wealth effects 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. *Rental Markets.* The first limitation relates to our focus on owner-occupied housing: our baseline 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 market averages in the relevant regions and connect the rental and housing markets through a traditional user cost calculation. 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 on 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 the study can be extended to include property taxes on multifamily properties, but doing so would require additional assumptions about the degree of tax passthrough.

2. *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 buyers. Second, existing buyers (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 in 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 these shocks. 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.

3. *Housing Supply.* In our baseline model, housing is supplied elastically at a given price, which we match in the calibration based on local values. In reality, housing supply is 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).

   However, in practice, 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 substantially more elastic in high-property-tax Texas, where muncipalities 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.

4. *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 also more likely to be financially constrained. We consider robustness around this point in subsection 5.5, in which we rebate property tax revenues only to the young, and find increased home ownership as a result.

5. *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 changes on allocations directly, to show the impacts in a transparent manner with fewer assumptions about welfare.

6. *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.

7. *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 mismached 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 coresidence.

   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.

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

9. *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.

10. *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).

11. *Other Taxes.* 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 fuller structural model incorporates these and other transactions 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 also abstract from the presence of other taxes with consequences 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 demonstrates, in an overlapping generations 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 motivate 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 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 US from 2016–2021. To create our panel of property taxes, we clean the data to include only residential properties. Full details are in the data appendix. We keep sales from 2016–2021 with a sale price greater than $25k. We aggregate these up to three different geographic levels: zipcode, PUMA, and county. We exclude zipcodes 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 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 persons per bedroom in Figure 1 Panel B. People aged 30–50 have the largest fraction with more than 1 person per bedroom. The data presented in these plots suggests 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 housing ownership 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 aged 30–50. 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 1 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 local homeownership on property tax rates at the PUMA level, including 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 1 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 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 reduce 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. These distributions also highlight the possibility for 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%.[2]

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.[3] 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.

We also examine the associations of high property taxes with the age distribution within zipcodes in Table 3. In Panel A, we regress the fraction of a zipcode's population in a certain age group on the zipcode'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 zipcode population with children under age 17 and under age 6 on the zipcode-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 property taxes.

We also find evidence that the increase in homeownership in high-property-tax areas is con-

[2]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.

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

centrated 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, 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 group, 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 overlapping generations (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 does 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. In each period $t$, they choose between renting and owning, denoted by $S_t \in \{R, O\}$, in Texas or California, $i_t \in \{TX, CA\}$.

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 $\Xi_i^R$ and location-specific homeownership benefits $\Xi_i^O$, with $\Xi_{TX}^R$ normalized to zero. Further, when households move to a new location, they incur a utility cost of moving, denoted by $m$. Overall, the utility function of a household is given by

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

where $\alpha$ is the preference for non-durable consumption and $\sigma$ the coefficient of relative risk aversion. In each period $t$, households have a probability of death $1-p_t$, and their bequests after death are as a function of total wealth:

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

where $\Psi$ is the intensity of the bequest motive.

House and rental prices are time-independent in both regions and denoted by $P_i$ and $R_i$. For owner-occupied housing, there is a minimum house size $\underline{H}$, whereas renters can choose an arbitrary house size. 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, $\phi_i$ represents the location-specific user costs that capture the endogenous factors.

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 as in (Guvenen and Smith, 2014). In addition to income risk, households are exposed to mortality risk, with $p_t$ representing a household's probability of surviving to age $j_t$.

**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

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

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

$$\begin{aligned} V^{adjust,l}(s_t) = \max_{C_t, A_{t+1}, \tilde{H}_t} & U^O_{i_t,l}(C_t, \tilde{H}_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1-p_t)B(W_{t+1}))\,, \\ \text{s.t.} \quad & A_{t+1} + P_l \tilde{H}_t + C_t = (1+r)A_t + Y_t + T_l + (1-F)(1-\delta)P_{i_t}H_t - \tau_{i_t}P_{i_t}H_t\,, \\ & A_{t+1} \geq -(1-\theta)\frac{1-\delta}{1+r}P_l\tilde{H}_t\,, \quad \tilde{H}_t \geq \underline{H}\,, \quad s_{t+1} = (A_{t+1}, \tilde{H}_t, Y_{t+1}, l, j_{t+1})\,, \end{aligned} \tag{15}$$

$$\begin{aligned} V^{noadjust,i_t}(s_t) = \max_{C_t, A_{t+1}} & U^O_{i_t,i_t}(C_t, H_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1-p_t)B(W_{t+1}))\,, \\ \text{s.t.} \quad & A_{t+1} + C_t = (1+r)A_t + Y_t + T_{i_t} - (\delta + \tau_{i_t})P_{i_t}H_t\,, \\ & A_{t+1} \geq -(1-\theta)\frac{1-\delta}{1+r}P_{i_t}H_t\,, \quad s_{t+1} = (A_{t+1}, H_t, Y_{t+1}, i_t, j_{t+1})\,, \end{aligned} \tag{16}$$

$$\begin{aligned} V^{rent,l}(s_t) = \max_{C_t, A_{t+1}, \tilde{H}_t} & U^R_{i_t,l}(C_t, \tilde{H}_t) + \beta(p_t \mathbb{E}_t[V(s_{t+1}, \varepsilon)] + (1-p_t)B(W_{t+1}))\,, \\ \text{s.t.} \quad & A_{t+1} + C_t + \phi_l P_l \tilde{H}_t = (1+r)A_t + Y_t + T_l + (1-F)(1-\delta)P_{i_t}H_t - \tau_{i_t}P_{i_t}H_t\,, \\ & A_{t+1} \geq 0\,, \quad s_{t+1} = (A_{t+1}, 0, Y_{t+1}, l, j_{t+1})\,. \end{aligned} \tag{17}$$

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.

We solve for the stationary distribution of the OLG model 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). 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 $\phi_i$ 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. Young households (aged 25–44) are more likely to rent, especially in California, while older households (aged 45–84) are more likely to own, particularly in California.

Figure 2 Panel B further illustrates the model's predictions for the optimal housing tenure and location choice over the life cycle. The model suggests 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.

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 concentration of housing ownership 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 from $V_{0.8} = -4.83$ to $V_2 = -4.04$.

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 aged groups, indicating that they benefit more in 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 move into California each year on average while 1.5% of households move out. After the reform, 3% of households move into California while 1% move out per yearly period 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

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 financial 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, $\mathbb{E}\left[\frac{dV}{d\tau_i}|i\right]$. Total 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, increasing the ability to purchase of financially constrained agents, 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 young 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 representing a force pushing against homeownership among elderly people.

We also highlight the effects on quantities of housing consumed across age among both the owner-occupied housing stock (Table 6 Panel A) and the rental stock (Table 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. Average wealth in the model decreases as a result of the increase in property taxes, falling from 0.35 to 0.31.

We show the change in the distribution of wealth in Figure 7. Overall wealth declines as a result of the declines in housing values. 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 age—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, preferences for homeownership push such constrained households to own in the worse labor markets in Texas.

## 5.5 Additional 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.

One potential limitation of our framework discussed in that section is treatment of property tax revenues. We model the revenue side of property taxes indirectly, by assuming they are rebated to individuals lump-sum, 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 particularly concerned that young families particularly value these expenses 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 Figure A6 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 as well as renting in both states. This increase begins among younger aged 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 Figure A6. We find, perhaps unsurprisingly, that younger residents receive an increase in welfare change under the change in property tax receipt policy, while older residents experience a decline in welfare.

# 6 Conclusion

Property taxes play a more powerful role in shaping housing allocations than is conventionally realized. We first characterize 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 toward 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 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 the 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 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.

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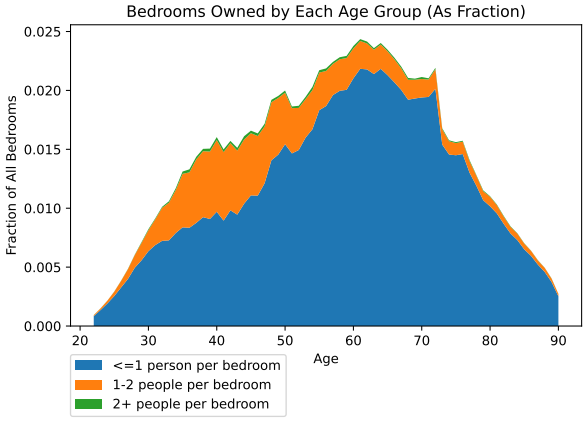
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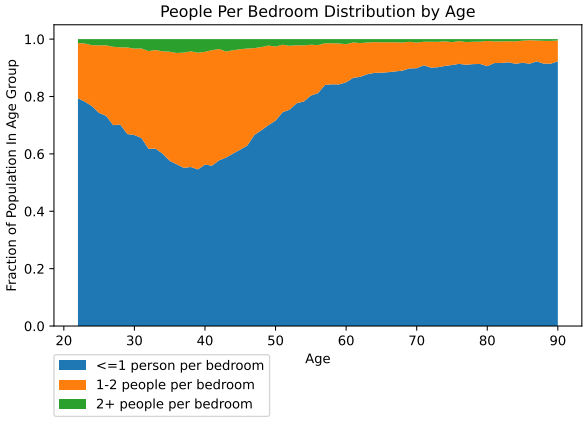
# Figures

Figure 1: Housing Allocation Across the Life Cycle

*Panel A: Bedroom Ownership Distribution*



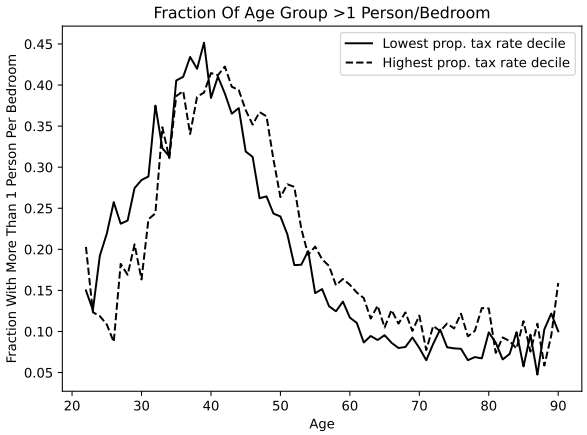

*Panel B: Crowding*




*Panel C: Bedroom Ownership Distribution*



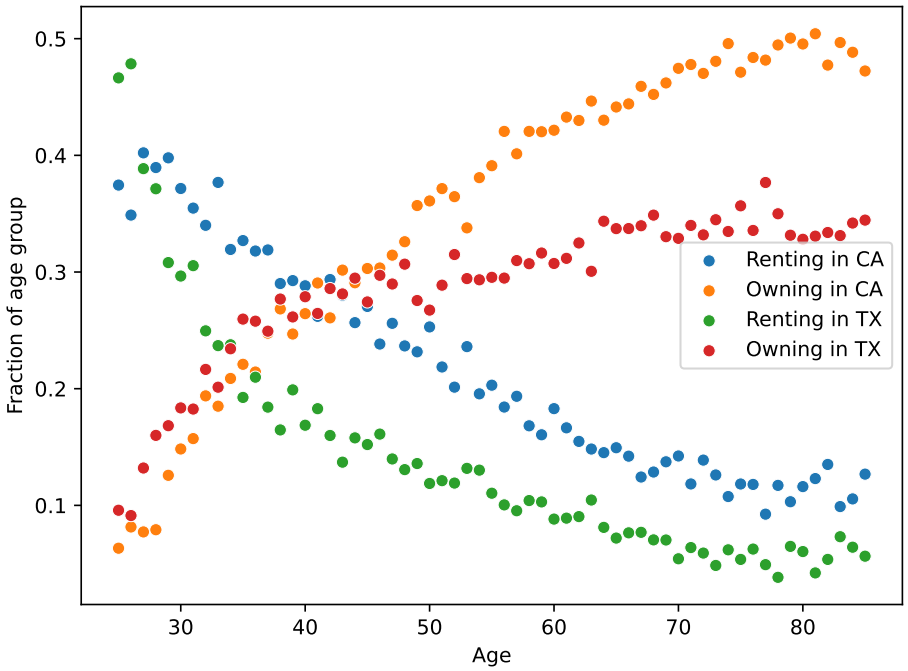

*Panel D: Crowding*



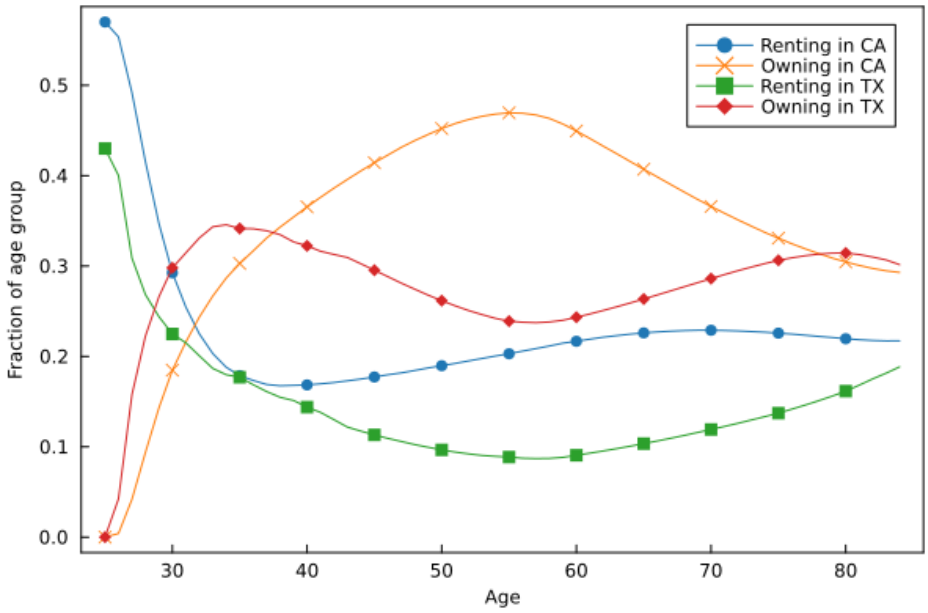

*Notes:* Data for this figure are drawn from the individual-level variables from the ACS 1-year publicly available microdata merged with PUMA-level property tax rates from Verisk/Infutor sale records. Panel A shows the fraction of all bedrooms in the US owned by each age group. This is the weighted sum 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 1 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

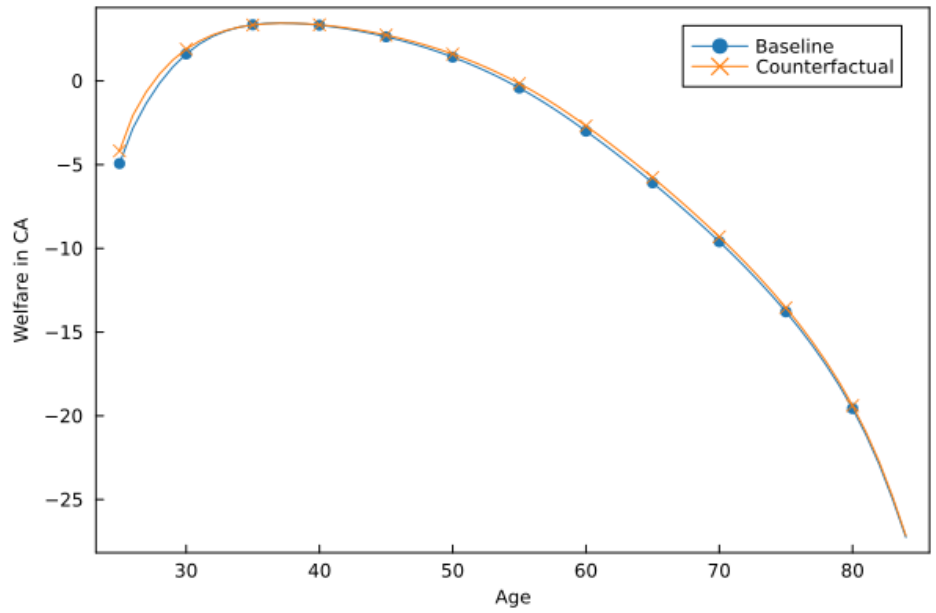



Panel B: Model-Implied Homeownership




*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.

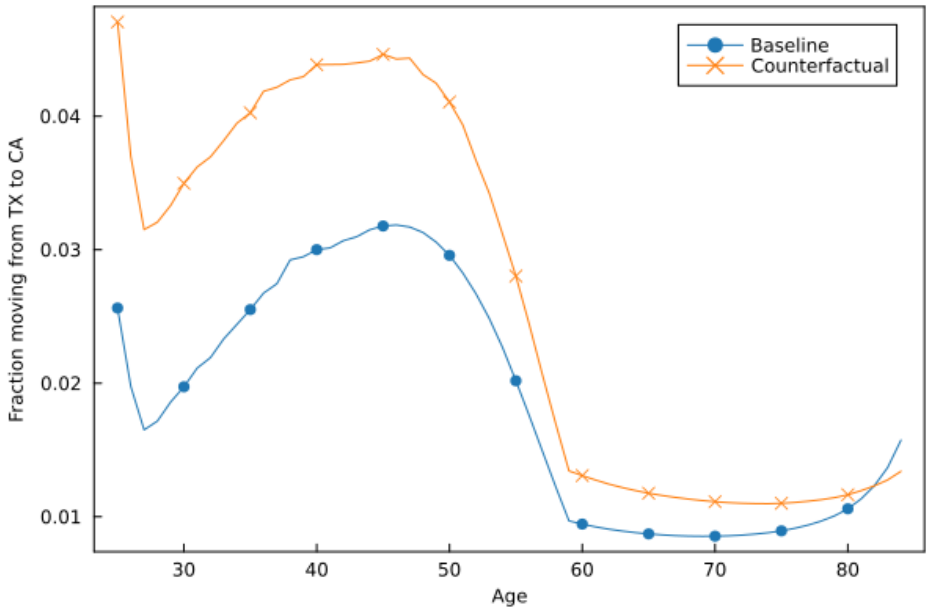
Figure 3: Welfare by Age Group Before and After a Property Tax Rise in California



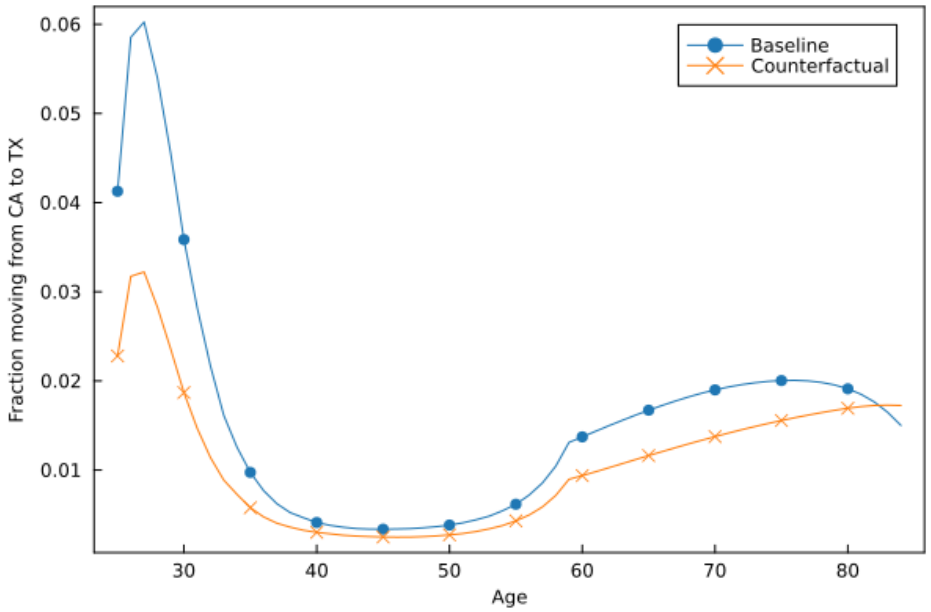

*Notes:* This figure shows the change in welfare by comparing our baseline model (discussed in section 4) to the policy counterfactual in section 5 in which we increase property tax rates in California (CA) to match those in Texas. We show here the welfare by age group in California. Welfare is estimated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

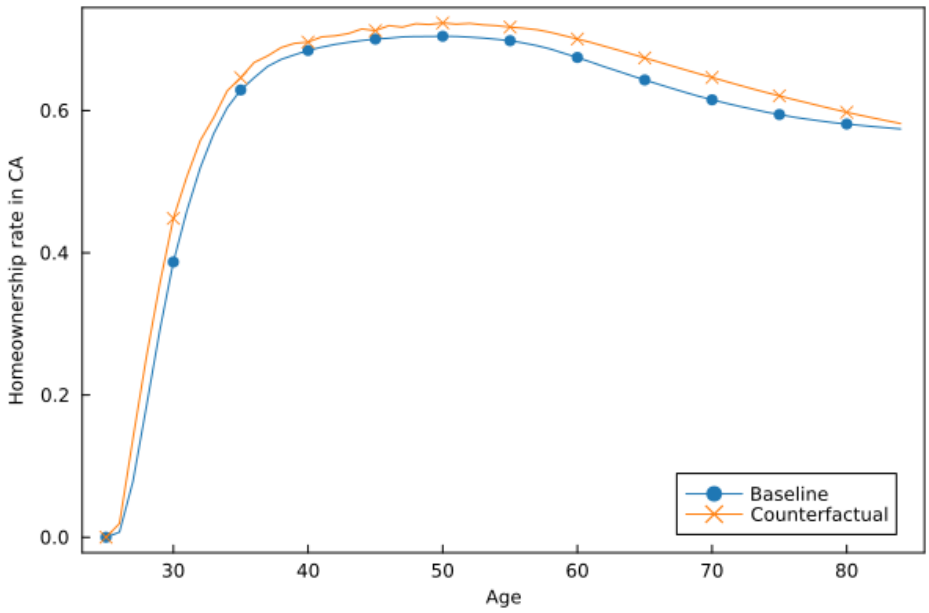



Panel B: Fraction Moving out of California by Age




*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.

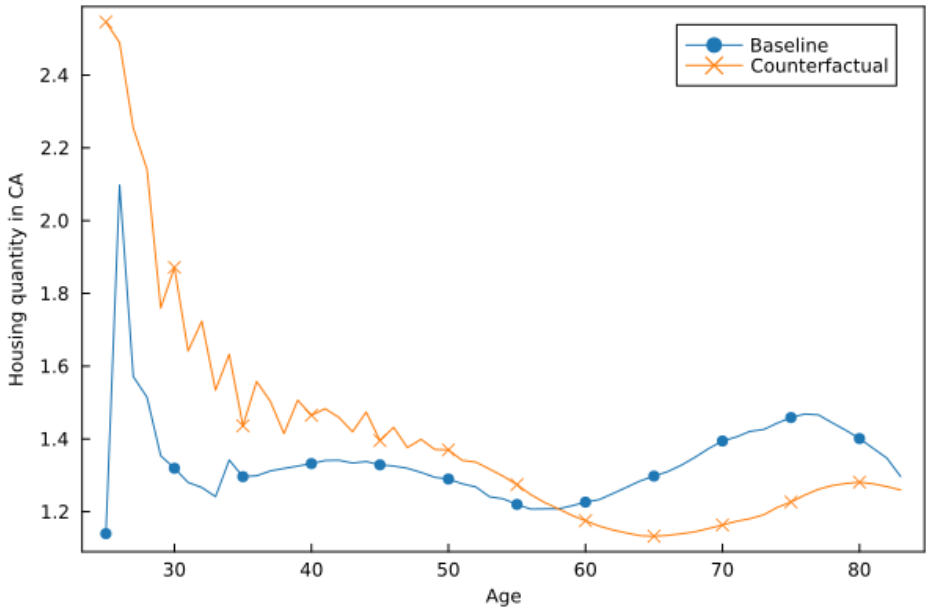
Figure 5: Impact of Property Taxes on Homeownership



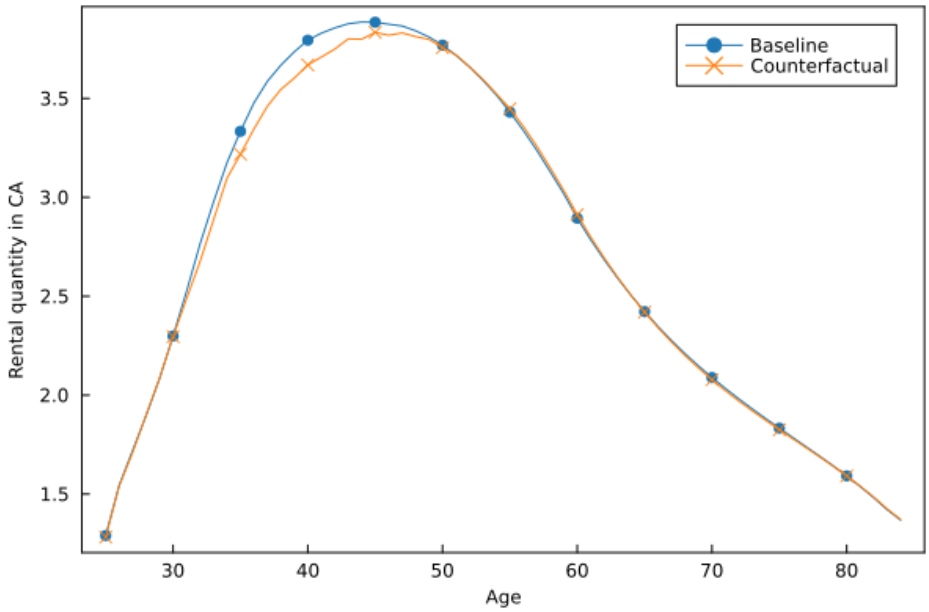

*Notes:* This figure shows the change in homeownership by comparing our baseline model (discussed in section 4) to the policy counterfactual in section 5 in which we increase property tax rates in California (CA) to match those in Texas. We plot the homeownership rate in the baseline calibration and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

Figure 6: Impact of Property Tax Increases on Housing Quantities

Panel A: Housing Quantity in California by Age

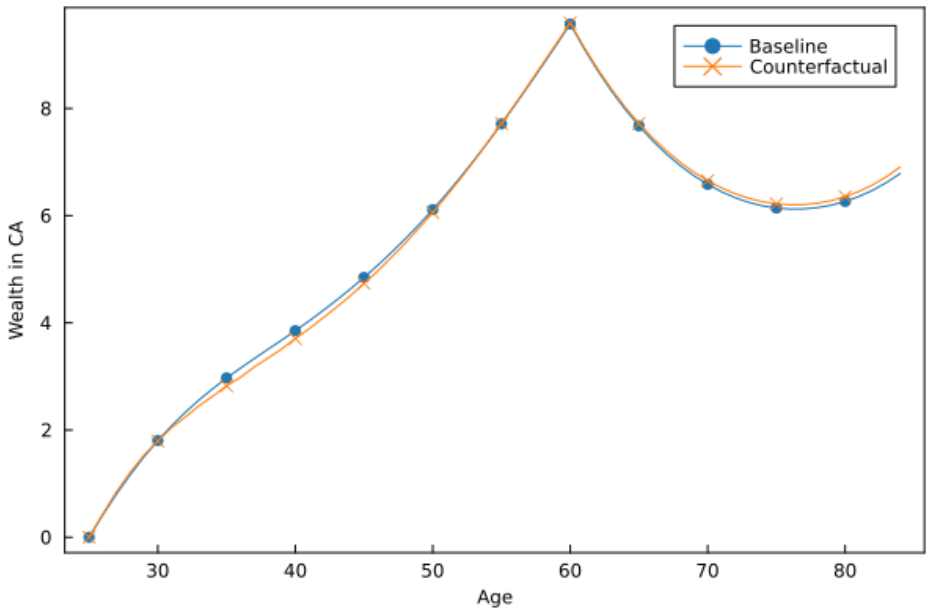



Panel B: Rental Quantity in California by Age




*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 age 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, 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, 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 zipcode level for 2016–2020. The zipcode-level property tax rates come from Verisk/Infutor sales data from 2016–2020. Panel A shows regressions of the fraction of the zipcode population in a given age range on the property tax rate of the zipcode, 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 zipcode level. Fixed effects are at the county and year levels. Property tax rates come from Verisk/Infutor in 2018 and are measures at the zipcode level. They are calculated as the property tax amounts divided by the sale price of the property that year. Zipcodes 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 | | |
| $\sigma$ | Relative risk aversion | 2.000 | Standard value |
| $r$ | Interest rate | 0.024 | See text |
| $\delta$ | Depreciation rate | 0.022 | See text |
| $\theta$ | LTV limit | 0.200 | See text |
| $F$ | Transaction cost selling | 0.050 | Díaz and Luengo-Prado (2010) |
| $\rho_z$ | Autocorrelation income | 0.910 | Floden and Lindé (2001) |
| $\sigma_z$ | Standard deviation income | 0.210 | Floden and Lindé (2001) |
| $\underline{H}$ | Minimum house size | 1.000 | See text |
| $\Psi$ | 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 |
| $\tau_1$ | Property tax Texas | 0.020 | Verisk Marketing Solutions |
| $\tau_2$ | Property tax California | 0.008 | Verisk Marketing Solutions |
| $\phi_1$ | Rent–price ratio Texas | 0.066 | User cost model |
| $\phi_2$ | Rent–price ratio California | 0.054 | User cost model |
| | Internal | | |
| $\alpha$ | Preference for non-durable consumption | 0.637 | Rent/Income=0.30 |
| $\beta$ | Discount factor | 0.879 | Wealth/Income=4.4 |
| $\Xi_2^R$ | Amenity benefit California | 0.358 | Share in California=0.57 |
| $\Xi_1^O$ | Homeownership benefit Texas | 0.448 | Homeownership Texas=0.66 |
| $\Xi_2^O$ | Homeownership benefit California | 0.379 | Homeownership California=0.61 |
| $\mu_1$ | Income shifter Texas | 0.148 | Income Texas=0.87 |
| $\mu_2$ | 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

| | Young (25–44) | Old (45–84) |
|---|---|---|
| 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 |

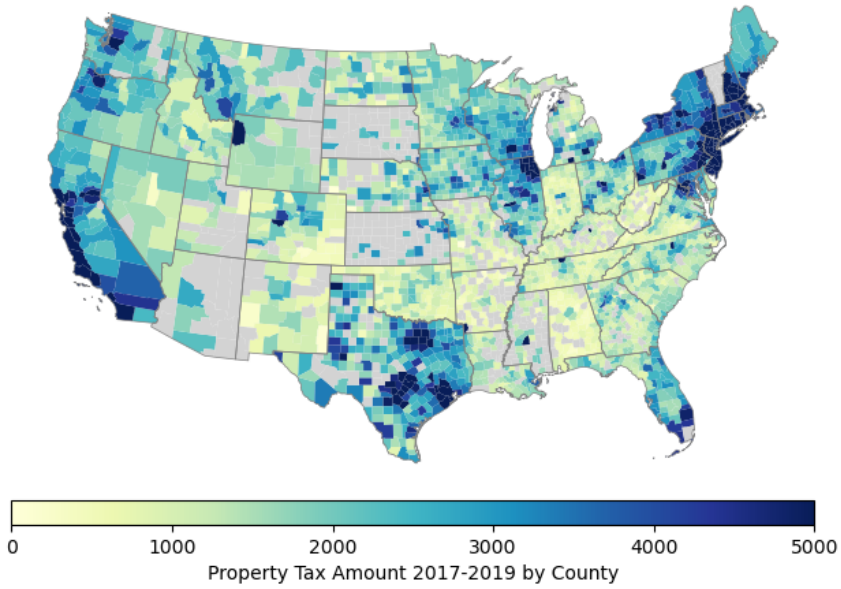
*Notes:* This table displays homeownership status and location choice across age groups, as generated by the calibrated overlapping generations (OLG) model. Each column shows the fraction of households within the respective age group that are renting or owning in California and Texas.

# Internet Appendix

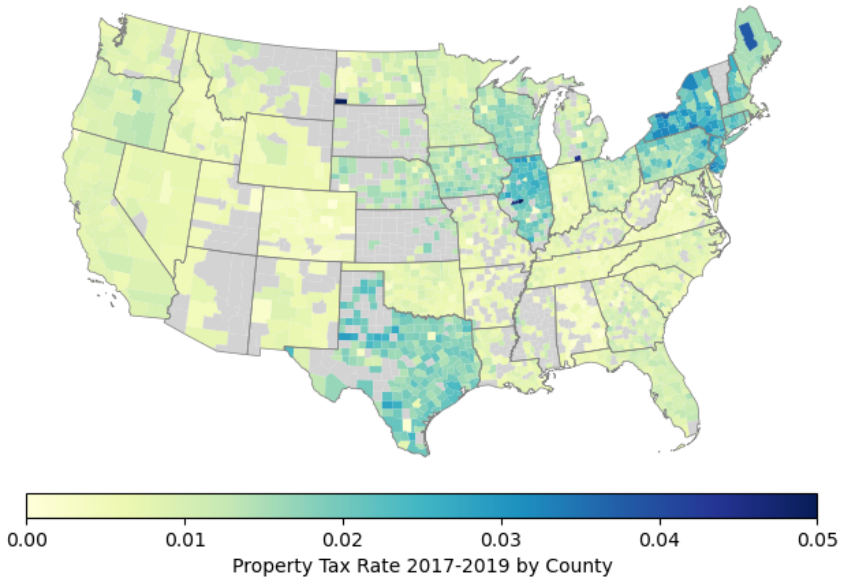
## A Additional Results

Figure A1: Regional Variation in Property Taxes

Panel A: Property Tax Amounts by County

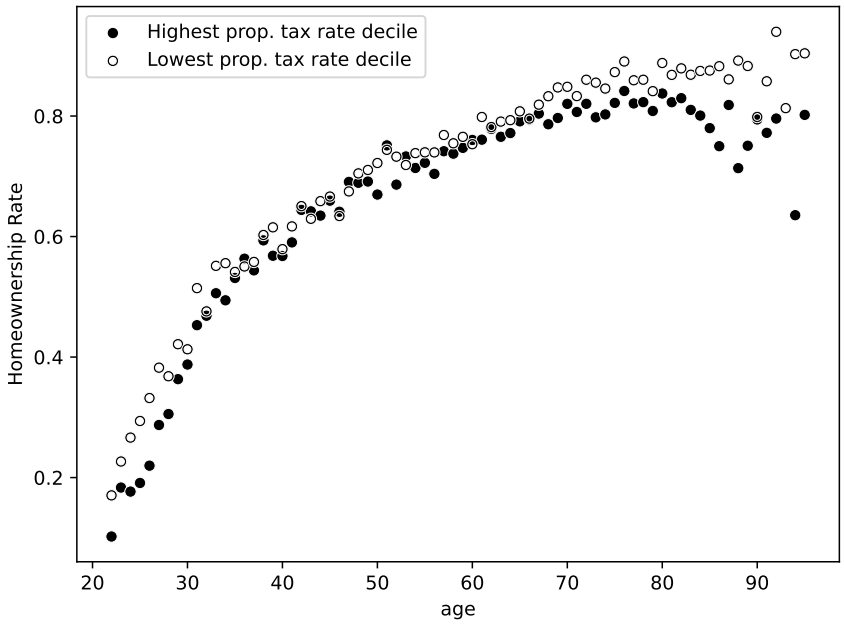



Panel B: Property Tax Rates by County




*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

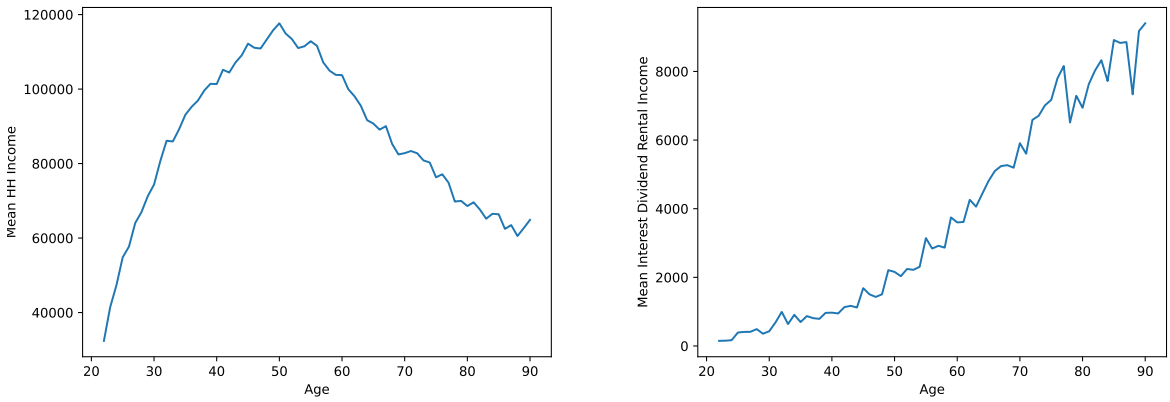



*Notes:* Data for this plot are drawn from the individual-level variables from the ACS 1-year publicly available microdata from 2017 to 2019. The plot shows the homeownership rate for each age, split by the highest property tax decile and the lowest property tax decile. Property tax rates for each PUMA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

Figure A3: Income and Wealth Distributions By Age

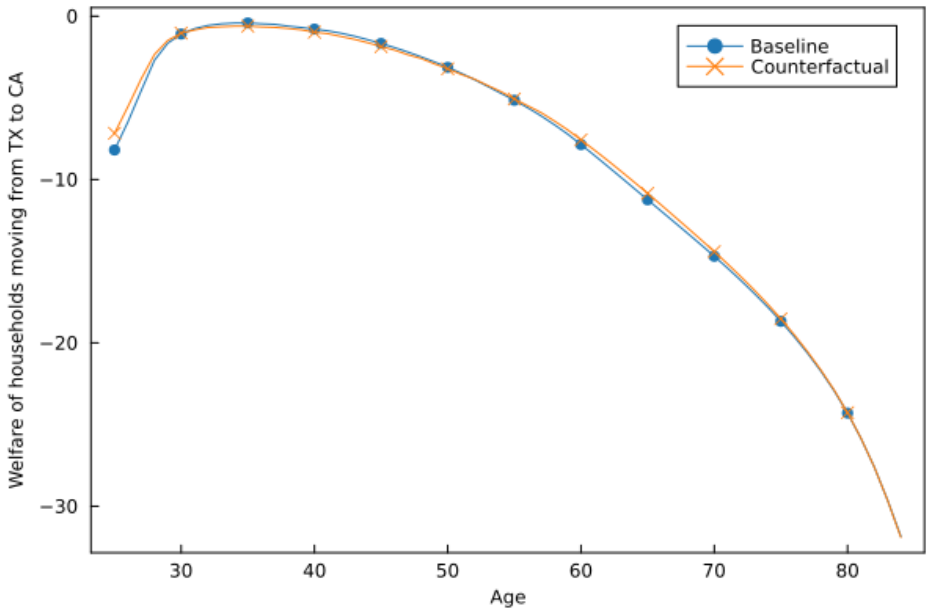
*Panel A: Income Distribution*

*Panel B: Interest Dividend Rental Income Distribution*



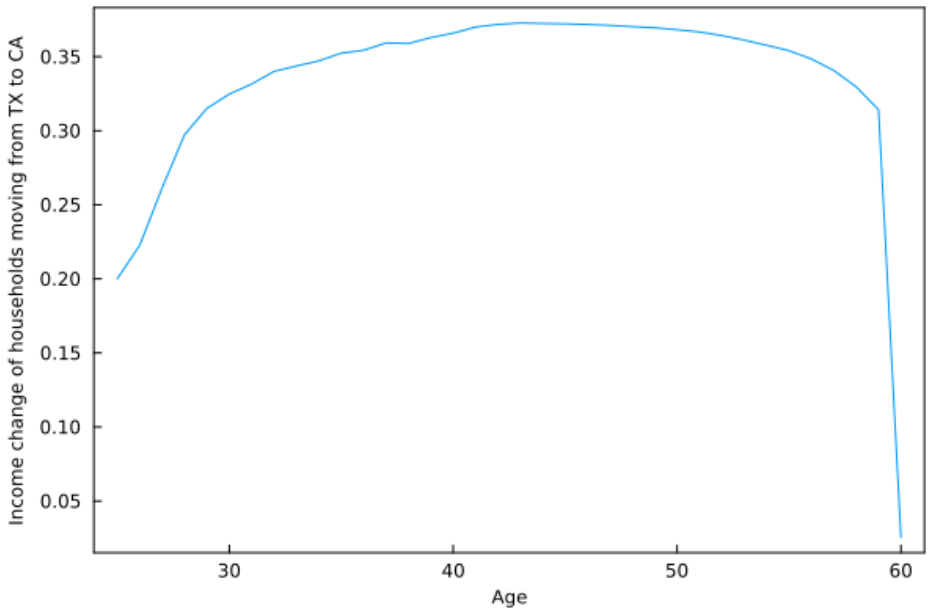

*Notes:* Data for Figure 1 come from the individual-level variables from the ACS 1-year publicly available microdata merged with PUMA-level property tax rates from Verisk/Infutor sale records. Panel A shows the mean household income for each age. Panel B shows the mean interest, dividend, and rental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

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.

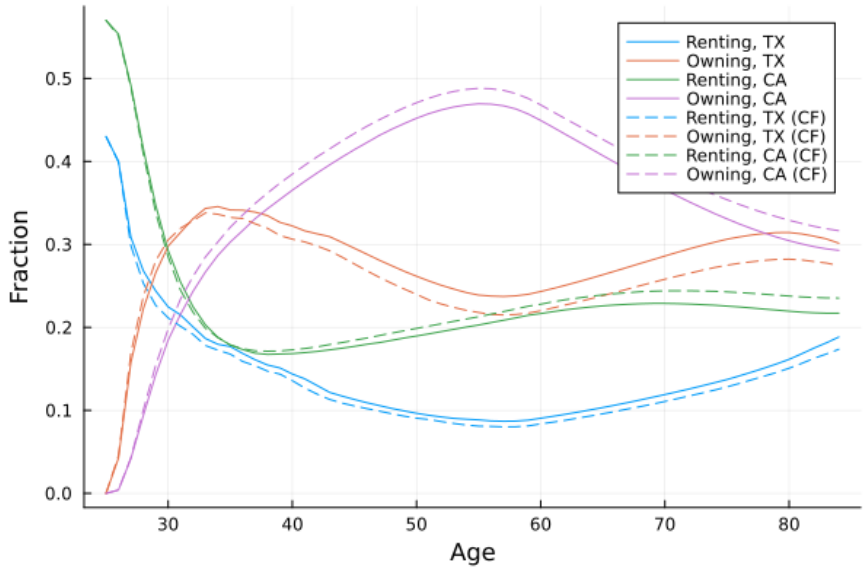
Figure A5: Income Change of Movers to California



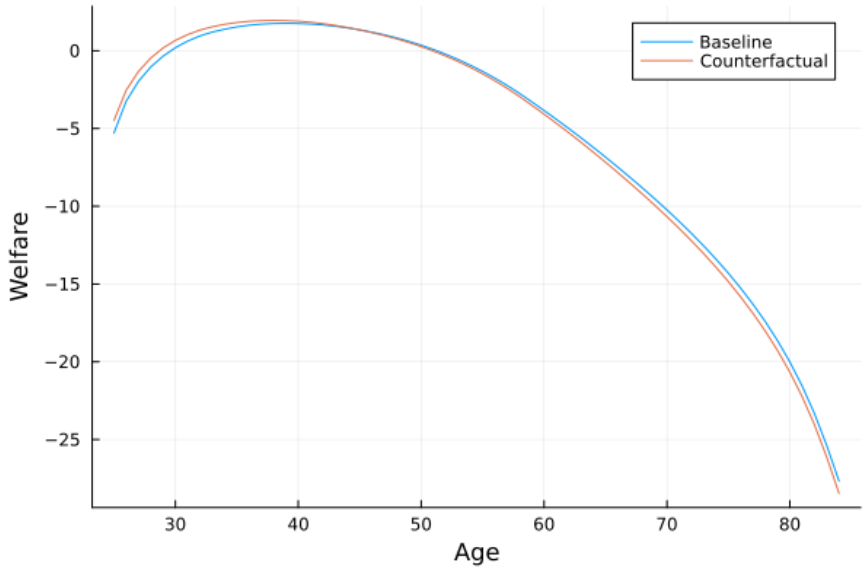

*Notes:* This figure plots the income change of households who move from Texas (TX) to California (CA) as a result of the policy counterfactual modeled in section 5, featuring higher property taxes in California. The y-axis represents the fraction of income gained upon moving, i.e. 0.05 implies a 5% income gain. Income gains are lower after age 60 due to retirement.

Figure A6: 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 a 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.

# B Data Appendix

**Sale-Based Tax Rates (Zipcode, 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 US from 2016 to 2021. 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 zipcode or PUMA level.

8. Keep zipcode years with more than 20 sales or PUMAs with more than 100 sales.

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