Homeownership Segregation

Nirupama Kulkarni * Ulrike Malmendier †

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ABSTRACT

Homeownership has long been an essential part of the "American Dream" and viewed as the foundation of upward mobility. This paper shows that, rather than the level of homeownership, the segregation of homeowners is a strong predictor of intergenerational upward mobility. We propose a novel measure of the residential segregation between homeowners and renters, and show that higher homeownership segregation predicts lowers upward mobility of children from low-income families, while not affecting high-income families. Homeownership segregation is predicted by restrictive housing regulations put in place since the 1970s, after the Fair Housing Act of 1968 had outlawed discriminatory housing practices. Areas with higher homeownership segregation still feature more restrictive land-use patterns today, including single-family zoning. We show that the segregation, not the level of single-family houses explains the adverse effects on children's upward mobility. We also document that Federal Fair Housing Act lawsuits are significantly more prevalent in areas with higher homeownership segregation, indicating greater persistence of discriminatory housing practices. Finally we show that the detrimental effects on children's mobility perpetuate into the future as children from low-income households are unable to move to better quality (low-poverty) neighborhoods when adult.

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*CAFRAL, Research Department, Reserve Bank of India Main Building, Fort, Mumbai 400 001, e-mail:nirupama.kulkarni@gmail.com.

†Department of Economics and Haas School of Business, 501 Evans Hall, Berkeley 94720, CA; email: ulrike@berkeley.edu.

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 the past decades, federal housing policies in the United States have aimed at increasing homeownership, with the explicit goal of improving upward mobility. The emphasis on increasing homeownership is partly a response to past discriminatory practices such as redlining and the Federal Housing Administration denying mortgage insurance in high-minority neighborhoods prior to the Fair Housing Act (under Title VIII of the Civil Rights Act) of 1968. However, these practices not only lowered homeownership among discriminated population groups, but also fostered segregation. By explicitly denying homeownership to certain communities and encouraging homeownership in suburban areas government policy separated (rich white) homeowners from (poor minority) renters (Rothstein, 2017).

In this paper, we argue that the segregation of homeowners and renters continues to be a significant negative influence on low-income families upward mobility. After the Fair Housing Act put an end to legal discrimination in the sale, rental, and financing of homes in 1968, land-use regulations have perpetuated and cemented residential segregation (Shertzer et al., 2016, 2018; Been, 2018; Elmendorf, 2019; Fischel, 2004), decreasing upward mobility and promoting socio-economic disparity (e.g., Wilson, 1987; Massey and Denton, 1993).

We introduce a novel measure of residential segregation, which we denote homeownership segregation. We use the homeownership data from the Census to capture how segregated homeowners are from renters, using a two-group entropy index that mirrors the racial segregation measures used in Theil (1972). Homeownership segregation reflects both market forces and (explicit or implicit) homeownership policies that limit homeowning in specific neighborhoods. We show that homeownership segregation has a significant impact on low-income households upward mobility, and link its persistence to restrictive housing policies.

Our main sources of data are the decennial Census and the intergenerational mobility data

[1] Cf., for example, 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.

provided by Chetty and Hendren (2018a). The upward mobility measure from Chetty and Hendren (2018a) is the estimated causal impact of one additional year of childhood in a commuting zone (CZ) on children's household income rank when adult at age 26, given their parents' income rank (percentile of the parents' income distribution), for cohorts born between 1980 and 1986. We construct our homeownership segregation measure as of 2000, i. e., corresponding to when the children were growing up. Our data on housing regulation comes from Gyourko et al. (2008), and our data on Federal Fair Housing Act lawsuits comes from Trounstine (2020).

In a first step, we motivate the focus on homeownership segregation, rather than homeownership rates (which are the focus of policy) by showing the lack of a robust relationship between across-CZ homeownership rates and intergenerational mobility. For children growing up in families with below-median income, we find no relationship between homeownership rates and average intergenerational mobility. For children growing up in families with above-median income, there is a positive association in the raw data, but it disappears when we control for CZ-level characteristics. Our finding is consistent with prior literature, which has attributed positive outcomes among children of homeowners to selection effects of owning a home (Barker and Miller, 2009; Holupka and Newman, 2012).

We then show that homeownership segregation, rather than homeownership rates, explains upward mobility in a CZ. We estimate a significantly negative relationship between homeownership segregation and the upward mobility of children from below-median income families, controlling for overall homeownership rates 2000. A one SD increase in homeownership segregation is associated with a 0.183 SD decline in intergenerational mobility of low-income children. Homeownership segregation has *no* impact on the intergenerational mobility of children of above-median income families, i.e., the decline in upward mobility of children of low-income families is not accompanied by a corresponding increase in the upward mobility of the children from high-income families.

To address the concern that other, unobserved characteristics of CZs featuring higher homeownership segregation might confound our results, we instrument for homeownership segregation using the planned portions of the interstate highway system in 1947. Following Baum-Snow (2007), who introduced exogenous variation in the number of highways (rays) emanating from a metropolitan area as an instrument for suburbanization, we rely on the *planned* portions of the interstate highway

system as those were built to facilitate trade and national defense, rather than metropolitan area development, and thus not driven by differences in local demand or supply factors.[2]

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 predicts homeownership segregation in 2000 (F-stat=16.53). Relating the instrument directly to upward mobility, we estimate that a one SD increase in the number of highways (rays) emanating from a commuting zone results in 0.191 SD higher homeownership segregation in 2000. Using the instrumental variable specification, the second-stage estimation reveals that one SD higher homeownership segregation in 2000 results in 0.743 SD lower intergenerational mobility of children from poor families, with no impact on the children with from rich families.[3] In economic terms, this corresponds to a 1.68% 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 15.275 years (Derenoncourt, 2019) to reflect the effect of spending the entire childhood in a CZ, the causal effect of growing up in a CZ is a 19.5% decline in income when adult for children from low-income families.

The results are robust to alternate definitions of homeownership segregation such as standard deviation in homeownership, a spatial homeownership segregation measure and a measure based on the homeownership dissimilarity index. We also distinguish between adverse effect on upward mobility due to selection of the kind of families that reside in high homeownership-segregation CZs and due to differences in place-based factors that influence children's upward mobility differently. Comparing the "causal" and "non-causal" measures of mobility from Chetty and Hendren (2018a) we find that place-based effects explain the adverse effects of homeownership segregation on upward mobility, and there is limited support for selection effects (arising from differences in the kind of families that reside in these CZs) driving our results.

We then show that it is the segregation of rich rather than poor homeowners drives the estimated

[2]In addition to addressing endogeneity issues, the instrument also speaks to the historical trends our analysis aims to capture: Barker and Miller (2009) use the same instrument to document white flight from inner cities. Consistent with their finding, we confirm that CZs with a 1 SD higher number of rays emanating from the city center have 11% lower white population in inner cities even in 2000. Our main hypothesis builds on the notion that this pre-1970s white flight also increased restrictive housing post-1970.

[3]For simplicity we refer to below-median income families as poor families, and to above-median income families as rich families. Their children are similarly referred to as poor and rich children.

relative difference in intergenerational mobility. We find that the entire relative difference between the children of below- and above-median income families is attributable to the segregation of the above median income homeowners.

We next examine the historical changes that explain these adverse place-based effect of homeownership segregation on children's upward mobility. We start from relating historical homeownership segregation, decade by decade from 1940–2010, to the intergenerational mobility measure of 2000. Our plots show that pre-1970 homeownership segregation does not predict upward mobility, but that there is a sharp change in 1970s, when homeownership segregation starts to strongly (and negatively) predict upward mobility. Results are similar also when we instrument homeownership segregation in each decade with the planned-highway instrument. Thus, homeownership segregation since the 1970s have increased the adverse place-based effects of growing up in a CZ in the 2000s.

The timing and historical persistence of the effects of homeownership segregation since the 1970s (but not before) are both consistent with restrictive housing regulations since the 1970s playing a causal role. Previous work has documented that, after Fair Housing Act ended legal discrimination in 1968, there was a simultaneous increase in land-use regulations aiming to preserve the homogeneity of certain neighborhoods (Shertzer et al., 2016, 2018; Been, 2018; Elmendorf, 2019; Fischel, 2004).

In the next step of the analysis, we document that this mechanism continues to be perpetuated today. First, we show that commuting zones with higher homeownership segregation are more likely to have restrictive land-use patterns today, as proxied for by the housing regulation index from Gyourko et al. (2008). A 1 SD increase in homeownership segregation in 2000, as instrumented by the planned portion of the highways in 1940s, is correlated with a 0.723 SD higher housing-regulation index. Local political pressures explain most of this pattern.

Second, we focus on a particularly prominent feature of restrictive-housing regulation, namely, single-family house zoning. In the U.S., home-owned units are predominantly single-family structures, and policymakers and commentators since at least the 1970s have observed single-family house zoning to be detrimental to economic mobility (Kain and Quigley, 1972; McDonald, 1974; Menendian and Gambhir, 2018). We add to this discussion by distinguishing the segregation

of single-family detached homes from the level effect, i. e., the fraction of single-family detached homes. We show that 1 SD higher homeownership segregation is associated with a 43.1 pp lower fraction of single-family detached homes, but that there is no passthrough to upward mobility However, CZs with 1 SD higher homeownership segregation also have 0.057 SD higher segregation of single-family detached homes. Instrumenting for the segregation of single-family detached homes with the planned portion of interstate highways in 1947, we estimate an associated 0.74 SD decline in the intergenerational mobility of low-income children relative to high-income children. While recent rhetoric has focused on single-family zoning, our analysis highlights that it is the *segregation*, and not the level of single-family housing that predicts upward mobility.

Third, we provide evidence on the forces within local government decisions in favor of land-use regulation. Housing restrictions limit access to good quality schools (Lafortune et al., 2018; Jackson et al., 2015), providing a link between homeownership segregation, housing restrictions, and children's upward mobility. Consistent with this channel, we document that CZs with more segregated homeownership witness more significant citizen opposition to new housing due to citizens' concerns regarding school crowding. These CZs also have poorer quality schools overall, measured using high-school dropout rates, consistent with the stronger desire of homeowners (in likely better school districts within the CZ), fighting to protect their schools from an influx of additional (lower-SES) families. Finally, adult children from low-income families living in CZs with higher homeownership segregation are, on average, less likely to have a high-school degree.

In addition to these three pieces of evidence on the prevalence of modern land-use regulation in highly segregated areas, we also show that the Fair Housing Act had not much bite in addressing segregation. Specifically, we document that (1) Federal Fair Housing Act lawsuits are more frequent in CZs with higher homeownership segregation, suggesting a persistence of discriminatory (illegal) housing practices in high-segregation CZs. Moreover, (2) when we estimate, for each CZ experiencing a first lawsuit under the Federal Fair Housing Act in a given decade from 1960–2010, its homeownership segregation in the next decade (controlling for the homeownership segregation in the previous decade), we find no effect. For example, CZs that experienced successful Fair Housing lawsuits between 1980–1990 saw no change in homeownership segregation in 1990. In other words, the Fair Housing Act appears to do little to change homeownership segregation over the intervening

decades from 1970 to 2010, further explaining the persistence of homeownership segregation and its adverse effect on upward mobility of children.

Finally, we show that the adverse effects of homeownership segregation and restrictive housing regulation on children's upward mobility are likely persist and affect future generations, as children from low-income families are unlikely to leave segregated neighborhoods. For this last step of the analysis, we use data on the residences of the cohorts of children from the baseline upward mobility measures when they are adult (Chetty et al., 2019). We show that, in CZs with high homeownership segregation, children from low-income families are unlikely to move to better neighborhoods (low-poverty census tracts) when adult, while children from high-income families are more likely to move. Given the importance of place-based factors on children's upward mobility (Chetty and Hendren, 2018b), the reduced residential mobility contributes to perpetuating adverse place-based effects into future generations.

Our paper is organized as follows. Section 2 provides the institutional details. Section 3 explains the data and homeownership segregation measures used in our analysis. Section 4 presents our results. We start by introducing the homeownership segregation measure; then we relate homeownership segregation to intergenerational mobility. The second part of the analysis links the current placed-based effects on upward mobility to historical segregation between 1940–2010 and examines the impact homeownership segregation on land-use restrictions. We finally examine the impact of the 1968 Fair Housing Act on homeownership segregation and look at long-term outcomes on adult children's residential mobility. Section 5 concludes.

2. Institutional Background

We describe below some institutional details starting with federal policies that excluded certain borrowers from owning homes and potentially encouraged racial segregation. We then discuss the Federal Fair Housing Act of 1969 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 (FHA) was established as a part of President

Roosevelt's New Deal under the National Housing Act. The FHA provides mortgage insurance for mortgages financed by private lenders and thus determines who gets easier access to mortgage financing in the U.S. While the broad goal of the FHA was to regulate the interest rates and terms of mortgages it insured, many of its practices allowed only white households to become homeowners and fostered segregation. For example, FHA regulation explicitly mentioned 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 in their lending. Other FHA policies included appraisers giving higher ratings to mortgage applications only if there were in racially homogeneous neighborhoods, further stymieing homeownership growth among Black communities and encouraging segregation (Rothstein, 2017). At the same time, the FHA subsidized and sponsored builders who were mass-producing single-family homes in the suburbs that catered exclusively to white households. Overall, much of the increase in homeownership rates since the inception of the FHA was concentrated among white households and was accompanied by a simultaneous widening of the segregation of white and African American homeowners.[4]

A related housing policy was the practice of "redlining" by the Home Owners Loan Corp (HOLC). The HOLC, established in 1933, 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 and divided them 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).

Fair Housing Act of 1968. Race-based zoning in cities was technically outlawed by the Supreme Court in a 1917 ruling and later rulings such as Shelley v. Kraemer (1948) (Trounstine, 2018), but the court rulings had limited impact in practice, underscoring the need for a legislative response. The Fair Housing Act under Title VIII of the Civil Rights Act put an end to legal

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

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 Fair Housing Act 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) was tasked with investigating any allegations of discrimination. However, it had only 30 days to decide whether to pursue the allegation and, even if it found evidence of discrimination, could not penalize the lawbreaker or even force them to comply. It could only pass the case on to the Justice Department, who could only act on it 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. Plausibly in response to these legal reforms, suburban areas post-1970 started enforcing land-use regulations that excluded development and led to the rise of separate and segregated suburban communities (Trounstine, 2020). While land-use regulations are not explicitly discriminatory, white communities could use them to preserve racial homogeneity, and they became one of the primary ways through which cities shaped segregation post-1970 (Shertzer et al., 2018; Been, 2018; Elmendorf, 2019; Fischel, 2004). Land-use regulations also enable local governments to direct public funding to certain neighborhoods while secluding predominantly minority neighborhoods from access to these services (Trounstine, 2018). Such land-use regulations also include filing lawsuits to block the development of multifamily housing, cf. Einstein et al. (2019). Wealthier neighbourhoods are also more likely to enforce such regulations (Gyourko et al., 2008; Trounstine, 2020). Glaeser and Sacerdote (2000) also document that post-1970, white households paid more to live in predominantly white areas and encouraged other quasi-legal methods of segregation.

3. Data and Summary Statistics

Our main sources of data are the Decennial Census (1940–2010), and the data on intergenerational mobility from Chetty and Hendren (2018a,b), available at the CZ level. 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 the effect of various explicit and implicit policies on the uniformity of homeownership 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 census tract level data from the 2000 Census. We construct the measure from the two-group entropy of homeowners and renters, similar to the racial segregation measure in Theil (1972).[5] Let $\phi_{CZ}(t)$ be the fraction of individuals of tenure t in a CZ, where tenure refers to two groups, homeowners (HO) and renters (RE). The CZ-level entropy index is

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

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

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

Homeownership segregation at the CZ-level is then given by

$$H_{CZ}^{Homeownership} = \sum_{ct} \frac{population_{ct}}{population_{CZ}} \frac{E_{CZ}^{Homeownership} - E_{ct}^{Homeownership}}{E_{CZ}^{Homeownership}} \tag{3}$$

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

where $population_{ct}$ and $population_{CZ}$ refer to the tract- and CZ-level population. Intuitively, homeownership segregation measures how different the homeownership (tenure) distribution of each census tract is from the overall CZ. $H = 1$ corresponds to the highest level of 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 the segregation of below-median income homeowners based on the entropy of the below-median income homeowners against the above-median income homeowners and all renters. Alternatively, we consider the segregation of the above median-income homeowners versus the below-median income homeowners and renters (leaving out rich renters), and similarly the segregation of the below-median income homeowners versus the above-median income homeowners and renters (leaving out poor renters). Similarly, we also calculate just above-median homeowners versus below-median homeowners, and finally above-median homeowners versus above-median renters (and similarly for below-median income families).

To supplement the baseline homeownership segregation measure, we also define three alternate measures of homeownership segregation. First, we use the standard deviation (SD) of tract level homeownership rate 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 spatial homeownership segregation, which is similar to the entropy-based measure except the tract level homeownership rate is the own homeownership rate combined with the distance-weighted homeownership rate of remaining (nearby) tracts within the CZ. And the third alternate measure, homeownership dissimilarity, is measured as:

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

where ϕ_{hj} and ϕ_{hC} refer to the fraction of homeowners at the tract and CZ level, and ϕ_{rj} and ϕ_{rC} refer to the fraction of homeowners at the tract and CZ level. This measure captures the evenness in distribution of homeowners and renters across tracts in a CZ. It is the percentage of homeowners

(renters) that would have to move to a different tract to achieve the CZ-level homeownership distribution.

3.2. Instrument: 1947 Highway Plan Rays

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 finds that suburbanization was higher in metropolitan areas that received more new highways between 1950 and 1990 than in those receiving fewer highways during this period. To address potential endogeneity concerns in the assignment of highwasy, Baum-Snow uses the number of *planned* highways in a 1947 national interstate highway plan as an instrument, arguing that the highways in the 1947 plan were meant to connect far away places partly based on military and naval establishments and not to facilitate local commuting. Hence, 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 measure provided by Baum-Snow (2007) 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.

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 among themselves (when 26 years old) relative to the rank percentile of parents' average family income (in 1996–2000) among parents.[6] They then estimate the relationship between the income rank of child i (in cohort s), y_i, and parents' income rank p_i within a commuting zone

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

CZ as:

$$y_i = \alpha_{CZ,s} + \psi_{CZ,s} p_i + \epsilon_i \tag{5}$$

Chetty et al. find that this rank-rank relationship is 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. Using the above coefficients, the expected rank of a child in cohort s whose parents' national income rank is p and who are permanent residents of CZ is then given by

$$\hat{y}_{p,CZ,s} = \hat{\alpha}_{CZ} + \widehat{\psi}_{CZ,s} p. \tag{6}$$

The estimates for parents at the 25^{th} and 75^{th} income percentiles provide proxies for the upward mobility of children from low-income and high-income families, respectively. We focus on the impact on children from low-income families.

Chetty and Hendren (2018a) build on this measure but contrast the upward mobility of permanent residents and households that move in order to decompose the upward mobility measure into the causal effect of growing up in a CZ ("childhood exposure effect") 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. The childhood exposure effect is the causal effect of growing up in a CZ, which Chetty and Hendren (2018a) estimate assuming that the timing of the moves is orthogonal to the children's potential outcomes.[7] These analyses use data data 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 to disentangle to causal effects from the selection effects.

[7] 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, they argue that the causal effect of growing up in Oklahoma is relative to growing up in Phoenix.

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. The authors supplement the survey with state-level analyses of legislative and executive actions determining land-use policies. This 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.

3.5. Fair Housing Act lawsuits between 1970–2000

To capture the effect of improper land-use restrictions, we use city-level data from Trounstine (2020) on Fair Housing Act violations. According to the Fair Housing Act, private citizens or the justice department could sue local governments if they felt that these governments had failed to ensure that people from protected classes had an equal opportunity to housing. Trounstine (2020) creates a dataset with all such proven violations of the Fair Housing Act from 1968 to 2011. 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 lawsuit under the Fair Housing Act as of a given date. Data is restricted to the cases that have received a decision in court.[8]

[8] Trounstine (2020) does not collect the outcomes of these cases for all lawsuits and hence we restrict our analysis to the same data.

3.6. Homeownership and Other Covariates

Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. High school dropout rates are provided by Chetty et al. (2015) and constructed based on data from Integrated Post-secondary Education Data System (IPEDS) and remaining data is from the 2000 Census. For weighting the data we use the number of housing units in each CZ from the Census 2000.

We also control for the two-group entropy-based racial segregation measure in 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

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

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

$$E_{ct}^{Racial} = \sum_{r} \phi_{ct}(r) \log_2 \frac{1}{\phi_{ct}(r)}. \tag{8}$$

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

$$H_{CZ}^{Racial} = \sum_{ct} \frac{population_{ct}}{population_{CZ}} \frac{E_{CZ}^{Racial} - E_{ct}^{Racial}}{E_{CZ}^{Racial}}. \tag{9}$$

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

$$H^{Income} = 2\ln(2) \int_{p} pE_{CZ}^{Inc}(p) H_{CZ}^{Inc}(p)\, dp. \tag{10}$$

This measure[9] is the weighted average of segregation at each percentile p, with greater weight placed on percentiles where entropy $E^{Inc}(p)$ is maximized. It calculates the segregation between groups who have incomes above and below the 100 x p$^{\text{th}}$ percentile of the income distribution. Here

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

$H^{Inc}(p)$ 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 (7) is given by:

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

And entropy in a tract, analogous to (2) and (8) is given by:

$$E_{ct}^{Inc}(p) = p \log_2 \frac{1}{p} + (1-p) \log_2 \frac{1}{1-p} \tag{12}$$

$H^{Inc}(p)$ is analogous to (3) and (9):

$$H_{CZ}^{Inc}(p) = \sum_{ct} \frac{population_{ct}}{population_{CZ}} \frac{E_{CZ}^{Inc}(p) - E_{ct}^{Inc}(p)}{E_{CZ}^{Inc}(p)} \tag{13}$$

We use the income bins from the 1990 and 2000 Census.

Finally, we use a measure of urban sprawl based on the commute time to work. Sprawl can be measured in other ways, such as in Burchfield et al. (2006) which uses spatial data on urban development and define sprawl as the scatterdness of residential development, or as in Glaeser and Kahn (2004) who measure sprawl based on the extent to which employment is decentralized. The different measures do not always agree. For example, while the commute-based measure aims to capture whether employment is not concentrated within city-centres, as does the measure of employment decentralization, Glaeser and Kahn (2004) mention that areas with lesser physical sprawl tend to be congested and older cities like New York, where people tend to commute using public transport and commute times are actually longer than in areas with more physical sprawl.

We follow Chetty et al. (2015) and define sprawl as the fraction of households with commuting times greater than 15 minutes. We use the 'Travel time to work' variable from the Census, available for everybody above 16 years who does not work at home. Since our goal is to capture how residential segregation increased due to the homeownership policies, we examine the impact on parents' commuting time.

The underlying data for all segregation measures are from the 2000 Census.

3.7. Sample 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 causal effect of the intergenerational mobility measure 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, Panel A provides the summary statistics of the variables used in our analysis. 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 20 years in a CZ. The statistics reveal that, for a child with parents at the 25^{th} percentile of the national income distribution, spending 20 years of childhood in a one SD better CZ (population-weighted) increases household income at age 26 by 1.53 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, this 1.53 percentile increase corresponds to a 4.8 percent increase in income relative to the mean income of \$26,091 among children with below-median income parents ($1.53 \times \$818/\$26{,}091 = 4.8$ percent). For a child with parents at the 75^{th} percentile, spending 20 years in a one SD better CZ increases household income by 1.03 percentiles, equivalent to 1.93 percent increase in income suggesting that neighborhood effects matter less for rich families.

Figure 3 shows the spatial variation of intergenerational mobility of below-median income families in Panel A, and for above-median income families in Panel B. We see a high degree of correlation between the children of below-median income families and the above-median income families, which is a first indication that improvement in the outcomes for kids from below-median income families is not coming at the expense of the kids from rich families. However, the maps also reveal some variation in outcomes of the children of the rich and the poor families. For example,

neighborhood effects are stronger for children of the below median income families in California.

Homeownership rate is based on the 2000 Census and is defined as the number of number of housing units occupied by homeowners relative to the total number of occupied housing units. Homeownership rate in 2000 was at 69.44% with a standard deviation of 4.77%. Homeownership rate ranged from 62.95% to 75.31%. Average homeownership rate of the above median-income households was a much higher 86.38% compared to a much lower 59.85%, an is similar throughout the distribution (mean, median, 10^{th} percentile, and 90^{th} percentile).

Our main variable of interest, homeownership segregation in 2000, is 0.12 on average, with a SD of 0.05. It ranges from 0.07 at the 10^{th} percentile to 0.19 at the 90^{th} percentile of CZs. Supplementary homeownership segregation variables include the above-median income and the below-median income homeownership segregation, which are defined as the segregation of rich homeowners and as the segregation of poor homeowners from the respective remaining households. We note that the segregation of the above-median income homeowners is higher than the segregation of the below-median income homeowners along all dimensions (mean, median, 10^{th} percentile, and 90^{th} percentile).

We instrument for homeownership segregation using the number of rays emanating from a CZ based on the 1947 Highway Plan. On average a CZ had 1.72 rays emanating from it with a standard deviation of 1.62. At the 10^{th} percentile of CZ, there were no rays passing through the CZ and at the 90^{th}, there were 4 rays emanating from a CZ.

On average the CZs in our sample have around 11 percent Black, 4 percent Hispanic population and other minority, 13 percent below poverty level, 5 percent with single mother, 21 percent divorced, 66 percent single-family homes and have 5 percent unemployment rate. There are on average 223,602 housing units in a CZ in our sample. The size of the counties captured in our analysis varies widely as can be seen from fact that the total number of housing units in the CZ varies from 60,384 at the 10^{th} percentile to 466,109 at the 90^{th} percentile.

4. Results

This section presents the results of our analysis. We start with an exploratory analysis of what the homeownership measure captures, then relate homeownership segregation to children's upward mobility. We then link historical homeownership segregation to children's upward mobility today. Next, we link homeownership segregation to housing regulation and examine the impact of the 1968 Fair Housing Act. we conclude by examining the longer-term effects on adult children's residential mobility.

4.1. What does homeownership segregation capture?

Homeownership segregation captures a distinct, and as yet understudied dimension of homeowning. Figure 1, Panel A shows the spatial variation of homeownership segregation, which can be compared with the the spatial variation of homeownership rates in 2000 in Panel B. Both measures capture a different dimension of homeowning. While the top panel shows that CZs in the south-west, figure in the top quintile of homeownership segregation, these CZs also have low homeownership rates. On the other hand, CZs in the north-east appear in the top quintiles along both homeownership segregation and homeownership level. In Figure 2 panel (a), we explore this distinction between homeownership segregation and homeownership rates (level) further by plotting homeownership segregation against homeownership rates for below-median and above-median income households. There is a lot more variation in homeownership rates with segregation for the below median income households. That is, as homeownership segregation increases, homeownership rates also decline for the below median income households. However, there is relatively lower variation in homeownership rates with homeownership segregation of the above median income households. Poor households seem to be surrounded by fewer homeowners as homeownership segregation increases. Thus, homeownership segregation essentially captures how segregated the poor households are from rich homeowners. Panel (b) splits the households into more granular income brackets and consistent with panel (a), homeownership rates fall with homeownership segregation for the poorer households but remain consistently high for the rich households.

Table 1, Panel B, examines the correlates of homeownership segregation. Column 1, examines

how homeownership segregation varies with sprawl or the spread of cities. Glaeser (2011) notes that policies that encourage home-owning implicitly encourage people to move away from higher density living. Thus, sprawl may also associated with more segregated living. Two measures of sprawl are used. The first measure of sprawl is similar to the one used in Chetty et al. (2015), that is, the fraction of households who live spend more than 15 minutes commuting to work. The other measure of sprawl is from Burchfield et al. (2007), which measures the percentage of undeveloped land surrounding a residential dwelling. Homeownership segregation is positively related to the first measure of sprawl corresponding to the fraction of people who have long commuting times to work, but negatively correlated to the spatial measure of sprawl from Burchfield et al. (2007).[10] Columns 3 suggests that CZs with high racial segregation also have high homeownership segregation. In column 4, we also find that with an increase in income segregation, homeownership segregation rises by nearly 0.6 SD. In a horse race regression, commuting times and income segregation seem to be the strongest determinants of homeownership segregation. Despite the historical origins of the segregation as discussed in Section 2, homeownership segregation in 2000 is highly correlated income segregation as opposed to racial segregation. The discussion in Section 2 sheds light on why income as opposed to racial segregation is a strong correlate of homeownership segregation, The 1968 fair Housing Act made discriminatory housing practices illegal, but was also accompanied by a concurrent increase land-use regulation post 1970. This switch from explicit to implicit discriminatory practices might explain why we see a stronger correlation between homeownership segregation and income rather than racial segregation.

[10]In the subsequent subsection we find a strong relationship between homeownership segregation and children's upward mobility. The positive correlation between homeownership segregation and the commuting time-based measure of sprawl also explains the puzzling finding in Chetty et al. (2015) who note that sprawl is a strong correlate of children's upward mobility. Their explanation is that sprawl might make it more difficult to reach jobs or other resources that facilitate upward mobility. But the puzzle with their explanation is why such a reduced access to jobs results in differences in children's upward mobility *before* children enter the labor market. Our paper points to an important reason sprawl affects intergenerational mobility, namely, through the effect on homeownership segregation.

4.2. Homeownership segregation and intergenerational mobility

Our primary analysis examines the relationship between homeownership segregation and intergenerational mobility. We use the following empirical specification:

$$\Delta\text{IGM}_{CZ} = \alpha_{c(CZ)} + \beta \times \text{Homeownership Segregation}_{2000,CZ} + \gamma X_{CZ} + \epsilon_{CZ} \tag{14}$$

Observations are at the CZ-level. ΔIGM_{CZ} refers to the causal component of intergenerational mobility of children belonging to below-median income families (25^{th} percentile), above-median income families (75^{th} percentile) and the difference between the two (25^{th} percentile–75^{th} percentile). The causal intergenerational mobility, also referred to as the childhood exposure effect, is the estimated causal impact of spending one additional year of childhood in a CZ on children's household income rank when adult, with parents at the 25^{th} (or alternatively the 75^{th}) percentile of 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. Dependent variables have been standardized (z-scored). Due to the linearity of the rank-rank relationship between parents' incomes and children's incomes, the 25^{th} percentile and 75^{th} percentile correspond to the intergenerational mobility measure of the children with parents below the median income and children with parents above the median income respectively. $\text{Homeownership Segregation}_{2000,CZ}$ is the entropy based homeownership segregation measure. Regressions include census division fixed effects [$\alpha_{c(CZ)}$] and the control variables: CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. β is our coefficient of interest and measures the correlation between homeownership segregation and intergenerational mobility. However, note that we cannot as yet assign a causal interpretation to this coefficient. For ease of interpretation, we standardize both the homeownership segregation and intergenerational mobility measure. Thus, β can be interpreted as the impact on intergenerational mobility (in terms of SD) for a one SD higher homeownership segregation. All regressions are clustered at the state level and observations are weighted by the number of housing units in a CZ in 2000 to get representative estimates of the U.S. population.

As an auxiliary step, we first relate homeownership levels to intergenerational mobility in Figure 4. Panels (a) and (c) [(b) and (d)] show the correlation between the level of homeownership in 2000 and intergenerational mobility for below-median (above-median) households with and without control variables, respectively. The figures show the bin scatter plots where each point plots 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. The y-axis variable is the causal component of intergenerational mobility measure for children of parents from the 25^{th} percentile [panel (a) and (c)] and 75^{th} percentile [panel (b) and (d)] from Chetty and Hendren (2018a), which given the linearity of the rank-rank condition corresponds to the below- and above-median income children's upward mobility. The x-axis variable of homeownership rates for above- and below-median income households is measured as of 2000, i.e., when the children were growing up. The y- and x-axis variables have been standardized (z-scored) for ease of interpretation. Panel (a) shows that there is no correlation between the average CZ-level homeownership rate of below-median income households and their average intergenerational mobility. Panel (b) on the other hand seems to suggest that there is a positive correlation between the average CZ-level homeownership of above-median income households and their average intergenerational mobility. Thus, the causal impact of one additional year of childhood in a CZ with higher homeownership rate is associated with higher household income rank when for the children when adult, only when the children's parents belong are wealthy (above-median income). This positive relationship is consistent with previous work that has found that owning a home is associated with better children's outcomes (Green and White, 1997) attributed to residential stability for families from homeowning. Subsequent work, however, attributes these positive outcomes to the selection into the kind of households that end up owning homes (Barker and Miller, 2009; Holupka and Newman, 2012). Indeed in panel (d), once we add controls based on demographic and economic characteristics of the CZ, the positive relationship between homeownership and intergenerational mobility for wealthy households disappears.

Having established that the level of homeownership has only limited impact on children's upward mobility, we next move to our main measure of interest, homeownership segregation. Figure 5, Panel (a) shows that the average intergenerational mobility of children from below-median income

families is lower in CZs with higher homeownership segregation. In contrast, panel (b) shows no significant relationship between average intergenerational mobility of children from above-median income families and homeownership segregation. In both figures, we control for the homeownership rate (level) since we are interested in effect of the geographic distribution of homeowners across neighborhoods (census tracts) within a CZ. More formal regressions are shown in Table 2 and include all baseline demographic and economic variables. Panel A shows that for children of below income families, CZs with a 1 SD higher homeownership segregation are associated with a 0.183 SD lower children's upward mobility. There is no corresponding effect on those belonging to above median income families. We also measure the relative gap between the mobility of below- and above-median income children in column 3. In CZs with 1 SD higher homeownership segregation, upward mobility of children from below-median income families is 0.142 SD lower compared to children from above-median income families (though significant at only the 10% level).

While the baseline uses an entropy-based segregation measure, results are robust to using alternative definitions of homeownership segregation. The first measure simply uses the SD of the tract level homeownership rate. Column 1 in Table A.1 shows that a 1 SD increase in homeownership segregation using this measure is associated with a 0.28 SD decline in the intergenerational mobility of below median income children relative to the above median income children. The second measure calculated is a spatial homeownership segregation measure which also accounts for the tract level homeownership rate as well as the distance-weighted homeownership rate in the surrounding tracts in the CZ. Column 2 in Table A.1 shows that a 1 SD higher homeownership segregation using this measure is associated with a 0.15 SD lower intergenerational mobility of below median income children relative to the above median income children. The third measure uses the homeownership segregation using a dissimilarity index. The dissimilarity index 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 3 in Table A.1 shows that a 1 SD higher homeownership segregation using this measure is associated with a 0.25 SD lower intergenerational mobility of below median income children relative to the above median income children. All three measures show that CZs with homeownership segregation have lower relative intergenerational mobility of below median income children relative to the above median income homeowners. The results are

both qualitatively and quantitatively in line with the baseline homeownership segregation measure.

While the estimates in Table 2 Panel A using the specification in Equation 14 show an adverse impact on the below-median income children, we cannot interpret the β estimate causally. Hence, to analyze the causal impact on homeownership segregation on children's upward mobility, we instrument for homeownership segregation using the planned portions of the interstate highway system in 1947 as a source of exogenous variation in homeownership segregation. This instrument is based on Baum-Snow (2007) who finds that the aggregate population of central cities in the U.S. declined despite an overall increase in the population growth of metropolitan areas as a whole. First, Baum-Snow (2007) documents that suburbanization was higher in metropolitan areas that received more new highways between 1950 and 1990 compared to those receiving fewer highways during this period. To address potential endogeneity concerns, he uses the number of planned highways in a 1947 national interstate highway plan as an instrument. As Baum-Snow (2007) notes, the highways in the 1947 plan were meant to connect far away places partly based on military and naval establishments and not to facilitate local commuting. Thus, some metropolitan areas received more highways simply because they were located close to these areas. We construct the instrument bsed on the data provided in Baum-Snow (2007). The instrument is based on the number of highways passing through a commuting zone as the number of "rays" emanating from the central cities for each MSA, which we then aggregate to the CZ level for our analysis. While the instrument addresses empirical identification issues, below we will show that the instrument is also closely related to the economic phenomenon we are interested in.

The specification instrumenting for homeownership segregation is as follows. The first stage is:

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

The second stage is:

$$\text{IGM}_{p,CZ} = \alpha_{c(CZ)} + \beta \times \widehat{\text{Homeownership}}\ \text{Segregation}_{2000,CZ} + \gamma X_{CZ} + \epsilon_{CZ} \tag{16}$$

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

using the specification:

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

$\text{IGM}_{p,CZ}$ is the causal effect of growing up in a CZ for children with parents at the p^{th} percentile of the national income distribution. We focus on the 25^{th} and 75^{th} percentile and also the relative difference between the two: causal upward mobility of children with parents at the 25^{th} relative to children of parents at the 75^{th} percentile. The upward mobility measure used 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^{th} (or alternatively 75^{th}) percentile 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. Dependent variables and the instrument have been standardized (z-scored). The baseline controls are included, namely, CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. All regressions include census division fixed effects. Observations are weighted by the number of housing units in a CZ in 2000 to get representative estimates of the U.S. population. Standard errors are clustered at the state level.

Highway Rays_{CZ}, representing the the planned portions of the 1947 highway plan, is used to instrument for homeownership segregation in 2000, that is, when the children in the underlying sample used to estimate the upward mobility were growing up. To be a valid instrument, first we require that the planned rays be a good predictor of homeownership segregation (rank condition). Figure 6 shows that the number of planned highways is a strong predictor of homeownership segregation in 2000. The regression estimate of planned highways on homeownership segregation yields a coefficient of 0.40 (s.e = 0.06) and R-squared = 0.17.

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 to facilitate metropolitan area development. 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.

Our choice of instrument is also motivated by economic considerations and the historical phenomenon we are trying to capture. Baum-Snow (2007) shows that there was nearly a 17% decline in population in city centers due to the highway construction between 1950 and 1990. Boustan and Margo (2013) finds that the "white flight" to the suburbs was accompanied by a coincident increase in Black homeownership in cities between 1940 to 1980. Shertzer and Walsh (2019) find evidence for "white flight" even in prior periods between 1900–1930. Boustan and Margo (2013) instruments for the white flight using the same instrument as in Baum-Snow (2007) and also documents an increase in Black homeownership in city centers. Indeed, in Table A.3 column 2 shows that CZs with higher exposure to the planned 1947 highways have 1.8 pp lower white population in inner cities even in 2000. Since we hypothesize that the white flight to white-only suburbs in the pre-1970 period was quickly accompanied by stringent housing regulation post the 1968 Federal Fair Housing Act, we instrument for CZs that had already experienced this segregation due to suburbanization, and Baum-Snow (2007) provides an ideal instrument for the economic phenomenon we are interested in.

In Table 2, Panel B, we formally examine how homeownership segregation causally impacts intergenerational mobility using the instrumental variable strategy. Column 1 shows the first stage as in Equation 15. The first stage yields an F-stat of 16.53, indicating that the planned highways of 1947 are a strong predictor of homeownership segregation. In columns 2–4 we see the results of the reduced form. There is a negative effect on the intergenerational mobility of the children of below-median income parents but no effect on children of above-median parents. Higher homeownership segregation leads to a 0.14 SD decrease in intergenerational mobility of below-median income children. A similar increase in homeownership segregation also leads to a 0.13 SD decrease in the intergenerational mobility of children of below-median income parents relative to children of above-median income parents. Columns 5–7 present the results of the 2SLS IV regression. The direction of these results are similar to those seen before, but the point estimates are larger. A 1 SD higher homeownership segregation leads to a 0.74 SD decrease in intergenerational mobility of below-median income children, and a 0.69 SD lower relative intergenerational mobility

(below-median income relative to above-median income families).

To summarize, the OLS estimates in Panel A in Table 2 show that the place-based (referred to as the causal) effect of growing up in a CZ with higher homeownership segregation is more adverse for children from low-income families. In Panel B, we showed that we can interpret this effect causally: higher homeownership segregation in a CZ leads to adverse place-based effects on children's upward mobility. We also examine whether the adverse effect on upward mobility is driven by the selection of the kind of families that reside in high homeownership segregation CZs. Table A.2 examines the impact on the non-causal upward mobility. For the non-causal intergenerational mobility measures, Chetty and Hendren (2018a) restrict to the permanent residents and calculate the effect on average upward mobility for children residing in a CZ. Unlike the strong impact on place-based effects that we document above, we find no effect on the non-causal average upward mobility. The effect on the permanent resident residents can be thought of as the combined effect of the place-based effect of a CZ and the selection effect coming from differences in the kind of families that reside in the CZ. Given the zero (statistically insignificant) effect of homeownership segregation on the non-causal upward mobility measure, one can argue that the selection effects are if anything positive (such that the combination of the place-based effect documented in Table 2 and the selection estimate is 0 as estimated in Table A.2).The OLS point estimate of -0.009 in column 1 in Table A.2 is also close to zero and much smaller than the point estimate of -0.183 in column 1 in Table 2 Panel A further confirming the positive selection bias. Thus, our baseline finding that homeownership segregation causes a decline in upward mobility operates primarily through place-based channels and cannot be attributed to negative selection of the kind of families that reside in these CZs.

4.2.1. Segregation of rich and poor homeowners

Figure 2 showed that homeownership segregation captures how segregated the rich homeowners are from poor households. To further refine this idea of the segregation of the above median income homeowners from remaining households, we construct two additional measures of segregation. The segregation of the homeowners with below median family income is the two-group entropy index where the below median income homeowners are compared to the remaining households (above median income homeowners and renters and the below median income renters). The above median

income homeownership segregation is analogously calculated. We want to capture whether it is the below median income families that are all segregated into one area, thereby being segregated from the "good" areas, or is it that the above median income homeowners segregate into good areas which the children from below median income families are not able to access. As shown in Table 1, the above median homeownership segregation is at 0.08. Similarly, for the segregation of below median income homeowners, we calculate the entropy of the below median income homeowners against the remaining households, namely, the above median income homeowners and renters and the below median income renters. The average value of this entropy measure is 0.05.

Table 3 explores whose segregation matters more, the rich homeowners or poor homeowners, for children's upward mobility. Column 1–2 in Table 3 examine segregation of rich homeowners from the poor (both homeowners and renters). The odd columns show the OLS estimates and the even columns show the 2SLS IV estimates. Columns 1 and 2 both confirm that this segregation is associated with a more adverse impact on the relative upward mobility of the children from low-income families relative to children from high-income families. In columns 3–4 we look at the impact of the segregation of rich homeowners from poor homeowners and find similar effects. In columns 5–8 on the other hand, we find a muted effect on the relative upward mobility. The segregation of the below median income homeowners seems to have no effect on the relative intergenerational mobility. These results echo the findings in Shertzer and Walsh (2019) who find evidence for "white flight" and increased segregation between 1900–1930. They also find that the rise in segregation was largely caused by white households. Our findings emphasize it is the segregation of the rich homeowners and not the poor that adversely affects upward mobility.

4.2.2. Homeownership segregation from 1940–2010 and upward mobility today

We established that homeownership segregation — measured as of 2000 when the children in the upward mobility measurement sample were growing up — causes an adverse impact on place-based effects of growing up in a CZ. Now we turn to examine whether upward mobility effects today can be explained by historical homeownership segregation between 1940–2010. We are interested in the following question: can we explain the current spatial patterns of upward mobility based on historical homeownership segregation? Particularly, can we trace back effects on the place-based

factors affecting children *today* to homeownership segregation between 1940–2010.

With this in mind, we repeat the specification in Equation 14 but replace the homeownership segregation in 2000 by the respective measures between 1940-2000. The results are presented in Figure 7, Panel A with the difference in the relative intergenerational mobility of children with parents at the 25^{th} percentile relative to those with parents at the 75^{th} percentile as the dependent variable. The estimates from the OLS specification for 8 separate regressions are shown. The figure shows the coefficient on the respective homeownership segregation for 1940, 1950, 1960, 1970, 1980, 1990, 2000, and 2010 with the bars representing the confidence intervals at the 5% level. Coefficients significant at the 5% level are shown in blue and in gray otherwise. Since we want to compare across time periods we retain the original entropy-based homeownership segregation measures and do not standardize (z-score) the homeownership segregation variables. Consistent with the results in Table 2 we see that CZs with higher homeownership segregation in 2010 have more adverse effects on upward mobility for children belonging to low-income families relative to those from high-income families. This effect is similar when we look at homeownership segregation in 1990, 1980, and even 1970. That is, homeownership segregation even as far back as the 1970s can explain the adverse effects of growing up in these CZs today. Of note, the figure also indicates a sharp departure from homeownership segregation patterns before 1970 (1940–1960). In all, the event study analysis suggests that upward mobility of children today can be traced to the homeownership segregation patterns in the 1970s.

In Figure 7, Panel B, we show the corresponding 2SLS IV estimates where homeownership segregation in each decade is instrumented with the planned portion of the interstate highway from the 1947 plan. That is, we repeat the specification in Equation 16 but replace the homeownership segregation in 2000 by the respective measures between 1940-2000. Again, the dependent variable is the difference in the relative intergenerational mobility of children with parents at the 25^{th} percentile relative children with parents at the 75^{th} percentile as the dependent variable. The estimates from the 2SLS IV regression for 8 separate regressions are shown with the coefficient on the respective homeownership segregation for 1940, 1950, 1960, 1970, 1980, 1990, 2000, and 2010. As before, the bars represent confidence intervals at the 5% level and coefficients significant at the 5% level are shown in blue and in gray otherwise. As before, for comparison across time period

we retain the original entropy-based homeownership segregation measures and do not standardize (z-score) the homeownership segregation variables. Consistent with the results in Table 2 we see that CZs with higher homeownership segregation in 2010 have more adverse effects on upward mobility of children belonging to low-income families relative to high-income families. This effect is similar when we look at homeownership segregation in 1990, 1980, and even 1970. That is, homeownership segregation even as far back as the 1970s can explain the adverse effects of growing up in these CZs today. The figure also indicates a sharp departure from homeownership segregation patterns before 1970 (1940–1960). Though there is some explanatory power for the homeownership segregation in 1960 (significant at the 5% level) on current upward mobility, the magnitude of these effects is much smaller compared to homeownership segregation between 1970–2010. We hypothesize that the introduction of the 1968 Fair Housing Act was accompanied by a concurrent increase in land-use land-use regulations in suburban areas post-1970 that restricted development (Trounstine, 2020; Shertzer et al., 2018; Been, 2018; Elmendorf, 2019; Fischel, 2004). This increase in land-use regulation possibly explains why we see that homeownership segregation since the 1970s can explain the adverse effects of homeownership segregation on children's upward mobility, even today. We next relate homeownership segregation to the restrictiveness of housing regulation.

4.3. The role of restrictive housing regulation

The main takeaway from the previous subsection relating upward mobility of children growing up today to historical homeownership segregation indicate that only homeownership segregation post-1970 has significant explanatory power in explaining current geographic differences in upward mobility. Based on the discussion in Section 2, we hypothesize that these patterns are consistent with the rise in more stringent land-use regulation starting the 1970s that plausibly arose after the introduction of the 1968 Federal Fair Housing regulation as local communities and governments to adopted alternate ways to maintain racial homogeneity in their neighborhoods. Hence, we now examine whether homeownership segregation is associated with more restrictive housing regulation today, preventing lower-income households from moving to better neighborhoods within CZs.

Table 4 relates homeownership segregation to housing restrictions. The housing restriction index

at the CZ-level is measured as of 2006[11] is from Gyourko et al. (2008). Gyourko et al. (2008) use a survey-based method and conduct a nationwide survey of residential land use regulation for nearly 2,600 communities and develop an index of stringency of local regulatory environments. They also provide a series of sub-indices that captures different aspects of the regulatory environment such as local political pressure, density restrictions, local project approval, approval delay, state court involvement, local zoning approval, supply restrictions, and state political involvement.

Table 4 links homeownership segregation to housing stringency. The OLS specification corresponds to Equation 14 with the dependent variable replaced by the housing stringency index. Dependent variable z-scored. Column 1 shows that a CZ with a 1 SD higher homeownership segregation is associated with a 0.174 SD higher stringency in housing regulation. In column 2, the reduced form estimates for Equation 17 are shown. CZs with a 1 SD higher exposure to planned highways in the 1947 plan are also associated with 0.143 SD higher stringency in housing regulation in 2006. Similarly, using the preferred 2SLS IV specification in Equation 16 with the housing stringency dependent variable, we see that a 1 SD higher homeownership segregation is associated with a 0.723 SD higher value on the housing stringency index in 2006. Together, these estimates thus show that areas that had more planned highways as per the 1947 plan, have more stringent housing regulations today. These CZs also have lower white population in city centers today (Table A.3) and as documented by (Baum-Snow, 2007) saw a greater population outflow from city centers between 1950-1990, particularly of the white population (Barker and Miller, 2009).

Figure 8 shows the components of the housing stringency index. The figure shows the coefficients for the 2SLS IV regression corresponding to column 3 in Table 4 with each individual sub-index as the dependent variable. The coefficient on homeownership segregation (in 2000) is shown. Bars represent the confidence intervals at the 5% level. The original combined index corresponding to column 3 in Table 4 is also shown at the top in red. We see that most of the increase in restrictive housing is attributable to local political pressure. Other factors such as state political involvement, local zoning approval, etc. do not show a similar with homeownership segregation. This relative importance of local housing restrictions is consistent with our hypothesis that communities use local

[11] Although we would ideally prefer to measure housing restrictiveness in 2000, that is, when the children were growing up, this is the earliest available year for which data is provided by Gyourko et al. (2008). Given the persistence of housing regulations we believe this does not pose a challenge for our analysis.

housing regulation as a way to seclude low-income and minority borrowers from their neighborhoods.

An important aspect of restrictive housing regulation in the U.S. is the emphasis placed by local bodies on single-family zoning. Policymakers and commentators contend that single-family zoning requirements prevent economic mobility of disadvantaged households (Kain and Quigley, 1972; McDonald, 1974; Menendian and Gambhir, 2018). Prior work has argued that single-family zoning ends up in more expensive housing, which in turn can keep many low- and middle- income families from owning homes. Such effects may be particularly detrimental to communities of color, limiting the supply of homes and subsequently depressing homeownership of low-income households. A related phenomenon in the U.S. is that home-owned units are predominantly single-family structures. Since homeownership is closely tied to the presence of single-family homes, we examine how the presence of single-family homes affects children's upward mobility. First, we use the specification in Equation 8 and 16 with the endogenous regressor replaced by the fraction of single-family detached homes. Table 5, Panel A examines the effects due to the level (fraction) of single family detached homes in a CZ and presents the OLS and 2SLS IV estimates. Column 1 shows the first stage and indicates that the planned 1947 interstate highways are not a strong predictor of the fraction of single-family homes in a CZ. Further, the estimates from the OLS specification shown in columns 2–4 further indicate that CZs with a higher fraction of single-family detached homes have *higher* upward mobility for children from both low-income as well as high-income families. In a relative sense too, the gap between the poor and rich children narrows in areas with a high fraction of single-family detached homes. The finding is counter to popular rhetoric that has focused on the detrimental effects of the level of single-family detached homes. The 2SLS IV estimates are shown for completeness, but given the weak first stage cannot be interpreted reliably.

In Panel B, we instead look at the segregation of single-family detached homes. Column 1 indicates that the instrument is a strong predictor of single-family detached homes in 2000 (F-stat=8.143). A 1 SD higher exposure to the planned highways leads to a 0.161 SD higher segregation of single-family detached homes in 2000. The OLS estimates in columns 2–5 indicate that the place-based effect of growing up in a CZ today is lower for children from low-income families but not children from high-income families. When we instrument with the planned 1947 interstate highway, point estimates are stronger with a 1 SD higher segregation of single-family detached homes leading

to a 0.919 SD lower place-based effect for children from low-income families. For high-income families, this effect is small and statistically insignificant (column 2). Even in a relative sense, a 1 SD higher segregation of single-family detached homes leads to a 0.74 SD decline in upward mobility for children from low-income families relative to their counterparts from high-income families. Overall, our results indicate that the segregation of single-family homes as opposed to the level of single-family homes determines children's upward mobility.

Finally we examine the channel that links housing restrictiveness to children's upward mobility. Our baseline analysis documents that growing up in a CZ with higher homeownership segregation has a negative impact on children's average household income rank when adult. Katz (2015) suggests that the impact on income largely works through the quality of education and schools. We hence hypothesize that restrictive housing limits children's access to good quality schools for low-income households.

Panel A in Table 6 shows that CZs with higher homeownership segregation face more citizen opposition to housing as citizens fear crowding in schools. Particularly, as Gyourko et al. (2008) notes, opposing school crowding may be an indirect way of opposing low-cost housing by citizens. Citizen opposition importance is provided by Gyourko et al. (2008) and measures how important is school crowding for citizens' opposition to low-cost housing in their CZ, measured as of 2006. Responses are coded from 1–5 and we z-score this variable and use it as the dependent variable in Panel B. Indeed, we find that in CZs with higher homeownership segregation, the importance placed on school crowding is higher. In column 2, using the reduced form estimate, we see that in CZs with a 1 SD higher homeownership segregation, there is a 0.173 SD higher opposition to school crowding. Our preferred 2SLS IV estimate in column 3 shows that in CZs with a 1 SD higher segregation, the importance placed on school crowding is 0.871 SD. These results point to greater citizen's concerns regarding school crowding.

Panel B in Table 6 links homeownership segregation to overall school quality (as proxied by high-school dropout rate in 2000). The OLS specification corresponds to Equation 14 with the dependent variable replaced by the housing stringency index (z-scored). In column 1, we see muted effects. However, in column 2, the reduced form estimates for Equation 17 are shown. CZs with a 1 SD higher exposure to planned highways in the 1947 plan are also associated with 0.201 SD higher

stringency in housing regulation in 2006. Similarly, using the preferred 2SLS IV specification in Equation 16 with the school dropout rate as the dependent variable, we see that a 1 SD higher homeownership segregation is associated with a 1.268 SD higher dropout rate. Thus consistent with the poorer education outcomes documented in Figure A.1, CZs with high homeownership segregation also have poorer quality schools.

We next shed light on who suffers the most from this overall decline in CZ-level school quality by examining the impact on high-school attainment for children from poor and rich families. Figure A.1 examines whether the children growing up in a CZ have a high-school diploma, when adult (that is at 26 years of age). This data is provided by Chetty et al. (2019) and is for the cohorts born between 1978–1983. Parents' income is measured as of 1996-2000, that is, when the children are growing up (as before). Thus, these are the children also captured by the upward mobility measures in Chetty and Hendren (2018a). The figure shows the coefficients for the 2SLS IV regression using the specification in Equation 16 where the dependent variable measures the CZ-level probability that a child with parents at the p^{th} percentile has a high-school diploma (measured when the child is 26 years of age). The coefficient on homeownership segregation (in 2000) is shown. Bars represent the confidence intervals at the 5% level. Coefficients significant at the 5% level are shown in blue and in gray otherwise. As before, we look at $p = 25$ and $p = 75$ to correspond to children with below-median and above-median income in the national income distribution between 1996–2000. CZs with higher homeownership segregation, children (both men and women) from low-income families are less likely to have a high school diploma. In contrast, we see no differences in likelihood of attaining a high-school diploma for children from high-income families. Thus, while segregation negatively affects poor children's access to high quality schools, it seems to have no impact on high-income children. These results suggest that schooling, specifically whether a child attains high school diploma, is the channel linking homeownership segregation to adverse effects on income when adult.

4.3.1. The Federal Fair Housing Act of 1968 and Homeownership Segregation

The introduction of the Fair Housing Act under Title VIII of the Civil Rights Act of 1968 ended legal discrimination. We now examine whether the Federal Housing Act had any discernible effect

on homeownership segregation. Data from Trounstine (2020) on Federal Housing Act lawsuits from 1970–2010 is aggregates at the CZ-level with a binary indicator for whether a court in a given CZ (specifically in a city within the CZ) has had its first Fair Housing Act lawsuit. As in Trounstine (2020) we restrict to only lawsuits that have had a court decision to avoid frivolous lawsuits.[12]

Table 7 links homeownership segregation to whether a given CZ has decided on a Fair Housing Act lawsuit as of 2000. The OLS specification corresponds to Equation 14 with the dependent variable replaced by the binary indicator for a decision on the Fair Housing lawsuits. In column 1, we see that a CZ with a 1 SD higher homeownership segregation is associated with a 17.8 percent higher likelihood of a Fair Housing lawsuit in a CZ. In column 2, the reduced form estimates for Equation 17 are shown. CZs with a 1 SD higher exposure to planned highways in the 1947 plan are also 9.9 percent more likely to have had a Fair Housing Act lawsuit between 1968–2000. Similarly, using the preferred 2SLS IV specification in Equation 16, we see that a CZ with a 1 SD higher homeownership segregation is 51 percent more likely to have had a Fair Housing Act lawsuit. Overall, these results show that Federal Fair Housing Act lawsuits are more prevalent in CZs with higher homeownership segregation in 2000. Tying this in with the finding in the previous subsection that showed that high homeownership segregation CZs also had more restrictive housing regulation in 2006, our results seem to indicate that in CZs with higher homeownership segergation, citizens availed of the the Federal Fair Housing Act. Plausibly, these lawsuits are indicative of more discriminatory housing practices within the CZs.

There are two ways to interpret the Federal Fair Housing Act lawsuits. Trounstine (2020) uses the Federal Fair Housing Act lawsuits as a way to gauge the changes in land use policy over intervening decades. Thus, one could argue that the Federal Fair Act lawsuits helped address discriminatory practices and corrected discrimination by market participants. Alternatively, one could interpret the lawsuits as a gauge of the prevalence of discriminatory practices (as we do). To shed light on this, we next examine the Federal Housing lawsuits in each decade from 1960–2010 and their impact on homeownership segregation in the next decade (controlling for the homeownership segregation in the previous decade). Table A.4 presents the results. The dependent variable is

[12] Trounstine (2020) does not have the outcome of the lawsuits for the full sample and hence we do not condition on whether the lawsuit was successful or not.

an indicator for a Fair Housing Lawsuit lawsuits filed between 2000–2010 on the homeownership segregation in 2010 and the regression also controls for homeownership segregation at the beginning of the period in 2000. Results shown in column 1 indicate no impact on homeownership segregation. Columns 2–6 similarly repeats this regression for all the intervening decades between 1970–2000 and finds no effect. We also find no relationship between whether a lawsuit under the Fair Housing Act was filed between 1970–2010 and homeownership segregation in 2010 in column 6 (consistent with Table 7). That is, the Fair Housing Act does little to change homeownership segregation over the intervening decades from 1970 to 2010, explaining the persistence of homeownership segregation and its adverse effect on the upward mobility of children even today. Our findings indicate that the Federal Fair Housing Act lawsuits likely reflect the prevalence of discriminatory housing practices as opposed to progress made towards eliminating such discriminatory practices post 1968.

4.4. Long-term effects: Adult children's residential mobility

We conclude by showing that the effects of homeownership segregation can perpetuate into future generations. Chetty et al. (2020) document that there are significant differences in placed-based effects on children's adult incomes across census tracts. That is, growing up in a particular neighborhood (census tract) determines children's average income when they are adult. Further, the previous subsection documented that CZs with high homeownership segregation also have more stringent housing regulation. Hence, we now examine whether these children are able to move to better neighborhoods when they are adult. Chetty et al. (2019) follows the same cohort as in the baseline upward mobility measures for born between 1978–1983 and provides outcomes for where the children reside when they are adult (age 26). These are the children also captured by the upward mobility measures in Chetty and Hendren (2018a). Figure 9, Panel A examines whether these children are able to move to better neighborhoods, defined as census tracts with poverty rates less than 10%. The figure shows the coefficients for the 2SLS IV regression using the specification in Equation 16 with the dependent variable measured at the CZ-level as the probability of a child with parents at the p^{th} percentile moving to a census tract with low poverty rates. The coefficient on homeownership segregation (in 2000) are shown. Bars represent the confidence intervals at the 5% level. Coefficients significant at the 5% level are shown in blue and in gray otherwise. As

before, we focus on $p = 25$ and $p = 75$ corresponding to children with parents with below-median and above-median income in the national income distribution between 1996–2000. Panel A shows that in CZs with higher homeownership segregation, children (both men and women) from low-income families are not able to move to low-poverty (good neighborhoods) when they are adult. In contrast, children from high-income families are *more* likely to move to low-poverty neighborhoods when they are adult. This is despite the fact that both low-income and high-income children are as likely to stay in the same CZ. On average, both high- and low-income children in CZs with higher homeownership segregation are more, but equally, likely to stay in their childhood CZ. Given the strong place-based effects on children (Chetty and Hendren, 2018b), the results in Figure 9 indicate that homeownership segregation widens the inequality between children from low-income families relative to high-income families, possibly even perpetuating childhood inequalities through place-based effects into future generations.

5. Conclusion

This paper shows that restrictive housing regulation since the 1970s has lowered the upward mobility of children in the U.S. Our paper introduces a new measure of homeownership segregation. Using the planned portion of the national interstate highway in 1947 as an instrument for homeownership segregation in 2000, we show higher homeownership segregation lowers upward mobility among low-income families in a CZ. We find that place-based factors and not the adverse selection of families explains the decline in upward mobility. Further, the effects are due to the segregation of the rich homeowners from the poor households.Upward mobility today is driven by homeownership segregation since the 1970s, a period that also coincided with the introduction of the Fair Housing Act in 1968 that made housing discrimination illegal but also concurrently increased restrictive housing regulation.

As a second part of the analysis, we hence hypothesize that more restrictive housing regulations since the 1970s prevent lower-income households from moving to better neighborhoods within CZs. Indeed, commuting zones with higher homeownership segregation are more likely to have restrictive land-use patterns in 2006. Given the prominence of single-family zoning in housing restrictions,

we distinguish between segregation and level of single-family detached housing. Segregation and not the fraction (level) of single-family detached homes in a CZ explains the adverse effect of homeownership segregation on upward mobility.

The introduction of the Fair Housing Act under Title VIII of the Civil Rights Act of 1968 legally put an end to discrimination in the sale, rental, and financing of homes but did little to change homeownership segregation over the intervening decades from 1970 to 2010. Instead, Federal Fair Housing Act lawsuits are more prevalent in CZs with higher homeownership segregation in 2000 possibly indicating the prevalence of greater discriminatory housing practices even today.

Overall, our paper highlights that land-use restrictions increase the segregation of low-income homeowners and are detrimental to low-income children's upward mobility. This paper emphasises a novel aspect of segregation, namely, homeownership segregation. The homeownership segregation is important for outcomes of children, especially for below median income families. The results in this paper challenges, to some extent, the promotion of homeownership in low-income census tracts. Perhaps alternate policies that encourage investment in human capital and "moving out" have higher marginal value in achieving the "American Dream" in the sense of opportunity for children, their education, and their careers. Thus, the analysis suggests bans on exclusionary zoning are necessary and perhaps even the introduction of inclusionary zoning requirements — such as those implemented in New Jersey and Massachusetts — would be more beneficial for improving children's outcomes.

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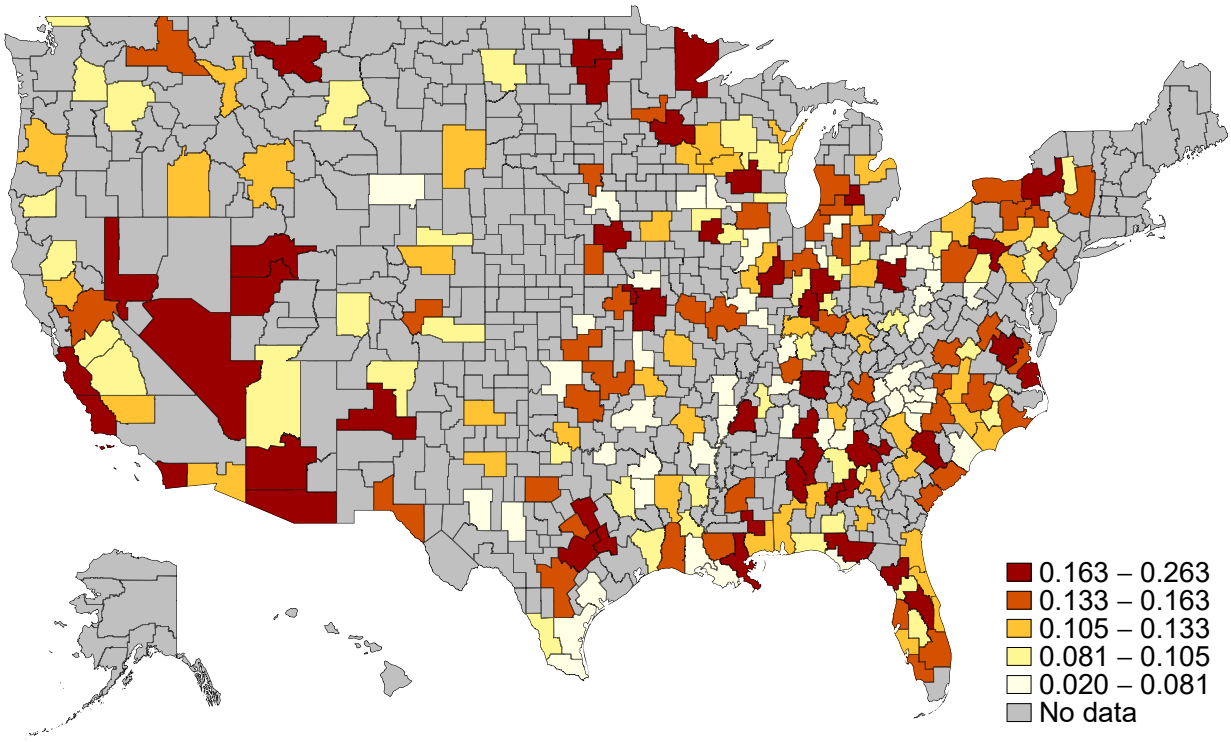
Figure 1. Map of Homeownership Segregation in 2000

The figures below show the heat maps for homeownership segregation (Panel A) and homeownership rate in 2000 (Panel B) at the CZ level. Data are divided into 5 quintiles as shown. 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: Map of Homeownership Segregation 2000



Panel B: Map of Homeownership Rates 2000

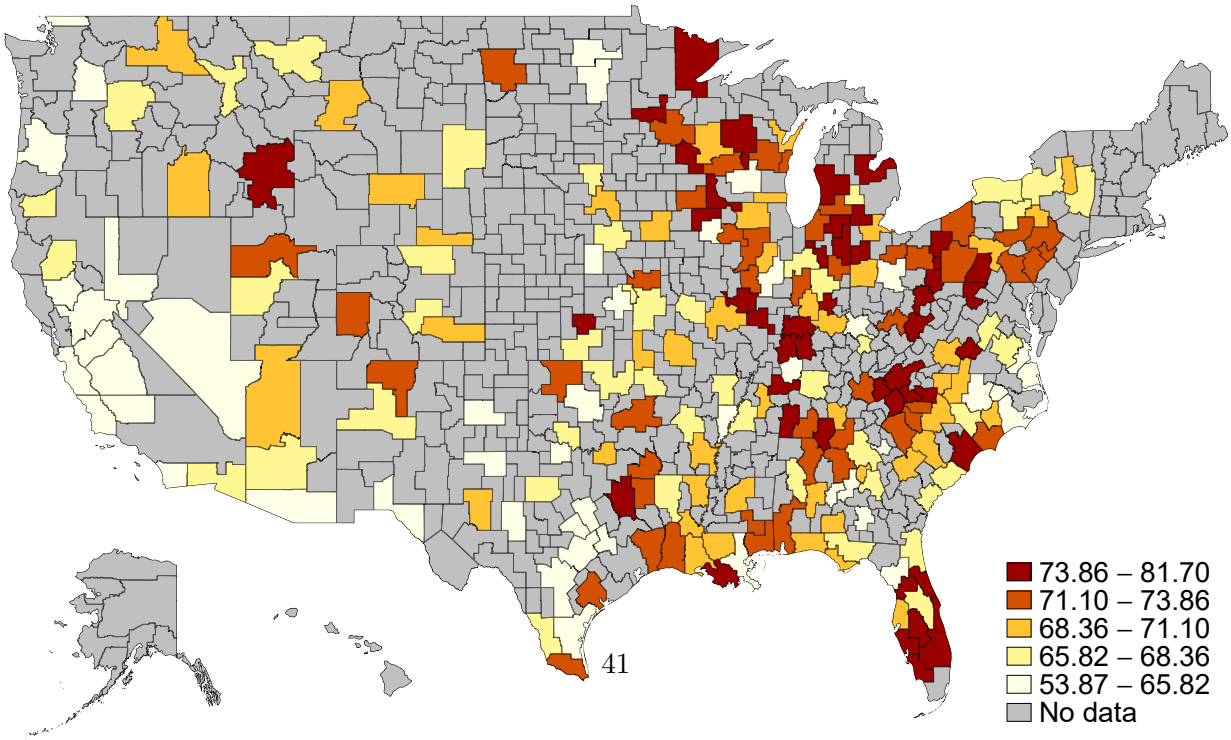
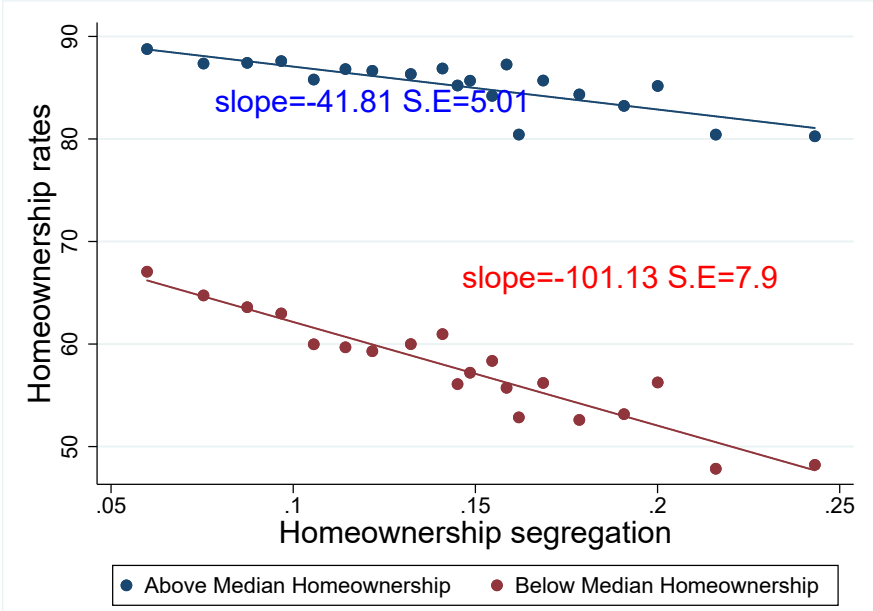
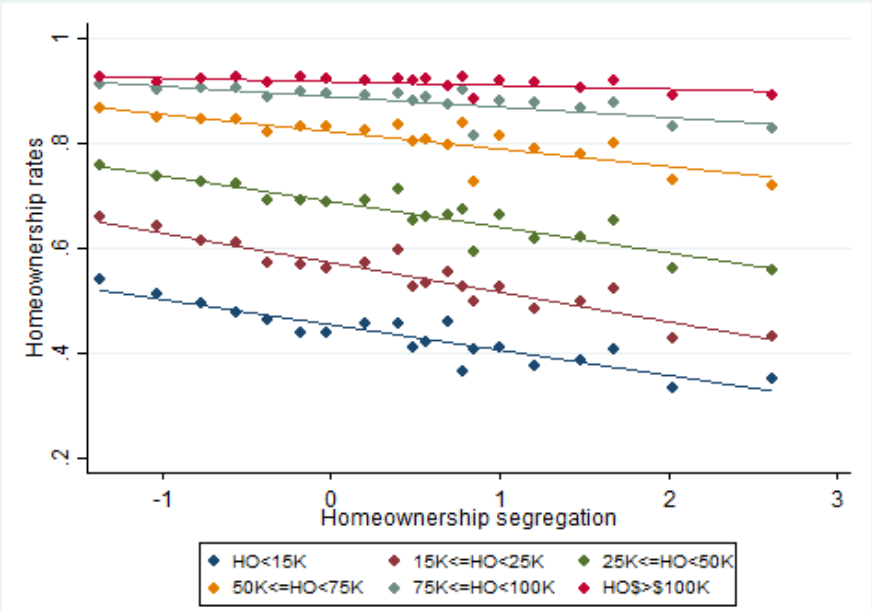


Figure 2. Homeownership Rate and Homeownership Segregation by Income Brackets

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. In Panel A, we plot the bin scatter plot for below and above median income homeownership rates against homeownership segregation. In panel B, we plot 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.



(a) **Above and Below Median Income Brackets**

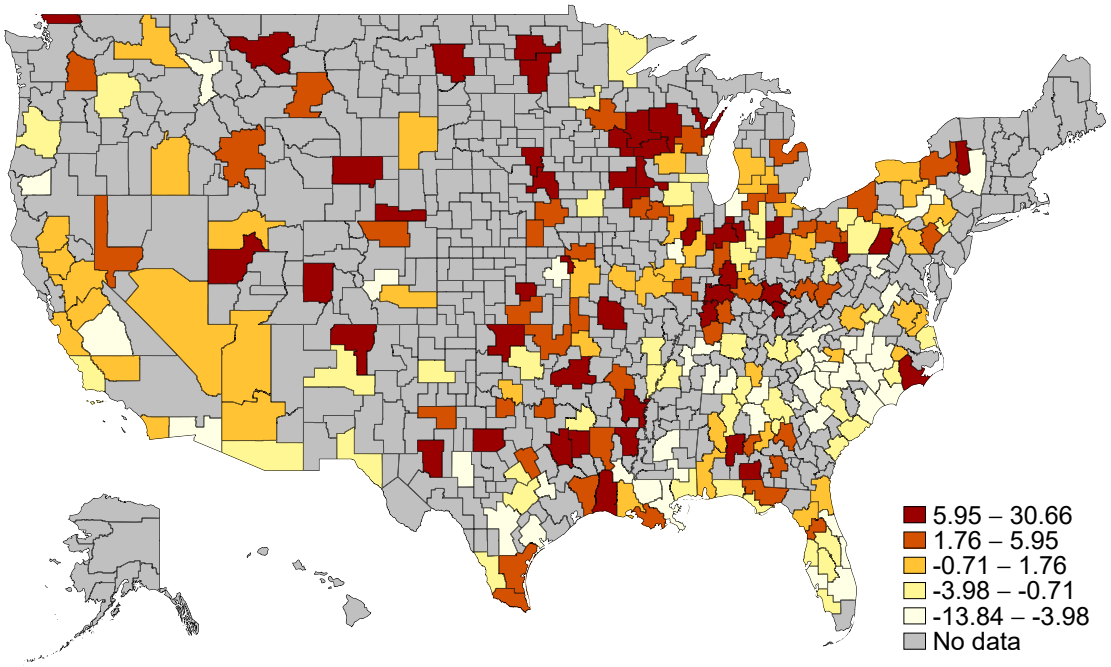


(b) **Granular income brackets**

Figure 3. 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 25th 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

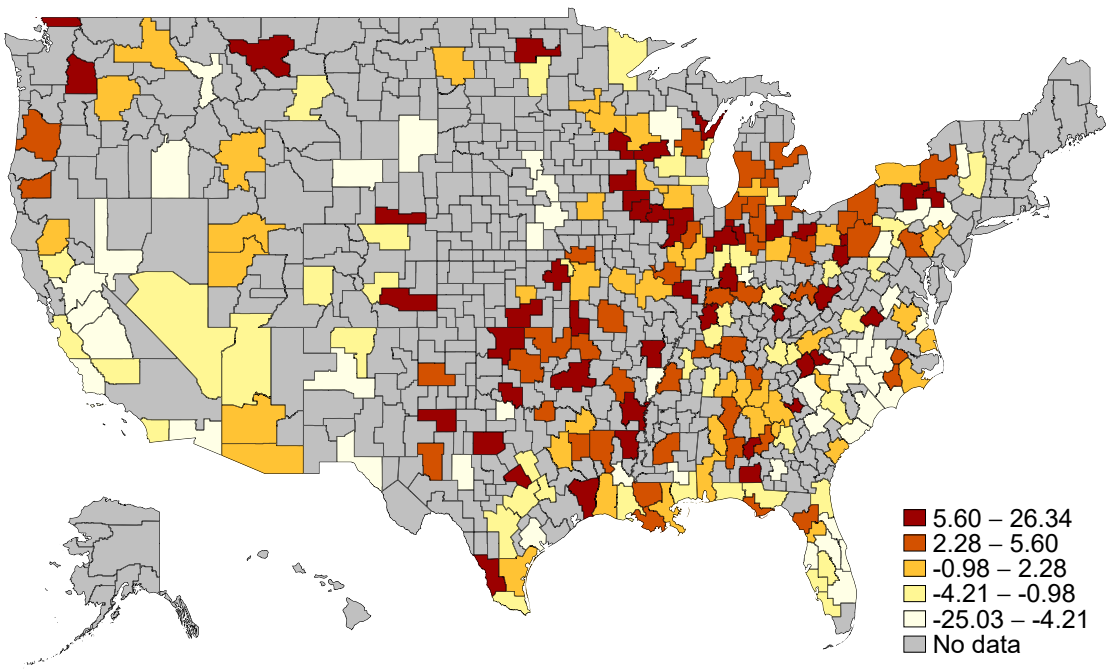
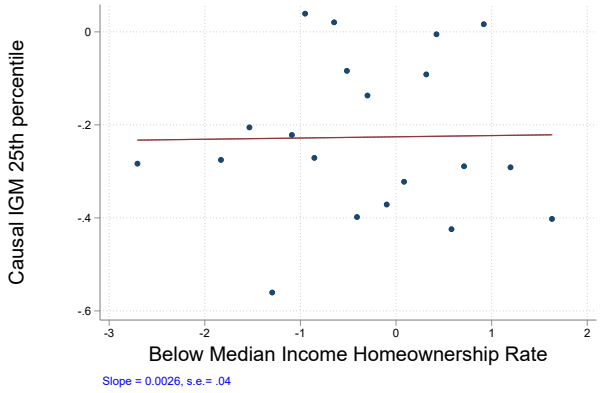
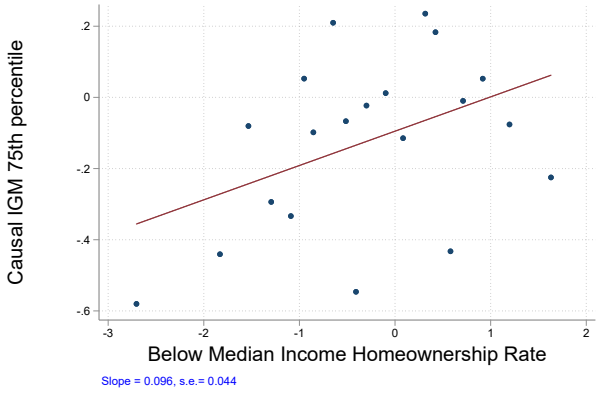


Figure 4. Homeownership Rate and Intergenerational Mobility

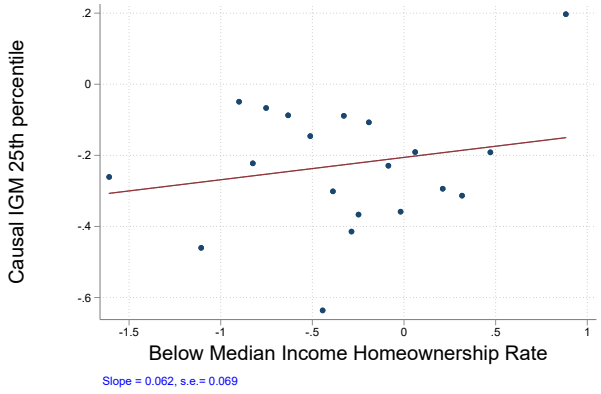
The plots below show the binscatter plots between intergenerational mobility and homeownership rates at the CZ level. The bin scatter plots show average of the y axis for each 5 percentile bin of the data along the x-axis. The causal intergenerational mobility (IGM) measure from Chetty and Hendren (2018a) 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^{th} percentile in panels (a) and (c) (alternatively at the 75^{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. Panels (c) and (d) also include the following control variables: census division fixed effects, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate as of 2000. Homeownership rate data for the below median income and above median income households on the x-axis is from the U.S. 2000 Census. Y-axis and x-axis variables are standardized (z-scored). Data are weighted by the number of housing units in each CZ in 2000.



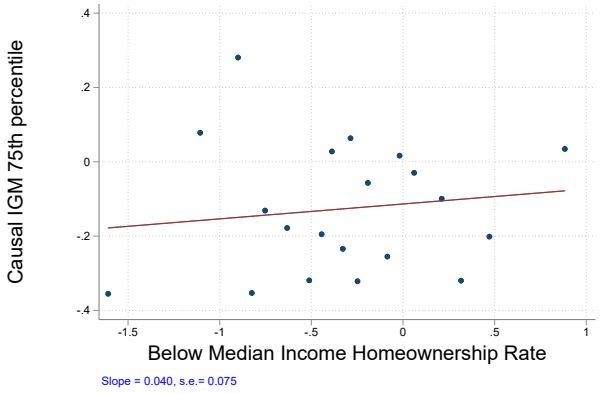
(a) **25^{th} percentile**



(b) **75^{th} percentile**



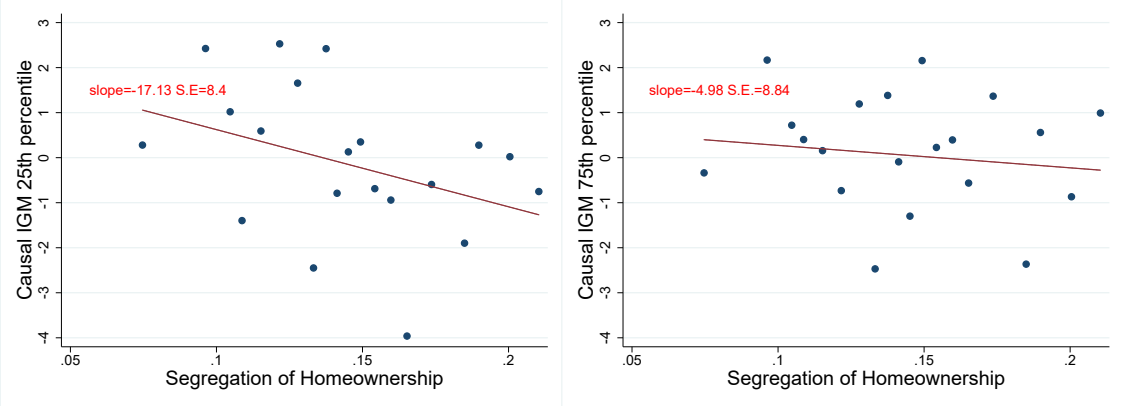
(c) **25^{th} percentile, with controls**



(d) **75^{th} percentile, with controls**

Figure 5. Homeownership Segregation and Intergenerational Mobility

The figures below shows the binscatter plot between intergenerational mobility and homeownership segregation using CZ level data with the average of the y-axis variable for each 5 percentile bin of the data along the x-axis variable. The vertical axis variable is standardized intergenerational mobility from Chetty and Hendren (2018a) which measures the causal component of growing up in a neighborhood on children's household income rank when adult with parental income at the 25^{th} (panel a) and 75^{th} (panel b) percentile of income children cohorts born between 1980–. Parents' income is measured as of 1996–2000. Homeownership segregation (HO segregation) is an entropy-based measure similar to Theil (1972) and calculated using the 2000 Census. Y-axis and x-axis variables are standardized (z-scored). Observations are weighted by the number of housing units in each CZ in 2000.



(a) 25^{th} Percentile (b) 75^{th} Percentile

Figure 6. 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.

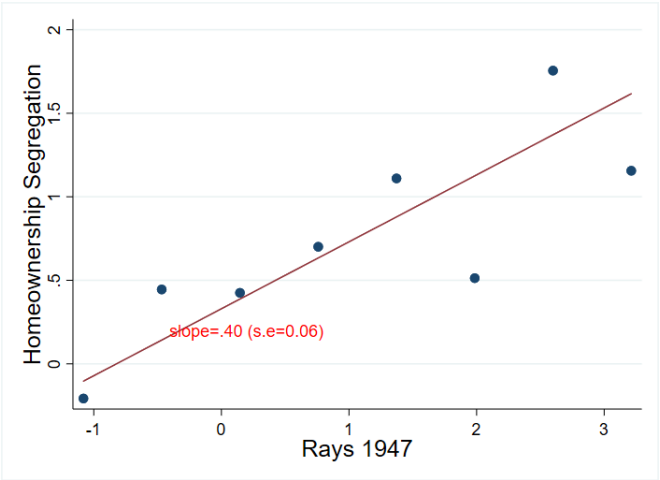
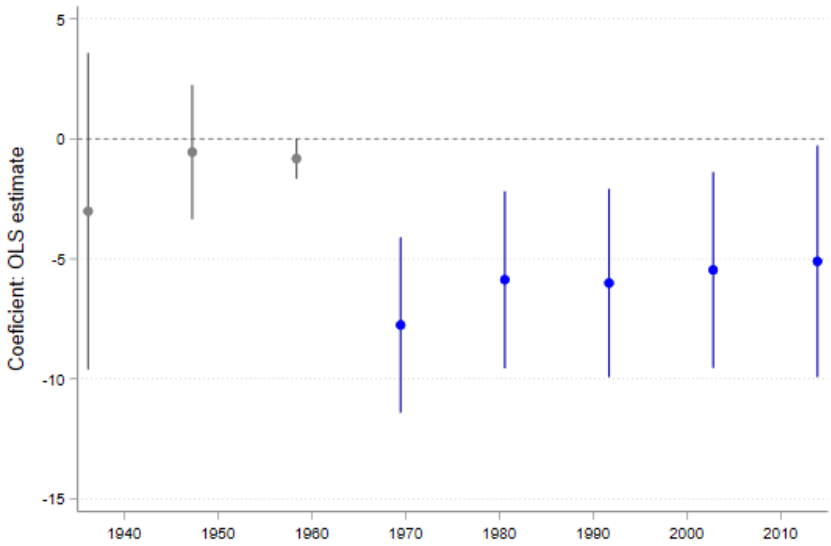


Figure 7. Homeownership Segregation between 1940–2010 and Intergenerational Mobility

This figure plots the OLS [Panel (a)] and the 2SLS IV [Panel (b)] estimates of homeownership segregation between 1940–2010 on the relative difference in intergenerational mobility of children with parents' income at the 25th percentile relative to children with parents at the 75th percentile of the national income distribution. Intergenerational mobility 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 25th (alternatively at the 75th) percentile of the parents' income distribution for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000 with income data from IRS tax returns for cohorts and parents of cohorts. There are 8 underlying regressions, one for each year between 1940–2010 and the coefficient from each regression is plotted on the graphs. Confidence intervals at the 5% level are shown. Homeownership segregation is an entropy-based measure similar to Theil (1972) and calculated using the 2000 Census. In panel (b), homeownership segregation is instrumented with the 1947 highway construction plan. The 1947 Interstate Highway Plan is the standardized number of rays emanating from a commuting zone calculated using data from Baum-Snow (2007). Controls included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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 and standard errors are clustered by state.

Panel (a): OLS Specification



Panel (b): Instrumental variable Specification

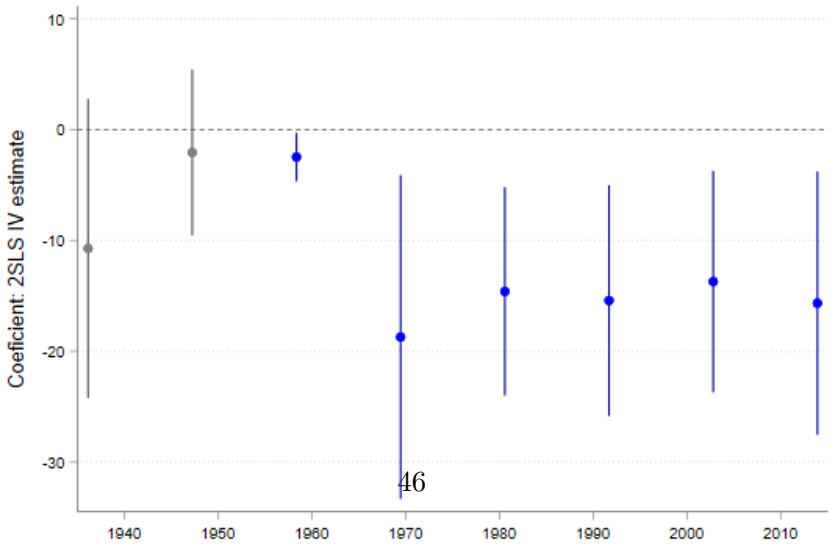


Figure 8. Impact on Housing Restrictions

This figure plots the 2SLS IV estimates of homeownership segregation on housing restrictions. The housing restriction index is measured as of 2006 at the CZ-level and is from Gyourko et al. (2008). Remaining variables are the components of the combined regulation index as indicated.Homeownership segregation is an entropy-based measure similar to Theil (1972) and calculated using the 2000 Census. Homeownership segregation is instrumented by the standardized number of rays emanating from a commuting zone calculated using data from Baum-Snow (2007). Controls included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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. Dependent variables have been standardized (z-scored). Standard errors are clustered by state. Confidence intervals at the 5% level are shown.

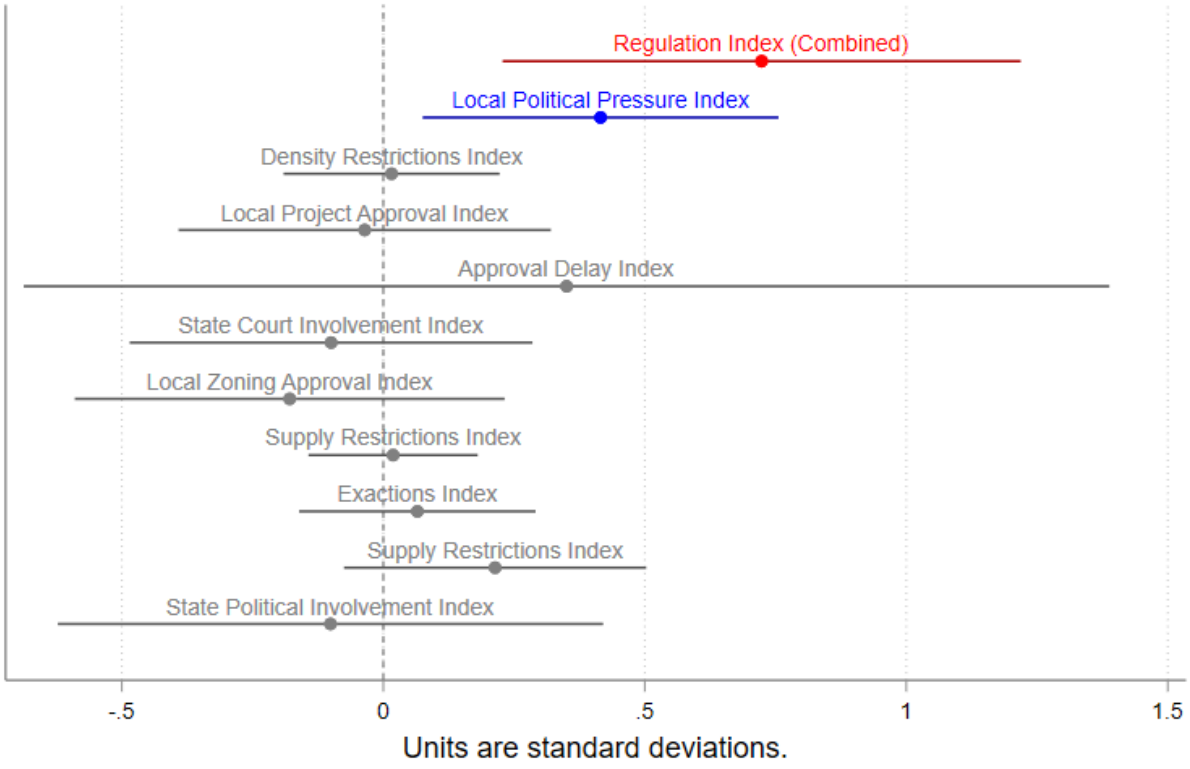
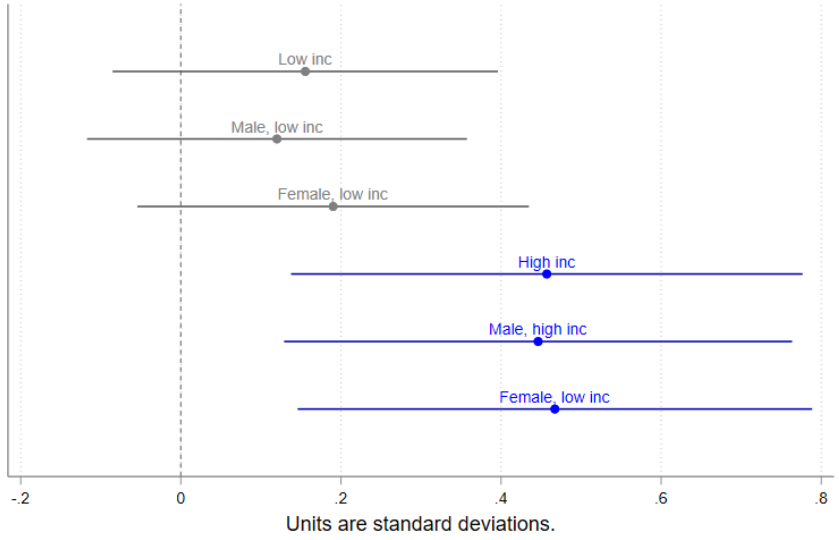
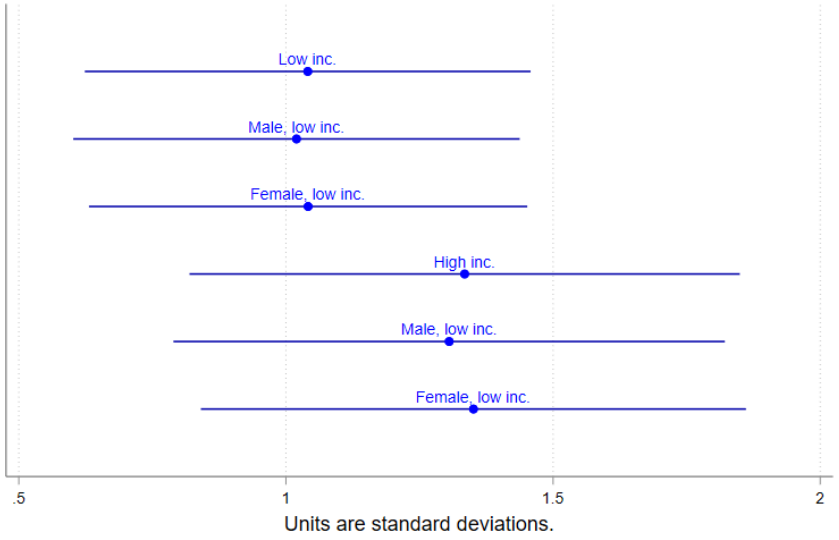


Figure 9. Impact on Residential Mobility

This figure plots the instrumental variable estimates obtained from 2SLS regressions with residential mobility of children when adult against the homeownership segregation instrumented with the standardized number of rays emanating from a commuting zone based on the The 1947 Interstate Highway Plan and calculated using data from Baum-Snow (2007). The dependent variables in Panel (a) is from Chetty et al. (2019) and measures the expected probability that an individual (male/female) with parents with below-median income (25^{th} percentile) or above-median income (75^{th} percentile) of the parental income distribution moves to a low-poverty (poverty below 10%) census-tract. The dependent variables in Panel (b) is from Chetty et al. (2019) and measures the expected probability that an individual (male/female) with parents with below-median income (25^{th} percentile) or above-median income (75^{th} percentile) of the parental income distribution remains in their childhood commuting zone (CZ). Income is measured from IRS tax returns for parents of cohorts born between 1978 and 1983. Location data of adult children is based on the IRS tax returns. Each point on the graph represents the 2SLS IV coefficient for each of these intergenerational mobility measures for the particular race, gender, and income group against the instrumented homeownership segregation. Dependent variable is standardized (z-scored). Controls included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. Data is from the 2000 Census. All regressions include census division fixed effects. Standard errors are clustered at the state level. Data are weighted by the number of housing units in each CZ in 2000.



(a) **Move to a low-poverty (good) neighborhood**



(b) **Stay in the same CZ**

Table 1. Summary Statistics

Panel A presents the summary statistics of the main variables in our analysis. Intergenerational mobility is from Chetty and Hendren (2018a) and estimates impact of 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. (Parents' income is measured as of 1996–2000. All income data for cohorts and parents of cohorts are from IRS tax records.) IGM_{25} and IGM_{75} measure the effect of growing up in a neighborhood for 20 years on intergenerational mobility separately for the 25^{th} percentile and 75^{th} percentile of the parents' income distribution. ΔIGM_{25-75} is the difference in the intergenerational mobility measure of the children of parents at the 25^{th} percentile and the 75^{th} percentile. Homeowner segregation is an entropy-based measure calculated at the CZ level using Census 2000 data. Homeownership segregation is instrumented by the 1947 highway construction plan. The 1947 Interstate Highway Plan is the standardized number of rays emanating from a commuting zone calculated using data from Baum-Snow (2007). CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, and the share of people below the poverty line are from the 2000 Census.
Panel B table presents the correlates of homeownership segregation. Homeownership, racial, and income segregation are entropy-based measure calculated at the CZ level using Census 2000 data. % Long commuting distance to work is the number of people in a CZ whose commuting time to work is greater than 15 minutes. Controls included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000 and includes census division fixed effects. Observations are weighted by the number of housing units in each CZ in 2000. IGM and HO segregation have been standardized (z-scored) for ease of interpretation. Standard errors are clustered by state.

Panel A : Summary Statistics

	Mean	SD	p10	p50	p90
IGM_{25}	1.53	6.70	-5.85	0.72	9.99
IGM_{75}	1.03	6.83	-7.01	1.02	8.95
ΔIGM_{25-75}	0.50	8.14	-7.53	-0.28	9.54
HO segregation	0.12	0.05	0.07	0.12	0.19
< Median Inc. HO Seg.	0.05	0.02	0.03	0.05	0.08
> Median Inc. HO Seg.	0.08	0.03	0.04	0.08	0.13
1947 Plan Rays	1.72	1.62	0.00	2.00	4.00
Homeownership rate	69.44	4.77	62.95	69.97	75.31
< Median Inc. HO Rate	59.85	6.71	50.98	60.51	68.18
> Median Inc. HO Rate	86.38	3.27	82.55	87.08	90.07
% Below poverty level	13.20	4.40	8.49	12.24	18.78
% Single mothers	4.69	1.27	3.32	4.54	6.19
% Divorced	21.01	2.36	18.22	20.88	24.03
% Single-family units	66.11	6.51	57.89	67.14	73.86
Unemployment Rate	4.85	1.44	3.48	4.57	6.39
All Housing Units	223,602	225,105	60,384	147,839	466,109
Observations	236				

Table 1. Summary Statistics (*continued*)

Panel B: Correlates of homeownership segregation

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	HO segregation				
Long commuting dist. to work	0.542***				0.133*
	(0.063)				(0.066)
Sprawl		-0.404***			-0.113**
		(0.042)			(0.044)
Racial segregation			0.305***		-0.067
			(0.060)		(0.083)
Income segregation				0.638***	0.503***
				(0.057)	(0.073)
No. of Obs.	217	217	217	217	217
R-squared	0.697	0.697	0.634	0.758	0.772
Controls	Y	Y	Y	Y	Y
No. of Clusters	39	39	39	39	39

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

Table 2. Homeownership Segregation and Intergenerational Mobility

This table presents the OLS (Panel A), first stage (column 1 in Panel B), reduced form/RF (columns 2–4 in Panel B) and 2SLS IV (columns 5–7 in Panel B) estimates of the impact of homeownership segregation on intergenerational mobility. 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, with parents at the 25^{th} (alternatively at the 75^{th}) percentile of the parents' income distribution 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. ΔIGM_{25-75} is the difference between the intergenerational mobility of children with parents at the 25^{th} percentile relative to those with parents at the 75^{th} percentile. Homeownership segregation is an entropy-based measure similar to Theil (1972) and calculated using the 2000 Census. IGM and homeownership segregation measures have been standardized (z-scored) for ease of interpretation. In columns 5–7 in Panel B, 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). In panel B, column 1, the dependent variable in the first stage regression is homeownership segregation. The dependent variables in the remaining columns are the IGM measures as indicated. Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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.

Panel A: OLS

	(1)	(2)	(3)
Dependent Variable	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
HO segregation	-0.183***	-0.010	-0.142*
	(0.058)	(0.087)	(0.078)
No. of Obs.	236	236	236
R-squared	0.255	0.211	0.118
Controls	Y	Y	Y
Type	OLS	OLS	OLS

Panel B: First stage, Reduced Form and 2SLS IV

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep Var.	*HO segregation*	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
1947 Plan Rays	0.191***	-0.142***	0.019	-0.132**			
	(0.047)	(0.043)	(0.073)	(0.054)			
HO segregation					-0.743***	0.097	-0.694**
					(0.220)	(0.368)	(0.271)
No. of Obs.	236	236	236	236	236	236	236
R-squared	0.579	0.256	0.211	0.128	.	0.201	.
F-stat	16.53						
Controls	Y	Y	Y	Y	Y	Y	Y
Type	First Stage	RF	RF	RF	IV	IV	IV

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

Table 3. Homeownership segregation of rich versus poor homeowners

This table presents the OLS (Columns 1,3,5,7) and 2SLS IV (Columns 2,4,6,8) 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, with parents at the 25th (alternatively at the 75th) percentile of the parents' income distribution 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 in all columns is ΔIGM_{25-75} ,defined as the difference between the intergenerational mobility of children with parents at the 25th percentile relative to those with parents at the 75th percentile. Homeownership segregation is the entropy-based measure similar to Theil (1972) and calculated using the 2000 Census. In columns 1–2 we measure segregation of the rich homeowners from poor homeowners and renters, in columns 3–4 we measure segregation of the rich homeowners from remaining homeowners and renters, in columns 5–6 we measure segregation of the poor homeowners from rich homeowners and renters, and in columns 7–8 we measure segregation of the poor homeowners from remaining homeowners and renters. IGM and homeownership segregation measures have been standardized (z-scored) for ease of interpretation. In columns 2, 4, 6, and 8 homeownership segregation is instrumented 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, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	ΔIGM_{25-75}							
Rich HO vs. Poor (HO+Rent)	-0.158*	-0.532**						
	(0.086)	(0.231)						
Rich HO vs. Rest			-0.168*	-0.508**				
			(0.085)	(0.205)				
Poor HO vs. Rich (HO+Rent)					-0.049	-0.605*		
					(0.068)	(0.349)		
Poor HO vs. Rest							-0.010	-1.455
							(0.071)	(1.140)
No. of Obs.	236	236	236	236	236	236	236	236
R-squared	0.122	.	0.126	0.016	0.102	.	0.099	.
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	IV	OLS	IV	OLS	IV	OLS	IV

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

Table 4. The Role of Housing Restrictions

This table presents the OLS (column 1), Reduced Form/RF (column 2) and 2SLS IV (column 3) estimates of homeownership segregation on housing restrictions. The housing restriction index is measured as of 2006 at the CZ-level is from Gyourko et al. (2008). Homeownership segregation is an entropy-based measure as in Theil (1972) and calculated at the CZ-level using Census 2000 data. Both the index and homeownership segregation are standardized (z-scored) for ease of interpretation. Homeownership segregation is instrumented by the 1947 highway construction plan. The 1947 Interstate Highway Plan is the standardized number of rays emanating from a commuting zone calculated using data from Baum-Snow (2007). Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. All regressions include census division fixed effects. Data is from the 2000 Census. Observations are weighted by the number of housing units in each CZ in 2000. Standard errors are clustered by state.

	(1)	(2)	(3)
Dependent Variable		Housing Regulation Index, 2006	
1947 Plan		0.143^{***}	
		(0.033)	
HO segregation	0.174^{***}		0.723^{***}
	(0.037)		(0.253)
No. of Obs.	214	214	214
R-squared	0.239	0.256	.
Controls	Y	Y	Y
Type	OLS	RF	2SLS IV

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

Table 5. Single-family Detached Homes and Intergenerational Mobility

This table presents the first-stage (column 1), OLS (columns 2–4), and 2 SLS IV (columns 5–7) estimates of the fraction (segregation) of single-family homes in 2000 on intergenerational mobility in Panel A (Panel B). Fraction of single-family detached homes is calculated at the CZ level using Census 2000 data. Segregation of single family homes is an entropy-based measure as in Theil (1972) and calculated as of 2000. Homeownership segregation is instrumented by the 1947 highway construction plan. The 1947 Interstate Highway Plan is the standardized number of rays emanating from a commuting zone calculated using data from Baum-Snow (2007). Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and graduation rate in 2000. Observations are weighted by the number of housing units in each CZ in 2000. Dependent variables have been standardized (z-scored) for ease of interpretation. All regressions include census division fixed effects. Standard errors are clustered by state.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	First stage	IGM_{25}	IGM_{75}	Δ IGM$_{25-75}$	IGM_{25}	IGM_{75}	Δ IGM$_{25-75}$
	Panel A: Fraction (level) of single-family detached homes						
1947 Plan	0.086						
	(0.075)						
Percentage of Single-family Homes		0.080*	0.185***	-0.087**	-1.712	-0.044	-1.377
		(0.045)	(0.060)	(0.042)	(1.675)	(0.816)	(1.160)
R-squared	0.395	0.248	0.266	0.124	.	0.207	.
	Panel B: Segregation of single-family detached homes						
1947 Plan	0.161***						
	(0.056)						
Single-family home segregation		-0.142***	-0.097	-0.037	-0.919***	-0.024	-0.740**
		(0.045)	(0.085)	(0.064)	(0.294)	(0.430)	(0.319)
R-squared	0.499	0.264	0.237	0.115	.	0.232	.
No. of Obs.	217	217	217	217	217	217	217
F-stat	8.143						
Controls	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	OLS	IV	IV	IV

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

Table 6. Channel: Concerns regarding school quality

This table presents the OLS (column 1), Reduced Form/RF (column 2) and 2SLS IV (column 3) estimates of homeownership segregation and housing restrictions due to Citizens' Opposition to Housing due to School crowding (Panel A) and High School dropout rates (Panel B). The dependent variable, citizen opposition importance is provided by Gyourko et al. (2008) and measures how important is school crowding for citizens' opposition to low-cost housing in a given CZ. Responses are coded from 1–5 and we use the z-scored values of this variable. Homeownership segregation is an entropy-based measure as in Theil (1972) and calculated at the CZ-level using Census 2000 data. Homeownership segregation is instrumented by the 1947 highway construction plan. The 1947 Interstate Highway Plan is the standardized number of rays emanating from a commuting zone calculated using data from Baum-Snow (2007). Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line. Panel A also includes the graduation rate in 2000. All columns include census division fixed effects. High school dropout rates are provided by Chetty et al. (2015) and constructed based on data from Integrated Post-secondary Education Data System (IPEDS) and remaining data is from the 2000 Census. Observations are weighted by the number of housing units in each CZ in 2000. Standard errors are clustered by state.

Panel A: Citizens' Opposition to Housing due to School Crowding

	(1)	(2)	(3)
Dependent Variable	Citizen Opposition Importance Placed on School Crowding		
1947 Plan		0.173***	
		(0.051)	
HO segregation	0.068		0.871***
	(0.070)		(0.267)
No. of Obs.	216	216	216
R-squared	0.136	0.169	.
Controls	Y	Y	Y
Type	OLS	RF	2SLS IV

Panel B: High school dropout rates

	(1)	(2)	(3)
Dependent Variable	High school dropout rates		
1947 Plan		0.201***	
		(0.065)	
HO segregation	0.027		1.268**
	(0.155)		(0.611)
No. of Obs.	173	173	173
R-squared	0.281	0.320	.
Controls	Y	Y	Y
Type	OLS	RF	2SLS IV

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

Table 7. Fair Housing Lawsuits and Homeownership Segregation

This table presents the OLS (column 1), Reduced Form/RF (column 2) and 2 SLS IV (column 3) estimates. The explanatory variable in each column is a binary indicator for whether a CZ has had its first Fair Housing lawsuit as of 2000. Data on Fair Housing lawsuits is from Trounstine (2020) at the city-level and is restricted to lawsuits that have had a decision by the courts. Homeownership segregation is an entropy-based measure as in Theil (1972) and calculated at the CZ-level using Census 2000 data. Homeownership segregation is instrumented by the 1947 highway construction plan. The 1947 Interstate Highway Plan is the standardized number of rays emanating from a commuting zone calculated using data from Baum-Snow(2007). Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. All columns include census division fixed effects. The remaining data is from the 2000 Census. Observations are weighted by the number of housing units in each CZ in 2000. Standard errors are clustered by state.

	(1)	(2)	(3)
Dependent Variable	Indicator for whether the CZ has had a Fair Housing Act lawsuit as of 2000		
1947 Plan		0.099**	
		(0.040)	
HO segregation	0.178***		0.510**
	(0.056)		(0.208)
No. of Obs.	217	217	217
R-squared	0.335	0.311	0.143
Controls	Y	Y	Y
Type	OLS	RF	2SLS IV

Online Appendix

Table A.1. Robustness to Alternate Measures

This table shows our baseline estimates using alternate measures of homeownership segregation. In Column 1, homeownership segregation is measured as the standard deviation in tract level homeownership rates (referred to as "Homeownership SD"). In column 2, homeownership segregation is similar to the entropy-based measure except the tract level homeownership rate is the own homeownership rate combined with the distance-weighted homeownership rate of remaining tracts in the CZ and referred to as "Spatial HO Seg.". In column 3, the 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"). All columns include control variables and census division fixed effect. The dependent variable from Chetty and Hendren (2018a) is the difference in the causal component of growing up in a neighbourhood for 20 years on intergenerational mobility for the 25^{th} percentile minus that of the 75^{th} percentile. Homeownership segregation is an entropy-based measure similar to Theil (1972) and calculated using the 2000 Census. Homeownership segregation is instrumented the standardized number of rays emanating from a commuting zone in the 1947 Interstate Highway Plan, calculated using data from Baum-Snow (2007). IGM, homeownership segregation, and the instrument have been standardized (z-scored) for ease of interpretation. Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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.

	(1)	(2)	(3)
Dependent Variable		ΔIGM_{25-75}	
Homeownership SD	-0.289***		
	(0.0495)		
Spatial HO Segregation		-0.158***	
		(0.0579)	
Homeownership Dissimilarity Index			-0.257***
			(0.0452)
No. of Obs.	236	236	236
R-squared	0.306	0.247	0.290
Controls	Y	Y	Y
No. of Clusters	40	40	40

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

Table A.2. Isolating Selection effects: Homeownership Segregation and non-causal intergenerational mobility

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 non-causal children's intergenerational mobility. The intergenerational mobility measure is provided by Chetty and Hendren (2018a) and measures the average household income rank of children when they are 26 years 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. The dependent variable is the intergenerational mobility measure for children at the 25^{th} (columns 2 and 5), 75^{th} (columns 3 and 6), the relative difference between the 25^{th} percentile and the 75^{th} percentile (columns 4 and 7) of the parents' income distribution. Homeownership segregation is an entropy-based measure similar to Theil (1972) and calculated using the 2000 Census. Homeownership segregation is instrumented the standardized number of rays emanating from a commuting zone in the 1947 Interstate Highway Plan, calculated using data from Baum-Snow (2007). IGM, homeownership segregation, and the instrument have been standardized (z-scored) for ease of interpretation. Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}	IGM_{25}	IGM_{75}	ΔIGM_{25-75}
1947 Plan				-0.628	-0.446	0.182			
				(0.578)	(0.331)	(0.282)			
HO segregation	-0.009	-0.487	-0.142*				-3.291	-2.336	0.955
	(0.630)	(0.407)	(0.078)				(2.895)	(1.677)	(1.403)
No. of Obs.	236	236	236	236	236	236	236	236	236
R-squared	0.404	0.334	0.118	0.412	0.337	0.539	0.281	0.243	0.482
F-stat									
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV

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

Table A.3. White flight

This table presents the OLS (column 1), Reduced Form (column 2) and 2SLS IV (column 3) estimates of homeownership segregation on white flight. White flight is measured using the average share of inner city population that is white between 1990 and 2000 based on data from Trounstine (2020). Homeownership segregation is an entropy-based measure calculated at the CZ-level using Census 2000 data. Homeownership segregation is instrumented 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, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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.

	(1)	(2)	(3)
Dependent Variable	Share of the inner-city population that is white (1990–2000)		
1947 Plan		-0.018**	
		(0.007)	
HO segregation	-0.032***		-0.090***
	(0.009)		(0.033)
No. of Obs.	217	217	217
R-squared	0.757	0.744	0.671
Controls	Y	Y	Y
Type	OLS	RF	2SLS IV

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

Table A.4. 1970–2010 Homeownership Segregation and Fair Housing Act Lawsuits

This table presents the effect of Fair Housing lawsuits on homeownership segregation. The dependent variable is homeownership segregation as of 2010, 2000, 1990, 1980, 1970, and 2010 in columns 1, 2, 3, 4, 5, and 6 respectively. The explanatory variable in each column is a binary indicator for whether a CZ has had its first Fair Housing lawsuit in the preceding decade that is for 2000–2010, 1990–2000, 1980–1990, 1970–1980, and 1960–1970 in columns 1, 2, 3, 4, and 5 respectively and between 1970-2010 in column 6. Data on Fair Housing lawsuits is from Trounstine (2020) at the city-level and is restricted to lawsuits that have had a decision by the courts. We map the data to the CZ-level and classify the binary indicator as 1 if any city within the CZ has had its first Fair Housing lawsuit in a given period. Homeownership segregation is an entropy-based measure calculated at the CZ level using Census 2000 data. Control variables included are CZ-level homeownership rate, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	HO segregation in year					
	2010	2000	1990	1980	1970	2010
Fair housing act lawsuit 2000-2010	0.003					
	(0.005)					
Fair housing act lawsuit 1990-2000		-0.001				
		(0.001)				
Fair housing act lawsuit 1980-1990			-0.000			
			(0.001)			
Fair housing act lawsuit 1970-1980				0.003		
				(0.004)		
Fair housing act lawsuit 1960-1970					0.001	
					(0.003)	
Fair housing act lawsuit 1970-2010						0.001
						(0.005)
No. of Obs.	217	217	217	210	182	217
R-squared	0.243	0.952	0.929	0.876	0.308	0.311
Controls	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	OLS	OLS	OLS	OLS

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

Figure A.1. Channel: High-school Attainment

This figure plots the instrumental variable estimates obtained from 2SLS regressions for residential mobility of children when adult whether they have graduated high school. The dependent variable is from https://www.opportunityatlas.org/. The dependent variable in panel a is the high school attainment of an individual (pooled, male, and female) with parents with below-median income (25^{th} percentile) of the parent income distribution remains in their childhood commuting zone (CZ). The dependent variable is based on income from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Dependent variables have been standardized for ease of interpretation. Homeownership segregation is instrumented 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, percentage divorced, fraction of single family mothers, unemployment rate, share of people below the poverty line, and the graduation rate in 2000. 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.