The Rent-Price Ratio and the Rate of Homeownership

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Abstract

This paper examines the long-standing empirical puzzle regarding the weak correlation between US housing rent-price ratios and standard macroeconomic determinants. Motivated by a correlation between the rent-price ratio and the homeownership rate, I assume that housing units provide different flows of housing services depending on whether they are rented or owner-occupied, and that this "rental discount" varies across the housing stock. The equilibrium wedge between implicit owner rents and tenant rents equals the rental discount on the marginal rental property, which depends on the homeownership rate. Utilizing empirical estimates of the elasticity of real tenant rents with respect to the homeownership rate, I demonstrate that this tenure-choice mechanism quantitatively accounts for approximately one-half of the variance in the US rent-price ratio over the 1984–2024 period.

JEL Classification: R31, R21, G12

Keywords: Rental discount factor, rent-price ratio, housing expenditure, tenant rent, implicit owner rent, house price.

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1. Introduction

A central line of inquiry in housing economics concerns the macroeconomic determinants of house price movements, typically analyzed through the lens of the rent-price ratio.[2] Under standard asset-pricing assumptions, this ratio combines observable data on tenant rents and owner-occupied house prices to proxy the unobservable earnings yield on residential real estate. A persistent empirical puzzle, however, is that standard fundamental determinants account for remarkably little variation in this ratio.

In a seminal contribution, Campbell et al. (2009) decompose the US rent-price ratio across various spatial aggregates and demonstrate that its dynamics are overwhelmingly driven by a latent residual component rather than variations in expected real rental growth or real interest rates. Consequently, existing literature frequently attributes these swings to time-varying risk premia or behavioral inefficiencies, leaving the underlying economic mechanism unresolved.

This paper proposes a structural explanation for this residual variance by establishing an empirical and theoretical link between the rent-price ratio and the aggregate homeownership rate. Between 1984 and 2024, the US rent-price ratio exhibited a robust negative correlation of -0.77 with the homeownership rate. When the share of owner-occupying households expands, real tenant rents decline relative to aggregate house prices. To rationalize this co-movement, I develop an equilibrium model of tenure choice where the implicit service flow of housing space is non-neutral with respect to its ownership status.

Building on the specialized housing frameworks of Ortalo-Magné and Rady (1999, 2006) and Kiyotaki, Michaelides, and Nikolov (2011), I assume that a given housing unit yields a lower flow of consumption services when tenant-occupied than when owner-occupied. The core theoretical innovation of this paper is to endogenize this "rental discount" by allowing it to vary heterogeneously across the aggregate housing stock. In equilibrium, risk-neutral landlords sort properties into the rental market based on the efficiency of service transmission, beginning with units that carry the lowest discount. The resulting valuation wedge between implicit owner-occupied rents and explicit tenant rents is uniquely pinned down by the rental discount of the *marginal* rental property.

When macroeconomic shifts alter the aggregate homeownership rate, the identity of the marginal property shifts endogenously along the distribution of the housing stock. This structural feature

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[2] See McCarthy and Peach (2004), Case and Shiller (2004), Himmelberg, Mayer and Sinai (2005), Glaeser and Gyourko (2006), Brunnermeier and Julliard (2008), Campbell, Davis, Gallin and Martin (2009) among others. The popular press and internet blogs have also highlighted movements in these ratios.

implies that an increase in owner-occupancy demand simultaneously drives up the price of units optimized for ownership while putting downward pressure on explicit tenant rents.

Crucially, if a contraction in the marginal rental discount occurs during a period of rising aggregate housing expenditure, the opposing forces on explicit tenant rents may offset, leaving observed rents smooth. Conversely, both forces operate in the same direction for implicit owner rents, generating substantial volatility in house prices. This mechanism provides a structural match for the macroeconomic patterns observed during the boom-and-bust cycle of the 2000s, where plummeting rent-price ratios coincided with expanding aggregate expenditures.

To evaluate the quantitative importance of this mechanism, I map the model's equilibrium conditions to US data spanning 1984 to 2024. By estimating the elasticity of real tenant rents with respect to the homeownership rate—while controlling for aggregate expenditure—I identify the structural parameters governing the marginal rental discount distribution. Counterfactual simulations reveal that variations in the marginal rental discount can account for approximately one-half of the total volatility in the US rent-price ratio over the sample period. This finding indicates that interpreting fluctuations in the rent-price ratio solely as movements in the financial earnings yield or risk premia is fundamentally incomplete and potentially misrepresents the true structural behavior of housing markets.

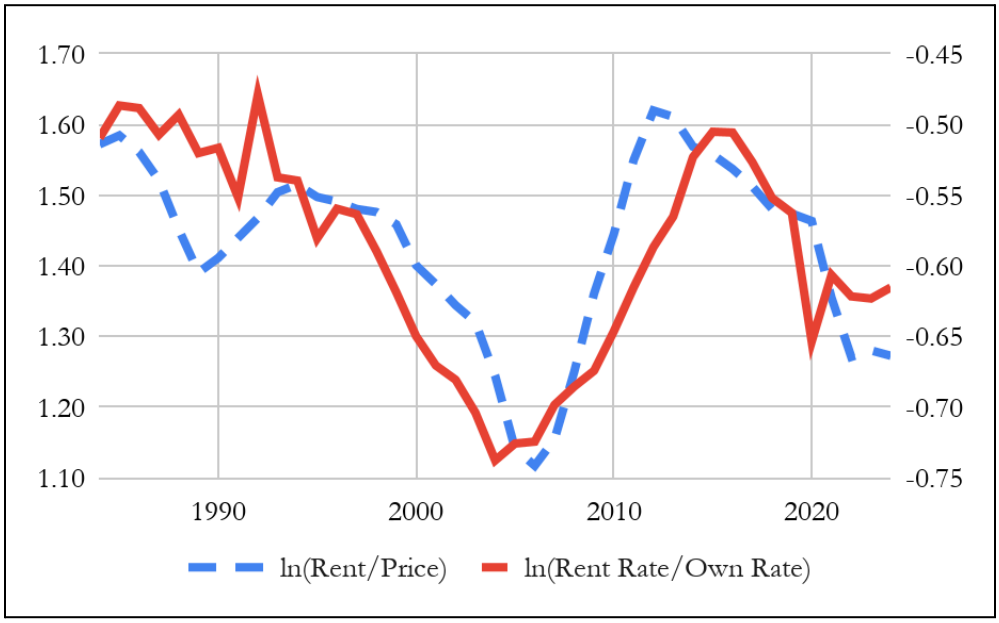
This paper contributes directly to a small but vital literature that differentiates the underlying dynamics of tenant rents from implicit owner rents. Most closely related is Pavlov and Wachter (2011), who examine a segmented housing market where variations in the relative demand for ownership are amplified by endogenous credit constraints. My analysis complements theirs by introducing a frictionless user-cost framework where housing units are perfectly substitutable across tenures, but subject to physical and geographic heterogeneity in rental efficiency.

The remainder of the paper is organized as follows. Section 2 documents the empirical co-movements between rent-price ratios and homeownership metrics. Section 3 delineates the structural rental discount model and establishes the core market-clearing conditions. Section 4 presents the quantitative estimation and counterfactual analysis. Section 5 evaluates the broader policy implications, and Section 6 concludes.

2. Rent-Price Ratios and the Rate of Homeownership

The ratio of tenant rents to house prices in the United States exhibited substantial low-frequency fluctuations between 1984 and 2024. This variation was primarily driven by large swings in the house price index, juxtaposed against a relatively stable and smooth growth path for tenant rents. To document these patterns, Figure 1 plots the log ratio of tenant rents, measured by the Bureau of Labor Statistics (BLS), to the Case-Shiller National Home Price Index. The aggregate rent-price ratio experienced broad swings of up to 0.5 log points over the sample period, with the most pronounced volatility concentrated around the housing boom and subsequent bust of the Great Recession.

Figure 1: Rent-Price Ratio vs. Rental Rate/Homeownership Rate, Annual 1984-2024



Source: US Census Bureau, BLS, Case-Shiller National Home Price Index

A standard approach in the asset-pricing literature interprets the rent-price ratio as a proxy for the unobservable earnings yield on residential real estate. However, as emphasized by Campbell et al. (2009) and Kishor and Morley (2015), mapping this ratio directly to standard financial fundamentals fails to provide a robust empirical account of these secular fluctuations. For example, the contemporaneous correlation between the log rent-price ratio and the 10-year real interest rate—obtained from the Federal Reserve Bank of Cleveland—is only 0.185 at an annual frequency over the 1984–2024 period. Furthermore, a baseline OLS regression of the log rent-price ratio on the log real interest rate yields a statistically insignificant coefficient and an R^2 of merely 0.034.

In stark contrast, the rent-price ratio co-moves tightly with aggregate measures of tenure status. Over the 1984–2024 sample, the correlation between the log rent-price ratio and the aggregate homeownership rate is -0.768 when applying the US Census Bureau's definition of consumer units. To ensure robust empirical grounding, I consider alternative definitions of tenure shares. The correlation remains robustly negative at -0.604 when utilizing the homeowner share of total observed housing expenditures, and at -0.739 when using the standard Census definition of household homeownership.

To visually characterize this relationship, Figure 1 benchmarks the log rent-price ratio against the log rental odds ratio, defined as one minus the homeownership rate divided by the homeownership rate among Census consumer units. The two series co-move closely across major macroeconomic episodes, capturing both the dramatic compression of the rent-price ratio during the 2000s housing boom and its recovery during the bust, as well as the more recent secular decline in the ratio. This empirical co-movement is not specific to the recent four decades; Appendix Figure A.1 confirms a structurally stable relationship over a century-long horizon spanning 1910 to 2025 using historical household homeownership rates.

Table 1: Regression of Rent-Price Ratios on Renter/Ownership Shares, Annual 1984-2024

Specification	Renter/Ownership Share (Consumer Units)	Renter/Ownership Expenditure Share	Renter/Ownership Share (Households)
Elasticity	1.350**(0.191)	0.800**(0.124)	1.235**(0.190)
Time trend	0.001(0.001)	-0.005**(0.001)	-0.001(0.001)
R-squared	0.593	0.550	0.552

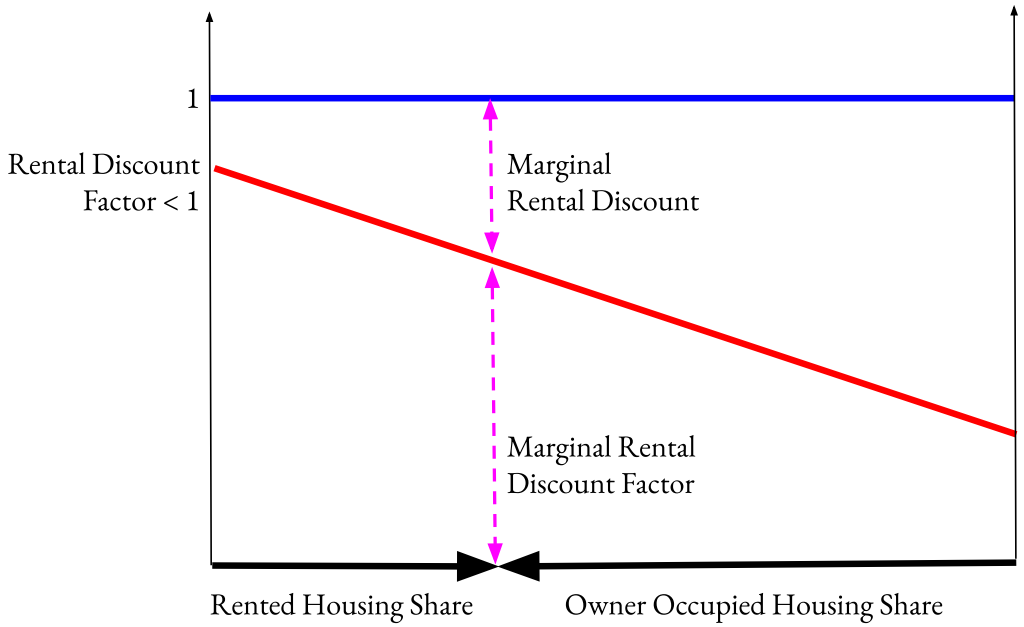
Source: US Census Bureau, BLS, Case-Shiller National Home Price Index

To formalize these descriptive patterns, I estimate a series of baseline bivariate regressions of the log rent-price ratio on alternative measures of the log rental odds ratio, controlling for a deterministic time trend. Table 1 reports the baseline OLS estimates. Across all three institutional definitions of tenure shares, the elasticity of the rent-price ratio with respect to the renter-to-owner odds share is positive, economically large, and highly statistically significant.

The estimation in column 1 reveals a highly significant elasticity of 1.350 and explains nearly 60 percent of the total variation in the rent-price ratio (R^2 = 0.593). Columns 2 and 3 show that this strong statistical relationship is invariant to whether tenure status is evaluated through observed expenditure shares (yielding an elasticity of 0.800) or household-level counts (yielding an elasticity of 1.235).

To reconcile these strong empirical regularities, this paper introduces a structural mechanism that endogenizes the link between aggregate tenure choice and market prices. Existing frameworks in housing macroeconomics—most notably Ortalo-Magné and Rady (1999, 2006) and Kiyotaki, Michaelides, and Nikolov (2011)—frequently feature a physical or institutional transaction friction known as a "rental discount". Under this discount, a given unit of residential space generates a lower flow of consumption services when occupied by a tenant than when occupied by an owner. In a stylized segment where units are otherwise identical and perfectly substitutable across tenures, spatial arbitrage implies that the explicit rent charged to a tenant must exceed the implicit, unobserved rental value enjoyed by an owner-occupier for an equivalent unit of physical housing space.

Figure 2: The Marginal Rental Discount and The Homeownership Rate



The principal theoretical departure of this paper is to allow this rental discount to vary heterogeneously across the aggregate housing stock, reflecting real-world differences in geographic configurations (e.g., urban cores versus suburban peripheries) and physical architecture (e.g., multi-family complexes versus single-family detached structures). Profit-maximizing landlords sort properties into the rental sector sequentially, operating along the distribution from the lowest discount to the highest, as shown in

Figure 2. We can define a rental discount factor as one minus the rental discount. Then properties will be rented out in order of highest to lowest rental discount factor, as shown in the Figure.

The equilibrium valuation wedge between market tenant rents and implicit owner rents is uniquely pinned down by the asset characteristics of the *marginal* rental property. When structural or macroeconomic shocks expand the aggregate homeownership rate, the identity of this marginal property shifts endogenously along the distribution of the housing stock. This contraction in the rental share raises the marginal rental discount factor, narrowing the gap between tenant rents and implicit owner-occupying values.

Assuming that market house prices reflect the present value of implicit owner-occupied service flows, any equilibrium expansion in homeownership simultaneously applies upward valuation pressure on house prices while dampening explicit tenant rents. This structural sorting mechanism provides a micro-founded rationalization for the strong negative correlation between the rent-price ratio and the homeownership rate documented in Table 1.

The structural model developed in Section 3 derives the formal market-clearing conditions that map the distribution of these rental discounts directly to observable data. In the quantitative analysis in Section 4, I exploit this structure to estimate the elasticity of real tenant rents with respect to the homeownership rate while explicitly controlling for aggregate housing expenditures. This structural estimation yields an elasticity that is roughly half the magnitude of the reduced-form coefficients reported in Table 1, implying that variations in the marginal rental discount can account for approximately 50 percent of the historical volatility in the US rent-price ratio.

3. Model of Rental Discount

Consider an economy with two groups of infinitely lived dynasties consisting of an exogenously evolving population of households. A unit mass of identical renter dynasties are populated by n_t renter households, and a unit mass of identical homeowner dynasties are populated by m_t owner households. n_t, m_t evolve exogenously over time. Each dynasty has preferences defined on housing services h_t, and numeraire non-housing goods c_t, such that given the discount factor β, dynastic preferences are given by:

$$u^{renter} = \sum_{t=0}^{\infty} \beta^t E_0[n_t(lnc_t + \alpha_t lnh_t)] \ , \tag{1}$$

$$u^{owner} = \sum_{t=0}^{\infty} \beta^t E_0[m_t(lnc_t + \alpha_t lnh_t)] \ .$$

Preferences between housing and non-housing consumption are Cobb-Douglas following Davis and Ortalo-Magne (2011). α_t captures an exogenous, potentially time varying, housing preference parameter.[3]

Every household faces the exogenous interest rate series $\{r_t\}$, earns exogenous income $\left\{y_t^{renter}, y_t^{owner}\right\}$ in period t, and may have inherited some debt $\left\{D_{-1}^{renter}, D_{-1}^{owner}\right\}$ from the previous period. The housing stock H_t, is assumed to grow exogenously. New additions to the housing stock are owned by firms whose shareholders are exclusively drawn from the homeowner dynasties.[4]

[3] Davis and Ortalo-Magne (2011) show that housing expenditure among renter households is stable in a cross section of geographic locations. The aggregate renter household expenditure share on rent payments has increased at a stable rate over time. These observations motivate the preferences adopted.

[4] This paper does not explore the interesting margin of the endogenous evolution of the housing stock and treats the changes to the housing stock as exogenous. The growth of the housing stock (proxied using the Census aggregate housing inventory) follows a linear trend very closely. Davis and Heathcote (2005) provide an analysis of an aggregate model with endogenous housing supply.

The housing market is segmented such that only owner households can own housing properties, which they can occupy themselves or rent out to renter households.[5] Since the housing market is segmented in this way, the price of housing services will in general differ between renter households and owner households. Let d_t denote the rental rate for renter households, or "tenant rent", and b_t denote the implicit rental rate for owner-occupying households, or "implicit owner rent".

In every period t, each housing space in the housing stock H_t is indexed by $z \in [0, 1]$. A unit of house space delivers one unit of housing services if it is owner occupied, but $\delta(z) \in (0, 1]$, where $\delta'(z) < 0$, units of housing services if it is renter occupied. $\delta(z)$ has the interpretation of a "rental discount factor" which varies in the stock of housing space, the distribution of which is assumed to be time-invariant. Housing spaces differ by the degree to which they can substitute for owner versus rental occupancy, i.e., the rental discount factor. This heterogeneity can be the result of various housing characteristics such as geographic location (downtown versus suburb) and physical make-up (single versus multi-unit dwelling).[6]

Housing spaces are rented out in order of $\delta(z)$, from high to low, such that the index z of the marginal rental property in period t, z_t^*, coincides with the measure of the share of the housing space stock H_t rented out before renting housing unit z_t^*. This leaves a share $\left(1 - z_t^*\right)$ of the housing stock to be assigned for owner-occupancy use. The supply of housing services available to renter households is

[5] For parsimony, I abstract away from the interesting dimension of households transitioning between renter and owner status over their lifecycle since it would complicate the analysis unnecessarily given the objectives of the paper. Chambers, Garriga and Schlagenhauf (2009) argue that virtually all the changes to the household rate of homeownership are explained by exogenous factors of new mortgage products and demographic factors. This further motivates a modelling of the homeownership rate as exogenous. Ortalo-Magne and Rady (1999,2006) and Kiyotaki, Michaelides and Nikolov (2011) among others consider theoretical models where the home ownership rate is endogenized.

[6] This can be justified in several ways. For instance, vacancy rates are higher among renter occupied properties and rental apartments located downtown may have lower vacancy rates than rental suburban detached homes. Alternatively, problems of moral hazard may imply that physical depreciation occurs at a faster rate in renter occupied properties than owner occupied properties, and this may be more of an issue in suburban detached homes than urban apartment complexes. The option to control the housing environment (decorating, sub-letting, keeping pets) is typically more restricted in renter occupied properties, and this may be more relevant in larger versus smaller properties. The stability of a fixed mortgage payment compared to fluctuating rents may be more valued in housing spaces with longer expected tenure such as detached family houses rather than apartments geared towards singles. Finally, in the US, limits on the tax benefits of property ownership can imply lower marginal benefits when a finite number of households own a larger multiple of housing units.

then given by $H_t \int_0^{z_t^*} \delta(x)dx$. Meanwhile, the supply of housing services available to owner-occupier households is $H_t\left(1 - z_t^*\right)$. This implies that the housing resource constraint of the economy is:

$$n_t h_t^{renter} + m_t h_t^{owner} = H_t\left[\int_0^{z_t^*} \delta(x)dx + \left(1 - z_t^*\right)\right]. \tag{2}$$

Bringing these elements together, renter dynasties maximize (1) subject to their wealth constraint given by:

$$\sum_{t=0}^{\infty} E_0\left[n_t \frac{d_t h_t^{renter} + c_t^{renter}}{\left(1+r_t\right)^t}\right] + n_0 D_{-1}^{renter} = \sum_{t=0}^{\infty} E_0\left[n_t \frac{y_t^{renter}}{\left(1+r_t\right)^t}\right]. \tag{3}$$

The left-hand side consists of the expected discounted value of the current and future stream of housing and non-housing expenditures plus the inherited initial period debt. The right-hand side consists of the expected discounted value of the current and future stream of income. Owner dynasties maximize (1) subject to their wealth constraint given by:

$$\sum_{t=0}^{\infty} E_0\left[m_t \frac{d_t h_t^{owner} + c_t^{owner}}{\left(1+r_t\right)^t}\right] + m_0 D_{-1}^{owner} = \sum_{t=0}^{\infty} E_0\left[m_t \frac{y_t^{owner}}{\left(1+r_t\right)^t}\right] + \sum_{t=0}^{\infty} E_0\left[\frac{H_t}{\left(1+r_t\right)^t}\left[d_t \int_0^{z_t^*} \delta(x)dx + b_t\left(1 - z_t^*\right)\right]\right], \tag{4}$$

and the owner occupancy constraint given by:

$$m_t h_t^{owner} = H_t\left(1 - z_t^*\right) \text{ for all } t. \tag{5}$$

The left-hand side of (4) consists of the expected discounted value of the current and future stream of implicit housing expenditures and explicit non-housing expenditures plus the inherited initial period debt. The right-hand side consists of the expected discounted value of the current and future streams of non-housing income, plus income from rental properties, plus the implicit income from the implicit rent on the household's owner-occupied housing portfolio that is not rented out. Constraint (5) simply states that the owner dynasties derive housing services from the stock of housing space which is not rented out.

An equilibrium is a set of prices $\{b_t, d_t\}$ and allocations $\left\{c_t^{owner}, c_t^{renter}, h_t^{owner}, h_t^{renter}, z_t^*\right\}$, such that the renter dynasties maximize (1) subject to prices and (3), and the owner dynasties maximize (1) subject to prices, (4) and (5), and the housing resource constraint (2) is satisfied.

3.1 Rent-Arbitrage Conditions

Let $q_t(z)$ denote the period t price (evaluated at period t) of housing space z when it is bought-to-let, and let $p_t(z)$ denote its price when it is owner-occupied. In the rental market, the supply of housing services is provided by owner dynasties who own-to-let. For rental housing, the price of a property z must equal the tenant rent $d_t\delta(z)$ plus the future resale value discounted using the discount rate on other assets (i.e. the interest rate r_t):

$$q_t(z) = \frac{1}{1+r_t}\left[d_t\delta(z) + E_t max\left\{q_{t+1}(z), p_{t+1}(z)\right\}\right]. \tag{6}$$

The expected future resale value $E_t max\left\{q_{t+1}(z), p_{t+1}(z)\right\}$ is the higher of the future asset price under rental versus owner occupancy. For owner-occupied housing:

$$p_t(z) = \frac{1}{1+r_t}\left[b_t + E_t max\left\{q_{t+1}(z), p_{t+1}(z)\right\}\right]. \tag{7}$$

The price of housing space z is $max\left\{q_t(z), p_t(z)\right\}$. If $q_t(z) > p_t(z)$ the property is renter-occupied, and if $q_t(z) \leq p_t(z)$, the property is owner-occupied. Since the difference $q_t(z) - p_t(z)$ is falling in z, there exists a marginal rental property z_t^*, such that housing spaces $z > z_t^*$ t are owner occupied, and housing spaces $z \leq z_t^*$ are rented out in period t.

For this marginal rental property, buyers are indifferent between renting out the property or using it for owner occupancy, so $q_t(z) = p_t(z)$. This implies the implicit rent b_t is equal to the tenant rent d_t times the rental discount factor of the marginal rental property $\delta\left(z_t^*\right)$ such that:

$$b_t = d_t\delta\left(z_t^*\right). \tag{8}$$

Meanwhile, the identity of the marginal rental property is pinned down by the rental share of the housing stock in period t, z_t^*.

Lemma 1: *The margin by which tenant rents translate into implicit owner rents is equal to the marginal rental discount factor* $\delta\left(z_t^*\right)$.

Consider a housing space z such that $E_t max\left\{d_j \delta(z), b_j\right\} = E_t b_j$ for all $j \geq t$. Thus, this housing space is never expected to be renter occupied. This implies that $E_t max\left\{q_j(z), p_j(z)\right\} = E_t p_j(z)$ for all $j \geq t$. In this case $p_t(z) = p_t$ independent of z, and rearranging the price equation results in a familiar equation for the earnings yield:

$$\frac{b_t}{p_t} = \left(r_t - g_t\right) \tag{9}$$

where $g_t \equiv \left(\frac{E_t p_{t+1}}{p_t} - 1\right)$ is the expected rate of price appreciation between period t and period $t + 1$. p_t is the price of housing spaces which are expected to remain owner occupied forever. This price is referred to as the "price of owner-occupied" housing. In the case where the earnings yield $\left(r_t - g_t\right)$ is constant, the implicit owner rent b_t will serve as an index of the house price.

Combining with (9), the tenant rent to owner-occupied house price ratio or "rent-price ratio" is:

$$\frac{d_t}{p_t} = \frac{1}{\delta\left(z_t^*\right)}\left(r_t - g_t\right).$$

Thus, the rent-price ratio can vary independently from the earnings yield of owner-occupied housing through the variation of the marginal rental discount factor $\delta\left(z_t^*\right)$.

3.2 Market Clearing Conditions

To facilitate the description of equilibrium outcomes, I proceed by defining the share of aggregate housing expenditure by renter households as:

$$\theta_t \equiv \frac{n_t d_t h_t^{renter}}{n_t d_t h_t^{renter} + m_t b_t h_t^{owner}}, \tag{10}$$

and the aggregate housing expenditure in the economy as:

$$X_t \equiv n_t d_t h_t^{renter} + m_t b_t h_t^{owner}. \tag{11}$$

Then, the owner occupancy condition (5) is given by:

(12) $$\left(1-\theta_t\right)X_t = b_t H_t\left(1-z_t^*\right).$$

Combining (2) and (5), the rental market clearing condition is given by:

(13) $$\theta_t X_t = d_t H_t \int_0^{z_t^*} \delta(x)dx.$$

Combining these two market clearing conditions (12) and (13) with the equilibrium relationship for the implicit rent in (8) allows the rental share of housing z_t^* to be expressed as:

(14) $$\frac{\theta_t}{1-\theta_t} = \frac{\int_0^{z_t^*}\delta(x)dx}{\left(1-z_t^*\right)\delta\left(z_t^*\right)}.$$

Lemma 2: *The marginal rental discount factor* $\delta\left(z_t^*\right)$ *is falling in the relative expenditure share of renters to owners,* $\frac{\theta_t}{1-\theta_t}$. Proof in the Appendix.

From equation (9), this implies the following Proposition.

Proposition 1: *The rent-price ratio* $\frac{d_t}{p_t}$ *is rising in the relative expenditure share of renters to owners,* $\frac{\theta_t}{1-\theta_t}$.

I proceed by showing how the share of housing expenditure by renters is related to the level of tenant and implicit owner rents. After rearranging (14), we can express:

(15) $$\theta_t = \frac{\int_0^{z_t^*}\delta(x)dx}{\left(1-z_t^*\right)\delta\left(z_t^*\right)+\int_0^{z_t^*}\delta(x)dx}.$$

Note here that given θ_t is the housing expenditure share by renters, this does not mean that a renter household occupies fraction θ_t of the available housing space. That fraction z_t^* is determined by this equilibrium condition, which is based on the distribution of the rental discount factor $\delta(x)$.

Since $\delta'(z) < 0$, we know that $\int_0^{z_t^*} \delta(x)dx > z_t^* \delta\left(z_t^*\right)$. From this, we can infer that the renter expenditure share exceeds the share of the stock of housing space which is rented out, $\theta_t > z_t^*$.

Combining (13) and (15), the tenant rent can be expressed as:

$$d_t = \frac{1}{\left(1-z_t^*\right)\delta\left(z_t^*\right)+\int_0^{z_t^*}\delta(x)dx}\frac{X_t}{H_t}. \tag{16}$$

The second equation shows the tenant rent is only affected by the distribution of housing expenditure between renter and owner households (i.e., θ_t) through the determination of the marginal rental property z_t^*. Combining with (8), we can make a similar observation for the implicit owner rent as:

$$b_t = \frac{\delta\left(z_t^*\right)}{\left(1-z_t^*\right)\delta\left(z_t^*\right)+\int_0^{z_t^*}\delta(x)dx}\frac{X_t}{H_t}. \tag{17}$$

From these equations, we can derive the following Proposition, which will play a key role in the quantitative analysis.

Proposition 2: *The elasticity of tenant rents with respect to the marginal rental discount factor is*

$$\frac{dlnd_t}{dln\delta\left(z_t^*\right)} = -\left(1-\theta_t\right) < 0. \tag{18}$$

The elasticity of implicit owner rents with respect to the marginal rental discount factor is

$$\frac{dlnb_t}{dln\delta\left(z_t^*\right)} = \theta_t > 0. \tag{19}$$

Proof in the Appendix.

Given that the homeowner share of aggregate housing expenditure is larger than the renter share of aggregate household expenditure, the elasticity of the tenant rent is larger than the elasticity of the implicit owner rent in absolute terms. Proposition 2 and Lemma 2 imply the following Proposition.

Proposition 3: *Tenant rents are rising in the relative expenditure of renters* $\frac{\theta_t}{1-\theta_t}$. *Owner-occupied house prices are falling in the relative expenditure of renters* $\frac{\theta_t}{1-\theta_t}$.

A message of the paper is that the distribution of housing expenditure, through $\frac{\theta_t}{1-\theta_t}$, matters in determining the level of house prices and tenant rents. In particular, using the idea of the marginal rental discount factor, Proposition 3 has the intuitive implication that an increase in demand for owning versus renting housing will tend to raise the price of units best suited for owner occupancy, and reduce the rent on units best suited for renter occupancy.

Appendix Figures A.2 and A.3 show that the rental odds ratio, correlated with $\frac{\theta_t}{1-\theta_t}$, does indeed co-move positively with the real tenant rent and negatively with the real house price, looking at long-run data from 1910-2025. In our sample period 1984-2024, the positive correlation between the rental odds ratio and real tenant rent is evident only after controlling for housing expenditure following (16), as will be shown below (see also Figure 3).

Note that in the absence of a variable rental discount factor in the housing stock, we would have $\delta(z) = \delta$ constant, as is typically assumed in the existing literature. Then, from (16), $\theta_t = z_t^*$ since $\int_0^{z_t^*} \delta dx = z_t^* \delta$. Then, from (16) and (17), the tenant rent and implicit owner rent are given by:

(20) $$d_t = \frac{1}{\delta}\frac{X_t}{H_t} \text{ and } b_t = \frac{X_t}{H_t},$$

which are both varying only in $\frac{X_t}{H_t}$, the aggregate housing expenditure relative to aggregate housing stock. Comparing with (16) and (17), the variable rental discount factor explains not only why their ratio $\frac{d_t}{b_t}$ can vary over time, but why their levels can vary independently of $\frac{X_t}{H_t}$.

4. Quantitative Analysis

To evaluate the empirical validity and quantitative importance of the structural sorting mechanism, I map the model's equilibrium conditions directly to annual US housing data spanning the 1984–2024 period.

4.1 Econometric Framework

From the pricing condition derived in Section 3 and applying the properties of Lemma 2, the log of real tenant rents can be approximated linearly as:

(21) $$lnd_t \simeq \Phi - \left(1 - \theta_t\right) ln\delta\left(z_t^*\right) + ln\frac{X_t}{H_t},$$

where Φ represents a structural constant, and d_t denotes the real tenant rent index, constructed empirically by normalizing the nominal Bureau of Labor Statistics (BLS) tenant rent index by the Consumer Price Index for All Urban Consumers (CPI-U) less shelter.

To parameterize the latent joint dynamics of the marginal rental discount and aggregate housing expenditures, I specify the following structural equations to match the data:

(22) $$ln\frac{X_t}{H_t} = \lambda lnx_t,$$

$$- \left(1 - \theta_t\right) ln\delta\left(z_t^*\right) = \mu ln\frac{\theta_t}{1-\theta_t},$$

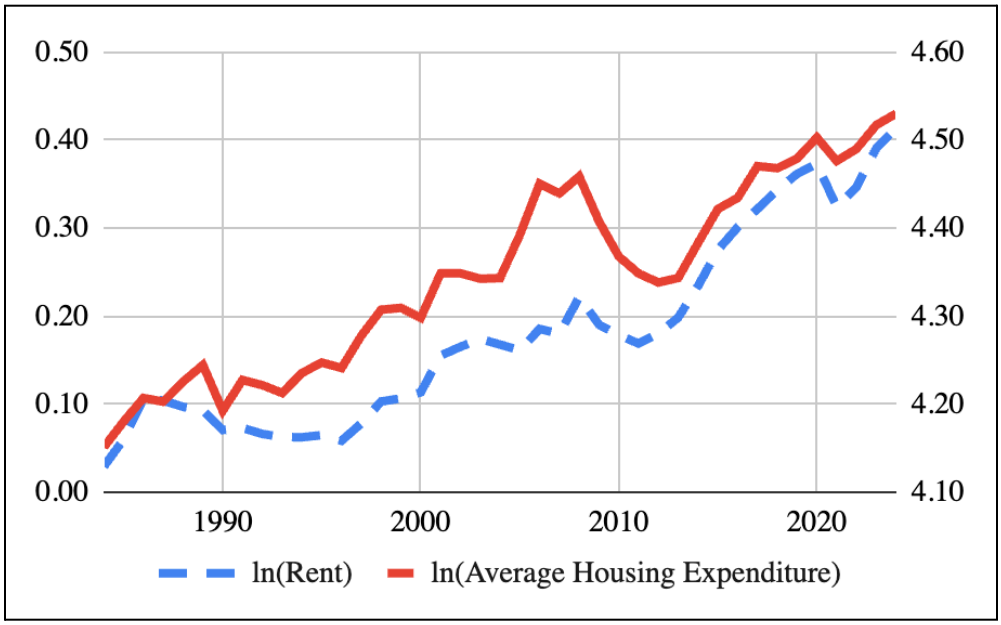
where x_t represents the average real aggregate housing expenditure across Census consumer units. The variable θ_t tracks the time-varying rental discount of the marginal property, which is unobservable but can be bounded through empirical proxies. Following the institutional definitions established in Section 2, I construct three alternative empirical measures for θ_t: (i) one minus the homeownership rate among Census consumer units, (ii) the share of observed housing expenditures originating from renter consumption units, and (iii) the aggregate renter share of households.

Substituting equations (22) into the structural baseline from equation (21) yields the principal estimating equation:

(23) $$lnd_t = \Phi + \mu ln\frac{\theta_t}{1-\theta_t} + \lambda lnx_t + \epsilon_t,$$

where ϵ_t is a stochastic error term capturing transitory observation noise and high-frequency structural shocks to the housing supply. The parameter of interest is μ, which identifies the elasticity of real tenant rents with respect to changes in the rental odds ratio. Under the hypothesis, an expansion in homeownership shifts the marginal rental discount factor higher, implying a structural restriction that $\mu > 0$.

Figure 3: Tenant Rent vs. Average Aggregate Housing Expenditure, Annual 1984-2024



Source: US Census Bureau, BLS

Figure 3 plots the change in log real tenant rents and the log of average housing expenditure between 1984 and 2024. Both have increased by around 0.4 log points over the entire period. Around the time of the Great Recession, average housing expenditure growth accelerated, then fell substantially, whereas the tenant rent grew more smoothly. The identification of the elasticity parameter μ in (23) comes from allowing the homeownership share to capture these innovations in the average housing expenditure which were not reflected in the tenant rent. In particular, when the homeownership share rises, the rental discount factor also rises, causing the tenant rent to fall relative to the path predicted by housing expenditure alone, which is what occurred.

4.2 Estimation

Table 2 reports the results of estimating (23) using the three different specifications for θ_t. All coefficients are significant with the correct signs, and the associated R-squared values are high. The three specifications for θ_t report similar results in terms of the coefficient for the average housing expenditure and the R-squared values.

The baseline OLS estimate in column 1 reveals that the structural sorting elasticity μ is 0.435 and highly statistically significant ($p < 0.01$). This coefficient implies that a 10 percent increase in the renter-to-owner odds ratio—corresponding to a contraction in the homeownership rate—induces an equilibrium expansion in real tenant rents of approximately 4.35 percent, holding aggregate real

expenditures constant. Column 2 demonstrates that this elastic response is structurally robust when measuring tenure shares via aggregate expenditure weights rather than raw consumer unit counts.

Table 2: Real Tenant Rents on Renter/Ownership Shares, Annual 1984-2024

Specification	Renter/Ownership Share (Consumer Units)	Renter/Ownership Expenditure Share	Renter/Ownership Share (Households)
Elasticity μ	**0.435**(0.070)**	**0.279**(0.031)**	**0.414**(0.063)**
Average Housing Expenditure	1.086**(0.049)	0.879**(0.035)	1.038**(0.044)
R-squared	0.933	0.956	0.937
Adjusted R-squared	0.930	0.954	0.933

Source: US Census Bureau, BLS

As a robustness check, a time trend was added to the regression specification in (23). Table 3 reports the results of estimating (23) using the three different specifications for θ_t, now allowing for a time trend term. The time trend term is not significant at the 5% level, and in two out of three cases the adjusted R-squared is lower after allowing for the time trend.

Table 3: Real Tenant Rents on Renter/Ownership Shares with Trend, Annual 1984-2024

Specification	Renter/Ownership Share (Consumer Units)	Renter/Ownership Expenditure Share	Renter/Ownership Share (Households)
Elasticity μ	**0.392**(0.073)**	**0.285**(0.038)**	**0.377**(0.068)**
Average Housing Expenditure	0.864**(0.147)	0.935**(0.123)	0.852**(0.143)
Time trend	0.002*(0.001)	0.000(0.001)	0.002*(0.001)
R-squared	0.937	0.956	0.940
Adjusted R-squared	0.932	0.952	0.931

Source: US Census Bureau, BLS

4.3 Variance of the Rent-Price Ratios

Let $\overline{\theta}$ denote the average renter share of housing expenditure in the sample period. Using the identification equation implied by Proposition 2 :

$$(24) \qquad \frac{dln\delta\left(z_t^*\right)}{dln\frac{\theta_t}{1-\theta_t}} \simeq \frac{1}{-(1-\overline{\theta})}\frac{dlnd_t}{dln\frac{\theta_t}{1-\theta_t}} = \frac{\mu}{-(1-\overline{\theta})}.$$

Since from (8), $\delta\left(z_t^*\right)$ is the inverse of the tenant rent to implicit owner rent, that implies:

$$(25) \qquad \frac{dln\frac{d_t}{b_t}}{dln\frac{\theta_t}{1-\theta_t}} \simeq \frac{\mu}{(1-\overline{\theta})}.$$

We can use this to calculate an estimate of the elasticity of the tenant rent to implicit owner rent with respect to $\frac{\theta_t}{1-\theta_t}$, as reported in Table 4.

Those are compared to the elasticity of the rent-price ratio to $\frac{\theta_t}{1-\theta_t}$, as previously reported in Table 1. A comparison shows that across the different specifications for $\frac{\theta_t}{1-\theta_t}$, the estimated elasticity for the tenant rent to implicit owner rent is about half the elasticity for the rent-price ratio. That is, assuming that the elasticity of the implicit owner rent tracks the elasticity of the owner-occupied house price, about half of the volatility of the rent-price ratio in the sample period is captured by changes in the marginal rental discount.

Table 4: Implied Elasticity of Rent-Price Ratios on Renter/Ownership Shares

Specification	Renter/Ownership Share (Consumer Units)	Renter/Ownership Expenditure Share	Renter/Ownership Share (Households)
Implied Elasticity $\mu/(1-\bar{\theta})$	**0.677**	**0.387**	**0.630**
Observed Elasticity (from Table 1)	1.350	0.800	1.235

4.2 Discussion of Estimation

The estimation takes the renter share of the aggregate housing expenditure as exogenous (to movements in tenant rents, aggregate housing expenditure, and housing stock). Substantively, this amounts to assuming, first, that the homeownership rate is exogenous, and second that the housing expenditure per renter household relative to per owner household is exogenous.

Regarding the exogeneity of the homeownership rate, Chambers, Garriga and Schlagenhauf (2009) decompose the sources of changes in household rates of homeownership from 1940-2005. They argue that virtually all the innovations to aggregate homeownership rates can be explained by a combination of new mortgage products (following discrete changes in the regulatory environment), the GI Bill and demographic factors. This motivates a specification of the ownership rate which is independent of movements in tenant rents.

Regarding the housing expenditure per renter household to owner household, this could in principle vary with the house price over time, since housing constitutes a substantial portion of homeowner wealth, and little or no portion of renter wealth. However, it is difficult to justify why that would be

contemporaneously correlated with movements in tenant rents. Moreover, even if they could be correlated, it turns out that instrumenting $\left(1 - \theta_t\right)$ with the homeownership rate only does not affect the quantitative implications of the paper, since the two variables are highly positively correlated.[7]

The analysis also assumes the evolution of the housing stock is exogenous. While we know that housing investment can increase during periods of high house prices, whether this substantively affected the aggregate stock of housing in the short term is a different issue. In particular, modelling the evolution of the housing stock as governed by a constant exogenous growth rate, captured through the time trend analysis, did not affect the quantitative implications of the paper.

5. Policy Implications

A central premise of this paper is that time-varying rent-price ratios do not necessarily map one-to-one to changes in the financial earnings yield or risk premia of owner-occupied real estate. Consequently, large variations in this ratio need not imply structural revisions in expected house price appreciation. Beyond this conceptual reassessment, the equilibrium sorting mechanism and the endogenous marginal rental discount generate three distinct policy implications.

5.1 Housing Consumption Inequality

Housing policies are frequently designed to mitigate consumption and wealth inequality between renters and owner-occupiers. Within this debate, secular house price appreciations are routinely interpreted as a mechanism that locks out renters from capital accumulation, thereby exacerbating long-run welfare disparities. The framework developed here reveals that the structural source of a house price appreciation is a critical determinant of its distributional consequences.

If an appreciation in aggregate house prices is driven by a contraction in the marginal rental discount (i.e., an expansion in the marginal discount factor $\delta\left(z_t^*\right)$), the equilibrium valuation gap between explicit tenant rents and implicit owner rents compresses. Under these conditions, for a given disparity in nominal housing expenditures between renter and homeowner dynasties, the inequality in the actual consumption of physical housing services *declines*. While the wealth channel continues to favor

[7] Furthermore, the canonical framework used to analyze the feedback effects between homeowner expenditure and house prices is that of the quantitative DSGE models with a housing sector developed in Iacoviello (2005) and Iacoviello and Neri (2010) among others. This literature reaches a stark conclusion that the movements of the homeowner expenditure are driven by exogenous changes in homeowner housing preferences to match the data during periods when the housing expenditure per renter household relative to owner household fluctuates.

existing asset holders, the real consumption gap narrows because the rental sector experiences an increase in service transmission efficiency at the margin.

5.2 The Equilibrium Effects of Rent Control

Standard partial-equilibrium models suggest that binding rent controls incentivize institutional landlords to liquidate rental portfolios in favor of owner occupancy, thereby mechanically driving up the aggregate homeownership rate. In a baseline model characterized by a homogeneous and invariant rental friction, such a transition would leave long-run house price indices unaffected, and the relaxation of these controls would cause market rents to mean-revert to their historical determinants.

In the presence of a heterogeneous and variable marginal rental discount, however, this policy transition generates permanent structural scars. An artificial expansion of the homeownership rate shifts the identity of the marginal property along the distribution toward units with higher physical or geographic conversion frictions. This structural sorting permanently raises the aggregate house price index and suppresses market tenant rents even *after* the administrative controls are dismantled.

This mechanism provides a structural rationalization for the historical evidence documented by Fetter (2016), who demonstrates that the implementation of wartime rent controls in the United States during the 1940s catalyzed a persistent expansion in homeownership. Coincident with the predictions of my model, this era was characterized by a -0.3 log point contraction in real tenant rents alongside a corresponding +0.3 log point expansion in real house prices. Crucially, the rent-price ratio remained structurally depressed long after the post-war deregulation, a pattern that cannot be reconciled without an endogenous marginal discount factor mechanism.

5.3 Homeownership Subsidies and Welfare Spillovers

In segmented housing markets, renters face a strictly higher shadow price for housing services than owner-occupiers. This wedge has historically been used to justify fiscal interventions aimed at expanding owner occupancy, such as the mortgage interest deduction or first-time homebuyer credit subsidies (e.g., Ortalo-Magné and Rady 1999, 2006; Kiyotaki, Michaelides, and Nikolov 2011).

The structural sorting framework introduces a novel general-equilibrium justification for these fiscal transfers by identifying a positive welfare spillover to non-transitioning renters. By subsidizing homeownership, the fiscal authority alters the aggregate distribution of housing expenditures, reducing the renter share θ_t. This contraction shifts the marginal property boundary, driving up the marginal rental discount factor and narrowing the wedge. Consequently, the premium paid by the remaining renters for housing services declines in equilibrium. Homeownership subsidies are therefore not merely

a targeted transfer to transitioning households; they operate as a general-equilibrium mechanism that lowers the real cost of housing services for all renters in the economy.

6. Conclusion

This paper re-examines the empirical information content of the residential rent-price ratio. While the asset-pricing literature conventionally treats this ratio as a direct proxy for the latent earnings yield on real estate, I document a robust, low-frequency co-movement between rent-price ratios and aggregate homeownership metrics in the United States from 1984 through 2024.

To rationalize this regular pattern, I embed a heterogeneous "rental discount" friction into a standard frictionless user-cost environment. In equilibrium, the valuation wedge between explicit tenant rents and implicit owner-occupied service flows is uniquely pinned down by the structural characteristics of the marginal rental property. When macroeconomic or institutional shifts alter the aggregate homeownership rate, the marginal property boundary shifts endogenously along the distribution of the housing stock, altering the relationship between market rents and asset prices.

Taking the model's equilibrium conditions to the data, structural estimates indicate that changes in the marginal rental discount can account for approximately one-half of the historical volatility in the US rent-price ratio over the last four decades. This quantitative finding suggests that standard variance decompositions that omit tenure-choice sorting may systematically misattribute structural shifts in the marginal property mix to movements in financial risk premia or market inefficiencies. More broadly, the insights developed here imply that for any durable asset class characterized by dual utilization modes—such as commercial real estate or capital equipment—the empirical relation between rental rates and asset prices is fundamentally mediated by the physical and institutional characteristics of the marginal rented unit.

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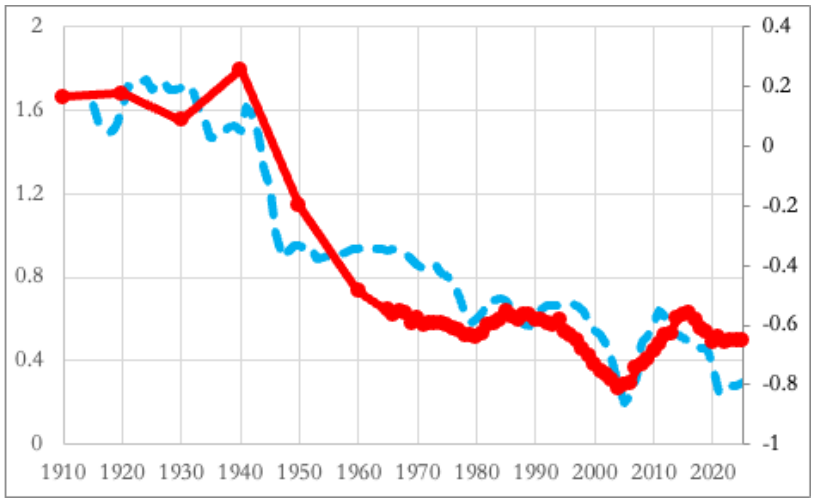
Appendix

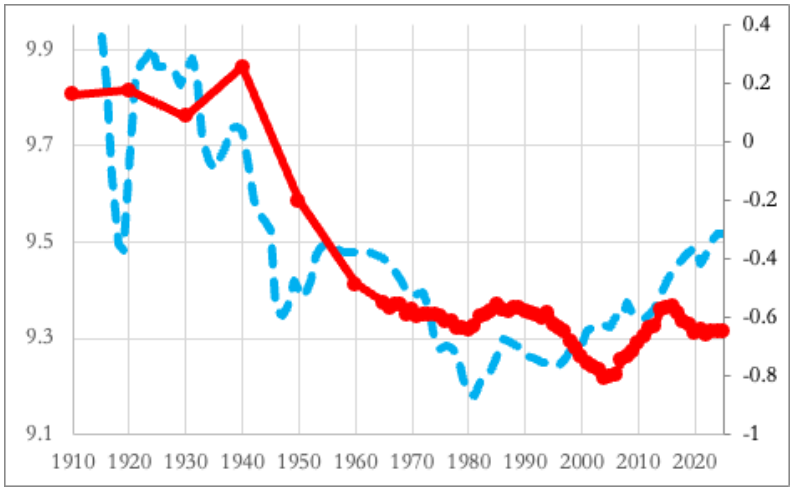
Figure A.1: Rent-Price Ratio vs. Rental Rate/Homeownership Rate, 1910-2025(in logs, Rent-Price Ratio is dashed line)



Source: US Census Bureau, BLS, Shiller Historic National Home Price Index

The homeownership rate rose permanently in the post-war years with the adoption of the GI Bill and innovations to housing finance (Chambers, Garriga and Schlagenhauf (2009)). The homeownership rate uses the household rate reported by the decennial Census for 1910-1960, and annually from 1965. The historic house price index is supplied and used by Shiller (2006).

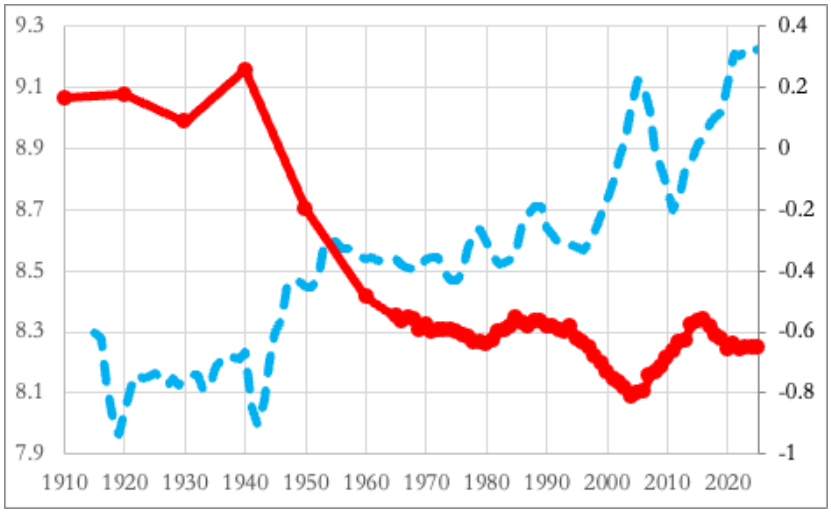
Figure A.2: Real Rent vs. Rental Rate/Homeownership Rate, 1910-2025(in logs, Real Rent is dashed line)



Source: US Census Bureau, BLS

A higher homeownership rate has been associated with lower real tenant rents. A higher homeownership rate has been associated with higher real house prices. Real rents and house prices are calculated using the CPI: All Items from the BLS.

Figure A.3: Real House Price vs. Rental Rate/Homeownership Rate, 1910-2025(in logs, Real House Price is dashed line)



Source: US Census Bureau, BLS, Shiller Historic National Home Price Index

Proof of Lemma 2

From (14), the differential $\frac{dz_t^*}{d\frac{\theta_t}{1-\theta_t}}$ is implicitly given by

$$1 = \frac{dz_t^*}{d\frac{\theta_t}{1-\theta_t}} \frac{d}{dz_t^*} \frac{\int_0^{z_t^*} \delta(x)dx}{\left(1-z_t^*\right)\delta\left(z_t^*\right)} \left[\frac{\delta\left(z_t^*\right)}{\left(1-z_t^*\right)\delta\left(z_t^*\right)} - \frac{\int_0^{z_t^*} \delta(x)dx}{\left[\left(1-z_t^*\right)\delta\left(z_t^*\right)\right]^2} \left(\left(1 - z_t^*\right)\delta'\left(z_t^*\right) - \delta\left(z_t^*\right) \right) \right],$$

$$\frac{dz_t^*}{d\frac{\theta_t}{1-\theta_t}} = \left[\frac{\delta\left(z_t^*\right)}{\left(1-z_t^*\right)\delta\left(z_t^*\right)} - \frac{\int_0^{z_t^*} \delta(x)dx}{\left[\left(1-z_t^*\right)\delta\left(z_t^*\right)\right]^2} \left(\left(1 - z_t^*\right)\delta'\left(z_t^*\right) - \delta\left(z_t^*\right) \right) \right]^{-1} > 0$$

Where the inequality follows since $\delta'\left(z_t^*\right) < 0$ and $\delta\left(z_t^*\right) > 0$. Then, observing that $\delta'\left(z_t^*\right) < 0$ implies the Lemma.

Proof of Proposition 2

Expressing (16) in logs, we get

$$lnd_t = -\ ln\left[\left(1 - z_t^*\right)\delta\left(z_t^*\right) + \int_0^{z_t^*} \delta(x)dx\right] + \ ln\frac{X_t}{H_t}.$$

Differentiating with respect to z_t^*, and then multiplying through by z_t^*

$$z_t^* \frac{dlnd_t}{dz_t^*} \equiv \frac{dlnd_t}{dlnz_t^*} = -\ z_t^*\left[\frac{\left(1-z_t^*\right)\delta'\left(z_t^*\right)-\delta\left(z_t^*\right)+\delta\left(z_t^*\right)}{\left(1-z_t^*\right)\delta\left(z_t^*\right)+\int_0^{z_t^*}\delta(x)dx}\right]$$

$$= -\ \frac{z_t^*\delta'\left(z_t^*\right)}{\delta\left(z_t^*\right)}\left[\frac{\left(1-z_t^*\right)\delta\left(z_t^*\right)}{\left(1-z_t^*\right)\delta\left(z_t^*\right)+\int_0^{z_t^*}\delta(x)dx}\right] = -\ \frac{dln\delta\left(z_t^*\right)}{dlnz_t^*}\left(1 - \theta_t\right),$$

where the last equality is from (15). This implies the first part of the Lemma after dividing through by $\frac{dln\delta\left(z_t^*\right)}{dlnz_t^*}$. From (8) we know that

$$\frac{dlnb_t}{dlnz_t^*} = \frac{dln\delta\left(z_t^*\right)}{dlnz_t^*} + \frac{dlnd_t}{dlnz_t^*} = \theta_t \frac{dln\delta\left(z_t^*\right)}{dlnz_t^*}.$$

This implies the second part of the Lemma after dividing through by $\frac{dln\delta\left(z_t^*\right)}{dlnz_t^*}$.