

Housing and Inequality *

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Abstract

We approach the literature on housing and inequality from two angles. One is the impact of inequality in endowments on that of housing consumption and wealth. A second is the associational (or memberships) inequality associated with neighborhoods, that is households' location both in physical jointly with social space. The review elaborates on those two dimensions of inequality. We focus on three distinctive features of housing: consumption, location and capital. For owner-occupants consumption and capital are bundled together in a single good. For both renters and owner-occupants, housing consumption, access to good neighborhoods and housing wealth follow from endowments inequality. Housing is a propagation mechanism for inequality through the location-specific returns to human capital investment and for owner-occupants the ability to use housing as collateral to finance investments. The paper uses this approach to analyse key aspects of housing and inequality and pays 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. The paper argues that those links go in both directions. It identifies three distinctive features of housing. One directly relates to the large and growing consumption expenditure share on housing, especially for poorer households. A second 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. And, three, housing is capital for homeowners, the most important form of wealth for most households and the main form of collateral.

These three features are bundled together in a single good for most households. It is difficult to unbundle them. Housing as a household asset differs from financial assets because it generates consumption services and embodies geographical location and social context. Housing is different from other durables because it embodies the advantages of location. To enjoy the return of the location of housing requires, in most cases, to live in the house. As the OECD (2020) housing and inclusive growth report puts it, *Housing can both reflect and reinforce inequalities across socio-economic groups, across generations, and across space.*

We do not review the massive housing literature; instead we defer to a number of existing extensive surveys. From within the massive literature on housing, we focus on features that either promote or follow from inequality, or both. The existing extensive surveys do not explicitly deal with inequality. Specifically, 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 returns to housing assets (mainly house price) are 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 evidence. Here we pay particular attention to locational aspects of housing and to those attributes that are most closely related to inequality. Most housing transactions involve search, 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 review exclusions from the housing market in connection with misinformation, foreclosures and evictions which do bear on inequality.

We address two broad aspects of housing and inequality. One is inequality that results

directly from how individuals' endowments are mapped, through housing but also labor and credit markets into unequal outcomes. This approach also accounts for the direct effects of families on children via transfers as well their impact on the productivity of human capital, which are treated as a private good. Accordingly, we review the observed *endowments*-related housing inequality in the context of the literature. A second, and different 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 to 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: 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 follow. Section 2 presents a simple conceptual framework for fixing ideas about the three features of housing. It highlights the role of housing as both a source of inequality and a propagation mechanism for inequality. Sections 3 – 5 elaborate respectively on these three features of housing. Section 6 discusses key issues related to racial discrimination and residential segregation whose consequences for inequality are particularly salient. Section 7 concludes.

2 A Conceptual Framework

To put the 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 for inequality, that is, consumption, capital, and location. The issues related to housing and inequality span micro and macro research; there is no single and simple canonical model. Instead, we seek to lay down a conceptual framework for organizing the discussion of these issues.

The long run evolution of housing price has provoked much discussion in both the housing literature and the popular press. As Knoll et al. (2017) establish for 14 advanced economies, real house prices stayed constant from the 1870s to the 1950s, but have since then risen strongly albeit with substantial cross-country heterogeneity. After controlling

for replacement costs those authors identify the steady growth of land prices as the key factor contributing to this outcome. This confirms that in spite of vast expansion of developed land throughout the world, land is increasingly scarce on a national scale. Since the opportunity cost of urban land is its non-urban use, this passes through as scarcity of land at the local scale, which is the heart of urban economics. The interaction between the location of economic activity and the location of individuals drives the density of economic activity within and across urban areas and economic forces that emanate from the urban landscape. Rising real prices of housing underlie current discussion in the public domain. It is important to understand how they impinge upon our ability to interpret the empirical evidence about the interaction between housing and inequality.

Our approach to housing and inequality follows two angles. One angle addresses how a given distribution of income is reflected in housing outcomes. This encompasses such issues as whether the mapping of low incomes to acutely low quality housing (such as homelessness) that gives rise to public policy concerns. A second angle addresses how housing outcomes feed back into the determination of income and wealth through a number of routes. By way of example, access to mortgage lending may allow for building up lifetime wealth. Similarly, phenomena lumped under the term neighborhood effects, which encompass contextual as well as endogenous social effects that are associated with the location aspects of housing, can be critical forces in the persistence of inequality (Durlauf, 1996); (Durlauf, 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 , a household's state variables include the level of human capital s_{t-1}^i and non-housing financial assets a_{t-1}^i , and a set of its current housing attributes, critically among them being housing location $\ell_{t-1}^i \in \mathcal{N}$, a set of locations that we specify when appropriate, and tenure status $\iota^i = r, o$. If household i is a homeowner ($\iota^i = o$), then it owns housing capital h_{t-1}^i . 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 . We assume that there is free mobility of non-housing financial assets across locations so that the return R_t is equalized across locations. 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 new location ℓ_t^i , non-housing consumption c_t^i , housing services h_t^i , and investment in human capital z_t^i in order to maximize the discounted sum of expected life-time utility, $\sum_{t=0}^{\infty} \beta^t E_0 [u^i(c_t^i, h_t^i; \ell_t)]$, 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:

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

where $\bar{h} \geq 0$ is a minimum amount of housing services required, which affects the income elasticity of housing consumption. The parameter ϵ determines the price elasticity of housing consumption. The utility of housing services depends on the tenure status, where $\xi_o > \xi_r$ is referred 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. For an owner endowed with h_{t-1}^i units of housing, the period t constraint is:

$$c_t^i + z_t^i + p_t(\ell_t^i) h_t^i + M_t^i \kappa_t^o + a_t^i = w_t(\ell_t^i) s_{t-1}^i + R_t a_{t-1}^i + p_t(\ell_t^i) h_{t-1}^i; \quad (2)$$

$$a_t^i \geq -(1-\phi) p_t(\ell_t^i) h_t^i. \quad (3)$$

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:

$$a_t^i = w_t(\ell_t^i) s_{t-1}^i + R_t a_{t-1}^i - c_t^i - z_t^i + q_t(\ell_t^i) h_t^i - M_t^i \kappa_t^r \geq 0. \quad (4)$$

The indicator M_t^i represents a moving decision taking the value 1 in the case of a move, and 0 otherwise. Moving can be due to changing housing size or housing location, i.e. $M_t^i = 1$ if either $h_t^i \neq h_{t-1}^i$ or $\ell_t^i \neq \ell_{t-1}^i$. The parameters (κ_t^o, κ_t^r) capture moving costs for owners and renters. The accumulation of human capital follows:

$$s_t^i = S(z_t^i; s_{t-1}^i, \ell_t^i), \quad (5)$$

which depends on investment in human capital z_t , location choice ℓ_t^i , and lagged human capital s_{t-1}^i . 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 are salient peer effects across individuals' human capitals at the location, all of which enter $S(\cdot)$ via ℓ_t^i .

This setup focuses on two aspects of housing decisions: neighborhood choice ℓ_t^i and housing services h_t^i . 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 in utility; entering the accumulation of human capital; and defining wage income in budget constraints (2) and (4).¹ 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_t^i through the budget constraint (2).

Housing services flow from housing structures that are produced using various inputs and, in particular, land. Whereas the notion of housing does connote land, our approach here emphasizes the spatial differentiation that land undergoes in urban use. This confers key significance to 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. The return to land owners, individuals, firms, or governments, reflects the institutional structure through which land is owned. Homeowners in many countries own the land on which their homes lie, or shares thereof. However, in some countries, notably the United Kingdom (UK), use of land may be fully owned via “freehold” leases or may be traded by means of leases of different durations (“leasehold”). Multi-dwelling structures may be owned as condominiums, cooperatives, or other forms. Whereas in most countries housing is built by individuals and land developers (private companies), increasingly developers keep dwelling units as rental properties. Differences in the institutional complexity of how housing services are supplied make it very difficult to have a precise understanding of the market for land around the world. Of course, land is also demanded by firms and governments, and the uses in 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 some countries like the US are financed by property taxes that are directly levied on property owners, homeowners and firms.

¹We discuss the implication of working from home in Section 5.5.

3 Housing Consumption

The fundamental role of housing is to provide shelter. In discussions surrounding housing affordability, 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, compared to food, clothing, health, education, leisure and transport.² Across households in OECD countries in 2015, the housing expenditure share for households in the bottom income quintile is 37%, 31% for the middle quintile and 25% for the top quintile. Over time, the average housing expenditure share increased by 6 percentage points during 2005 to 2015. The increase for the bottom income quintile is much higher, at 9 percentage points, triple those of the top quintile.³ 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).

There is particular attention given to housing expenditure share among renters, as households in the bottom quintile are more likely to be renters.⁴ Relying on the affordable Housing Database data for 31 OECD countries around 2014 – 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* in the US shows that the share of renters spending more than 30 – 50% have all doubled since 1960s. In 2022, nearly half of renters are spending more than 30% while a quarter of renters are spending more than 50% of their income on housing.

The high housing expenditure share among low-income households limits financial resources for non-housing consumption, saving, or investment in human capital. This situation can potentially contribute to broader and more persistent inequality, especially

²Household expenditures come from national household budget surveys and have been harmonised by the OECD following a classification developed by United Nations Statistics Division.

³This differential growth pattern can be extended back to 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.

⁴Using the OECD Wealth Distribution Database 2011 – 2016, Causa et al. (2019) document that the homeownership rate among the bottom income quintile is more than 25 percentage points lower than among the top quintile for 20 countries.

when there is ample evidence on the lack of growth in income for poorer households during recent decades. The *2024 Economic Report of the President* in the US presents a vivid picture of the financial burden of housing 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.

This concern prompts two arguments. First, the increase in housing expenditure may reflect a quality improvement in housing. Quigley and Raphael (2004) document that improvements in the quality of rental units from 1960 to 2000 in the US due to plumbing and kitchen facilities, local zoning ordinances reducing density and minimum size requirements, and others. 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 neighborhoods. Using US data from 1930 to 2012, Aladangady et al. (2017) find that the increase in inequality in house prices and rents is not explained by tangible dwelling characteristics such as plumbing, heating system, or number of rooms, but rather by locations that offer different "intangibles," such as access to employment and local amenities. A second argument against this concern is that the patterns of housing expenditure shares could simply reflect changes in preferences for housing consumption. To evaluate this argument, we will now discuss the significant role of income and price elasticities of housing demand.

3.2 Income and Price Elasticities of Housing Demand

The variation in housing expenditure share across households and across time are important inputs to understanding the preference structure of housing demand. As we discuss below, it is important for understanding the relationship between housing and inequality.⁵

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

⁵For recent examples of using *price-inelastic* housing demand in understanding how rising relative price of housing leads to rising wealth inequality see (Borri and Reichlin, 2018) and for rising net capital share of aggregate income see (Rognlie, 2015). The *income-inelastic* housing demand is used in understanding the effect of zoning deregulation on reducing welfare inequality (Grossmann et al., 2021); and for how the rising aggregate skill premium can lead to an increase in spatial sorting by skill group see (Finlay and Williams, 2022).

discussed.⁶ For a renter, when the borrowing constraint (4) is not binding, the relative expenditure across housing and non-housing can be expressed as:

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

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 MSAs, which leads them and a substantial fraction of macro housing studies to adopt Cobb-Douglas preferences where both price and income elasticity are equal to one, i.e. $\bar{h} = 0$, and $\varepsilon = 1$. While this type of preference could be convenient and useful for understanding macro patterns, it is of limited use for understanding housing and inequality. More specifically, it implies housing expenditure share is always equal to the preference parameter ω . Thus, the cross-section and time-series patterns of the housing expenditure share can only be explained by assuming the preference parameter ω to be larger and rising faster for poorer households. In other words, the ‘regressive’ patterns of housing expenditure shares simply reflect heterogeneity in housing preferences, both in levels and changes, rather than indicating a concern for housing affordability.

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

Income-inelastic housing demand, here due to subsistence housing consumption \bar{h} , implies that income after deducting housing costs for poorer household is even lower

⁶There 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).

compared to the richer households, leaving limited financial resources for non-housing consumption and investment. This has led to a suggestion by the *IFS Deaton Review of Inequalities* (Cribb et al., 2023) for the United Kingdom (UK) to deduct housing costs from disposable incomes when measuring poverty and inequality for the bottom part of the income distribution. The report finds that disposable income measured after deducting housing costs are more correlated with non-income-based measures of low living standards, such as food insecurity of material deprivation rate calculated by the UK Department for Work and Pensions.

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

In efforts to alleviate inequality in housing consumption and allow for access to shelter, governmental presence in housing is ubiquitous. However, we defer to previous literature and eschew a general discussion of housing policy.⁷ Instead, in the remainder of this section we restrict attention to two issues. One is housing instability and exclusion from the housing market; the second is rent control. The former poses, *inter alia*, important legal issues of current concern in the US and is about extreme market outcomes stretching the notion of affordability.⁸ The latter aims at arresting spiraling housing costs by directly interfering with the operation of the housing market.

3.3 Exclusion from the Housing Market

The growing global concerns about housing affordability are also about providing shelter to the extreme poor, who find themselves in complex circumstances leading to evictions, foreclosure or even homelessness. Evictions are removals of tenants from rental properties by their landlords, but they may also pertain to removal of homeowners of foreclosed properties. These outcomes are conceptually related; they amount to *exclusion* from the

⁷Saiz (2023) surveys 290 papers on policies around the world. For the United States alone, Olsen and Zabel (2015) reference more than 200 papers.

⁸Whether or not there exists a fundamental right to shelter is being litigated, as of the time of writing, in the Supreme Court of the United States; Case No. 23-175.

housing market at least for some time. This is the case for households that cannot afford to occupy spaces typically considered as dwellings and become homeless.

More than 2 million households incur eviction filings annually in the US. Collinson et al. (2024) show that eviction filings are preceded by income and employment decreases and 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 suffering 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, moves to inferior neighborhoods and family instability. Moreover, foreclosures have spillover effects as they propagate in their immediate neighborhoods (Towe and Lawley, 2013) producing unintended outcomes via spillovers.

The incidence of homelessness, which is both an extreme manifestation of housing inequality and inherently hard to measure, is increasingly present worldwide. It has become particularly acute in high cost metropolitan areas in the US.⁹ Its incidence in California is twice California's share of US population. The Annual Homelessness Assessment Report by the US Department of Housing and Urban Development reveals a substantial increase of 103,176 people (a 19 percent rise) experiencing homelessness from 2016 to 2023.¹⁰ It varies dramatically across demographic groups, being around 6 per 10,000 for Asians and rising to 60 for African Americans and to 136 for Native Americans. About a quarter of the homeless people in shelters have jobs. In Los Angeles, 78% of the homeless are also unsheltered, whereas in New York City, where a legal "right to shelter" means that only 8% are unsheltered; in the rest of the United States the unsheltered are 51%. More than 1.4 million people pass through emergency shelters every year. Over and above the poverty and hardship it is associated with, in the eyes of many, blights the affected urban areas. Its political impact has attracted the attention of decision makers.¹¹

The UK Office of National Statistics (2023) reports that 13,955 people in England and

⁹This is underscored by the many guises homelessness takes with tents, shelters, cars, motels and couches hosting the homeless. See "A Life without a Home." *New York Times*, February 25, 2024. <https://www.nytimes.com/interactive/2024/02/21/opinion/homelessness-crisis-america-stories.html>

¹⁰Total Homeless Individuals, 653,104, US, 2023. Data originate in point-of-time counts by local volunteers who seek to enumerate homeless, sheltered and unsheltered on a single night in January.

¹¹A new US government program plans to reduce homelessness by 25% by 2025 [<https://tinyurl.com/2p3um298>].

Wales, or 2.3 per 10,000 people, were in hostels and temporary shelters for the homeless in Census 2021.¹² Like in the US, the incidence of homelessness is uneven across different demographic groups, with a greater proportion of Blacks and younger individuals, who are often in poor health and lack skills. Fetzner et al. (2023) argue in favor of a causal impact of an unanticipated increase in rent subsidies in the UK on statutory homelessness, but also evictions, financial distress, insecure temporary accommodations, which is most acute for families with children, single parents and those in poor health.

Evans et al. (2019) explore different policies aimed at reducing or preventing homelessness. They highlight 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 various specific cases, little is known about why its incidence varies so dramatically across demographic groups as well as geographical areas. Overall, homelessness deserves greater attention by the housing literature.

3.4 Rent Control

Local and national governments worldwide have resorted to various rent control schemes; some have continued in existence in many countries; see OECD Housing Database.¹³ Rent control is defended as insurance against rent increase. This may address the issue of housing affordability without direct commitment of public resources such as providing housing benefits. However, ordering rents to stay put 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 to all and hinders residential mobility. It causes both misalignment of demand with consumption as households’ circumstances change, and may even reduce labor mobility. In the long run it causes misallocation of capital. Hardman and Ioannides (1999) study rent control and allow for 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 effect of rent control depends on the mixture of other housing

¹²<https://www.gov.uk/government/collections/homelessness-statistics>. UK housing authorities have a statutory obligation to shelter the homeless.

¹³<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>.

policies, as Favilukis et al. (2023) demonstrate, which may be specific to housing location.

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 also 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 by 13 to 20 percent and employment by 8 to 13 percent. Rent control deregulation has complex effects. Donner et al. (2017) study the distributional effects of deregulating the Stockholm rental housing market. rents would increase in Stockholm’s wealthy center (by 30-70 percent); suburban neighborhoods might experience smaller increases and some even rent decreases.

Autor et al. (2014) study the complexity of the distributional effects of rent deregulation for Cambridge, Massachusetts. Property values rose and improved amenities as a result of deregulation benefited both existing and new owners but hurt tenants. 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 percent and lowered renters’ displacement from San Francisco. However, landlords reduce rental housing supply by 15 percent by selling to occupants and by redeveloping buildings.

4 Housing Capital

Housing capital is typically about half of the national capital stock in many countries. It is the most important form of wealth for most homeowners. For them, 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:

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

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 which case the relative housing expenditure for owners in (7) coincides with that for renters in (6). The effective price is affected by tax treatment of the flow of housing services, mortgage interest charges, housing wealth as via property taxes, capital gains and climate-related investments. These factors, typically

accounted for by the user cost theory of Poterba (1984) and used extensively from the housing affordability literature to the macroprudential one. The combined effect on inequality of these adjustments and tax preferences for inequality is highly nonlinear.¹⁴ Furthermore, individuals' forecasts of the future course of housing prices and the discount rates they use depend on their resources, on their financial sophistication, and their location (which affects the forecasts themselves).

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 progressive taxation, and on wealth, due to borrowing constraints. We take up these in turn below.

4.1 Housing Wealth

Housing wealth has occupied 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, has been documented in Piketty and Zucman (2014). Its importance has been documented in other countries for recent decades. Causa et al. (2019) utilize microdata from the ECB Household Finance and Consumption Survey and the Luxembourg Wealth Survey across 23 OECD countries during the 2010s. They find that for the majority of countries housing assets are more than half of the total assets of the middle class (households in the middle three quintiles of the income or wealth distribution).

There is a clear pattern of homeownership across the spectrum of income and wealth distributions. We discussed evidence that low income households are more likely to be renters in Section 3.1. The picture is even starker along the wealth distribution. Using the OECD Wealth Distribution Database for 27 countries around 2011 – 2016, Causa et al. (2019) further report that in almost all countries the homeownership rate in the top wealth quintile was more than 50 percentage points higher than the homeownership rate in the bottom wealth quintile.¹⁵ The homeownership rate captures the role of housing on wealth inequality through an extensive margin, distinguishing those who own from

¹⁴Indeed, the mortgage interest rate depends nonlinearly on the down payment, an outcome of borrowing constraints.

¹⁵The only exception is the Netherlands where the difference was about 30 percentage points.

those who do not, renters. Among homeowners, variations in the value of their housing stock are also an important component of the wealth inequality. According to OECD (2022), using data from 28 OECD countries for 2019 (or latest available year), the mean value of owner-occupied housing assets of those in the fifth quintile of wealth (income) distribution is almost 16 (4) times higher than those in the first quintile. Those variations in the mean value can be driven by both the size and the locations of the housing stock.

Housing wealth can be a propagation mechanism for inequality as the distribution of housing wealth can persist into future generations through inheritance or other channels. Using the ECB Household Finance and Consumption Survey in 18 OECD countries, Causa et al. (2019) document that on average about 20% of households have inherited their house outright or received it as a gift. Direct funding from parents (the “Bank of Mum and Dad”) is another channel through which individuals’ access to homeownership depends on parental wealth.¹⁶ Using panel data from the UK, Blanden et al. (2023) identify a strong and increasing intergenerational persistence of homeownership. They do so by establishing a relationship between the homeownership status of individuals aged 42 and that of their parents when they were 16 years old.¹⁷ Using population-level Danish administrative data, Daysal et al. (2023) also find a strong correlation between parental housing wealth and children’s wealth at ages 29-33. Furthermore, they estimate the effect of parental housing wealth changes at different stages of childhood. They find that the effect is significant during the early and middle childhood, but close to zero during the teen years. Changes in children’s educational attainment and earnings can account for only 20-30% of the transmission of parental housing wealth.¹⁸ They attribute the remaining unexplained portion to changes in unobserved household environment and parental behaviors that influence children’s savings and investment behavior.

¹⁶Using the *British Household Panel Survey*, Wood and Clarke (2018) estimate an increase in “Bank of Mum and Dad” funding since 1990s. Estimates of its magnitude among the first-time buyers varies from 27 percent in the *English Housing Survey* to 60 percent according to the Council of Mortgage Lenders.

¹⁷More 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.

¹⁸The positive relationship between parents’ housing wealth and children’s education have been documented for other countries, e.g. Germany, Sweden, the US and the UK (Lovenheim, 2011; Pfeffer and Hallsten, 2012; Karagiannaki, 2017).

4.2 Housing Returns and Wealth Inequality

Housing capital acts as a propagation mechanism for inequality by exacerbating the impact of changes in housing return due to unequal distribution of housing wealth. A debate surrounding the influential work of Piketty and Zucman (2014) revolves around the attention those authors drew on a rising aggregate wealth-to-income ratio, which is interpreted 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 rise in the return to housing capital. He disputes the *accumulation view* of Piketty (2014), where the rise in the capital share is due to capital accumulation. Instead, it supports a *scarcity view*: scarcity of land pushes up the return of housing capital which in turn increases the housing capital share when housing demand is sufficiently price-inelastic (see Section 3.2).¹⁹ His findings suggest that the shift of aggregate income is from renters to homeowners.²⁰ Therefore, policymakers concerned about inequality should monitor housing costs, and particularly regarding restrictions on land use and residential construction, as these factors contribute to housing scarcity.

Among homeowners, variations of housing returns by location through changes in house prices or rents can drive heterogeneity of returns across the wealth distribution. Substantial spatial variation in housing returns has been documented for 15 OECD countries (Amaral et al., 2022) using city-level data; see also Aladangady et al. (2017) who use US city data. Using two countrywide data sets for Norway that follow individual homeowners, Eggum and Larsen (2023) measure capital gains based on changes in house prices, and explicitly consider three types of capital gains: realized, semi-realized, or potential depending the timing of buying and selling. They find a substantial increase in capital gains inequality over the period 2007 to 2019 both across and within geographical strata and across and within birth cohorts.

The distinction between realized and potential gains is also crucial for the finding of Piketty and Zucman (2014) of a rise in the wealth-to-income ratio. Bonnet et al. (2014) argue that the returns on housing capital should be evaluated using rents, which represent

¹⁹The rising relative price of housing can also be driven by a slower productivity growth in the construction sector compared to other sectors, which as shown in Borri and Reichlin (2018) can contribute to rising wealth inequality when housing demand is price-inelastic.

²⁰Greaney (2023) highlights the uneven distribution of gains from local productivity shocks across homeowners and renters. A positive local shock raises wages and housing costs, which generates larger welfare gain to homeowners because they are insulated from higher housing costs, but the rise in rent mitigates the positive effect for renters.

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 grown significantly faster than rents since the late 1990s.²¹ When they recalculate the value of housing capital using rents, they find only a modest increase in the wealth-to-income ratio relative to Piketty and Zucman (2014). While the debate on the causes of the rising wealth-to-income ratio remains unsettled, these authors agree on the real consequences of housing price increase on access to housing and its impact on inequality.

Fagereng et al. (2022) make a distinct yet closely related argument regarding the distributional consequences of escalating 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 welfare for net buyers and sellers. This has implications across cohorts since the young are more likely to be net buyers of housing compared to the old. Thus, rising house prices can favor older generations at the expense of younger ones. However, the collateral constraint (3) implies that changes in house prices can influence the welfare of homeowners, even if they choose not to buy or sell houses.²²

4.3 Housing as Collateral

Housing capital is the primary and often sole source, of pledgeable capital for most households. Unlike other purchases with debt, homeowners can also use home equity to borrow for other purposes.²³ According to the OECD Wealth Distribution Database, about one-quarter of households (one-third of homeowners) have mortgages in 27 OECD countries. The share of households with mortgage debt increases with household income from less than 10%, for the bottom quintile, to over 40%, for the top income 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 over 75 percent in 11 of them. Among households with mortgages, it represents more than 80% of household

²¹Fagereng et al. (2022) document the same pattern in Norway from 1994 to 2015, but recent 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.

²²In the presence of collateral constraints, changes in house prices can cause even larger redistribution between net buyers and net sellers of houses (Kiyotaki et al., 2011).

²³De Soto (2000) has drawn attention to the fundamental role of ownership of titled property, over and above arguably disputable ownership of housing as shelter, for the functioning of capital markets that may allow economic development.

debt.

The ECB Household Finance and Consumption Survey provides information on the use of the primary home as collateral, asking respondents about the purpose of the primary home mortgage for 22 OECD countries (Causa et al., 2019). They find that the main purpose of mortgages is to buy or renovate the primary home. In most OECD countries, less than 10% of homeowners use primary home mortgages for other purposes. The only exception is Canada where it reaches 30%. The fraction is higher for homeowners in the top income and wealth quintiles. The most common other uses are to purchase other real estate assets, followed by financing business or professional activity, covering living expenses or other purchases, consolidating other debts and for education purposes.

As house prices increase, households can and do borrow more based on their home equity. The literature documents various spending outcomes resulting from increased borrowing, including increased investment in human capital²⁴ and reduced labor supply²⁵. Most studies concentrate on the impact on consumption, driven by the strong correlation between house prices and aggregate consumption. These studies specifically investigate the collateral effect of house price 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, and across households with different degrees of financial constraint. The typical life-cycle model predicts a positive age profile of housing wealth effects, as older homeowners have a shorter time horizon and therefore a stronger incentive to utilize housing wealth for consumption. This prediction contrasts with the negative age profile found by 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 the 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 rises in house prices, borrowing, and consumption. The study of house price growth across geographical areas

²⁴Lovenheim (2011) uses short-run changes individual housing wealth during a period of high housing wealth liquidity in the early 2000s in the US as exogenous variation in wealth of homeowners. He finds that \$10,000 in home equity raises college enrollment by 0.7 of a percentage point on average; the effect is much higher for low income families, 5.7 percentage points.

²⁵Favilukis and Li (2023) use variations in house price growth across US MSAs to show the rise in housing wealth post Covid-19 has contributed to the fall in the labor supply among the older workers.

must address confounding regional shocks, such as fluctuations in local income expectations, which can be the common driver behind both 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 the Danish mortgage reform that allows homeowners to use mortgage loans for any purpose.²⁶ 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 a longitudinal survey data on expectations to identify unanticipated changes in home values. These studies provide compelling evidence for the collateral effect on consumption, especially for young homeowners who are more financially constrained.

The collateral constraint (3) clearly benefits 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, the majority of households have mortgages, and the availability of mortgage options depends on credit scores and income levels. The two primary types of mortgages are adjustable-rate mortgages and fixed-rate mortgages. In the US, the majority of mortgages are 30-year fixed-rate mortgages, which is a unique feature both in terms of their share and extended maturity. This differs from mortgage markets in many other countries. According to the OECD (2022), in around half of the 26 OECD countries, over 50 percent of mortgages are fixed-rate in 2019–2020. However, the duration of the fixed-rate period is typically shorter in these countries. In the UK, for instance, fixed-rate mortgages with durations over 10 years are uncommon. Most are 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, due to substantial transaction costs associated with buying and selling houses, as reflected in the budget constraint (2) by the parameter κ^o , housing is often regarded as an illiquid asset. Households whose wealth primarily consists of housing

²⁶Recent 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).

wealth are sometimes referred to as “wealthy hand-to-mouth” households (Kaplan and Violante, 2014). Consequently, among households with the same level of wealth, those with more housing wealth are typically more financially constrained than those with more liquid assets. 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. We now turn to the decision between owning and renting, as well as the broader wealth portfolio decision.

4.4 Renting, Owning, and the Wealth Portfolio

Pure preference for the mode of housing tenure, that is renting vs. owning (but there are many other modes), either directly or indirectly (via the tenure mode attributes of locations), is expressed by parameter ξ_i in utility function (1). It drives a wedge between housing demand by owners and renters, *cet. par.* Renters face effective borrowing constraints, while owners can borrow using the housing asset as collateral. This means housing has a dual role both consumption and investment good. Henderson and Ioannides (1983) motivated considerable literature that distinguishes owner-occupants from renters: the former are modeled as individuals whose investment demand for housing exceeds their consumption demand, with the difference serving as an asset.²⁷

Properly comparing renting to owning requires comparing the lifetime indirect utilities associated with renting vs. owning, defined in section 2 as function of the state variables as of time t . The difficulty of working with indirect value functions is well known.²⁸ So much of the empirical literature models tenure choice in terms of discrete choice models based on annualized cost comparisons. For renters, they 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.

Such imputations are facilitated by the user cost of housing (Poterba, 1984), that is, the one-period cost of housing services per unit of owner-occupied stock. This is defined as the sum of 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), the opportunity costs of funds within the asset portfo-

²⁷See also the literature on understanding the determinants of homeownership rates surveyed by Goodman and Mayer (2018), and the macro life-cycle model of Chambers et al. (2009).

²⁸Notable progress has been made with econometric methods bypassing tedious computation of the value function; see Davis et al. (2021) for a housing application.

lio, net of the expected capital gain. This last reduces the opportunity cost of housing, an effect which theoretically could be strong enough to make the demand for owner-occupied housing upward-sloping (Dusansky and Koç, 2007). Many homeowners benefit from the levered housing returns; these returns typically exceed unlevered ones (Jorda et al., 2019).²⁹ This could explain households’ seemingly irrational behavior during housing-price bubbles. 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 maintenance behavior and many others.³⁰

To study housing tenure choice in the context of inequality requires recognizing an economy’s institutional setting. At one extreme, barriers to free choice in the form of market discrimination on various grounds of taste, This is taken up in Section 6. At another extreme, access to public (social) housing differs dramatically across countries. Eligibility often reflects non-price rationing, depending on individuals’ demographics in complex ways; *c.f.* 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, so its variation with income and wealth inequality is tricky to assess. The average renter is much poorer than the average owner. Kaas et al. (2019) work with the Household Finance and Consumption Survey of the ECB (2013–2016) and show that this explains the negative correlation between homeownership and wealth inequality, as measured by the Gini coefficients, across European countries. Some differences are stark. Germany, a much wealthier country than Greece, has a homeownership rate of 44% relative to Greece’s 72%, while the Gini coefficients for wealth are 0.76 for Germany and 0.56 for Greece, respectively. It is thus difficult to draw lessons from international comparisons even across two different European countries.

Given their opportunity sets, households who choose to own their residences are clearly better off. But by how much? How do they compare with those who choose to rent? In view of the myriad factors entering these decisions and the numerous endogeneities, the findings of Sodini et al. (2023) are particularly interesting. Municipally owned rental

²⁹The levered return is equal to the unlevered return minus the long-term mortgage rate multiplied by the leverage ratio, divided by the equity ratio.

³⁰Bailey et al. (2018a) show, using plausibly exogenous variation in house price beliefs, that more pessimistic home buyers 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.

housing in Stockholm was unexpectedly privatized, confronting tenants with a tenure choice. They find that homeownership caused substantial wealth accumulation, as house price growth exceeded the borrowing rate. Homeowners increase consumption relative to the preceding four years. They also avail themselves of additional borrowing capacity, because they were able to purchase their homes at a discount relative to the market. Homeowners were able to “climb the housing ladder.” Older homeowners were able to allocate more of their financial wealth to risky assets. The average “treated” household moves up from the fifty-fourth to the seventy-first percentile of the Stockholm wealth distribution.

It is interesting to review briefly the returns to housing as an asset from a macroeconomic perspective. Jorda et al. (2019), Supplemental Data, Table A.5, show that the average annual (unweighted) real returns to housing are quite heterogeneous across countries. Average (unweighted) returns to housing exceed those to equity for the entire sample 1870–2015 (including war years): 7.26% vs. 6.67%. They also do so for Belgium, Denmark, France, Germany, Japan, Netherlands, Norway, Portugal and Sweden. However, the opposite is true for the US and the UK, for which the figures for housing and equity are: 6.10% vs. 8.46%, and 5.44% vs. 6.83%, respectively. Real returns to equity fluctuate much more than those to housing and their correlation was high and positive up till World War II, but it is much lower since then; see Jorda et al. (2019), especially Figures VII and VIII that plot decadal moving averages for 16 countries. Those 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 diversification which economists have fully explored.

4.4.1 Housing in Households’ Wealth Portfolios and Inequality

The 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 owner-occupy, so they face the problem of hedging risks. Both renters and owners are exposed to aggregate and 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. Those loans may have fixed or adjustable interest rates; the latter expose borrowers to aggregate shocks. Inflation benefits fixed rate borrowers. The amount of housing equity depends on the origin of assets. Family members may assist younger households with loans or gifts that allow them to afford greater home equity. Thus all the components of households' asset portfolios are stochastically interdependent and also depend on individuals' own means as well as those of their parents.

Unlike Sodini et al. (2023), Chetty et al. (2017) use instrumental variable methods to show that increases in property value (holding home equity constant) reduce stock holdings, while increases in home equity wealth (holding property value constant) increase stock holdings. The stock share of liquid wealth rises by 1 percentage point — 6% of the mean stock share — for a household that spends 10% less on its house, holding wealth fixed.

Enriching the basic framework of section 2 in order to assess housing in the portfolio of assets requires accounting explicitly for the stochastic structure of returns and integrating the location decision, with its own hedging requirements. Ortalo-Magné and Prat (2016) offer a first step in the latter direction. The former has been addressed only partially.

Variations in income and wealth map differently into variations in consumption and investment demands. 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) also uses Survey of Consumer Finances data and confirms the prediction that the mix of non-housing assets differs between the constrained and unconstrained cases, net of actual and imputed rental income. Arrondel and Lefebvre (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 where 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 house-

holds within the population, to assess fully the endowments-related housing inequality that originates in wealth portfolios.

There are fixed components of transactions costs of all types. They cause portfolio readjustments to take place at discrete times, usually coinciding with housing consumption changes. Demographic shocks or job relocation (planned or unplanned) can lead to moving, remodeling or changes of tenure. Flavin and Nakagawa (2008) and Flavin and Yamashita (2011) allow for adjustable non-housing consumption and general asset portfolios. Since overall risk preference depends on wealth, distributional consequences follow. The highly levered position of young homeowners leaves little room for extensive risk diversification. Notably within that literature, Flavin and Nakagawa (2008) and Flavin and Yamashita (2011) endogenize the timing of adjustments of the housing quantity in reaction to exogenous events. Thus, housing is quasi-fixed during residence spells whose lengths are endogenous, but timing depends on the share of housing in total wealth. These considerations link endowments-related housing inequality with associational inequality. The strength of the neighborhood effects, documented by Chetty and Hendren (2018a,b) (see section 5.2), depends on the length of residential spells; see section 5.1. Relatively high transactions costs prevent households from adjusting their housing consumption in line with their preferences and lead to prolonged residence spells. This is an advantage in good neighborhoods but a disadvantage in bad ones, impacting associational inequality. This link between residence spells and inequality cries out for further exploration.

Martinez-Toledano (2022) emphasizes, using Spanish data, 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 trading patterns of households across wealth levels in the US housing market for 1988–2013. It complements the findings of Martinez-Toledano (2022) by showing that poorer households are more likely to buy risky 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 wealth inequality that is higher 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 fuller understanding of the impact from cyclical fluctuations. As they are macroeconomic in origin they mask important detail about the risks faced by individual households and how they may 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 across the OECD countries. Home equity-based borrowing has grown in importance, especially in the US. Mortgage interest deductability (present in many countries) lowers the cost of homeownership, but its incidence is uneven.³¹ The length of mortgage loans is also important, because interest charges are front-loaded, allowing greater tax deductions early on, and varies across countries. The dominant fixed-interest 30-year loan in the US is uncommon internationally.

Eliminating the mortgage interest deduction has been debated in the US and in Europe.³² Arguments in favor are that it generates a large tax revenue loss and is effectively a regressive tax as it interacts with the progressivity of taxation, the value of the deduction increases with household incomes and the associated marginal tax rates. Arguments against eliminating are that it will reduce the homeownership rate. Sommer and Sullivan (2018) consider its general equilibrium effect through endogenous house prices and rents and challenge this view by showing that eliminating the mortgage interest deduction can reduce house prices by increasing the relative cost of homeownership. Consequently, lower house prices imply that low-wealth, credit-constrained households would more likely become homeowners. They argue that the elimination of the mortgage interest deduction could actually increase homeownership. More importantly, such a reform would improve the housing consumption of lower-income relative to higher-income households.

Rather than reviewing the huge specialized literature on the tax treatment of housing we focus on a few additional key issues. The tax treatment of housing favors higher-

³¹For example, for the US, see earlier discussion on President Clinton's National Homeownership Strategy in 1995 and President Bush's American Dream Downpayment Initiative in 2003.

³²Since 2002, this deduction is limited in the US; IRS Publication 936.

income households. A progressive tax system reduces the burden of the property tax, which is levied on property values, and the actual tax liability may be deductible from the US federal income tax under certain conditions and various improvement categories may also be tax-advantaged. A related and under-explored issue is that the 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 on the l.h.s. $p(\ell_t^i)h_t^i$ is associated with asset income on the r.h.s. $p(\ell_{t-1}^i)h_{t-1}^i$, which is implicit if the home is not sold. That too favors owner-occupancy over renting. From (4), renters incur housing expenditure $q_t(\ell_t^i)h_t^i$ which is not associated with any asset income. This amounts to unequal treatment of renters relative to owners. The property tax, an important feature of the tax treatment of housing with implications for inequality, is discussed in section 5.3.1.

Poterba and Sinai (2008) show that the often-forgotten exclusion of the imputed income of owner-occupants from tax liability is an important benefit favoring higher income taxpayers. They assess that the revenue loss from the exclusion of this imputed income from the US 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, with data for several European countries, that the impact on income inequality is ambiguous. That 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. Figari et al. (2017) investigate the distributional implications of abolishing 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 that exhibit varying tax treatment of homeowners. They argue that removing the “homeownership bias” generates revenues which can lighten taxation of labor without inequality-increasing side effects. As highlighted by Kiyotaki et al. (Forthcoming), a clear distributional impact of removing homeownership subsidies is welfare loss to older generations who are more likely to be homeowners, a reason why it is likely to be politically difficult to implement.

Finally, transaction taxes on property transfers have garnered significant attention

from policymakers, as seen in the *Henry Review* (Australia) and the *Mirrlees Review* (UK). Research using data from Australia, Europe and the US demonstrates that transaction taxes reduce homeowners' mobility, transaction volume, and house prices in the ownership market, resulting in substantial welfare loss, as reviewed by Määttä and Terviö (2022). Recent literature explores the distributional effects of transaction taxes and their impact on tenure decisions. For instance, a study by Han et al. (2022) analyzes the introduction of a city-level transaction tax in the City of Toronto, compared to other areas in the Greater Toronto Area. They find that a higher transaction tax decreases buy-to-own transactions while increasing buy-to-rent transactions, leading to a lower homeownership rate. Their analysis, employing a housing search model encompassing rental and ownership markets, reveals significant welfare loss and distributional effects among new home-buyers, 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 neighborhood location. Neighborhoods are the stuff of social space, regardless of the institutional environment of housing. They host social life, promote social interaction, and accommodate informational channels, all functions that persist with, and/or complement increasing reliance on informational technologies. Precisely because of their multiple roles, neighborhoods are hard to define, and still are crucial for housing's role in inequality. Definitions favored by economists often follow the geographic detail associated with data availability.³³

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 additional attention is needed to the interface between economic and social space. The present section elaborates on attributes of locations as access to jobs, schools and social networking opportunities. However, the Covid-era experience with Working-from-Home (WFH) has ushered in important changes, discussed

³³As we have already noted, Durlauf (2001) is credited for introducing the *memberships* or *associational* theory of inequality. Durlauf (2004) is a thorough review of theory and empirics, and Graham (2018) adopts the term associational inequality in a review of identification and estimation issues pertaining all types of neighborhood effects. A series of articles by a team of New York Times journalists, lead by Buchanan et al. (2023), has pioneered interactive maps of New York city neighborhoods that are defined by the perception of residents.

in section 5.5.

The location decision has investment-like features.³⁴ It involves social as well as moving ones, and pays off over time. As Kennan and Walker (2011) emphasize, and Jia *et al.* (2023) recently reaffirm, many aspects of new locations might not be ascertained without moving and experiencing living in a new location. As the location decision is conceptually similar for renters and owners we focus here on the formulation for renters. Owners, however, have more at stake as they typically incur greater moving costs.

5.1 Location Choice as Investment

Moving is an investment decision that trades off incurring current costs against expected future returns. Residential moves are often prompted by changes in demographic characteristics, like household composition and fertility decisions, or jobs. which motivate the housing location and quantity chosen. Households with school-age children evaluate locations for local school quality, whereas retired persons will value different local amenities.

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

Moving is modelled in Ngai and Sheedy (2020) as an investment in match quality between the household and location and neighborhood amenities. Macroeconomic conditions, search and other frictions can impede moves, as households tolerate quality

³⁴Bilal and Rossi-Hansberg (2021) proposed the concept of location *asset* to underscore this feature.

mismatch. Frequency of moving defines residence spells, which are linked to exposure to neighborhood effects (Chetty and Hendren, 2018a,b) and adjustment to households' asset portfolios, as we discussed earlier in section 4.4.1. Impediments to households' ability to invest in locational aspects of housing thus contributing to housing-related inequality. Restrictions in housing supply can make access to attractive locations expensive and will have inequality consequences both immediately and in the future via the propagation mechanisms; see also section 5.3.2. Since future skill depends on current skill, households' duration of stay in a neighborhood reflects a tradeoff between beneficial neighborhood effects and quality mismatch.

Researchers have documented a long-standing decline in renters' mobility in the US, which reflects mostly rent-to-rent moves (Ioannides and Zabel, 2019). The pronounced decline in residential mobility in the US involves young adults, in particular, a group most to need to invest in location.³⁵ An important next step in this area is to establish causal motives of residential moves, until now only rarely addressed by the literature, with the exception of Kennan and Walker (2011) and Jia et al. (2023).

5.2 Location Choice and Neighborhood Effects

The literature that has examined the importance of neighborhood as part of the housing decisions has looked at a myriad of socioeconomic outcomes. A key objective of this literature is to describe the 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 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

³⁵From 1976 to 2016, the percent of those who moved in the preceding year declines monotonically with age. The mobility of those of age 20–24 declined from 40% to 25% during 1976–2016 in monthly terms.

distribution.

A neighborhood is inherently multidimensional, and that 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 the multidimensional nature of neighborhoods seriously implies that they may be evaluated in an ordinal fashion in the sense that sets of attributes of neighborhoods are considered jointly. Neighborhoods are identified as discrete objects, and neighborhood choice is addressed by means of discrete choice tools resting on utility comparisons. These 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. In view of Theorem 1, Brock and Durlauf (2002), there exist plausible parameter values for which the utility tradeoffs between individuals' valuations of the demographic characteristics of their neighborhoods and that of the social effects 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, thereby inducing within-group homogeneity and cross-group heterogeneity. The interplay of individual characteristics and social effects leading to segregation underlie models of tipping and the dynamics of segregation, examined empirically by Card et al. (2008) and Card et al. (2011). See also section 6, and in particular [6.2.1](#).

In the remainder of the present section, we first explore the role of neighborhoods as hosts of spatial and social proximity. Then we examine the literature on housing and neighborhood effects, focusing on two extreme geographies. One considers neighborhoods defined as *points in space* that are associated with social context and in particular the acquisition of education. A second adopts *census tracts* as neighborhoods, which are discrete spatial population groups that delineate urban areas. Both these approaches serve as a background for studying assortative matching, the formation of neighborhoods

and their dynamic evolution in relation to changing tastes.

5.2.1 Neighborhood Effects and Jobs

Since the review by Ioannides and Datcher Loury (2004), the literature has sought to establish links between social connections and employment prospects. Calvo-Armengol and Jackson (2004) 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 de-identified confidential Facebook.com data for 55 countries establish that more people get jobs where their weak ties work and for the same reason, namely that their weak ties are more numerous. In all the countries in their data, going to work where a specific friend works is more likely the higher is the tie strength (although not always statistically significantly greater than zero for all three of their tie strength measures). Interestingly, they show that the value of strong ties for jobs is positively correlated with greater income inequality. Several authors have established that the incidence of unemployment clusters spatially. Specifically, Bilal (2023) confirms this claim for France and tests a theory that that is due to firms' co-location decisions and behavior, not of workers'. He shows that firms' behavior amplifies spatial unemployment differentials five-fold.

Bayer et al. (2008) provide powerful evidence that job referral networks are neighborhood-based. Their micro data from the long-form of the US Census for Boston, Massachusetts, with detail down to the Census block, links the Census block of individuals' residence and that of the workplace for a large sample of prime-age workers in the Boston metro area. They use novel identification methods and document significant evidence of social interactions: residing on the same block makes it one-third more likely to work together. Similarity in terms of education, age, and presence of children is consistent with more intensive social interactions. They also show that the significance of neighborhood-based job referral networks extend to additional labor market outcomes (such as labor force participation, hours and earnings).³⁶

³⁶In a conceptually similar study Hellerstein et al. (2014) use matched employee-employer data (by merging the LEHD and the DEED data) for a large number of workers and link workers' residence and employment. They obtain robust evidence that workers who are more connected to their neighbors have lower 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.

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. They use several outcomes, that is, high school graduation, attendance at a four-year college, a measure of years of postsecondary education, and permanent wage. They find, in particular, that a ninetieth versus tenth percentile school or neighborhood increases the high school graduation probability and college enrollment probability by at least 0.04 and 0.11 and permanent wages by 13.7 percent.

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. They use wage and housing price data and find 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), who use data from Spain, show that in bigger cities not only the mean is greater but so is 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. This in turn causes greater dispersion of earnings within occupational groups in bigger cities. Lhuillier (2024) also postulates that workers learn from one another and confirms 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 does favor skill accumulation but accentuates spatial inequality.

5.2.2 Sorting with Neighborhoods Modeled as Points in Space

This section looks at a simplification of the basic framework, due to Ioannides (2013), section 3.3, in order to focus on housing and associational inequality when neighborhoods are defined as points on the positive real line, $\ell \in \mathcal{N} = R_+$. The assumption that housing is consumed at the unit level allows us to focus on how sorting defines neighborhood income distributions. The model determines an equilibrium rent $q(\ell)$ that drives individuals' self-selection into neighborhoods and underpins the resulting neighborhood income dis-

tributions. Locations are indexed by parents' average neighborhood schooling, $S(\ell)$, itself an endogenous quantity. The equilibrium rent is increasing in this quantity. It is derived using a two-period snapshot of the basic framework, two-period dynasties consisting of a parent and child each. 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 to their children's expected schooling. The model delivers an equilibrium rent function $q(S)$, a *hedonic rent function*, which is increasing in S (and sigmoid under reasonable assumptions) and supports assortative matching. Average neighborhood parental schooling is given 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 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. Specific investment in human capital accumulation that depends on location ℓ may strengthen or weaken the impact of the neighborhood component of associational inequality depending on whether it is a substitute or a complement.

5.2.3 Sorting with Neighborhoods Modeled as US Census Tracts

This previous section stripped the location choice to a bare minimum in order to isolate the role of housing prices in neighborhood sorting. Neighborhoods have multiple attributes over which individuals have preferences. These include various amenities, and also descriptions of the neighborhood population with particular demographic characteristics, neighborhood school quality, geographical attributes etc. Defining neighborhoods in terms of spatially well-defined areas for which data on the plethora of relevant charac-

teristics exist allows us to model 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 over neighborhoods of renters who are likely recipients of housing vouchers. Their specification is a special case of (1), $\sigma = 1, \varepsilon = 1, \bar{h} = 0$, with the addition of location-specific amenities including demographic characteristics of the census tract, which they express in terms of simple functions of model parameters and choice probabilities.³⁷ They then 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.³⁸ They find that $X = 20$ maximizes the aggregate earnings of children of renting households offered location-restricted vouchers. Their results show that such a substitution benefits the children of households that accept them, but not of those who were not offered vouchers. They thus demonstrate that properly designed housing vouchers may improve intergenerational mobility.

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 and for housing services may be substitutes or complements. Notably the study uses neighborhood characteristics in a nested hierarchical setting. A random sample of observations on households from the American Housing Survey is geolocated and linked to its neighborhood cluster, defined as the set of their immediate neighbors, which is in turn linked to their census tract and then to their respective metropolitan area. Their approach allows the authors to estimate endogenous and contextual neighborhood effects. Controlling for non-random sorting into neighborhoods allows for unbiased estimates and provides a means for identifying endogenous neighborhood effects. Their neighborhood choice accounts for numerous characteristics of neighborhoods and their residents and their results confirm the importance of homophily. Their estimates of the housing structure demand equation confirm that neighborhood effects are important and that housing demands by neighbors are interdependent. This particular feature is a key element of Autor et al. (2014) who show empirically that such residential neighborhood

³⁷Their estimation of deep parameters is innovative. Their method and data allow them to form the likelihood of observed choice probabilities in terms of model parameters without having to solve for the underlying value functions. This powerful procedure could have potentially many applications.

³⁸<https://www.opportunityatlas.org/>

effects are critical in assessing the redistributive effects of removing rent control in the City of Cambridge, Massachusetts. Although neither Davis et al. (2021) nor Ioannides and Zabel (2008) explicitly address inequality, their methodological approaches are important to understanding how housing contributes to associational inequality. One may use the estimates to make inferences about individuals' neighborhood context at much finer geographical detail as 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 who are *plausibly forced* to make decisions are thus particularly useful. An interesting example of such research is Chyn (2018), who compares young adult outcomes of children displaced by demolitions of public housing to outcomes for originally similar but non-displaced peers in nearby public housing in Chicago. The displaced households were offered tenant-based housing vouchers. The displaced children were more likely to be employed and earned more in young adulthood, experienced fewer violent crime arrests 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).

Patacchini and Zenou (2011) identify neighborhood effects in the 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 compare outcomes for households that chose private dwellings in residential neighborhoods with those that plausibly were assigned Council housing units (public or social housing in the UK). Their results suggest that parental involvement and neighborhood quality are complements. In "good" neighborhoods, better educated parents provide time input in their kids' education, and their kids are more likely to reach high educational levels. That is not the case for those living in "bad" neighborhoods.

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, with school zone 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 the children's

human capital, which depends on local school quality. A novelty of their approach is that school quality improves from the sorting of high performing teachers across schools, while pay is unchanged, to schools with higher socioeconomic status students in the same large US school district. They find, using data from 2002 to 2017 for housing prices from Zillow’s Transactions and Assessment Database (ZTRAX), and community data from the American Community Survey, that the school quality channel accounts for over half of the total wealth effect of a housing market shock.

5.3 Assortative Matching and Changing Amenities

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

A large literature seeks to document that individuals are attracted by cities that host other individuals of similar skills. A rich literature finds that skilled individuals’ earnings are higher in larger cities. Households’ moves provide evidence on the relationship between individuals’ characteristics and the wage and other characteristics of destinations. Card et al. (Forthcoming) use longitudinal data from the Longitudinal Employer-Household Dynamics (LEHD) program of the US Census Bureau. Consistent with recent research from France, Spain and Germany, they find that two thirds of the variation in observed wage premiums for working in different commuting zones (CZ) is attributable to skill-based sorting, and 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), which is “almost entirely due to sorting on unobserved skills within the college workforce.” Moreover, they find that matching across CZs is much larger 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 inequalities.

Individuals’ pursuit of better lifetime prospects is associated with greater earnings inequality. 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 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 through additions and conversions. Thus, shocks to housing demand due to arrival of wealthier consumers increase housing prices for all. The attraction of 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 US college/high school graduate wage gap coincided with increased geographic sorting as college graduates concentrated in high-wage, high-rent cities. The supply of amenities changed to match changing tastes. Such amenities together with changes in cities' wages and rents increased welfare inequality between high school and college graduates by more than is implied by the increase in the college wage gap alone.³⁹

Changes in cities that follow changing demographics are not always welcome. A case in point is Paris, where concern about preserving the characteristic urban fabric of its center has taken the form of keeping it affordable to diverse demographic and occupational groups. Specifically, its government has pioneered a policy whereby the city has the right of first refusal when dwelling units come up for sale. The properties it purchases are converted to government-owned housing, which results in one-fourth of Paris residents to live in government-owned housing.⁴⁰

5.3.1 Local Provision of Education and Property Tax

A potentially important force of inequality that is linked to sorting across locations operates via local provision of education when it is financed largely by local taxes. Public provision of education, which accounted in 2019 for 91% of enrollments in US primary and secondary education, may widen rather than narrow existing educational inequalities. Property taxes amount to one-third of combined state and local taxes in the US, and are the principal source of financing local public services, such as public safety, in addition to schools. In 2018-2019, local taxes amounted to 36% of K-12 public education

³⁹See Almagro and Dominguez-Iino (2022) for a similar urban reshaping in Amsterdam induced by tourism. It led to new housing regulations, all of which have had notable distributional effects.

⁴⁰“How Does Paris Stay Paris?” *New York Times*, March 19, 2024.

revenue in the US, where the representative homeowner pays 1% of their property value in local taxes.⁴¹ If viewed as a tax on housing and consumption, it is regressive because lower-income households spend a greater share of their income on housing; see section 3. However, if viewed as a tax on capital, 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 (Kenyon et al., 2022). The power of local governments over zoning (section 5.3.2 below), together with their control over the property tax can reinforce sorting and contribute to inequality via regressive educational outcomes.

Reliance on the local community property tax base for financing schools is a source of inequality in the US for additional reasons. Property tax assessments vary in accuracy and equity along the community wealth distribution. Moreover, US state governments, which contributed 47% of US K-12 public education spending in 2018–2019, employ different policies in aiding poorer school districts. The school choice systems that are increasingly being introduced aim at delinking residential location with school attendance. As Avery and Pathak (2021) show, whether or not school choice rules truly increase access to high-quality schools is complicated by families' self-selection of housing choices. However, in some US states, voluntary school integration that promotes school diversity may help close the achievement gap and overcome racial barriers. This is the case with Boston's Metropolitan Council for Educational Opportunity (<https://metcoinc.org/>). And last, there is evidence of racial inequalities in assessment, as 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 United States, Avenancio-Léon and Howard (2022) find that Black and Hispanic owners face a 10% to 13% higher tax burden for the same level of public services. This comes about because such owners are effectively assessed at higher rates because their properties are assessed based on structure, ignoring other characteristics that are included in the market value. They find that just over half of this disparity is between neighborhoods and due to the fact that the assessments are less sensitive to neighbourhood attributes compared to market prices. This leads to overtaxation of communities with a high share of minority residents in the presence of well-documented racial segregation in the US (see Section 6.2).

⁴¹While the picture is similar for Canada, where most of the 40% of school finance comes from local taxation originates in the property tax, that is not the case worldwide.

A lot of research has sought to identify the consequences for inequality of the school finance reforms that originated in legal and political changes in the US since the 1970s. Jackson et al. (2015) look at the basic causal impact of school spending and finance reform. They establish that a 10% increase in school spending per pupil per year for all 12 years of public education leads to 0.31 more completed years of education, 7% higher wages, and a 3.2 percentage points reduction in adult poverty. The effects are more pronounced for children from low-income families. Wide implementation of reforms would further delink education spending from the local property tax base and reduce the associated inequality. For further details we defer to the specialized literature on proposed reforms of school access and finance. They are relevant here because they might in part offset the adverse effects of residential sorting on inequality via its impact on human capital accumulation.

5.3.2 Zoning and Land-Use Regulation

Zoning and codes affect the supply of housing. The extent in which residential sorting contributes to inequality depends critically to households' ability to afford housing in locations with attractive amenities. Housing types and prices depend on land use regulations and zoning, in particular. In the US, land use regulation is under local government control, though 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 they are far more prevalent than in other countries. They limit housing opportunities for those who cannot afford large homes or lots.⁴²

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 policy makers.⁴³ In an effort to dampen the effects of exclusionary zoning on the lowest-income residents, Trounstein (2023) argues that 'whiter' US local governments implement more stringent land use regulations which help preserve racial homogeneity.⁴⁴

⁴²A proposed introduction of zoning in the UK has been criticized as likely increasing housing inequality; see <https://tinyurl.com/mr23u8bm>.

⁴³See Rouse et al. (2021) for a policy inspired view and Ellickson (2022) for a long-standing legal critique.

⁴⁴Similar to the effect of zoning is a finding by Kulkarni and Malmendier (2022) that the upward mobility of children from low-income families is not predicted by homeownership rates, but by home-

Favilukis et al. (2023) develop a dynamic stochastic spatial equilibrium model and use it to evaluate the effects of zoning changes, rent control, housing vouchers, and tax credits. Calibrating the model to the New York metropolitan statistical area, they find that housing affordability policies “carry substantial insurance value” but reduce aggregate housing and labor supply. Housing affordability policies that enhance access to this insurance (for the neediest households) create substantial net welfare gains.

Diamond and Gaubert (2022) show that, by 2017, sorting through moves in US cities has been driven by preferences for consumption amenities, in contrast to moves for production amenities as in earlier times. They assess how well-being 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 nominal wage inequality increased in percentage points (of utility) by 16.7 between 1980 and 2000, and by 10.7 between 2000 and 2017. Adding the effects of changes in rents shows that the increase in wage inequality declined 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 larger change in well-being inequality of 17 and 12.1 percentage points between 1980–2000 and 2000–2017, respectively.

The findings of Diamond and Gaubert (2022) are consistent with Hsieh and Moretti (2019) and also Herkenhoff et al. (2018). The latter work with a representative-individual, general equilibrium multi-region model with endogenous housing supply and specification of state-level land-use regulations that affect housing and non-housing production. They simulate their model with panel data at the level of US states for 1950–2014 and examine how a slowdown in productivity and output growth feeds into high house prices in high-income states, like California and New York. They predict that deregulating just California and New York back to their 1980 land-use regulation levels would raise aggregate productivity and consumption by at least as much as 7% and 5%, respectively in those states.

5.3.3 Codes

Housing and building code restrictions are state- or locally-controlled policies in the US (and often elsewhere) and affect the cost of new housing and the use of existing stock ownership segregation. Higher residential segregation between homeowners and renters predicts lower upward mobility of children from low-income families, while not affecting high-income families.

through remodeling and *filtering*. Filtering is the process through which dwelling units as they age and depreciate in quality and price "filter" down to occupancy by lower-income households. It has served as a robust source of lower-cost housing. Remodeling and filtering constrain housing stock maintenance and re-use, both sources of housing options for lower- and middle income-households. They also influence the demographic composition of central cities. Gentrification, defined as reoccupation of central cities by higher-income households when the central city becomes more attractive, depends on the age composition of the housing stock. Rosenthal (2014) estimates, using American Housing Survey data, that owner-occupied housing units filter at a rate of 0.5 percent per year, while rental dwellings filter at higher rates, typically 1.8–2.5 percent per year. Both processes are slowed by real house price inflation. 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).

These regulations have been examined by normative approaches such as Faigelbaum and Gaubert (2020), who consider optimal spatial policies in the presence of sorting. By endogenizing housing supply elasticity as a function of local supply regulations, they allow the planner to change the supply elasticities. They find that spatial efficiency requires redistribution to low-wage cities and a higher share of high-skill workers in such locations. Spatial efficiency requires that the currently largest metropolitan areas shrink and become more skill intensive, but with lower wage inequality. Interestingly, their prescription of discouraging moves to "superstar" cities seems to be realized as an outcome of the Covid-19 era. However, the attraction of superstar cities may survive, if one of the principal disadvantages, congestion, is mitigated (Krugman, 2023).

5.4 Intergenerational Aspects of Neighborhood Effects

Neighborhoods matter for intergenerational mobility. This is established by a series of studies starting with Chetty and Hendren (2018a,b). These studies have used information on moves of seven million families across US commuting zones and counties to estimate neighborhood effects on intergenerational mobility. By observing household careers over successions of residential neighborhoods and implementing clever identification strategies that exploit variations across birth cohorts, genders, and quantiles, they estimate that

neighborhood effects on children’s incomes converge to those of permanent residents at a rate of 4% per year of exposure. Using US counties as the concept of neighborhood, they estimate that for children in low-income families, each year of childhood exposure to one standard deviation “better county” (defined as those 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%.⁴⁵

As the present section underscores, the impact of housing location on inequality via its associational aspect means that location is at least such a necessity, if not more, as housing consumption. Tackling inequality requires not just affordable housing but affordable housing in opportunity-rich neighborhoods, as Raj Chetty argued in his Testimony to the US Congress [<https://tinyurl.com/mpw3sh6k>].

In the US housing, becomes “unaffordable” (to use a popular term) to the poor for many reasons. They include high urban land values in central cities, where low-skill jobs have often located. Exclusionary zoning and land use restrictions, due to local control of land use, make living near better jobs and schools expensive. Thus, the local income distribution and expensive housing reinforce income segregation patterns, with the poor living disproportionately near low-paying jobs. The local political process itself can, through the local control of schools, zoning and land-use regulation sections 5.3.1 and 5.3.2) produces feedbacks reinforcing income and racial segregation, which in turn can sustain under-investment in human capital by minority groups (Durlauf, 1996).

In a large and spatially diverse economy like the US, economic growth is often sharply localized, leading to spatially uneven housing price inflation. This hampers the relocation of skilled individuals in pursuing job opportunities in fast-growing sectors and hence can harm aggregate growth (Hsieh and Moretti, 2019; Herkenhoff et al., 2018). However, recently, according to both economics research and popular accounts on Working from Home (to which we come next), the Covid-19 pandemic may have reversed the superstar cities phenomenon of extraordinarily high housing costs that were producing a flight to less expensive locations.

⁴⁵See 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.

5.5 Working from Home

The Covid-19 pandemic and the policy response throughout the world forced 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 after the end of the pandemic show that while 80% of those between the ages of 18 and 64 who are working do so in-person, those who work partly or entirely remotely are distinct: Most have bachelor's degrees, followed by those with graduate degrees, those with some college and those with high school or less. In the US, they are predominantly white, both males and females with no children.⁴⁶

These facts force an assessment of the impact of WFH on the housing market and indeed the urban structure of the economy. Across cities, workers who can work remotely can keep high-productivity jobs but economize by moving to lower-cost locations; within cities, remote job access flattens the intracity house-price gradient [OECD (2023), Ch. 4, Fig. 4.6] and elevates the importance of multi-center urban areas.

Among a flurry of research Brueckner et al. (2023) stands out. They use data for house prices and rents from ZTRAX, for local amenities and productivity from Albouy (2016), and for county population outflows from the United States Postal Service address change data. They confirm, in broad stroke, much discussed predictions of WFH, including urban population outflows. Improvements in urban transportation have improved the efficiency of the urban economy, but do not seem to have altered its basic geometry so far. In contrast, as a technology WFH is quite different. For many OECD countries, WFH increased between 25% to 35% from 2020 to 2022 [OECD (2023), Fig. 4.5]. By bringing about an enormous reduction of commuting costs, it is an urban decentralization force with major implications for housing and inequality. In high-productivity cities real-estate owners lose and renters gain, with the opposite effects in low-productivity cities. Davis et al. (2023) emphasize the effect of WFH as a technology complementary to working from the office that has the effect of 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 will continue after the pandemic ends.

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 in-

⁴⁶“Who still Works from Home.” *The New York Times*, March 16, 2024.

dustrial composition of cities and inequality. 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, ultimately, some commercial real estate in central cities will be converted to housing.⁴⁷

While it is too early to assess the impact of WFH on individual productivity and TFP, a review by Van Nieuwerburgh (2023) emphasizes the complexity of making reliable inferences. WFH saves commuting time and may induce workers to work longer hours, but it is hard to assess its effects on individual productivity from the lost serendipity of office interactions and the consequences for corporate culture. WFH, coming after widespread adoption of 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.

6 Racial Discrimination and Segregation

Race is an important determinant of inequality in numerous countries and especially the US. It persists even after controlling for household-level state variables such as initial level of skill, assets or location. Race discrimination is present in many markets including housing (Lang and Kahn-Lang Spitzer, 2020). It affects both ownership and rental markets, and is by definition a powerful driver of housing inequality. Race drives unequal treatment of otherwise identical people based on their race, ethnicity, gender or socioeconomic status. Its consequences for housing inequality are important both in their own right, as an endowment force of inequality. Location is a force of residential segregation by race and therefore associational inequality (Schelling, 1971). Discrimination today goes beyond overt exclusion from markets. We need to assess both its current impact and the persistent effects of past exclusion from housing markets. Detecting such effects and assessing their measurable implications for welfare requires further research on both endowments and associational housing inequality.

Housing, a bulky, costly and highly differentiated commodity, is traded in personalized markets. Those interpersonal transactions are conducive to racial and other discriminatory practices even when they are ostensibly outlawed. As Arrow (1998) puts it, in the

⁴⁷OECD (2023), Ch. 4, details how the new geography of housing demand evolves. E.g., whereas population densities decline with distance from the centers of Functional Urban Areas, house price differences increase with distance from the centers for small and medium such Areas along with increased reliance on telecommuting technologies.

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 nowadays taking place increasingly via the web.

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. Suboptimal choices in the face of misinformation or disinformation result in welfare loss. Bergman et al. (2020) and Bergman et al. (2024), discussed further in section 6.1.2, examine lack of information as a barrier to moving to “good” neighborhoods.⁴⁸ Furthermore, as much of housing search activity nowadays takes place online, 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 is the fact that although searching via online markets allows agents to avail themselves of masses of information that reduce search costs, they are not as effectively “monitored” for compliance with antidiscrimination laws as physical markets. By making information exchange somewhat impersonal, agents may operate with manipulated information; they are vulnerable to outcomes that are even more unequal than physical markets (sections 6.1.2 and 6.1.3). We refer to these outcomes as instances of *endowments* inequality.

Discriminatory practices can discourage, or even hinder, access to “good” neighborhoods, effectively facilitating housing outcomes characterized by residential segregation and exacerbating *associational* inequality. Residential segregation by race and by income are enduring features of urban America. Graham (2018) argues that “understanding the effects of residential segregation on educational attainment, labor market outcomes, criminal activity, and other outcomes has been a leading project of the social sciences for over half a century.” Here we seek to clarify conceptual issues of associational housing inequality. We defer to Graham (2018) for a review of the econometrics of measuring neighborhood effects, that is effects on long-run life outcomes of associational inequality linked with location.

⁴⁸We follow Chetty and Hendren (2018a,b) and adopt the term “good” neighborhoods and use informally to refer to neighborhoods with low poverty, unemployment and crime rates, with good student test scores or large fractions of college graduates.

Gaps in homeownership and wealth holding between Whites and Blacks 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, but still stands at two-thirds of the White rate of 67% in 2020. However, Derenoncourt et al. (2024) argue that the increase in Black homeownership has not contributed substantially to the improvement of the racial wealth gap. They show that on the contrary there is a widening of racial wealth gap since 1980. This is 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 those to equity. These findings suggest that housing as a source of associational inequality through neighbourhood effects is likely to be a more important factor than endowment inequality via housing wealth in explaining 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 below.

The remainder of this section reviews recent research on how the practice of overt discrimination (especially by intermediaries) may be detected, how misinformation and disinformation lead to unequal outcomes in housing markets and how residential segregation as an aggregate outcome may be an unintended consequence of individuals' housing decisions. Both taste-based and statistical discrimination operate. The former is more likely exercised in person-to-person settings. A household can afford a particular dwelling but if a transaction is not consummated, the household is rationed. A case in point is Courant (1978) who predicts, using a search model, that if "some whites are unwilling to sell housing to blacks competitive equilibria in which blacks pay more for housing than whites are sustainable." Statistical discrimination may be a more appropriate concept of discrimination as an attribute of the behavior of intermediaries acting as agents of others.

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. Despite variation in methods, sample sizes and locations, the audit studies consistently find evidence of statistically significant discrimination against home seekers who belong to historically disadvantaged racial or ethnic groups. The 2012 US national audit study

found that there were 9% more audits in which a White home buyer was shown more available houses than an equally qualified Black home buyer than the share in which the Black home buyer was shown more houses than their White counterpart. However, the authors note that housing discrimination against Black and Hispanic home seekers appears to have recently declined in the US, with more advertised units being shown to such customers.

Bayer et al. (2017) seek to detect discrimination in the form of racial and ethnic price differentials in the housing market. They use a rich new data set of repeat sales that covers two million repeat-sales housing transactions drawn from four major US metropolitan areas and account for house and neighborhood-by-time fixed effects. They find that Black and Hispanic home buyers pay premia of around 2% on average in those four cities. These premia are not explained by variation in buyer income or access to credit. 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 blacks buy from blacks and Hispanics from Hispanics.”

Kermani and Wong (2021) approach discrimination in the form of gaps in the housing returns realized by Black and Hispanic homeowners. The gaps in returns they find are much larger than can be explained by housing costs differences alone. Instead, they are almost entirely due to distressed home sales, that is, foreclosures and short sales. Black and Hispanic homeowners are more likely to experience such sales and more likely to live in neighborhoods with many distressed sales. Greater income instability and fewer liquid assets both make them more vulnerable to adverse shocks. Using quasi-experimental variation in loan modifications the authors show that policies that facilitate restructuring of the mortgages of distressed minority borrowers can increase housing returns and mitigate wealth shocks.

In addition to direct discrimination in housing markets, housing outcomes can reflect discrimination in mortgage credit markets. Tootell (1996) found evidence of racial discrimination in lending to minority applicants, regardless of where applicants intended to purchase and not only in predominantly minority neighborhoods. He finds that discrimination goes beyond redlining of neighborhoods (at least in Boston). Relatedly Bhutta et al. (2022) examine racial discrimination in mortgage approvals using new data on mortgage applications from the US Home Mortgage Disclosure Act (HMDA) database. They

find that after accounting for significantly lower credit scores and higher down payment requirements, which make minority applicants less likely than White applicants to receive *algorithmic* approval from race-blind automated underwriting systems (AUS), observable applicant risk factors explain most of the racial disparities in credit denials. They also find that in the AUS data unobservable risk factors explain at least some of the residual 1-2 percentage points in loan denial gaps, and conclude that gaps attributed to racial factors have played a limited role in generating denial disparities 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 of minority workers to good jobs, according to the spatial mismatch hypothesis, which was first proposed by John F. Kain in 1968. A vibrant literature that has followed has attributed to it a substantial fraction of racial differences in employment. However, most recently 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 indeed played a role historically, especially when the fractions of Black residents of central US cities was greater and housing discrimination more widespread than today. The endogeneity of both employment and residential decisions makes this a complex matter, which is indeed centrally important for the associational component of housing inequality.

6.1.1 Discrimination via Intermediaries

Just as banks reject mortgage applications by minority applicants, real estate agents can neglect to show certain homes to families belonging to minorities. In both those instances, agents act on inferences about whether particular applicants “fit” in certain neighborhoods. 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.

That housing market intermediation as a social transaction was racially fraught in the past is unambiguous. Discriminatory behavior was defended on grounds of professional

ethics and reluctance to thwart racial preferences of other residents. 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.” The economics literature has sought to determine if that era is indeed bygone.

The US Government has adopted a number of devices, in particular HUD Audits, to enforce compliance with the US Fair Housing Act passed in 1968. That and subsequent legislation prohibits discrimination by direct providers of housing, such as landlords and real estate companies and by other entities, including municipalities, banks and other lending institutions, and homeowners insurance companies. It prohibits discriminatory practices that make housing unavailable to persons because of race or color, religion, sex, national origin, familial status or disability [<https://www.justice.gov/crt/fair-housing-act-1>].

Historically, discrimination took the form of steering Black and Hispanic home seekers to minority neighborhoods and denying them loans (redlining). Specifically, Christensen and Timmins (2023) seek to explain how discrimination can impact households’ choice of neighborhood. They estimate the welfare effects for a renter confronted with choice set constraints determined by the landlord response probabilities for the renter specific demographic group. The authors’ data originate in landlords’ responses from real-time data collected through an online realtor platform. Landlords were sent stylized inquiries (via a bot) from fictitious applicants posing as White, African American and Latinx in order to estimate choice constraints in five different metropolitan areas. Christensen and Timmins (2023) estimate preference parameters from a residential sorting model, using data for actual location decisions of households from InfoUSA.⁴⁹ They find that neighborhoods with such amenities as school quality, less crime, many cafes, and environmental quality, are associated with higher levels of discrimination. They estimate the welfare costs of discrimination at 4.7% of annual income for renters of color, with the costs increasing for African Americans as their incomes rise.

Christensen and Timmins (2022) provide further powerful evidence that the role of intermediaries is conducive to housing discrimination in neighborhood choice. Using data from the 2012 Audits (and from previous audits for 1977, 1989, and 2000) they find

⁴⁹InfoUSA, <https://dupri.duke.edu/infousa-data> is a massive consumer database.

that discrimination has declined over time for renters and prospective owners: White and minority testers are shown similar numbers of units. However, the units shown to minority testers are (relative to their white counterparts) closer to inferior quality schools, in neighborhoods with higher poverty rates, with fewer residents who are skilled workers and fewer college-educated families, and with more single-parent households.⁵⁰ They 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 more 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 low-level 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-experimental evidence, why low-income families in the United States 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 of affordability or proximity to family and jobs they perceive as accessible to them. However, Bergman et al. (2024) argue that it is informational barriers that prevent families from moving to high-opportunity areas. As part of a randomized controlled trial, housing voucher recipients in Seattle and King County, Washington were also provided services in the form of customized search assistance, landlord engagement, and short-term financial assistance. The intervention increased the fraction of families who moved 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, Bergman et al. (2024) suggest that redesigning affordable housing policies in order to provide customized assistance in housing search could reduce residential segregation and increase upward mobility substantially. Both this work 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

⁵⁰These facts may help explain why upward mobility experienced by African American households is inferior to those of white ones (Chetty and Hendren, 2018a,b).

of associational housing inequality.⁵¹

6.1.3 Disinformation via Housing Ads

Much of search for a home 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, must be treated as digital maps of physical markets. They are particularly important as conduits of information and might have even taken on part of the role played by person-to-person informal search. The literature has not yet fully addressed that role, at least not as much as in the case of job search.

Besbris et al. (2021) examine cross-sectional data about rental housing advertised online via millions of geocoded Craigslist.org posts across the 50 US largest metropolitan statistical areas, merged with census tract-level data from the American Community Survey. They find that online searchers for rentals are shown different types of information depending on the demographic composition of the neighborhoods searched. Ads for units in neighborhoods with more Black, Latino, or with poorer residents are relatively less precise about unit amenities, and relatively more precise about tenant (dis)qualifications, as 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 web-based.

6.2 Segregation: Homophily vs. Discrimination

Whereas the evidence of racial segregation is indisputable, its causes are harder to establish. Segregation could reflect homophily — people like being near others like themselves (Ioannides and Zabel, 2008) — given the residential options available to them, which

⁵¹Bergman et al. (2020) is a related but more data-intensive study that links randomized school quality information (from GreatSchools, a non-profit organization that provides free and accessible school quality ratings to families via a web-based platform, www.greatschools.org) with GoSection8.com, a US wide web site with listings for low-income families. The authors show that to help households move to better neighborhoods access to information complements more-expensive policies, such as MTO and CMTO, though is arguably less effective.

might differ across demographic groups.⁵² Aliprantis et al. (Forthcoming) argue that evidence that high-income high-wealth Black households live in neighborhoods with characteristics similar to those of low-income White households is not compatible with the notion that neighborhood sorting by income and race cannot be explained by financial constraints alone. Instead, they argue that neighborhood sorting is due to homophily. Given the options open to them — high-SES Black neighborhoods in US metropolitan areas are rare — Black households sort into Black neighborhoods. That is enough, they argue, to explain the racial gap in neighborhood quality at all income levels.

Racial discrimination offends on grounds of fairness and morality, but how significant are the associated welfare costs? Higgins (2022) estimates, using a dynamic assignment model, the welfare cost of racial discrimination by looking at the segmentation of housing markets by race and its impact on the choice of mode of tenure. He finds that Black households pay higher quality-adjusted rents and prices. He also finds that discrimination resulting in such gaps in the US shows some improvement since 1960, and in particular since the 1968 Fair Housing Act. However, rent and price gaps have declined by about one-half, but a large gap in homeownership rates between Whites and Blacks persists. Black households are on average 20 percentage points less likely to own a house than White households with the same income. Black households typically live in lower quality homes than similar White households. Relative to a market without discrimination, Black households were (on average) in terms of lifetime consumption-equivalent welfare five percent worse off in 1960, and remain one percent worse off in 2019.

Regardless of its causes, segregation begets a potent force of associational inequality when it operates in combination with neighborhood effects, as we argue in section 5. In institutional settings where this is possible, individuals self-organize into neighborhoods that imply access to employment opportunities and prospects for human capital accumulation that mutually reinforce the forces of inequality. The occupational composition of such neighborhoods tend to further reinforce patterns through peer effects as Chetty and Hendren (2018a,b) have demonstrated.

⁵²In view of section 2, homophily is in principle nested within a general specification of the “amenity” function through $\mathcal{L}(\ell^i)$, that allows for preference to be near neighbors of your own race/ethnic background.

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*” [*ibid.*, 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*.⁵³

A “bare-bones” model (in the spirit of Schelling (1971)) can explain how homophily contributes to the emergence of segregation. Suppose that in (1), utility u_i is defined in terms of $\mathcal{L}(\ell)$ only and there exist only two types of individuals: $i \in \{A, B\}$. In addition, i ’s evaluation of ℓ is expressed in terms of a vector of neighborhood attributes \mathbf{Y}_ℓ , of the share of individuals in neighborhood ℓ with a particular characteristic X , such as higher education, or the share of individuals of a particular type, and of a shock that is assumed to be i.i.d. extreme-value distributed over all individuals and neighborhoods. Suppose that the distribution of X differs across the two populations. For the pure case of homophily, with individuals valuing the share of their own particular type who choose the same neighborhood, $\xi(X|\ell) = \text{Prob}(A|\ell)$, the choice probabilities follow from the logit model:

$$\text{Prob}(i|\ell) = \frac{\exp[\mathbf{Y}_\ell b_i + \alpha_i \text{Prob}(i|\ell)]}{\sum_{j \in \Lambda} \exp[\mathbf{Y}_j b_i + \alpha_i \text{Prob}(i|j)]}, \quad \forall \ell \in \mathcal{N}. \quad (8)$$

If neighborhoods A and B do not differ in terms of contextual effects, $\mathbf{Y}_\ell = \mathbf{Y}$, it follows that $\text{Prob}(A|\ell) > \text{Prob}(B|\ell)$, if $\alpha_A > \alpha_B$. The model can be easily generalized. The equilibrium neighborhood choice probabilities obey a system of functional fixed points along the lines of (8), which may exhibit multiplicity, provided that homophily is sufficiently strong; see Brock and Durlauf (2002).⁵⁴

Card et al. (2008, 2011) test the Schelling model of neighborhood tipping using re-

⁵³See Ioannides (2013), Ch. 2, 3 for further discussion of literature inspired by Schelling (1971).

⁵⁴Analytical and estimation properties of a more general sorting model, of which Equation (8) is a bare-bones version, are provided by Bayer and Timmins (2005, 2007), for the static, and by Davis et al. (2021) and Zhang (2004) for the dynamic cases. In fact, Zhang (2004) modernizes the Schelling model using the theory of stochastic stability and proves that segregation emerges and persists even if every person in a society prefers to live in an integrated neighborhood. Residential location patterns that are most resistant to tipping are equivalent to stochastically stable equilibria.

gression 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 5% to 20% minority share. They find large, significant discontinuities in the White population growth rate at the identified tipping points. Still, they find that housing price reactions to tipping are relatively modest. 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.⁵⁵

Caetano and Maheshri (2021) test Schelling-type models by identifying whether neighborhoods are observed in transition or at steady states. They work with monthly data on all transactions during 1990-2004 for all San Francisco Bay Area neighborhoods (defined as population groupings of 10,000 households). They find, using novel instrumental variable methods, that sorting based on unobserved neighborhood amenities is the most important factor generating segregation. By mitigating endogenous sorting, moving costs play an important role as frictions in dynamic choice models.

6.2.2 Neighborhood Income Distributions and Overall Inequality

Considering the numerous forces that are 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 on measuring US segregation and its neighborhood context finds Black and Hispanic households reside in neighborhoods with median income substantially lower than White households even after controlling for household income. Reardon et al. (2015) argue that the literature has relied on relatively broad categories of income (poor, middle-class and affluent) that are not comparable over time, and often lacks a single universally accepted summary statistic to describe segregation. They pro-

⁵⁵Using the same US Census tract data, Card et al. (2011) delve deeper into the racial dynamics and find that tipping behavior is one-sided, and neighborhoods with minority shares below the tipping point attract both White and minority residents.

pose a new measure of segregation to address these two concerns. Using data from the US Census and the American Community Survey, they measure income in percentile rank relative to the national income distribution and plot the median income of neighborhoods (defined as US census tracts) as a function of households incomes.⁵⁶ The steepness of this curve serves as a measure of segregation, with a flat line indicating no segregation and a 45-degree line maximum segregation.

They construct this curve 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 *ibid.*, 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 disproportionately in neighborhoods with substantially lower median incomes. The difference in the neighborhood median income between Black and White households is about 10 percentage points across the entire distribution of household income.⁵⁷ In other words, Blacks and Hispanics must have household incomes that are substantially higher than Whites and Asians in order to live in neighborhoods with the same median income. In 2009, Black households at the 50th income percentile are living in neighborhoods with median income almost identical to White households at the 10th income percentile. These patterns of racial differences in income segregation are persistent, as indicated by the minimal change in the vertical distance between these curves from 1990 to 2009 (see *ibid.*, Table 1).

The fact that these patterns have changed little over time is an enduring puzzle. As Sampson and Levy (2022) point out, even though residents of both advantaged and disadvantaged neighborhoods in Chicago travel far and wide, their relative residential isolation by race and class persists: racial disparities in mobility-based disadvantage are even more pronounced than residential neighborhood disadvantage.

⁵⁶The following studies may be considered as precursors to this approach. Hardman and Ioannides (2004), employing data for micro neighborhoods from the US American Housing Survey, Schmidheiny (2006) working with Swiss data, and Wheeler and La Jeunesse (2008) working with data from a sample of 359 US metropolitan areas all underscore that sorting into neighborhoods is very 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.

⁵⁷More precisely, for 2009, they find that for households at 10th percentile income, the neighborhood median income for Black and White households are at the 31th and 43th percentile respectively, i.e. the difference is equal to 12 percentage points. For households at the 50th and 90th percentile, the difference is equal to 8 and 7 percentage points respectively.

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 it. Second, an upsurge of interest (partly because of new tools) in urban and regional economics, where the economics of housing has always played an important role, was realized. Third an interest in quantitative housing policy design was motivated by 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. This review has dual objectives. One to demonstrate ways that income and wealth inequality have exacerbated unequal housing outcomes; and two, to explore how two increasingly salient features of housing, such as its neighborhood dimension and the prominent role of housing in household asset portfolios, contribute to overall inequality.

Areas that deserve attention in future research include a full understanding of the forces that promote residential segregation, which is critically important for the feasibility of urban policies aiming at creating stable, economically and racially mixed neighborhoods. The role of policy tools like zoning and mandates of mixed income housing while market forces work in favor of segregation deserve attention, especially in the context of place-based policies. Housing vouchers, operating on the demand side, and supply side regulations need to be explored in general equilibrium contexts. Both are employed in various combinations worldwide. Many of the policies have general equilibrium effects, but such analyses have only just began. The consequences of reduced mobility for aggregate growth, while mitigated in part by working-from-home, also appear to be important. Little appreciated is 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.

We argue that housing and inequality are better understood via three distinct features of housing: consumption, location and capital. One overarching theme cries out for attention, that is linking life cycle events with households' residential and financial decisions. Doing so also requires accounting for possibly catastrophic events leading to exclusion from the housing market. Articulating the role of attributes of the neighborhoods, the importance of search frictions and the increased reliance of intermediation on

web-based technologies deserve attention. They all impact human and financial capital accumulation and the distribution of income and wealth.

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