Homeownership Segregation

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February 24, 2022

ABSTRACT

Homeownership has long been an essential part of the "American Dream," and is considered the foundation of upward mobility. This paper shows that the upward mobility of children from low-income families is not predicted by homeownership rates, but by homeownership segregation. Higher residential segregation between homeowners and renters predicts lower upward mobility of children from low-income families, while not affecting high-income families. Differently from racial and income segregation, homeownership segregation has remained stable since the 1970s. Consistent with the notion that restrictive land-use regulation preserved historical homeownership segregation patterns after the 1968 Fair Housing Act (FHA), commuting zones with higher homeownership segregation feature more land-use regulation. The same areas also face more Federal FHA lawsuits, indicating greater persistence of discriminatory housing practices. Channels mediating the effect of homeownership on children's upward mobility include income segregation, racial segregation, school segregation, and commuting times.

JEL Codes: D14, J15, R21, R23, R31
Keywords: Intergenerational mobility, homeownership, segregation, restrictive land-use regulation.

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1. Introduction

The belief in owning one's home as the foundation of upward mobility and as an essential part of the "American Dream" has been strongly held across the political spectrum.[1] For decades, federal housing policies in the United States have aimed to increase homeownership, with the explicit goal of improving upward mobility. The emphasis on homeownership is partly a response to past discriminatory practices such as redlining and the Federal Housing Administration denying mortgage insurance in high-minority neighborhoods. These practices not only lowered homeownership rates among discriminated population groups, though, but also fostered segregation. By explicitly denying homeownership to certain communities and encouraging homeownership in other, often suburban areas, government policy separated homeowners from renters, frequently along socio-economic and racial lines (Rothstein, 2017).

In this paper, we argue that the segregation of homeowners and renters is a significant negative predictor of low-income families' upward mobility. We introduce a novel measure of the residential segregation of homeowners and renters using a two-group entropy index, akin to the racial segregation measure in Theil (1972). We show that homeownership segregation strongly predicts low-income households' upward mobility, while there is no relation with high-income households. We also document the persistence of homeownership segregation since the 1970s and link it to restrictive housing policies that were implemented after the Fair Housing Act (under Title VIII of the 1968 Civil Rights Act) put an end to legal discrimination in the sale, rental, and financing of homes. We argue that land-use regulations perpetuated residential segregation, decreasing upward mobility and promoting socio-economic disparity (cf. Wilson, 1987; Massey and Denton, 1993).

The measure and analysis of homeownership segregation complements prior work on the mobility effects of other types of segregation. We show that the primitive factor underlying racial and income segregation is often tied to homeownership as homeowners exert significant influence on local policies, including the implementation and enforcement of exclusionary landuse and zoning restrictions (Hall and Yoder, 2022; Been, 2018; Elmendorf, 2019). Such behavior might be motivated

[1] Cf. the homeownership policies of President Bill Clinton and President George Bush during their respective presidential terms, http://www.nytimes.com/2008/12/21/business/worldbusiness/21iht-admin.4.18853088.html?pagewanted=all and http://spectator.org/articles/42211/true-origins-financial-crisis.

by a desire to seclude minority and low-income households. Our analysis reveals the causal influence of homeownership segregation in generating adverse mobility effects, including the mediating role of racial and income segregation. The focus on homeownership segregation also reveals the limitations of prior predominant focus on homeownership rates.

Our analysis utilizes four main sources of data: the decennial Census, intergenerational mobility data from Chetty and Hendren (2018a,b), the data on housing regulation from Gyourko et al. (2008), and data on Federal FHA lawsuit decisions from Trounstine (2020). Upward mobility is the estimated impact of one additional year spent in a census division, or commuting zone (CZ), on children's income rank when adult, given their parents' income rank as of 1996-2000. To match the period parents' income is captured, we measure homeownership segregation using the 2000 Census. Alternatively, we use homeownership segregation as of 1990 or the average of 1990 and 2000.[2]

In a first step, we motivate the focus on homeownership segregation, rather than homeownership rates, which are the focus of policy. For children growing up in poor[3] families, we find no relationship between homeownership rates and average intergenerational mobility. For children from rich families, there is a positive association, though it is not robust to the inclusion of further CZ-level controls.[4] Homeownership segregation, instead, does explain upward mobility in a CZ. We estimate a significantly negative relationship for children from low-income families, controlling for homeownership rates: a one SD increase in homeownership segregation in 2000 is associated with a 0.127 SD decline in upward mobility. Homeownership segregation has no impact on the mobility of children from above-median income families.

To address the concern that other, unobserved characteristics of CZs featuring higher homeownership segregation confound the results, we instrument for homeownership segregation using the planned rays in the interstate highway system in 1947. Following Baum-Snow (2007), who

[2] In 2000, children in the Chetty and Hendren (2018b) sample were between 14 to 20 years old. Since Chetty et al. (2019) find place-based intergenerational mobility are highest for the 13–23 age group, we focus on homeownership segregation in 2000 in our baseline analysis.

[3] For simplicity we refer to below-median income families as low-income or poor families, and to above-median income families as above-median income or rich families.

[4] For example, when we control for the fraction of single-family mothers in the Chetty and Hendren (2018b) sample, the positive association between homeownership rate and upward mobility of children from rich families disappears. While a positive association is consistent with some prior literature (Green and White, 1997), more recent work has attributed positive outcomes among children of homeowners to selection effects of owning a home (Barker and Miller, 2009; Holupka and Newman, 2012).

first introduced the exogenous variation in the number of highways emanating from a metropolitan area as an instrument for suburbanization, we rely on the *planned* portions of the interstate highway system as those were designed to facilitate trade and national defense, rather than metropolitan area development, and thus not driven by differences in local demand or supply factors.

We estimate a strong and robust relationship between (instrumented) homeownership segregation and intergenerational upward mobility. In the first stage, the presence of planned 1947 interstate highways emanating from a CZ positively predicts homeownership segregation in 2000 (F-statistic = 15.252). The second-stage estimation indicates that one SD higher homeownership segregation in 2000 results in 0.580 SD lower mobility of children from poor families, with no impact on rich families. In economic terms, this corresponds to a 0.62% decline in income for a child spending 1 more year in a CZ with a 1 SD higher homeownership segregation in 2000. Scaling this up by 15.525 years to reflect the effect of spending the entire childhood in a CZ,[5] the total effect is a 9.60% decline in income when adult. The magnitude of the instrumented estimate is larger than the OLS estimate due to the selection of families likely to invest more in their children's human capital into "homeownership enclaves," underscoring the need to instrument for homeownership segregation. Consistent with the selection of families, CZs with high homeownership segregation also feature low shares of poverty and low unemployment rates.

To further distinguish place-based factors from selection of families residing in high-segregation CZs, we compare the measures of place-based ("causal") mobility effects to measures from Chetty and Hendren (2018a) that reflect the combined selection effect plus the place-based effect. We find that homeownership segregation strongly predicts negative place-based mobility, while there is limited evidence of selection effects driving our results. If anything, selection effects are positive, consistent with the smaller OLS estimate relative to the instrumented estimate above.

Our results are robust to alternative measures of homeownership segregation such as the standard deviation in homeownership (defined over all tracts in a CZ) and the homeownership dissimilarity index from Massey and Deaton (1988). We also address the potential concern that

[5] While the original measures in Chetty and Hendren (2018b) and Chetty et al. (2020) assume constant place-based effects over each year of childhood and scale the measure by 20 to arrive at the effect of an entire childhood in a CZ, subsequent work by Chetty et al. (2019) shows that there is a kink in the place-based effect at age 13 with place-based effects in pre-teen years having less of an influence on children's upward mobility than teenage years up until age 23. Hence, we use the adjusted scaling factor of 15.525 as in Derenoncourt (2019).

certain tracts might have fewer homeowners due to intrinsic neighborhood characteristic, such as tracts close to university campuses featuring predominantly renters. Our results are robust to (i) leaving out tracts where the fraction of household head below 24 years of age is in the top decile across tracts in the country and, alternatively, (ii) retaining only tracts with an above-median percentage of household heads older than 34 years.[6]

We also show, however, that it does matter which subset of homeowners – poor or rich – are segregated. When we define two new two-group entropy measures, the first capturing how segregated rich homeowners are from everyone else (rich renters, poor renters, and poor homeowners) and the second capturing how segregated poor homeowners are from everyone else, we find that the entire upward-mobility effect is attributable to the segregation of rich homeowners. In other words, rich homeowners forming exclusive enclaves appear to be at the core of the adverse effect of homeownership segregation on the mobility of children from low-income families.

We next turn to zoning and land-use regulation, which are at the core of the second part of our analysis. While median homeownership segregation fell from 1960 to 1970, it has remained relatively stable since then. We hypothesize that, after the 1968 Fair Housing Act ended the possibility of legal discrimination in housing, the subsequent rise in restrictive land-use regulation (as documented by Shertzer et al. (2016, 2018), Been (2018), Elmendorf (2019), and Fischel (2004) among others) perpetuated and cemented residential segregation. We provide two pieces of evidence.

First, we show that commuting zones with higher homeownership segregation in the 1970s (and similarly in later decades) accumulate more land-use regulation by the 2000s, using the measure of land-use restrictions from Trounstine (2020) based on Gyourko et al. (2008). One SD higher homeownership segregation in 1970 is associated with 0.167 SD higher housing restrictiveness in 2006, and 0.619 SD after instrumenting. Effects persist throughout from 1970–2000.

Second, we show that areas with high (historical and current) homeownership segregation are more likely to face lawsuits under the Fair Housing Act. We use hand-collected data from Trounstine (2020) on FHA lawsuits to proxy for (concerns about) persistent discriminatory practices in housing. We show, separately for each decade post-1968 (i. e., by 1970, by 1980, by 1990, and by 2000), that

[6]The average age of first-time home buyers is between 31 (National Association of Realtors) to 34 (2009 American Housing Survey).

CZs with higher homeownership segregation are more likely to have had an FHA lawsuit and first decision in each decade since the 1980s. For example, CZs that had 1 SD higher homeownership segregation in 1980 were 36% more likely to face a Fair Housing lawsuit by 1990. The effects in earlier periods (between 1968-1980) are muted likely because it was too early for the endogenous regulation to take effect. In all, the higher incidence of FHA lawsuits indicates greater persistence of discriminatory housing practices in these areas.

We also examine the channels mediating the effects of homeownership segregation on children's upward mobility. That is, in addition its direct effects on mobility, homeownership segregation might exert an indirect effect on a mediating variable, which in turn affects children's upward mobility. We consider four potential mediators: income segregation, racial segregation, school segregation, and commuting time. While the 1968 Fair Housing Act made overt racial discrimination difficult, we have seen that land-use regulations allowed CZs to preserve homeownership segregation and, as a result, possibly influenced the income and racial homogeneity of CZs. We also examine school segregation given the focus on children's outcomes and previous work that distinguishes between neighborhoods' and students' racial segregation (Card and Rothstein, 2007). Finally, Glaeser (2011) notes that policies that encourage home-owning implicitly encourage people to move away from higher density living and increase commuting times. We find that CZs with 1 SD higher homeownership segregation have 1.517 SD higher-income segregation, 1.774 SD higher racial segregation, 2.057 SD higher school segregation, and a 1.84 SD higher fraction of households with long commuting times.

At the same time, we strengthen the evidence on the direct homeownership channel by exploiting a second instrument based on the ease of mortgage financing between 1970–2000. We show that the increase in homeownership segregation that is predicted by the 1947 highway interstate plan, is driven by areas which benefited from eased access to mortgage financing. We define a CZ as having easier access to mortgage financing if the fraction of its houses for which the nationwide changes in the conforming loan limit (CLL) made it possible to finance their purchase with conforming loans is above the median in either of the three decades 1970-1980, 1980-1990, and 1990-2000. We exploit that CLL changes are determined at the national level and thus quasi-exogenous at regional level. We show that the effect of (instrumented) homeownership segregation on upward mobility is driven by segregation in those areas that most benefited from the easing of mortgage financing. That is, interacting the indicator for CZ-level ease of mortgage financing with our baseline highway instrument, we find that homeownership segregation in 2000 is driven by the CZs that had higher exposure to the highway instrument (as in our baseline), but only in CZs that also had greater ease of mortgage financing between 1970–2000. This refinement points directly to homeownership as being causal, i.e., that aspects of home-owning are the driving force behind homeownership segregation and upward mobility.

Lastly, we show that our findings are mirrored when we zoom into one particular aspect of homeowning: single-family structures, which make up the overwhelming majority of homeowned units in the U.S. Single-family zoning has been the focus of land-use policies, with commentators arguing that it can be detrimental to economic mobility (Kain and Quigley, 1972; McDonald, 1974; Menendian and Gambhir, 2018). We add to this discussion by distinguishing between the level (fraction) and the segregation of single-family detached homes (both rental and homeowned units). A 1 SD higher fraction of single-family detached homes has no predictive power for either low- or high-income children's upward mobility. However, one SD higher *segregation* of single-family detached homes predicts 0.100 SD lower mobility for poor children, and 0.406 SD after instrumenting, with no adverse effects for high-income children. In other words, while recent rhetoric has focused on single-family zoning, our analysis highlights that the segregation, not the level of single-family housing predicts adverse effects for low-income children.

The emphasis on segregation also highlights another aspect of single-family zoning: it can keep renters from accessing certain neighborhoods, explaining the adverse effects on poor children's outcomes. Indeed, Glaeser (2011) points out that encouraging homeownership or zoning can curtail rental markets from thriving. While these results link homeownership segregation to the land-use regulation, the question still remains whether homeownership is driving these results. To make the link, we again exploit the ease of mortgage financing and show that single-family detached segregation in 2000 and is driven by the CZs that had higher exposure to the highway instrument (as in our baseline), but only in CZs that also had easier mortgage access highlighting some aspect of homeownership as the driving mechanism linking the segregation of single-family detached homes to homeownership segregation in 2000.

Overall, our paper documents that homeownership segregation has an adverse causal effect on low-income children's upward mobility with no corresponding decline among high-income children. Its effect has been persistent over the past decades, fostered by land-use regulation. These findings point to homeownership segregation as a dimension to be tracked by policymakers. The sole focus on increasing homeownership rates might not suffice to remove barriers to upward mobility. Instead, an additional focus on homeownership de-segregation might be helpful to foster positive long-run outcomes of children from low-income families.

Related Literature. Our paper is primarily related to the literature examining the evolution of segregation in US cities and its impact on household outcomes (Shertzer and Walsh, 2019; Ananat, 2011). Cutler and Glaeser (1997) show that CZs with high racial segregation are associated with worse outcomes for Black households. Cutler et al. (1999) dsitinguish between different phases of segregation, with the period from 1890-1970 marked by migration of Black households to urban areas, leading to the formation and expansion of ghettos, and the post-1970 period of declining racial segregation, albeit accompanied by decentralized racism, where white households paid more to live in predominantly white areas. Fischer et al. (2004) and Fischer (2008) also document that racial segregation peaked in the 1970s and declined steadily thereafter. However, scholars have noted a concurrent increase in income segregation and income inequality (Fogli and Guerrieri, 2019). We contribute to this literature by focusing on homeownership segregation, an as yet understudied dimension of segregation. Differently from racial and income segregation, homeownership segregation has remained fairly stable since the 1970s, and hence captures a unique dimension of segregation.

Our paper is also related to the papers examining the causes of the decline in racial segregation since the 1970s and the subsequent rise in income segregation. Bischoff and Reardon (2014) argue that the rise in income segregation is attributable to the introduction of the 1968 FHA, which was successful in targeting racial discrimination (and hence by extension racial segregation), but led to an increase in land-use and zoning restrictions, increasing income segregation. Such restrictive land-use regulations can contribute to regional disparity in provision of public goods, housing costs, racial segregation, lower construction, and lower elasticity of housing supply [see Gyourko and Molloy (2015) and references therin].[7] The historical determinants of these zoning policies have remained relatively understudied (Shertzer and Walsh, 2019). One exception is Krimmel (2021) who uses the introduction of landmark school finance equalization as a source of variation to establish an endogenous increase in land-use regulations to counter the loss of local control over public good financing. In a similar vein, our paper highlights how the 1968 FHA was accompanied by an endogenous rise in restrictive land-use regulations that preserved historical homeownership segregation patterns, adversely affecting children's upward mobility, even today.

Our paper is organized as follows. Section 2 provides institutional details. Section 3 introduces the data and homeownership segregation measures used in our analysis. Section 4 presents the results on homeownership segregation and intergenerational mobility. Section 5 links historical segregation to land-use restrictions. Section 6 considers the channels mediating the estimated effects and, Section 7 concludes and discusses policy implications.

2. Institutional Background

We start from a brief description of past federal policies that excluded certain borrowers from owning homes and encouraged racial segregation. We then discuss the Federal FHA of 1968 that made such discriminatory practices illegal, and discuss the subsequent rise in land-use regulations.

History of federal policies promoting discriminatory practices in mortgage lending. In 1934, the Federal Housing Administration was established as part of President Roosevelt's New Deal under the National Housing Act. It provides insurance for mortgages financed by private lenders and thus determines who gets easier access to mortgage financing. The broad goal was to regulate the interest rates and terms of mortgages it insured, but many of its practices allowed only white households to become homeowners (Fishback et al., 2021) and fostered segregation. For example, its regulation explicitly stated that "incompatible racial groups should not be permitted to live in the same communities." Other agencies regulating mortgage access, such as the Veterans Administration (VA), reinforced these federal policies maintaining racial homogeneity among neighborhoods through their lending. The policies of

[7] Also see Glaeser and Gyourko (2018), Turner et al. (2014), Shertzer et al. (2016), Shertzer et al. (2018), Shertzer et al. (2021), Hsieh and Moretti (2019), Duranton and Puga (2019), and Glaeser et al. (2006).

the Federal Housing Administration also included giving higher appraisal ratings to mortgage in racially homogeneous neighborhoods, further stymieing homeownership growth among Black communities and encouraging segregation (Rothstein, 2017). The Federal Housing Administration also subsidized builders who were mass-producing single-family homes in suburbs that catered exclusively to white households. Overall, much of the increase in homeownership rates since the inception of the Federal Housing Administration was concentrated among white households and was accompanied by widening segregation of white and African American homeowners.[8]

A related housing policy was the practice of "redlining" by the Home Owners Loan Corp (HOLC). Established in 1933, the HOLC was set up to help refinance home mortgages that were in default after the 1929 crisis and subsequent collapse of the housing industry. The HOLC color coded federal government maps of all metropolitan areas into four categories, ranging from 'best' to 'hazardous.' The presence of 'detrimental influences' and 'undesirable populations' relegated neighbourhoods to be classified as hazardous, or 'red zones.' Undesirable populations referred to Black, brown, or Jewish households. Mortgages in redlined areas came with more stringent terms and conditions, further limiting Black and other minority households' access to mortgages (Harriss, 1951) with effects persisting in later decades up until 2010 (Aaronson et al., 2021).

Fair Housing Act of 1968. Race-based zoning in cities was technically outlawed by the Supreme Court in a 1917 ruling as well as later rulings such as Shelley v. Kraemer (1948) (Trounstine, 2018), but the court rulings had limited impact in practice. The Fair Housing Act (FHA) under Title VIII of the Civil Rights Act put an end to legal discrimination in the sale, rental, and financing of homes. The act did not see a smooth passage in Congress: In 1966 it died due to a Senate Filibuster (Dubofsky, 1968), and in 1968, to get liberal Republicans to support the bill, it was amended to cover only 80% of the nation's housing. The prospects of the bill continued to remain weak, but on April 4, Martin Luther King was assassinated, and as riots broke out, a few House Republicans came out in support of the bill. Two months later the Supreme Court ruled that the bill should extend to all housing in the U.S. (Massey, 2015).

The FHA made it illegal to refuse to rent or sell to someone because of race, and banned agents from bringing up the race of neighbours in the area. The Housing and Urban Development (HUD)

[8]See Rothstein (2017) for a full discussion of such policies.

was tasked with investigating any allegations of discrimination. However, it had only 30 days to decide whether to pursue the allegation and could not penalize lawbreakers or force them to comply. It could only pass the case on to the Justice Department, which could act on it only if it found that there was some pattern of discrimination (Massey, 2015). The onus was on the victims to file a lawsuit and recover damages, and the penalty was capped at 1000 dollars (Massey, 2015). Thus, while the act was historical in its passing, violations did not result in significant consequences.

Housing regulation post-1970. After the legal reforms of 1968, suburban areas saw a rise in land-use regulations. Land-use regulations enable local governments to direct public funding to certain neighborhoods while excluding predominantly minority neighborhoods from access to these services (Trounstine, 2018). They also allow for filing lawsuits to block the development of multifamily housing, cf. Einstein et al. (2019). Wealthier neighbourhoods are more likely to enforce such regulations (Gyourko et al., 2008; Trounstine, 2020). Thus, while land-use regulations are not explicitly discriminatory, white communities could use them to preserve racial homogeneity. They became one of the primary ways through which cities shaped segregation post-1970 (Shertzer et al., 2018; Been, 2018; Elmendorf, 2019; Fischel, 2004) and led to separate and segregated suburban communities (Trounstine, 2020).

3. Data and Summary Statistics

Our main sources of data are the Decennial Census (1960–2010), intergenerational mobility data from Chetty and Hendren (2018a,b), the data on housing regulation from Gyourko et al. (2008), and data on Federal FHA lawsuit decisions from Trounstine (2020). This section describes these and additional sources of data and the construction of the main variables used in our analysis.

3.1. Homeownership Segregation

Our main explanatory variable of interest is homeownership segregation, i. e., the separation of homeowners from renters. Homeownership segregation reflects market forces as well as the effect of various policies that (explicitly and implicitly) made homeownership uniform across neighborhoods. For example, regulatory and land-use restrictions such as single-family zoning prevent communities from constructing dwellings other than single-family detached homes. This keeps not only homeownership rates, but also house prices high in these neighborhoods (Glaeser and Gyourko, 2002) and prevents poorer households from moving into these neighborhoods.

We measure homeownership segregation at the CZ level using tract-level data from the Decennial Census.[9] We construct the two-group entropy of homeowners and renters, similar to the racial segregation measure in Theil (1972),[10] as follows: Let $\phi_{CZ}(t)$ be the fraction of units with tenure t in a CZ, where tenure refers to two groups, homeowners (owner-occupied units) HO) and renters (renter-occupied units) RE). The CZ-level entropy index is

$$E_{CZ}^{Homeownership} = \sum_t \phi_{CZ}(t) \log_2 \frac{1}{\phi_{CZ}(t)}. \tag{1}$$

Similarly, for each census tract ct, the level of diversity in homeownership is the entropy index

$$E_{ct}^{Homeownership} = \sum_t \phi_{ct}(t) \log_2 \frac{1}{\phi_{ct}(t)}. \tag{2}$$

The entropy indices capture "evenness" in the tenure distribution, within the overall CZ in (1) and within a census tract in (2). Homeownership segregation at the CZ-level is then given by

$$H_{CZ}^{Homeownership} = \sum_{ct \in CZ} \frac{\text{Occupied housing units}_{ct}}{\text{Occupied housing units}_{CZ}} \frac{E_{CZ}^{Homeownership} - E_{ct}^{Homeownership}}{E_{CZ}^{Homeownership}}, \tag{3}$$

where Occupied housing units$_{ct}$ and Occupied housing units$_{CZ}$ refer to the tract- and CZ-level occupied housing units. That is, homeownership segregation is the weighted average of the differences between the entropy (or "diversity") of the CZ and each tract, relative to the total diversity of the CZ. Intuitively, it measures how different the homeownership (tenure) distributions of the census tracts are from the overall CZ. $H = 1$ corresponds to the highest level of

[9]Our sample includes commuting zones using the 1990 definition. For the time series data, we use the county to CZ definitions provided by Eckert and Peters (2020). Census tracts are designed such that the tract-level population is 4000. Since census tracts can be merged or added over time to maintain this population size, we also conduct a supplementary analysis where we match the tracts to the 2010 tract definitions based on the crosswalk provided by Logan and Stults (2012). While the baseline analysis has the advantage of defining a neighborhood based on the population characteristics a given period, the supplementary analysis allows us to hold constant the neighborhood definition across time.

[10]Cf. also the analysis of racial segretation and homeownership in Kulkarni and Malmendier (2021).

homeownership segregation, and $H = 0$ to no homeownership segregation at all.

In additional analyses, we also measure how segregated rich and poor homeowners are from the remaining population. We define the segregation of rich homeowners as the entropy of the above median-income homeowners against the remaining households, namely, the below-median income homeowners and all renters; and we define the segregation of below-median income homeowners based on the entropy of the below-median income homeowners against the remaining households, i. e., in that case against the above-median income homeowners and all renters. We use the parental family income at the 50^{th} percentile of $59,500 from Chetty et al. (2015) and take the closest bucket in the Census corresponding to $49,999 as the cutoff to define below- and above-median income households, homeowners, and renters.

We also define two alternate measures of homeownership segregation. The first is the standard deviation (SD) of tract-level homeownership rates for each CZ. A SD of zero implies that the homeownership rate is very similar across all census tracts, i. e., corresponds to $H = 0$ using the entropy based measure. Second, we use homeownership dissimilarity akin to Massey and Deaton (1988):

$$Dissimilarity = 0.5 \sum_{j} \left| \frac{N_{hj}}{N_{hC}} - \frac{N_{rj}}{N_{rC}} \right| \tag{4}$$

where N_{hj} and N_{hC} refer to the number of homeowners at the tract and CZ level, and N_{rj} and N_{rC} refer to the number of renters at the tract and CZ level. This measure proxies for the evenness in the homeowner-renter distribution across tracts in a CZ by the percentage of homeowners (renters) that would have to move to a different tract to achieve the CZ-level homeownership distribution. Previous literature uses either entropy or dissimilarity to measure other types of segregation (such as racial segregation). We choose the entropy-based measure over the dissimilarity index as our main metric for two reasons. First, it can measure the spatial distribution of multiple groups simultaneously, which we utilize when examining the segregation of four different groups (owner- and renter-occupied units of above- and below-median income households). The dissimilarity index instead can only measure the segregation of two groups compared to each other. Second, the entropy index is more easily interpretable than the dissimilarity index as it directly provides a unit of segregation rather than the changes needed to make the sample homogeneous (Iceland, 2004).

The entropy based measure is also preferable to the standard deviation of homeownership rates within a CZ as the latter suffers from bias towards exreme outcomes.[11] In addition, the entropy-based measure allows for comparisons across dimensions (income, race, and homeownership), whereas neither the dissimilarity index nor the standard deviation do.

We use the entropy-based homeownership segregation in the main text, but also show, in Section 4, that the baseline results are not sensitive to our choice of the segregation measure.

3.2. Instruments

Our goal is to assess the influence of homeownership segregation on intergenerational upward mobility. As we will see, homeownership is correlated with other variables such as income or racial composition (and we will in fact examine their role as mediators of the estimated effect in Section 6). To ensure that we identify a causal role of the evenness in tenure distributions across tracts in a CZ, we introduce an instrument that, historically, has directly affected the types of housing constructed, while not directly affecting its correlates. Specifically, we use the planned portions of the interstate highway system as a source of exogenous variation in homeownership segregation. This instrument is based on Baum-Snow (2007), who analyzes the decline in the aggregate population of central cities in the U.S. when, at the same time, the population of metropolitan areas as a whole was growing. Baum-Snow (2007) documents that suburbanization was higher in metropolitan areas that received more new highways between 1950 and 1990. To address potential endogeneity in the assignment of highways, he uses the number of *planned* highways in a 1947 national interstate highway plan as an instrument. As Baum-Snow (2007) shows, the 1947 plan was designed to connect far away places partly based on military and naval establishments, and not to facilitate local commuting. Local demand and supply conditions did not determine highway placement.

Baum-Snow (2007) measures the number of highways passing through a commuting zone as the number of "rays" emanating from the central cities as per the 1947 highway plan. We use this

[11] Since all observations are assigned equal weights in the calculation of their standard deviation, $SD = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(x_i - \overline{x})^2}$, a few extreme observations may bias the measure. For example, the standard deviation measure for a CZ with four tracts with homeownership rates of 0.50, 0.01, 0.05 and 0.60, may be biased by the influence of the second and third observation if these tracts represent only a very small fraction of total units.

measure at the Metropolitan Statistical Area level, and map it to the commuting zones used in our analysis. We discuss the validity of the instrument and further details in Section 4.

As a supplementary empirical strategy, we also exploit cross-sectional variation in the changes in the ease of mortgage financing between 1970–2000 as an additional instrument. Specifically, we use geographic variation in the effect of changes in the so-called conforming loan limit (CLL). The CLL is a regulatory cutoff in the size of mortgage loans above which Government Sponsored Enterprises (GSEs) cannot purchase or guarantee loans. Since the GSEs are the predominant player in the secondary mortgage market, their policies determine who gets access to mortgage credit and by extension to homeownership. The year-to-year CLL changes are determined at the national level, reflecting changes in average house prices, and hence are plausibly exogenous to local-level housing supply and demand.[12]

We measure the CZ-level increase in the ease of mortgage financing as the share of houses in a CZ that became eligible for GSE-conforming loans over the past decade, separately for 1970–1980, 1980–1990, and 1990–2000. For example, for 1990–2000, we calculate the percentage of houses that were eligible for conforming loans in 2000, when the GSEs could purchase or securitize single-family loans up to $252,700 (and $485,800 for four family homes), but not in 1990, when the limit was only $187,450 ($360,150 for four-family homes). Assuming a loan-to-value ratio of 80%,[13] this change in CLL corresponds to house prices between $234,312 and $315,872. We then use the closest $200,0000–$400,000 bucket from the 1990 Census to calculate the fraction of houses at the CZ-level that can became GSE-eligible between 1990–2000. (We use the CZ-level using house prices as of 1990 to avoid confounding price effects resulting from the higher credit supply.) We carry out a similar exercise for 1970–1980 and 1980–1990 based on the CLL increases from $33,000 in the early 1970s to $93,750 in 1980 and $187,450 in 1990. We then denote a CZ as having easier access to mortgage financing if its fraction of houses with eased access to financing is above the median fraction in any of the intervening decades (1970–1980, 1980–1990, or 1990–2000).

[12] Adelino et al. (2014) and Kulkarni and Malmendier (2021) employ similar strategies to examine the impact on house prices and homeownership, respectively.

[13] Mortgages with a loan-to-value ratio below 80% qualify for purchase by the GSEs, while mortgages above this ratio require private mortgage insurance to qualify as GSE-eligible, cf. the definition of "cheap to finance" in Adelino et al. (2014) and Loutskina and Strahan (2015).

3.3. Intergenerational Mobility Measure

We use the upward mobility measure from Chetty and Hendren (2018a), which builds, in turn, on the data and results from Chetty et al. (2015). The authors use administrative records from IRS tax returns on the incomes of 40 million children born between 1980–91 and their parents to assess upward mobility in the United States. They define upward mobility as the rank percentile of children's income (when 26 years old) among themselves, relative to the rank percentile of parents' average family income (in 1996–2000) among parents.[14] They estimate the relationship between the income rank of child i, y_i, and parents' income rank p_i within a commuting zone CZ,

$$y_{i,CZ} = \alpha_{CZ} + \psi_{i,CZ} \times p_{i,CZ} + \epsilon_{i,CZ}, \tag{5}$$

to be almost perfectly linear in all CZs. On average, a 10 percentile-point increase in parent rank correlates with a 3.41 percentile increase in a child's income rank. The authors provide the corresponding estimates of the expected rank of a child whose parents' national income rank is p and who are permanent residents of CZ, $\hat{y}_{p,CZ} = \hat{\alpha}_{CZ} + \widehat{\psi}_{CZ}p$. We use p equal to the 25^{th} and 75^{th} income percentiles. Given the linearity of the rank-rank relationship, these estimates capture the upward mobility of children from below median-income (low-income) and above-median income (high-income) families, respectively.

Chetty and Hendren (2018a) further contrast the upward mobility of permanent residents and households that move in order to decompose the upward mobility measure into a childhood exposure effect (place-based effect of growing up in a CZ) and a residual effect that reflects the sorting of families into different CZs. That is, the average upward mobility measure is based on the permanent residents, the childhood exposure effect is based on the movers, and the residual component is the difference (referred to as the selection component). The interpretation of the childhood exposure effect as the causal place-based effect of growing up in a CZ relies on the assumption that the timing of the moves is orthogonal to the children's potential outcomes.[15] These analyses use data

[14] The children's age at the time when the parents' income is measured thus varies across cohorts.

[15] For example, consider two families who move from Phoenix to Oklahoma. If children who moved at younger ages had higher outcomes when adult than children who moved later, then the causal effect of growing up in Oklahoma is higher than that of growing up in Phoenix if the timing of the moves is uncorrelated with unobserved predictors of future income.

of cohorts born between 1980 and 1986, and parents' income continues to be measured in 1996–2000.

We focus on the childhood exposure measures based on contrasting permanent residents and the movers respectively. In supplementary analysis, we also look at the impact on average upward mobility based on the permanent residents to assess selection effects.

3.4. Housing Restrictiveness Index

For data on land-use regulation, we use the Wharton Residential Land Use Regulatory Index (WRLURI), as provided by Trounstine (2020). This index was built by Gyourko et al. (2008) based on a nationwide survey of local governments in 2006. The authors survey the local land-use control environments in terms of (i) the general characteristics of the regulatory process, e. g., involvement of states, localities, councils, legislatures, and courts; (ii) rules pertaining to the local residential land-use regulation; and (iii) outcomes of the regulatory process such as how regulation impacts the costs of lot development, review times, etc. After supplementing the survey with state-level analyses of legislative and executive actions determining land-use policies, the data is combined into an aggregate measure of the stringency of the local regulatory environment, available for 2,729 metropolitan areas. Gyourko et al. (2008) also provide the following eleven sub-indices: local political pressure index, open space index, approval delay index, local project approval index, state court involvement index, local zoning approval index, local assembly index, exactions index, density restrictions index, supply restrictions index, and state political involvement index. Trounstine (2020) merges the WRLURI data with other city-level demographic information from the 1970 and 2000 Census of Population and Housing to form panel data. The original Gyourko et al. (2008) survey based-data a standardized index ranging from -2 to 5 for 2,700 municipalities. We use the data from Trounstine (2020), which measures the metropolitan-level housing stringency index as the difference between the municipality-level minimum score of the WRLURI index and the value of the index at the metropolitan level.

3.5. Fair Housing Act lawsuits between 1970–2000

We also use city-level data from Trounstine (2020) on FHA violations. Under the FHA, private citizens or the justice department can sue local governments if they feel that these governments have failed to ensure that people from protected classes have an equal opportunity to housing. The Act made discrimination on the basis of race, color, national origin, religion, sex, familial status, and disability in the housing markets illegal. To establish a violation, the concerned party needs to show that the city has failed to ensure that households from the protected class had an equal opportunity to reside in a place.

Trounstine (2020) identifies lawsuits under the FHA between 1968 and 2010 by searching the (former) Lexis Uni data of LexisNexis for cases that contain the words "Fair Housing Act" and "injunct." Data is restricted to cases that have received a decision in court. We use a county-CZ crosswalk to bring these variables to the CZ-level. As in Trounstine (2020), we create a binary variable at the CZ-level that indicates whether a CZ had a first decision on a lawsuit under the FHA as of a given date. The variable serves as a proxy for (perceived) violations of the FHA, such as continued discriminatory practices and improper land-use restrictions.

3.6. Homeownership and Other Covariates

Control variables from the Census data include CZ-level homeownership rate and the share of people below the poverty line, in the baseline analysis for 2000 and in the historical analyses from 1960, 1970, 1980, and 1990, respectively.

We also use the two-group entropy-based racial segregation measure from Theil (1972) for Black and white households. Here, $\phi_{CZ}(r)$ is the fraction of individuals of race r in a CZ where race refers to the two groups, white (w) and Black (b). The CZ-level entropy index for each race is

$$E_{CZ}^{Racial} = \sum_r \phi_{CZ}(r) \log_2 \frac{1}{\phi_{CZ}(r)}. \tag{6}$$

For each tract ct, the level of racial diversity is given by the entropy index

$$E_{ct}^{Racial} = \sum_r \phi_{ct}(r) \log_2 \frac{1}{\phi_{ct}(r)}. \tag{7}$$

The degree of racial segregation at the CZ-level is then given by

$$H_{CZ}^{Racial} = \sum_{ct} \frac{population_{ct}}{population_{CZ}} \frac{E_{CZ}^{Racial} - E_{ct}^{Racial}}{E_{CZ}^{Racial}}. \tag{8}$$

It captures how different the racial distribution of each census tract is from the CZ.

We also calculate entropy-based income segregation as in Reardon (2011), where

$$H^{Income} = 2\ln(2) \int_p pE_{CZ}^{Inc}(p) H_{CZ}^{Inc}(p)\, dp. \tag{9}$$

This measure is the weighted average of segregation at each percentile p, with greater weight placed on percentiles where entropy $E^{Inc}(p)$ is maximized.[16] It calculates the segregation between groups who have incomes above and below the p^{th} percentile of the income distribution. Here $H^{Inc}(p)$ is the CZ-level two-group Theil Index, which measures the extent to which the income distribution in each census tract deviates from the CZ-level income distribution. Entropy in a CZ, analogous to (1) and (6) is given by:

$$E_{CZ}^{Inc}(p) = p \log_2 \frac{1}{p} + (1-p) \log_2 \frac{1}{1-p} \tag{10}$$

And entropy in a tract, analogous to (2) and (7) is given by:

$$E_{ct}^{Inc}(p) = p \log_2 \frac{1}{p} + (1-p) \log_2 \frac{1}{1-p} \tag{11}$$

$H^{Inc}(p)$ is analogous to (3) and (8):

$$H_{CZ}^{Inc}(p) = \sum_{ct} \frac{population_{ct}}{population_{CZ}} \frac{E_{CZ}^{Inc}(p) - E_{ct}^{Inc}(p)}{E_{CZ}^{Inc}(p)} \tag{12}$$

We use the income bins from the 2000 Census, which are: less than \$10,000; \$10,000 to \$14,999; \$15,000 to \$19,999; \$20,000 to \$24,999; \$25,000 to \$29,999; \$30,000 to \$34,999; \$35,000 to \$39,999; \$40,000 to \$44,999; \$45,000 to \$49,999; \$50,000 to \$59,999; \$60,000 to \$74,999; \$75,000 to \$99,999;

[16] See Appendix 2 of Reardon (2011) for the derivation of this equation from the rank-order theory information index which is $H^{Income} = [\int_1^0 E(p) / \int_1^0 E(q)\, dq] H(p)\, dp$.

\$100,000 to \$124,999; \$125,000 to \$149,999; \$150,000 to \$199,999; and \$200,000 or more.

For school segregation, we base our measure on Card and Rothstein (2007), which captures racial segregation of students across schools. Data on the size and racial composition of public schools is from the Common Core of Data (CCD) schools survey for 2000–01. Each wave records information on schools' enrollment at each grade level and the racial composition of the schools' overall enrollment. The information on private schools comes from the 1997–98 Private School Survey (PSS). We calculate the average fraction of Black students at all schools in a CZ, weighted by the number of black students in each school, divided by the total number of black students in the CZ, and then we do the same for white students (the average fraction of Black students at all schools in a CZ weighted by the number of white students in each school divided by the total number of white students in the CZ). School segregation is the difference between those two averages. Essentially, school segregation captures the difference in exposure of Black versus white students to Black students. By construction, this measure ranges from 0 to 1.

Finally, we measure urban sprawl following Chetty et al. (2015) as the 'Travel time to work' variable from the Census, available for everybody above 16 years who does not work at home, and define sprawl as the fraction of households with commuting times greater than 15 minutes in 2000.

3.7. Descriptive Statistics

Starting from the full U.S.-wide census data, our sample is constrained by two main requirements. The first restriction comes from the availability of our main instrument for homeownership segregation, the number of planned highways in the 1947 Highway Plan. We map the MSA-level data from Baum-Snow (2007) to the CZ level, restricting our analysis to the urban commuting zones for which data for the instrument is available. (The instrument is based on suburbanization of metropolitan areas, which is a phenomenon pertaining to urban areas.) The second data limitation is imposed by the number of CZs for which the the measure on place-based ("causal") effects on intergenerational mobility from Chetty and Hendren (2018a) is available. Our final analysis is restricted to the 236 urban commuting zones for which all data is available.

Table 1 shows the summary statistics of the variables in our sample. There are on average 234,054 housing units in a CZ, but the size of the counties captured in our analysis varies widely, ranging from 61,940 housing units in a CZ at the 10^{th} percentile to 485,668 at the 90^{th} percentile.

Our sample features a homeownership rate of 0.69, reaffirming its representativeness for the U.S. The data also reveals a homeownership gap between poorer families (0.60) and richer families (0.86). The sample average of homeownership segregation is 0.12 with a standard deviation of 0.05, ranging from 0.11 at the 10^{th} percentile to 0.18 at the 90^{th} percentile. The magnitude of the entropy-based homeownership segregation measure does not have a particularly intuitive meaning (Bischoff and Reardon, 2014), but the comparison of homeownership segregation across CZs captures cross-sectional variation. We also see that the segregation of above-median income homeowners (from the rest of the population) is higher than the segregation of below-median income homeowners along all dimensions (mean, median, 10^{th} percentile, and 90^{th} percentile). The first alternative measure of homeownership segregation, the standard deviation in homeownership rates across tracts within a CZ is 0.14 on average, and the second alternative measure, the dissimilarity index, has an average value of 0.24, indicating that on average 24% of homeowners would have to change residence for each tract to have the same percentage of homeowners as the overall CZ.

Another measure of segregation that we consider is the segregation of single-family detached homes. Here, the average is 0.12, close to the overall homeownership segregation of 0.15. The percentage of single-family detached homes to the overall housing units is on average 0.68 comparable to the overall homeownership rate of 0.69. While these measures focus on the type of structure and include both homeowned and rental units, an important feature of single-family detached units in the U.S. is that they are predominantly homeowned (Glaeser, 2011). On average, nearly 85% of the single-family detached homes are owner occupied. For the median CZ, nearly 75% of homeowners stay in single-family detached structures relative to a much lower 21% of renters staying in single-family detached homes. Given this close association between homeownership and single-family detached homes, Glaeser (2011) argues that homeowning encourages people to move away from high-density living (Glaeser, 2011). Hence, in Table 1 we also examine long commuting times. Nearly 36% of the population above 16 (who do not work at home) spend more than 15 minutes commuting.

Income, is on average, \$34,955 ranging from \$27,012 at the 10^{th} percentile to \$44,987 at the 90^{th} percentile. Income segregation is 0.07 on average. On average, nearly 13% of the population live below the poverty level. The percentage of Black population is 11% and white population if 82%, and racial segregation is 0.18 on average. School segregation is on average 0.17. Table A.1 shows the summary statistics for additional variables. On average, the fraction of single mothers in our analysis was 0.05, with unemployment rates at 0.05. Average median monthly rent was $553, with median house price values at $128,662 for the CZs in our sample. High-school dropout rate was at 0.03 and violent crime (number of arrests for serious crime per 1000 capita) was 1.79.

The intergenerational mobility measures IGM_{25} and IGM_{75} capture the increase in income rank of the children of parents at the 25^{th} and the 75^{th} percentiles, respectively, due to spending an additional year in a better CZ, where the mean income rank of children of permanent residents is one percentile higher. The statistics reveal that, for a child with parents at the 25^{th} percentile of the national income distribution, spending one additional year of childhood in a one-percentile better CZ (population-weighted) increases household income at age 26 by 0.07 percentile points. Using the estimate of Chetty and Hendren (2018a), who find that a 1 percentile increase in income translates to an additional $818 at age 26 on average, and given a mean income of $26,091 from Chetty et al. (2015), the estimated effect of 0.07 percentile translates to a 0.22% ($= 0.07 * \$818/\$26,091$) increase in annual income. To get a sense of the economic magnitude, we can scale up to get the place-based effect for a child spending their entire childhood in a given CZ, which translates to a 3.41% higher annual income for adult children. For a child with parents at the 75^{th} percentile, spending 1 year in a better CZ increases household income by 0.05 percentiles, equivalent to 2.43% [=0.05*$818/$26,091*15.525] increase in annual income, suggesting that neighborhood effects matter less for rich families.[17]

We conduct supplementary analyses using the correlational IGM measure for the children who grew up in a CZ between 1980-1988 from Chetty and Hendren (2018a). This measure includes both the place-based effect of growing up in a CZ and the selection effect (due to the kind of families that reside in a CZ). As shown in Table A.1, the permanent residents' intergenerational mobility

[17] While Chetty and Hendren (2018a,b) assumed a constant place-based effect, and multiplied by 20 to arrive at the effect of spending an entire childhood giving an estimated 4.39% ($= 0.22\% * 20$) higher annual income, Chetty et al. (2019) acknowledged that the place-based effects are smaller for younger children, -0.017 for children below 13 years, -0.04 from 13 to 23 years of age, and negligible place-based effects on children's adult income. To account for this kink in marginal place-based effects during childhood, Derenoncourt (2019) scales the place-based effect by 15.525 years [= (23-13)+(17/40)*13].

for children with parents at the 25$^{\text{th}}$ income percentile is 45 percentiles, compared to 58 percentile for children with parents at the 75$^{\text{th}}$ income percentile. Comparing this to the place-based IGM for low-income families, the effect of spending one's entire childhood in a CZ translates to 1.4 ($20*0.05$) percentile higher place-based IGM for the average CZ compared to the baseline percentile rank of 45 (roughly 3% of the correlational IGM). Unlike the place-based effects, we see that the income rank of children at the 75$^{\text{th}}$ percentile is greater than the income rank of children at the 25$^{\text{th}}$ percentile, hinting at greater selection effects for high-income families.

We instrument for homeownership segregation using the number of rays emanating from a CZ based on the 1947 interstate highway plan. Table 1 shows that, on average a CZ had 1.76 rays emanating from it, with a standard deviation of 1.63. At the 10th percentile of CZ, there were no rays passing through the CZ and at the 90th, there were 4 rays emanating from a CZ.

A Fair Housing lawsuit was filed and decided (by 2000) in nearly 14% of the CZs in our sample. The average value for the Housing regulation index as of 2006 from Trounstine (2020) based on the Gyourko et al. (2008) index is -0.35 in our sample.

4. Homeownership Segregation and Intergenerational Mobility

We start with an exploratory analysis of homeownership segregation, before turning to children's upward mobility.

4.1. What does homeownership segregation capture?

We argue that homeownership segregation captures a distinct, and as yet understudied dimension of homeowning. Figure 1 illustrates what aspect of homeowning is captured by our measure of homeownership segregation using the examples of Atlanta (Panel A) and Kansas City (Panel B). In our sample, Atlanta measures about 1.5 SD higher in terms of homeownership segregation (0.240) than Kansas City (0.163). The figures illustrates how the difference in homeownership segregation emerges by plotting the absolute value of the difference between the tract-level homeownership rate relative to the CZ-level homeownership rates, with larger differences indicated by darker shades of blue. In Panel A, we see that most of Atlanta's tracts feature the darker shades. That is, Atlanta has a rather uneven spatial distribution of homeowners at the tract-level. In comparison, the dispersion is lower in Kansas City as seen by the lighter shades (for the 0 to 0.2 range) predominant across its tracts. That is, homeowners are more evenly distributed across Kansas City.

Turning to the distinction relative to homeownership rates, Figure 2 contrasts the nationwide spatial variation of homeownership segregation (in Panel A) and homeownership rates (in Panel B) as of 2000. The differing graphical distributions indicate that the two measures capture different dimensions of homeowning. For example, CZs in the South West figure in the top quintile of homeownership segregation, but have low homeownership rates. On the other hand, many CZs in the North East are in the top quintiles of both segregation and rates.

Figure 3 explores the distinction between homeownership segregation and homeownership rates further by plotting homeownership segregation against homeownership rates, separately for below- and above-median income households (Panel A). Two distinct trends stand out. First, CZs with higher homeownership segregation tend to have lower homeownership rates. Second, the negative correlation is stronger for below- than for above-median income households. In fact, when we split households into more granular income brackets, as shown in Panel B, we observe almost no variation in segregation for the highest-income (and highest homeownership) bracket, while homeownership rates fall with homeownership segregation for each successive income bracket.

We also contrast homeownership segregation, and its evolution over time, with other, more commonly studied types of segregation. As shown in Figure 4 homeownership segregation has remained quite stable over the last decades with a slight uptick in 2000.[18] In supplementary analysis in Figure A.1, we hold the neighborhood definition constant over time (by matching the tracts in each decade to the 2010 tract definition) and a slightly increasing trend post-1970, but with a sharper uptick uptick between 1990 to 2000.

In contrast, as a large prior literature has documented, racial segregation peaked in 1970, followed by a sharp decline in subsequent decades, which has been attributed to the 1968 Fair Housing Act (Fischer et al., 2004; Fischer, 2008; Shertzer et al., 2016, 2018). The relatively stable trend of homeownership segregation also contrasts with that of income segregation. For example,

[18]Since much of the U.S. was not divided into census tracts prior to the 1970s, we restrict the calculation of our segregation measures from 1970 onwards Logan and Stults (2012).

Bischoff and Reardon (2014) show that income segregation, especially of affluent households (above the 90^{th} percentile of income), has been increasing since the 1980s, and attribute this trend to increase in zoning regulations after the 1968 Fair Housing Act (Bischoff and Reardon, 2014).[19]

Given the distinct trends in racial, income, and homeownership segregation, homeownership segregation appears to represent a component of segregation not captured by these previous measures. How can we tie them together? As we will discuss in more detail in Section 5, a plausible interpretation is that, because the 1968 Fair Housing Act directly targeted racial segregation, racial segregation declined. Land-use regulation emerged as an endogenous response and allowed landlords and homeowners to seclude low-income borrowers. As a result, income segregation, especially of the rich, increased as noted in Bischoff and Reardon (2014). Our measure, homeownership segregation motivates an endogenous increase in land-use regulation by landowners and homeowners to preserve existing homeownership segregation, explaining its persistence.

Finally, we investigate the correlates of homeownership segregation. Table A.2 displays the regression coefficients of a range of demographic variables, standardized (z-scored) and regressed on homeownership segregation. CZs with high homeownership segregation appear to have less poverty and unemployment (CZs with 1 SD higher homeownership segregation have a 0.28 SD lower share of poor households and 0.43 SD lower unemployment rates), though they are also more expensive cities in terms of median monthly rent (0.47 SD higher) and median house price values (0.26 SD higher). These CZs also feature 0.178 SD higher fraction of Black population but on average do not differ in terms of high-school dropout rates and violent crime.

4.2. Upward Mobility effects: Graphical Illustration

Our primary analysis examines the relationship between homeownership segregation and upward mobility, especially among low-income families, and contrasts it with the relation between homeownership and upward mobility (or lack thereof).

We illustrate the spatial variation in upward mobility in Figure 5, separately for children from poor and from rich families. The maps reveal that, while there is significant correlation, CZs with

[19] This increase in income segregation, is somewhat more modest based on subsequent work by Logan and Stults (2012), but more recent work has also documented a similar sharp increase in income segregation since the 1980s (Fogli and Guerrieri, 2019).

high place-based mobility effects on poor children do not necessarily provide upward mobility to rich children, for example, in many CZs in the northern Midwest and near the south-western coast.

We anticipate the formal estimation of the relationship between upward mobility effects, on the one hand, and homeownership or homeownership segregation, on the other hand, in Figure 6. Each point in the bin scatter plots is the average of the y-axis variable for each 5-percentile bin of the x-axis variable. Observations are weighted by population and the fitted line on the underlying observations is shown in each plot.

Starting from the analysis of homeownership *rates*, Panel (a) shows that there is no correlation with upward mobility among poor families, but, in Panel (b), a positive correlation among rich households. Thus, the place-based upward mobility effect of one additional year of childhood in a CZ is associated with higher homeownership only if the children's parents are wealthy. This positive relationship is consistent with earlier work that has found that owning a home is associated with better children's outcomes (Green and White, 1997). While initially attributed to residential stability due to homeowning, later literature suggests a non-causal interpretation reflecting the selection of families into homeowning (Barker and Miller, 2009; Holupka and Newman, 2012).

Turning to our main measure of interest, homeownership segregation, Panel (c) shows that the upward mobility of children from poor families is lower in CZs with higher homeownership segregation, while Panel (d) shows no significant relationship for children from above-median income families. Note that, in both figures, in addition to census division (CZ) fixed effects, we control for the homeownership rate since we are interested in effect of the geographic distribution of homeowners across neighborhoods (census tracts) within a CZ.

4.3. Upward Mobility effects: Estimations

We show the corresponding regression estimates based on the following empirical specification for homeownership *rates* as the explanatory variable,

$$Y_{CZ} = \alpha_{c(CZ)} + \beta \times \text{Homeownership Rate}_{CZ} + \gamma X_{CZ} + \epsilon_{CZ}, \tag{13}$$

and for homeownership *segregation*, which is our main explanatory variable of interest:

$$Y_{CZ} = \alpha_{c(CZ)} + \beta \times \text{Homeownership Segregation}_{CZ} + \gamma X_{CZ} + \epsilon_{CZ}. \tag{14}$$

In both sets of estimations, observations are at the CZ-level. As dependent variables, we employ the place-based component of intergenerational mobility of children from below-median income families (25$^{\text{th}}$ percentile), from above-median income families (75$^{\text{th}}$ percentile), or to the difference between the two (25$^{\text{th}}$ percentile–75$^{\text{th}}$ percentile). Regressions include census division fixed effects, $\alpha_{c(CZ)}$. In addition, we also control for homeownership rates and the share of people below the poverty line. All regressions are clustered at the state level, and observations are weighted by the number of housing units in a CZ to get representative estimates of the U.S. population.

In the baseline specification, homeownership segregation and the control variables are as of 2000 in order to match the time period when parent's income for the upward mobility is measured (1996–2000).[20] We also show robustness to alternate homeownership segregation in 1990 and the average of 1990 and 2000. Since the level of homeownership segregation has no intuitive meaning, we standardize the measure so that coefficients can be interpreted in terms of standard deviations. For ease of interpretation we also standardize the upward mobility measures, which allows comparisons of children from low- and high-income families. Note that we cannot as yet assign a causal interpretation to the coefficient estimate $\hat{\beta}$.

Table 2 provides the estimation results. Starting from homeownership rates (in Panel A), we estimate no significant relationship between below-median income households' homeownership and their children's upward mobility (column 1), also after controlling for the fraction of households below the poverty line and census division fixed effects (column 2). In contrast, the upward mobility of children from high-income families is 0.178 SD higher in CZs with 1 SD higher above-median income homeownership rates (column 3). The more stringent specification in column 4 shows a similar positive association between homeownership segregation and children's upward mobility. Without access to further instruments, it is not possible to establish whether the positive effect of

[20]In 2000, the children in the Chetty and Hendren (2018b) sample were between 14 to 20 years old and Chetty et al. (2019) find place-based intergenerational mobility are highest for the 13–23 age group.

homeownership of rich children is causal.[21] The main insight from this auxiliary analysis is that, despite the policy focus on homeowning as the pathway to higher upward mobility for low-income children, there is no significant correlation.

Turning to homeownership segregation, in Panel B of Table 2, CZs with a 1 SD higher homeownership segregation are associated with 0.127 SD lower upward mobility for children from poor families, and there is no corresponding effect on those belonging to rich families. We also measure the relative gap between the mobility of below- and above-median income children in column 3, and estimate only a noisy effect.

As in the estimations with homeownership levels as the explanatory variable, we cannot interpret the estimated effects of homeownership segregation causally. The OLS estimates are biased if the location decisions of homeowners and resulting extent of homeownership segregation are directly influenced by children's upward mobility, or are correlated with unobserved CZ characteristics that also predict upward mobility. For example, if homeowners in CZs with low mobility effects are motivated to segregate into separate neighborhoods for other reasons, the OLS estimates would be biased downward (larger in absolute magnitude). Alternatively, measurement errors could bias the estimate towards zero.

To address this endogeneity bias, we use the planned portion of the 1947 interstate highway system as a source of exogenous variation in homeownership segregation, as discussed in Section 3.2. The instrument is based on the the number of "rays" built within one mile from the central city for each MSA, which we then match to the CZ level for our analysis.

For the planned portions of the 1947 highway plan to be a valid instrument, we require the planned rays be a good predictor of homeownership segregation (rank condition). Figure 7 shows that the number of planned highways is a strong predictor of homeownership segregation in 2000. Census-division fixed effects and control variables are included. The regression estimate of planned highways on homeownership segregation yields a coefficient of 0.131 (s.e. = 0.033).

To satisfy the exclusion restriction, we rely on the fact that the planned portion of the highway was designed for trade and national defense and not in response to local commuting demands or

[21] The positive association between homeownership rate and intergenerational mobility for high-income children disappears once we control for the fraction of single-mothers in a CZ. The results on homeownership segregation, instead, are robust to controlling for the fraction of single-family mothers.

to facilitate metropolitan area development. In fact, Baum-Snow (2007) shows that the 1947 plan did not respond to changes in commuting demand. Overall, the analysis in Baum-Snow (2007) suggests that the 1947 highway plan was designed to connect large cities but not high growth cities which were likely to respond to racial and social segregation preferences.

We note that the positive association between the instrument and homeownership segregation is consistent previous literature. While Baum-Snow (2007) originally used the instrument to show a 17% population decline in city centres due to the highway construction between 1950 and 1990. Boustan and Margo (2013) focus on its impact on homeownership and in particular the overall increase in owner-occupancy in metropolitan areas between 1940 and 1980. They argue that white homeowners moving to the suburbs allowed Black ownership to increase in central cities. To account for unobserved factors such as racial preferences affecting this suburbanization, Boustan and Margo (2013) too rely on the planned portion of the interstate highway system in 1947 to generate a shift-share instrument for white suburbanization. Similarly, we rely on the variation in homeownership segregation induced by the highway instrument as orthogonal to racial or income preferences of households within CZs.

Using this instrument, we estimate the following first stage:

$$\text{Homeownership Segregation}_{2000,CZ} = \alpha_{c(CZ)} + \gamma X_{CZ} + \rho \times \text{Highway Rays}_{CZ} + \epsilon_{CZ}. \tag{15}$$

And in the second stage, we estimate

$$\text{IGM}_{p,CZ} = \alpha_{c(CZ)} + \beta \times \widehat{\text{Homeownership Segregation}}_{CZ} + \gamma X_{CZ} + \epsilon_{CZ}. \tag{16}$$

We also show the reduced form effect that captures the impact of the instrument on upward mobility,

$$\text{IGM}_{p,CZ} = \alpha_{c(CZ)} + \phi \times \text{Highway Rays}_{CZ} + \gamma X_{CZ} + \epsilon_{CZ}. \tag{17}$$

As before, we focus on IGM at the 25^{th} and 75^{th} percentiles, and also on the relative difference between the two, and include the same set of controls and fixed effects as in (13) and (14). Observations are weighted by the number of housing units in a CZ to get representative estimates of the U.S. population. Standard errors are clustered at the state level.

Panel C of Table 2 presents the estimation results. The first-stage estimation of equation (15) in column 1 yields an F-statistic of 15.252, indicating that the planned highways are a strong predictor of homeownership segregation. CZs with 1 SD higher number of rays emanating from the city center in the 1947 interstate highway plan have 0.131 SD higher homeownership segregation. Columns 2–4 show the estimates from the reduced form specification relating the instrument directly to children's upward mobility: a negative effect of 0.076 SD on the intergenerational mobility of children of poor parents, no effect on children of rich parents, and, correspondingly, a negative effect of 0.081 SD on the difference in upward mobility effects for poor and rich kids. Finally, the results of the 2SLS IV regression are similar, but the point estimates are larger. A 1 SD higher homeownership segregation predicts a 0.580 SD decrease in intergenerational mobility for poor children (column 5), no adverse effects on rich children (column 6), and a differential negative effect on poor relative to rich children of 0.619 SD.

To get a sense of the economic magnitude, consider a child who spends their entire childhood in a CZ with 1 SD higher homeownership segregation. The 0.580 SD effect in column 5, which in turn corresponds to a 0.197 percentile decline (using the value of 0.34 percentiles of 1 SD from Table 1), corresponds to a 3.06 percentile decline in children's income rank after scaling by 15.525 years as in Derenoncourt (2019). This decline amounts to a \$2504 (9.60%) lower annual income (relative to the median annual income of \$26,091) for a child who spends their entire childhood in a CZ with 1 SD higher homeownership segregation. Using the aggregation over 20 years, as in Chetty and Hendren (2018a,b), the 0.580 SD decline in children's upward mobility corresponds to a 3.94 percentile lower children's rank, or a \$3226 (12.37%) lower annual income.

The economic magnitudes of the effect of homeownership segregation on children's upward mobility are comparable to the estimated neighborhood effects from previous papers. As a baseline, Chetty and Hendren (2018b) estimate the neighborhood effect of the median CZ at a 1.9% annual income increase. Chetty et al. (2016) find that children from low-income families who grow up in the areas they designate as "high opportunity" earn 13.9% more per year as adults than those who grow up in "low-opportunity" areas. Derenoncourt (2019) examines the effect of the Great Migration and finds that a 1 SD larger increase in the black population due to the Great Migration lowered adult income rank of children from low-income families by 3 percentiles, which translates to a 9% lower adult income.

Selection effects. The magnitude of the 2SLS IV negative estimates is larger than that of the OLS estimates, pointing to the presence of omitted or unobservable CZ characteristics that positively correlate with both homeownership segregation and upward mobility. Selection of the kind of families that reside in CZs may help explain the bias in the OLS estimates. For example, CZs with high homeownership segregation feature lower fraction of households below the poverty line and are associated with lower unemployment rates (Table A.2). Hence, CZs with high homeownership segregation may plausibly feature selection of families who are able to invest more in their children's human capital. In this case, our estimated OLS coefficient $\hat{\beta}$ from (14) is equal to the true β and a bias term given by the $\frac{cov(\text{Homeownership Segregation}_{2000,CZ},\text{Unobservables})}{Var(\text{Homeownership Segregation}_{2000,CZ})}$. If the true effect β of the change in homeownership segregation between 1990–2000 on upward mobility is negative (as our 2SLS estimates suggest), and the covariance between homeownership segregation and unobservables is positive, the estimated effect from the OLS specification is attenuated, consistent with our findings.

Another way to see the positive selection bias by differentiating between the selection- and the place-based components of upward mobility. If we substitute the outcome measure of place-based mobility effects with the "correlational IGM" measure, which combines place-based and selection-induced factors, the estimations yield no or only marginally significant estimates. As shown in Table A.3, the OLS point estimate of 0.002 in column 1 is close to zero and much smaller than the point estimate of -0.127 in column 1 in Table 2. Moreover, the effect on high-income families is negative and insignificant. After instrumenting, the estimated effects on both high- and low-income families are negative, of very similar magnitude, and insignificant or marginally significant, resulting in insignificant effects close to zero for the differential impact on high- and low-income families. Given the significantly negative estimates for the place-based determinants, we can thus infer that the selection effects coming from differences in the kind of families that reside in the CZ are if anything positive. In all, homeownership segregation appears to cause a decline in upward mobility that operates primarily through place-based channels and cannot be attributed to the negative selection of the kind of families that reside in these CZs.

In a similar spirit, we can rule out selection effects that are specific to only a subset of tracts as explanation for our estimates. Specifically, we address the concern that certain tracts might have fewer homeowners due to intrinsic neighborhood characteristic, such as tracts close university campuses featuring households who are predominantly renters and are unlikely to become homeowners. To correct for such features of certain neighborhoods, we carry out two exercises to either exclude tracts with a high fraction of households that are unlikely to be homeowners, or include only tracts with a high fraction of households that are likely to be homeowners. We rely on information about the average age of first-time home buyers, which is between 31 (National Association of Realtors) to 34 (2009 American Housing Survey). In the first test, we recalculate our baseline homeownership segregation measure, leaving out tracts where the fraction of the population with household heads below 24 years of age is in the top decile across tracts in the country. In the second test, we focus on the age group where the household head is above 34 years with the rationale that they are more likely to own a house. For this segregation measure, we only retain tracts which have a fraction of household heads with age greater than 34 years is above median. These two cutoffs (24 and 34 years) are based on the granularity at which the household head's age available in the Census at the tract-level. Results using these two alternate homeownership segregation measures are shown in Panel A and B of Table A.4. Results in both panels are similar to the baseline.

Alternative homeownership segregation measures. In our baselines analysis, we calculate homeownership segregation in 2000 as it corresponds to the 1996–2000 period when the parents' family income is measured in Chetty and Hendren (2018b) to calculate upward mobility of their children. At that time, the children, born between between 1980 and 1986, were 14-20 years old. In Table A.5, Panel A, we repeat the analysis measuring homeownership segregation as of 1990, that is, when the children in the sample are between 4-10 years of age, and in Panel B we use the average homeownership segregation between 1990–2000. Columns 1–3 correspond to the specifications in Table 2 Panel A and columns 4–10 correspond to the specifications in Panel C. The results in both panels are both quantitatively and qualitatively similar to the baseline. The robustness of our results might be surprising since Chetty et al. (2019) find that place-based effects on pre-teen children below 13 years are more muted than those on older children between 14-23. Note, however that homeownership segregation between 1990 and 2000 is highly correlated (95%). We will return to the persistence of homeownership segregation in Section 4.4.

The results are also robust to using alternative definitions of homeownership segregation rather than the entropy-based segregation measure. The first alternative measure is the SD of the tract-level homeownership rate. Panel A in Table A.6 shows that a 1 SD increase in homeownership segregation using this measure leads to a 0.310 SD decline in the intergenerational mobility of below-median income children using our most robust 2SLS IV specification in column 7. The second measure (in Panel B) uses the dissimilarity index, which compares the dissimilarity of the two groups (homeowners and renters) at the tract level and then averages it across all tracts in the CZ. Column 7 in Table A.6 shows that a one SD higher dissimilarity predicts 0.317 SD lower intergenerational mobility of below-median income children. The results are both qualitatively and quantitatively in line with the baseline homeownership segregation effects in Table 2.

Refined segregation measures: rich versus poor homeowners. Returning to our entropy-based segregation measure, we now distinguish between the segregation of rich and of poor homeowners and ask whose segregation appears to drive the adverse impact on children's upward mobility. It could be that the poor families and by extension poor children are secluded away from the rich, essentially forming ghettos (Berry, 1976; Cutler and Glaeser, 1997). Alternatively, the rich may be secluded from the rest, forming high-earner homeownership enclaves (Bischoff and Reardon, 2014). To investigate this distinction, we define two alternate entropy-based measures: (i) segregation of the rich homeowners from everyone else, and (ii) the segregation of the poor homeowners away from everyone else.

Figure A.2 reveals that the corresponding spatial distributions are distinct from that of overall homeownership segregation in Panel A of Figure 2, and distinct from each other. For example, CZs on the West Coast are in the highest quintile of above-median income segregation (Panel B), while the segregation of below-median homeowners in this region is more modest (Panel A). Places such as Texas, instead, feature a high degree of segregation of the poor homeowners (Panel A), but not of the rich homeowners (Panel B).

Figure A.3 illustrates what these segregation measures capture for the example of Atlanta. Panel A shows the heat map of the absolute differences between the fraction of below-median income homeowners (relative to all homeowners and renters) in each tract minus the same fraction calculated at the CZ-level. This distribution is very even across the CZ-level. In contrast, the distribution of the absolute differences between the fraction of above-median income homeowners in each tract minus the same fraction calculated at the CZ-level (in Panel B) is not evenly distributed across tracts. In fact, Atlanta is the 4^{th} highest in terms of above median income homeownership segregation for the CZs in our sample. In comparison, in terms of segregation of below-median income homeowners, it has a more modest rank of 64.

Table 3 provides the estimates of the respective influence of these segregation measures on children's upward mobility. Columns 1–2 show the estimates from model (14) except with the segregation measure replaced with the segregation of rich homeowners (column 1) and poor homeowners (column 2). Column 1 shows that CZs with 1 SD higher segregation of the rich have 0.197 SD lower upward mobility for children from low-income families. In contrast, column 2 shows no effect of the segregation of the poor homeowners on these children's upward mobility. The "horse race" regression in column 3 confirms a strongly negative effect of rich-family segregation (-0.215) and no effect of poor-family homeownership segregation. Thus, it is the segregation of the rich homeowners (e. g., the formation of exclusive enclaves where the rich are homeowners) that explains the adverse effect on children's upward mobility with no effect attributable to the segregation of the poor (e. g., ghettos where poor homeowners reside).

Columns 4–7 instrument for homeownership segregation. The instrument is a strong predictor of the segregation of the rich homeowners (F-statistic=41.231) but a weak predictor of the segregation of poor (F-statistic=1.066). The 2SLS IV estimates in column 6 show that a 1 SD higher segregation of rich homeowners leads to a 0.388 SD lower intergenerational mobility of poor children. 2SLS estimates for the instrumented segregation of poor homeowners is shown in Column 7 for completeness, but cannot be interpreted reliably given the weak first stage.

In light of the distinct effects of the segregation of the rich homeowners and the poor homeowners, we also consider the four-group entropy comprised of the rich renters, rich homeowners, poor renters, and poor homeowners. (As discussed above, the entropy-based measures allows for multi-group variants, which are not possible under the dissimilarity index.) As Table A.7 indicates, the baseline effects are similar to Table 2.

4.4. Historical Homeownership Segregation

In Section 3, we discussed the historical persistence of homeownership segregation. Figure 4 revealed its persistent trend since 1970. In this subsection, we show that, as a result, we can trace children's upward mobility today directly to historical homeownership segregation patterns.

Table 4 shows the results from re-estimating models (14) and (15)-(17) with homeownership segregation in 2000 replaced by the respective measures from earlier decades since 1970. Given the strong adverse effects on children from low-income families estimated so far, we focus on the upward mobility of children with parents at the 25$^{\text{th}}$ percentile.

The top panel shows that, in the first stage, planned highways are a strong predictor of homeownership segregation starting in every decade since 1980 (F-statistics of 11.921 and above). The OLS estimates relating homeownership segregation to upward mobility are weaker and significant only in 1980 and 2000. Turning to the reduced form estimates in the third panel, we see that, since the 1980s, a 1 SD increase in rays in the 1947 interstate highway plan is associated with a 0.075 SD, 0.062 SD, and 0.076 SD lower upward mobility, respectively. Finally, the two-stage instrumented estimates in the bottom panel show a strong effect. CZs with 1 SD higher homeownership segregation lead to a 0.428 SD, 0.484 SD, and 0.580 SD lower upward mobility. Also note that, in all panels, the 1970 coefficients are similar to the 1980 coefficients, though not statistically significant. We cannot reject the null that the coefficients in 1970 are equal to the coefficients from 1980.[22]

These estimation results indicate that we can explain the current spatial patterns of upward mobility based on historical homeownership segregation. The historical time-frame includes periods before the children in our sample (1980-1986 cohort) were born. In other words, historical developments that affected homeownership segregation over the past decades appears to have a lasting impact on place-based upward mobility effects even today.

[22] Results are similar using the constant neighborhood (tract-level) definitions in Table A.8.

What explains this historical persistence? One possible explanation relates to zoning and the rise of land-use regulation after 1968. As discussed in Section 2, the 1960s and the 1970s were a period of great civil unrest, eventually leading to the introduction of the 1968 Fair Housing Act. Previous work has noted that the 1968 Fair Housing Act was accompanied by a concurrent increase in land-use regulations in suburban areas post-1970, which restricted development (Trounstine, 2020; Shertzer et al., 2018; Been, 2018; Elmendorf, 2019; Fischel, 2004). The underlying notion is that, when homeowners and landlords could no longer explicitly discriminate, they started influencing land-use regulation as an implicit way of keeping especially minority homeowners out of certain neighborhoods. Much of the land-use regulations created barriers for low-income households, and previous literature has shown that, while this period saw a sharp decline in racial segregation (Fischer et al., 2004; Fischer, 2008; Shertzer et al., 2016, 2018), income segregation increased, especially the segregation of affluent households above the 90^{th} percentile income, which has been attributed to zoning and land-use regulation (Bischoff and Reardon, 2014). Consistently, we have shown that the segregation of rich homeowners adversely affects children's upward mobility (Table 3). We thus hypothesize that land-use regulations allowed homeowners and landlords to freeze homeownership segregation patterns in the 1970s and 1980s, explaining the historical persistence of these effects today.

The next section examines the role of land-use regulations in explaining the adverse effects of homeownership segregation on children's upward mobility in more detail.

5. The Role of Restrictive Housing Regulation

The main takeaway from the previous section is that homeownership segregation since the 1980s has significant explanatory power for current geographic differences in upward mobility among children from low-income families. We investigate the hypothesis that the endogenous rise in land-use regulations post the 1968 Fair Housing Act cemented existing segregation as local governments and homeowners adopted alternate methods to maintain homogeneity in their neighborhoods.

5.1. Housing Restrictiveness

We start by relating historical homeownership segregation to the measure of land-use regulations provided by Trounstine (2020), which we map to the commuting zone. While we would ideally utilize data on the decade-by-decade changes in housing restrictions, this data is not easily available. We rely on the snapshot as of 2006, interpreted as the cumulative restrictiveness by 2006. (The cumulative measure poses less of a challenge in our context given the persistence of housing restrictions.)

We estimate the relation between decade-by-decade historical homeownership segregation in 1970–2000 and housing restrictiveness in 2006, using estimating equations akin to (14) and (15)-(17) for each decade between 1970–2000. The empirical specification for the OLS estimate is:

$$\text{Housing Restrictiveness}_{2006,CZ} = \alpha_{c(CZ)} + \beta \times \text{HO Segregation}_{d,CZ} + \gamma X_{d,CZ} + \epsilon_{CZ} \tag{18}$$

Here, Homeownership $\text{Segregation}_{d,CZ}$ is the entropy-based homeownership segregation in prior decades, namely, for d equal to 1970, 1980, 1990, and 2000. Regressions include census division fixed effects $[\alpha_{c(CZ)}]$. In addition, we also control for homeownership rates and the share of people below the poverty line the decade, d. β is our coefficient of interest and measures the correlation between homeownership segregation in a decade and housing restrictiveness today (in 2006). For ease of interpretation, we standardize both homeownership segregation and housing regulation index. All regressions are clustered at the state level and observations are weighted by the number of housing units in a CZ to get representative estimates of the U.S. population. The specification instrumenting for homeownership segregation is as follows. The first stage is as before

$$\text{HO Segregation}_{d,CZ} = \alpha_{c(CZ)} + \gamma X_{d,CZ} + \rho \times \text{Highway Rays}_{CZ} + \epsilon_{CZ}, \tag{19}$$

only now separately for each decade d. The second stage is:

$$\text{Housing Restrictiveness}_{2006,CZ} = \alpha_{c(CZ)} + \beta \times \text{HO } \widehat{\text{Segregation}}_{d,CZ} + \gamma X_{d,CZ} + \epsilon_{CZ} \tag{20}$$

The reduced form specification is:

$$\text{Housing Restrictiveness}_{2006,CZ} = \alpha_{c(CZ)} + \phi \times \text{Highway Rays}_{CZ} + \gamma X_{CZ} + \epsilon_{CZ} \tag{21}$$

The first stage in Panel A of Table 5 reveals strong predictive power of the instrument for Housing Restrictiveness. Moreover, whether we instrument Homeownership Segregation or not, or use the reduced-form specification, we estimate a strong positive association between homeownership segregation in every single decade since the 1970s and the housing restrictiveness index. A CZ with 1 SD higher homeownership segregation has at least 0.1 SD higher housing restrictiveness in 2006 in every single decade, both in the simple OLS estimations (Panel B) and in the reduced-form estimations (Panel C).

The 2SLS estimates in the bottom panel similarly show that CZs where homeownership segregation since 1970 was higher (as a result of highway construction) have higher housing restrictiveness today.[23]

Overall, the results are consistent with the hypothesis that land-use regulations fostered or cemented existing homeownership segregation. The estimated positive relationship is consistent with land-use regulations arising in response to homeowners interests. As documented in previous literature, homeowners can exert significant influence on local politicians in this respect (Hall and Yoder, 2022; Been, 2018; Elmendorf, 2019), especially through zoning restrictions that allow them to maintain elevated home values (Gyourko et al., 2008; Saiz, 2010) in order to create wealth (Banzhaf, 2013; Ellickson, 1977; Fischel, 2004).

5.2. Fair Housing Act Lawsuits

Another aspect of land-use regulation is that, historically, "racial zoning" was used to serve two purposes: first, to keep Black households out of segregated white areas; and second, to ensure that rich and predominantly white homeowners were far from industrial zones and environmentally hazardous activities, forcing Black communities to live close to industrial areas and creating slums

[23] Results are qualitatively similar using the constant neighborhood (tract-level) definitions in Table A.9, however, the 2SLS IV estimate in 1970 shows no effect, with homeownership segregation since the 1980s appearing as a strong predictor of housing stringency today.

and ghettos that historically had limited access to public goods (Rothstein, 2017).

We show that homeownership segregation is tied to racial (and other types of) discrimination utilizing the data from Trounstine (2020) on lawsuits under the FHA. As Trounstine (2020) details, several Justice departments and private parties pursued local governments for violating the provisions of the FHA over the subsequent decades. While it took some time, initially, for lawsuits to be filed and decided, Figure 8 shows that the number of CZs with decisions under the FHA has been steadily increasing since the 1970s and sharply since 1990. A high incidence of lawsuits in a CZ at a given point in time likely indicates the persistence of discriminatory practices even post-1968, when the FHA had rendered racial zoning illegal.

To test whether CZs with high homeownership segregation had a higher incidence rate of Fair Housing lawsuits, we relate homeownership segregation to a binary variable that indicates whether a CZ had a first decision on a lawsuit under the FHA as of a given date. We estimate models akin to the specifications in (14)-(17) for each decade between 1970–2000. The OLS estimation is

$$Y_{d,CZ} = \alpha_{c(CZ)} + \beta \times \text{Homeownership Segregation}_{d-1,CZ} + \gamma X_{d-1,CZ} + \epsilon_{CZ}, \tag{22}$$

where the outcome variable $Y_{d,CZ}$ indicates whether a CZ had a decision on a FHA lawsuit by time d (1980, 1990, and 2000). The variable serves as a proxy for (perceived) violations of the FHA, such as continued discriminatory practices and improper land-use restrictions over the prior decade. We relate this outcome to Homeownership $\text{Segregation}_{d-1,CZ}$ over the previous decade and include census-division fixed effects $\alpha_{c(CZ)}$. In addition, we also control for homeownership rates and the share of people below the poverty line in the previous decade, $d-1$.[24] The coefficient of interest β measures the correlation between homeownership segregation in the past decade and CZs that have a decision under the Fair Housing lawsuit by the beginning of the next decade. For ease of interpretation, we standardize the homeownership segregation measure. All regressions are clustered at the state level, and observations are weighted by the number of housing units in a CZ to get representative estimates of the U.S. population.

[24]Since much of the U.S. was not divided into census tracts before 1970, we can reliably calculate the homeownership segregation measures only post-1970.

The specification instrumenting for homeownership segregation is, in the first stage,

$$\text{HO Segregation}_{d-1,CZ} = \alpha_{c(CZ)} + \gamma X_{d-1,CZ} + \rho \times \text{Highway Rays}_{CZ} + \epsilon_{CZ}, \tag{23}$$

and in the second stage

$$Y_{d,CZ} = \alpha_{c(CZ)} + \beta \times \widehat{\text{Homeownership Segregation}}_{d-1,CZ} + \gamma X_{d-1,CZ} + \epsilon_{CZ}. \tag{24}$$

The reduced-form specification is:

$$Y_{d,CZ} = \alpha_{c(CZ)} + \phi \times \text{Highway Rays}_{CZ} + \gamma X_{d-1,CZ} + \epsilon_{CZ}, \tag{25}$$

where Highway Rays_{CZ}, representing the the planned portions of the 1947 highway plan, instruments for homeownership segregation. The remaining variables are as in model (22).

Table 6 shows the results. The top panel confirms that planned highways predict homeownership segregation between 1970–1990 (with all F-statistics above 10 other than 6.691 for 1980). While the OLS estimates in the second panel do not indicate a strong relationship between homeownership segregation in the previous decade and FHA lawsuits, both the reduced-form and the 2SLS IV estimates in the bottom two panels indicate otherwise. The reduced form estimates show that, especially since the 1980s, CZs that had higher exposure to planned highways were more likely to have had an FHA lawsuit and decision in 1990 and 2000. This result and "trend" is consistent with the gradual increase in decisions under the FHA since the 1970s (Figure 8). A CZ with 1 SD higher planned highways in the 1947 highway plan was 6.2% (7.4%) more likely to have a decision under the FHA in 1990 (2000). Similarly, the 2SLS IV estimates in the bottom panel show that a CZ with 1 SD higher homeownership segregation in 1980 and 1990 was 36% and and 57% more likely to have had a decision under the FHA by 1990 and 2000, respectively. Thus, in all, we find that homeownership segregation especially since the 1980s predicts greater clampdown on discrimination by Justice departments and private parties under the FHA.[25] The same CZs with historically high homeownership segregation, which increased land-use restrictions after the 1968 FHA (Table 5),

[25] Results are similar using the constant neighborhood (tract-level) definitions in Table A.10.

also were more likely to face Federal FHA lawsuits, indicating greater persistence of discriminatory practices in these CZs (Table 6).

6. Channels

Our analyses and findings so far point to homeownership segregation as a significant determinant of place-based influences on upward mobility. Homeownership segregation is a novel measure that differs from existing measures of homeownership rates, both in its definition and in its ability to forecast mobility effects.

At the same time, homeownership segregation is correlated with other types of segregation that have been studied in the prior literature, such as income segregation (correlation 0.77), racial segregation (0.22), and school segregation (0.20). These correlations raise the question how to discern the respective influences of homeownership segregation and other types of segregation. One possibility is that homeownership segregation affects other types of segregation, which in turn generate adverse mobility effects. In that case, other forms of segregation would be mediators of the homeownership-segregation effect, possibly in addition to a direct homeownership-segregation effect on upward mobility. Another possibility is that the correlations indicate a confound and there is no causal influence of homeownership segregation.

How can we distinguish between those possibilities? Note that it is not easily possible to study the effects of homeownership segregation "controlling for" other types of segregation in our baseline analysis precisely because homeownership segregation likely affects income and racial segregation, which in turn affects upward mobility. For example, land-use regulations that aim to preserve homeownership segregation might exclude low-income, minority, or rental households from certain neighborhoods (allowing only rich households who can own homes to remain), essentially causing income segregation. This income segregation could in turn affect children's upward mobility, e. g., through externalities of being surrounded by the rich households such as access to better schools, greater influence on local politicians, greater public funding, etc. As an extreme example, consider the case where all of the adverse effect of homeownership segregation on upward mobility is through its effect on income segregation. Then explicitly controlling for these segregation measures in our analysis would erroneously block the very variation we are interested in capturing, biasing our results. In other words, the inclusion of income or racial segregation in our baseline analysis would be a textbook case of so-called "bad controls" (Angrist and Pischke, 2008).

We can, however, consider the roles of other types of segregation in mediating the effect of homeownership segregation on children's upward mobility. As Imbens (2020) points out, mediation analyses are frequently used in neighboring sciences such as biostatistics and epidemiology to delineate the "causal pathway," but "are not as common in economics, and probably deserve more attention in the latter."

Figure A illustrates the direct and indirect effect involved in a typical analysis of mediators (Imbens, 2020). The treatment variable, homeownership segregation (X), can directly affect the outcome variable, children's upward mobility (IGM), but there is also an indirect effect wherein homeownership segregation affects a mediating variable (such as income, racial, school segregation or commuting time), which then affects children's upward mobility.

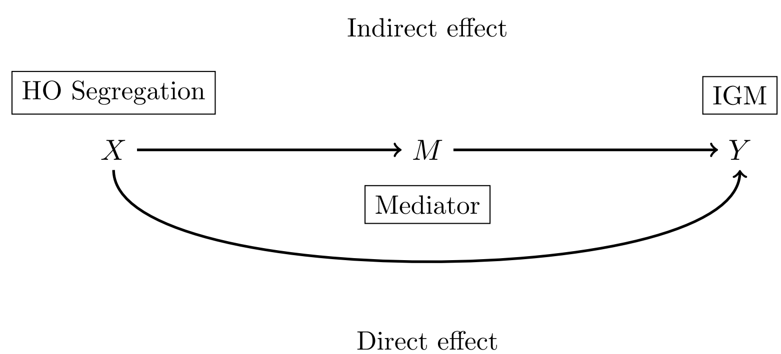


Figure A. Direct and indirect effects with mediators

A full mediation analysis involves three steps (Imbens, 2020). The first step captures the total effect of X (homeownership segregation) on Y (upward mobility). The second step involves establishing the indirect effect of X on Y, which comprises two components (i) the effect of X (homeownership segregation) on M (mediators, here other types of segregation), and (ii) the effect of the mediators on Y (upward mobility). The third step infers the direct effect by subtracting the indirect effect from the total effect (VanderWeele, 2015).

Our analysis so far has focused on the first step, i. e., the total effect of homeownership segregation on upward mobility (cf. Table 2). Below, we implement part (i) of the second step, relating homeownership segregation to potential mediators. Part (ii) of the second step, however, requires further instruments for each of the mediators.[26] We lack such additional exogenous variation. Note in particular that randomness of the treatment (X) (which we achieve with the planned-highway instrument) does not necessarily imply randomness of the mediator since the mediator is itself a post-treatment variable as Figure A illustrates. Lacking such additional sources of variation, we cannot implement part (ii) of step 2 and step 3.

Our analysis of possible channels thus proceeds in three steps. First we perform step 2.i of the mediation analysis, corroborating the role of other types of segregation as mediators. We then turn to additional arguments empirical and analyses, based on a further homeownership-related instrument (variation in the ease of mortgage financing), to corroborate the causal role of homeownership segregation in generating adverse mobility effects. We conclude by providing additional evidence of the role of housing-related segregation (as opposed to ownership rates, the traditional outcome of interest) in the context of single-family detached homes.

Mediators. We examine four types of segregation as playing a mediating role in the effect of homeownership segregation on children's upward mobility: income segregation, racial segregation, commuting times, and school segregation. Our previous findings on land-use regulation motivate the focus on income and racial segregation as mediators. While the 1968 FHA made overt racial discrimination difficult, land-use regulations allowed CZs to preserve homeownership segregation and, indirectly, the racial homogeneity of CZs by targeting minority households. These land-use regulations also ended up targeting low-income households, motivating our focus on income segregation. We examine school segregation given our focus on outcomes of children growing up in specific CZs, and motivated by previous literature that has tried to distinguished between neighborhood racial segregation from students' racial segregation within schools (Card and Rothstein, 2007). Finally, we consider commuting time as a mediating variable. Glaeser (2011)

[26] Traditional mediation analyses in biostatistics and epidemiology often establish these indirect effects of the mediators on Y, controlling for X, through multi-equation regression frameworks. However, the resulting estimates are biased in the absence of experimental variation in the mediators (Bullock and Ha, 2011).

notes that policies that encourage home-owning implicitly encourage people to move away from higher density living, a concept tied to our homeownership segregation measure. Long commuting time is also intricately tied to our instrument which examined the homeownership segregation effects arising from highway construction, motivating our focus on this variable as a mediator. As

We implement part (i) of the second step of the mediation analysis, using specifications similar to equations (14), (15), (16), and (17), but with the dependent variables replaced by the potential mediators. Table 7 presents the results. Our preferred specification using the 2SLS IV estimates shows the effect of homeownership segregation induced by the planned highways on each of the mediators using estimating equation (16). Columns 3, 6, 9, and 12 show that 1 SD higher HO segregation induced by the planned highways in 1947 predicts 1.517 SD higher income segregation, 1.774 SD higher racial segregation, 2.057 SD higher school segregation, and 1.840 SD higher commuting times.

In other words, the data reveals a strong relationship between homeownership segregation and other types of segregation, which have previously been linked to intergenerational mobility effects. This relationship might reflect their mediating role, but it also raises the question whether homeownership segregation does play a causal role in and of itself.

Establishing the homeownership channel. Our arguments so far for homeownership segregation as a primitive factor, rather than a mere correlate with racial, income, or other types of segregation, have been twofold. First, we have laid out how the 1947 highway instrument targeted directly the location of housing structures, rather than other types of segregation. Similarly to Boustan and Margo (2013), who rely on the 1947 highway plan to generate a shift-share instrument for white suburbanization that accounts for unobserved factors such as racial preferences, we have relied on the variation in homeownership segregation induced by the highway instrument as orthogonal to racial or income preferences of households within CZs.

Second, we have pointed to homeownership as a driver of land-use regulation. Homeownership segregation is directly tied to the motivations of homeowners to seclude minority and low-income households (which could include renters, as well as low-income and minority homeowners) from their neighborhoods as the previous paragraph discusses. Further, homeowners are in a better position to affect policy decisions such as land-use regulation through their greater influence on local politicians (Been, 2018; Elmendorf, 2019). Homeowners are also better informed about local policies and previous work has argued that homeownership causally increases their participation in local politics Hall and Yoder (2022).

We take an additional step towards establishing the causal role of homeownership segregation empirically by introducing a second instrument, that directly links to homeownership: the ease of mortgage financing. Specifically, we use the nationwide variation in the conforming loan limit (CLL) to generate CZ-level variation in access to mortgage finance.[27] The CLL limits the origination balance of loans eligible to be purchased by the GSEs. Since conforming-loan mortgages are easier to obtain for borrowers due to the GSE's participation in the secondary mortgage market, CLL increases improve access to mortgage financing. As discussed in Section 3.2, we exploit that CLL changes are determined at the national level to infer that changes in the ease of obtaining a mortgage loan in a region are quasi-exogenous. Specifically, we identify geographic variation in the ease of mortgage financing using the fraction of houses in a CZ that become conforming for each decade between 1970–2000, based on the starting house price values in each decade and a loan-to-value ratio of 80%. We then define a CZ as having easier access to mortgage financing if its fraction is above the median in any of the three decades 1970–1980, 1980–1990, and 1990–2000.

We use this additional instrument to show that the increase in homeownership segregation that is predicted by the 1947 highway interstate plan, is driven by areas which benefited from eased access to mortgage financing. That is, we include the additional instrument as well as its interaction with our baseline instrument in our estimations. The idea is to test how much of the effect of (instrumented) homeownership segregation on income mobility in 2000 is driven by variation in the ease of access to mortgage financing in the intervening decades. This refinement tests directly for homeownership as being causal, i. e., that aspects of home-owning are the driving force behind homeownership segregation and upward mobility.

In column 1 in Table 8, we show the first stage. The estimates reveal that the entire effect of the 1947 highway plan on homeownership segregation is driven by areas that also benefitted from

[27] Our empirical strategy relates on Loutskina and Strahan (2015), who also exploit the GSEs' inability to purchase mortgages above the CLL threshold to examine the impact on banks' credit supply.

increases in the ease of mortgage financing. We estimate strongly positive coefficients on both the change in the ease of mortgage financing and its interaction, but a (marginally significant) negative coefficient on the level effect of the highway-plan instrument. These first-stage estimates assuages concerns that alternative channels, such as an increase in alternate segregation measures (income or racial), are driving our results. Instead, mortgage access appears to be a significant factor.

Using the newly instrumented homeownership-segregation variable in the second stage (column 2), we replicate the significantly negative effect of homeownership segregation on upward mobility. The point estimate implies that a 1 SD higher homeownership segregation results in a 0.438 SD lower low-income children's upward mobility. These estimates are comparable to the effects documented in Table 2.

This refinement in Table 8 points directly to homeownership as being causal, i.e., that aspects of home-owning are the driving force behind homeownership segregation and upward mobility. Taken together, the baseline results based on the highway-plan instrument and the refined results based on the (highway-plan)×(change in ease of mortgage financing) interaction indicate that homeownership segregation directly predicts intergenerational upward mobility, beyond the influence of racial and income segregation in and of themselves. Homeownership segregation in turn, will induce income and racial segregation as these neighborhoods over-proportionally attracted (and catered to) white middle- and upper-class families.

Single-family detached home Segregation. As our last step, we perform additional analyses that corroborate the role of housing-related segregation, as opposed to the levels (or rates) of homeownership. In this part of the analysis we focus on single-family structures. For both theoretical and empirical reasons homeownership in the U.S. is closely associated with single-family detached homes. Empirically, single-family detached homes make up the overwhelming majority of homeowned units in the U.S. As we saw in Table 1, nearly 85% of single-family detached homes are owner-occupied. For the median CZ, nearly 75% of homeowners stay in single-family detached structures relative to a much lower 21% of renters who stay in single-family detached homes. As Glaeser (2011) notes, a prominent feature of housing in the US is that people in multi-family units overwhelmingly rent and people in single-family units overwhelmingly own homes. Theoretically, too there is an argument to be made that the optimal contract for single-family detached homes is owner-occupancy since landlords are not able to monitor tenants in these structures, and owner occupancy internalizes the externalities arising from such imperfect monitoring (Henderson and Ioannides, 1983; Kanemoto, 1990; DiPasquale and Glaeser, 1999; Shilling and Dombrow, 1991; Galster, 1984). In fact, Glaeser (2011) contends that encouraging homeowning implicitly encourages low-density living as they implicitly discourage multi-family buildings.

Further, since single-family zoning is the focus of land-use regulations and zoning policies that discourage multi-family buildings in certain neighborhoods, it is directly tied to our analysis in Section 5 on housing restrictiveness. Indeed, policymakers and commentators, argue that single-family zoning requirements prevent economic mobility of disadvantaged households (Kain and Quigley, 1972; McDonald, 1974; Menendian and Gambhir, 2018).

We start again from relating the rate, or fraction of single-family homes to upward mobility, and then contrast the results with the relation between single-family segregation and upward mobility. We use the specification from model (13) with the endogenous regressor Homeownership Rate replaced by the fraction of single-family detached homes (including renters and homeowned), SF Homeownership Rate. Table A.11, Panel A presents the OLS estimates. While column 1 in Panel A indicates a positive effect of the fraction of single-family detached home and children's upward mobility for low-income children, this effect disappears upon adding controls and census division fixed effects in column 2. Columns 3 and 4, however, suggest that the fraction of single-family detached homes may be positively associated with high-income children's upward mobility. As in the analysis of (overall) homeownership effects in Panel A of Table 2, the positive relation with rich children's upward mobility likely reflect the selection effects of rich households that become homeowners — a phenomenon that is particularly closely tied to the presence of single-family detached homes.

Turning to the segregation of SF homes, in Panel B and C, we recoup the previous results on homeownership segregation. Without instrumenting, in Panel B, we estimate that the upward mobility of the children from low-income families is 0.1 SD lower in CZs with 1 SD higher segregation of single-family detached homes, while there is no significant relation with the upward mobility of high-income children. After instrumenting with the planned highways instrument, in Panel C, the reduced-form estimates in Panel C in columns 2–4 show that a 1 SD higher instrument value predicts a 0.097 SD lower upward mobility for poor children, but no discernible effect on the rich children, with a significant effect on the difference as well. The 2SLS IV estimates in columns 5–7 confirm these findings, highlight the insignificant effects on rich children, and significant effects on the difference (0.462 SD lower) between rich and poor children.

Here, too, we can also include the second instrument (change in the ease of mortgage financing) to pin down the relation to homeownership. In columns 3–4 of Table 8, we show again the single-instrument result from columns 1 and 5 of Table A.11 for comparison. We then turn to including the CLL-based instrument as well as its interaction with the baseline instrument in columns 5–6. As in column 2, the entire effect on homeownership induced by the planned highways is driven by CZs with easier access to mortgage financing between 1970–2000. Column 6 shows the 2SLS instrumental variable results and the point estimates suggest that a 1 SD higher segregation of single-family detached units results in a 0.421 SD lower low-income children's upward mobility comparable to the effects documented in column 2 and in Table 2. As before, this refinement points directly to homeownership as being causal in affecting segregation of single-family detached homes.

Overall, our results indicate that the segregation of single-family homes exerts significant influence on the place-based upward mobility effects on children from low-income families. Our finding suggests that the debate about single-family home zoning restrictions would benefit from widening the focus on the rate (level) of single-family homes to also consider the segregation of single-family homeowners.

7. Conclusion and Policy Implications

This paper shows that homeownership segregation is a significant determinant of upward mobility among children from low-income families in the U.S. Using a a new measure of homeownership segregation, we show that higher homeownership segregation lowers upward mobility among low-income families in a CZ. Place-based factors, and not the adverse selection of families explains the decline in upward mobility. Further refinement of the analysis reveals that the effects are due to the segregation of rich homeowners from poor households. The predictive power of homeownership segregation even applies to historical measures, especially since the 1980s – a period that also coincided with the introduction of the FHA in 1968, which made housing discrimination illegal but was accompanied by a concurrent increase in restrictive land-use regulation.

We propose that after the 1968 Fair Housing Act outlawed discriminatory housing practices, the endogenous increase in restrictive land-use regulations allowed landowners and homeowners to preserve historical homeownership segregation patterns over time, explaining its adverse effect on children's upward mobility even today. CZs with higher homeownership segregation in the 1970s and later decades feature more land-use regulation in the 2000s and face more Federal FHA lawsuits, indicating greater persistence of discriminatory housing practices. We show that the channels mediating the effect of homeownership on children's upward mobility include income segregation, racial segregation, school segregation, and commuting times.

We conclude with a discussion of policy implications. A natural question is whether homeownership de-segregation can be used as a policy tool to help low-income families. Examples include bans on exclusionary zoning or the introduction of inclusionary zoning requirements — such as those implemented in New Jersey and Massachusetts. Both types of measures could potentially be beneficial in improving children's outcomes. Alternatively, mortgage policy could encourage home-owning in historically disadvantaged neighborhoods (census tracts) with low homeownership rates, evening out the tenure distribution within CZs. Indeed, policy has already targeted low homeownership rates in historically disadvantaged neighborhoods: The 1992 GSE Act promotes households' mortgage access in disadvantaged, that is, high-minority and low-income tracts, and mandates that a certain portion of the secondary market activity for the Government Sponsored Enterprises be targeted towards these areas (Jaffee and Quigley, 2007; Bhutta, 2009). Similarly, the 1997 Community Reinvestment Act mandates depository institutions direct credit access, including mortgage access, to low- and moderate-income neighborhoods (Bhutta, 2008). These policies could potentially reduce homeownership segregation by increasing homeownership in low-homeownership neighborhoods. However, our findings on the key role of rich-homeowner segregation suggest caution. As these policies are unlikely to affect the segregation of families with above-median income, the adverse effects might persist. Relatedly, Kulkarni and Malmendier (2021) find that while the 1992 GSE Act increased the ease of mortgage financing in underserved neighborhoods and Black homeownership in these neighborhoods increased, it was accompanied by white families moving out of these neighborhoods, inadvertently increasing racial segregation. In this sense, the results in Kulkarni and Malmendier (2021) parallel the difference in findings between Chetty et al. (2016) and Derenoncourt (2019), i. e., highlight the differences in outcomes when implementing place-based policies at scale. Chetty et al. (2016) examine the Moving to Opportunity (MTO) experiment to study place-based effects and find that when families in high-poverty housing projects were randomly moved to lower-poverty neighborhoods, children's outcomes improved. In comparison, Derenoncourt (2019) uses the Great Migration from 1940-1970 as a setting to examine the impact on children's upward mobility, and finds that large-scale movement to opportunity locations radically changed the racial composition of northern cities and altered place-based effects, turning opportunity locations into opportunity desserts. Thus, while reducing homeownership segregation should be an important policy goal, the inadvertent effects of such policy at scale, especially on the behavior of high-income families, need to be considered. Regardless of these deliberations, our paper highlights that homeownership segregation is an important dimension to be tracked by policymakers as it affects children's long-run outcomes.

References

Aaronson, Daniel, Daniel Hartley, and Bhashkar Mazumder, 2021, The effects of the 1930s holc "redlining" maps, *American Economic Journal: Economic Policy* 13, 355–92.

Adelino, Manuel, Antoinette Schoar, and Felipe Severino, 2014, Credit Supply and House Prices: Evidence from Mortgage Market Segmentation, *NBER WP 17832*.

Ananat, Elizabeth Oltmans, 2011, The Wrong Side(s) of the Tracks: The Causal Effects of Racial Segregation on Urban Poverty and Inequality, *American Economic Journal: Applied Economics* 3.2, 34–66.

Angrist, Joshua D., and Jörn-Steffen Pischke, 2008, *Mostly Harmless Econometrics: An Empiricist's Companion* (Princeton University Press).

Banzhaf, H Spencer, 2013, The market for local public good, *Case Western Reserve Law Review* 64, 1441.

Barker, David, and Eric Miller, 2009, Homeownership and Child Welfare, *Real Estate Economics* 37.2, 279–303.

Baum-Snow, Nathaniel, 2007, Did Highways Cause Suburbanization?, *The Quarterly Journal of Economics* 122.2, 775–805.

Been, Vicki, 2018, City NIMBYs, *Journal of Land Use & Environmental Law* 33.2, 217–250.

Berry, Brian JL, 1976, Ghetto Expansion and Single-family Housing Prices: Chicago, 1968–1972, *Journal of Urban Economics* 3.4, 397–423.

Bhutta, Neil, 2008, Giving Credit where Credit is Due? The Community Reinvestment Act and Mortgage Lending in Lower-income Neighborhoods, *Finance and Economics Discussion Series*.

Bhutta, Neil, 2009, Regression Discontinuity Estimates of the Effects of the GSE Act of 1992, *Finance and Economics Discussion Series*.

Bischoff, Kendra, and Sean F Reardon, 2014, Residential segregation by income, 1970–2009, *Diversity and disparities: America enters a new century* 43.

Boustan, Leah P, and Robert A Margo, 2013, A Silver Lining to White Flight? White Suburbanization and African–American Homeownership, 1940–1980, *Journal of Urban Economics* 78, 71–80.

Bullock, John G., and Shang E. Ha, 2011, Mediation analysis is harder than it looks, *Cambridge Handbook of Experimental Political Science* 508 – 522.

Card, David, and Jesse Rothstein, 2007, Racial Segregation and the Black-White Test Score Gap, *Journal of Public Economics* 91.11-12, 2158–2184.

Chetty, Raj, John N. Friedman, Nathaniel Hendren, Maggie R. Jones, and Sonya R. Porter, 2020, The Opportunity Atlas: Mapping the Childhood Roots of Social Mobility, *NBER Working Paper*.

Chetty, Raj, and Nathaniel Hendren, 2018a, The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects, *The Quarterly Journal of Economics* 133.3, 1107–1162.

Chetty, Raj, and Nathaniel Hendren, 2018b, The Impacts of Neighborhoods on Intergenerational Mobility II: County-level Estimates, *The Quarterly Journal of Economics* 133.3, 1163–1228.

Chetty, Raj, Nathaniel Hendren, Maggie R Jones, and Sonya R Porter, 2019, Race and Economic Opportunity in the United States: An Intergenerational Perspective, *The Quarterly Journal of Economics* 135, 711–783.

Chetty, Raj, Nathaniel Hendren, and Lawrence Katz, 2016, The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment, *The American Economic Review* 106.4, 855–902.

Chetty, Raj, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez, 2015, Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States, *The Quarterly Journal of Economics* 129.4, 1553–1623.

Cutler, David M., and Edward L. Glaeser, 1997, Are ghettos good or bad?, *The Quarterly Journal of Economics* 112, 827–872.

Cutler, David M., Edward L. Glaeser, and Jacob L. Vigdor, 1999, The rise and decline of the american ghetto, *Journal of Political Economy* 107, 455–506.

Derenoncourt, Ellora, 2019, Can you Move to Opportunity? Evidence from the Great Migration, *Forthcoming, American Economic Review*.

DiPasquale, Denise, and Edward L. Glaeser, 1999, Incentives and Social Capital: Are Homeowners Better Citizens?, *Journal of Urban Economics* 45.2, 354–384.

Dubofsky, Jean Eberhart, 1968, Fair housing: a legislative history and a perspective, *Washburn LJ* 8, 149.

Duranton, Gilles, and Diego Puga, 2019, Urban growth and its aggregate implications, *NBER Working Paper*.

Eckert, Gvirtz A., F., and Michael Peters, 2020, A method to construct geographical crosswalks with an application to us counties since 1790, *NBER Working Paper* .

Einstein, Katherine Levine, David M Glick, and Maxwell Palmer, 2019, *Neighborhood Defenders: Participatory Politics and America's Housing Crisis* (Cambridge University Press).

Ellickson, Robert C, 1977, Suburban growth controls: An economic and legal analysis, *The Yale Law Journal* 86, 385–511.

Elmendorf, Christopher S, 2019, Beyond the Double Veto: Housing Plans as Preemptive Intergovernmental Compacts, *Hastings Law Journal* 71.1, 79.

Fischel, William A, 2004, An Economic History of Zoning and a Cure for its Exclusionary Effects, *Urban Studies* 41.2, 317–340.

Fischer, Claude S, Gretchen Stockmayer, Jon Stiles, and Michael Hout, 2004, Distinguishing the Geographic Levels and Social Dimensions of US Metropolitan Segregation, 1960–2000, *Demography* 41.1, 37–59.

Fischer, Mary J, 2008, Shifting Geographies: Examining the Role of Suburbanization in Blacks' Declining Segregation, *Urban Affairs Review* 43.4, 475–496.

Fishback, Price V, Jonathan Rose, Kenneth A Snowden, and Thomas Storrs, 2021, New evidence on redlining by federal housing programs in the 1930s, *NBER Working Paper*.

Fogli, Alessandra, and Veronica Guerrieri, 2019, The end of the american dream? inequality and segregation in us cities, *NBER Working Paper*.

Galster, George C., 1984, On the measurement of metropolitan decentralization of blacks and whites, *Urban Studies* 21, 465–470.

Glaeser, Edward, and Joseph Gyourko, 2018, The economic implications of housing supply, *Journal of Economic Perspectives* 32, 3–30.

Glaeser, Edward L., 2011, Rethinking the Federal Bias Toward Homeownership, *Cityscape: A Journal of Policy Development and Research,* 5–37.

Glaeser, Edward L., and Joseph Gyourko, 2002, The Impact of Zoning on Housing Affordability, *NBER Working Paper*.

Glaeser, Edward L, Joseph Gyourko, and Raven E Saks, 2006, Urban growth and housing supply, *Journal of economic geography* 6, 71–89.

Green, R. K., and M. White, 1997, Measuring the Benefits of Homeowning: Effects on Children, *Journal of Urban Economics* 41.3, 441–461.

Gyourko, Joseph, and Raven Molloy, 2015, Regulation and housing supply, in *Handbook of regional and urban economics*, volume 5, 1289–1337 (Elsevier).

Gyourko, Joseph, Albert Saiz, and Anita Summers, 2008, A New Measure of the Local Regulatory Environment for Housing Markets: The Wharton Residential Land Use Regulatory Index, *Urban Studies* 45.3, 693–729.

Hall, Andrew, and Jesse Yoder, 2022, Does homeownership influence political behavior? Evidence from administrative data, *The Journal of Politics*.

Harriss, C. Lowell, 1951, History and Policies of the Home Owners' Loan Corporation, *H. Wolff Book Manufacturing Co., Inc.* 7–9.

Henderson, J Vernon, and Yannis M Ioannides, 1983, A model of housing tenure choice, *The American Economic Review* 73, 98–113.

Holupka, Scott, and Sandra J. Newman, 2012, The Effects of Homeownership on Children's Outcomes: Real Effects of Self Selection?, *Real Estate Economics* 40.3, 566–602.

Hsieh, Chang-Tai, and Enrico Moretti, 2019, Housing constraints and spatial misallocation, *American Economic Journal: Macroeconomics* 11, 1–39.

Iceland, John, 2004, The multigroup entropy index (also known as theil's h or the information theory index), *US Census Bureau. Retrieved July* 31, 2006.

Imbens, Guido, 2020, Potential outcome and directed acyclic graph approaches to causality: Relevance for empirical practise in economics, *Journal of Economic Literature*.

Jaffee, Dwight M., and John M. Quigley, 2007, Housing Subsidies and Homeowners: What Role for Government-Sponsored Enterprises? [with comment], *Brookings-Wharton Papers on Urban Affairs,* 103–149.

Kain, John F, and John M Quigley, 1972, Housing Market Discrimination, Home-ownership, and Savings Behavior, *The American Economic Review* 62.3, 263–277.

Kanemoto, Yoshitsugu, 1990, Contract types in the property market, *Regional Science and Urban Economics* 20, 5–22.

Krimmel, Jacob, 2021, Reclaiming local control: School finance reforms and housing supply restrictions, *FRB Working Paper*.

Kulkarni, Nirupama, and Ulrike Malmendier, 2021, Mortgage Policies and their Effects on Racial Segregation and Upward Mobility, *University of California, Berkeley Working Paper*.

Logan, Xu Zengwang, John R., and Brian Stults, 2012, Interpolating us decennial census tract data from as early as 1970 to 2010: A longitudinal tract database, *Professional Geographer* 66, 412–420.

Loutskina, Elena, and Philip E. Strahan, 2015, Financial Integration, Housing and Economic Volatility, *Journal of Financial Economics* 115.1, 25–41.

Massey, Douglas, and Nancy Deaton, 1988, The dimensions of residential segregation, *Social Forces* 2, 281–385.

Massey, Douglas, and Nancy A Denton, 1993, *American Apartheid: Segregation and the Making of the Underclass* (Harvard University Press).

Massey, Douglas S, 2015, The legacy of the 1968 fair housing act, in *Sociological Forum*, volume 30, 571–588, Wiley Online Library.

McDonald, John F, 1974, Housing Market Discrimination, Homeownership, and Savings Behavior: Comment, *The American Economic Review* 64.1, 225–229.

Menendian, Stephen, and Samir Gambhir, 2018, Racial Segregation in the San Francisco Bay Area.

Reardon, Sean, 2011, Measures of Income Segregation, *CEPA Working Papers. Stanford Center for Education Policy Analysis*.

Rothstein, Richard, 2017, *The Color of Law: A Forgotten History of How Our Government Segregated America* (Liveright Publishing).

Saiz, Albert, 2010, The geographic determinants of housing supply, *The Quarterly Journal of Economics* 125, 1253–1296.

Shertzer, Allison, Tate Twinam, and Randall P Walsh, 2016, Race, Ethnicity, and Discriminatory Zoning, *American Economic Journal: Applied Economics* 8.3, 217–246.

Shertzer, Allison, Tate Twinam, and Randall P Walsh, 2018, Zoning and the Economic Geography of Cities, *Journal of Urban Economics* 105, 20–39.

Shertzer, Allison, Tate Twinam, and Randall P Walsh, 2021, Zoning and segregation in urban economic history, *Regional Science and Urban Economics* 103652.

Shertzer, Allison, and Randall P Walsh, 2019, Racial Sorting and the Emergence of Segregation in American Cities, *The Review of Economics and Statistics* 101.3, 415–427.

Shilling, Sirmans C., J., and Jonathan Dombrow, 1991, Measuring depreciation in single-family rental and owner-occupied housing, *Journal of Housing Economics* 1, 368–383.

Theil, Henri, 1972, *Statistical Decomposition Analysis: With Applications in the Social and Administrative Sciences (Studies in Mathematical and Managerial Economics)* (North-Holland Publishing Company).

Trounstine, Jessica, 2018, *Segregation by design: Local politics and inequality in American cities* (Cambridge University Press).

Trounstine, Jessica, 2020, The Geography of Inequality: How Land Use Regulation Produces Segregation, *American Political Science Review* 114.2, 443–455.

Turner, Matthew A, Andrew Haughwout, and Wilbert Van Der Klaauw, 2014, Land use regulation and welfare, *Econometrica* 82, 1341–1403.

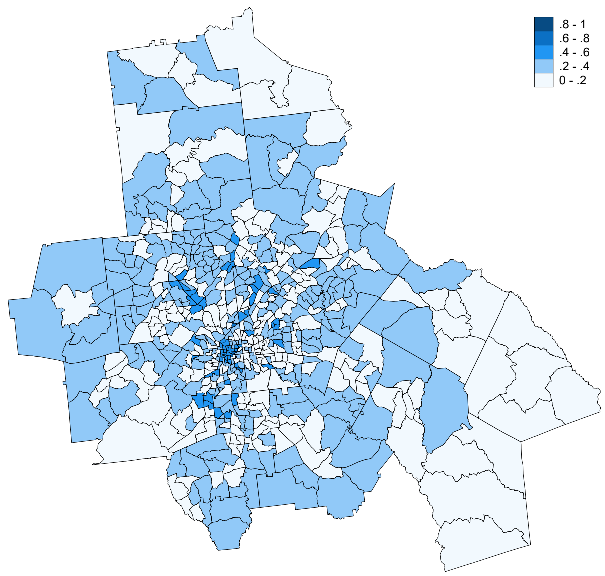
VanderWeele, Tyler, 2015, Explanation in causal inference: methods for mediation and interaction, *Oxford University Press*.

Wilson, William Julius, 1987, *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy* (University of Chicago Press).

Figure 1. Homeownership Segregation: Atlanta versus Kansas City

The figures show the heat maps depicting the homeownership segregation for Atlanta (Panel A) and Kansas City (Panel B). The absolute value of the difference of in tract-level homeownership rate relative to the same value calculated at the CZ-level. The heat maps show values in 5 ranges: 0-0.2, 0.2-0.4, 0.4-0.6, 0.6-0.8, and 0.8-1. Data is from the 2000 Census.

Panel A: Atlanta



Panel B: Kansas City

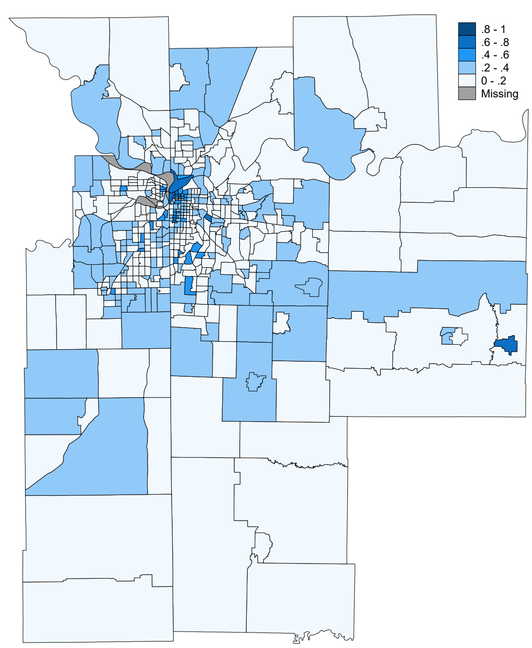
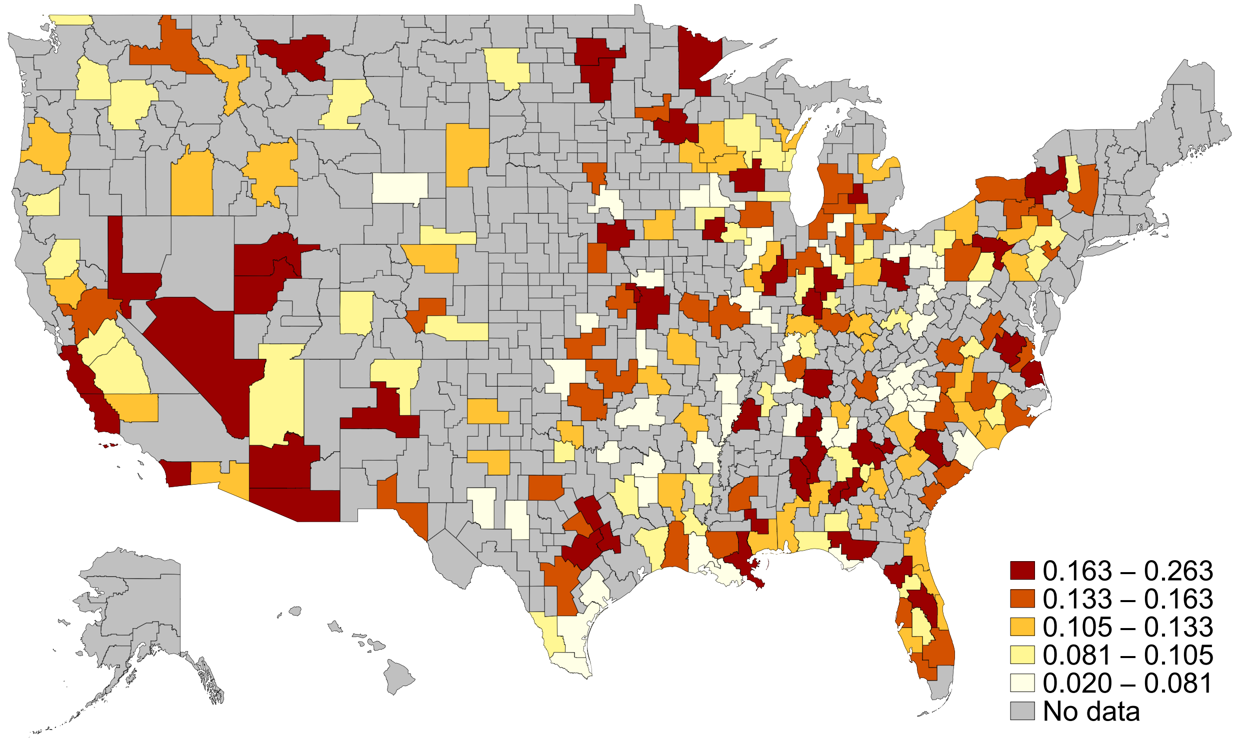


Figure 2. Map of Homeownership Segregation in 2000

The figures below show the heat maps for homeownership segregation (Panel A) and homeownership rates in 2000 (Panel B) at the CZ level, using Census 2000 data. Data are divided into quintiles as shown. Homeownership segregation is an entropy-based measure calculated at the CZ level .

Panel A: Map of homeownership segregation 2000



Panel B: Map of homeownership rates 2000

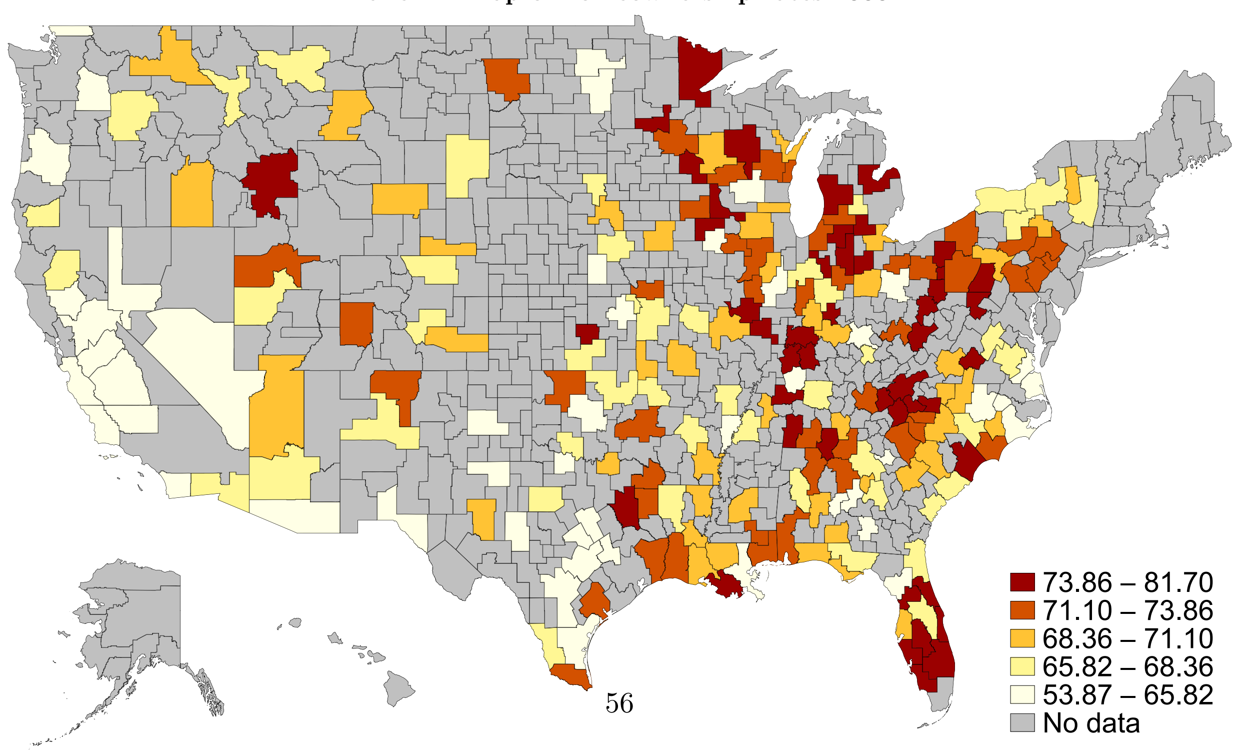
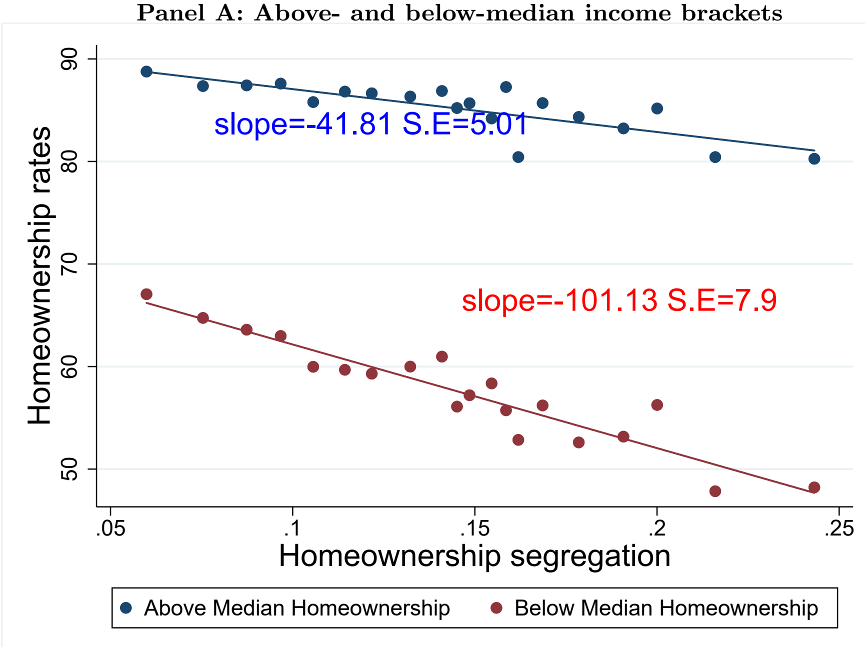


Figure 3. Homeownership Rates and Homeownership Segregation by Income

The figures below show the bin scatter plots with the linear fit between homeownership rates and homeownership segregation for different income brackets. The y-axes show the homeownership rate and the x-axes show homeownership segregation. The bin scatter plots show average of the y axis for each 5 percentile bin of the data along the x-axis. Homeownership rates in 2000 are from the 2000 Census. Homeownership segregation is an entropy-based measure calculated at the CZ level using Census 2000 data. Panel A shows the bin scatter plot for below and above median income homeownership rates against homeownership segregation. Panel B shows the homeownership rates separately for households with income less than $15,000; income between $15,000 to $25,000; income between $15,000 to $25,000; income between $25,000 to $50,000; income between $50,000 to $75,000; income between $75,000 to $100,000; and income greater than $100,000. Data is from the 2000 Census.

Panel A: Above- and below-median income brackets



Panel B: Granular income brackets

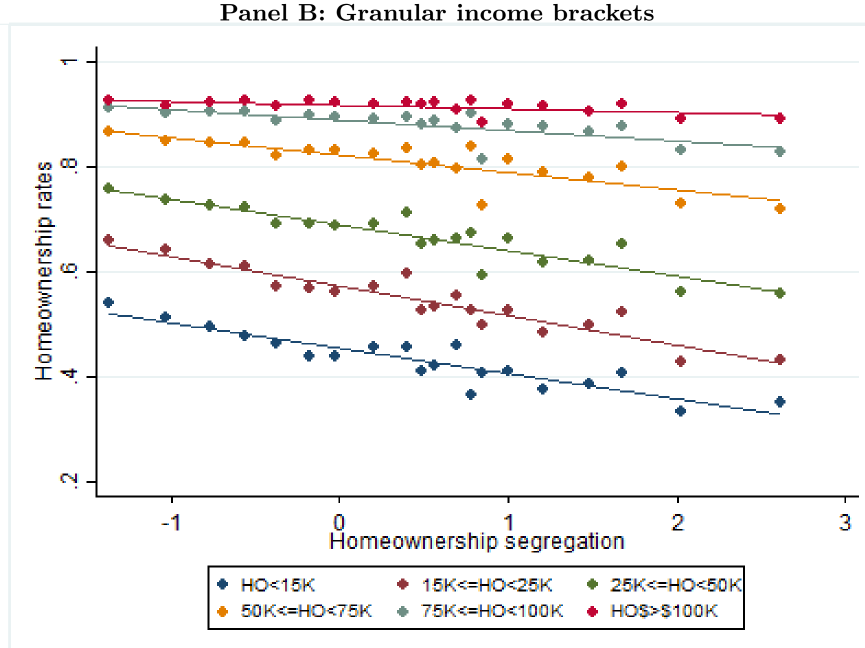


Figure 4. Time Series Homeownership Segregation

The figures below shows the time series plot of median, 25th, and 75th percentile of homeownership segregation. Homeownership segregation is an entropy-based measure similar to Theil (1972) and calculated at the CZ level using the decennial census data from the year 1970 to 2000.

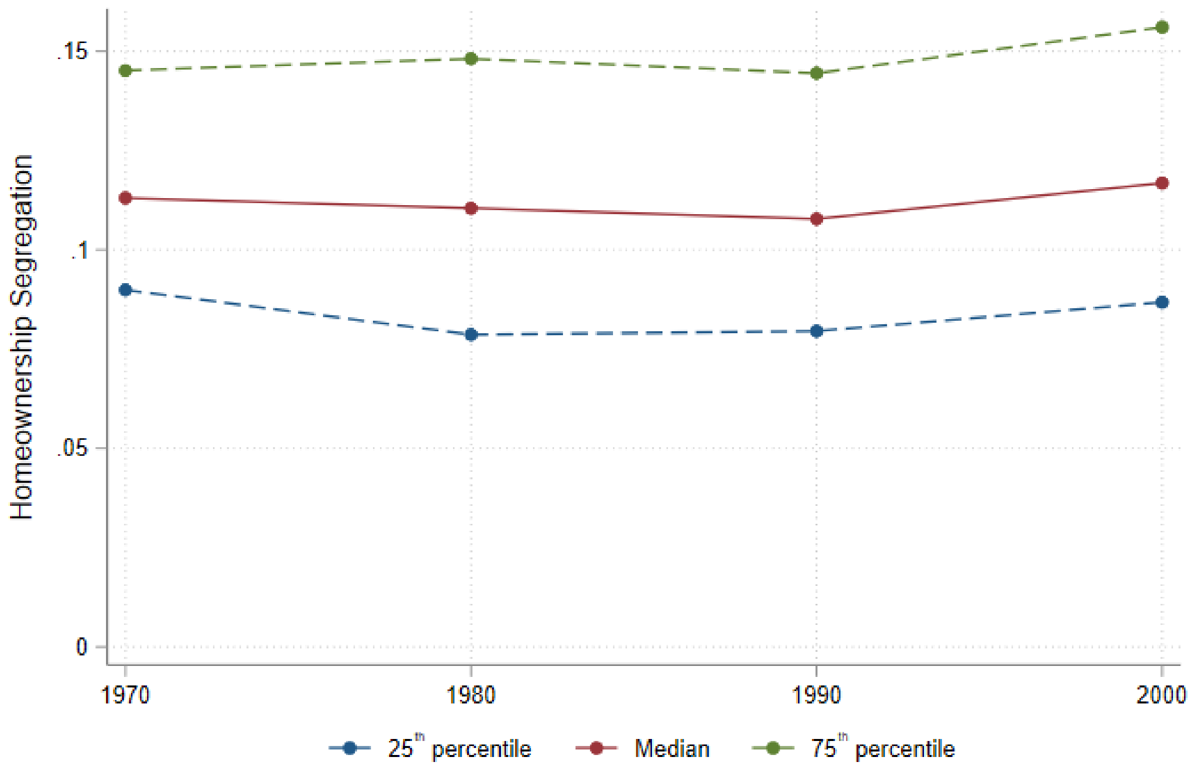
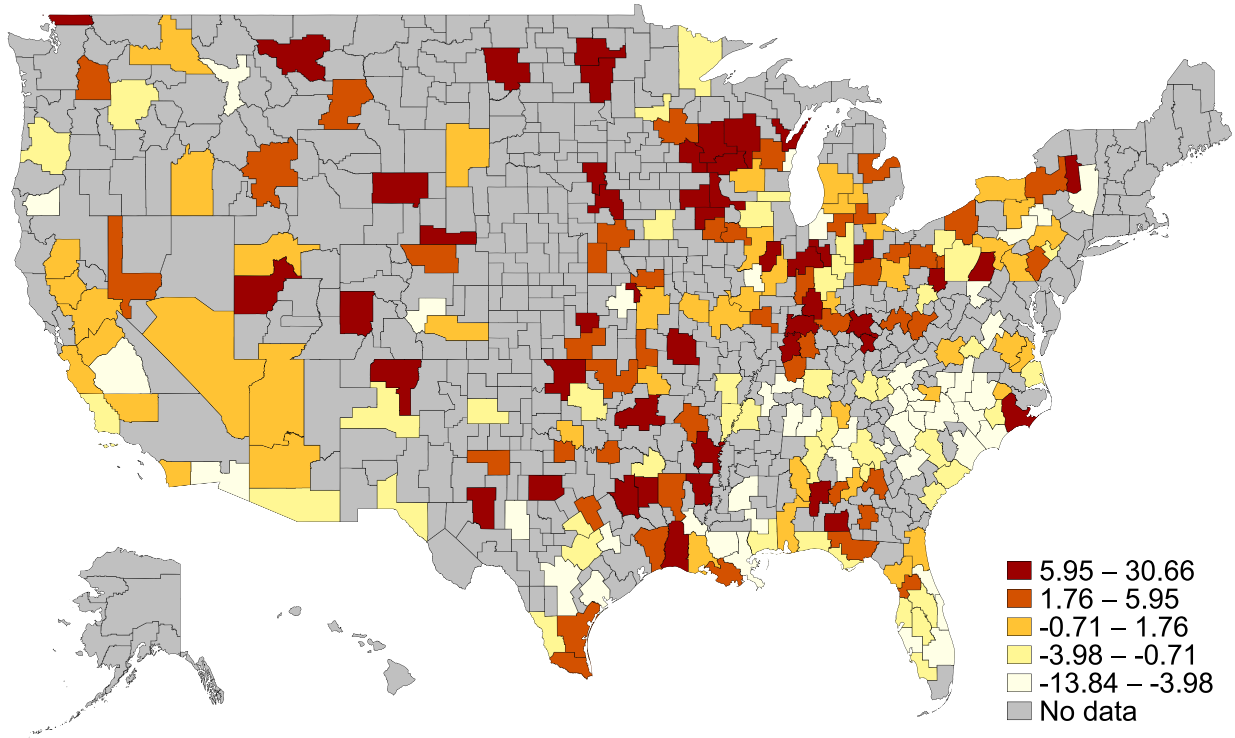


Figure 5. Map of Intergenerational Mobility

The figures below show the heat maps for the intergenerational mobility at the 25th (Panel A) and 75th percentile (Panel B) at the CZ level.Data are divided into 5 quintiles as shown. The intergenerational mobility measures from Chetty and Hendren (2018a) capture the estimated impact of one additional year of childhood in a CZ on children's household income rank when adult, with parents at the 25th percentile in Panel A (and at the 75th in Panel B) of the parents' income distribution for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data is at the CZ-level from Chetty and Hendren (2018a) and measures income from IRS tax returns for cohorts and parents of cohorts.

Panel A: 25th Percentile



Panel B: 75th Percentile

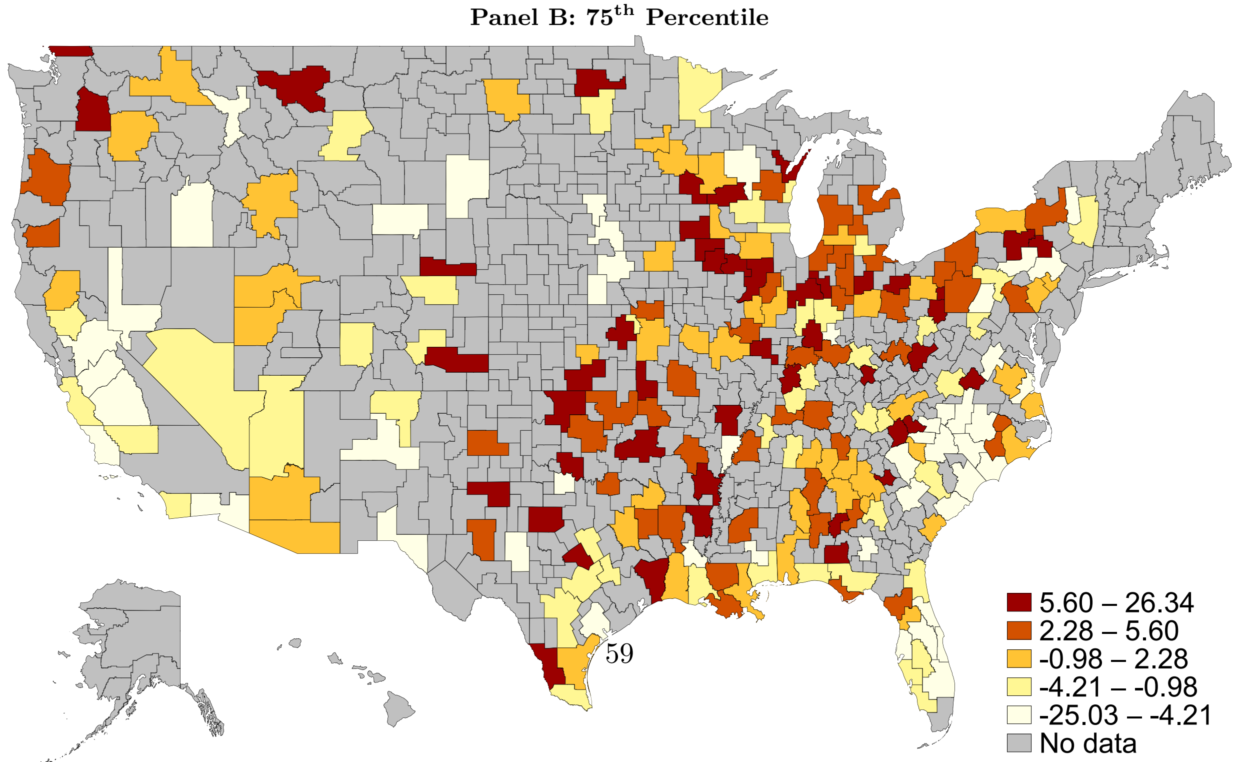
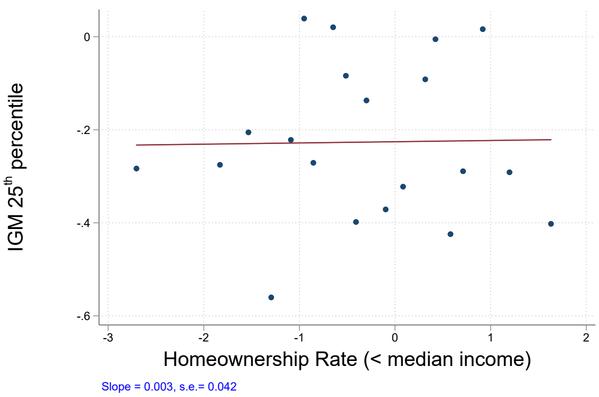
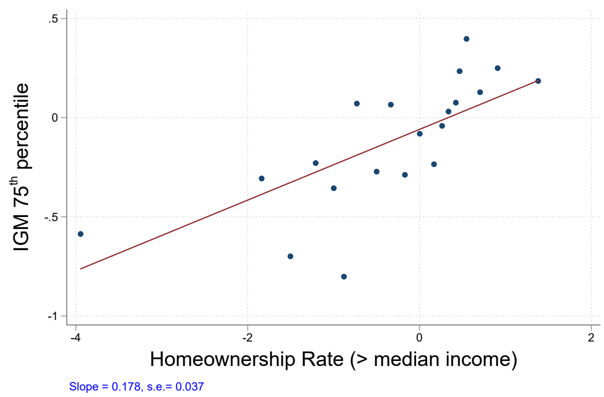


Figure 6. Homeownership Rate, Homeownership Segregation, and Intergenerational Mobility

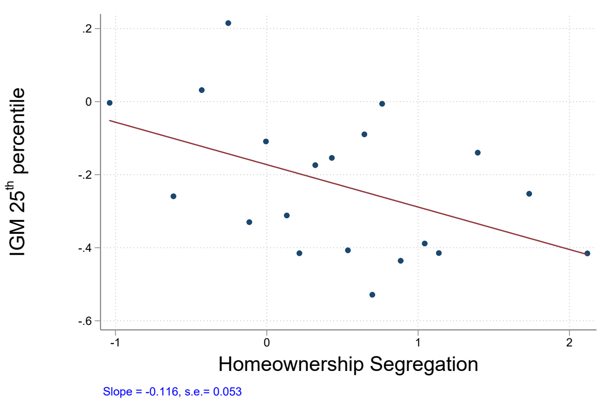
The plots below show the binscatter plots between intergenerational mobility and homeownership rates and segregation at the CZ level. The bin scatter plots show average of the y axis for each 5 percentile bin of the data along the x-axis. The causal intergenerational mobility (IGM) measure from Chetty and Hendren (2018a) is the estimated causal impact of one additional year of childhood in a CZ on children's household income rank when adult, with parents at the 25$^{\text{th}}$ percentile in panels (a) and (c) (alternatively at the 75$^{\text{th}}$ percentile in panels (b) and (d)) of the parents' income distribution for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data is at the CZ-level from Chetty and Hendren (2018a) and measures income from IRS tax returns for cohorts and parents of cohorts. Homeownership rate in panels (a) and (b), and homeownership segregation in panels (c) and (d), in 2000 on the x-axis is from the U.S. 2000 Census. Y-axis and x-axis variables are standardized (z-scored). Panels c and d include census division fixed effects and homeownership rate as of 2000. Data are weighted by the number of housing units in each CZ in 2000 in all panels.



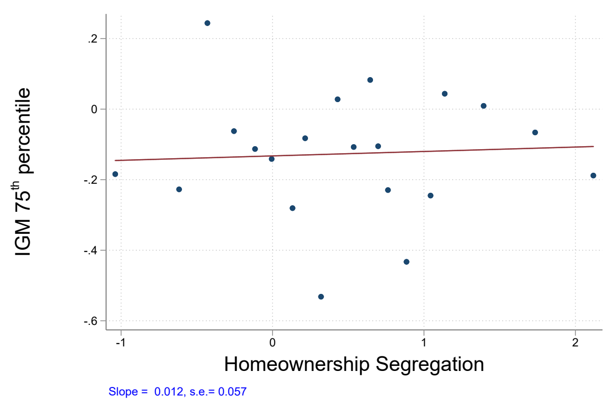
(a) **Homeownership rate, 25$^{\text{th}}$ percentile**



(b) **Homeownership rate,75$^{\text{th}}$ percentile**



(c) Homeownership segregation, 25$^{\text{th}}$ Percentile



(d) Homeownership segregation, 75$^{\text{th}}$ Percentile

Figure 7. First Stage: 1947 Interstate Highway Plan and Homeownership Segregation

The figure below presents the binscatter plots between homeownership segregation and the instrument used in our analysis. The bin scatter plots show average of the y axis for each 5 percentile bin of the data along the x-axis. Y-axis represents homeownership segregation which is an entropy-based measure based on Theil (1972) calculated at the CZ-level using 2000 Census. X-axis shows the number of planned highways in 1947, which is the standardized number of rays emanating from a commuting zone and is from Baum-Snow (2007). Y-axis and x-axis variables are standardized (z-scored). Observations are weighted by the number of housing units in each CZ in 2000. Census division fixed effects are included.

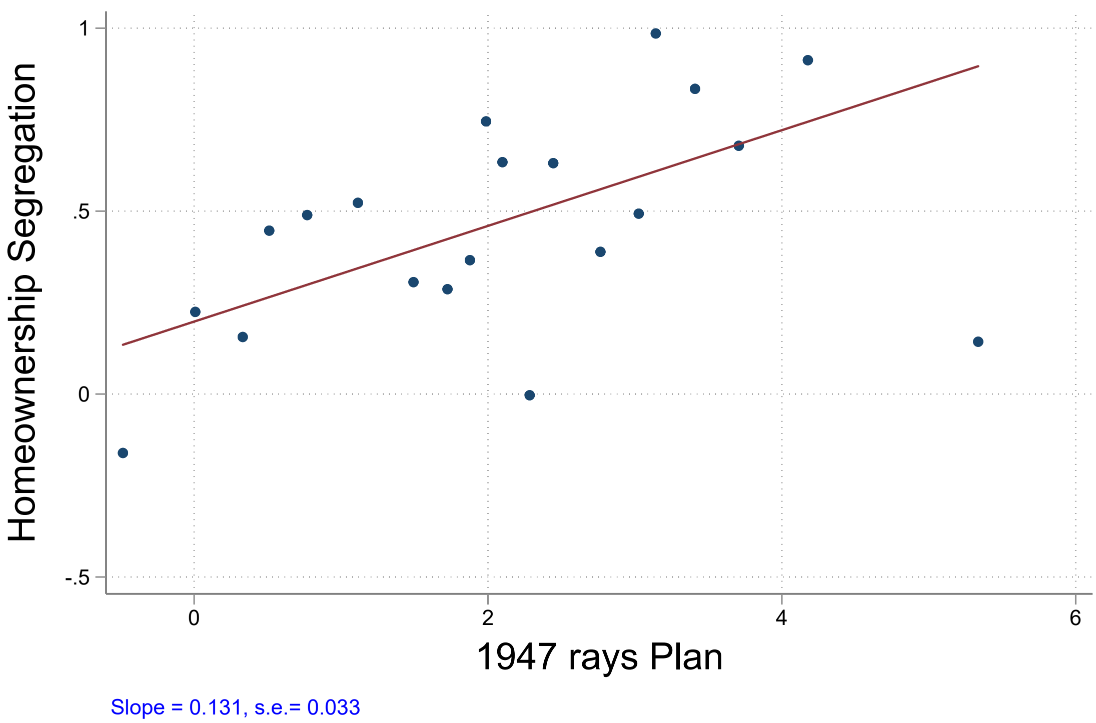


Figure 8. Time Series Lawsuits under the 1968 Fair Housing Act

The figures below shows the time series plot of the number of CZs that have received a decision under the Fair Housing Act between 1968–2000. Data is from Trounstine (2020).

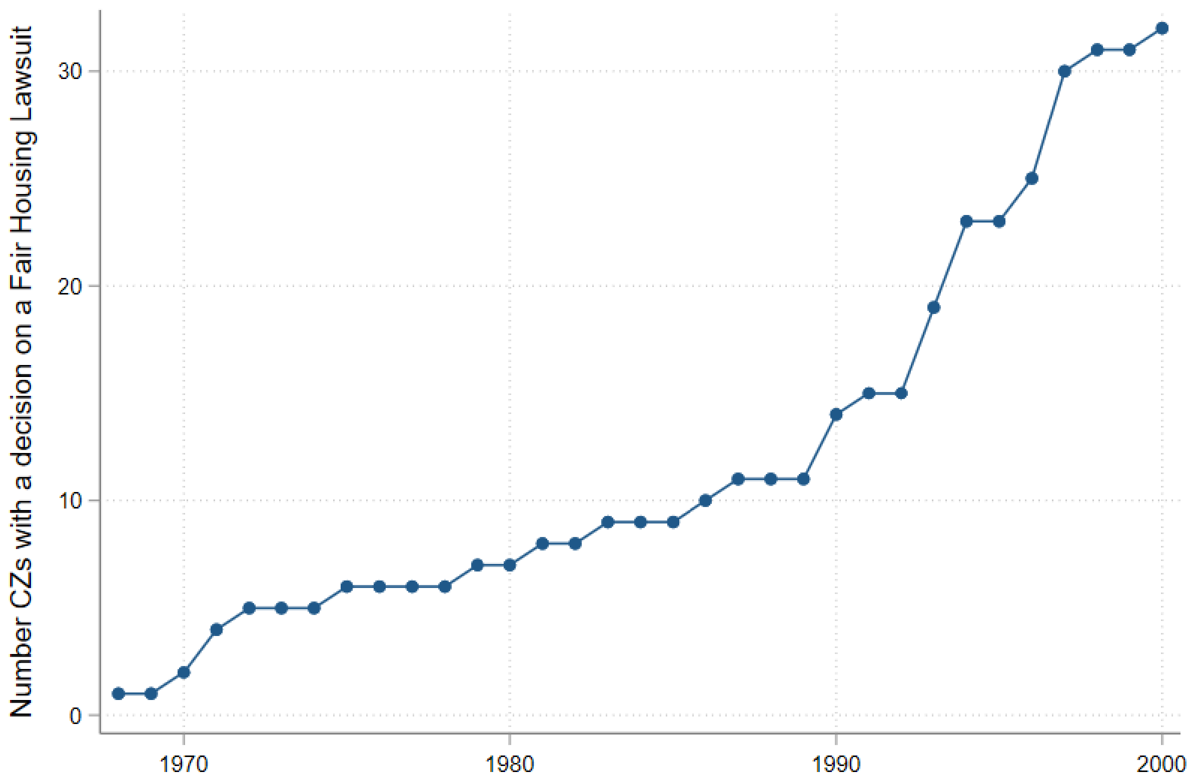


Table 1. Summary Statistics

	Mean	SD	p10	p50	p90
Homeownership (HO) rate	0.69	0.05	0.63	0.70	0.75
Below-median income HO rate	0.60	0.07	0.51	0.61	0.68
Above-median income HO rate	0.86	0.03	0.83	0.87	0.90
Homeownership segregation	0.12	0.05	0.09	0.12	0.15
Below-median income HO seg.	0.05	0.02	0.03	0.05	0.08
Above-median income HO seg.	0.08	0.03	0.04	0.08	0.13
SD HO segregation	0.14	0.03	0.10	0.14	0.19
HO dissimilarity index	0.24	0.05	0.17	0.24	0.31
% SF detached	0.68	0.06	0.60	0.68	0.75
% homeowners in SF detached	0.85	0.04	0.80	0.85	0.90
SF segregation	0.12	0.06	0.04	0.11	0.21
Median Income (in $)	34,955	7,231	27,012	33,766	44,987
% Below poverty level	13.17	4.35	8.54	12.33	18.60
Income segregation	0.07	0.03	0.03	0.06	0.10
%Black population	11.04	11.71	0.71	6.05	30.94
%White population	81.56	11.99	62.73	85.08	94.41
Racial segregation	0.18	0.08	0.08	0.17	0.28
Long commuting times	0.36	0.08	0.26	0.36	0.46
School segregation	0.17	0.15	0.01	0.14	0.37
IGM_{25}	0.07	0.34	-0.33	0.03	0.46
IGM_{75}	0.05	0.34	-0.35	0.05	0.44
ΔIGM_{25-75}	0.02	0.41	-0.38	-0.01	0.48
1947 Plan Rays	1.76	1.63	0.00	2.00	4.00
FHA lawsuit decision	0.14	0.35	0.00	0.00	1.00
Housing regulation index (2006)	-0.35	0.62	-1.11	-0.40	0.49
Housing Units	234,054	228,351	61,940	160,214	485,668
Observations	236				

Notes: This table presents the summary statistics of the main variables in our analysis. Homeownership rate is the ratio of homeowners to total renters and homeowners. Below (above) median income homeownership rate is the ratio of above (below) median income homeowners to total homeowners and renters. Percentage of single-family detached homes is the ratio of single-family detached homes to all housing structures and percentage of homeowners in single-family detached homes is the ratio of homeowners in single-family detached homes. SF segregation is the segregation of single-family detached homes (including both rental and owner-occupied units) from remaining housing structures. Homeownership, racial, income, and SF segregation are the entropy-based measures calculated at the CZ level using 2000 Census data. Above (below) median income homeownership segregation is the segregation of homeowners with above (below) median income based on the 2000 Census data. SD HO segregation is the standard deviation of tract-level homeownership rates. Dissimilarity index of homeownership is the percentage of a homeowners that would have to change residence for each tract to have the same percentage of homeowners as the CZ. CZ-level median income, percentage of people below the poverty line, percentage Black population, percentage white populations and number of housing units are from the 2000 Census. Long commuting times is the fraction of households that spend more than 15 minutes of time commuting to work based on the 2000 Census data. School segregation is measured as the exposure of students to minority groups within their schools as in Card and Rothstein (2007). Data for school quality and racial exposure of students is from National Center for Education Statistics' Common Core of Data for the fiscal year 1996–97. Intergenerational mobility (IGM) is from Chetty and Hendren (2018a) and estimates the causal impact of one additional year of childhood growing up in a CZ on children's household income rank when adult at age 26, with parents at the 25^{th} (alternatively at the 75^{th}) percentile of the parents' income distribution for cohorts born between 1980 and 1986. Data is from Chetty and Hendren (2018a) and measures incomes from IRS tax returns for cohorts and parents of cohorts. Parents' income is measured as of 1996–2000. All income data for cohorts and parents of cohorts are from IRS tax records. ΔIGM_{25-75} IGM for the 25^{th} percentile minus the IGM for the 75^{th} percentile. 1947 Plan rays is the number of rays emanating from a commuting zone in the 1947 interstate highway plan and calculated using data from Baum-Snow (2007). Fair Housing Act (FHA) lawsuit decision is an indicator for whether a CZ has had a first decision on a lawsuit under the FHA based on data from Trounstine (2020) by 2000. Housing regulation index (2006) is from Trounstine (2020) and measured as the CZ-level difference of the municipality-level minimum score of the Wharton Residential Land Use Regulatory Index from Gyourko et al. (2008) and the CZ-level value of the Gyourko et al. (2008) index.

Table 2. Homeownership Segregation and Intergenerational Mobility

Panel A: Homeownership rates

	(1)	(2)	(3)	(4)
Dep. variable:	IGM_{25}		IGM_{75}	
Below median income HO rate	0.003	0.040		
	(0.063)	(0.066)		
Above median income HO rate			0.178***	0.129**
			(0.031)	(0.058)
R-squared	0.000	0.175	0.088	0.205
N	236	236	236	236
Baseline controls	N	Y	N	Y
Type	OLS	OLS	OLS	OLS

Panel B: Homeownership segregation

	(1)	(2)	(3)
Dep. variable:	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
HO segregation	-0.127**	0.015	-0.117*
	(0.061)	(0.071)	(0.064)
R-squared	0.190	0.190	0.109
N	236	236	236
Baseline controls	Y	Y	Y
Type	OLS	OLS	OLS

Panel C: Instrumenting homeownership segregation with the 1947 Highway plan

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. variable:	HO Segregation	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
1947 Plan Rays	0.131***	-0.076***	0.022	-0.081**			
	(0.033)	(0.028)	(0.048)	(0.032)			
HO segregation					-0.580**	0.169	-0.619***
					(0.246)	(0.349)	(0.232)
R-squared	0.509	0.196	0.191	0.121	.	0.167	.
F-statistic	15.252						
N	236	236	236	236	236	236	236
Baseline controls	Y	Y	Y	Y	Y	Y	Y
Type	First stage	RF	RF	RF	IV	IV	IV

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table shows estimates of homeownership rates (Panel A) and homeownership segregation (Panel B and C) on intergenerational mobility measure (IGM). Homeownership segregation (HO Segregation) and homeownership rates are as of 2000. Dependent variables are as indicated. OLS, first stage, reduced form (RF), and instrumented variables (2SLS IV) are as shown. In Panel C, homeownership segregation is instrumented with planned rays in the 1947 interstate highway plan based on data from Baum-Snow (2007). Baseline controls include share below poverty line in 2000 in all panels and homeownership rate in 2000 in Panels B and C. All columns except 1 and 3 in Panel A include census division fixed effects Observations are weighted by the number of housing units in each CZ in 2000. The instrument, IGM, homeownership rate, and homeownership segregation measures have been standardized (z-scored). Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Table 3. Homeownership Segregation of Rich versus Poor Homeowners

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. variable:		IGM_{25}		Segregation of		IGM_{25}	
				Rich HO	Poor HO		
Segregation of Rich HO	-0.197***		-0.215***			-0.388***	
	(0.060)		(0.075)			(0.118)	
Segregation of Poor HO		-0.073	0.041				-1.804
		(0.054)	(0.071)				(1.599)
1947 Plan Rays				0.195***	0.042		
				(0.030)	(0.041)		
R-squared	0.215	0.178	0.216	0.611	0.457	0.175	.
F-statistic				41.231	1.066		
N	236	236	236	236	236	236	236
Baseline controls	Y	Y	Y	Y	Y	Y	Y

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents the OLS (columns 1,2,3), first stage (columns 4,5) and 2SLS IV (columns 6,7) estimates of homeownership segregation on intergenerational mobility using alternative measures of homeownership segregation. Intergenerational mobility measure (IGM) from Chetty and Hendren (2018a) is the estimated causal impact of one additional year of childhood in a CZ on children's household income rank when adult at age 26 for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Income data is from IRS tax returns for cohorts and parents of cohorts. The dependent variable, IGM_{25}, is defined as the intergenerational mobility of children with parents at the 25^{th} percentile. Homeownership segregation is the entropy-based measure similar to Theil (1972) and calculated using the 2000 Census. Segregation of rich homeowners is the segregation measure of the rich homeowners from everyone else (poor homeowners and all renters) and the segregation of poor homeowners is the segregation measure of the poor homeowners from everyone else (rich homeowners and all renters). IGM and homeownership segregation measures have been standardized (z-scored) for ease of interpretation. In columns 4, 5, 6, and 7 homeownership segregation is instrumented by the standardized number of rays emanating from a commuting zone in the 1947 interstate highway plan, calculated using data from Baum-Snow (2007). Control variables included are CZ-level homeownership rate and share of people below the poverty line. Data is from the 2000 Census. All regressions include census division fixed effects. Observations are weighted by the number of housing units in each CZ in 2000. Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Table 4. Historical Homeownership Segregation and Intergenerational Mobility

	(1)	(2)	(3)	(4)
Dep. variable		IGM_{25}		
HO Segregation in	1970	1980	1990	2000
		First Stage		
1947 Plan Rays	0.140**	0.176***	0.129***	0.131***
	(0.054)	(0.035)	(0.037)	(0.033)
R-squared	0.405	0.436	0.505	0.509
F-Stat	6.779	24.771	11.921	15.252
		Ordinary Least Squares		
HO Segregation	-0.032	-0.131**	-0.034	-0.127**
	(0.056)	(0.062)	(0.063)	(0.061)
R-squared	0.201	0.201	0.184	0.190
		Reduced Form		
1947 Plan Rays	-0.059*	-0.075***	-0.062**	-0.076***
	(0.031)	(0.027)	(0.028)	(0.028)
R-squared	0.214	0.203	0.199	0.196
		Two-stage least squares		
HO Segregation	-0.420	-0.428***	-0.484**	-0.580**
	(0.265)	(0.159)	(0.236)	(0.246)
R-squared	.	0.083	.	0.121
N	193	236	236	236
Baseline controls	Y	Y	Y	Y

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents the estimates for the impact of homeownership segregation on children's intergenerational mobility for the first stage (Panel A), OLS (Panel B), Reduced form/RF (Panel C) and 2SLS IV (Panel D). Panel A shows the first stage with homeownership segregation in each decade instrumented by number of rays in a CZ in the 1947 interstate highway from Baum-Snow (2007). Homeownership segregation for each decade is an entropy-based measure as in Theil (1972). The dependent variable in panels B, C, and D is the intergenerational mobility measure (IGM) from Chetty and Hendren (2018a) and is the estimated causal impact of one additional year of childhood in a CZ on children's household income rank when adult at age 26 at the 25^{th} percentile of the income distribution for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. All columns include the control variables homeownership rate and share of people below the poverty line from each Decennial Census and census division fixed effects. Observations are weighted by the number of housing units in each CZ.The instrument, IGM_{25}, and homeownership segregation measures have been standardized (z-scored). Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Table 5. The Role of Housing Restrictiveness

	(1)	(2)	(3)	(4)
Dep. variable	Housing Regulation Index, 2006			
HO Segregation as of	1970	1980	1990	2000
	First Stage			
1947 Plan Rays	0.140**	0.176***	0.129***	0.153***
	(0.054)	(0.035)	(0.037)	(0.040)
R-squared	0.405	0.436	0.505	0.464
F-Stat	6.779	24.771	11.921	14.747
	Ordinary Least Squares			
HO Segregation	0.114***	0.173***	0.124***	0.167***
	(0.033)	(0.034)	(0.040)	(0.022)
R-squared	0.194	0.237	0.220	0.248
	Reduced Form			
1947 Plan Rays	0.103***	0.111***	0.097***	0.104***
	(0.023)	(0.021)	(0.022)	(0.021)
R-squared	0.275	0.287	0.299	0.290
	Two-stage least squares			
HO Segregation	0.761**	0.585***	0.653***	0.619***
	(0.305)	(0.146)	(0.242)	(0.211)
R-squared	.	.	.	.
N	173	198	198	198
Baseline controls	Y	Y	Y	Y

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table relates homeownership segregation to housing restrictiveness. The top panel shows the first stage with homeownership segregation for 1970–2000 in columns (1)–(4) instrumented with the 1947 interstate highway plan rays provided by Baum-Snow (2007). Homeownership segregation for 1970–2000 in columns 1–4 is the entropy-based measure based on Theil (1972) and standardized (z-scored). Housing Regulation Index as of 2006 is the dependent variable in the bottom 3 panels and presents the OLS, reduced forms, and two-stage least squares estimates as indicated. Housing regulation index (2006) is from Trounstine (2020) and measured as the CZ-level difference of the municipality-level minimum score of the Wharton Residential Land Use Regulatory Index from Gyourko et al. (2008) and the CZ-level value of the index. Control variables included are CZ-level homeownership rate and the share of people below the poverty line in each decade. All columns include census division fixed effects. Observations are weighted by the number of housing units in each CZ. Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Table 6. Homeownership Segregation and Fair Housing Act Lawsuits

	(1)	(2)	(3)
Dep. variable	Indicator for Fair Housing Lawsuit Decision by		
	1980	1990	2000
HO Segregation as of	1970	1980	1990
	First Stage		
1947 Plan Rays	0.140**	0.176***	0.129***
	(0.054)	(0.035)	(0.037)
R-squared	0.408	0.436	0.505
F-Stat	6.779	24.771	11.921
	Ordinary Least Squares		
HO Segregation	0.017	0.068	0.092*
	(0.020)	(0.047)	(0.048)
R-squared	0.159	0.116	0.246
	Reduced Form		
1947 Plan Rays	0.030	0.062**	0.074***
	(0.025)	(0.025)	(0.021)
R-squared	0.177	0.161	0.281
	Two-stage least squares		
HO Segregation	0.209	0.357**	0.574***
	(0.189)	(0.154)	(0.186)
R-squared	.	.	.
N	192	235	235
Baseline controls	Y	Y	Y

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents the first stage (top panel), OLS (second panel), Reduced Form (third panel) and 2SLS IV (bottom panel) estimates. In the top panel, homeownership segregation is instrumented in the column (1)-(4) for the years 1970-2000 respectively, using the 1947 interstate highway plan rays provided by Baum-Snow (2007). The 1947 interstate highway plan is the standardized number of rays emanating from a commuting zone. Homeownership segregation in 1970, 1980, and 1990 in columns 1–3 is an entropy-based measure as in Theil (1972) and standardized (z-scored). In the remaining panels, the explanatory variable is a binary indicator for whether a CZ has had a first decision on a Fair Housing lawsuit as of 1980 in column (1), 1990 in column (2), and 2000 in column (3). Data on FHA lawsuits is from Trounstine (2020) at the CZ-level. Control variables included are CZ-level and homeownership rate and the share of people below the poverty line. All columns include census division fixed effects. Observations are weighted by the number of housing units in each CZ. Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Table 7. Channels:
Mediating Effects of Income, Racial, and School Segregation, and Commuting Times

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep. variable:	Income Segregation			Racial Segregation			School Segregation			Long commuting times		
HO Seg.	0.716***		1.517***	0.466***		1.774***	0.621***		2.057***	0.549***		1.840***
	(0.073)		(0.361)	(0.131)		(0.481)	(0.122)		(0.434)	(0.072)		(0.401)
1947 Plan		0.342***			0.400***			0.458***			0.414***	
		(0.072)			(0.092)			(0.084)			(0.058)	
R-squared	0.696	0.537	0.374	0.275	0.299	.	0.349	0.335	.	0.528	0.520	.
N	236	236	236	236	236	236	235	235	235	236	236	236
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	RF	2SLS IV	OLS	RF	2SLS IV	OLS	RF	2SLS IV	OLS	RF	2SLS IV

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents the OLS, Reduced Form (RF) and 2 SLS IV estimates of the impact of homeownership segregation on four measures– income segregation, racial segregation, school segregation, and long commuting time. Homeownership segregation is instrumented using the 1947 interstate highway plan rays provided by Baum-Snow (2007). Homeownership, racial, and income segregation are the entropy-based measures as in Theil (1972) and calculated at the CZ level using 2000 Census data. School segregation is measured as the exposure of students to minority groups within their schools as in Card and Rothstein (2007). Data for school quality and racial exposure of students is from National Center for Education Statistics' Common Core of Data for the fiscal year 1996–97. Long commuting times is the fraction of households that spend more than 15 minutes of time commuting to work based on the 2000 Census data. Control variables included are CZ-level homeownership rate and the share of people below the poverty line in 2000. All columns include census division fixed effects. Observations are weighted by the number of housing units in each CZ. The instrument, homeownership segregation, and all dependent variables have been standardized (z-scored). Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Table 8. Establishing the Homeownership Channel

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. variable:	HO segregation	IGM$_{25}$	SF detached segregation	IGM$_{25}$	SF detached Segregation	IGM$_{25}$
1947 Plan	-0.137*		0.240***		-0.098	
	(0.071)		(0.061)		(0.079)	
Δ Ease in mortgage financing$_{1970-2000,CZ}$ * 1947 Plan Rays	0.380***				0.340***	
	(0.088)				(0.120)	
Δ Ease in mortgage financing$_{1970-2000,CZ}$	0.554***				0.654***	
	(0.149)				(0.137)	
HO Seg.		-0.438**		-0.406**		-0.421***
		(0.179)		(0.171)		(0.160)
R-squared	0.555	0.086	0.509	0.067	0.546	0.055
F-statistic	17.959		15.593		15.956	
N	236	236	236	236	236	236
Baseline controls	Y	Y	Y	Y	Y	Y
Type	First stage	2SLS IV	First stage	2SLS IV	First stage	2SLS IV

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents the first stage and 2 SLS IV estimates of the impact of homeownership segregation on children's intergenerational mobility in columns 1–2 and the impact of the segregation of single-family detached units on children's intergenerational mobility in columns 3–6. In column 3–4, segregation of single-family detached units is instrumented with the number of rays in a CZ in the 1947 interstate highway from Baum-Snow (2007). In Column 1 and 5 the respective segregation measure is instrumented by the highway instrument, ΔEase in mortgage financing$_{1970-2000,CZ}$, and the interaction of the two terms. ΔEase in mortgage financing$_{1970-2000,CZ}$ is 1 for above median values of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1970–2000. Column 1, 3, and 5 show the respective first stages. The 2SLS IV estimates are presented in column 2, 4, and 6 with the dependent variable intergenerational mobility (IGM) from Chetty and Hendren (2018a). IGM is the estimated causal impact of one additional year of childhood in a CZ on children's household income rank when adult at age 26 at the 25th percentile of the income distribution for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. All columns include the control variables homeownership rate and share of people below the poverty line from each Decennial Census and census division fixed effects. Observations are weighted by the number of housing units in each CZ. The highway instrument, IGM$_{25}$, and homeownership segregation measures have been standardized (z-scored). Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Online Appendix

Figure A.1. Time Series Homeownership Segregation: Matched tracts

The figures below shows the time series plot of median, 25^{th}, and 75^{th} percentile of homeownership segregation. Homeownership segregation is an entropy-based measure similar to Theil (1972) and calculated at the CZ level using the decennial census data from the year 1970 to 2000. In this figure, we use match the tracts across decades to the 2010 tract definitions.

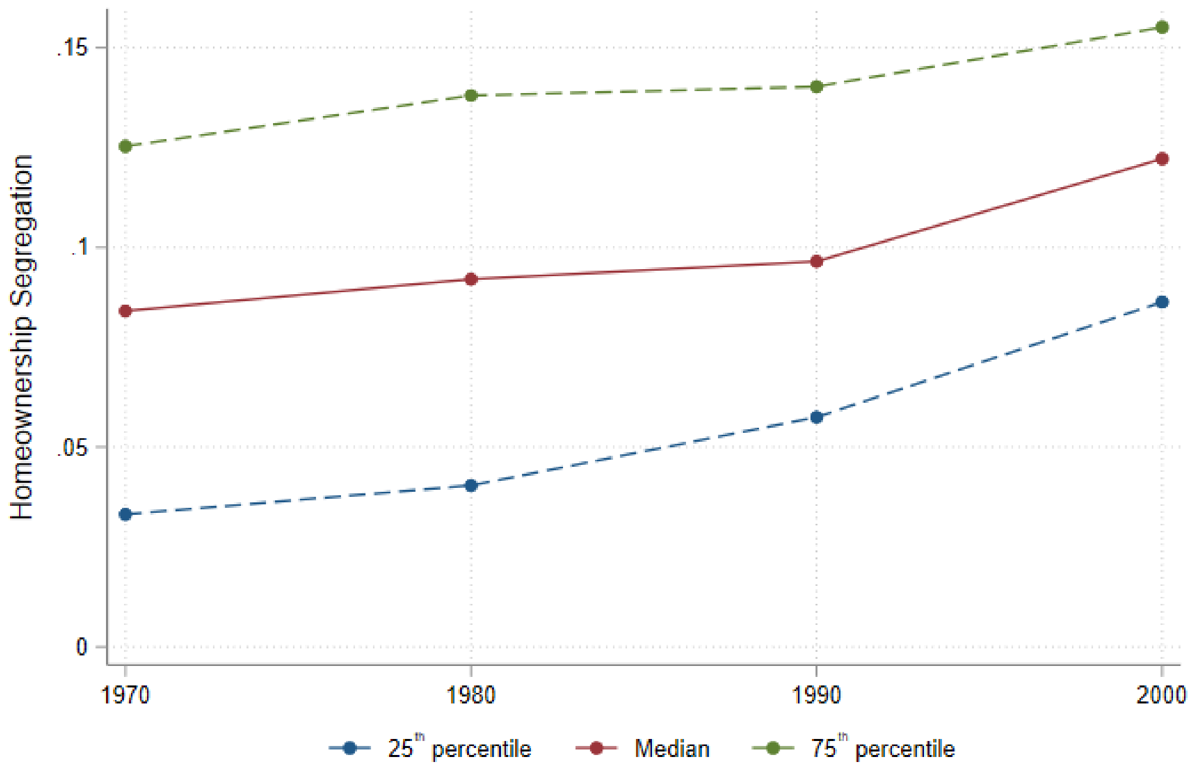
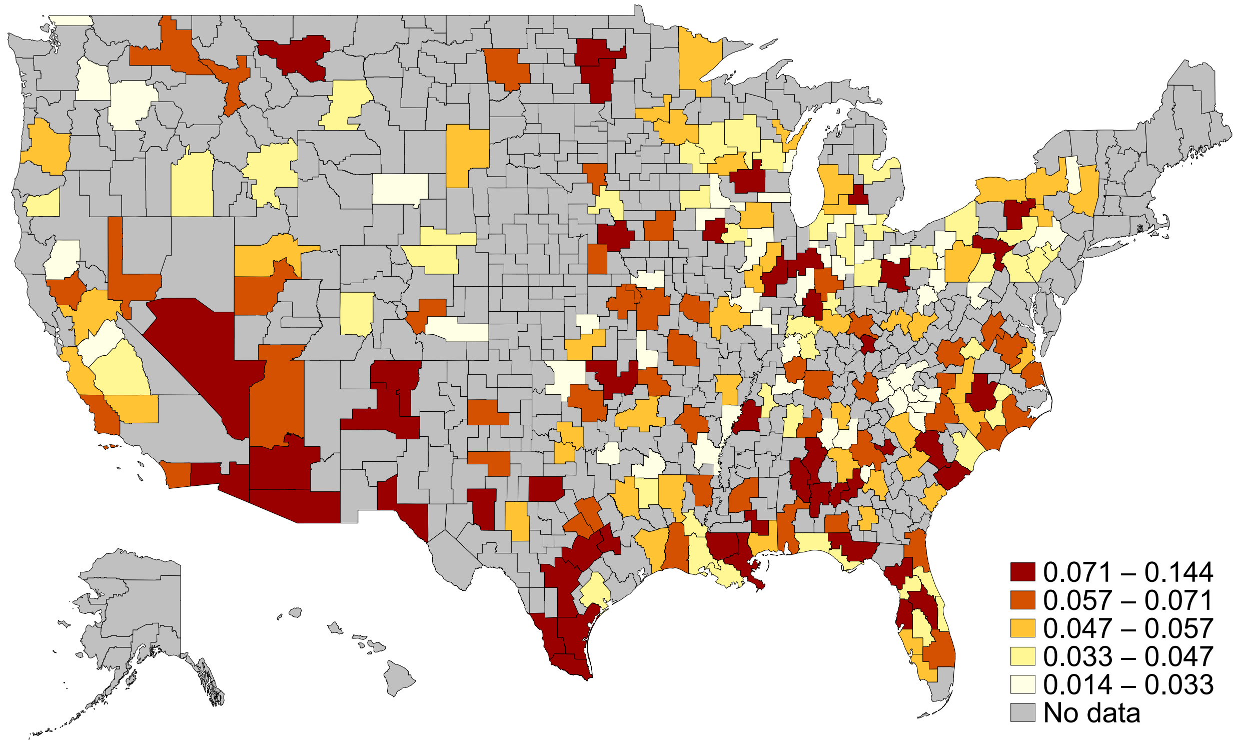


Figure A.2. Map of Above- and Below-Median Income Homeownership Segregation in 2000

The figures below show the heat maps for below-median income homeownership segregation (Panel A) and above-median income homeownership rates in 2000 (Panel B) at the CZ level, using Census 2000 data. Below (above) median income segregation measures the segregation of the below (above) median income homeowners relative to remaining homeowners and renters using an entropy-based measure and is calculated at the CZ level. Data are divided into quintiles as shown.

Panel A: Below-median income homeownership segregation



Panel B: Above-median income homeownership segregation

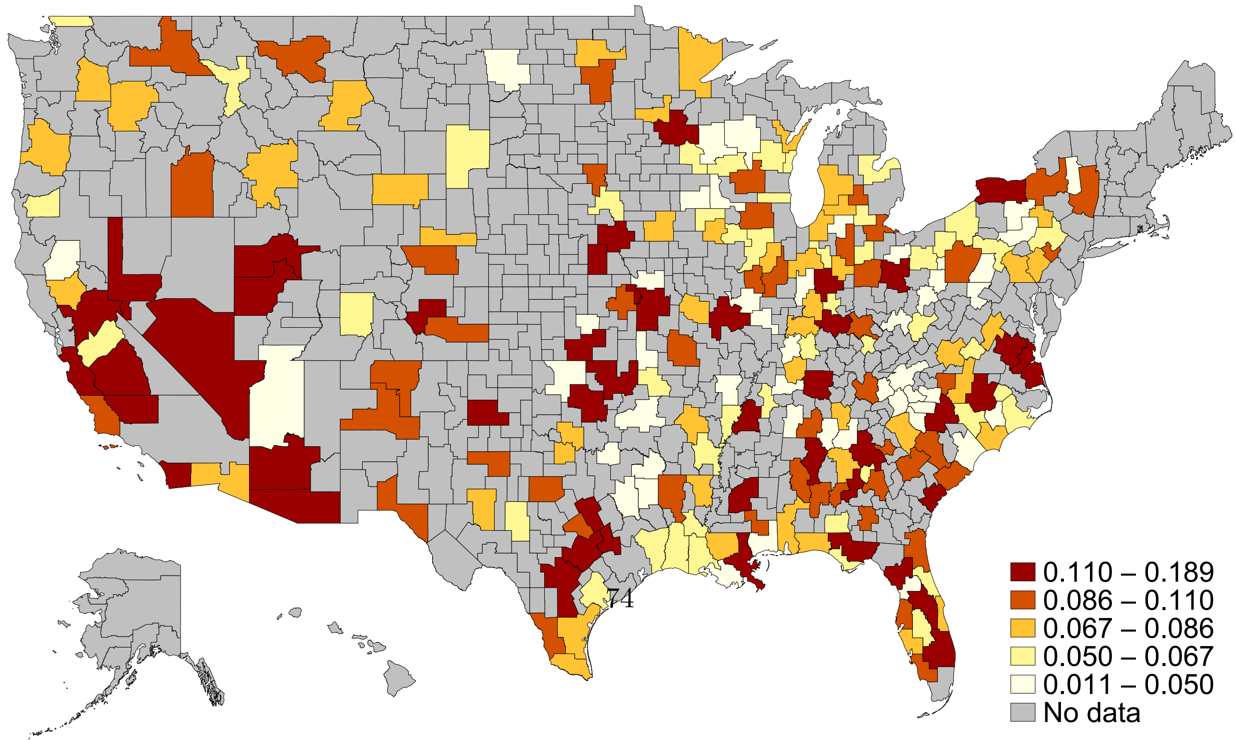
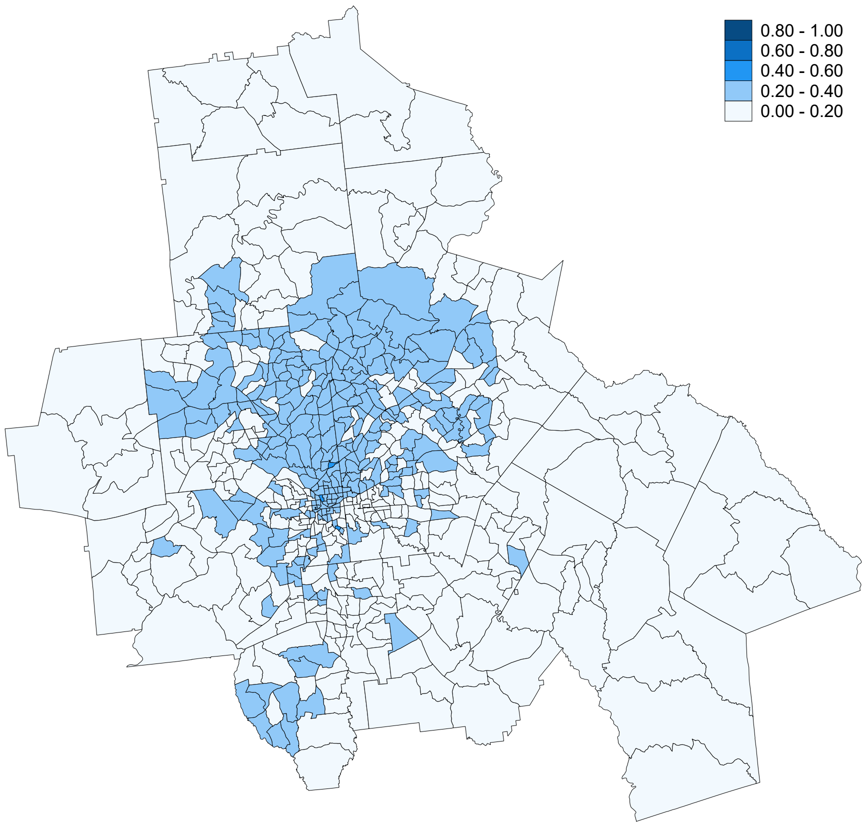


Figure A.3. Segregation of Rich and Poor Homeowners: Atlanta

The figures show the heat maps of the below- and above-median income homeowners for Atlanta. Panel A shows the absolute value of the difference of the fraction of below-median income homeowners (relative to all homeowners and renters) at the tract-level minus the same value calculated at the CZ-level. Panel B shows the absolute value of the difference of the fraction of above-median income homeowners (relative to all homeowners and renters) at the tract-level relative to the same value calculated at the CZ-level. The heat maps show values in 5 ranges: 0-0.2, 0.2-0.4, 0.4-0.6, 0.6-0.8, and 0.8-1. Data is from the 2000 Census.

Panel A: Below-median income homeowners



Panel B: Above-median income homeowners

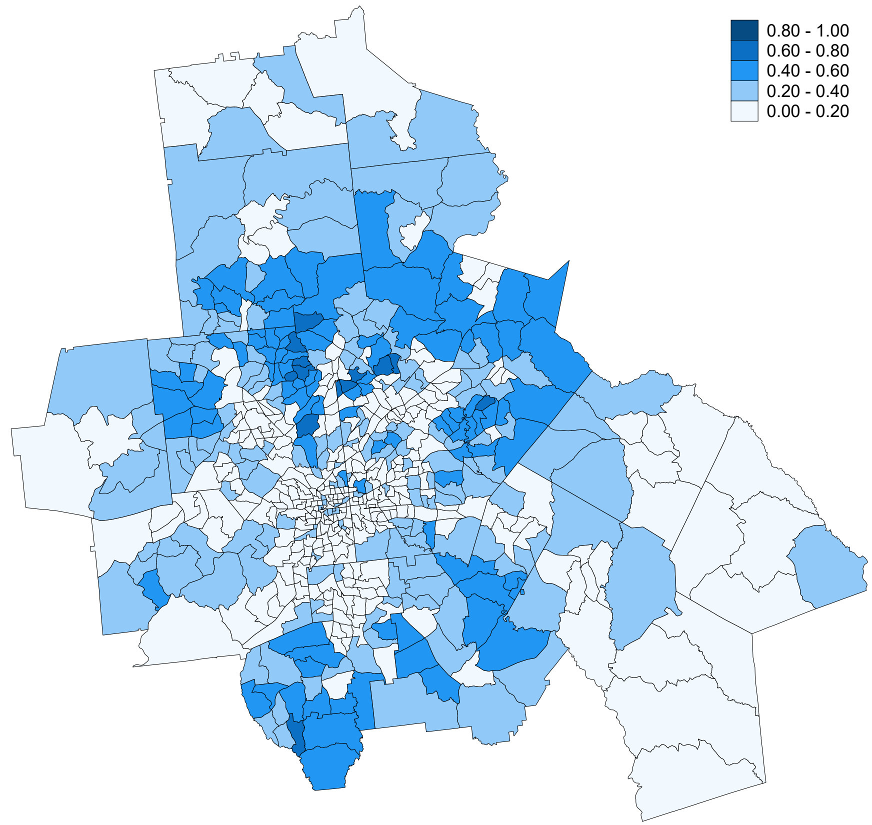


Table A.1. Summary Statistics for Additional Variables

	Mean	SD	p10	p50	p90
Correlational IGM_{25}	44.55	4.08	39.31	44.50	50.57
Correlational IGM_{75}	58.24	2.79	54.54	58.12	61.95
Correlational ΔIGM_{25-75}	-13.69	3.05	-17.30	-14.20	-8.98
Fraction single mothers	0.05	0.01	0.03	0.04	0.06
Percentage Divorced	0.21	0.02	0.18	0.21	0.24
Median monthly rent	553	122	426	533	696
Median House value	128,662	44,805	90,821	119,251	169,758
Unemployment Rate	0.05	0.01	0.03	0.05	0.06
High-school dropout rates	0.03	1.02	-1.06	-0.11	1.42
Violent crime per capita ('000s)	1.79	0.96	0.87	1.60	3.21
Observations	217				

Notes: This table shows summary statistics for remaining variables used in our analysis. The correlational IGM is the calculated using the permanent residents from Chetty and Hendren (2018a) and measures the average household income rank of children when they are 26 years for children from the 1980–1988 birth cohort with parents at the 25^{th} (75^{th}) percentile of the national income distribution as measures between 1996–2000. Correlational ΔIGM_{25-75} is the correlational IGM_{25} minus correlational IGM_{75}. Fraction of children with single mothers, fraction of adults divorced, median monthly gross rent, median house price value, and unemployment rate are from the 2000 Census. High school dropout rate is the residual from a regression of household income per capita based on the National Center for Education Statistics' Common Core of Data for 2000-2001 and from Chetty et al. (2015). Violent crime rate is the number of arrests for serious violent crimes per 1000 capita from Uniform Crime Reports.

Table A.2. Correlates of Homeownership Segregation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. variable:	Homeownership segregation								
Poor share	-0.277***								
	(0.091)								
% Single mothers		0.041							
		(0.115)							
Percentage Divorced			-0.576***						
			(0.119)						
Median monthly rent				0.465***					
				(0.158)					
Median House value					0.258*				
					(0.132)				
Unemployment Rate						-0.434***			
						(0.097)			
% Black population							0.178*		
							(0.103)		
High-school dropout rates								0.164	
								(0.105)	
Violent crime									0.035
									(0.094)
R-squared	0.065	0.001	0.301	0.350	0.136	0.177	0.027	0.023	0.001
N	236	236	236	236	236	236	236	173	201

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table shows the correlates of homeownership segregation. Homeownership segregation is the entropy-based measure calculated at the CZ level using 2000 Census data. Poor share (percentage of people below the poverty line), fraction of children with single mothers, fraction of adults divorced, median monthly gross rent, median house price value, unemployment rate, and the percentage of Black population are from the 2000 Census.High school dropout rate is the residual from a regression of household income per capita based on the National Center for Education Statistics' Common Core of Data for 2000-2001 and from Chetty et al. (2015). Violent crime rate is the number of arrests for serious violent crimes per 1000 capita from Uniform Crime Reports. In each column, homeownership segregation is the dependent variable and regressed on each of the variables indicated. All variables are standardized (z-scored).

Table A.3. Isolating Selection Effects:
Homeownership Segregation and Permanent Residents' Intergenerational Mobility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. variable:	Correlational Intergenerational Mobility measure								
	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
HO segregation	0.002	-0.473	-0.117*				-3.327	-3.051*	0.276
	(0.585)	(0.320)	(0.064)				(3.083)	(1.773)	(1.478)
1947 Plan Rays				-0.435	-0.399	0.036			
				(0.412)	(0.243)	(0.199)			
R-squared	0.367	0.303	0.109	0.376	0.315	0.488	0.219	0.095	0.476
N	236	236	236	236	236	236	236	236	236
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	RF	RF	RF	IV	IV	IV

Notes: This table presents the OLS (columns 1–3), Reduced Form/RF (columns 4–6) and the 2SLS IV estimates (columns 7–9) of the impact of homeownership segregation on the correlational intergenerational mobility. The correlational intergenerational mobility is from Chetty and Hendren (2018a) and measures the average household income rank of children when they are 26 years for children from the 1980–1988 birth cohort with parents at the 25^{th} (75^{th}) percentile of the national income distribution as measures between 1996–2000. Correlational ΔIGM_{25-75} is corresponding IGM for parents at the 25^{th} percentile minus IGM for the 75^{th} percentile. The dependent variable is the correlational intergenerational mobility measure for children at the 25^{th} (columns 1, 5 and 8), 75^{th} (columns 2, 6, and 9), the relative difference between the 25^{th} percentile and the 75^{th} percentile (columns 3,7 and 10) of the parents' income distribution. Homeownership segregation is instrumented using the 1947 interstate highway plan rays provided by Baum-Snow (2007). Correlational IGM, homeownership segregation, and the instrument have been standardized (z-scored) for ease of interpretation. Control variables included are CZ-level homeownership rate and share of people below the poverty line. Data is from the 2000 Census. All regressions include census division fixed effects. Observations are weighted by the number of housing units in each CZ in 2000. Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Table A.4. Robustness to Including Tracts with Households More Likely to Become Homeowners

Panel A: Excluding tracts with top decile of population < 25 years of age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep. Variable	IGM_{25}	IGM_{75}	Δ IGM_{25-75}	HO Segregation	IGM_{25}	IGM_{75}	Δ IGM_{25-75}	IGM_{25}	IGM_{75}	Δ IGM_{25-75}
1947 Plan				0.275^{***}	-0.113^{***}	0.029	-0.117^{**}			
				(0.042)	(0.037)	(0.074)	(0.050)			
HO Segregation	-0.178^{**}	-0.042	-0.112					-0.410^{***}	0.105	-0.426^{***}
	(0.072)	(0.086)	(0.069)					(0.122)	(0.256)	(0.164)
No. of Obs.	236	236	236	236	236	236	236	236	236	236
R-squared	0.251	0.210	0.112	0.411	0.241	0.210	0.124	0.196	0.190	0.008
F-stat				11.01						
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV

Panel B: Excluding tracts with above median of population > 24 years of age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep. Variable	IGM_{25}	IGM_{75}	Δ IGM_{25-75}	HO Segregation	IGM_{25}	IGM_{75}	Δ IGM_{25-75}	IGM_{25}	IGM_{75}	Δ IGM_{25-75}
1947 Plan				0.324^{***}	-0.113^{***}	0.029	-0.117^{**}			
				(0.056)	(0.037)	(0.074)	(0.050)			
HO Segregation	-0.158^{***}	-0.035	-0.102^{**}					-0.347^{***}	0.089	-0.360^{**}
	(0.054)	(0.061)	(0.049)					(0.077)	(0.226)	(0.169)
No. of Obs.	236	236	236	236	236	236	236	236	236	236
R-squared	0.255	0.210	0.114	0.301	0.241	0.210	0.124	0.203	0.190	0.012
F-stat				11.01						
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents the OLS (columns 1–3), First stage (column 4), Reduced Form/RF (columns 5–7) and the 2SLS IV estimates (columns 8–10) of the impact of homeownership segregation on children's intergenerational mobility. In Panel A homeownership segregation is the two-group entropy-based measure in 2000 and in panel A excludes tracts in the top decile with household head's age below 24 years. Similarly, in Panel B homeownership segregation in 2000 only includes tracts where the fraction of household head above 34 years is above median at the national level. Remaining details on specifications are as in Table A.6.

Table A.5. Robustness to Using Homeownership Segregation in 1990

Panel A: Homeownership segregation in 1990

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep Var.	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	HO Segregation	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
1947 Plan				0.102^{***}	-0.104^{***}	0.010	-0.094^{**}			
				(0.035)	(0.032)	(0.048)	(0.036)			
HO Segregation	-0.163^{**}	-0.002	-0.134^{**}					-1.015^{***}	0.100	-0.922^{**}
	(0.070)	(0.073)	(0.063)					(0.358)	(0.451)	(0.432)
No. of Obs.	236	236	236	236	236	236	236	236	236	236
R-squared	0.246	0.211	0.114	0.574	0.262	0.211	0.132	.	0.203	.
F-stat				8.344						
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	OLS	RF	RF	RF	IV	IV	IV

Panel B: Average homeownership segregation in 1990 and 2000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep Var.	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	HO Segregation	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
1947 Plan				0.103^{***}	-0.104^{***}	0.010	-0.094^{**}			
				(0.031)	(0.032)	(0.048)	(0.036)			
Ho Segregation	-0.179^{***}	-0.007	-0.143^{*}					-1.009^{***}	0.100	-0.916^{**}
	(0.064)	(0.082)	(0.071)					(0.321)	(0.445)	(0.383)
No. of Obs.	236	236	236	236	236	236	236	236	236	236
R-squared	0.252	0.211	0.117	0.579	0.262	0.211	0.132	.	0.202	.
F-stat				10.686						
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	OLS	RF	RF	RF	IV	IV	IV

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents the OLS (columns 1–3), First stage (column 4), Reduced Form/RF (columns 5–7) and the 2SLS IV estimates (columns 8–10) of the impact of homeownership segregation on children's intergenerational mobility. In Panel A homeownership segregation is the two-group entropy-based measure in 1990 and in Panel B it is the average homeownership segregation in 1990 and 2000. Remaining details on specifications are as in Table A.6.

Table A.6. Robustness to Alternate Measures

Panel A: Segregation measured as standard deviation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. variable:	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
Std. Deviation	-0.224***	-0.054	-0.140*				-0.310***	0.117	-0.353**
	(0.054)	(0.075)	(0.070)				(0.104)	(0.238)	(0.161)
1947 Plan Rays				-0.097**	0.037	-0.111**			
				(0.040)	(0.075)	(0.048)			
R-squared	0.231	0.192	0.117	0.190	0.192	0.117	0.222	0.163	0.063
N	236	236	236	236	236	236	236	236	236
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	RF	RF	RF	IV	IV	IV

Panel B: Segregation using Dissimilarity Index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. variable:	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
Dissimilarity Index	-0.205***	-0.076	-0.106				-0.317***	0.120	-0.361**
	(0.053)	(0.071)	(0.072)				(0.103)	(0.248)	(0.178)
1947 Plan Rays				-0.097**	0.037	-0.111**			
				(0.040)	(0.075)	(0.048)			
R-squared	0.220	0.195	0.107	0.190	0.192	0.117	0.206	0.157	0.031
N	236	236	236	236	236	236	236	236	236
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	RF	RF	RF	IV	IV	IV

Notes: This table presents the OLS (columns 1–3), First stage (column 4), Reduced Form/RF (columns 5–7) and the 2SLS IV estimates (columns 8–10) of the impact of homeownership segregation on children's intergenerational mobility. In Panel A, homeownership segregation is measured as the standard deviation in tract level homeownership rates (referred to as "Homeownership SD"). In Panel B, homeownership segregation is the dissimilarity index of homeownership calculated as the measure of the evenness with which two groups are distributed across tracts in a CZ (referred to as "HO Dissimilarity Index"). Homeownership segregation is instrumented using the 1947 interstate highway plan rays provided by Baum-Snow (2007). Intergenerational mobility (IGM) for the 25^{th} and 75^{th} is as defined in Table 1. IGM, homeownership segregation, and the instrument have been standardized (z-scored) for ease of interpretation. Control variables included are CZ-level homeownership rate and share of people below the poverty line. Data is from the 2000 Census. All regressions include census division fixed effects. Observations are weighted by the number of housing units in each CZ in 2000. Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.

Table A.7. Multi-Group Homeownership Segregation Index: Accounting for Rich vs. Poor and Homeowners vs. Renters

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep. Variable	IGM_{25}	IGM_{75}	Δ IGM_{25-75}	HO Segregation	IGM_{25}	IGM_{75}	Δ IGM_{25-75}	IGM_{25}	IGM_{75}	Δ IGM_{25-75}
1947 Plan				0.178***	-0.113***	0.029	-0.117**			
				(0.043)	(0.037)	(0.074)	(0.050)			
HO Segregation	-0.273***	-0.054	-0.181					-0.633***	0.162	-0.656**
	(0.075)	(0.120)	(0.112)					(0.185)	(0.403)	(0.290)
No. of Obs.	236	236	236	236	236	236	236	236	236	236
R-squared	0.259	0.210	0.117	0.594	0.241	0.210	0.124	0.189	0.188	.
F-stat				11.01						
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents the OLS (columns 1–3), First stage (column 4), Reduced Form/RF (columns 5–7) and the 2SLS IV estimates (columns 8–10) of the impact of homeownership segregation on children's intergenerational mobility.Homeownership segregation is the four-group entropy-based measure based on rich homeowners, rich renters, poor homeowners, and poor renters in 2000. Remaining details on specifications are as in Table A.6.

Table A.8. Historical Homeownership Segregation and Intergenerational Mobility: Matched Tracts

	(1)	(2)	(3)	(4)
Dep. variable		IGM_{25}		
HO Segregation in	1970	1980	1990	2000
		First Stage		
1947 Plan Rays	-0.008	0.206^{***}	0.111^{**}	0.154^{***}
	(0.088)	(0.047)	(0.051)	(0.040)
R-squared	0.217	0.286	0.308	0.465
F-Stat	0.009	19.541	4.785	14.568
		Ordinary Least Squares		
HO Segregation	0.057	-0.107^{*}	-0.027	-0.096^{*}
	(0.049)	(0.056)	(0.055)	(0.055)
R-squared	0.257	0.212	0.200	0.189
		Reduced Form		
1947 Plan Rays	0.002	-0.067^{**}	-0.054^{*}	-0.069^{**}
	(0.033)	(0.033)	(0.031)	(0.027)
R-squared	0.248	0.213	0.212	0.198
		Two-stage least squares		
HO Segregation	-0.284	-0.323^{**}	-0.487^{*}	-0.448^{**}
	(4.501)	(0.147)	(0.283)	(0.206)
R-squared	.	0.129	.	0.040
N	83	166	210	236
Baseline controls	Y	Y	Y	Y

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents robustness of the results in table 4. The homeownership segregation measures are calculated by holding the neighborhood definition constant over time by matching the tracts in each decade to the 2010 tract definition using the crosswalk from Logan and Stults (2012).

Table A.9. The Role of Housing Restrictiveness: Matched Tracts

	(1)	(2)	(3)	(4)
Dep. variable	Housing Regulation Index, 2006			
HO Segregation as of	1970	1980	1990	2000
	First Stage			
1947 Plan Rays	-0.008	0.206***	0.111**	0.154***
	(0.088)	(0.047)	(0.051)	(0.040)
R-squared	0.217	0.286	0.308	0.465
F-Stat	0.009	19.541	4.785	14.568
	Ordinary Least Squares			
HO Segregation	0.038	0.170***	0.090**	0.167***
	(0.044)	(0.034)	(0.034)	(0.023)
R-squared	0.265	0.280	0.202	0.249
	Reduced Form			
1947 Plan Rays	0.098**	0.116***	0.090***	0.104***
	(0.041)	(0.025)	(0.022)	(0.021)
R-squared	0.364	0.322	0.284	0.290
	Two-stage least squares			
HO Segregation	-7.328	0.595***	0.758*	0.614***
	(45.775)	(0.214)	(0.439)	(0.211)
R-squared	.	.	.	.
N	78	150	183	198
Baseline controls	Y	Y	Y	Y

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents robustness of the results in table 5. The homeownership segregation measures are calculated by holding the neighborhood definition constant over time by matching the tracts in each decade to the 2010 tract definition using the crosswalk from Logan and Stults (2012).

Table A.10. Homeownership Segregation and Fair Housing Act Lawsuits: Matched Tracts

Dep. variable	(1)	(2)	(3)
	Indicator for Fair Housing Lawsuit Decision by		
	1980	1990	2000
HO Segregation as of	1970	1980	1990
	First Stage		
1947 Plan Rays	-0.008	0.206^{***}	0.111^{**}
	(0.088)	(0.047)	(0.051)
R-squared	0.217	0.286	0.308
F-Stat	0.009	19.541	4.785
	Ordinary Least Squares		
HO Segregation	0.008	0.098^{*}	0.098^{**}
	(0.056)	(0.052)	(0.040)
R-squared	0.259	0.151	0.251
	Reduced Form		
1947 Plan Rays	0.047	0.066^{**}	0.080^{***}
	(0.041)	(0.031)	(0.022)
R-squared	0.287	0.162	0.284
	Two-stage least squares		
HO Segregation	-5.680	0.319^{**}	0.717^{**}
	(55.698)	(0.160)	(0.324)
R-squared	.	.	.
N	83	166	209
Baseline controls	Y	Y	Y

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents robustness of the results in table 6. The homeownership segregation measures are calculated by holding the neighborhood definition constant over time by matching the tracts in each decade to the 2010 tract definition using the crosswalk from Logan and Stults (2012).

Table A.11. Single-family Detached Homes and Intergenerational Mobility

Panel A: Single-family detached rates (Level)

	(1)	(2)	(3)	(4)
Dep. variable:	IGM_{25}		IGM_{75}	
% SF	0.111*	0.036	0.276***	0.165***
	(0.056)	(0.065)	(0.044)	(0.056)
R-squared	0.025	0.174	0.134	0.215
N	236	236	236	236
Baseline controls	N	Y	N	Y
Type	OLS	OLS	OLS	OLS

Panel B: Single-family detached home segregation

	(1)	(2)	(3)
Dep. variable:	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
SF segregation	-0.100*	-0.037	-0.052
	(0.056)	(0.083)	(0.063)
R-squared	0.186	0.191	0.097
N	236	236	236
Baseline controls	Y	Y	Y
Type	OLS	OLS	OLS

Panel C: Instrumenting homeownership segregation with the 1947 Highway plan

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. variable:	HO Segregation	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
1947 Plan Rays	0.240***	-0.097**	0.037	-0.111**			
	(0.061)	(0.040)	(0.075)	(0.048)			
SF segregation					-0.406**	0.153	-0.462**
					(0.171)	(0.298)	(0.186)
R-squared	0.509	0.190	0.192	0.117	0.067	0.151	.
F-statistic	15.593						
N	236	236	236	236	236	236	236
Baseline controls	Y	Y	Y	Y	Y	Y	Y
Type	First stage	RF	RF	RF	IV	IV	IV

Notes: This table shows estimates of the percentage of single-family detached homes (%SF) in Panel A and single-family detached units segregation (SF detached segregation) in Panel B and C on intergenerational mobility measure (IGM). Segregation and percentage of single-family detached homes rates are as of 2000. Dependent variables are as indicated. OLS, first stage, reduced form (RF), and instrumented variables (2SLS IV) are as shown. In Panel C, SF segregation is instrumented with the number of rays emanating from a CZ in the 1947 interstate highway plan and is from Baum-Snow (2007). Baseline controls are as indicated and include census division fixed effects and share below poverty line in 2000. In addition, control variables in Panels B and C include homeownership rate in 2000. Observations are weighted by the number of housing units in each CZ in 2000. The instrument, IGM, and homeownership segregation measures have been standardized (z-scored). Standard errors are clustered by state. Remaining variables and data sources are defined in Table 1.