On the Welfare Gains of Housing Affordability*

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Abstract

This paper studies the welfare effects of expanding access to standard mortgage financing for factory-built homes. We begin by outlining the regulatory barriers that prevent many low- and middle-income U.S. households from using traditional mortgage credit in this segment. Compared with chattel loans—the primary financing instrument for manufactured homes—mortgages feature longer maturities, lower interest rates, and tax deductibility of interest payments. To evaluate the welfare consequences of equalizing these conditions, we develop a dynamic life-cycle model of housing decisions that highlights a key trade-off: manufactured homes are more affordable than site-built homes but face less favorable financing terms. The model is calibrated to match both the overall homeownership rate and the distribution of site-built versus manufactured homes in the U.S. South. Our results show that even under a conservative reform—granting tax deductibility alone, while holding interest rates and maturities fixed—welfare gains are substantial, equivalent to a 2% permanent increase in real income, or a 28% increase in lifetime income in present discounted value terms.

Keywords: Factory Built Homes, Mortgages, Tax Deductions

JEL Classification: D6, E2, H2, R2

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1 Introduction

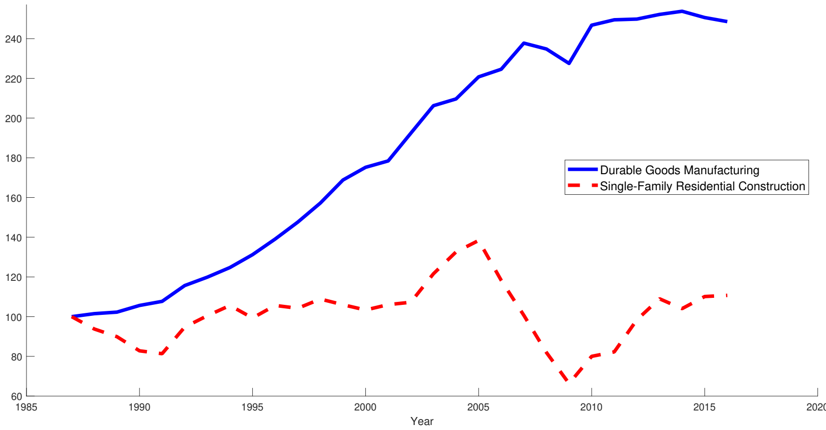
Housing affordability is one of the most pressing economic challenges in the United States. While much of the debate emphasizes supply-side constraints—such as zoning regulations or slowing construction productivity—less attention has been paid to the role of financial institutions in shaping access to affordable housing. This paper argues that distortions in mortgage financing, particularly for factory-built (manufactured) housing, represent a critical and underappreciated barrier to affordability.

Factory-built homes offer a promising avenue for expanding housing affordability. They are substantially less expensive per square foot than site-built homes and thus have the potential to broaden access to homeownership for lower- and middle-income households. Their cost advantage stems from production methods in the manufacturing sector, which typically achieve higher productivity than traditional construction. By contrast, labor productivity in the site-built construction industry has remained stagnant for decades. Figure 1 illustrates these trends: the solid blue line shows labor productivity in the manufacturing of durable goods (which includes manufactured homes), while the dashed red line represents productivity in single-family residential construction. Since the 1980s, productivity in durable goods manufacturing has nearly doubled, albeit with some fluctuations, whereas single-family construction has shown little to no improvement. These productivity differences have translated directly into cost differences. Manufactured homes typically sell for 30 to 50 percent of the cost per square foot of comparable site-built units.

Yet the adoption of manufactured homes remains limited. A central reason lies in how U.S. credit markets classify and finance these homes. Manufactured housing has often been excluded from standard mortgage products, instead being financed through personal property loans with shorter maturities, higher interest rates, and no eligibility for the mortgage interest deduction. This institutional exclusion raises the cost of ownership, depresses demand, and perpetuates social stigma associated with manufactured housing.

Recent work by Schmitz (2020) highlights that the U.S. construction industry has failed to adopt modern production technologies, particularly so-called factory production methods. According to Schmitz, this failure is not accidental but rather the result of deliberate obstruction: organized groups within the traditional construction sector have actively blocked and undermined efforts to introduce these technologies. Indeed, throughout the past century, various attempts to integrate "factory-built" housing into residential construction have been systematically sabotaged by the traditional sector, which continues to rely on on-site, "stick-built" methods.

Figure 1: Labor Productivity: Durable Goods Manufacturing Vs Single-Family Residential Construction(1987=100)



Note: Labor productivity indexes (1987=100). Blue solid line: durable goods manufacturing; red dashed line: single-family residential construction. **Source:** BLS; *Sveikauskas, Rowe, and Mildenberger (2018)*.

The obstruction of factory-built housing has persisted for nearly a century. With the exception of a brief surge in production and sales during the 1960s (discussed further below), the traditional construction sector has largely succeeded in suppressing the adoption of factory-built technologies. According to Schmitz (2020), the tactics employed by the traditional sector have evolved over time. From the 1920s through the 1970s, resistance primarily took the form of local ordinances and restrictions imposed at the town, county, or even state level, explicitly targeting factory-built methods. Since the 1970s, however, these efforts have escalated to the national level.

A key policy approach has been the creation of federal programs that subsidized the construction of traditional, site-built ("stick-built") homes while excluding factory-built alternatives. For instance, the Section 235 program provided subsidized mortgage interest rates to buyers of stick-built homes but denied eligibility to purchasers of factory-built units. More recently, initiatives such as the Duty to Serve mandate, introduced under the Housing and Economic Recovery Act (HERA) of 2017, were designed to expand mortgage access for manufactured housing. In practice, however, implementation has been limited and uneven. As a result, the housing market today is characterized by the coexistence of two distinct types of homes: factory-built units, which are considerably more affordable, and traditional site-built homes, which benefit from broader institutional support. Despite their cost advantage, manufactured homes remain inaccessible to many households.

In this paper, we study the welfare consequences of expanding access to standard mortgage credit for factory-built homes. We develop a tractable life-cycle model with heterogeneous households that make consumption and housing tenure choices. Specifically, households decide whether to rent or own, and, conditional on ownership, whether to live in a site-built or a factory-built home. The framework emphasizes a central trade-off: factory-built homes are more affordable but are subject to restrictive financing conditions and social stigma, whereas site-built homes are more expensive yet benefit from longer maturities, lower interest rates, and tax-deductible mortgage payments. The model is calibrated to replicate homeownership rates and the distribution of housing types observed in the U.S. South.

Equipped with the model, we perform counterfactual policy experiments in which financing conditions for factory-built homes are aligned more closely with those of the traditional mortgage market. Our results point to substantial welfare gains. Even under a conservative scenario in which interest rates and loan maturities remain fixed, extending tax deduction benefits to factory-built home loans produces a fivefold increase in factory-built homeownership among households in the bottom half of the income distribution. This policy yields an average welfare improvement equivalent to a permanent 2% increase in real income per period, or, in present discounted terms, a one-time increase of 28% in lifetime real income at time 0.

The remainder of the paper is structured as follows. Section 2 situates our work within the existing literature and outlines its contributions. Section 3 provides an overview of the conflict in the housing market between traditional and factory-built sectors. Section 4 introduces the life-cycle model that forms the basis of our analysis. Section 5 describes the parameterization strategy. Section 6 presents the welfare implications of reforms to the financing conditions of factory-built homes. Section 7 concludes.

2 Literature Review

Our work relates to several strands of the literature. A first group of studies emphasizes supply-side constraints as a central driver of housing affordability. Borri and Reichlin (2018); Schmitz (2020); Galesi (2014) discuss the productivity slowdown in construction and strategic barriers that prevent efficiency gains, while Seok and You (2019) model the long-run evolution of U.S. housing markets consistent with rising costs. In particular, Schmitz (2020) documents, in addition to stagnant labor productivity in the site-built industry, various barriers from that industry and regulatory institutions that have limited the expansion of more affordable options such as manufactured homes. Saiz (2010) shows that geographic constraints make supply elastically limited in many metropolitan areas, Hilber and Vermeulen (2016) demonstrate that in such constrained places local earnings shocks translate strongly into house prices, and Hsieh and Moretti (2019) estimate large national output losses from misallocation due to land-use regulation. Knoll et al. (2017) provide long-run global evidence of sustained real house price increases.

A second strand studies how housing tax policy affects tenure decisions, prices, and leverage. Early contributions such as Aaron (1970); Nordhaus (1968) established the importance of housing tax incentives, while Poterba and Sinai (2008) documented the large expenditures involved. Glaeser and Shapiro (2003) evaluated the benefits of the mortgage interest deduction (MID). Hilber and Turner (2014) showed that the MID primarily affects higher-income households in unconstrained markets, while in constrained settings it is largely capitalized into prices. Sommer and Sullivan (2018) used a structural model to show that eliminating the MID reduces prices and leverage with little effect on homeownership, and Karlman et al. (2021) analyzed the costs of reversing such entrenched policies. From a macro perspective, Gervais (2002); Jeske et al. (2013) showed how tax subsidies distort capital accumulation and raise leverage.

A third strand emphasizes credit frictions and differential access to mortgage markets. Duca and Rosenthal (1994) documented that liquidity and down payment constraints impede transitions into ownership, while Ambrose et al. (2002) found evidence of credit rationing in FHA lending. Mian and Sufi (2011) showed that home-equity-based borrowing fueled leverage and defaults in the 2000s, and Mian and Sufi (2022) argued that expansions in credit supply encourage speculative activity and amplify boom–bust cycles.

Finally, a growing strand focuses specifically on manufactured housing. Wubneh and Shen (2004) find limited negative externalities on nearby property values, challenging stigma-based objections. U.S. Department of Housing and Urban Development (2009); Joint Center for Housing Studies of Harvard University (2023) document the significant cost advantages of manufactured over site-built housing. Lawrence et al. (1992) show elevated default risks in mobile home credit, while Park (2022) shows that loans secured as personal property carry much higher default risk than those classified as mortgages, with land tenure playing a crucial role. Other contributions, such as Lowman (2019); Banga (2022), discuss barriers in chattel lending, while Mei (2022) highlights how minimum lot-size regulations affect the affordability of smaller homes, and Ríos-Rull and Sánchez-Marcos (2008) provide a framework for analyzing heterogeneous house sizes. My paper contributes to this literature by embedding these institutional frictions into a life-cycle model and quantifying their welfare costs. I show that reforms such as reclassifying manufactured homes as real property, extending maturities, and granting tax deductibility can substantially improve welfare, particularly for low-income households.

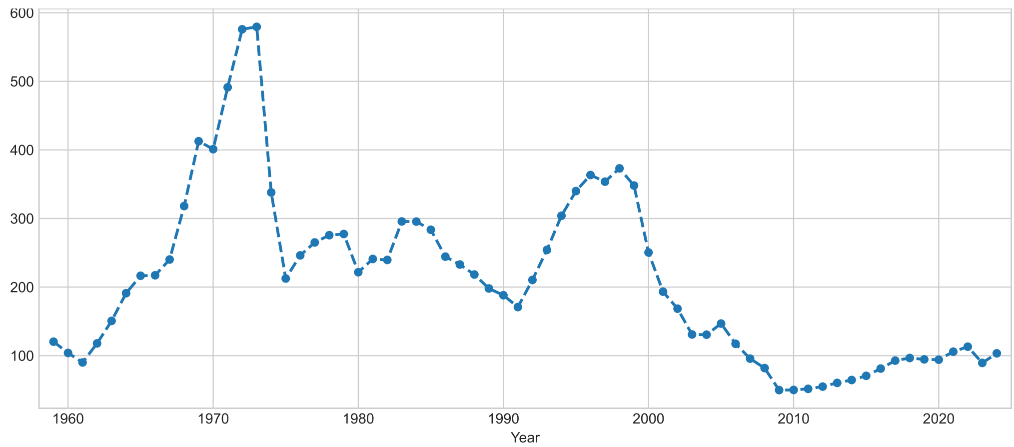
Overall, the literature has examined four central themes: (i) supply constraints and geography as drivers of price-level differences; (ii) the capitalization of tax preferences for owner-occupied housing into prices and leverage; (iii) the role of credit frictions and loan design in determining access to ownership; and (iv) the dependence of manufactured housing outcomes on financing form and land tenure. Building on these insights—and particularly on the argument in Schmitz (2020)—this paper contributes in two ways. First, we provide a framework that embeds institutional and financial frictions into a life-cycle model that highlights a key trade-off at the heart of the manufactured housing market: affordability versus financing conditions and stigma. Finally, we show that reforms granting manufactured homes broader access to mortgage markets can yield substantial welfare improvements, especially for lower- and middle-income households.

3 Overview of the Housing Market Conflict in the U.S

Since their introduction in the early twentieth century, factory-based construction methods have faced persistent challenges in gaining widespread acceptance. Schmitz (2020) notes that the traditional site-built sector sometimes used terminology to shape perceptions: when small modular homes emerged in the late 1940s, they were often labeled as "trailers," evoking associations with the temporary shelters of the Depression era. These associations, combined with concerns about quality and mobility, contributed to zoning ordinances that restricted such housing in many jurisdictions.

Despite these challenges, the industry experienced a period of rapid expansion. Figure 2 illustrates the trajectory of manufactured home shipments between 1959 and 2024. From 1960 to 1972, shipments rose substantially, increasing from 103,700 to 575,900 units, and factory-built homes accounted for nearly 60% of total single-family production. At the time, forecasts anticipated further growth; however, by 1980 shipments had declined to 221,600 units. As noted by Schmitz (2020), policy decisions and industry dynamics—including the influence of HUD and the National Association of Home Builders—contributed to the reversal of this expansion[1].

Figure 2: Shipments of Manufactured Homes (in thousands): 1959-2024



Note: Annual shipments of manufactured homes, 1959–2024 (thousands of units). **Source:** U.S. Census Bureau.

Two mechanisms have been particularly important. First, regulatory requirements mandated that manufactured homes be transported and installed with a permanent chassis. This rule reinforced associations with mobile housing, exposed the units to restrictive zoning, and led lenders to classify them as personal property rather than

[1]According to Schmitz (2020), the key actors were HUD and the NAHB.

real estate. The result was greater reliance on chattel loans rather than mortgages, along with higher production costs. Second, manufactured homes were often excluded from residential zones and, where permitted, located in less desirable areas. These factors limited demand and constrained affordability, leaving manufactured homes with only a small share of the single-family market—roughly 10%, similar to the share observed in the late 1940s.

Federal housing programs also reinforced these patterns. Beginning in the late 1960s, subsidies such as the Section 235 program supported buyers of site-built housing but excluded purchasers of manufactured homes. Subsequent low-income housing initiatives followed a similar approach, further skewing incentives. The introduction of the HUD Code in 1974, while intended to standardize requirements, in practice applied only to manufactured homes and often imposed new restrictions in markets where they had previously faced fewer regulatory burdens.

Taken together, zoning rules, financing barriers, and federal policies shaped the trajectory of factory-built housing in the United States. Although the technology offered potential cost advantages, these institutional factors limited its role to a relatively small segment of the single-family housing market.

4 Model

Thus far, we have established that the marginal role of manufactured homes in the housing market is largely driven by unfavorable financing conditions and persistent social stigma. Building on this observation, we develop a heterogeneous-agents decision model in which households choose not only between renting and owning, but also among different types of housing when choosing to be a homeowner. The key trade-off in the model is the following: while traditional homes are more expensive than manufactured homes, they can be financed through standard mortgages, which feature longer maturities, lower interest rates, and tax-deductible interest payments. Manufactured homes, by contrast, are generally financed with chattel loans, which lack these advantages and impose higher borrowing costs. In addition, residing in a manufactured home entails a social stigma, often stemming from its association with "trailers." In the model, we capture this stigma as a direct utility cost.

4.1 Environment

We consider an economy that lasts 30 periods, populated by a continuum of households of measure one. In the first period, households randomly draw a labor productivity or skill z that determines their permanent income from a distribution $F(z)$. For simplicity, we assume that this productivity is fixed over the life-cycle.

4.2 Preferences

Individuals derive utility from both consumption and housing services, which can be obtained through three channels: renting, owning a traditional home, or owning a factory-built home. In the model, households select their housing type in the first period of life, and for simplicity, this choice is assumed to be irreversible. As will be shown later, housing choice depends primarily on a household's permanent income.

The model thus produces an endogenous segregation of households across income levels and housing tenure. Higher-income households choose traditional homes, households unable to afford ownership remain renters, and the intermediate segment becomes owners of manufactured homes. Although this assumption may appear stylized, it aligns with empirical evidence (U.S. Department of Housing and Urban Development (2009); Joint Center for Housing Studies of Harvard University (2023)). In particular, households residing in traditional homes tend to have higher incomes than those in manufactured homes, while manufactured-home owners, in turn, generally have higher incomes than renters.

In what follows, let the subscript $i \in \{x, y, R\}$ denote the type of living condition (x stands for traditional-home ownership, y factory-home ownership, and R being a renter). Individuals discount the future at the rate β. Preferences are given by:

$$\sum_{t=1}^{T} \beta^{t-1} U(c_{ti}, s_{ti})$$

where $U(c_{ti}, s_{ti})$ is given by:

$$U(c_{tx}, s_{tx}) = \frac{(c_{tx}^{\alpha}(s_{tx} - \underline{s})^{1-\alpha})^{1-\sigma}}{1-\sigma}$$

$$U(c_{ty}, s_{ty}) = \kappa_y + \frac{(c_{ty}^{\alpha}(s_{ty} - \underline{s})^{1-\alpha})^{1-\sigma}}{1-\sigma}$$

$$U(c_{tR}, s_{tR}) = \frac{(c_{tR}^{\alpha}(s_{tR})^{1-\alpha})^{1-\sigma}}{1-\sigma}$$

Let c_{ti} denote consumption in period t for an individual who has chosen housing option $i \in \{x, y, R\}$, and let s_{ti} denote the flow of housing services enjoyed in each period. We assume that $s_{ti} = s_i$ for $i = x, y$, meaning that once a household chooses homeownership, the size–quality bundle of the home remains fixed over time. The parameter α represents the weight on consumption in preferences, and σ is the standard CRRA coefficient of relative risk aversion. The novel element in our preference specification is the parameter κ_y, which captures the potential utility cost associated with living in a factory-built home. In addition, the parameter $\underline{s}$ imposes a minimum requirement for housing services, ensuring that all households consume at least a basic level of shelter. This parameter plays a key role in generating renters in the model, consistent with the fact that rental households represent a significant share of the economy in the data.

4.3 Markets

We distinguish three sectors within the housing industry: the rental market, the traditional (site-built) housing sector, and the manufactured housing sector. Let p_{sR} denote the periodic rental price, while p_{sx} and p_{sy} represent the purchase prices of one unit of traditional and manufactured housing, respectively. Consistent with empirical evidence, we assume $p_{sx} > p_{sy}$.

Financing conditions differ across sectors. Traditional homes are financed through standard mortgages, while manufactured homes are financed exclusively through personal (chattel) loans. Let r_x denote the interest rate for a mortgage in the traditional housing sector, and r_y the interest rate for a chattel loan in the manufactured housing sector. These interest rates are taken as exogenous, with $r_y > r_x$, reflecting observed data. In both cases, borrowing is modeled as a fixed-rate loan with constant periodic payments.

If a household chooses to finance the purchase of a traditional home, let b_x denote the principal loan amount. The household then makes a fixed periodic payment of

$$\frac{b_x\, r_x(1+r_x)^T}{(1+r_x)^T - 1},$$

where T denotes the loan maturity. This payment can be decomposed into two components: interest paid in that period ($r_x b_x$) and principal repayment, given by the difference between the total payment and the interest.

Analogously, if the household finances the purchase of a manufactured home, let b_y denote the principal loan amount. The periodic payment is given by

$$\frac{b_y\, r_y(1+r_y)^{T-\chi}}{(1+r_y)^{T-\chi} - 1},$$

where $\chi > 0$ captures the shorter maturity of chattel loans relative to traditional mortgages.

Households are also subject to borrowing constraints. In particular, we assume that for any type of loan, the periodic payment cannot exceed a fixed fraction of household income. For mortgages in the traditional housing sector, the borrowing constraint is given by

$$\frac{b_x\left[r_x(1+r_x)^T\right]}{(1+r_x)^T - 1} \leq (1-\phi_x) w z,$$

where b_x denotes the loan principal, r_x the mortgage interest rate, T the maturity, w the wage rate, z the household's productivity, and $\phi_x \in [0,1]$ the maximum allowable income share allocated to debt service.

Analogously, for loans in the manufactured housing sector, the borrowing constraint is

$$\frac{b_y\left[r_y(1+r_y)^{T-\chi}\right]}{(1+r_y)^{T-\chi} - 1} \leq (1-\phi_y) w z,$$

where b_y is the loan principal, r_y the chattel loan interest rate, $T-\chi$ the shorter maturity relative to mortgages, and $\phi_y \in [0,1]$ the maximum income share for this type of loan.

Renters face a similar affordability condition. Let $p_{sR} B_R s_{tR}$ denote the per-period rental payment, where p_{sR} is the rental price, s_{tR} the quantity of rental services, and B_R a parameter capturing the relative quality or usability of rental housing. The borrowing constraint for renters is

$$p_{sR} B_R s_{tR} \leq (1 - \phi_R) wz,$$

with $\phi_R \in [0, 1]$. The parameter B_R reflects the additional cost or reduced quality associated with renting compared to ownership. It can be interpreted, for example, as restrictions on property usage or lower amenities in rental housing. Introducing B_R allows the model to replicate the empirical share of renters observed in the data.

The sole purpose of chattel loans and mortgages in our model is to finance the purchase of a housing unit. To prevent households from using these loans to finance consumption, we impose an additional constraint requiring that consumption be financed exclusively out of after-tax income:

$$c_{1i} + \gamma_i p_{si} s_i \leq wz(1 - \tau) + \tau d_i, \quad i \in \{x, y\}.$$

In this expression, $\gamma_i p_{si} s_i$ denotes the required down payment, i.e., the fraction of the purchase price that must be paid upfront. Households are subject to an income tax at a rate τ. Depending on the type of house they choose, they may also be eligible for tax deductions, which we denote by d_i[2].

This constraint implies that, in the first period, household consumption can be financed only with available after-tax income; loan proceeds are restricted solely to the purchase of housing. We refer to this restriction as the *illiquid-debt constraint*.

Tax deductions in our model depend on the amount borrowed by a household and vary with the type of credit obtained. Let b_x and b_y denote the loan amounts required for purchasing a traditional home and a factory-built home, respectively. The associated tax deductions are given by d_x for mortgages and d_y for personal loans.

Accordingly, the after-tax income in period $t > 1$ for a household that purchases a traditional home is:

$$wz - \tau\big(wz - d_x(b_x)\big),$$

while for a household that purchases a factory-built home, after-tax income is:

$$wz - \tau\big(wz - d_y(b_y)\big).$$

[2]Tax deductions, of course, will depend also on the size of the housing unit.

Households begin making interest payments at the end of period 1. In the benchmark scenario, only mortgages are eligible for tax deductions. Thus, households that purchase a factory-built home receive no tax deduction, i.e., $d_y = 0$.

4.4 Household's Problem

At the beginning of the first period, households draw and observe their skill level z, which determines their life-cycle labor productivity. Simultaneously, they learn the prevailing prices, borrowing rules, and tax/deduction policies. Equipped with this information, households make decisions regarding consumption, housing, and borrowing, seeking to maximize intertemporal discounted utility.

The housing choice involves a key tradeoff. Manufactured homes are relatively inexpensive but more difficult to finance, ineligible for tax deductions, and subject to social stigma. In contrast, traditional homes are more costly but easier to finance and free from stigma. Households without sufficient resources to cover the down payment for homeownership may instead choose to rent.

Budget constraints depend on the type of housing chosen. For each housing option, households face one budget constraint per period. Consider first the case in which a household purchases a traditional home. The budget constraint in the first period is given by:

$$c_{1x} + \frac{b_x\left[r_x(1+r_x)^T\right]}{(1+r_x)^T - 1} + p_{sx}s_x \leq wz + b_x - \tau\left(wz - d_x\right).$$

This condition states that first-period expenses—consumption, the down payment, and the first mortgage installment—are financed through the mortgage loan, labor income net of taxes, and the applicable tax deduction.

For all subsequent periods ($t \geq 2$), the household's budget constraint takes the form:

$$c_{tx} + \frac{b_x\left[r_x(1+r_x)^T\right]}{(1+r_x)^T - 1} \leq wz - \tau\left(wz - d_x\right).$$

In words, this restriction requires that, from the second period onward, consumption and mortgage payments are financed solely by labor income net of taxes and deductions.

If the household instead chooses to purchase a factory-built home, the budget constraints are as follows. In the first period:

$$c_{1y} + \frac{b_y \left[r_y (1+r_y)^{T-\chi} \right]}{(1+r_y)^{T-\chi} - 1} + p_{sy} s_y \leq wz + b_y - \tau \left(wz - d_y \right).$$

For the remaining periods until the loan matures ($2 \leq t \leq T - \chi = \hat{T}$):

$$c_{ty} + \frac{b_y \left[r_y (1+r_y)^{T-\chi} \right]}{(1+r_y)^{T-\chi} - 1} \leq wz - \tau \left(wz - d_y \right).$$

Finally, after the loan has been fully repaid ($\hat{T} < t \leq T$):

$$c_{ty} \leq wz(1-\tau).$$

The interpretation is analogous to the traditional home case. In the first period, household expenditures include consumption c_{1y}, the down payment $p_{sy}s_y$, and the first installment of the personal loan $\frac{b_y[r_y(1+r_y)^{T-\chi}]}{(1+r_y)^{T-\chi}-1}$. These expenses are financed through the personal loan b_y and labor income net of taxes and deductions, $wz - \tau(wz - d_y)$.

In subsequent periods prior to loan maturity ($2 \leq t \leq \hat{T}$), expenditures consist of consumption c_{ty} and the periodic loan payment, financed by labor income net of taxes and deductions. Once the loan is fully repaid ($t > \hat{T}$), the household simply consumes its available after-tax income in each period, effectively behaving in a hand-to-mouth manner.

If the household chooses to rent, the budget constraint is:

$$c_{tR} + p_{sR} B_R s_{tR} \leq wz(1-\tau), \quad \forall t \geq 1.$$

In this case, households allocate their after-tax income entirely to consumption and rent. Given prevailing prices, the household's optimization problem can therefore be written as:

$$V(z) = \underset{\{x,y,R\}}{Max} \left\{ V_x; V_y; V_R \right\}$$

where $V_x = V_x(z)$ is the value function that corresponds to buying a traditional home for an individual with productivity z and is given by:

$$V_x(z) = \underset{\left\{\left\{c_{tx}\right\}_{t=1}^{T}, s_x, b_x\right\}}{Max} \left\{ \sum_{t=1}^{T} \beta^{t-1} U(c_{tx}, s_x) \right\}$$

$$s.t.$$

$$c_{1x} + \frac{b_x[r_x(1+r_x)^T]}{(1+r_x)^T - 1} + p_{sx}s_x \leq wz + b_x - \tau\left(wz - d_x\right),$$

$$c_{tx} + \frac{b_x[r_x(1+r_x)^T]}{(1+r_x)^T - 1} \leq wz(1+\gamma) - \tau\left(wz - d_x\right) \quad \forall\, t \geq 2,$$

$$\frac{b_x[r_x(1+r_x)^T]}{(1+r_x)^T - 1} \leq (1-\phi_x)wz,$$

$$c_{1x} + \gamma_x p_{sx} s_x \leq wz(1-\tau) + \tau d_x.$$

Let's denote by $V_y = V_y(z)$ the value function for a household with productivity z that decides to buy a factory home. Then $V_y(z)$ is given by:

$$V_y(z) = \underset{\left\{\left\{c_{ty}\right\}_{t=1}^{T}, s_y, b_y\right\}}{Max} \left\{ \sum_{t=1}^{T} \beta^{t-1} \left[U(c_{ty}, s_y)\right] \right\}$$

$$s.t.$$

$$c_{1y} + \frac{b_y[r_y(1+r_y)^{T-\chi}]}{(1+r_y)^{T-\chi} - 1} + p_{sy}s_y \leq wz + b_y - \tau\left(wz - d_x\right),$$

$$c_{ty} + \frac{b_y[r_y(1+r_y)^{T-\chi}]}{(1+r_y)^{T-\chi} - 1} \leq wz - \tau(wz - d_x) \quad \forall\, 2 \leq t \leq \hat{T},$$

$$c_{ty} \leq wz(1-\tau) \quad \text{for } \hat{T} < t \leq T,$$

$$\frac{b_y[r_y(1+r_y)^{T-\chi}]}{(1+r_y)^{T-\chi} - 1} \leq (1-\phi_y)wz,$$

$$c_{1y} + \gamma_y p_{sy} s_y \leq wz(1-\tau) + \tau d_y.$$

$V_R = V_R(z)$ is the value function that a household obtains if it chooses to be a renter:

$$V_R(z) = \underset{\left\{\left\{c_{tR}\right\}_{t=1}^{T}, \left\{s_{tR}\right\}_{t=1}^{T}\right\}}{Max} \left\{ \sum_{t=1}^{T} \beta^{t-1}[U(c_{tR}, s_{tR})] \right\}$$

$$s.t.$$

$$c_{tR} + p_{sR}B_R s_{tR} \leq wz(1-\tau) \quad \forall t \geq 1,$$

$$p_{sR}B_R s_{Rt} \leq (1-\phi_R)wz \quad \forall t \geq 1.$$

5 Calibration

The model is calibrated in two stages, following Gourinchas and Parker (2002). In the first stage, we estimate or assign values to the parameters that can be identified independently of the model structure. In the second stage, we estimate the remaining parameters using indirect inference, conditional on the first-stage calibration. Specifically, the indirect inference procedure is implemented to match moments related to homeownership and to the share of factory-built homes among homeowners.

5.1 First Step

At this stage of the parametrization exercise, we distinguish two subsets of parameters. The first subset consists of nineteen parameters that can be directly assigned using external sources. These include the preference parameters (α, σ); the average interest rates for mortgage and chattel loans (r_x, r_y); and the average income tax rate τ,[3] the limits on payment-to-income ratios (ϕ_x, ϕ_y, ϕ_R), and the prices of housing and rental units, measured in square feet (p_{sx}, p_{sy}, p_{sR}). In addition, this subset includes the model horizon T and the maturity gap between mortgage and personal loans χ, the minimum required home size $\underline{s}$, the parameters governing down payments (γ_x, γ_y), and the parameters determining tax deductions (A_x, A_y), where we assume $d_i = A_i b_i$ for $i \in \{x, y\}$. The values of these parameters are assigned using different external sources, as described below.

We begin by setting standard values for β and σ, setting them to 0.95 and 2 respectively. We set $\alpha = 0.76$, following Karlman et al. (2021). The time to maturity for mortgages is set to $T = 30$ while for loans at the factory-built segment, we follow Banga (2022) who argues that the maturity is at 21 years. So, we set $\chi = 9$. Next, using data from OECD, we set $\tau = 0.31$, which reflects the average income tax wedge in the United

[3]For simplicity, we assume a constant average tax rate. However, the model could easily be extended to incorporate a progressive tax schedule, as observed in the data.

States.

One of the sources we use is the Manufactured Housing Survey (MHS), conducted by the U.S. Census Bureau. The survey produces monthly and annual estimates of the average sales price for newly manufactured homes and characteristics of the units, including weight, size, how the home was titled, etc. MHS coverage includes all newly manufactured homes that have received a Federal inspection (i.e., HUD-code homes). Data on housing characteristics are available annually going back to 1980, while data on shipment units are available going back to 1959. We use the annual MHS for 2021 to compute the median average sales price per square foot, focusing on those units located in the South region, as they have a higher presence and fewer restrictions for manufactured homes in that part of the country.

Housing units in the model are measured in square feet, and prices are expressed in 2021 dollars per square foot of each housing type (or per square foot of rental units). According to the MHS, the 2021 median sales price of factory-built homes was $p_{sy} = \$70$ per square foot, while the median price per square foot of traditional homes in the same region was $p_{sx} = \$122.9$ for detached units and $p_{sx} = \$150.9$ for attached units. To remain conservative in our counterfactual exercises, we adopt the lower value of $p_{sx} = \$122.9$, thereby minimizing the price gap between traditional and factory-built homes. For the rental market, the average apartment size is 978 square feet,[4] with an average monthly rent of $1,343[5]. Since the model is annual, we calibrate the rental price as $p_{sR} = 1{,}343 \times \frac{12}{978} = 16.47$ dollars per square foot per year.

Regarding interest rates, we follow Banga (2022), who reports an average rate of 9.25% for financing manufactured homes, while the average mortgage rate is taken from FRED and set at 5.09%. Borrowing and rent-limit constraints are calibrated as follows: for mortgages, we set $\phi_x = 0.72$ following Karlman et al. (2021); for factory-built homes, Banga (2022) notes that about one quarter of borrowers exhibit debt-to-income ratios above 43%, but given the coexistence of mortgages and chattel loans in this segment, and to remain conservative, we rely on information from Cascade Financial Services and assume $\phi_y = 0.5$. For renters, Census Bureau data indicate that roughly 40% of households devote at least 35% of income to rent, and an informal benchmark sets a 30% threshold; accordingly, we calibrate $\phi_R = 1 - 0.325 = 0.675$. The down-payment

[4] https://getflex.com/blog/average-apartment-size/

[5] https://www.apartmentlist.com/renter-life/cost-of-living-in-south-carolina

parameters are set to $\gamma_x = 0.035$, corresponding to the minimum requirement for FHA mortgages, and $\gamma_y = 0.05$, following Lowman (2019). Minimum size requirements are taken from the International Residential Code (IRC), which mandates a minimum dwelling area of 320 square feet and at least 120 square feet per room; we therefore set $\underline{s} = 120$. Finally, we assume a simple functional form for tax deductions, $d_i = A_i b_i$ with $A_i \geq 0$, and calibrate A_i to equal the corresponding interest rate r_i for $i \in \{x, y\}$.

The second subset of parameters within the set of sets of parameters that are calibrated without using the model are those that govern the distribution of income types. To calibrate these parameters, we assume that z is drawn randomly from a log-normal distribution and that the log of z has a mean of μ_z and a variance of σ_z^2. To calibrate these parameters, we use data from the Panel Study of Income Dynamics (PSID), a longitudinal survey representative of the U.S. population, conducted annually since 1968 and biennially since 1997. We use the waves from 1989-2018. We restrict our sample to those households in which the head is the same along the sample period. A description of what a head is can be found in Heathcote et al. (2010). We define earnings as the sum of the earnings of heads and wives. Earnings include all income coming from wages, salaries, commissions, bonuses, overtime, and the labor part of self-employment income. We measure a household's permanent income as the household's average earnings over all periods during which the household is observed. Using the Consumer Price Index for Urban Consumers (CPI-U), we convert nominal earnings into real units using 2021 as the base year.

In our model, a household's skill level z is interpreted as its permanent income. We restrict the analysis to households below the top decile of the permanent income distribution, since our focus is on households for whom housing is perfectly illiquid and serves solely as a source of housing services. In the United States, approximately 5% of the population owns more than one home. Given evidence that the South exhibits a relatively higher share of non-primary residences, we conservatively set this figure at 10%. It is also reasonable to assume positive assortative matching between permanent income and the number of properties owned. Based on these considerations, we calibrate the parameters of a log-normal income distribution using only the bottom 90% of the distribution. We deliberately avoid using a heavy-tailed specification such as the

Pareto distribution[6], since our framework abstracts from the right tail. This procedure yields parameter estimates of $\hat{\mu}_z = 1.85$ and $\hat{\sigma}_z^2 = 0.89$.

5.2 Second Step

With the first set of parameters calibrated, three parameters remain to be determined: (w, κ_y, B_R). These parameters are estimated through indirect inference, using three empirical moments as targets:

- The share of homeownership among households in the South, obtained from FRED. According to these data, 66% of households in the region are homeowners.
- The share of factory-built homes among homeowners. Schmitz (2020) estimates this figure at roughly 6% nationwide. Because manufactured homes are more prevalent in the South, we target a value of 10%, consistent with estimates ranging between 8% and 12%.
- The share of traditional homes among homeowners, which corresponds to the residual share after accounting for manufactured homes.

Taken together, these targets imply that in the South 66% of households are homeowners, of which 10% own manufactured homes and 90% own traditional homes. The remaining 34% of households are renters.

To construct these moments, we simulate the model multiple times, with each simulation consisting of 10,000 agents. We then search for the parameter vector $\theta = (w,\ \kappa_y,\ B_R)$ that minimizes the distance between the empirical moments and the moments generated by the model. Formally, the objective function is given by:

$$\hat{\theta} = \underset{\{\theta\}}{\operatorname{argmin}} \left\{ \left[\hat{m} - m(\theta)\right]' W \left[\hat{m} - m(\theta)\right] \right\},$$

where $\hat{m}$ denotes the vector of empirical moments and $m(\theta)$ denotes the corresponding model-generated moments. The weighting matrix W is set equal to the identity. Applying this procedure yields the $w = 594$, $\kappa_y = -0.0008$, and $B_R = 15$.

[6] See, for example, Guvenen et al. (2021).

5.3 Calibrated Parameter Values and Model Fit

In this section, we present the values of our calibrated parameters. Table 1 reports the parameters that are either taken directly from the data or drawn from previous studies. Table 2 provides the estimated parameters of the lognormal distribution for income, while Table 3 reports the internally calibrated parameters. Using these estimates, we then compare the model-generated moments with the empirical target moments. The results of this comparison are shown in Table 4. As the table indicates, the model matches the targeted moments with a high degree of accuracy. In particular, the calibrated model reproduces the share of homeownership in the South region of the United States, as well as the distribution of site-built and manufactured homes within homeownership. Having established the model's ability to replicate key features of the data, we now turn to policy counterfactuals that explore the implications of extending mortgage access to manufactured homes on the same terms as traditional homes.

Table 1: Parameters from Literature and Directly Observed Data

Parameter	Value	Source
α	0.76	Karlman et al. (2021)
σ	2	Literature
β	0.95	Literature
r_x	5.09%	FRED
r_y	11.9%	Banga (2022)
τ	0.31	OECD
ϕ_x	0.72	Karlman et al. (2021)
ϕ_y	0.5	Cascade Financial Services
ϕ_R	0.7	U.S. Census Bureau
p_{sx}	122.9	Manufactured Housing Survey
p_{sy}	70.0	Manufactured Housing Survey
p_{sR}	16.47	Manufactured Housing Survey
$\underline{s}$	120	IRC
χ	7	Banga (2022)
T	30	Time horizon of the model
γ_x	0.035	FHA
γ_y	0.05	Lowman (2019)

6 Extending the Mortgage Credit Market to Factory-Built Homes

In this section, we use the calibrated model to conduct counterfactual experiments in which access to mortgage financing is equalized for manufactured homes. Our main

Table 2: Estimated Parameters of the Income Distribution

Parameter	Value
μ_z	1.85
σ_z^2	0.89

Table 3: Internally Calibrated Parameters

Parameter	Value
κ_y	-0.0008
w	594
B_R	15

Table 4: Model Fit

Moment	Data	Model
Share of Factory-built home-ownership	0.1	0.1
Share of Traditional home-ownership	0.56	0.56
Share of Renters	0.34	0.34

exercise of interest is to modify the financing conditions that prevail in the factory-built housing segment, bringing them closer to those observed in the standard mortgage market. Specifically, we focus on three dimensions of financing: (i) the interest rate on loans, (ii) eligibility for tax deductions, and (iii) loan maturity. Before proceeding, it is important to assess the validity of such exercises.

The interest rate gap between the two housing segments cannot be attributed solely to regulatory differences that prevent certain loans from being classified as mortgages. Borrowers in the factory-built segment are typically lower-income and therefore riskier. As such, the interest rate spread observed in the data may reflect efficient pricing, where higher rates compensate for greater risk. Furthermore, mortgages are secured by both the house and the land. While many households (particularly in the South) own the land on which they place their manufactured homes, they may be unwilling to pledge it as collateral. This reluctance reflects the trade-off between avoiding the risk of losing land in the event of default and facing less favorable loan terms, such as shorter maturities, higher interest rates, and the absence of tax deductions.

At the same time, it is important to recognize that a significant share of credit in the factory-built segment consists of chattel loans, a direct consequence of regulations that classify manufactured homes as mobile homes and legally exclude them from mortgage status. Even if all loans in this segment were reclassified as mortgages, there is no guarantee that financing conditions would fully converge to those in the traditional segment. As noted above, interest rate differentials are partly justified by risk. Loan maturity, likewise, depends on both risk and loan size. While thirty-year mortgages are standard in the housing market, the substantially lower prices of manufactured homes provide a rationale for shorter maturities. If lending in this segment is indeed riskier, shorter terms may also reflect lenders' preference for more liquidity as compensation.

Beyond these considerations, altering the interest rate raises broader concerns from a general equilibrium perspective. Although we argue that regulatory distortions contribute to the gap between traditional and manufactured housing, both interest rates and maturities are ultimately equilibrium-determined variables. Our model is therefore not fully suited to capture the general equilibrium forces at play. For instance, if we were to model a decline in the interest rate for manufactured homes that reduces the gap relative to traditional housing, general equilibrium effects—such as an increase in demand—could offset some of the gains that appear in our partial equilibrium framework.

The treatment of loan maturity is somewhat different. While it can also be viewed as an equilibrium outcome, its flexibility to adjust in general equilibrium is less clear. Maturity can reasonably be treated as exogenous, even in richer frameworks. A limitation of our model, however, is the absence of risk—particularly income risk—which reduces the relevance of maturity in some respects. Nevertheless, since the model features payment-to-income constraints, loan maturity continues to play a meaningful role. For this reason, we include it as part of our counterfactual experiments.

Given the complexities surrounding interest rates and loan maturities, we focus our main experiments on tax deductions, which are determined entirely by policy. Importantly, granting households access to tax deductions without adjustment would create a free-lunch effect. To avoid this, we implement all counterfactuals in a revenue-neutral manner, ensuring that government revenues under the policy remain equal to those in the benchmark scenario. In addition, we conduct a set of conservative exercises in which we allow for changes in loan maturity within the factory-built housing segment, although this is not our main variable of interest.

6.1 Result I - Change in Home-Ownership Following an Increase in Tax Deductions

Recall that throughout the paper, we assumed the following simple, functional form for tax deductions:

$$d_i = A_i b_i \text{ for } i \in \{x, y\}.$$

We set $A_x = r_x$ and initially $A_y = 0$. Our main policy experiment fixes both the interest rate and the maturity of chattel loans. In other words, we assume—conservatively—that even if manufactured homes become eligible for mortgage financing and tax deductions, households continue to face the same interest rate, reflecting their intrinsically higher risk. Similarly, loan maturities remain unchanged to ensure that the experiment isolates the effect of tax deductions alone. To adopt an even more conservative stance, we begin by setting $A_y = \frac{r_y}{2}$. To prevent this policy from functioning as a free lunch, we implement the reform in a revenue-neutral manner. Specifically, the government is assumed to impose a lump-sum tax on all households in each period, ensuring that revenues under the policy reform remain equal to those in the benchmark scenario. Table 5 reports the resulting changes in the distribution of homeownership. The effects are substantial. Relative to the baseline, in which 10% of households own factory-built homes, the introduction of tax deductions increases this share to 18.63%, nearly doubling the prevalence of factory-built homeownership. This expansion arises primarily from renters transitioning into homeownership: the fraction of renters declines from 34% to 26.2%. By contrast, the share of households owning traditional homes remains largely unchanged, decreasing only slightly from 56% to 55.2%. In other words, our counterfactual suggests that a significant portion of former renters are able to transition into homeownership, while some households at the lower end of the traditional-homeowner distribution switch to manufactured homes. By doing so, they reduce housing costs and enjoy higher levels of consumption. These results align closely with the narrative that our model is designed to capture.

Again, these results are under the assumption that only half of the interest payments are subject to tax deductions. The potential increase in homeownership is larger as we increase A_y. For instance, in the extreme case in which $A_y = r_y$, the increase in factory-

Table 5: Comparing Home-Ownership Distribution

Moment	$A_y = 0$	$A_y = 4.63\%$
Share of Factory-built home-ownership	10%	18.63%
Share of Traditional home-ownership	56%	55.15%
Share of Renters	35%	26.22%

Note: The table reports baseline and counterfactual homeownership rates by housing type and the share of renters. In the counterfactual, households purchasing manufactured homes may deduct half of their interest payments; all other parameters remain at baseline values.

built homeownership would be as large as 22.58%.

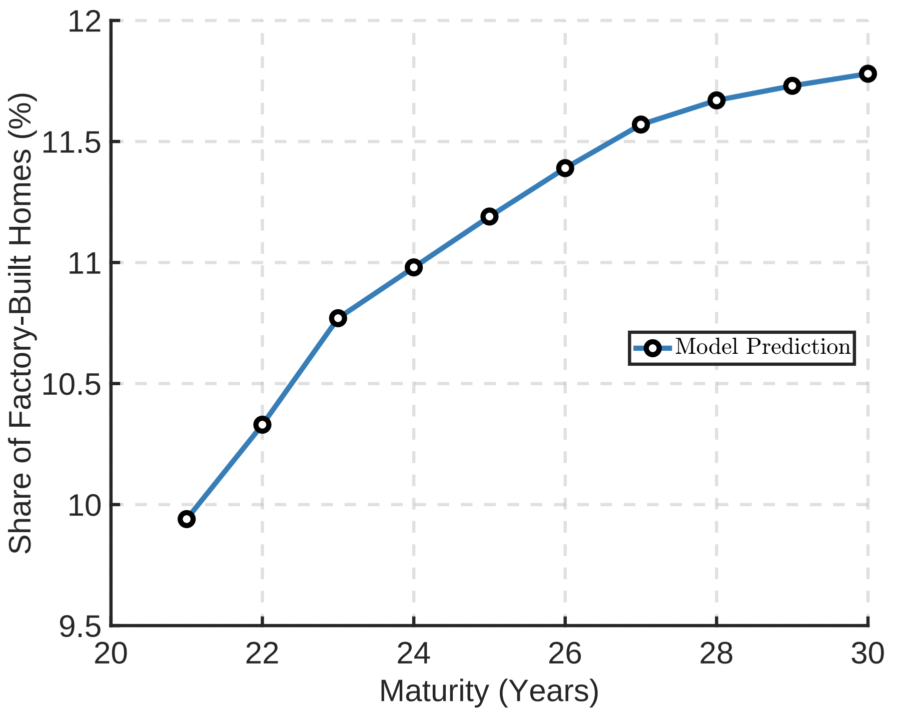
6.2 Result II - Welfare Gains Following an Increase in Tax Deductions

Returning to our main policy experiment, where we set $A_y = \frac{r_y}{2}$, we evaluate welfare gains in income-equivalent terms. Specifically, we ask by how much average income in each period of the baseline scenario would need to increase for households to be indifferent between remaining in the baseline or adopting the policy counterfactual. Equivalently, we solve the model under the baseline and identify the income transfer required to replicate the utility level attained under the counterfactual, where the effective "price" of loans is reduced through tax deduction benefits. The results indicate that such a transfer amounts to roughly 2%. In other words, the average welfare gain corresponds to a permanent (per-period) increase in real income of 2%. In present discounted value terms, using the subjective discount factor, this is equivalent to a 28% increase in lifetime income over the 30 modeled periods. In the most optimistic case—when households are permitted to deduct interest payments on manufactured home loans fully—the periodic income-equivalent welfare gain reaches 3%.

6.3 Result III - Increasing Loan Maturity in the Factory-Built Segment

We now turn to the role of loan maturity in the factory-built housing segment. In this counterfactual exercise, maturities are allowed to vary from 21 years, as in the baseline model, up to 30 years, which corresponds to the standard mortgage term. Importantly, manufactured homes remain ineligible for interest payment tax deductions, consistent with the baseline scenario. Under these assumptions, we find that in the most favorable case, where $\chi = 0$ (i.e., maturity equals 30 years), the share of factory-built homeownership increases only modestly, from 10% to 11.78%. This estimate may nonetheless be conservative, as the model does not incorporate income risk. Overall, these results indicate that extending loan maturities alone generates only a small increase in factory-built homeownership, especially when compared with our earlier counterfactual in which loans for manufactured homes were made eligible for interest payment tax deductions.

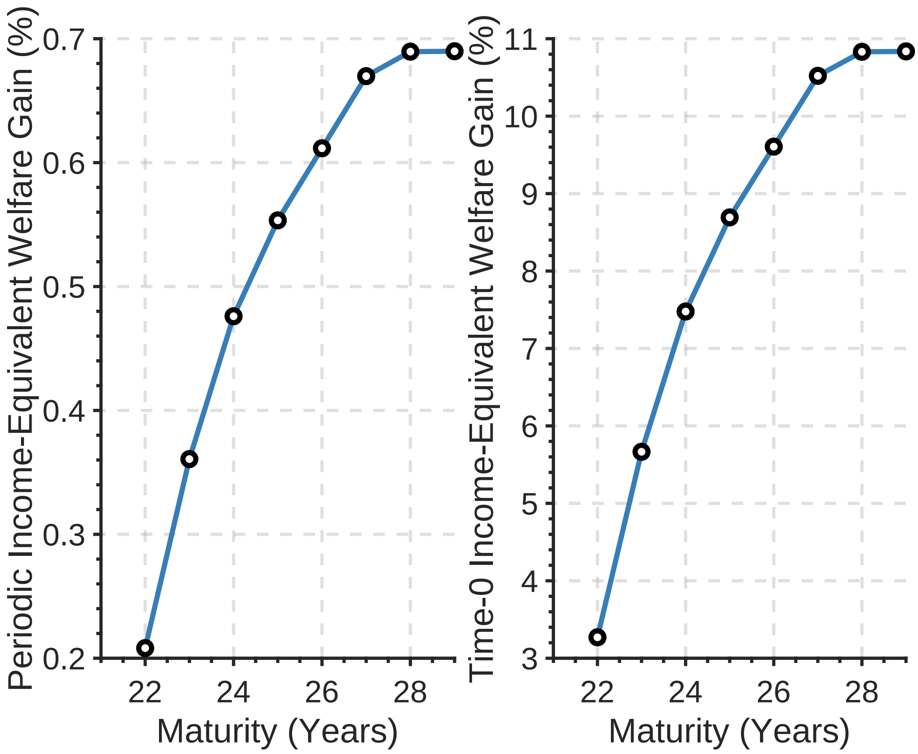
Figure 3: Share of the Factory-Built Housing Segment as a Function of Loan Maturity ($A_y = 0$)



Note: Share of factory-built homes as a function of loan maturities in the model. The counterfactual keeps interest rates and tax deduction policies at their baseline levels.

Turning to welfare gains, the results are consistent with the modest effects of extending loan maturities on factory-built homeownership. As such, the welfare improvements generated by this counterfactual are also limited. Figure 4 illustrates this point. The left panel reports welfare gains in terms of permanent income equivalents, showing that when maturities are extended, average welfare gains rise from only 0.2% (at a maturity of 22 years) to 0.7% (when maturities for manufactured homes are aligned with those in the traditional housing sector). The right panel presents the same exercise in terms of time-zero income equivalents, where welfare gains increase from roughly 3% to 11%. These magnitudes are substantially smaller than those obtained in the previous counterfactual that introduced tax deductibility of interest payments.

Figure 4: Income Equivalent Welfare Gain as a Function of Loan Maturity ($A_y = 0$)



Note: The left panel reports income-equivalent gains from extending loan maturities for manufactured homes, holding tax deduction eligibility and interest rates at baseline levels. The right panel presents the same measure expressed in present value at time 0, as a fraction of periodic income.

7 Conclusions

In this paper, we study the welfare implications of narrowing the gap in financing conditions between manufactured and site-built housing. Building on earlier insights, we argue that the disparate borrowing conditions across these segments are partly the result of regulations and policies enacted decades ago, which remain in place today. To analyze this issue, we develop a tractable life-cycle model with heterogeneous agents that incorporates housing choices. We calibrate the model to match the observed homeownership rate and the distribution of homeownership by housing type in the U.S. South, and show that the model replicates these key moments well.

Using the calibrated model, we evaluate a simple policy experiment that extends tax deduction benefits to manufactured homes. We find a remarkably large effect: the share of factory-built homes in the housing stock nearly doubles. This expansion is driven primarily by low-income households who transition from renting to homeownership, and to a lesser extent by households at the upper end of this group who switch from traditional to manufactured homes. The redistribution in homeownership is accompanied by substantial welfare gains, equivalent on average to a 2% permanent increase in real income (or a 28% increase in present discounted value terms). By contrast, when the counterfactual focuses only on extending loan maturities—while maintaining the absence of tax deductibility—the gains are far more modest. Equalizing maturities across loan types raises welfare by just 0.7% in terms of a permanent income-equivalent increase. These results underscore that access to tax deductions, rather than loan maturity, is the more powerful lever for expanding homeownership and improving welfare in the manufactured housing segment. Nevertheless, it should be noted that our framework abstracts from income risk and other features that may amplify the welfare impact of loan maturity.

We also acknowledge that a more rigorous analysis of financial equalization would require additional model features. In particular, one could extend the framework to allow for stochastic income processes, endogenous reversibility in the homeownership decision, and the treatment of housing as both a consumption good and an asset. Moreover, embedding the model in a general equilibrium setting with production and fiscal policy would permit a richer set of counterfactuals, such as changes in equilibrium interest rates. While our model is necessarily stylized, it introduces a novel and policy-relevant trade-off in housing decisions: manufactured homes are more affordable but face less favorable financing conditions.

We believe that the efficiency and welfare consequences of regulatory distortions affecting manufactured housing have not received sufficient attention in the literature. This paper aims to take a first step in that direction by providing a quantitative framework to evaluate potential policy reforms. Our results highlight the importance of financing conditions in shaping housing choices and suggest that policies targeting tax deductibility could play a central role in improving access to homeownership for low-income households.

During the preparation of this work the authors used ChatGPT (OpenAI) to assist with editing for clarity, grammar, and style. The authors carefully reviewed and revised all suggestions, and take(s) full responsibility for the content of the publication.

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