Housing and Inequality *

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Abstract

We approach the literature on housing and inequality from two angles. One is the impact of unequal endowments on housing. The second is the "memberships" inequality associated with neighborhoods, namely, households' location in a geographic and social context. We elaborate on these two angles of inequality and focus on three distinctive features of housing: consumption, capital and location. For owner-occupants, capital and consumption are bundled together in a single good. For both renters and owner-occupants, housing consumption inequality, access to good neighborhoods, and housing wealth follow from unequal endowments. Housing can propagate inequality by enabling owner-occupants to use it as collateral for other investments, or secure higher returns to human capital investments through the better schools in better neighborhoods. We use this approach to analyse key aspects of housing and inequality, paying special attention to the impacts of racial discrimination and segregation.

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1 Introduction

This paper reviews the economics literature to uncover the links between housing and inequality, and argues that those links go in both directions. It identifies three distinctive features of housing. One relates directly to the large and growing share of housing consumption expenditures, especially among poorer households. A second feature is housing as capital for homeowners; housing is the most important form of wealth for most households and the main form of collateral. The third feature is access to schools and job information networks, via neighborhoods, which provides crucial social context that is central to the propagation of income and wealth inequality.

For most households, these three features are bundled in a single good in the form of their "primary residence", as real estate holdings other than primary residences are very concentrated. Using the OECD Wealth Distribution Database for more than 20 OECD countries, Causa et al. (2019) report that only about 20% of average households own real estate properties other than their main residence (see Figure 17) and that 70% of these other properties are held by those at the top 10% of wealth distribution (see Figure 24).[1] While the primary residence is not a household's only asset, it differs from financial assets and indeed other real estate assets because it generates consumption services and embodies geographical location and social context, that is, the "neighborhoods effect." As the OECD *Housing and Inclusive Growth* report puts it, *"housing can both reflect and reinforce inequalities across socio-economic groups, across generations, and across space;"* OECD (2020).

We do not review the large housing literature; instead, we refer to a number of existing extensive surveys on topics not addressed by this paper. We focus on features that contribute to or follow from inequality, or both. The existing extensive surveys do not explicitly address inequality. Davis and Van Nieuwerburgh (2015) and Piazzesi and Schneider (2016) focus on housing as a financial asset in a macroeconomic context, with an emphasis on how the return to housing assets (mainly house prices) is related to its volatility, its correlation with other financial assets, and overall asset portfolio choice. Duca et al. (2021) provide an extensive review of house price cycles using international

[1] According to the US Survey of Consumer Finances in 2019, 65% of families in the US held a primary residence, with an average value of $399,000; 13% of families held other residential real estate, with an average value of $468,000; and 7% of families held net equity in non-residential real estate, with an average value of $435,000 (all in 2022 US dollars).

evidence. In contrast, in the current paper we pay particular attention to locational aspects of housing and to those attributes that are closely related to inequality. Most housing transactions involve search activities, but the large volume of research on search models of the housing market, ably reviewed by Han and Strange (2015), does not focus on housing and inequality. In this paper, we also review the impact of racial/ethnic discrimination, as well as displacements in the housing market, in connection with misinformation, foreclosures, and evictions, all of which have a bearing on inequality.

We address two broad aspects of housing and inequality. The first aspect is the inequality that results directly from how individuals' endowments map – through housing, but also labor and credit markets – into unequal outcomes. This approach also accounts for the direct effects of parents on the welfare of their offspring via transfers as well as via their impact on the productivity of their offspring's human capital. Accordingly, we review the observed *endowments*-related housing inequality in the context of the literature. A second strand of mechanisms are *social* and comprise the *memberships* or *associational* theory of inequality, a term that we adopt, along with Graham (2018), from Durlauf (2001). Individuals self-select into associations, broadly construed, which has major consequences for their subsequent access to opportunities through informational links and social interactions. This operates in the social space and articulates a fundamental dimension of the memberships theory, namely, the allocation of housing, which is inherently linked to neighborhood choice. It gives rise to neighborhood income distributions and to residential segregation. It thus accords to housing inequality a role that goes well beyond its role as an element in the consumption bundle.

The remainder of the paper is organized as follows. Section 2 presents a simple conceptual framework for fixing ideas about the three features of housing (consumption, capital, and location). It highlights the role of housing as both a source and a propagation mechanism for inequality. Sections 3 to 5 elaborate on the three features of housing, respectively. Section 6 discusses key issues related to racial discrimination and residential segregation, the consequences of which are particularly salient for inequality. Section 7 concludes.

2 A Conceptual Framework

To put research on housing and inequality into perspective, this section sketches a simple conceptual framework that focuses on the three features of housing that are critical to inequality: consumption, capital, and location. These features related to housing and inequality span micro and macro research, and there is no single simple canonical model that includes them. Instead, we seek to lay down a conceptual framework for organizing the discussion of these features.

The long-run evolution of housing prices has provoked much discussion in both the housing literature and the popular press. As Knoll et al. (2017) established for 14 advanced economies, real house prices fluctuated around a flat trend until the mid-20th century and have since then risen strongly, albeit with substantial cross-country heterogeneity. After controlling for replacement costs, the authors identified the steady growth of land prices as the key factor contributing to this outcome. This confirms that, despite the vast expansion of developed land throughout the world, land for urban use is becoming increasingly scarce everywhere. Since the opportunity cost of urban land is its non-urban use, the impact of land scarcity at the national level is transmitted to the value of urban land parcels. The interaction between the location of firms and the location of individuals within urban areas, which drives the density of economic activity within and across urban areas, generates the derived demand for urban land parcels according to the urban landscape. Rising real prices of housing underlie the current discussion in the public domain. It is important to understand how rising prices impinge upon our ability to interpret empirical evidence on the interaction between housing and inequality.

We approach housing and inequality from two angles. One angle addresses how a given distribution of income is reflected in housing outcomes. This encompasses such issues as whether it is the result of mapping low-incomes through the housing market to acutely low-quality housing or some other force, such as housing-specific externalities. This is relevant for inequality because it raises public policy concerns. A second angle addresses how housing outcomes feed back into the determination of income and wealth through a number of routes. For example, access to mortgage borrowing may enable the accumulation of lifetime wealth.[2] Similarly, phenomena lumped under the term "neigh-

[2]As we discuss in Section 4.4, there are caveats to this due to the illiquid and risky nature of housing transactions.

borhood effects", which encompass contextual and endogenous social effects associated with locational aspects of housing, can be critical forces in the persistence of inequality (Durlauf, 1996, 2001; Graham, 2018).

To formally model housing requires specifying preferences and the constraints that account for the dynamic setting of housing decisions. At any point in time t, state variables of a household include the level of human capital s^i_{t-1}, non-housing financial assets a^i_{t-1}, current housing location $\ell^i_{t-1} \in \mathcal{N}$, and tenure status $\iota^i_{t-1} = r, o$. If household i is a homeowner ($\iota^i_{t-1} = o$), then it owns housing capital h^i_{t-1}. The aggregate state variables considered here are the gross return to non-housing financial assets R_t, a location-specific house price index $p_t(\ell)$, a location-specific rental price index $q_t(\ell)$, and the location-specific wage rate $w_t(\ell)$ in each location ℓ_t. We assume that there is free mobility of non-housing financial assets across locations so that the return R_t is equalized across locations.[3] Houses are immobile and therefore house prices and rents are location-specific.

Given the set of aggregate and household-level state variables, a household chooses a (potentially new) location ℓ^i_t, non-housing consumption c^i_t, housing services h^i_t, and investment in human capital z^i_t in order to maximize the discounted sum of expected life-time utility, $\sum_{t=0}^{\infty} \beta^t E_0 \left[u^i \left(c^i_t, h^i_t; \ell^i_t \right) \right]$, where β is a discount factor. The expectation is taken with respect to shocks such as income, house price and rent. The infinite life-time specification allows for the interpretation that location and human capital choice affect the utility of future generations in a dynastic setting. Per-period utility is defined as:

$$u^i \left(c^i, h^i; \ell^i \right) = \frac{\mathcal{L}^i \left(\ell^i \right) \left[\left(\omega \xi_{\iota^i} \left(h^i - \bar{h} \right)^{\frac{1-\varepsilon}{\varepsilon}} + (1-\omega) \left(c^i \right)^{\frac{1-\varepsilon}{\varepsilon}} \right)^{\frac{\varepsilon}{1-\varepsilon}} \right]^{1-\sigma}}{1-\sigma}. \tag{1}$$

Here $\bar{h} \geq 0$ is a minimum amount of housing services required, which affects the income elasticity of housing consumption. The parameter $0 < \omega < 1$ determines the weight on housing consumption versus non-housing consumption. The parameter $\epsilon > 0$ determines the price elasticity of housing consumption. The utility of housing services depends on the tenure status, where $\xi_o > \xi_r$ is referred to as the *warm glow effect*. The term $\mathcal{L}^i(\ell^i)$ reflects location-specific preference, such as location-specific amenities.

The period-specific budget constraints for households depend on their tenure status.

[3] It is straightforward to allow for different interest rates for borrowers and lenders, with the latter being typically smaller than the former by a wedge that depends on the riskiness of mortgage lending.

For an owner endowed with h^i_{t-1} units of housing, the period t constraint is:

$$\begin{aligned} c^i_t + z^i_t + p_t(\ell^i_t)h^i_t + M^i_t\kappa^o_t + a^i_t &= w_t(\ell^i_t)s^i_{t-1} + R_t a^i_{t-1} + p_t(\ell^i_t)h^i_{t-1}; \quad (2) \\ a^i_t &\geq -(1-\phi)\, p_t(\ell^i_t)h^i_t,\ 0<\phi<1. \quad (3) \end{aligned}$$

Constraint (3) states that the housing asset can be used as collateral for borrowing. In contrast, a renter in this model does not own any housing asset and cannot borrow:

$$a^i_t = w_t(\ell^i_t)s^i_{t-1} + R_t a^i_{t-1} - c^i_t - z^i_t - q_t(\ell^i_t)h^i_t - M^i_t\kappa^r_t \geq 0. \quad (4)$$

The indicator M^i_t represents a moving decision taking the value of 1 in the case of a move, and 0 otherwise. Moving can be motivated by a change in housing size or housing location, i.e. $M^i_t = 1$ if either $h^i_t \neq h^i_{t-1}$ or $\ell^i_t \neq \ell^i_{t-1}$. The parameters (κ^o_t, κ^r_t) capture moving or transaction costs for owners and renters. The accumulation of human capital follows:

$$s^i_t = S\left(z^i_t; s^i_{t-1}, \ell^i_t\right), \quad (5)$$

which depends on investment in human capital z_t, location choice ℓ^i_t, and lagged human capital s^i_{t-1}. For example, access to better schooling in a certain location can contribute to the accumulation of human capital for a given level of investment, or there may exist salient peer effects across individuals' human capital at the location, all of which enter $S(\cdot)$ via ℓ^i_t.

This setup focuses on two aspects of housing decisions: neighborhood choice ℓ^i_t and housing services h^i_t. It spells out the three features of housing. First, housing enters utility as a *consumption service* for both renters and owners. Second, housing confers *locational* advantages for both renters and owners, providing amenity utility entering the accumulation of human capital, and defining wage income in budget constraints (2) and (4). Third, housing enters the budget constraint (2) and the collateral constraint (3) as *an investment in housing asset* for owners. The collateral constraint also affects the investment in human capital z^i_t through the budget constraint (2). The last two features of housing are the key for housing to contribute to inequality. Put differently, within the framework presented above, housing would not affect inequality if the following two sets of assumptions are true. First, if $w(.)$ and $S(.)$ are independent of location and there are no costs to adjust housing consumption or location ($\kappa^r_t = \kappa^o_t = 0$), then there are no locational advantages, and house price and rent will be the same in all locations. Second,

if there is no borrowing constraint, then housing does not play a role as a collateral. When these two sets of assumptions hold, housing is like other consumption goods. Endowment inequality will affect housing, but housing would not affect inequality.

Housing services flow from housing structures that are produced using various inputs, the supplies of which are generally quite elastic except for that of land. While the notion of housing does connote land, our approach here emphasizes the spatial differentiation that land undergoes in urban use. This confers key significance on the actual location of land parcels that host dwelling units that may be rented or owned. Thus, the operation of the housing market generates derived demand for land that may be developed for urban housing use. Such land does not exist in infinitely elastic supply. Indeed, urban land supply depends on many factors such as land-use regulations and technological improvements.[4]

The return to landowners (who may be individuals, firms, institutions or the government) reflects the institutional structures through which land is owned. Homeowners in many countries own the land on which their homes lie, or a share thereof. However, in some countries, notably the United Kingdom, the use of land may be fully owned via "freehold" leases or it may be traded by means of leases of varying duration via "leasehold". Multi-dwelling structures may be owned as condominiums, cooperatives, or other forms. While in most countries housing is built by individuals and land developers, developers are increasingly keeping dwelling units as rental properties.[5] Differences in the institutional complexity of how housing services are supplied make it very difficult to obtain a precise understanding of the market for land around the world. Of course, land is also demanded by firms and governments, and the use to which it is put has important implications for inequality. Firms provide jobs and consumption opportunities. Governments provide numerous services in the form of amenities but also education, which in countries like the US are financed by property taxes that are directly levied on property

[4]Recent literature has highlighted the important interaction of technological improvements and the role of land in housing. Using evidence from average commuting speeds in England since mid-19th century, Miles and Sefton (2020) provide a model to explain the hockey-stick pattern of house prices in the long run as a result of changes in the transport efficiency, due to its rapid improvement prior to the mid-20th century and its subsequent slowdown. Borri and Reichlin (2018) and Grossmann et al. (2024) focus on another technological explanation, namely, the slower productivity growth in the construction sector relative to the rest of the economy, for the rise in house prices during recent decades.

[5]We do not model the behavior of such actors or of large housing developers. Individuals' asset portfolios may include shares of such companies. The basic framework can nest the case of small landlords, who may own more housing than they themselves consume and rent out the difference, earning asset income (see Section 4.4), by modifying it in the style of Henderson and Ioannides (1983).

owners, homeowners and firms. We return to this matter in Section 5.3.1.

3 Housing Consumption

The fundamental role of housing is to provide shelter. Patterns of housing expenditure shares, over time and across households, have garnered significant attention from policymakers and researchers.

3.1 Housing Expenditure Share

Using micro data on household expenditure for 20 countries, OECD (2020) reports that housing is the largest single expenditure item, larger than food, clothing, health, education, leisure and transport.[6] In 2015, the housing expenditure share across households in OECD countries was 37% for households in the bottom quintile, 31% for the middle quintile and 25% for the top quintile. The average housing expenditure share increased by 6 percentage points from 2005 to 2015; the increase for the bottom income quintile was much higher at 9 percentage points, three times that for the top quintile.[7] Similar patterns of changes in housing expenditure shares have been documented using micro data for individual countries, such as France, Germany, the UK and the US (Accardo et al., 2017; Dustmann et al., 2022; Belfield et al., 2015; Albouy et al., 2016).

The housing expenditure share among renters has received particular attention, as households in the lowest quintile are more likely to rent.[8] Relying on the Affordable Housing Database data for 31 OECD countries from 2014 to 2018, OECD (2020) reports that more than a third of renters in the private market spend over 40% of their income on housing. The 2024 *Economic Report of the President* shows that the shares of renters in the US spending more than 30% or more than 50% of their income on housing have both doubled since the 1960s. In 2022, nearly half of renters were spending more than 30%, and a quarter of renters were spending more than 50%.

[6]Household expenditure data come from national household budget surveys and have been harmonised by the OECD in accordance with the Classification of Individual Consumption according to Purpose (COICOP) developed by United Nations Statistics Division. The consumption of services from an owned house is measured by imputing a rent equivalent.

[7]This differential growth pattern can be discerned as far back as 1995 for 10 countries where the housing expenditure share increased by 13 percentage points for the bottom income quintile, 7 percentage points for the middle, and 3.5 percentage points for the top.

[8]Using the OECD Wealth Distribution Database 2011 – 2016, Causa et al. (2019) document that the homeownership rate among the lowest income quintile is more than 25 percentage points lower than the rate among the highest quintile for 20 countries.

The high housing expenditure share among low-income households limits their financial resources for non-housing consumption, saving, or investment in human capital.[9] This situation can contribute to broader and more persistent inequality of the endowment type, especially given the ample evidence of a lack of growth in income for poorer households during recent decades. The *2024 Economic Report of the President* presents a vivid picture of the financial burden of housing in the US by calculating the number of work hours needed to afford the monthly median rental rate. It reveals an increase from 55 hours in 2002 to 70 hours in 2022 for median wage earners and from 110 hours to 180 hours for households earning the federal minimum wage.

The rising housing costs have been linked to the incidence of adult children living with their parents. Figure 2.10 in OECD (2020) documents that, on average across 31 OECD countries, about 50% of young adults aged 20-29 were living with their parents in 2017. There is a wide variation across countries with the highest shares (above 70%) in Southern European countries (Italy, Greece, Spain and Portugal), compared with 40-50% in the UK and the US, and only 10-20% in the Nordic countries (Norway, Finland and Sweden). This is a transfer in kind between generations, but it could lead to other issues such as limiting job mobility.

The concern about the increasing housing expenditures prompts two arguments. First, the increase in housing expenditure may reflect an improvement in housing quality. As documented in Quigley and Raphael (2004), there were substantial improvements in the quality of rental units in the US between 1960 and 2000 due, among other things, to modernizing plumbing and kitchen facilities, and local zoning ordinances reducing density and increasing minimum size requirements. However, this argument might not be as relevant for more recent decades, especially in terms of floor space per person (see Ghent and Leather (2021) for the US and Belfield et al. (2015) for the UK). Moreover, another crucial measure of housing quality is neighborhood quality. Using three scale- and population-invariant measures – the variance in logs, the Gini coefficient and the Theil entropy measure – Aladangady et al. (2017) find that the increase in inequality in house prices and rents in the US between 1930 and 2012 cannot be explained by tangible dwelling characteristics such as plumbing, heating systems, or the number of rooms. Instead, they attribute this trend to variations in location that provide distinct "intangibles," such as proximity to job opportunities and local amenities. A second argument against this

[9]High rents in particular also constrain the young generation in saving for a downpayment.

concern is that the patterns of housing expenditure shares could simply reflect changes in preferences for housing consumption. This would be true if the utility function (1) is Cobb-Douglas with $\bar{h} = 0, \epsilon = 1$. In this case, the housing expenditure share is equal to the preference parameter ω. We evaluate this argument by discussing next the significant role of income and price elasticities of housing demand.

3.2 Income and Price Elasticities of Housing Demand

The variations in housing expenditure shares across households and across time are important inputs for understanding the preference structure of housing demand, thus for understanding the relationship between housing and inequality.[10]

As the housing choice of a homeowner is both a consumption and an investment decision, we defer its discussion to Section 4, where the role of housing as capital is discussed.[11] For a renter, when the borrowing constraint (4) is not binding, the relative expenditure across housing and non-housing can be expressed as:

$$Renter: \frac{q_t(\ell_t^i)h_t^i}{c_t^i} = \left(\frac{h^i}{h^i - \bar{h}}\right)\left(\frac{\omega}{1-\omega}\right)^{\varepsilon} q_t(\ell_t^i)^{1-\varepsilon}. \tag{6}$$

Albouy et al. (2016) and Finlay and Williams (2022) provide a brief review of estimates of price and income elasticities of housing. Davis and Ortalo-Magne (2011) find that median housing expenditure shares are roughly constant across US metropolitan statistical areas (MSAs), which leads the authors and a substantial share of macro housing studies to adopt Cobb-Douglas preferences where both price and income elasticity are equal to one ($\bar{h} = 0$ and $\varepsilon = 1$). Although these types of preferences may be convenient and useful for understanding macro patterns, they are of limited use for understanding housing and inequality. More specifically, they imply that the housing expenditure share is always equal to the preference parameter ω. Thus, the cross-sectional and time series patterns of housing expenditure shares can only be explained by assuming that the preference parameter ω is larger and increases faster for poorer households. In other words,

[10] For a recent example of the use of *price-inelastic* housing demand in understanding how rising relative price of housing leads to rising wealth inequality, see Borri and Reichlin (2018); for the rising net capital share of aggregate income, see Rognlie (2015). The *income-inelastic* housing demand is used to understand the effect of zoning deregulation on reducing welfare inequality (Grossmann et al., 2021); it is also used to explain how a higher aggregate skill premium can lead to an increase in spatial sorting by skill group (Finlay and Williams, 2022).

[11] There are different ways to calculate imputed rent for homeowners, such as market rent of similar properties or self-reported rental equivalent. This poses challenges to estimating elasticities of housing for homeowners (Finlay and Williams, 2022).

the "regressive" patterns of housing expenditure shares simply reflect heterogeneity in housing preferences, both in levels and changes.

Using city-level variations in income, prices, and rental expenditures for the United States, Albouy et al. (2016) estimate that the price and income elasticity of housing are less than one. These findings are corroborated by more recent findings by Finlay and Williams (2022), who use micro data on consumption and thus avoid assumptions regarding the aggregation of preferences in a city. The key reason for rejecting the Cobb-Douglas preferences is that an aggregate approach that does not control for the local cost of housing $q_t(\ell_t)$ masks the offsetting price and income effects given richer MSAs also have higher housing rents. More specifically, higher housing rents imply *higher* housing expenditure when housing demand is price-inelastic, but higher income implies *lower* housing expenditure when housing demand is income-inelastic.

The finding of income-inelastic housing demand is due to the fact that poorer households spend more of their income on housing than richer households. One concern is that income after deducting housing costs is even lower for poorer households compared to richer households, leaving limited financial resources for non-housing consumption and investment. This led to a suggestion in the *IFS Deaton Review of Inequalities* (Cribb et al., 2023) for the UK to deduct housing costs from disposable incomes when measuring poverty and inequality in the bottom part of the income distribution. The report finds that disposable income measured after deducting housing costs is more closely correlated with non-income-based measures of living standards, such as food insecurity or the material deprivation rate calculated by the UK Department for Work and Pensions.

The finding of price-inelastic housing demand, on the other hand, is due to the simultaneous increase in the relative price of housing and in the housing expenditure share. The recent survey by Duca et al. (2021) on housing prices and rents highlights an important role for locations, and specifically for the location-specific housing supply elasticity which pertains to the fixed supply of land and related issues. The locational aspects of housing, such as access to employment, local amenities, and associational inequality, will be the focus of Section 5.

We defer to previous literature and eschew a general discussion of housing policy.[12] In the remainder of this section, we restrict our attention to two issues: housing displace-

[12]Saiz (2023) surveys 290 papers on policies around the world; Olsen and Zabel (2015) refer to more than 200 papers on the US alone. Neither of those studies focuses on addressing housing and inequality.

ments and rent control. The former poses, among other things, important legal issues of current concern in the US and relates to extreme housing market outcomes.[13] The latter aims at arresting spiraling housing costs by directly interfering with the operation of the housing market.

3.3 Housing Displacements

There is a growing global concern centered around providing shelter to the extreme poor, who find themselves in complex circumstances leading to housing displacements taking the form of eviction, foreclosure, or even homelessness. Evictions are removals of tenants from rental properties by their landlords, but they may also pertain to the removal of homeowners of foreclosed properties. These outcomes are conceptually related; they amount to *displacement* of households from their shelter for at least some time. This is the case for households who cannot afford to occupy spaces commonly considered as suitable for dwellings and become homeless.

More than 2 million households incur eviction filings annually in the US.[14] Collinson et al. (2024) show that eviction filings are preceded by decreases in income and employment or health events. They establish that eviction orders increase homelessness and reduce earnings and access to credit. Diamond et al. (2020) detail the differential impact of foreclosures: landlords suffer a financial shock, tenants an eviction shock, and homeowners are far more profoundly affected by both shocks. These shocks result in housing "instability," reduced homeownership in the future (in part because of lingering effects of reduced credit scores), financial distress, relocation to inferior neighborhoods and family instability. Moreover, foreclosures have adverse spillover effects on property values as they propagate in their immediate neighborhoods, producing undesirable outcomes (Towe and Lawley, 2013). Differences in distressed home sales, foreclosures and short sales, are found to be the main driving force for the existence of a racial gap in realized housing returns (Kermani and Wong, 2021) as Black and Hispanic homeowners are more likely to experience a distressed sale or live in neighborhoods with more dis-

[13]The Supreme Court of the United States, Case No. 23-175, ruled that fining and arresting homeless people does not violate constitutional protections against cruel and unusual punishment under the Eighth Amendment; https://tinyurl.com/yc6te8hs.

[14]Not surprisingly, the actual numbers are hard to establish. Gromis et al. (2022) "mine" 99.9 million court cases and use novel techniques to estimate 2.7 million cases annually between 2000–2018. Data collection is hampered by hard-to-access court data. High eviction filing rates also occur outside of high-cost urban areas.

tressed home sales. Desmond (2012) emphasizes the disruption that evictions cause to residents of poor urban Black neighborhoods in particular, and notes that they affect more households headed by women. Indeed, he likens the impact on those households to that inflicted by incarceration of young Black men, "a typical but severely consequential occurrence contributing to the reproduction of urban poverty."

Homelessness is an extreme manifestation of housing inequality, and while its incidence is inherently hard to define and measure, it is increasingly present worldwide. It has become particularly acute in high-cost metropolitan areas in the US.[15] To illustrate this, California, which has 12% of the US population and is one of the richest US states, hosts nearly 30% of the entire US homeless population. The Annual Homelessness Assessment Report by the US Department of Housing and Urban Development reports an increase of 19% since 2023.[16] The incidence of homelessness varies dramatically between demographic groups, from about 6 per 10,000 people for Asians to 60 for African Americans and 136 for Native Americans. About a quarter of homeless people in shelters have jobs. In Los Angeles, 78% of the homeless are unsheltered, whereas in New York City a legal "right to shelter" means that only 8% are unsheltered. In the rest of the US, 51% of the homeless are unsheltered. More than 1.4 million people pass through emergency shelters every year. Beyond the poverty and hardship associated with it, it is often seen as a blight in affected urban areas. Its political impact has attracted the attention of decision makers.[17]

The UK Office of National Statistics (2023) reports that 13,955 people in England and Wales, or 2.3 per 10,000 people, were in hostels and temporary shelters for the homeless in the 2021 Census.[18] As in the US, the incidence of homelessness in the UK varies across demographic groups, with a greater incidence among younger and Black individuals who are often in poor health and lack skills. Fetzer et al. (2023) establish a causal impact of unanticipated cuts in rent subsidies in the UK on statutory homelessness, but also evictions, financial distress and insecure temporary accommodation, which is most acute

[15]This is underscored by the many forms that homelessness takes, with tents, shelters, cars, motels and couches hosting the homeless.

[16]Total Homeless Individuals, 770,000, US, 2024. Data originate in point-of-time counts by local volunteers who seek to enumerate homeless, sheltered and unsheltered on a single night in January. https://www.huduser.gov/portal/datasets/ahar.html

[17]A new US government program plans to reduce homelessness by 25% by 2025 https://tinyurl.com/2p3um298.

[18]https://www.gov.uk/government/collections/homelessness-statistics. UK housing authorities have a statutory obligation to shelter the homeless.

for families with children, single parents and those in poor health. They argue that such cuts may be shortsighted because local governments have to be compensated due to statutory homeless obligations, which leads to ambiguous net social savings.

Evans et al. (2019) explore different policies aimed at reducing or preventing homelessness, highlighting the impact of the volatility of funding availability. Several other researchers seek to evaluate the effectiveness of specific interventions, such as providing cash assistance in a randomized evaluation setting. O'Flaherty (2019) argues that while a fair amount is known about policies that are effective in specific cases, little is known about why the incidence of homelessness varies so dramatically across demographic groups as well as geographical areas. Overall, homelessness deserves greater attention in the housing literature.

3.4 Rent Control

Local and national governments across the world have resorted to various rent control schemes, especially in response to housing scarcity after World War II. In many countries, some form of rent control remains in existence (see the OECD Housing Database).[19] According to OECD (2021), rent control stringency varies even across OECD countries, with Sweden being the most stringent and UK one of the least. Although rent control is defended as insurance against rent increases without a direct commitment of public resources such as providing housing benefits, ordering rents to remain fixed and granting rights to sitting tenants (who may not necessarily be low-income households) has a plethora of effects. In the short run, it does not guarantee housing for all and hinders residential mobility. It causes misalignment of demand with consumption as households' circumstances change and may even reduce labor mobility. In the long run, it hampers housing investment and thus causes misallocation of capital. Hardman and Ioannides (1999) study rent control and allow for adjustments in the allocation of housing by means of restrictions on the frequency of moves within an aggregate two-sector model. They find that rent control favors physical capital investment at the expense of housing investment. The simulations reported in Figure 4.7 of OECD (2021) reveal an improved allocative efficiency in line with the relaxation of the rental market regulation.

[19] https://www.oecd.org/els/family/PH6-1-Rental-regulation.pdf. In the US, as of 2022, over 200 local governments had a rent control policy in place; see https://www.naahq.org/rent-control-policy.

Glaeser and Luttmer (2003) emphasize that in New York City, "rent stabilization" affecting some of the rental housing stock leads to misallocation that creates horizontal inequities across demographic subgroups. Enström-Öst and Johannson (2023) employ a unique randomized rental apartment lottery in the Stockholm metropolitan area, which has rent control, to analyse the behavior of individuals receiving rent-controlled housing contracts. They find that receiving such a contract leads to a reduction in recipients' annual labor income between 13% to 20% and employment between 8% to 13%. Rent control deregulation has complex effects. Donner et al. (2017) examine the likely distributional effects of deregulating the Stockholm rental housing market and predict that if rent control in metropolitan Stockholm were to be lifted, rents would increase in the city's wealthy center by 30-70%. However, suburban neighborhoods might experience smaller increases, and some even rent decreases. All of these studies demonstrate instances of profound misallocations associated with rent control.

Among many studies, the following two demonstrate the complexity of the distributional effects of rent deregulation. Autor et al. (2014) show that in Cambridge, Massachusetts, rent deregulation led to increases in property values and associated improvements in amenities, which affected both existing and new owners of formerly controlled and never-controlled units, but hurt tenants. Such residential neighborhood effects are critical in assessing the redistributive effects of removing rent control. Specifically, price appreciation in decontrolled units and nearby never-controlled units accounted for almost one-quarter of the total property appreciation between 1988 and 2005. Most of that appreciation accrued to never-controlled properties through spillovers (due to improved maintenance, amenities, and more efficient sorting of individuals to housing) and much less to investment. Diamond et al. (2019) use a 1994 law change in San Francisco to show that the introduction of rent control reduced renters' mobility by 20% and lowered renters' displacement from San Francisco. However, the response by landlords reduced rental housing supply by 15% due to sales to occupants and building redevelopment.

4 Housing Capital

Housing capital makes up about half of the national capital stock in many countries and is the most important form of wealth for most homeowners. For these individuals, housing choice is a joint consumption and investment decision. When the collateral constraint is

not binding, the relative consumption across housing and non-housing can be expressed as:

$$Owner: \frac{h_t^i}{c_t^i} = \left(\frac{h^i}{h^i - \bar{h}}\right)\left(\frac{\omega}{1-\omega}\right)^{\varepsilon}\left[p_t(\ell_t^i) - E\left(\frac{p_{t+1}(\ell_t^i)}{R_{t+1}}\right)\right]^{-\varepsilon}. \tag{7}$$

If the house price is equal to the discounted sum of future rents, the term in the square bracket above, is equal to the rent $q_t(\ell_t^i)$. In that case, the relative housing expenditure for owners in (7) coincides with that for renters in (6). Owners incur an *effective* price, which is affected by many factors: the tax treatment of the flow of housing services, mortgage interest charges, housing wealth via property taxes, capital gains, and climate-related investments; see the user cost theory of Poterba (1984).[20]

What truly differentiates the housing decision of homeowners from those of renters are the *housing wealth effect* through the budget constraint (2), the *collateral effect* through the borrowing constraint (3), and the effective *dependence* of the price of owning on income (due to nonlinear taxation), and on wealth (due to borrowing constraints), as we discussed earlier.

4.1 Housing Wealth

Housing wealth has accounted for a significant fraction of national wealth for centuries. Evidence for France, Germany, the UK and the US since 1700, and for Australia, Canada, Japan, and Italy since 1970, is documented in Piketty and Zucman (2014). The continued importance of housing wealth has been documented for many OECD countries in recent decades. OECD (2021) summarizes findings by Causa et al. (2019) using microdata from the ECB Household Finance and Consumption Survey and the Luxembourg Wealth Survey during the 2010s. The authors find that, for the majority of countries, housing assets make up more than half of the total assets of households in the middle three quintiles of the income or wealth distribution.

Figure 5.2 in OECD (2021) reveals a negative relationship between homeownership rate and the share of net wealth held by the top 10%, with a correlation coefficient of -0.54.[21] This negative correlation is indicative of the close relationship between housing

[20] The effective price is defined as the sum of (i) after-tax depreciation, repair and improvement costs, property taxes, and after-tax interest costs that apply to the portion corresponding to the share that is financed by borrowing (levered); and (ii) the opportunity costs of funds within the asset portfolio, net of the expected capital gain. Expected capital gains reduce the opportunity cost of housing, an effect which theoretically could be strong enough to make the demand for owner-occupied housing upward sloping. This could explain the seemingly irrational behavior of households during housing price bubbles (Dusansky and Koç, 2007).

[21] Household net wealth is defined in the OECD Guidelines for Micro Statistics on Household Wealth

and inequality, but it has not been highlighted in the literature. Relatedly, Figure 5.4 in OECD (2021) reports a negative correlation coefficient of -0.61 between the average homeownership rate and the homeownership gap between the top and the bottom income quintiles for 27 OECD countries. The figure indicates that homeownership is more evenly distributed across income groups in countries with high average homeownership.

Within OECD countries, the homeownership rate increases with income and wealth; see Figure 7 in Causa et al. (2019). On average in 20 countries during the 2010s, the homeownership rate among the bottom income quintile was more than 25 percentage points lower than that among the top income quintile. The picture is even more pronounced along the wealth distribution: in almost all OECD countries, the homeownership rate in the top wealth quintile was more than 50 percentage points higher than the rate in the bottom wealth quintile.[22] Among homeowners, inequality in housing wealth is an important component of wealth inequality. According to OECD (2022), data from 28 OECD countries for 2019 (or the latest available year) show that the mean value of owner-occupied housing assets of those in the fifth quintile of the wealth (income) distribution is almost 16 (4) times higher than that of those in the first quintile.

Inequality in housing wealth, like in other forms of wealth, can persist into future generations through inheritance or other channels. Using the ECB Household Finance and Consumption Survey, Causa et al. (2019) document that, on average in 18 OECD countries, approximately 20% of households inherited their house outright or received it as a gift. Direct contributions to the cost of home purchase by parents is another channel through which individuals' access to homeownership depends on parental wealth. In some OECD countries, this channel has become increasingly important for young households in purchasing a home (OECD, 2020).[23] Using panel data from the UK, Blanden et al. (2023) look at the homeownership status of individuals aged 42 and that of their parents when they were 16 years old, identifying a strong and increasing intergenerational persistence of homeownership.[24] Using population-level administrative data from Denmark, Daysal

as the value of financial and non-financial assets net of the value of liabilities held by private households resident in the country.

[22]The only exception is the Netherlands where the difference was about 30 percentage points.

[23]According to the *English Housing Survey* (a national survey for England), the proportion of first-time buyers that had help from friends and family for their downpayment increased from 22% in 1995 to 29% in 2016 and to 36% in 2023.

[24]More specifically, they find that for the earliest cohort of 42 year-olds observed in 2000, the homeownership rate is about 14 percentage points higher for those whose parents owned their home in 1974. For the cohort observed in 2015, that increases to 27 percentage points.

et al. (2023) also find a strong correlation between parental housing wealth and their children's wealth at ages 29 to 33. Furthermore, they estimate the effect of parental housing wealth changes at different stages of childhood: they find a significant effect during early and middle childhood, but close to no effect during teenage years. Changes in children's educational attainment and earnings account for only 20-30% of the transmission of parental housing wealth.[25] The authors attribute the remaining unexplained portion to changes in unobserved household environments (specifically in unobserved transfers from parents to children), and parental behaviors that influence children's savings and investment behavior.

4.2 Housing Returns and Wealth Inequality

Returns to housing have important implications for inequality due to unequal distribution of housing wealth and the fact that housing asset is the most important asset in most households' wealth portfolios. This observation plays a central role in the debate surrounding the influential work of Piketty and Zucman (2014). The authors documented a substantial increase in the aggregate wealth-to-income ratio and interpreted it as a shift of aggregate income from workers to those who own capital. Rognlie (2015) shows that the increase is entirely driven by housing capital and especially by the increase in the return to housing capital. He disputes the *accumulation view* of Piketty (2014), according to which the rise in the capital share is due to capital accumulation. Instead, Rognlie supports a *scarcity view*, according to which the scarcity of land increases the return to housing capital, which in turn increases the housing capital share when housing demand is sufficiently price-inelastic (see Section 3.2).[26] His findings suggest that the shift of aggregate income has been from renters to homeowners. Therefore, policymakers concerned about inequality should monitor housing costs, and particularly those that may be linked to restrictions on land use and residential construction, as these factors contribute to housing scarcity. We take up these issues in Section 5.3.2 below.

Among homeowners, variations in housing returns by location can drive heterogeneity of returns across the wealth distribution. Using city-level data, Amaral et al. (2022)

[25]The positive relationship between parents' housing wealth and children's education have been documented for other countries, including Germany, Sweden, the US and the UK (Lovenheim, 2011; Pfeffer and Hallsten, 2012; Karagiannaki, 2017).

[26]The rising relative price of housing could also be driven by slower productivity growth in the construction sector compared to other sectors, which, as shown by Borri and Reichlin (2018), can contribute to rising wealth inequality when housing demand is price-inelastic.

document substantial spatial variation in housing returns across 15 OECD countries (see also Aladangady et al. (2017) who use US city data).[27] Using two country-wide data sets for Norway that follow individual homeowners, Eggum and Larsen (2024) measure capital gains based on changes in house prices and consider explicitly three types of capital gains: realized, semi-realized, and potential depending on legal definitions linked to the timing of buying and selling.[28] They find a substantial increase in capital gains inequality over the period 2007 to 2019, as measured by differences between the ninetieth and the tenth percentiles across and within both geographical strata and birth cohorts. They adopt this measure because it is in relative terms, thus it is easy to interpret as difference in purchasing power.

The distinction between realized and potential gains is also crucial to the finding of Piketty and Zucman (2014) of an increase in the wealth-to-income ratio. Bonnet et al. (2014) argue that returns to housing capital should be evaluated using rents, which represent the actual income derived from housing capital for landlords and the opportunity cost for owner-occupiers. They find that in Canada, Germany, France, the US and the UK house prices have increased significantly faster than rents since the late 1990s.[29] When the authors recalculate the value of housing capital using rents, they find only a modest increase in the wealth-to-income ratio relative to the findings of Piketty and Zucman (2014). Although the debate on the causes of the rising wealth-to-income ratio remains unsettled, these authors agree on the real consequences of housing price increases for access to housing and the potential impact on inequality.

Fagereng et al. (2022) make a different yet closely related argument regarding the distributional consequences of rising asset prices. In a world without borrowing and collateral constraints, the *welfare* of households that never buy or sell assets is unaffected by changes in asset prices. Similarly, changes in house prices only have an impact on the welfare of net buyers and sellers. This has implications across cohorts, since young people are more likely to be net buyers of housing than older people. Thus, rising house prices can favor older generations at the expense of younger ones. However, the collateral constraint

[27]The contribution of the location to the structure of returns to housing has been overlooked, but Ortalo-Magné and Prat (2016) offer a theoretical first step in this direction.

[28]The paper tracks individuals who were owners on January 1, 2007, and January 1, 2019. The capital gain is defined as semi-realized if an owner sells the unit she owned on January 1, 2007, and had purchased before January 1, 2007.

[29]Fagereng et al. (2022) document the same pattern in Norway from 1994 to 2015, but other studies utilizing micro data from the UK and Germany (Belfield et al., 2015; Dustmann et al., 2022) reveal that rents have increased at a faster rate than prices.

(3) implies that changes in house prices can influence the welfare of homeowners even if they choose not to buy or sell.[30]

4.3 Housing as Collateral

Housing capital is the primary, and often the only, source of pledgeable capital for most households. Unlike other purchases that use debt, homeowners can use their home equity to borrow for other purposes.[31] According to the OECD Wealth Distribution Database, across 27 OECD countries about one-quarter of households (one-third of homeowners) have mortgages. The share of households with mortgage debt increases with household income, from less than 10%, in the bottom quintile, to more than 40%, in the top quintile (Causa et al., 2019). Mortgage debt is the largest component of household debt, accounting for more than half of total household debt in 26 OECD countries and more than 75% in 11 OECD countries. Among households with mortgages, it represents more than 80% of household debt.

The ECB Household Finance and Consumption Survey provides information on the use of the primary home as collateral, asking respondents in 22 OECD countries about the purpose of the mortgage on their primary home (Causa et al., 2019). The results reveal that the main purpose of mortgages is to buy or renovate the primary home; in most OECD countries, fewer than 10% homeowners use a mortgage on the primary home for other purposes (Canada is an exception with more than 30%). The fraction is higher for homeowners in the top income and wealth quintiles. The most common other uses are purchasing other real estate assets, followed by financing business or professional activities, covering living expenses or other purchases, consolidating other debts, and educational purposes.

The literature documents various spending outcomes resulting from increased borrowing against home equity, including increased investment in human capital[32] and reduced labor supply.[33] Most studies concentrate on the impact on consumption, driven by the

[30] In the presence of collateral constraints, changes in house prices can cause even greater redistribution between net buyers and net sellers of houses (Kiyotaki et al., 2011).

[31] De Soto (2000) has drawn attention to the fundamental role of titled property ownership, over and above arguably disputable ownership of housing as a shelter, for the functioning of capital markets that can allow economic development.

[32] Lovenheim (2011) uses short-run changes in individual housing wealth during a period of high housing wealth liquidity in the early 2000s in the US as exogenous variation in the wealth of homeowners. He finds that $10,000 in home equity raises the rate of college enrollment by 0.7 percentage points on average; the effect is much higher for low-income families by 5.7 percentage points.

[33] Favilukis and Li (2023) use variations in house price growth across US MSAs to show the increase

strong correlation between house prices and aggregate consumption. Specifically, these studies investigate the collateral effect of house prices on consumption and assess its significance relative to the wealth effect. The two effects imply that house price fluctuations will have heterogeneous effects across young and old households, and across households with different degrees of financial constraints. The typical life-cycle model predicts a positive age profile of housing wealth effects, as older homeowners have a shorter planning horizon and therefore a stronger incentive to utilize housing wealth for consumption. However, this prediction is in contrast to the negative age profile found in many empirical studies. Cloyne et al. (2019) demonstrate that the key to reconciling these two bodies of literature lies in the fact that younger households face greater financial constraints, and more financially constrained households exhibit a more pronounced response to increases in house prices due to the collateral effect.

A major challenge in the literature is to identify the extent to which a rise in house prices is independent of common factors that also influence other relevant outcomes. For example, anticipation of income growth can result in simultaneous increases in house prices, borrowing, and consumption. Studies of house price growth across geographical areas must therefore address confounding regional shocks such as fluctuations in local income expectations, which can be the common driver behind house prices and consumption (Attanasio et al., 2011). Significant progress has been made in addressing this issue and identifying the collateral effect of house price increases. For example, Leth-Petersen (2010) uses the natural experiment provided by a Danish mortgage reform that allowed homeowners to use mortgage loans for any purpose. The author finds that the effect is strongest for younger households who are more financially constrained.[34] Recent work by Cloyne et al. (2019) and Andersen and Leth-Petersen (2021) confirms the significant collateral effect for younger households. These studies utilize administrative data on individual mortgages to demonstrate that rising house prices prompt mortgage extraction through refinancing. In particular, Cloyne et al. (2019) exploit the prevalence of short-term fixed-rate mortgages in the UK, where most homeowners refinance at regular and quasi-exogenous intervals. Andersen and Leth-Petersen (2021) use longitudinal survey data on expectations to identify unanticipated changes in home values in Denmark.

in housing wealth post Covid-19 has contributed to the fall in labor supply among older workers.

[34]Recent work uses the Danish reform to investigate effects on labor market behavior. By relaxing household liquidity constraints, the reform contributed to more entry into entrepreneurship (Jensen et al., 2022) and better job matching (He and le Maire, Forthcoming).

The collateral constraint (3) can benefit homeowners when housing prices increase. However, it is important to acknowledge that this is a simplified approach to modeling the role of housing as collateral in many macro models. In reality, most households have mortgages and the availability of mortgage options depends on credit scores and income levels. The two principal types of mortgage are adjustable-rate and fixed-rate. In the US, the majority of mortgages are 30-year fixed-rate mortgages, which differ from mortgage markets in many other countries, both in terms of their share and extended maturity. According to OECD (2022), in around half of the 26 OECD countries surveyed, more than 50% of mortgages in 2019–2020 were fixed rate. However, the duration of the fixed-rate maturity is typically shorter in these countries than in the US. In the UK, for instance, fixed-rate mortgages with a duration over 10 years are uncommon; most are fixed for 2-5 years before adjusting to a new rate. This setup can incentivize homeowners to refinance when rates fall, but if house prices decrease, owners are likely to face higher interest rates with their existing mortgage providers unless they can generate additional equity to compensate for the price decline.

There are two additional factors that need to be considered in relation to the benefits of housing as collateral. First, substantial transaction costs associated with buying and selling houses (which are reflected in the budget constraint (2) by the parameter κ^o) cause housing to be regarded as an illiquid asset. Among households with the same level of wealth, those with more housing wealth could be more financially constrained than those with more liquid assets. For this reason, households whose wealth consists primarily of housing wealth are sometimes referred to as "wealthy hand-to-mouth" households (Kaplan and Violante, 2014). Second, the leverage provided by housing investment implies a much larger gain (or loss) relative to non-housing assets when experiencing the same increase (or decline) in prices. This concern is particularly important in the presence of uncertainty in house prices. We next turn to the decision between owning and renting, as well as the broader wealth portfolio decision.

4.4 Renting, Owning, and the Wealth Portfolio

The pure preference for the mode of tenure of the housing, that is, renting versus owning, is expressed by the parameter ξ_{ι^i} in the utility function (1). For owners, housing has a dual role as both a consumption and an investment good. Henderson and Ioannides (1983)

motivated a considerable literature that distinguishes owner-occupants from renters, with the former modeled as individuals whose investment demand for housing exceeds their consumption demand.[35]

Properly comparing renting to owning requires comparing the lifetime indirect utilities associated with renting versus owning, defined in Section 2 as a function of the state variables at time t. The difficulty of working with value functions is well known,[36] so much of the empirical literature models tenure choice in terms of discrete choice based on annualized cost comparisons. For renters, those costs are based on market data on rents and expectations about the future (although this is rarely done). For homeowners, this requires imputations that take into account all attributes of owning. Inequality in income and wealth impinge upon this choice.

As we discussed earlier in this section, such imputations are facilitated by the user cost of housing (Poterba, 1984). Many homeowners benefit from levered housing returns; these returns typically exceed unlevered ones (Jorda et al., 2019).[37] The leverage choice is influenced by expectations of future housing prices (which may be conditioned on owners' demographic characteristics), agency issues and neighborhood effects that, for example, affect house maintenance behavior and many other things.[38]

Studying housing tenure choice in the context of inequality also requires recognizing the institutional setting of an economy. At one extreme, there may be barriers to free choice because of taste-based market discrimination; this is discussed in Section 6. At another extreme, access to public (social) housing and its allocation differ dramatically across countries. Eligibility often reflects non-price rationing, which depends on individuals' demographics in complex ways (for UK council housing, see King (1980), and for Singapore public housing estates, see Wong (2013)). Since homeownership involves highly endogenous determinants and institutional differences, its relationship with income and wealth inequality is tricky to assess. In line with the finding of OECD (2021) discussed

[35]See also the literature on understanding the determinants of homeownership rates surveyed by Goodman and Mayer (2018), and macro life-cycle models such as Chambers et al. (2009).

[36]Notable progress has been made with econometric methods bypassing tedious computation of the value function; see Davis et al. (2021), discussed below in Section 5.2.3.

[37]According to Jorda et al. (2019), p. 1266, the levered real housing returns TR' is a function of unlevered real housing returns TR: $TR' = \frac{TR - \alpha r_0}{1-\alpha}$, where r_0 is the real long-term mortgage rate and α is the leverage ratio proxied by total mortages divided by the value of housing stock.

[38]Bailey et al. (2018a) show, using plausibly exogenous variation in house price beliefs, that more pessimistic homebuyers make smaller down payments and choose higher leverage, in particular in states where default costs are relatively low, as well as during periods when house prices are expected to fall on average.

earlier, Kaas et al. (2019) use the ECB Household Finance and Consumption Survey (2013–2016) to show a negative correlation between homeownership and wealth inequality across European countries. Some differences are stark: Germany, a much wealthier country than Greece, has a homeownership rate of 44% compared to 72% for Greece, while the respective Gini coefficients for wealth are 0.76 and 0.56. It is thus difficult to draw lessons from international comparisons even across two European countries.

Given their opportunity sets, are households that choose to own their homes better off? In view of the myriad factors entering the decisions, and the numerous endogeneities, the findings of Sodini et al. (2023) are particularly interesting. In Stockholm, municipally owned rental housing was unexpectedly privatized, confronting tenants with a tenure choice between owning and renting. The authors employ a battery of rigorous tools to control for potential endogeneities. For example, a key issue is whether the wealth shock is endogenous, conditional on the treatment. They thus instrument the wealth shock (which is net of the opportunity cost of giving up a desirable rental unit in a rent-controlled market) with a hypothetical wealth shock based on neighborhood-level house prices. This hypothetical wealth shock is also available for households in the control group, which allows the authors to control for differences across households with different wealth shocks. Another important concern is while the treatment might cause moves, some of them are endogenous. By using a variety of techniques they account for the fact that movers are inherently different from stayers. These authors conclude that households that purchased their homes (while taking advantage of discounts relative to the market) experienced substantial wealth accumulation. However, the authors do not account for the combined effect of price discounts and house price growth exceeding the borrowing rate. Homeowners also took advantage of additional borrowing capacity and increased consumption relative to the previous four years. That is because homeownership increased borrowing capacity much more than wealth. Still, those new homeowners moved up from the fifty-fourth to the seventy-first percentile of the Stockholm wealth distribution.

It is interesting to briefly review the returns to housing as an asset from a macroeconomic perspective. Jorda et al. (2019) (Supplemental Data, Table A.5) report that the average annual (unweighted) real returns to housing are quite heterogeneous across countries, but they exceed the returns to equity for the authors' entire sample period of 1870–2015 (including war years): 7.3% versus 6.7%. The authors find that real returns

to housing exceed the return to equity in individual countries such as Belgium, Denmark, France, Germany, Japan, Netherlands, Norway, Portugal and Sweden. However, the opposite is true for the US (6.1% versus 8.5%) and the UK (5.4% versus 6.8%). Real returns to equity fluctuate much more than returns to housing, and their correlation was high and positive until World War II, but it has been much lower since then. Figures VII and VIII in Jorda et al. (2019) plot the decadal moving averages for 16 countries. The authors argue that the evidence of overall low covariance of real returns to equity and housing over the long run reveals potential attractive gains from portfolio diversification which economists have not fully explored.

4.4.1 Housing in Households' Wealth Portfolios and Inequality

The housing tenure choice literature considers individual housing outcomes and how they are affected by inequality. However, the quantity of housing – the largest component in most households' wealth portfolios – depends on all the factors (including numerous options for saving and borrowing) that determine the household's entire portfolio. Households must consume housing services regardless of whether they rent or own the property they live in, so they face the problem of hedging risks. Both renters and owners are exposed to aggregate and individual-specific shocks, but the risks they face are different. Owners with mortgages commit to a down payment and interest payments that depend on the nature of their mortgage loans. These loans may have fixed or adjustable interest rates. The latter expose borrowers to aggregate shocks, while inflation benefits fixed-rate borrowers.

Variations in income and wealth map differently into variations in housing consumption and investment demands.[39] Ioannides and Rosenthal (1994) test the predictions of Henderson and Ioannides (1983) and find that investment demand is more sensitive to wealth and income than consumption demand and that consumption demand is more sensitive to demographic and geographic variables. Moreover, the value of the principal residence of most owner-occupiers is determined by their consumption demand for housing, not their investment demand. Brueckner (2017) uses Survey of Consumer Finances and confirms the prediction that the mix of non-housing assets differs between constrained and unconstrained cases, net of actual and imputed rental income. Arrondel and Lefebvre

[39]This is measured as total real estate holdings. The value of primary residence is examined separately.

(2001), using French data, show that the difference between consumption and investment demands cannot in itself explain housing purchases by French households. Crossley et al. (2022) use UK household-level data on borrowing, consumption, and investment to show a borrow-to-invest motive, whereby leveraged households increase borrowing to make additional residential investments so as to get closer to their optimal asset portfolio. These studies could be used, along with the distribution of demographic characteristics of households within the population, to assess the endowments-related housing inequality that originates in wealth portfolios.

Transaction costs typically include fixed components of all types. They cause portfolio readjustments to take place at discrete times, usually coinciding with changes in housing consumption. Demographic shocks or job relocation (planned or unplanned) can lead to moving, remodeling, or changes in tenure. Flavin and Nakagawa (2008) and Flavin and Yamashita (2011) allow for adjustable non-housing consumption and general asset portfolios. Since the overall risk preference depends on wealth, the distributional consequences follow. The highly levered position of young homeowners leaves little room for extensive risk diversification. Notably within the housing and asset portfolio literature, both of the above-mentioned papers endogenize the timing of adjustments of the housing quantity in reaction to exogenous events. Thus, housing is quasi-fixed during residence spells whose length is endogenous, but timing depends on the share of housing in total wealth. These considerations link endowment-related housing inequality with associational inequality. The strength of neighborhood effects, documented by Chetty and Hendren (2018a,b), depends on the duration of residential spells (see Sections 5.1 and 5.2). Relatively high transaction costs prevent households from adjusting their housing consumption in line with their preferences and lead to prolonged residence spells. They thus favor the impact of good neighborhoods by strengthening associational inequality at the cost of misallocation. This link between residence spells and inequality calls for further exploration.

Martinez-Toledano (2022) emphasizes market timing. Using Spanish data, she finds that top wealth holders time the market better, investing a larger share in housing during booms and reshuffling their portfolios away from housing and in favor of financial assets at the beginning of busts. Such portfolio reshuffling is an important driver of short- to medium-term fluctuations in wealth inequality. Sakong (2022) estimates the trade

patterns of households across wealth levels in the US housing market for 1988–2013. This study complements the findings of Martinez-Toledano (2022) by showing that poorer households are more likely to buy risky financial assets in booms — when expected returns are high — and to sell after a bust — when expected returns are low. The interquartile-range-difference is 60 basis points annually. Consequently, geographical areas in the US with historically high housing market volatility will be associated with greater wealth inequality than income inequality.

All in all, theoretical and empirical progress has been made in our understanding of the role of housing in households' wealth portfolios. However, the macroeconomic estimates obtained by Jorda et al. (2019), discussed at the end of the preceding section, have not yet been fully integrated by the literature in order to provide a fuller understanding of the impact of cyclical fluctuations. As such fluctuations are of macroeconomic origin, they mask important details about the risks faced by individual households and how they can be hedged.

4.5 Taxation and Housing Inequality

Mortgage debt is an important part of household debt, accounting for more than half of all household debt in the OECD countries. It has also grown in importance, especially in the US. Mortgage interest deduction, available in many countries, reduces the cost of homeownership, but its incidence is uneven. The length of mortgage loans is also important because interest charges are front-loaded, allowing greater tax deductions early on, and vary across countries.

The elimination of the mortgage interest deduction has been debated in both the US and in Europe.[40] Arguments in favor are that it generates a large loss in tax revenue and is effectively a regressive feature as it interacts with the progressivity of taxation: the value of the deduction increases with household incomes and the associated marginal tax rates. An argument against eliminating mortgage interest deduction is that it will reduce the homeownership rate, which according to DiPasquale and Glaeser (1999) would reduce the investment in social capital. In contrast, Sommer and Sullivan (2018) argue that the elimination of deductibility could potentially raise the homeownership rate by considering the general equilibrium effect on house prices. They find that eliminating the

[40]This deduction is limited in the US nowadays, but it still favors taxpayers with higher marginal tax rates (see IRS Publication 936).

mortgage interest deduction could reduce house prices, which reduces the required down-payment. This implies that more low-wealth and credit-constrained households could become homeowners, resulting in a higher homeownership rate. They show that such reform would improve the housing consumption of lower-income households compared to higher-income households.

Rather than reviewing the huge specialized literature on the tax treatment of housing, we focus on a few key issues pertaining to inequality. The tax treatment of housing favors higher-income households. A progressive tax system that also allows for deduction of property taxes reduces the burden of property taxes, which are levied on property values. In the US, the actual tax liability may be deductible from the federal income tax under certain conditions, and various improvement categories may also be tax-advantaged. Figure 4.4 in OECD (2021) shows that across OECD countries, the marginal effective tax rate for owner-occupied, debt-financed investment ranges from a subsidy of 70% in the Netherlands to a tax of 22% in the UK.

A related and underexplored issue is the fact that implicit income in the form of housing services from owner-occupied homes (a form of asset income in kind) is rarely taxed. That is, from (3), the value of housing consumption in the l.h.s. $p(\ell_t^i)h_t^i$ is associated with asset income in the r.h.s. $p(\ell_t^i)h_{t-1}^i$, which is implicit if the home is not sold. This also favors owner-occupancy over renting. From (4), renters incur housing expenditure $q_t\left(\ell_t^i\right)h_t^i$ which is not associated with any asset income. This amounts to unequal treatment of renters relative to owners, that is, horizontal inequity. Property taxes, an important feature of the tax treatment of housing, with implications for inequality are discussed in Section 5.3.1.

Poterba and Sinai (2008) emphasize that the often forgotten exclusion of the imputed income of owner-occupants from the tax liability is an important benefit favoring higher-income taxpayers. They assess that the revenue loss in the US from the exclusion of this imputed income from total income amounts to four times the revenue loss from the property tax deduction. They also show that the "last dollar" user-cost of housing that follows by taxing the imputed income (and treating it like landlord rental income) decreases with household income. However, as List (2023) shows, using data from several European countries, the impact of taxing imputed income on income inequality is ambiguous. This is because the share of housing in total wealth typically decreases with

total wealth. Thus, the user cost decreases with total income, and wealthier households hold little mortgage debt. List quantifies inequality within and across renters and owners by means of Theil's generalized entropy measure. Figari et al. (2017) investigate the distributional implications of abolishing the mortgage interest tax exemption (and other special tax treatments of expenses related to the main residence) and include the imputed rents as taxable income of homeowners. They look at six European countries with varying tax treatment of homeowners and argue that removing the "homeownership bias" would generate revenues that could allow taxation of labor to be lightened. As highlighted by Kiyotaki et al. (Forthcoming), a clear distributional impact of removing homeownership subsidies is a welfare loss, measured as consumption-equivalent, for older generations, who are more likely to be homeowners. This could be a reason why it is politically difficult to implement.

Finally, transaction taxes on property transfers have garnered significant attention from policymakers, as seen in *Henry Review* (in Australia) and *Mirrlees Review* (in the UK). Research using data from Australia, Europe, and the US, as reviewed by Määttänen and Terviö (2022), demonstrates that transaction taxes reduce homeowners' mobility, transaction volumes, and house prices in the ownership market, resulting in substantial welfare loss. The discussion has led to proposals to replace transaction taxes with property taxes; see Chapter 6 of OECD (2021) for a discussion of transaction taxes and residential mobility in OECD countries. A recent literature explores the distributional effects of transaction taxes and their impact on tenure decisions. For instance, Han et al. (2022) find that a higher transaction tax decreases buy-to-own transactions while increasing buy-to-rent transactions, which leads to a lower homeownership rate. Their analysis, employing a housing search model encompassing rental and ownership markets, reveals a significant aggregate welfare loss and distributional effects among new homebuyers, renters, investors, and existing homeowners.

5 Housing, Location, and Associational Inequality

Unlike other major durables, the location of housing links economic and social spaces through their neighborhoods. They host social life, promote social interaction, and accommodate informational channels – all functions that persist with and/or are complemented by increasing reliance on informational technologies. Precisely because of their

multiple roles, neighborhoods are hard to define, but they are still crucial for housing's role in inequality (Durlauf, 2001). The definitions of neighborhoods favored by economists often follow the geographic detail associated with data availability.[41]

Topa and Zenou (2015) link neighborhood effects, which are typically construed in geographical space, with social network effects, which are typically construed in social space. They recognize that much more additional attention should be paid to the interface between the two. The present Section elaborates on attributes of locations such as access to jobs, schools, and social networking opportunities. However, the Covid-era experience with working from home (WFH) has ushered in important changes; see Section 5.5.

5.1 Location Choice as Investment

Moving as an investment decision involves a trade-off between incurring immediate costs against expected future returns.[42] Residential moves are often prompted by changes in demographic characteristics, such as household composition and fertility decisions, or job prospects, which motivate the chosen location and housing quantity. Households with school-age children evaluate the location of the local school quality, while retired persons will value different local amenities. With the location decision being conceptually similar for renters and owners, here we focus on the formulation for renters. Owners, however, have more at stake as they typically incur greater moving costs.

The location choice ℓ_t^i proxies for the *associational* information that enters the determination of wage $w(\ell_t^i)$ and skill accumulation $S(z_t^i; s_{t-1}^i, \ell_t^i)$, as in equation (5). It generates future payoffs in terms of better jobs and schooling opportunities through the same wage and skill accumulation functions. Choosing location equates the marginal cost of a location to its marginal benefits. The latter consists of two components. The first component of benefits can be broadly interpreted as proxying for the full range of benefits accorded by a location, to be referred to as *associational* benefits. These include more lucrative employment opportunities in a more expensive location, or better social networking options, given one's skill and social status. The second component reflects the role of location in the improvement of skill. Since such improvements pay off in

[41] Durlauf (2004) offers a detailed review of the theory and concepts for neighborhoods in a multitude of contexts. Logan and Parman (Forthcoming) emphasize the subtlety of spatial context. Buchanan et al. (2023) have pioneered interactive maps of New York City neighborhoods as defined by the *perceptions* of residents. As a general concept, this is consistent with any measure of inequality.

[42] Bilal and Rossi-Hansberg (2021) proposed the concept of location *asset* to underscore this feature.

the future, households anticipate them in setting direct spending on skill accumulation, thereby bringing in a relationship between current and future location. The fact that both components express social effects may justify their being referred to collectively by the literature as *neighborhood effects*.

As Kennan and Walker (2011) emphasize and Jia et al. (2023) recently reaffirm, many aspects of a new location may not be fully understood without moving and experiencing life in that location. Moving is modeled in Ngai and Sheedy (2020) as an investment in the match quality between the household and the house, which depends on characteristics such as location and neighborhood amenities. Macroeconomic conditions and search and other frictions can impede moves, as households tolerate quality mismatch. The timing of moving defines residence spells, the lengths of which are linked to the intensity of exposure to neighborhood effects (Chetty and Hendren, 2018a,b) and the adjustment to households' asset portfolios, as discussed in Section 4.4.1. Impediments to households' ability to invest in locational aspects of housing contribute to housing-related inequality. Restrictions in housing supply can make access to attractive locations expensive and will have consequences for inequality both immediately and in the future (see also Section 5.3.2). Since future skill depends on current skill via (5), the duration of households' stay in a neighborhood reflects a trade-off between beneficial neighborhood effects and quality mismatch.

Researchers have documented a long-standing decline in the mobility of renters in the US, which reflects mostly rent-to-rent moves (Ioannides and Zabel, 2019). This pronounced decline in residential mobility in the US involves young adults, in particular, the group most in need of investing in location.[43] An important next step in this area is to establish causal motives of residential moves. These have only rarely been addressed by the literature, with the notable exceptions of Kennan and Walker (2011) and Jia et al. (2023).

5.2 Location Choice and Neighborhood Effects

The literature examining the importance of neighborhood in housing decisions has looked at a myriad of socioeconomic outcomes. A key objective of this literature is to describe the

[43]From 1976 to 2016, the percentage of those who had moved in the preceding year declined monotonically with age, the mobility of those of aged 20–24 declining from 40% to 25% during 1976–2016 in monthly terms.

implications of neighborhood choice along with choice of housing for an in-depth analysis of the relationship between housing and inequality. Access to better neighborhoods is determined by the ability to pay for better-quality housing, which is jointly packaged with better neighborhood effects. The non-random sorting of households across neighborhoods makes it difficult to establish causal relationships between neighborhood characteristics and individual outcomes. Some of the literature examining neighborhood choice sets out to account for selection effects, using covariate controls or counterfactual models. Other work aims at characterizing the sorting of households into communities as equilibrium outcomes, using estimation models of the choice process. All researchers recognize that the joint distributions of housing consumption and income within different urban areas are not random samples from the unconditional national distribution.

Neighborhoods function inherently in a multidimensional way, and this fact confronts all empirical studies of neighborhood choice. Location in space is inherently heterogeneous. Housing density typically varies, as an outcome of supply and demand for shelter, and underlies associational benefits. Bailey et al. (2018b) establish that spatial and social proximity are strongly correlated, despite the aspatial nature of modern communication technologies (on which much social interaction now relies).

Taking seriously the multidimensional nature of neighborhoods implies that they must be evaluated in an ordinal fashion by jointly considering the set of all neighborhood attributes. Neighborhoods are identified as discrete objects, and the choice of a neighborhood is addressed by means of discrete choice tools based on utility comparisons. Such tools allow us to address the link between housing and inequality via the persistence of neighborhoods with characteristics pertaining to inequality. Utility comparisons on which estimations rest can accommodate a great range of possibilities, including peer effects and social norms, typically instances of homophily, being important as explanatory variables. The results of such comparisons imply rich equilibrium outcomes. In view of Theorem 1 in Brock and Durlauf (2002), there exist plausible parameter values for which the utility trade-offs between individuals' private utility from living in a neighborhood and their valuation of the social effects associated with that neighborhood can produce up to three equilibria – one of which is unstable and two are stable. Such conceptualizations may structure outcomes whereby individuals may segregate themselves by type in the presence of strong social effects. This induces within-group homogeneity and cross-group

heterogeneity. The interplay of individual characteristics and social effects leading to segregation underlies models of tipping and the dynamics of segregation. Such Schelling-type models have been examined empirically by Card et al. (2008) and Card et al. (2011); see Section 6.

In the remainder of this section, we first explore the role of neighborhoods as hosts of economic and social proximity. Then we examine the literature on housing and neighborhood effects, focusing on two extreme geographies. One considers neighborhoods conceptualized as *points in space* that are associated with the social context, and in particular the social determinants of the acquisition of education. A second adopts *census tracts* as neighborhoods, which are discrete spatial population groups that delineate urban areas.

5.2.1 Neighborhood Effects and Jobs

A long-standing literature review by Ioannides and Datcher Loury (2004) and an elegant model by Calvo-Armengol and Jackson (2004) have sought to establish links between social connections and employment prospects. The latter model labor markets within which workers find out about jobs through their social networks. They show that both wages and employment are positively associated across time and agents. Gee et al. (2017), using anonymized confidential data from Facebook for 55 countries, establish that more people obtain jobs where their weak ties (i.e., casual acquaintances) work than where their strong ties (i.e., friends) work because weak ties are more numerous. In all the countries in those authors' data, going to work where a specific friend works is more likely the higher is the tie strength (although it is not always statistically significantly greater than zero for all three of their tie strength measures). Interestingly, the authors show that the value of strong ties for jobs is positively correlated with greater country income inequality, as measured by the Gini coefficient. Several authors have established that the incidence of unemployment clusters spatially. Bilal (2023) confirms this for France and tests a theory that this is due to firms' co-location decisions and behavior, not of workers'. He shows that firms' behavior increases spatial unemployment differentials five-fold.

Hellerstein et al. (2014) use matched employee-employer data for a large number of workers in the US and link workers' residence and employment.[44] They obtain robust

[44]These researchers merge the data from the Longitudinal Employer-Household Dynamics (LEHD) program and the Decennial Employer-Employee Database (DEED). The latter are assembled by matching the 2000 US Census Long-Form respondents from the "Sample Edited Detail File" (SEDF) to their establishment of employment.

evidence that workers who are more connected to their neighbors have lower job turnover and greater earnings. The former effect also holds for those who are more connected to neighbors of the same ethnic or race group, though not the latter. This points to neighborhood-based job-related interactions. The authors' dataset is massive and their claims particularly persuasive as they rely on much weaker assumptions than other similar research.

Altonji and Mansfield (2018) seek to establish lower bounds for the neighborhood (treatment) effects associated with, for example, attending the same schools or living in the same neighborhoods when individuals sort based on observed and unobserved characteristics. Using multiple datasets, they confirm strong effects affecting several outcomes. In particular, they find that attending a ninetieth versus a tenth percentile school or living in a ninetieth versus a tenth percentile neighborhood increases the probability of high school graduation by 4% and college enrollment by 11% percent, and permanent wages by 13.7%.

Neighborhood effects for job opportunities can be broadly explained in terms of sorting between workers and firms in the presence of complementarities. Eeckhout et al. (2014) show that the nature of the complementarities determines the equilibrium skill distribution across cities. If skill complementarity is extreme, then the skill distribution has thicker tails in large cities. The authors use wage and housing price data to show that large cities disproportionately attract both high-and low-skilled workers; those with average skills are more evenly present across city sizes. DeLaRoca and Puga (2017) use data from Spain to show that not only are mean earnings greater in bigger cities but also the dispersion of earnings. They attribute the latter to the fact that "big city experience" not only improves skills but also benefits most those with higher innate ability, leading to greater dispersion of earnings within occupational groups. Lhuillier (2024) also postulates that workers learn from one another and confirms, using French matched employer-employee administrative data, that workers employed in relatively skill-dense cities experience faster wage growth, and disproportionately so if they are skilled. Spatial sorting of skilled workers and more productive jobs in larger cities, defined as commuting zones, favors skill accumulation but accentuates spatial wage inequality, defined in terms of between-city wage variance.

5.2.2 Sorting with Neighborhoods Modeled as Points in Space

This section considers a simplification of the basic framework, from Ioannides (2013) in order to focus on housing and associational inequality when neighborhoods are conceptualized as points on the positive real line, $\ell \in \mathcal{N} = R_+$. The model determines an equilibrium rent $q(\ell)$ that drives individuals' self-selection into neighborhoods and underpins the resulting neighborhood income distributions. Locations are indexed by parents' average neighborhood schooling, $\bar{S}(\ell)$, which is an endogenous quantity. At each location ℓ parents care about non-housing consumption, defined as income minus housing rent, and the expectation of their children's schooling. The latter is produced with parental schooling, parents' average neighborhood schooling, the child's ability and a random shock as inputs. Individuals are characterized by a vector of attributes: parental schooling, parental income, an idiosyncratic characteristic of the child, and a random shock that enters the educational production function (the counterpart of (5) here) together with parental income and schooling. Parents' trade off location and their children's expected schooling. The model delivers an equilibrium rent function $q(\bar{S})$, a *hedonic rent function*, which is increasing in $\bar{S}$ (and sigmoid under reasonable assumptions), and supports assortative matching. Average neighborhood parental schooling is obtained as an implicit function of all parameters and increasing in parental income. The neighborhood income distribution, that is, the distribution of income of parents who choose neighborhood $\bar{S}$, is well defined and lognormal and so is that of parental education. These distributions define the associational inequality that is mediated by the housing market. Their means, conditional on parents' neighborhood schooling, are increasing in that quantity; their variances are decreasing functions of the correlation between parental income and willingness to pay for neighborhood quality, which is evidence of sorting. Parental education and income are positively correlated within neighborhoods.

5.2.3 Sorting with Neighborhoods Modeled as US Census Tracts

The previous section stripped the location choice to a bare minimum in order to isolate the role of housing prices in neighborhood sorting. The attributes of neighborhoods include numerous amenities, and also descriptions of the neighborhood population with particular demographic characteristics, neighborhood school quality, geographical attributes etc. Defining neighborhoods as spatially well-defined areas for which data on the plethora of

relevant characteristics exist allows modeling neighborhood choice over discrete sets of options.

Davis et al. (2021) is a good example of a dynamic model of optimal location choice and its estimation based on data for all census tracts of Los Angeles. The authors seek to recover preferences of renters, who are likely recipients of housing vouchers, over neighborhoods. They rely on very special but commonly made assumptions on utility:[45]

$$u^i(\ell|j,\epsilon) = \frac{1}{\sigma_{\epsilon_\ell}} \ln \mathcal{L}^i(\ell^i) + \frac{1-\omega}{\sigma_{\epsilon_\ell}} \ln c^{i,\ell^i} + \frac{\omega}{\sigma_{\epsilon_\ell}} \ln h^{i,\ell^i} - \kappa_{\ell^i,j^i} + \epsilon^i_\ell, \tag{8}$$

where κ_{ℓ^i,j^i} denotes the cost of moving from neighborhood j^i to ℓ^i, ϵ_{ℓ^i} is a random utility shock, $\mathcal{L}^i(\ell), c^i(\ell^i)$, and $h^i(\ell^i)$ are as defined earlier, and σ_{ϵ_ℓ} is a parameter that effectively rescales the variance of the draws of the utility shocks. The observations form a long panel, obtained from a 5% subsample of the relevant population, who are followed over all moves. The location-specific amenities include demographic characteristics of the census tract, which they express in terms of simple functions of model parameters and choice probabilities.[46] The authors examine what would happen if Los Angeles were to convert its existing housing assistance program to one where all housing assistance is in the form of housing vouchers that can only be used in the top X% of Opportunity Atlas neighborhoods.[47] They find that $X = 20$ maximizes the aggregate earnings of children of renting households offered location-restricted vouchers. Their results show that such substitution benefits the children of households that accept vouchers, but not those who were not offered vouchers. They thus demonstrate that properly designed housing vouchers may improve intergenerational mobility, an important concern linked to neighborhoods. While the within-period stochastic structure is simple (though it could be generalized), it is nonetheless put to very ambitious use in estimating a dynamic structural model, a method that has many other potential applications.

An alternative approach by Ioannides and Zabel (2008) models neighborhood choice jointly with demand for housing services in a two-stage setting. In principle, demand for neighborhood quality and for housing services may be substitutes or complements. Notably the study uses neighborhood characteristics in a nested hierarchical setting.

[45] This assumes a Cobb-Douglas utility, which is a special case of (1) with $\sigma = 1, \varepsilon = 1, \bar{h} = 0$.

[46] While their assumptions are very special, their estimation of deep parameters is innovative. It is based on a little known approach that allows evaluation of the likelihood of observed choice probabilities in terms of model parameters without having to solve for the underlying value functions. This powerful procedure could potentially have many applications. The robustness of their results is impressive.

[47] For details on those data see https://www.opportunityatlas.org/

A random sample of observations on households from the American Housing Survey is geolocated and linked to their neighborhood clusters, defined as the set of their immediate neighbors, which is in turn linked to their census tract and then to their respective metropolitan area. The authors' approach allows them to estimate endogenous and contextual neighborhood effects. Controlling for nonrandom sorting into neighborhoods allows for unbiased estimates and provides a means for identifying endogenous neighborhood effects. Their neighborhood choice accounts for numerous characteristics of the neighborhoods and their residents, and the results confirm the importance of homophily. The authors' estimates of the housing structure demand equation confirm that neighborhood effects are important and that housing demands by neighbors are interdependent. The importance of these effects is also demonstrated by Autor et al. (2014), discussed in Section 3.4.

Although neither Davis et al. (2021) nor Ioannides and Zabel (2008) explicitly address inequality, their methodological approaches are important for understanding how housing contributes to associational inequality. The estimates may be used to make inferences about the neighborhood context of individuals in much finer geographical detail than in Reardon et al. (2015), which is discussed in Section 6.2.2 below.

While Ioannides and Zabel (2008) correct for sample selection, their approach to inference is not based on observing agents at decision points. Data for individuals when they are *plausibly forced* to make decisions are thus particularly useful. An interesting example of such research is Chyn (2018), who compares the outcomes in young adulthood for children displaced by the demolition of public housing to the outcomes for originally similar but non-displaced peers in nearby public housing in Chicago. The displaced households were offered tenant-based housing vouchers. Chyn finds that displaced children were more likely to be employed and earned more in young adulthood, experienced fewer arrests for violent crime and had lower high school dropout rates than those not displaced. Several related studies use field experimental data from the "Moving to Opportunity" (MTO) program, a major randomized housing mobility experiment (Bergman et al., 2024). This and related studies are discussed further in Section 6.1.2 below.

Patacchini and Zenou (2011) identify neighborhood effects on inputs by parents to their children's education and therefore to human capital investment. Using panel data from an entire cohort of the UK National Child Development Study (NCDS), they com-

pare outcomes for households that chose private dwellings in residential neighborhoods with those who were assigned council housing units (public or social housing in the UK). Their results suggest that parental involvement and neighborhood quality are complements.[48] In "good" neighborhoods, better-educated parents provide time input into their children's education, and their children are more likely to reach high educational levels. This is not the case for those living in "bad" neighborhoods.[49]

Gilraine et al. (2023) associate school quality with the intergenerational transmission of wealth from rising housing prices in a model linking neighborhood choice and endogenous local school quality in the US, with school zones as the unit of observation. Rising prices improve school quality via the increased tax base and hence also increase human capital and future incomes. Wealth consists of intergenerational transfers and their children's human capital, which depends on local school quality. A novelty of the authors' approach is that school quality improves via the sorting of high-performing teachers across schools (while pay is unchanged) to schools with higher socioeconomic status students in the same large school district. Using data from 2002 to 2017 from Zillow's Transactions and Assessment Database (ZTRAX) for house prices, and community data from the American Community Survey, these authors find that the school quality channel accounts for over half of the total wealth effect of a housing market shock. They confirm that the estimates indicate that most of the change in school quality is not due to changing peer effects (i.e., to changes in student demographics), but is instead due to changes in teacher quality.

5.3 Assortative Matching and Changing Amenities

Since individuals sort themselves into residential neighborhoods in a nonrandom fashion, it is not surprising that the joint distributions of their neighbors' characteristics do not form random samples of a nation's or a city's population.

A large literature seeks to document that individuals are attracted to cities that host other individuals of similar skill levels. A rich literature finds that the earnings of skilled individuals are higher in larger cities. Households' moves provide evidence on the re-

[48]To counter possible criticism that these results are due to unobserved heterogeneity, such as heritability, the authors obtain results for adopted children and find that the "results remain (qualitatively) unchanged."

[49]We follow Chetty and Hendren (2018a,b) and adopt the term "good neighborhoods", using it informally to refer to neighborhoods with low poverty, unemployment and crime rates, with good student test scores or large fractions of college graduates.

lationship between individuals' characteristics and the wages and other characteristics of their destinations. Card et al. (Forthcoming) use longitudinal data from the LEHD program of the US Census Bureau and find, consistent with recent research from France, Spain, and Germany, that two-thirds of the variation in observed wage premiums from working in different commuting zones (CZs) is attributable to skill-based sorting, and that the effect is much stronger for college-educated workers. Thus, they find a positive correlation between measured returns to skill and CZ average wages (and CZ size), that is, "almost entirely due to sorting on unobserved skills within the college workforce." Moreover, they find that the matching across CZs is much higher for college-educated workers. Assortative matching fuels nominal inequalities across cities. Moreover, differences in local housing costs more than offset the corresponding earnings premiums, suggesting that workers who move to larger CZs have lower net-of-housing consumption, which produces real income inequality. Clearly, since moves are voluntary, such real income losses must be offset by higher consumption amenities.

Since households make deliberate choices about job opportunities and quality of life in evaluating prospective destinations over time, neighborhoods, communities, and indeed entire cities are reshaped to reflect preferences as the demographic characteristics of urban populations change. Larger cities also host more heterogeneous populations (DeLaRoca and Puga, 2017). The heterogeneity of the housing stock affords flexibility in accommodating different tastes and demands and can provide more housing through additions and conversions. Thus, shocks to housing demand due to the arrival of wealthier consumers increase housing prices for all. The attraction of the so-called superstar cities, in particular, has been an important force in the reshaping of US urban areas (Gyourko et al., 2013; Baum-Snow, 2023).

Diamond (2016) demonstrates how sorting has reshaped higher-skilled US cities. From 1980 to 2000, the rise in the wage gap between high school and college graduates coincided with increased geographic sorting as college graduates concentrated in high-wage, high-rent cities. The supply of amenities changed to match changing tastes. These amenities, together with changes in wages and rents in cities, increased the welfare inequality between high school and college graduates by more than is implied by the increase in the wage gap alone.[50] In a more recent paper, Diamond and Gaubert (2022) show that

[50]See Almagro and Dominguez-Iino (2022) for a similar urban reshaping in Amsterdam induced by tourism that led to new housing regulations, all of which have had notable distributional effects.

changes in amenities have played an important role relative to job opportunities, especially after 2000. The authors assess how welfare inequality has changed by examining the impact of the different drivers of sorting: changes in nominal wages alone, then rents, and finally amenities. They find that changes in nominal wages alone can account for a 16.7 percentage points increase in welfare inequality between 1980 and 2000, and by 10.7 percentage points between 2000 and 2017. Including the effects of changes in rents reduces the increase in welfare inequality by 10 percentage points, because high-skill workers tend to live in more expensive locations. However, adding the effects of changes in endogenous amenities leads to a greater change in welfare inequality of 17 and 12.1 percentage points between 1980 and 2000 and between 2000 and 2017, respectively.

Changes in cities that follow changing demographics are not always welcomed by existing residents. A case in point is Paris, where concern over preserving its characteristic urban fabric combined with efforts to keep the city center affordable for diverse demographic and occupational groups have led to a notable initiative. That is, the city government has pioneered a policy giving it right of first refusal (known in French as *droit de préemption urbain*) when dwelling units come up for sale. The properties the government does purchase are converted to public housing, which has resulted in one-fourth of Paris residents' living in such housing.[51]

5.3.1 Local Provision of Education and Sorting

In countries like the US, where 91% of enrollments in primary and secondary education are accommodated by local governments and financed through property taxes in their jurisdictions, a potentially important force of housing inequality is linked to location.[52]

The presence of this force is much greater in the US than in any other OECD country with the exception of Canada, and the impact of property taxes on inequality via housing depends on its incidence. The majority of the relevant literature considers that property taxes levied on private homes are capitalized on house prices, thus reducing their attractiveness. The literature also considers that the benefits of the locally provided public

[51] "How Does Paris Stay Paris?" *New York Times*, March 19, 2024. The respective legislation may be found here: https://parisplu.paris.fr/DOC_RU/P_URB_DPS.pdf

[52] Property taxes amount to one-third of combined state and local taxes in the US, and are the principal source of financing of local public services, such as public safety, in addition to schools. In 2018-2019, local taxes amounted to 36% of K-12 public education revenue in the US, where the representative homeowner pays 1% of their property value in local taxes. In addition, US states contributed 47% of US K-12 public education spending in 2018–2019. The picture is similar in Canada, where most of the 40% of school finance originates in property taxes, but this is not the case worldwide.

services that a property tax finances are also capitalized on house prices, enhancing their attractiveness. The literature generally agrees that the property tax levied on rental properties is shifted to renters. If viewed as a tax on housing consumption, it is regressive because lower-income households spend a larger share of their income on housing (see Section 3). If viewed as a tax on capital, however, it is more progressive because higher-income taxpayers own larger shares of capital. In either case, it may be regressive for the lowest income groups, while more progressive for the other groups (Reschovsky, 2023). Thus, the net effect is not clear.

However, the power of local governments over zoning (see Section 5.3.2 below), together with their control over the property taxes can reinforce sorting and contribute to inequality via regressive educational outcomes. Higher home values, which generate a larger tax base, are often associated with high levels of residential segregation by socioeconomic status (see Section 6). Therefore, wealthy communities and school districts may spend more per student, and housing may thus contribute to widening rather than narrowing existing educational inequalities, in turn contributing to associational inequality.

There are other reasons why reliance on the local community property tax base for financing schools is a source of inequality in the US. Property tax assessments vary in accuracy and equity along the community wealth distribution. Moreover, state governments employ different policies in aiding poorer school districts, and local governments employ a variety of redistributive tax abatement schemes. Evidence of racial inequalities in tax assessment has been explored by Avenancio-Léon and Howard (2022). Using administrative data on transactions and tax assessments, and a property-level data set spanning most properties in the US, the authors find that Black owners and Hispanic owners face a tax burden that is between 10% and 13% higher for the same level of public services. This is because these owners are effectively assessed at higher rates (based on the house structure), while other characteristics that are factored into the market value are ignored. Given the well-documented existence of racial segregation in the US, this leads to over-taxation of communities with a high share of minority residents (see Section 6.2).

For all these reasons, the literature has not settled on the net redistributive impact of the local financing of education. The incidence of such taxes depends on demand and supply elasticities as well as on numerous other issues, including whether it is considered

on a lifetime or annual basis, and on the income concepts employed (especially if the imputed income from the owner-occupied home is included). Incidence on an annual basis is more appropriate for renters and on lifetime basis for owners, which is an important feature that complicates the analysis.

In addition, systems allowing children to apply to schools outside their neighborhood that are increasingly being contemplated and introduced in the US aim at delinking residential location from school attendance. As Avery and Pathak (2021) show, whether or not such systems truly increase access to high-quality schools is complicated by families' self-selection of housing choices in an environment of endogenous differentiation of housing prices and school qualities that emerge in equilibrium,.

5.3.2 Land-Use Regulation, Zoning, and Codes

Not only are parcels of land differentiated due to location, but their suitability for housing is subject to numerous land use regulations, zoning and building codes. They are implemented to varying degrees across the world and affect the supply of housing and therefore rents, prices and inequality. Regulations are also subject to overlapping governmental jurisdictions to varying degrees. Across OECD countries, such overlaps tend to be greater in the wealthier countries, as demonstrated by Figure 4.4 in OECD (2021). Decentralization of land-use regulations is associated with more restrictive land use settings, as it allows local jurisdictions to adopt policies that favor politically powerful groups of residents. It also allows different levels of government to hamper or even hinder projects that are likely to expand housing supply.

By design, metropolitan-level governments may weigh the pros and cons of different interventions that address market failures and externalities that transcend smaller jurisdictions within their authority. Land-use policies of one jurisdiction may adversely affect an abutting jurisdiction. Encouraging industrial location that is appealing to a particular community may generate externalities, harmful as well as beneficial. Such reasons mitigate in favor of imposing metropolitan level policies that address net social welfare. Policies restricting urban sprawl is a case in point. Because land use and building density regulations are often very site-specific and hard to quantify, it is not easy to relate land use governance patterns to levels of overall development unless the relevant sites fall within the scope of their respective metropolitan authorities. Figure 4.7 in OECD

(2021) simulates a relaxation of land use policies across OECD countries and shows that countries with the highest house price to income ratios are likely to benefit the most.[53]

Housing types and prices depend on land use regulations with zoning affecting density, in particular. In the US, land use regulation is under local government control, though it is subject to state-level legislation, which in turn influences public and social housing policies. Zoning is typically criticized for promoting low-density residential developments in US cities, where such developments are far more prevalent than in other countries. They limit housing opportunities for those who cannot afford large homes or lots.[54]

Lens (2022) argues that zoning policies in the US have racist and classist origins, make housing more expensive, and reinforce segregation patterns. The role of exclusionary zoning laws in placing restrictions on the types of homes that can be built in particular neighborhoods has been emphasized by US policy makers.[55] In examining the effects of exclusionary zoning on the lowest-income residents, Trounstine (2023) takes a political economy approach that links the racial composition of communities to voting patterns over the stringency of land use regulations that are implemented by US local governments. The author draws attention to the fact that cities with a higher percentage of White households than their metropolitan area in 1970 were more likely to have restrictive land use patterns in 2006. Trounstine also shows, using precinct-level initiative elections from several California cities, that neighborhoods with more White households are more supportive of restricting development. Although land use policies are, in principle, race neutral, adopting restrictive policies could contribute to racial as well as homeownership segregation (Kulkarni and Malmendier, 2022).

Like zoning, housing and building code restrictions are either state-controlled or locally-controlled policies in the US (and often elsewhere) and affect both the cost of new housing and the use of existing stock through remodeling. While such restrictions confer some rigidity on the housing market's ability to cater to households of different incomes and taste, filtering in some way mitigates this. Filtering refers to the process through which dwelling units command lower rents and prices as they age and depreciate

[53]Here we focus of microeconomic effects of land-use regulation, but do underscore that an emerging literature has focused on how the misallocation that it leads to have implications for aggregate productivity. See Herkenhoff et al. (2018).

[54]A proposed introduction of zoning in the UK has been criticized as likely increasing housing inequality; see https://tinyurl.com/mr23u8bm.

[55]See Rouse et al. (2021) for a policy inspired view and Ellickson (2022) for a long-standing legal critique.

in quality (not unlike other capital goods) and become affordable for occupancy and purchase by lower-income households. It has served as a robust source of lower-cost housing in the US. Remodeling and filtering influence housing stock maintenance and reuse, both of which are sources of housing options for lower- and middle-income households. They also influence the demographic composition of the city centers. Gentrification, defined as the reoccupation of the city center by higher-income households when the central city becomes more attractive, is particularly pronounced in large North American cities and depends critically on the age composition of the housing stock.

Using American Housing Survey data, Rosenthal (2014) estimates that owner-occupied housing units filter at a rate of 0.5% per year, while rental dwellings filter at higher rates, typically 1.8–2.5% per year. Both processes are slowed by inflation in the real house price and are less likely where the price elasticity of demand is high. Dwelling units are more likely to transition into the rental sector as they age. To visualize the impact of the filtering process, Rosenthal estimates that the real income of an occupant moving to a 50-year-old home would be 60% less than the income of an occupant of a newly built home (most of which are owner-occupied). Rosenthal's results confirm that "filtering is a viable long-run market-based source of lower-income housing," which is relevant to the design of housing assistance. The process of gentrification, however, is a source of the spatial pattern of upward filtering as higher-income households are drawn to old but centrally located, and subsequently heavily renovated dwelling units (Brueckner and Rosenthal, 2009). Urban redevelopment is often seen as a key policy in arresting the decline of city centers throughout the world. It raises land values and invites gentrification which together with filtering are important factors affecting the supply of low-income housing in central cities throughout the world. But it also intensifies calls for affordable housing policies.[56]

5.4 Intergenerational Aspects of Neighborhood Effects

A series of recent studies has established that neighborhoods matter for intergenerational mobility. Specifically, Chetty and Hendren (2018a,b) use information on moves by seven million families across US commuting zones and counties to estimate neighborhood effects on interegenerational mobility. The confidential data they have access to allow them to observe the careers of households as they move from one neighborhood to another.

[56]Some of the complexities of the ensuing conflicts are reviewed in a special case by Ioannides (2017).

They allow them, in particular, to implement clever identification strategies that exploit variations across birth cohorts, genders, and quantiles, and to estimate that neighborhood effects on the income of people who moved to a neighborhood as a child converge to those of permanent residents at a rate of 4% per year of exposure. When they use US counties to represent neighborhoods, they find that for children in low-income families, each year of childhood exposure to one standard deviation "better" county (defined as a county with less concentrated poverty, less income inequality, better schools, a larger share of two-parent families, and lower crime rates) increases household income at age 26 by 0.5%.[57]

5.5 Working from Home

After the onset of the Covid-19 pandemic in 2020, policy responses around the world forced a reliance on telecommuting technologies or Working-from-Home (WFH). Not all jobs are amenable to WFH, but substantial numbers of workers continued their work remotely. The latest US data covering the end of the pandemic show that only 80% of those between the ages of 18 and 64 who are working do so in-person. Among those who work partly or entirely remotely most have a bachelor's degree, followed by a graduate degree, some college, and finally high school or less. They are predominantly White (both men and women) and have no children.[58] Recent survey data show that the percentage of paid full days worked from home rose from 7.5% pre-Covid to 61% in May 2020, has been dropping since then but has stayed above 25% as of the time of writing.[59]

These facts call for an assessment of the impact of WFH on the housing market and indeed the urban structure. Across cities, workers who can work remotely can retain high-productivity jobs but economize by moving to lower-cost locations. Within cities, remote job access flattens the intracity house price gradient (OECD (2023), Figure 4.6) and elevates the importance of multi-center urban areas.

Among a flurry of research Brueckner et al. (2023) stands out. The authors use data on house prices and rents from ZTRAX, data on local amenities and productivity from Albouy (2016), and data on county population outflows from US Postal Service address

[57] See Chyn and Daruich (2021) and Fogli et al. (2022) for uses of micro estimates in macro quantitative models and the importance of the associated general equilibrium effects.

[58] Based on Current Population Survey data. Ben Casselman, Emma Goldberg and Ella Koeze."Who still Works from Home," *The New York Times*, March 8, 2024.

[59] A monthly online survey run jointly by the University of Chicago, ITAM, MIT, and Stanford University. https://wfhresearch.com/

change data. They confirm, in broad strokes, much discussed predictions of WFH, including urban population outflows. For many OECD countries, WFH increased by between 25% and 35% from 2020 to 2022 (OECD (2023), Figure 4.5). By bringing about an enormous reduction in commuting costs for workers, it represents an urban decentralization force with major implications for housing and inequality. In high-productivity cities real-estate owners lose and renters gain, and vice versa in low-productivity cities. Davis et al. (2024) emphasize that WFH and working from the office are complementary technologies in the aggregate that lead to an increasing demand for residential space and house values. They do not predict a mass exodus to remote locations, but their approach does support the notion that at least some telecommuting would continue after the pandemic ended.

Since many jobs do not lend themselves to telecommuting, WFH introduces another source of inequality, firmly linked to housing and with long-run consequences for the industrial composition of cities. WFH favors primarily highly skilled workers and occupations and is likely to have major distributional consequences, softening urban housing markets while strengthening suburban and rural ones and in ways that are as yet hard to assess. There is reasonable speculation that some commercial real estate in city centers will be converted to housing.

It is also too early to assess the net impact of WFH on individual productivity and total factor productivity. WFH saves commuting time and may induce workers to work longer hours, but it is difficult to assess the effects on individual productivity of lost serendipity in office interactions and the consequences for corporate culture (Van Nieuwerburgh, 2023). WFH, which comes after widespread adoption of informational technologies that reduce the need to travel to shop or consult a doctor (or other professionals), is bound to have major impacts on housing and land use. It is an open question whether the Covid-19 pandemic may have reversed the attractiveness of "superstar" cities (Gyourko et al., 2013), whose extraordinarily high housing costs have produced a flight to less expensive locations.

6 Racial Discrimination and Segregation

Race discrimination is present in many markets including housing (Lang and Kahn-Lang Spitzer, 2020). To the extent that discrimination drives unequal treatment of otherwise identical people based on their race, ethnicity, gender, or socioeconomic status,

it is a potential driver of housing inequality. Its consequences for housing inequality are important in their own right as an endowment force of inequality and via ethnic and racial segregation as a force of associational inequality.

Housing is traded in personalized markets where interpersonal transactions are conducive to racial and other discriminatory practices even when such practices are ostensibly outlawed. As Arrow (1998) puts it, in the housing market "the transactors bring to it a whole set of social attitudes which would be irrelevant in the market model." As housing transactions almost always require search, discrimination operates through both person-to-person and intermediated transactions, with the latter increasingly taking place via the internet.

Individuals subject to discrimination face opportunity sets which are either adversely unrepresentative of market opportunities or accompanied by incomplete information on the full set of attributes of housing. As a result, they face suboptimal options or outcomes, given their preferences and endowments. Furthermore, with the prevalence of online housing search, novel possibilities for misinformation and disinformation arise for at least two reasons. One is the *informational divide*: lower-income home seekers may not be as web-savvy in searching for opportunities as higher-income ones. A second reason is the fact that although searching via online markets allows agents to avail themselves of masses of information at trivial search costs, such markets are not as effectively "monitored" for compliance with antidiscrimination laws as physical markets. Agents may be susceptible to manipulated information, making them vulnerable to outcomes that are even more unequal than on physical markets (Sections 6.1.2 and 6.1.3). We refer to these outcomes as instances of the *endowments* inequality.

Gaps in homeownership and wealth holding between White households and Black households in the US are important features of the housing market that have received particular attention. As shown by Derenoncourt et al. (2024), the Black homeownership rate has increased since 1860 to 46.4%, but still remained roughly two-thirds of the White homeownership rate of 72% in 2020. The authors argue, however, that the increase in Black homeownership has not contributed substantially to an improvement in the racial wealth gap. On the contrary, they show that there has been a widening of the racial wealth gap since 1980 because Black households have held nearly two-thirds of their wealth in housing and very little in equity and other risky assets during a period when

returns to housing were lower than returns to equity. However, as we discuss in Section 3.3, these effects could be due in part to distressed sales that are more likely to affect disadvantaged neighborhoods. In any case, the findings suggest that housing as a source of associational inequality through neighborhood effects is likely to be a more important factor than endowment inequality via housing wealth in explaining the racial wealth gap. As discussed in Section 5, access to schools and jobs could constrain earnings, resulting in less disposable income to invest in equity. We delve into racial segregation further in Section 6.2.

6.1 Detecting Discrimination through Market Outcomes

Oh and Yinger (2015) review four US national studies based on in-person audits together with studies based on correspondence audits in the US and in several European countries.[60] Despite variation in methods, sample sizes and locations, the studies consistently find evidence of statistically significant discrimination by real estate agents against home seekers who belong to historically disadvantaged racial or ethnic groups. However, findings from audits studies do not yield a uniform picture. The authors note that housing discrimination against Black and Hispanic home seekers in some aspects of real estate agent behavior appears to have declined recently in the US. For example, more advertised units are being shown to such customers. At the same time, what appears to have increased is the practice of "steering", whereby Black and Hispanic homeseekers are directed to minority neighborhoods. This claim of Oh and Yinger (2015) receives strong support from the more recent study of Christensen and Timmins (2022), which is discussed further in section 6.1.1.

Bayer et al. (2017) seek to detect discrimination in the form of racial and ethnic price differentials in the housing market, using a rich data set covering 2 million repeat-sale housing transactions drawn from four major US metropolitan areas and accounting for house and neighborhood-by-time fixed effects. They find that Black and Hispanic homebuyers pay premia of around 2% on average in the four cities. They also show that Black and Hispanic buyers pay more for housing "regardless of the race or ethnicity of the seller, and that (if anything) these premia are greater when Black households buy

[60] An in-person audit involves monitoring the behavior of realtors when dealing in-person with individuals posing as potential buyers who have identical profiles but belong to different ethnic groups. Correspondence audits are similar but take place over the internet.

from Black households and Hispanic households from Hispanic households."

In addition to direct discrimination in housing markets, housing outcomes can also reflect discrimination in mortgage credit markets. Tootell (1996) finds evidence of racial discrimination in lending to minority applicants, regardless of where the applicants intended to purchase. He finds that discrimination goes beyond redlining of neighborhoods (at least in Boston). More recently, Bhutta et al. (2022) examine racial discrimination in mortgage approvals using data on mortgage applications from the US Home Mortgage Disclosure Act (HMDA) database. They account for significantly lower credit scores and higher downpayment requirements, making minority applicants less likely than White applicants to receive *algorithmic* approval from race-blind automated underwriting systems (AUS). They find after these adjustments that observable (and unobservable) applicant risk factors explain most of the racial disparities in loan denial gaps. They conclude that gaps attributed to racial factors have played a limited role in generating disparities in credit denials in recent years.

Racial discrimination in labor markets means that minority households have fewer resources, other things being equal, and that they are more likely to hold jobs with characteristics that are perceived as "risk factors" in the mortgage application process. In addition, racial housing discrimination and residential segregation can reduce access to good jobs for minority workers, according to the spatial mismatch hypothesis first proposed by John F. Kain in 1968. A vibrant literature that has followed has attributed to this hypothesis a substantial fraction of racial differences in employment. Most recently, however, rigorous empirical research by Card et al. (2024) has raised serious doubts about the role of geographic proximity to good jobs as a major source of the Black-White racial earnings gaps in major US cities today. These findings do not contradict the notion that spatial mismatch has historically played a role, especially when the fractions of Black residents of central US cities were greater and housing discrimination more widespread than today. However, the endogeneity of both employment and residential decisions makes this a complex matter that is indeed centrally important for the associational component of housing inequality.

6.1.1 Discrimination via Intermediaries

Just as banks may reject mortgage applications by minority applicants, real estate agents can screen which homes to show to families of minorities. In both instances, agents act on inferences about whether particular applicants "fit" in certain neighborhoods, and both banks and real estate agents may engage in taste-based discrimination. In the former case, banks perceive that minority applicants are not reliable borrowers; in the latter case, agents fear that their clients would object to members of certain minorities as neighbors or face opprobrium of engaging in discriminatory behavior from people other than their clients. Such behaviors are known as statistical discrimination.

The fact that housing market intermediation as a social transaction has been racially fraught in the past is unambiguous. Interestingly, discriminatory behavior by realtors was once defended on grounds of professional ethics and a reluctance to go against the racial preferences of other residents.[61] The economics literature has sought to determine if that era is indeed over.

The US government has adopted a number of devices, in particular, Department of Housing and Urban Development (HUD) audits, to enforce compliance with the US Fair Housing Act passed in 1968. That and subsequent legislation prohibit discrimination on grounds of race or color, religion, sex, national origin, familial status or disability by all involved in the direct provision of housing, such as landlords, real estate companies, municipalities, banks, and homeowners' insurance companies.[62]

Historically, discrimination took the form of *s*teering Black and Hispanic home seekers to minority neighborhoods and denying them loans ("redlining"). Christensen and Timmins (2023) seek to explain how discrimination can impact households' choice of neighborhood. They estimate the welfare effects for renters confronted with choice set constraints determined by the landlords' response probabilities for specific demographic groups, using real-time data from landlords' responses collected through an online realtor platform. Landlords were sent stylized inquiries (via a bot) from fictitious applicants posing as White, African American and Latinx individuals. Their responses were used to estimate choice constraints in five different US metropolitan areas. The authors estimate

[61] From 1924-1949, the US National Association of Realtors *Code of Ethics,* Article 34, featured the following guidance: "A Realtor should never be instrumental in introducing into a neighborhood...members of any race or nationality...whose presence will clearly be detrimental to property values in that neighborhood."

[62] https://www.justice.gov/crt/fair-housing-act-1

preference parameters from a residential sorting model, using data on actual location decisions of households from InfoUSA.[63] They find that neighborhoods with amenities such as good schools, less crime, many cafes, and high environmental quality are associated with higher levels of discrimination. They estimate the welfare costs of discrimination at 4.7% of the annual income of renters of color, with costs increasing for African Americans as their incomes increase.

In an earlier paper (Christensen and Timmins, 2022), the authors provide powerful evidence that the role of intermediaries is conducive to housing discrimination in neighborhood choice. Using data from the 2012 HUD audits (and from previous audits for 1977, 1989, and 2000), they find that discrimination has declined over time for renters and prospective owners. In an experiment, White and minority testers are shown similar numbers of units, but the units shown to minority testers (relative to their White counterparts) were closer to inferior schools and in neighborhoods with higher poverty rates, with fewer residents who are skilled workers and fewer college-educated families, and with more single-parent households.[64] The authors find that holding preferences and income constant, *discriminatory steering* alone can explain the disproportionate number of minority households in high-poverty neighborhoods in the US and the higher exposure of African American mothers to toxic pollutants where they live. Christensen et al. (2022) offer detailed evidence that renters with African American or Hispanic/Latinx names are 41% less likely than renters with "White" names to be offered properties in locations with a low level of pollution exposure. No discriminatory constraints appear to be present in locations with high levels of pollution.

6.1.2 Discrimination, Information and Disinformation

Bergman et al. (2020) and Bergman et al. (2024) seek to explain, using field experiments, why low-income families in the US are more likely to live in neighborhoods that offer limited opportunities for upward income mobility (as established by Chetty and Hendren (2018a,b)). A common explanation for this pattern is that low-income families *prefer* such neighborhoods either because they are cheaper or are closer to family and to jobs they perceive as accessible to them. Bergman et al. (2024) argue, however, that informational

[63] InfoUSA, https://dupri.duke.edu/infousa-data is a massive consumer database.

[64] These facts may help explain why African American households experience inferior upward mobility than White households (Chetty and Hendren, 2018a,b).

barriers prevent families from moving to high-opportunity areas. As part of a randomized controlled trial, recipients of housing vouchers in Seattle and King County, Washington were provided services in the form of customized search assistance, landlord engagement, and short-term financial assistance.[65] The intervention increased the fraction of families moving to high-upward-mobility areas from 14% in the control group to 54% in the treatment group. Based on these findings and additional evidence from interviews with families, the authors suggest that redesigning affordable housing policies in order to provide customized assistance in housing search could reduce residential segregation and increase upward mobility substantially.[66] These findings on informational barriers and the results of Chetty and Hendren (2018a,b) on the role of the length of exposure to neighborhood effects are powerful evidence in favor of associational housing inequality.

6.1.3 A Role for Information Technology Tools

Much home search now takes place online. We also know that individuals interact with their online social contacts about housing decisions (Bailey et al., 2018b). Online platforms that host listings, such as Zillow.com, Craigslist.org and many others, should be treated as digital maps of physical markets. The literature has not yet fully addressed this role, at least not to the same extent as the case of job search.

Besbris et al. (2021) examine cross-sectional data on rental housing advertised online via millions of geocoded Craigslist.org posts across the 50 largest US MSA, merged with census tract-level data from the American Community Survey. They find that ads for units in neighborhoods with more Black and Latino residents, or with poorer residents are relatively less precise about unit amenities, and relatively more precise about tenant (dis)qualifications, compared with ads from "more White" or lower-poverty neighborhoods. Searches for units in White and Asian neighborhoods are more likely to display positive descriptions of neighborhood characteristics and to include higher-rent listings in low-income White and Asian neighborhoods undergoing, or poised to undergo gentrification. The consequences of biased information are difficult to detect, but are potentially important for inequality because housing market intermediation is increasingly

[65]The financial assistance was designed to prevent leases from not being signed and took the form of security deposits and application fees on a case-by-case basis depending upon each family's needs. It averaged $1,060 per family.

[66]Bergman et al. (2020) show that helping households move to better neighborhoods by providing better information complements more expensive policies, such as Moving to Opportunity (MTO) and Creating Moves to Opportunity (CMTO), though it is arguably less effective.

web-based. In contrast to the manipulation of prospective tenants' opportunity sets, a complementary study by Rouse et al. (2021) sheds light on the different screening techniques large-and small-portfolio landlords employ with predominantly low-income black prospective tenants. Both aim at revenue maximization by excluding "risky" tenants but large-portfolio landlords are more likely to employ algorithmic methods, which in effect embody statistical discrimination, while small-portfolio landlords typically use informal methods that aim at excluding "risky" tenants with similar outcomes.

6.2 Segregation: Homophily vs. Discrimination

The significance of segregation by race and income has been widely highlighted in the literature, and especially by Graham (2018) in connection with neighborhood effects. In addition, we note that Logan and Parman (Forthcoming) elaborate on important issues of measurement that segregation raises, and the scales at which it is construed.

As the preceding sections argue and Logan and Parman (Forthcoming) extensively detail, segregation could reflect homophily (i.e. people like being "near" others like themselves), given the residential options available to them, which might differ across demographic groups and are defined in specific spatial contexts.[67] Aliprantis et al. (Forthcoming) use evidence that high-income, high-wealth Black households live in neighborhoods similar to neighborhoods occupied by low income White households to argue neighborhood sorting cannot be explained by financial constraints alone. Instead, they argue that neighborhood sorting is due to homophily. Given the residential options open to them — high-socioeconomic status Black neighborhoods in US metropolitan areas are rare — Black households sort into Black neighborhoods. This is enough, the authors argue, to explain the racial gap in neighborhood quality at all income levels.

Although housing outcomes due to segregation are difficult to disentangle from those due to discrimination, it is generally agreed that racial discrimination is offensive on grounds of fairness and morality. But what are its associated welfare costs, and are there any benefits? A body of literature finds that racial segregation, especially when it results from individuals' deliberate decisions, could generate benefits. For example, sufficiently large populations of prosperous Black households may, in the presence of racially motivated restrictive policies, be better off in Black neighborhoods where they

[67] In view of Section 2, homophily may be nested within a general specification of the "amenity" function through $\mathcal{L}(\ell^i)$.

may live near others like themselves while accessing good schools. Indeed, Bayer et al. (2014) specify demographic conditions under which this is possible. They find that improved educational attainment of Black relative to White individuals between 1990 and 2000 led to a significant rise in segregation in the form of an increased number of middle-class Black communities. This goes against the grain of objections to segregation that link reduced educational inequalities to increased racial segregation. Cutler et al. (2008) arrive at broadly similar conclusions on segregation of immigrants into ethnic neighborhoods but only after they correct for endogenous selection into such neighborhoods.

6.2.1 Homophily, Segregation, and Inequality: The Schelling Model

Current research on residential segregation has benefited from modernization of Schelling's models of neighborhood location decisions and neighborhood tipping which imply segregation as a stable outcome even when homophily is weak (Schelling, 1971). In Schelling's words, "[this] kind of analysis explores the relationship between the behavior characteristics of the *individuals* who comprise some social aggregate, and the characteristics of the *aggregate*"(p. 13). A key element of Schelling's ideas in conjunction with the mechanics of self-organization is that aggregate social outcomes that reflect magnification of individual propensities may well be *unintended*.[68]

Card et al. (2008, 2011) are notable examples of renewed empirical interest in the Schelling model. The authors test the Schelling model of neighborhood tipping using regression discontinuity methods with US Census tract data from 1970 through 2000 in order to detect the presence of discontinuities in the dynamics of neighborhood racial composition. They show that White population flows exhibit tipping-like behavior in most US cities, with a distribution of tipping points ranging from a 5% to 20% minority share. They find large, significant discontinuities in the growth rate of White population at the tipping points. Still, they find that housing prices show relatively modest effects of

[68] A "bare bones" model (in the spirit of Schelling (1971)) would be a discrete choice version of the model in Section 2 that can explain how homophily contributes to the emergence of segregation. Consider a population made up of two different types of individuals who value more the presence in their neighborhood of individuals of their own type. Self-organization of individuals into two neighborhoods follows, and the equilibrium outcomes may exhibit multiplicity, provided that homophily is sufficiently strong; see Brock and Durlauf (2002). Analytical and estimation properties of a more general sorting model are provided by Bayer and Timmins (2005, 2007) for the static cases, and by Davis et al. (2021) and Zhang (2004) for the dynamic cases. In fact, Zhang (2004) formulates the Schelling model as a spatial (potential) game and using the theory of stochastic stability proves that segregation emerges and persists as a stochastically stable state, defined as one that minimizes interracial contact, even if every person in a society prefers to live in a half-Black half-White neighborhood.

tipping. Estimated tipping points persist and imply attitudes of White residents across US cities which are consistent with common knowledge about prevailing racial tolerance. Card et al. (2008, 2011) provide the first direct empirical evidence of the nonlinear dynamic behavior predicted by social interaction models of the Schelling type: segregation is driven at least in part by preferences of White families over the (endogenous) racial and ethnic composition of neighborhoods.[69] Xu et al. (2024) simulate a Schelling-type model and show that when homophily is defined in terms of neighbors' decisions instead of their demographic characteristics – in other words, in terms of endogenous instead of exogenous social effects – racial integration may emerge but segregation prevails provided that housing is allocated through the market and segregation is increasing with income inequality (measured by the ratio of the top to the bottom income quantile). While the authors do provide an empirical example, it is their theoretical results on the enduring tendency for segregation due to homophily that are notable.

Regardless of its causes, segregation constitutes a potent but not necessarily immutable force of associational inequality when it operates in combination with neighborhood effects. Indeed, as discussed at the end of Section 6.2, in institutional settings where it is possible, individuals can self-organize into neighborhoods that offer access to employment opportunities and prospects for human capital accumulation that may offset the general forces of inequality.

6.2.2 Neighborhood Income Distributions and Overall Inequality

Considering the numerous forces present in the housing decisions of households and determine their geographic location, what can we say about the *neighborhood* income distributions that result from their self-organization into neighborhoods? As reviewed by Reardon et al. (2015), the literature that measures US segregation and its neighborhood context finds Black and Hispanic households residing in neighborhoods with substantially lower median income than the neighborhood in which White households live, even after controlling for household income. The authors criticize this literature for relying on relatively broad categories of income (poor, middle-class and affluent) that are not comparable over time, and often lacking a single universally accepted summary statistic

[69] Card et al. (2011) delve deeper into the racial dynamics and find that tipping behavior is one-sided, and that neighborhoods with minority shares below the tipping point attract both White and minority residents.

to describe segregation. They propose and implement a new non-parametric measure of segregation as a way to address these two concerns. Using data from the US Census and the American Community Survey, they measure households' incomes in terms of percentile rank relative to the national income distribution and then plot the median income of their neighborhoods (defined as US census tracts) as functions of the percentile rank of households' incomes.[70] The steepness of the resulting curves serves as a non-parametric measure of segregation, with a flat line indicating no segregation – i.e., everyone has the same neighborhood income — and a 45-degree line indicating maximum segregation.

They construct such curves for four racial/ethnic groups (White, Black, Hispanic and Asian). All four curves are upward sloping and all become steeper for higher income percentiles, indicating substantial income segregation within each racial group, and especially among higher-income households (see Figure 3). Importantly, the curves for Asian and White households are much higher than those for Black and Hispanic households; that is, even after controlling for household income, Black and Hispanic households live disproportionally in neighborhoods with substantially lower median incomes. The difference in neighborhood median income between Black and White households is about 10 percentage points across the entire distribution of household income.

7 Conclusion

The housing literature has exploded over the last two decades. First, the Great Recession of 2007-2009 motivated a search for a deeper understanding of the critical role of housing after subprime mortgages were blamed for the financial crisis that led to the recession. Second, there has been a surge in interest, partly as a result of new tools and new data, in urban and regional economics, where the economics of housing has always played an important role. Third, interest in quantitative housing policy design has been motivated by the increasing welfare inequality (including homelessness) that has taken hold in many countries and has drawn attention to housing inequality. It has challenged traditional approaches to many economic issues.

[70] A precursor of this approach is Hardman and Ioannides (2004), who employ data for micro neighborhoods from the US American Housing Survey and introduce the concept of *Schelling statistics*. Relatedly, Schmidheiny (2006) works with Swiss data and Wheeler and La Jeunesse (2008) work with data from a sample of 359 US metropolitan areas and underscore that sorting into neighborhoods is imperfect. For example, Wheeler and La Jeunesse (2008) show that overall income inequality within a metro area tends to be driven by variation within neighborhoods, not between them.

This review has two principal objectives. The first is to demonstrate ways that income and wealth inequality have exacerbated unequal housing outcomes. The second is to explore how two increasingly salient features of housing – its neighborhood dimension and the prominent role of housing in household asset portfolios – contribute to overall inequality of income, wealth and welfare. As the reader will have realized, a review of this literature must cope with the lack of uniformity in the particular measures of inequality employed by different contributors. Increasing reliance on welfare measures makes this even harder, as contributors do not employ the same utility functions.

Areas that deserve attention in future research include a full understanding of the forces that promote residential segregation, which is critical for the feasibility of urban policies aiming at creating stable racially mixed neighborhoods. The role of policy tools such as zoning and mandates for mixed-income housing while market forces work in favor of segregation deserves attention, especially in the context of place-based policies. Housing vouchers, operating on the demand-side, and supply-side regulations, both of which are employed in various combinations across the world, should be explored in general equilibrium contexts. Many of the policies have general equilibrium effects, but such analyses have only just begun. The consequences of reduced mobility for aggregate growth, while mitigated in part by working from home, also appear to be important. How the demographic structure of many economies, along with surging home and stock prices, will usher in increased inequality via intergenerational transfers and thus further exacerbate economic and social inequality is little appreciated.

We argue that housing and inequality are better understood through three distinct features: consumption, capital, and location. An overarching theme that demands attention is the connection between life-cycle events and households' residential and financial decisions. Doing so also requires accounting for possibly catastrophic events leading to households' being displaced from their homes. Articulating the role of the attributes of the neighborhoods, the importance of search frictions, and the increased reliance on web-based technologies deserve attention as they all impact human and financial capital accumulation and the distribution of income and wealth.

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