Homeownership and the American Dream – An Analysis of Intergenerational Mobility Effects

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ABSTRACT

Increasing homeownership has been a major policy goal for decades, especially in low-income areas. We argue that the positive correlation of homeownership and intergenerational mobility is highly place-dependent. First, we link commuting zone-level homeownership rates to intergenerational mobility, and find a strong positive relationship. The relationship persists after instrumenting for ownership using housing supply, judicial procedure, or price shocks. Second, we show that the positive relation between of homeownership and upward mobility is significantly diminished, or disappears, in areas with high sprawl or segregation. Third, we find a similar relationship between homeownershhip and social capital – strongly positive but significantly diminished in high-sprawl or high-segregation areas. Our findings suggest that parents' homeownership and, more generally, high homeownership rates may not benefit, or even disadvantage children in segregated, poor areas, possibly through reduced residential mobility.

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I. Introduction

" No person, even the President, can . . . guarantee you . . . [that] you will always have the job you have today . . . But we can guarantee to people that we're going to empower them to help themselves. We'll make home ownership more accessible."

– President Bill Clinton (1995)

"We can put light where there's darkness, and hope where there's despondency in this country. And part of it is working together as a nation to encourage folks to own their own home."

— President George W. Bush (2002)

Owning a home has long been considered an integral part of achieving the American Dream and ensuring upward mobility for ones' family and children. As the above quotes indicate, the belief in owning your home has been strongly held across the political spectrum.[1] Numerous policy measures since the 1930s, especially with the establishment of Fannie Mae, have aimed at increasing homeownership rates. More recently, policy measures have been enacted to ensure lending to underserved groups. The Federal Housing Enterprise Financial Safety and Soundness Act ("GSE Act") encourages lending by the Government Sponsored Enterprises (GSEs) — such as Fannie Mae and Freddie Mac — to low-income and minority families. The older Community Reinvestment Act ("CRA Act") of 1977 has a similar mandate and applies to all banking institutions that receive the Federal Deposit Insurance (FDIC), not just the GSEs.

Much of the existing research on the effect of homeownership confirms this notion. For example, Green and White (1997) show that children of homeowners are less likely to drop out of high school and have lower rates of teenage pregnancies. Coulson and Fisher (2009) find that homeowners are less likely to be unemployed (though they also have lower wages). A large older strand of literature has examined the impact of homeownership rates on various other outcomes. Homeownership is one of the main sources of wealth accumulation and provides

[1]See below for articles discussing policies on homeownership of President Bill Clinton and President George Bush during their respective presidential terms in the period leading up to the crisis. `http://www.nytimes.com/2008/12/21/business/worldbusiness/21iht-admin.4.18853088.html?pagewanted=all` `http://spectator.org/articles/42211/true-origins-financial-crisis`

insurance against rising housing costs (Orzechowski and Sepiella (2003)). Homeownership is also associated with better housing quality and satisfaction (Rohe and Stegman (1994)).

In addition to these individual (direct) benefits of homeownership, a large body of research points to indirect benefits and positive externalities. DiPasquale and Glaeser (1999), for example, find that homeowners are more likely to be involved in local government and, thus, areas with high homeownership have higher social capital. They argue that home-owning gives individuals the incentive to invest in the community. High homeownership rates have also been related to increased housing prices, possibly through the channel of higher maintenance (Coulson and Li (2010), Glaeser and Shapiro (2003)).

The recent crisis, however, has challenged the rationale behind this drive to increase homeownership and has drawn attention to harmful lock-in effects. Recent homeowners have witnessed plummeting house prices and increased foreclosures (Mian et al. (2014), Mian et al. (Forthcoming)). Negative equity, in turn, reduces household mobility or household ability to migrate, which was especially detrimental during the Great Recession (Ferreira et al. (2011), Ferreira et al. (2011),Yagan (2013)).

Of course, such lock-in effects of homeownership are always present, not only during a crisis, and they are in fact the mechanism behind some of its merits, such as improved social capital: Homeownership creates barriers to residential mobility and thereby encouraging individuals to invest more in their community (DiPasquale and Glaeser (1999)). If we take this logic seriously, it implies that the encouragement of homeownership in areas that provide for little upward mobility is counterproductive as it ties family and children to those disadvantaged areas. For example, in areas with segregated living, high homeownership rates may exacerbate the effect of living in a bad neighborhood. Policies that encourage homeownership based on aggregate characteristics should take this heterogeneity into account.

In this paper, we test whether homeownership is related to intergenerational mobility and, if so, whether this relationship persists in areas associated with fewer opportunities, such as high-sprawl and high-segregation areas. Both the 1992 GSE Act and the 1977 CRA Act encourage lending to low income individuals. In addition, these policies also explicitly encourage lending in low income *neighborhoods*.[2] Given the emphasis on encouraging homeownership in underserved low-income areas, its benefits ought to be as strong if not stronger.

We use the comprehensive data on intergenerational mobility provided by Chetty and Hendren (2015) and Chetty et al. (2015) which covers the entire US as well as the corresponding homeownership rates, which we obtain from the 2000 Census. Previously, data limitations on homeownership and measures of children's outcomes have made the analysis of homeownership effects and location-based heterogeneity challenging. Prior work has used survey data such as the Panel Study of Income Dynamics (PSID) and National Longitudinal Surveys (NLSY) (Green and White (1997), Haurin et al. (2001)). While one advantage of survey data is that they provide outcomes at the individual level, they have very limited geo-coded data (such as at the MSA-level for the public use data) and are based on only a subsample of individuals.

The data provided on intergenerational mobility by Chetty et al. (2015) – and in particular its causal component provided by Chetty et al. (2015) – are ideally suited for our purposes. The measure is based on confidential individual level federal income tax records of nearly 40 million children and their parents. The intergenerational mobility measure links children's income to parents' income. Chetty and Hendren (2015) estimate the impact of neighborhoods on intergenerational mobility. This causal estimate focuses on the subset of 5 million families who move across neighborhoods in the US.[3] The paper estimates the causal effect of growing up in a commuting zone (CZ) by using a fixed effects model identified from the families that move. Chetty and Hendren (2015) also decompose overall intergenerational mobility measures of neighborhoods into two components, the causal component and the sorting component. The causal component of intergenerational mobility measures the causal impact of growing up in a

[2]Specifically, The 1992 GSE Act designates census tracts where median family income is less 90% of the median family income of the MSA as underserved. The GSE 1992 Act mandates that a certain portion of the GSE lending be targeted to these underserved areas. Similarly, the CRA Act defines areas as underserved if the median family income is less than 80% of the median family income of the MSA.

[3]This is a follow-up to a previous paper, Chetty et al. (2015). Chetty et al. (2015) track children born in 1980–82 (1980–82 birth cohorts) and measure the parent income in 1996–2000 when the children are from 14–16 years old. All children are ranked at the national level based on their income in 2011–2012. Similarly parents are ranked at the national level based on their mean income between 1996–2000. The intergenerational mobility measure is the rank-rank relationship between children's income and parents' income. Chetty et al. (2015) find that this rank-rank relationship between mean child ranks and parent ranks is almost perfectly linear. These estimates in Chetty et al. (2015) merely represent the intergenerational mobility measure for all children at the given levels of geography and do not attempt to distinguish between the causal effect of growing up in a neighborhood.

neighborhood. The sorting component measures the intergenerational mobility of children in a given neighborhood whose outcomes would have been the same regardless of where they grow up. While we focus on the causal component, we also provide a comparison to outcomes associated with the permanent residents, that is, the families that did not move. This intergenerational mobility measure of the permanent residents is comprised of both the sorting and the causal component. We look at the across-CZ effect of homeownership rates and intergenerational mobility.

We use the causal component in the Chetty and Hendren (2015) data at the commuting zone (CZ) level. To capture heterogeneity of children from different income backgrounds, we analyze two groups of children, namely those with below-median income parents and those with above-median income parents. In our baseline results, we first look at across-CZ variation and find that higher homeownership rates in 2000 is associated with higher intergenerational mobility of children. The effect is driven by the causal component of intergenerational mobility. Specifically, homeownership rates are higher where the causal effect of growing up in a neighborhood is higher. For children growing up in families at the 25^{th} percentile a 1 standard deviation higher homeownership rate is also associated with a 0.601 percentile increase in income rank. We use an instrumental variables strategy to instrument for homeownership rates and confirm our findings.

First, we instrument for homeownership rates in 2000 using the stock of single family detached homes in 1990 as a percentage of all housing structures in 1990. Glaeser and Shapiro (2003) find that the structure of housing, specifically, single family detached dwellings are a good measure of owner occupied housing. Glaeser and Shapiro (2003) use the MSA level of single family detached homes in 1980 to instrument for homeownership at the individual level.[4] Following Glaeser and Shapiro (2003) we use the stock of single family detached homes in 1990 as a percentage of all housing structures in 1990 as an instrument for homeownership rates in 2000. We find that a 1 standard deviation higher percentage single family detached homes in 1990 is associated with nearly 0.0782 standard deviation higher homeownership rates in 2000.

[4]Specifically, they examine the benefits of the home mortgage interest deduction and find that the deduction is particularly poor instrument for encouraging homeownership.

Additionally, 20 years of exposure to a CZ with 1 standard deviation higher instrumented homeownership rate in 2000 increases a child's income rank by 0.90 percentile for those in below-median income families. This translates to almost 3 percent higher earnings. For above-median income individuals the effect is almost 74 percent higher. A 1 standard deviation higher instrumented homeownership rate in 2000 increases child's rank by 1.56 percentile for above-median income families.

Second, we use lender rights to instrument for homeownership. The lender rights index from Kulkarni (2015) is an index measuring the ease of the foreclosure at the state level.[5] The lender rights index represents difficulty in starting the foreclosure process for lenders. The motivation for using the lender rights as an instrument is that high lender rights are also associated with higher mortgage lending and thus predict high homeownership rates. We find this to be a good instrument for predicting homeownership rates. Instrumenting with the lender rights index yields similar results and we find that high homeownership rates also result in higher intergenerational mobility of children. The effect for children with above-median income parents is similar.

Third, we supplement the analysis by using the median house price shock between 1980 to 1990 as an instrument for homeownership rates in 2000. Higher house prices are associated with lower homeownership rates. We use the difference in the median house price in 1990 and 1980 as a measure of the affordability of owning a home in 2000. Our results are similar to using the other two instruments, and children's ranks in CZs with one standard deviation higher homeownership rates results in a 0.675 percentile higher income rank. The effect for children with above-median income parents is higher at 0.951 percentile increase in child income rank.

Our main goal is to examine the large geographic heterogeneity in the impact of higher aggregate homeownership rates on children's outcomes across the US.

First, we examine how the impact of homeownership rate on intergenerational mobility varies by segregation and by sprawl. Glaeser (2011) notes that policies that encourage homeownership

[5]Specifically, Kulkarni (2015) looks at several foreclosure laws at the state level. She focuses on whether lenders need to go to court to start foreclosure proceedings (judicial), lender access to borrowers assets other than the collateral securing the mortgage (recourse) and borrower ability to make whole the mortgage even after foreclosure proceedings have started (right-of redemption. Each state is assigned a number from 1–3 depending and added up to get an index of lender rights. We use the standardized index in our analysis.

implicitly encourage people to move away from higher density living towards areas with more sprawl. Areas with high sprawl, however, might be associated reduced positive effects of homeownership on social capital. For example, high voter turnouts and involvement in local communities may be diminished in sprawling areas due to the higher costs of social interaction. Sprawl may make it harder to access jobs and to experience income mobility. Sprawl may also be associated with more segregated living as well as with difficulties in accessing to grocery stores, retail and schools. Additionally, homeownership results in reduced household mobility and homeownership may exacerbates the impact of living in bad neighborhoods especially in highly segregated areas.

For our analysis we use the measure of sprawl that Chetty and Hendren (2015) use. Sprawl is measured as the fraction of people (not working from home) with greater than 15 minutes of commute time to work. Since the focus of our analysis is to capture a measure of sprawl more closely linked to segregated living, the commuting distance based sprawl measure is ideally suited for our purposes. We find that the positive impact of homeownership on intergenerational mobility is diminished in areas with high sprawl. Possibly, the positive spillovers associated with high social capital and high homeownership rates on children is diminished in more sprawling and segregated areas where there are higher costs to interacting with people. We find that children from below-median income families witness a 63 percent reduction in the positive effect of homeownership compared to a smaller 46 percent reduction for above-median income families for areas with a 1 SD higher sprawl.

To examine what aspect of sprawling areas is driving this heterogeneity in impact of homeownership rates on intergenerational mobility, we turn to two distinct measures of segregation, namely racial segregation and segregation by income. For the racial segregation measure we use the Theil (1972) measure which captures how different on average is the racial composition of each census tract within a CZ compared to the racial composition of the entire CZ. Growing up in a neighborhood with 1 SD higher racial segregation causes a 38 percent reduction in the positive impact of homeownership rates on intergenerational mobility of below-median income families. The effect for children from above-median income families is a similar 39 percent reduction for children from above-median income families.

Our measure of income segregation based on Reardon (2011). This measure of segregation captures the uneven distribution of income levels within a CZ. Intuitively, this measure captures how different the income distribution in each census tract is on average from the income distribution of the entire CZ. We find that in areas with high level of income segregation, the positive impact of homeownership rates is diminished. That is, for children from below-median income families, growing up in neighborhoods with 1 SD higher segregation diminishes the positive impact of homeownership rates by 42 percent. For children from above-median income families, living in a neighborhood with 1 SD higher segregation of income reduces the positive impact of homeownership rate by a lower 35 percent.[6]

We then examine the channels through which homeownership leads to higher intergenerational mobility. DiPasquale and Glaeser (1999) find that homeowners invest more in social capital and homeownership may encourage higher investment in local amenities. Glaeser and Sacerdote (2000) find that there are social benefits to homeownership. Motivated by this literature, we look at the impact of homeownership rates on social capital. To proxy for social capital we use the index from Rupasingha and Goetz (2008) also used in Chetty and Hendren (2015). This index is constructed using the response rate to the Decennial Census, the voter turnout rates in the presidential elections and number of tax-exempt non-profit organizations (representing community involvement). We find that a 1 SD higher homeownership rate is also associated with a 0.16 SD higher value of the social capital index. To examine why high sprawl and segregation leads to reduced positive effects of homeownership at the CZ level, we look at heterogeneity of the impact of homeownership rate on social capital. A 1 SD higher homeownership rate in an area with a 1 SD higher sprawl results in a 50 percent reduction in the social capital index. Similarly, high racial segregation and segregation of income reduce the social capital index by 30 percent and 29 percent respectively.

Our paper is organized as follows. Section II explains the data used in our analysis. Section IV shows our baseline estimates estimating the impact of homeownership rates on intergenerational mobility. Section V looks at the cross-sectional heterogeneity across areas

[6]Chetty and Hendren (2015) also look at sprawl and segregation of income measures and find that high sprawl and high segregation is associated with lower intergenerational mobility.

with differing sprawl. Section VI shows the cross-sectional heterogeneity across areas with differing segregation of income. Section VII looks at the impact of homeownership rates on social capital. Section VIII concludes.

II. Data and Summary Statistics

A. Data

We use data at the commuting zone (CZ) level mainly from the data provided by Chetty and Hendren (2015) and from the Census 2000. Additional data used and their sources are described below. For our analysis we focus on the CZ level analysis since it covers the entire US as opposed to Metropolitan Statistical Areas (MSAs) which cover only urban areas. Additionally, there is less sorting across CZs than at the more granular county level. Hence, we focus mainly on CZ level analysis.

A.1. Intergenerational Mobility measure

In an earlier paper, Chetty et al. (2015) use administrative records on the incomes of around 40 million children and their parents to describe features of intergenerational mobility in the United States. The main focus of their paper is on the geographical or spatial variation in intergenerational mobility. In the subsequent paper by Chetty and Hendren (2015), the authors build on this measure and provide causal estimates of growing up in a neighborhood. We use these causal estimates of intergenerational mobility of a CZ from Chetty and Hendren (2015) in our analysis.

The mobility measures in Chetty and Hendren (2015) track children born between 1980–91 (1980–91 birth cohorts). Parent income is measured as the average family income from 1996 to 2000. For the estimates we use, cohort (children) income is recorded when the child is 26 years old.[7] The children's age when the parents' income is measured will thus vary across cohorts. Chetty and Hendren (2015) then rank parents based on their position in the *national* income

[7]Chetty and Hendren (2015) use this as the baseline measure. However, they also provide estimates for other ages of outcome measurement and find that all yield very similar estimates.

distribution. Similarly, they rank children — within a cohort — at the national level. They find that the rank-rank relationship between parents' income rank and children's income rank to be almost perfectly linear.[8]

To get an estimate of the causal effect of growing up in a neighborhood, Chetty and Hendren (2015) focus on the subset of families that move. We describe their estimation procedure below. The following discussion closely follows Section VII in the Chetty and Hendren (2015) paper. To get an estimate of the causal effect of growing up in a neighborhood, first Chetty and Hendren (2015) subset to the families that move. Let T_C represent the age at which children enter the labor market. Let y_i be the outcome of the child when adult. In our estimates this is the child's income rank at age 26. Children's outcome is a function of family input, neighborhood characteristics and the disruption costs of moving. Let μ_{pc} denote the causal effect of growing up in a neighborhood. Let the mean level of parental inputs to child i be $\bar{\theta}_i$.[9] First, Chetty and Hendren (2015) make the simplifying assumption that disruption costs do not vary across neighborhoods. Let $\bar{\kappa}_0$ be the disruption costs of moving.[10]

Second, they assume that neighborhood effects are additive. Focusing only on the first-time movers, who move from origin o to destination d at age m, Chetty and Hendren (2015) model the child's outcome as a simple linear exposure time specification as below:

$$y_i = (T_C - m)(\mu_{pd}) + m\mu_{po} + \bar{\theta}_i + \bar{\kappa}_0 \tag{1}$$

where μ_{pd} is the causal effect of growing up in the destination d with parental income at percentile p. Analogously, μ_{po} is the causal effect of growing up in the destination o with parental income at percentile p.

They make a third assumption that for all origin-destination pairs the choice of when to move is independent of other inputs $\bar{\theta}_i$ conditional on origin and destination. Intuitively, this says that there is no sorting for any origin-destination pair.

[8]Specifically, Chetty et al. (2015) first showed that the rank-rank is almost perfectly linear. Chetty and Hendren (2015) builds on this analysis.

[9]This is the average parental input across the entire childhood.

[10]All Chetty and Hendren (2015) need is that the disruption costs do not vary in a differentially age-dependent manner across neighborhoods. For heterogeneous disruption costs, one can think of $\bar{\theta}_i$ as incorporating these disruption costs.

The parental inputs $\bar{\theta}_i$ can be decomposed into a component which is origin-destination pair specific and a residual as follows:

$$\bar{\theta}_i = \alpha_{odps} + \eta_{1i} \tag{2}$$

where η_{1i} is independent of exposure time to the origination and destination and α_{odps} captures variation in outcomes across parent income (p), cohort (s), origin (o) and destination (d). In their empirical specification they parameterize separate controls for each origin-destination pair with a linear control for income and a quadratic term for cohort. Adding the cohort controls ensures that they are controlling for the fact that outcome for different cohorts is measured at different years.

This motivates their empirical model as follows:

$$y_i = (T_C - m)[(\mu_d^0 + \mu_d^P p)1\{d(i) = d\} - (\mu_o^0 + \mu_o^P p)1\{o(i) = o\}] + \alpha_{odps} + \eta_{1i} \tag{3}$$

Thus, for every origin-destination pair, Chetty and Hendren (2015) estimate a regression of child outcomes on exposure time to the destination $T_C - m$,

$$y_i = (T_C - m)(\mu_{od}^0 + \mu_{od}^1 p) + \alpha_{odps} + \eta_{2i} \tag{4}$$

where $\mu_{od}^0 + \mu_{od}^1 p$ gives the estimate of spending an additional year of childhood in destination d relative to origin o. α_{odps} includes controls for parental income and cohort described above.

Let $\mu_{od}^p = \mu_{od}^0 + \mu_{od}^1 p$ for each origin-destination pair at percentile p. Them the causal effect of each place μ_{pc} can be estimated from the regression of

$$\mu_{od}^p = G\mu_{pc} + \eta_{3od} \tag{5}$$

where G is a matrix with the rows representing origin-destination pairs and columns representing the unique places (N_c). For each row the origin column is coded as a -1 and the destination is coded as $+1$. With this, we get the estimates of causal effect of growing up in a neighborhood as μ_{pc}. Note, each row sums to zero, since each entry will have a $+1$ for destination and -1 for origin. Since, the matrix G does not have full rank, the impact of exposure to places is measured relative to one omitted place. μ_{pc} is normalized to have a population-weighted value of zero. Then, μ_{pc} can be interpreted as the effect of exposure to a place (CZ) c relative to where the average population lives.

Intuitively, the procedure can be described as follows. Specifically, they first focus on the population of residents who move across CZs to determine μ_{pc}. Second, they use a exposure-time identification strategy to identify the fixed effects using the movers in the sample. The intuition of how the estimates are constructed is clearer from the following example. Consider families who move from Phoenix to Oklahoma. If children of families who moved at younger ages had higher outcomes when adult compared to children who moved later, then one can posit that this is due to the causal effect of growing up in Oklahoma is higher relative to Phoenix. To claim that the effect if causal they need the assumption that the timing of the moves is orthogonal to the children's potential outcomes.

The above procedure gives the causal effect of growing up in a neighborhood (μ_{pc}) which is the main focus of our analysis. We also supplement the analysis by looking at the sorting component of intergenerational mobility.

To get the sorting component, they focus on the permanent residents, that is, families that never move. The intergenerational mobility measures for the permanent residents represents both the causal effect of growing in a neighborhood and a sorting component, that is, differences in the characteristics of the families that reside in these CZs.

To determine the intergenerational mobility measures for the permanent residents, y_{pc}, first, they rank at national level child i (in cohort s) based on their income, y_i. Similarly, they rank at national level parents of these children based on their incomes, p_i. The intergenerational mobility measure is then rank-rank relationship between parents' income rank and children's income rank for each CZ

Thus, they estimate the relationship between child rank (y_i) and parents' rank (p_i) as:

$$y_i = \alpha_{cs} + \psi_{cs} p_i + \epsilon_i \tag{6}$$

They find that this rank-rank relationship is almost perfectly linear in all CZ's c. Expected rank of a child in cohort s whose parents' national income rank is p and are permanent residents of CZ c is then given by:

$$\hat{y}_{pcs} = \hat{\alpha_c} + \hat{\psi}_{cs} p \tag{7}$$

Thus, the above gives an estimate of the intergenerational mobility for permanent residents which comprises of both the sorting and causal effect of growing up in a CZ. To decompose the observed outcome of permanent residents into a sorting and causal component, we need to make an assumption of the total relevant exposure time, T_C. The selection component of the permanent residents is then $\hat{\theta}_{pc} = \bar{y}_{pc} - T_C * \hat{\mu}_{pc}$. The mean selection effect depends on the assumption about T_C. We use $T_C = 20$ year exposure as in Chetty and Hendren (2015). In our analysis, we focus on the intergenerational mobility measure for children of parents at the 25^{th} and 75^{th} percentile for which the causal component measure os available. Additionally, focusing on both these percentiles allows us to look at the heterogeneity of the effects of homeownership we observe for both the low and high income families. Note that given the linearity of the rank-rank relationship, 25^{th} and 75^{th} percentile measures correspond to the average outcomes of children from below-median and above-median income families.

A.2. Instrument 1: Single Family Detached Homes

In our analysis we three different instruments to instrument for homeownership rates in 2000. The first instrument we use is the fraction of single family detached homes to the total housing units in 1990. This instrument has been used in prior literature to instrument for individual level of homeownership rates. Glaeser and Shapiro (2003) instrument for individual homeownership in 1993 using MSA level % of single family detached homes in 1980. Following this idea, we instrument for CZ-level homeownership rates in 2000 using CZ-level percentage of single-family detached homes to the total housing units in 1990. We use the data from the 1990 Census to calculate the fraction of single family detached homes to the total housing units in a CZ.

A.3. Instrument 2: Lender Rights Index

One of the instruments for homeownership rates we use in our analysis is lender rights index. The lender rights index comes from Kulkarni (2015). The data is available at the state level and higher values of the index correspond to either greater ease in starting foreclosure proceedings or to greater access to borrower's assets in case of a foreclosure. Thus the instrument can be thought of as representing high lender rights. Foreclosure laws vary by state and the index is at the state-level.

The index is constructed using the classification of states as judicial or non-judicial, recourse or non-recourse and right to redeem. All variables correspond to the ease of ability to foreclosure on a property or amount available to the lender after a foreclosure has occurred. In judicial foreclosure states mortgage lenders need to go to court to foreclose on a property representing higher cost to lenders compared to non-judicial states where the lender can start foreclosure proceedings without going to court. In non-recourse states the lender only has access to the property securing the loan. In recourse states, in addition, lenders can also access borrower wages and personal property. Right to redeem laws allow the borrower the right to redeem or make whole the mortgage amount due even after the foreclosure period. The length of time spent in right to redeem varies across states.

In Kulkarni (2015) each state is assigned a value of 1–3 corresponding to each of the three classifications of judicial/non-judicial, recourse/non-recourse and right to redeem with high values representing greater ease of foreclosure (or alternatively greater access to the borrowers other assets in case of foreclosure). For the classification of judicial states, we use Gerardi et al. (2013) and classify states as either 1 for judicial and 3 for non-judicial. That is, in non-judicial states lenders do not need to go to court to start a foreclosure process and hence lender rights are higher.

For recourse states, we further use the classification of states as fair-market-value and non-fair-market value. In fair-market value states the lender has recourse to the shortfall between the loan amount due and the fair-market-value of the property. In non-fair-market-value states, the lender has recourse to the shortfall between the loan amount due and the foreclosure sale price of the property. Since a foreclosed property usually sells at distressed prices, this implies lender has recourse to a higher amount in non-fair-market value states compared to fair-market-value states. Thus, Kulkarni (2015) codes non-recourse as 1, fair-market-value as 2 and non-fair-market-value as 3. One added complication is that in some states the statute of limitations is very low and hence in those remaining states, fair-market-value is also coded as 1 and non-fair-market-value states is coded as 2 to account for the fact that when the statute of limitations is low, the lender has very little time to pursue recourse in these states. For classification of recourse we use the classifications from Rao and Walsh (2009).

Similarly Rao and Walsh (2009) also gives a classification for equity of redemption, that the ability of the borrower to make whole his mortgage even after the foreclosure procedure. The higher length of time allowed, the lower is the corresponding lender right.

The lender rights index represents the sum of all these assigned values at the state level. We standardize this variable in our analysis.

A.4. Instrument 3: House price shock 1980–1990

The third instrument we use in our analysis is the median house price shock between 1980 to 1990. 1990 approximately corresponds to the affordability of homeownership when parents (mothers) are around 35 years of age.[11] The average age of first-time home buyers is between 31 (National Association of Realtors) to 34 (2009 American Housing Survey). Thus, the house price shock corresponds to roughly when the parents of the children in our analysis become homeowners. We estimate the house price shock as the difference in the median value of the house in 1980 to 1990. Median house price data is from the 1990 Census and 1980 Census.

A.5. Measure of Sprawl

For our cross-sectional heterogeneity results we use the measure described in Chetty and Hendren (2015). We use the fraction of people not working from home with greater than 15 minutes of commute time to work. Glaeser and Kahn (2004) use sprawl to describe cities where people need to drive large distances to conduct their daily lives. Sprawl in this case is

[11] This estimate of the mother's age is based on the Chetty et al. (2015) sample.

higher wherein people need to drive large distances for employment, or in other words, cities in which employment is very decentralized. The commuting time based sprawl measure can be thought of as capturing this version of sprawl. The advantage of using this sprawl measure is that it is constructed using the 2000 Census and thus has the most extensive geographic coverage. Additionally, we are interested in a measure of sprawl that more closely captures the effect of living in more segregated areas and the commuting time based measure of sprawl more accurately captures this.

A.6. Measures of Segregation

We use the same measures of segregation as in Chetty and Hendren (2015). For racial segregation, we use the Theil (1972) measure and for segregation of income we use the measure from Reardon (2011).

The Theil (1972) measure of segregation at the CZ level uses the census tract level data from the 2000 Census. Let $\phi(r)$ be the fraction of individuals of a race r in a CZ. In the analysis, we consider the following racial groups: black, white, Hispanic and others.

At the CZ level, the racial diversity is given by the entropy index

$$E = \sum_r \phi_r log_2 \frac{1}{\phi_r} \tag{8}$$

For each tract j, across race r, the level of racial diversity is given by the entropy index:

$$E_j = \sum_r \phi_{rj} log_2 \frac{1}{\phi_{rj}} \tag{9}$$

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

$$H = \sum_j \frac{population_j}{population_{CZ}} \frac{E - E_j}{E} \tag{10}$$

where $population_j$ and $population_{CZ}$ respectively refer to the tract and CZ level population. Intuitively the segregation measure here measures how different the racial distribution of each census tract is from the CZ. $H = 1$ corresponds to the highest level of segregation and $H = 0$

corresponds to when there is no racial segregation at all.

For segregation of income, we use the measure in Reardon (2011). The segregation of income uses a measure analogous to the one above. The idea is to look at the population in different percentiles of income as opposed to the different racial groups in the Theil (1972) index. We measure the degree to which the population below the p^{th} percentile is segregated from the population above the p^{th} percentile. Let p denote the fraction below the p^{th} percentile.

The two-group entropy index is then given by:

$$E(p) = plog_2 \frac{1}{p} + (1-p) log_2 \frac{1}{1-p} \tag{11}$$

The index $H(p)$ at the CZ level for each percentile p is then given by

$$H(p) = \sum_j \frac{population_j}{population_{CZ}} \frac{E(p) - E(p)_j}{E(p)} \tag{12}$$

The overall income segregation is then given by:

$$Income\ Segregation_p = 2log(2) \int_p E(p)H(p)dp \tag{13}$$

This measure is also provided by Chetty and Hendren (2015) and they use the 2000 Census data income data to get a measure of the segregation of income.

A.7. Other variables

Our main independent variable of interest is the homeownership rate. We use the Census 2000 to measure the homeownership rate at the CZ level. The other control variables included in our analysis are percentage of population below the poverty level, percentage female, percentage divorced and percentage black. All control variables 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 use a social capital index at the county level which is provided by Chetty and Hendren (2015) and is from Rupasingha and Goetz (2008). The social capital index is constructed based on voter turnout rates, fraction of people who return their census forms, and other measures of participation in community organizations at the county level. This measure is then aggregated up to the CZ level.

CZs for which all the above data is available were used in our analysis. We look at 588 CZ is our final analysis. Since most of the data is available from the Census 2000, most of the data limitation is imposed by the number of CZs for which the causal effect of intergenerational mobility measure from Chetty and Hendren (2015) is available.

B. Summary Statistics

Table I gives the summary statistics of the variables used in our analysis. Data are at the county level and there are 588 CZs for which all data is available.

The causal component of intergenerational mobility is the income rank of the children in percentiles — relative to the mean across all CZ — of the children of parents at the 25^{th} and 75^{th}. The causal effect of growing up in a neighborhood for children of parents at the 25^{th} percentile is 3.69 percentiles. For children at the 75^{th} percentile this measure is 2.45 percentiles.

The intergenerational mobility measures of the permanent residents give the income rank of the children in percentiles of the children of parents at the 25^{th} and 75^{th}. This corresponds to the average intergenerational mobility of children of below-median income families and children of above-median income families. Intergenerational mobility for the permanent residents at the 25^{th} percentile is 46.21 percentile with a standard deviation of 5.27. Intergenerational mobility for the permanent residents at the 75^{th} percentile is 59.60 percentile with a standard deviation of 3.48. Figure 1, Panel A shows the spatial variation of the data. We see that there is substantial regional variation in intergenerational mobility.

Average homeownership rate in 2000 was at 71.31 percent with a standard deviation of 5.51 percent. However, the minimum and maximum homeownership rates are between 43.53 percent to 84.41 percent displaying a wide range of variation across US states similar to the intergenerational mobility measure. Figure 1, Panel B shows the spatial variation of homeownership rates in 2000. Again, we see that there is substantial regional variation in homeownership rates.

On average CZs have around 14.26 percent of population with people below the poverty line, 51 percent female, 22 percent divorced and 9 percent black.

We use the fraction of all housing structures which are single family detached units in 1990 as the first instrument for homeownership rates. On average, around 68 percent of all housing structures are single family detached units in CZ. We also use the lender rights index as an instrument for homeownership rates which has been standardized and ranges from -1.73 to 2.58. The third instrument, the difference in median hose prices between 1980-1990 ranges from a decline of $15,400 to an increase of $167,070 from 1980 to 1990. On average, median house prices increased $17, 670 between 1980 to 1990.

For cross-sectional heterogeneity measures we also look at the Chetty and Hendren (2015) measure of sprawl, the fraction of people not working from home with more than 15 minutes of commute time to work. On average around 59 percent of the population lives more than 15 minutes of their place of work. However, there is a wide range from a low as 24 percent of the population to a high of 84 percent of the population living at large commuting distance.

We look at two measures of segregation, racial segregation and the segregation of income. Our racial segregation measured based on the Theil (1972) index was on average 14 percent. There was a wide range for this index too from 1 percent to 48 percent. Segregation of income was on average 4.61 percent.

The social capital index ranges from -3.2 to 3.07 and is constructed based on voter turnout rates, fraction of people who return their census forms and other measures of participation in community organizations. Low values of the index correspond to low social capital.

We weight all our regressions using the total number of housing units in 2000. On average the CZs in our analysis had 177,226 housing units. The size of the counties captured in our analysis varies widely as can be seen from fact that total number of housing units in the CZ varied from 8166 housing units to CZs with more than 5 million housing units.

III. Empirical Methodology

Our main regression specifications test for the link between intergenerational mobility and homeownership. All regression specifications are at the commuting zone level. Intergenerational mobility is calculated from Chetty and Hendren (2015). The mobility measures track children born between 1980–91 (1980–91 birth cohorts). Parent income is the average family income from 1996 to 2000. The children's age when the income is measured will vary across cohorts. Cohort (children) income is recorded at age 26. The causal component of growing up in a neighborhood for 20 years is measured for children from below-median income families, that is at the 25^{th} percentile and for above-median income families, that is, at the 75^{th} percentile. Homeownership data is from the US Census Bureau and is as of 2000.

A. Baseline Specification

The baseline empirical specification is as follows:

$$Intergenerational\ Mobility_c = \beta_0 + \beta_1 * Homeownership\ Rate2000_c + \gamma X_c + \epsilon \tag{14}$$

All data is at the CZ level c. We repeat this analysis for each of our mobility measures, that is for children from below-median income families, that is at the 25^{th} percentile and for above-median income families, that is, at the 75^{th} percentile. For ease of interpretation we standardize the homeownership rate variable. The controls included are percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ. All regressions are clustered at the state level. All regressions are weighted by the number of housing units in a county in 2000 to get representative estimates of the US population.[12] In all our specifications we show the weighted least squared regressions. While there is a loss of efficiency using the weighted estimators (Deaton (1997), Cameron and Trivedi (2005), Angrist and Pischke (2008)), this criticism only applies when the treatment effect is homogenous. Since the treatment effect of the homeownership rates on intergenerational mobility is heterogeneous

[12]Note, we also used the number of children in the Chetty and Hendren (2015) sample for weighting and results remain quantitatively and qualitatively the same.

— as we will also empirically establish later — we show the weighted estimate results. All results remain qualitatively the same in the unweighted estimates.

The above regression specification, however, only establishes causality. In the subsection below we describe the instruments we use for homeownership rates and provide some justification for their validity.

A.1. Instrumenting for homeownership

Our second set of specifications instrument for homeownership using the single family detached homes in 1990. Glaeser and Sacerdote (2000) use the stock of single family detached homes at the MSA level in 1980 as an instrument for homeownership at the individual level in 1990.[13] The idea is that the housing structure is generally a good predictor of homeownership.

Following the same logic, we use the single family detached homes in 1990 to instrument for homeownership rates in 2000. Our regression specification is as follows.

The first stage:

$$Homeownership\ Rate2000_c = \delta X_c + \rho * Fraction\ of\ Single\ family\ detached\ homes\ 1990_c + \epsilon_c \tag{15}$$

The second stage instruments for homeownership:

$$Intergenerational\ Mobility_c = \theta X_c + \beta * \widehat{Homeownership}_{2000c} + \eta_c \tag{16}$$

$Homeownership\ Rate2000_c$ represents the homeownership rate in 2000 at the CZ level. Equation 15 represents the first stage, where the instrument is the CZ-level fraction of single family detached homes. All standard errors are clustered at the state level. Equation 16 represents the second stage using the instrumented homeownership rate. We include CZ level

[13]Coulson and Fisher (2009) use a similar instrument to test the impact of housing tenure on labor market outcomes.

controls.

Figure 4, Panel A graphically shows the binned scatter plots of fraction of single family detached house in 1990 against homeownership rates in 2000. This is analogous to the first stage of the instrumented regression, except without the controls. High fraction of single family detached homes in 1990 also predict high homeownership rates in 2000.

In our second set of specifications, we instrument for homeownership rates using the lender rights index developed in Kulkarni (2015). Thus, the instrument can be thought of as representing high lender rights. We standardize the lender rights index. Foreclosure laws vary by state and the index is at the state-level. The idea is that high lender rights represents easier access to mortgage credit and thus higher homeownership rates.

Our regression specification is as follows.

The first stage:

$$Homeownership\ Rate2000_c = \delta X_c + \rho * Lender\ Rights\ Index\ _s + \epsilon_c \tag{17}$$

The second stage instruments for homeownership:

$$Intergenerational\ Mobility_c = \theta X_c + \beta * \widehat{Homeownership}_{2000_c} + \eta_c \tag{18}$$

$Homeownership\ Rate2000_c$ represents the homeownership rate in 2000 at the CZ level. Equation 17 represents the first stage, where the instrument is the state-level lender rights index. All standard errors are clustered at the state level. Equation 18 represents the second stage using the instrumented homeownership. We include CZ level controls.

We wish to see whether high lender rights are associated with high homeownership rates. Figure 4, Panel B plots the homeownership rates in 2000 against our continuous measure of lender rights. We see that higher lender rights are associated with higher homeownership rates.

As a third instrument, we also instrument for homeownership rates using the median house price shock in 1980 to 1990 as an instrument for homeownership rates in 2000. We use the median house price shock between 1980–1990 as a measure of the affordability of owning a home in 2000. The average age of the mothers in the Chetty et al. (2015) is 41 in 1996. Thus, the 1990 median house price value corresponds to the affordability of the house when parents (mothers) are around 35 years of age. According to the 2009 American Housing Survey data the average age of the first-time home buyers was 34. Another survey conducted recently by the National Association of Realtors also estimates the average age of the first-time home buyers to be 31 years. Thus, using the median house price shock between 1980 to 1990 as a measure of affordability of owning a home seems reasonable. This instrument aims to capture the effect of owning a home. However, note the effect of homeownership that we capture will include both the individual impact of homeownership and the aggregate impact of homeownership rate on intergenerational mobility. Figure 4, Panel C shows the first stage results. Higher house price shocks are associated with lower homeownership rates. The first stage and second stage specification is similar to Equation 15 and Equation 16.

We also tried instrumenting for homeownership rates using the Saiz (2010) measure. The Saiz (2010) instrument has been recently used to instrument for housing prices (Mian et al. (2014), Mian et al. (Forthcoming)). The Saiz (2010) measure calculates the fraction of land unavailable for development due to steep slopes and bodies of water. The hypothesis is that single family detached homes may be easier to build compared to multi-family structures where land availability is higher. The first stage results are robust, that is, unavailability of land is inversely correlated with single family detached homes. However, given the large cross-sectional heterogeneity that we find across sprawl the Saiz (2010) instrument was particularly bad at predicting the impact on intergenerational mobility. Another way to say this is that the exclusion restriction is violated because sprawl (loosely, the inverse of the unavailability measure) also affects intergenerational mobility. For a recent critique of using the Saiz (2010) measure as an instrument for house prices, see Davidoff (2014)

B. Cross-sectional Heterogeneity: Difference-in-difference specification

In Section V and Section VI we look at the cross-sectional heterogeneity of the effect of homeownership rates on intergenerational mobility. In Section V we examine how the impact of homeownership rate on intergenerational mobility varies by sprawl or the spread of cities. In Section VI we also examine cross-sectional heterogeneity with racial segregation and segregation of income. We explicitly show the empirical specifications below for the heterogeneity with the sprawl measure. The other empirical specifications simply replace the sprawl measure with the respective interaction terms namely racial segregation and segregation of income.

The specification for the instrumented cross-sectional heterogeneity using the fraction of single family detached homes in 1990 is as follows.

The first stage:

$$\begin{aligned} Homeownership\,Rate2000_c = \delta X_c + \rho * Fraction\ Single\ family\ detached\ homes\ 1990_c + \\ \omega * Fraction\ Single\ family\ detached\ homes\ 1990_c * Sprawl + \epsilon_c \end{aligned} \tag{19}$$

The second stage instruments for homeownership:

$$\begin{aligned} Intergenerational\ Mobility_c = \theta X_c + \beta * \widehat{Homeownership}_{2000_c} \\ + \tau * \widehat{Homeownership}_{2000_c} * Sprawl + \eta_c \end{aligned} \tag{20}$$

For ease of interpretation we standardize the homeownership rate and interaction variable. As before the above specifications include CZ-level controls and are weighted at the state level. The specification for the lender rights index and the house price shock is similar to the above.

IV. The link between homeownership and intergenerational mobility

We now turn to our main empirical analysis and examine the relationship between homeownership and intergenerational mobility. As a first step of our analysis, we wish to link homeownership to intergenerational mobility. Prior literature has found that owning a home leads to better outcomes for children (Green and White (1997). We first present the baseline estimates of the link between homeownership rates and the casual impact of living in a neighborhood.

Figure 5 shows the relationship between average intergenerational mobility and the homeownership rate in 2000 weighted by the population in each CZ. The dependent variable is the causal component of intergenerational mobility measure for children of parents from the 25^{th} percentile (panel (a)) and 75^{th} percentile (panel (b)) from Chetty and Hendren (2015). Due to the linearity of the rank-rank relationship between parents' incomes and children's incomes, this corresponds to the intergenerational mobility measure of the children with parents below the median income and of parents above the median income. Higher values of intergenerational mobility correspond to higher intergenerational mobility. Figure 5 shows that there is a strong positive relationship between the two variables for children from below-median income families and children from above-median income families.

Table II looks at this relationship more formally. To get good estimates of heterogeneity across groups, we look at two different measures of intergenerational mobility.[14] We look at the impact of homeownership rates on the below-median income backgrounds (columns 1–5) and on children with above-median income backgrounds (columns 6–10). The variables for homeownership rate has been standardized for ease of interpretation. All columns are weighted by the number of housing units in each CZ in 2000 and are clustered at the state level. Except for columns 1 and 6, all specifications include CZ-level controls.

In Panel A we focus on the causal effect of growing up in a CZ. Specifically, the dependent

[14] Chetty and Hendren (2015) provides these two measures of intergenerational mobility for childhood exposure effects of living in a CZ.

variable in Panel A is the causal effect of growing up in a CZ for twenty years. Twenty years of exposure to a CZ with 1 standard deviation higher homeownership rate is associated with a 0.735 increase in the child's income rank for families with below-median income. Including the controls percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ reduces the impact of homeownership rate to a 0.601 increase in income rank. A 0.601 percentile increase in income translates to a roughly 1.89 percent increase in earnings. For above-income families, children growing up in areas with a 1 standard deviation higher homeownership rate causes the child's income rank to increase by 0.855 percentiles. This is almost 30 percent higher than the impact on the below-median income children and translates to a 2.69 percent increase in earnings.

In columns 3 and 8 we instrument for homeownership rate in 2000 using the stock of single family detached homes in 1990 as a percentage of all housing structures in 1990. Instrumenting for homeownership rates in column 3 shows that a one standard deviation higher instrumented homeownership rate in 2000 results in 0.899 percentile increase in children's rank from below-median income families. This is similar in magnitude to the results from the OLS regressions in columns 1–2, though slightly higher. For above median-income families (column 8), children growing up in CZs with a 1 standard deviation higher homeownership rate causes children's income to increase by 1.565 percentiles.

In columns 4 we use the lender rights index as an instrument for homeownership. A one standard deviation increase in homeownership rate increases the causal component of intergenerational mobility by 1.22 percentiles for below-median income families and by 2.66 percentiles (column 9) for above-median income families.

In columns 5 we use the median house price shock between 1980–1990 as an instrument for homeownership. Twenty years of exposure to a CZ with a 1 standard deviation higher homeownership rate increases the children's rank by 0.675 percentiles for below-median income families and by 0.951 percentiles for above median income families.

For completeness we also examine the impact of homeownership rates on the intergenerational mobility of the children of permanent residents in Panel B. This can be thought of as representing the effect of both the causal effect of growing up in a neighborhood and the residual sorting component. In other words, the sorting component is the effect on intergenerational mobility driven by differences in the characteristics of individuals in the CZ. The effect on the permanent residents is weak for the below-median income families. Thus, we are assured that at the CZ level, the impact of higher homeownership rates on intergenerational mobility is not being driven by the sorting of borrowers across CZs. For above-median income families, homeownership rates are positively related to the impact on homeownership rates, however, the magnitudes are *lower* than the causal effect of growing up in all specifications (except in column 1 which does not include any controls). Thus, at the CZ level, the positive association between growing up in a CZ with high homeownership rates is not driven by the sorting component, that is, due to differences in individuals across these CZs and is being driven by the causal component of growing up in a CZ as we saw in the specifications in Panel A.

V. Does the impact of homeownership on intergenerational mobility vary by sprawl?

In the previous section, we saw that higher homeownership rates is associated with higher intergenerational mobility consistent with the findings in prior literature. We next look at whether there are place-based differences in the impact of homeownership rates on intergenerational mobility. In this section we explore the cross-sectional heterogeneity of the effect of homeownership rate on intergenerational mobility. We examine how the impact of homeownership rates on intergenerational mobility varies by 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 is intricately linked with homeownership. The hypothesis is that areas with high sprawl also diminish the positive effects associated with homeownership. Many of the positive effects of homeownership such as the high social capital — for examples, more investment in local amenities and higher involvement in local communities — may be more diminished in more sprawling areas. Sprawl may also be associated with that more segregated living. Additionally, homeownership results in reduced household mobility and homeownership exacerbates the impact of living in bad neighborhoods.

We use the measures of sprawl that Chetty and Hendren (2015) use.[15] Sprawl is measured as the fraction of people — not working from home — with more than 15 minutes of commute time to work.[16] We use this measure of sprawl since it is based on the 2000 Census has the most expansive coverage across the US. This index implicitly measures the version of sprawl considered in Glaeser and Kahn (2004). Sprawl in this case is higher wherein people need to drive large distances for employment, or in other words, cities in which employment is very decentralized. Additionally, we are interested in measure of sprawl that more closely captures the effect of living in more segregated areas.

Figure 6 examines the heterogeneity of the effect of homeownership rate on intergenerational mobility for CZs across areas with differing sprawl. We split the CZs into terciles based on the sprawl measure. The top tercile corresponds to "high sprawl" and "low sprawl" corresponds to the bottom tercile. In Figure 6 we restrict to CZs with homeownership rates in 2000 above the first percentile and below the 99^{th}. In panel (a) we see that consistent with the previous findings, high homeownership rates is associated with high intergenerational mobility for children of parents with income at the 25^{th} percentile in low sprawl areas. However, in high sprawl areas this relationship is reversed. Higher homeownership rate is in fact associated with lower intergenerational mobility. For children of parents from above-median income backgrounds, we see that homeownership is associated with higher causal impact of growing up in a neighborhood for both high sprawl and low sprawl areas.

In Table III, Panel A, we examine this relationship more formally. Columns 1–4 show the cross-sectional heterogeneity across areas with sprawl for children of below-median income parents. The variables homeownership rates and sprawl measure have all been standardized for ease of interpretation. Column 1 shows the simple OLS results. Consistent with results in the previous section, the coefficient on homeownership rate is positive indicating higher

[15]Sprawl is not the main focus of the Chetty and Hendren (2015) paper. They club it together with the segregation measure and find that high sprawl is associated with lower intergenerational mobility.

[16]For some recent coverage of the relationship between intergenerational mobility and sprawl see: http://www.nytimes.com/2013/07/29/opinion/krugman-stranded-by-sprawl.html?_r=0) http://bettercities.net/article/intergenerational-mobility-vs-sprawl-there-connection-20382 http://www.newgeography.com/content/003868-distortions-and-reality-about-income-mobility http://realestateresearch.frbatlanta.org/rer/2013/08/does-sprawl-really-limit-income-mobility.html

homeownership rates are associated with higher intergenerational mobility. Accounting for the heterogeneity with respect to sprawl increases the coefficient on homeownership rates across all specifications. Growing up in a CZ with one standard deviation higher homeownership rate is associated with a 1.731 percentile increase in the child's rank for below-median income families. The interaction term with the measure of sprawl, our coefficient of interest, is also negative. This indicates that the positive impact of homeownership rates is diminished in CZs with high sprawl. That is, a one standard deviation higher homeownership rates of a CZ in more sprawled cities leads to a 1.090 percentile lower income rank for children from below-median income families. In other words, the positive effect of higher homeownership rates on intergenerational mobility for below-median income children is diminished by 63 percent in areas with 1 SD higher sprawl. The coefficient on the sprawl measure is also negative indicating that high sprawl cities are in general associated with low intergenerational mobility which is consistent with the findings in Chetty and Hendren (2015). The direct impact of living in areas with high commute times (high sprawl) decreases the causal impact of living in a neighborhood on children's incomes by 3.883 percentiles. As Chetty and Hendren (2015) note, that this is the impact on the children's outcomes while they are growing up and hence does not directly correspond to their commute times when adult. Thus, commute times are capturing some characteristic of the CZ that is driving this relationship.

The impact on the children for the above-median income families is similar. Growing up in a CZ with one standard deviation higher homeownership rate is associated with a 2.487 percentile increase in the child's rank for above-median income families. Looking at the interaction term, the positive impact of homeownership rates diminishes in CZs with high sprawl. That is, a one standard deviation higher homeownership rates of a CZ in more sprawled cities leads to a 1.146 percentile lower income rank for children from above-median income families. For children from above-median income families, the positive effect of higher homeownership rates on intergenerational mobility is diminished by 46 percent (compared to 63 percent for below-median income families) in areas with 1 SD higher sprawl. As before, the coefficient on the sprawl measure is also negative a 1 SD higher sprawl measure decreasing the causal impact of living in a neighborhood on children's incomes by 1.946 percentiles.

VI. Does the impact of homeownership on intergenerational mobility vary by segregation?

In the previous section, we documented large place-based heterogeneity across areas with varying sprawl. High sprawl areas may also be associated with high segregation. To augment the analysis in the previous section, we look at place-based heterogeneity across segregation. We examine both racial segregation and segregation of income.

We first graphically examine the relationship between segregation and the effect of homeownership rates on intergenerational mobility. Analogous to our analysis in Figure 6, we split the CZs into terciles based on the racial segregation. The top tercile corresponds to "high segregation" and "low segregation" corresponds to the bottom tercile. In Figure 6 we restrict to CZs with homeownership rates in 2000 above the first percentile and below the 99^{th}. In panel (a) the relationship between high homeownership rates and intergenerational mobility for children of parents with income at the 25^{th} percentile is weak in both the high and low segregation areas. For children of parents from above-median income backgrounds, we see that homeownership is associated with higher causal impact of growing up in a neighborhood especially in the low segregation areas. In high segregation areas, homeownership rates still have a positive effect on intergenerational mobility, though the effect is slightly lower. Looking at the segregation of income in Figure 8 shows very similar effects.

In Table IV, Panel A we explore the heterogeneity across areas with varying racial segregation. High homeownership rate is associated with high intergenerational mobility as can be seen from the coefficient on homeownership rate. The direct impact of growing up in a neighborhood with 1 standard deviation higher homeownership rates for the children from below-median income families ranges from 1.457–3.631 percentiles. For children from above-median income families, the effect on children's outcomes is a higher 2.450–6.703 percentiles.

The direct effect of living in a racially segregated neighborhoods is slightly lower. This is consistent with Chetty and Hendren (2015) who find racial segregation to have a lower impact on intergenerational mobility. The interaction term of the Theil (1972) measure of racial segregation and homeownership rates has a negative coefficient. Thus, neighborhoods with 1 standard deviation higher racial segregation and 1 standard deviation higher homeownership rate results in a reduction in intergenerational mobility of 0.550 percentiles for children from the below-median income families. Thus, the overall impact of 1 standard deviation higher homeownership rate in a neighborhood with 1 standard deviation higher racial segregation neighborhood is a 0.907 percentile lower income for the children from the below-median income families. For children from the above-median income families, we find similar effects. A 1 standard deviation higher racial segregation in a neighborhood with 1 standard deviation higher homeownership reduces the positive impact of homeownership rate by 0.962 percentiles. Instrumenting for homeownership rates yields very similar results though the effect is slightly higher ranging from 1.318 to 1.545 percentile reduction in above-median income children.

In Table IV, Panel B we explore the heterogeneity across areas with differing segregation of income. First, the causal effect of living in CZs with higher homeownership rates is associated with higher income of children as can be seen from the coefficient on homeownership rates. Twenty years of exposure to CZs with 1 standard deviation higher homeownership rates causes child's income rank to increase between 1.16 and 4.8 percentile for children from below-median income families. For above-median income families this ranges from 2.32 to 10.45 percentiles.

Second, the causal effect of living in CZs with higher segregation of income is lower in areas with higher segregation of income as can be seen from the coefficient of segregation of income. This is consistent with Chetty and Hendren (2015).

Third, we see that 20 years of exposure to CZs with 1 standard deviation higher segregation of income and 1 standard deviation higher homeownership rates decreases a child's income rank by 0.46 percentiles for below-median income families. This corresponds to 0.5 percent reduction in income. Instrumenting for homeownership rates yields similar results, though the magnitudes are slightly higher. For above-median income families, children's income rank increases by 0.812 percentiles.

VII. Homeownership Rates and Social Capital

We now supplement our empirical analysis by examining the channels through which homeownership impacts intergenerational mobility. Homeownership is associated with higher outcomes for the children of homeowners. In our analysis, we focused on place-based differences that can operate through the aggregate impact of homeownership. Glaeser and Sacerdote (2000) find that there are large social benefits to homeownership. DiPasquale and Glaeser (1999) find that homeowners are more likely to be involved in local government and areas with high homeownership have higher social capital. To test this channel of the impact of homeownership we analyze whether areas with high homeownership rates are also associated with high social capital. In our setting, we proxy for social capital using the social capital index constructed by Rupasingha and Goetz (2008) (as in Chetty and Hendren (2015) and Chetty et al. (2015)). The index is constructed using voter turnout rates, the fraction of people who return their census forms, and other measures of participation in community organizations. The CZ level social capital index measure is constructed by population weighting the county level measures provided by Rupasingha and Goetz (2008). This measure of social capital index is similar in spirit to the involvement in local government and community explored in DiPasquale and Glaeser (1999).

Table V shows the results of this analysis. In columns 1–2, we first relate homeownership rates to social capital. For ease of interpretation, we standardize both homeownership rates and the social capital index. Column 1 shows that a 1 standard deviation higher CZ level homeownership rate is associated with a 0.057 standard deviation increase in the social capital index. All columns are weighted by the number of housing units in each CZ in 2000 and are clustered at the state level. Adding the controls fraction with percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ yields very similar results. A 1 standard deviation higher homeownership rates is associated with a 0.160 standard deviation increase in the social capital index measure.

In columns 3 we instrument for homeownership rate in 2000 using the stock of single family detached homes in 1990 as a percentage of all housing structures in 1990. The second stage results in column 4 shows the estimates using the instrumented homeownership rates. A 1 standard deviation higher instrumented homeownership rate in 2000 results in 0.33 standard deviation increase in the social capital index. This is similar in magnitude to the results from the OLS regressions in columns 1–2 though slightly higher.

In columns 4 we use the foreclosure rights index or the lender rights index as an instrument for homeownership. The lender rights index is a measure for whether a state has high or low lender rights in terms of ease of the foreclosure process and access to the borrowers' assets in case of foreclosure. The idea is that high lender rights are also associated with higher mortgage lending and thus predicts high homeownership rates. The second stage results are weak and not statistically significant.

In columns 5 we use the increase in median house price between 1980–1990 as an instrument for homeownership. 1990 corresponds to when the parents buy houses. The increase in median house price between 1980–1990 can be thought of as a measure of how affordable homeownership is in a particular area. Column 5 shows the second stage results. The second stage is similar to the previous results. A one standard deviation increase in homeownership rate is associated with a higher social capital index of 0.176 standard deviation.

In this subsection we confirmed the positive link between homeownership rates and the social capital index. Advocates of pro-homeownership policies cite the positive externalities of homeownership as a reason for encouraging homeownership. Next, we examine whether the heterogeneity of the impact of homeownership rates on social capital. Note, in Section VI and V we established that the impact of homeownership rates on intergenerational mobility diminishes in areas with high segregation and high sprawl. In Table VI we look at the heterogeneity of the relationship between social capital and homeownership rates. The hypothesis is that segregation and sprawl decrease the impact of homeownership rates on social capital. In panel A, we examine the heterogeneity with respect to sprawl as measured by the fraction of people with less than 15 minutes commuting time to work. As before, higher homeownership rate is associated with higher value of the social capital index though insignificant when we instrument for homeownership rate using the lender rights index and the house price shock between 1980 to 1990. All variables have been standardized for ease of interpretation. Neighborhoods with high fraction of people with commuting times greater than 15 minutes is associated with high social capital. Higher homeownership rates in areas with high sprawl *decreases* social capital. A 1 standard deviation higher homeownership rate in a a neighborhood with a one standard deviation higher sprawl is associated with 0.103 standard deviation reduction in the social capital index. Instrumenting for homeownership rates yields very similar results though the effect is insignificant when instrumenting using the lender rights index.

In Panel B, we look at heterogeneity across the segregation of income. Consistent with the results in Panel A, we find that areas with high homeownership rates and high segregation of income have lower social capital. Similarly, in panel C, we look at heterogeneity across racial segregation using the Theil (1972) index and find that high homeownership rate in highly racially segregated areas is associated with low social capital.

VIII. Conclusion

In this paper we relate homeownership to children's upward mobility. We establish a positive relationship, on average, but also significant cross-sectional heterogeneity depending on sprawl. We find that in areas with higher sprawl there is a lower impact of homeownership on intergenerational mobility. We also find that in neighborhoods with high segregation, higher homeownership is associated with lower intergenerational mobility, possibly through reduced residential mobility of households. Our results caution against encouraging homeownership based on prior evidence of benefits of homeownership. Instead, policies aimed at encouraging homeownership should take into account the important place-based heterogeneity across the US.

References

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

Cameron, A. Colin, and Pravin Trivedi, 2005, Microeconometrics: Methods and Applications, *New York: CambridgeUniversity Press* .

Chetty, Raj, and Nathaniel Hendren, 2015, The impacts of neighborhoods on Intergenerational Mobility: Childhood exposure effects and County-level estimates, *Working paper* .

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

Coulson, Edward, and Lynn M. Fisher, 2009, Housing tenure and labor market impacts: The search goes on, *Journal of Urban Economics* .

Coulson, Edward, and Herman Li, 2010, Measuring the external benefits of homeownership, *Paper presented at the 46th Annual AREUEA Conference, Denver, Colorado.* .

Davidoff, Thomas, 2014, Supply Constraints are Not Valid Instrumental Variables for Home Prices Because They Are Correlated with Many Demand Factors, *Working Paper* .

Deaton, Angus, 1997, The Analysis of Household Surveys: A Microeconometric Approach to Development Policy, *Baltimore, MD: Johns Hopkins University Press* .

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

Ferreira, Fernando, Joseph Gyourko, and Joseph Tracy, 2011, Housing Busts and Household Mobility: An Update, *Working Paper, National Bureau of Economic Research* .

Gerardi, Kristopher, Lauren Lambie-Hanson, and Paul S. Willen, 2013, Do Borrower Rights Improve Borrower Outcomes? Evidence from the Foreclosure Process, *Journal of Urban Economics* .

Glaeser, Edward, and Matthew E. Kahn, 2004, Sprawl and Urban Growth, *Handbook of Regional and Urban Economics* .

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

Glaeser, Edward L., and Bruce Sacerdote, 2000, The social consequences of housing, *Journal of Housing Economics* .

Glaeser, Edward L., and Jesse M. Shapiro, 2003, The Benefits of the Home Mortgage Interest Deduction, *Working paper, Harvard* .

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

Haurin, Donald R., Toby L. Parcel, and R. Jean Haurin, 2001, The Impact of Homeownership on Child Outcomes, *Joint Cneter of Housing Studies of Harvard University Working Paper Series* .

Kulkarni, Nirupama, 2015, State Foreclosure Laws and Credit Rationing, *Working Paper* .

Mian, Atif, Kamlesh Rao, and Amir Sufi, Forthcoming, Household Balance Sheets, Consumption, and the Economic Slump, *Quarterly Journal of Economics* .

Mian, Atif, Francesco Trebbi, and Amir Sufi, 2014, Foreclosures, House Prices, and the Real Economy, *Journal of Fiannce* .

Orzechowski, Shawna, and Peter Sepiella, 2003, New Worth and Asset Ownership of Households: 1998 and 2000, *Current Population Reports, P70-88, May 2003. Washington, DC: U.S. Commerce Department, Bureau of the Census.* .

Rao, John, and Geoff Walsh, 2009, Foreclosing a Dream, *National Consumer Law* .

Reardon, Sean, 2011, Measures of income segregation., *CEPA Working Papers. Stanford, CA: Stanford Center for Education Policy Analysis.* .

Rohe, William M., and Michael A. Stegman, 1994, The Impact of Home Ownership on the Social and Political Involvement of Low-Income People., *Urban Affairs Quarterly* .

Rupasingha, Anil, and Stephan Goetz, 2008, US County-level Social Capital Data, 1990–2005, *Northeast Regional Center for Rural Development, Penn State University* .

Saiz, Albert, 2010, The Geographic Determinants of Housing Supply, *Quarterly Journal of Economcis* .

Theil, Henri, 1972, Statistical decomposition analysis. With applications in the social and administrative sciences number v. 14. In Studies in mathematical and managerial economics., *Amsterdam, New York: North-Holland Pub. Co.; American Elsevier Pub. Co.* .

Yagan, Danny, 2013, The home mortgage interest deduction and migratory insurance over the great recession, *Working paper, University of California, Berkeley* .

Table I. Summary Statistics

The table below shows the summary statistics of all variables used in our analysis. Intergenerational mobility measures are from Chetty and Hendren (2015). The causal component of intergenerational mobility corresponds to the causal effect of growing up in a neighborhood (CZ) for 20 years. We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile and 75^{th} percentile of the income distribution. The intergenerational mobility for the permanent residents corresponds to the causal and sorting component of intergenerational mobility. Controls variables percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ are from the U.S. Census in 2000. Percentage single family detached units is from 1990 Census. Difference in median house price value between 1980 to 1990 is from 1980 and 1990 Census respectively. Our sprawl measure, percent of population with commute time > 15 min is from the 2000 Census. Racial segregation and segregation of income is calculated at using data from the 2000 Census. The measure of social capital index at the CZ level provided by Chetty and Hendren (2015) and is from Rupasingha and Goetz (2008). All housing units (2000) data is also from the 2000 Census.

	Mean	SD	Min	Max
Causal measure (25^{th} percentile)	3.69	12.29	-48.32	66.81
Causal measure (75^{th} percentile)	2.45	13.83	-89.60	69.03
Permanent Residents (25^{th} percentile)	46.21	5.27	34.05	63.73
Permanent Residents (75^{th} percentile)	59.60	3.48	50.69	71.71
Homeownership Rate 2000	71.31	5.51	43.53	84.41
% below Poverty Level	14.26	5.24	5.51	35.68
% Female	50.73	1.16	40.32	53.39
% Divorced	21.81	2.66	12.28	31.60
% Black	9.47	13.12	0.01	66.36
% Single family detached units (1990)	68.36	8.40	26.90	86.18
Lender rights Index (Standardized)	0.05	0.94	-1.73	2.58
Difference in median HP $(08-09)$ in '000s	17.67	19.11	-15.40	167.07
Sprawl (% with Commute > 15 min.)	58.79	11.06	24.48	84.39
Theil (1972) Index	14.34	9.00	0.67	47.63
Segregation of Income	4.61	3.15	0.38	13.79
Social Capital Index	-0.07	1.13	-3.20	3.07
All Housing Units 2000	177226	412976	8166	5355469
Observations	588			

Table II. Intergenerational Mobility and Homeownership Rate 2000

The table below shows the OLS and instrumented results of intergenerational mobility against homeownership rate in 2000 using CZ level data. Columns 1–2 and 6–7 show the OLS results. Columns 3–5 and columns 8–10 show instrumental variable regressions. The instruments in the first stage are CZ-level fraction of single family detached homes in 1990 (IV1), state-level lender rights index (IV2) and the difference in median house price value between 1980 to 1990 (IV3). All columns include the controls percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ. The dependent variable in Panel A is the causal component of intergenerational mobility from Chetty and Hendren (2015) corresponding to the causal effect of growing up in a neighborhood for 20 years. We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile (columns 1–5) and 75^{th} percentile (columns 6–10) of the parent income distribution. The dependent variable in Panel B is the intergenerational mobility for the permanent residents from Chetty and Hendren (2015). This corresponds to the causal and sorting component of intergenerational mobility. All other data are from the US 2000 Census. All columns are weighted by the number of housing units in each CZ in 2000. The homeownership rate variables has been standardized for ease of interpretation. Standard errors are clustered by state.

Panel A: Causal Component

	25^{th}					75^{th}				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	IV1	IV2	IV3	OLS	OLS	IV1	IV2	IV3
Homeownership Rate 2000	0.735***	0.601**	0.899*	1.220*	0.675**	0.917**	0.855**	1.565*	2.660*	0.951**
	(0.232)	(0.267)	(0.473)	(0.733)	(0.272)	(0.428)	(0.407)	(0.806)	(1.369)	(0.462)
Number of Observations	588	588	588	588	588	588	588	588	588	588
R squared	0.0313	0.140	0.137	0.127	0.140	0.0390	0.0586	0.0448	.	0.0584
Type	OLS	OLS	IV	IV	IV	OLS	OLS	IV	IV	IV
Controls		X	X	X	X		X	X	X	X
Number of Clusters	49	49	49	49	49	49	49	49	49	49
Weighted	X	X	X	X	X	X	X	X	X	X

Panel B: Permanent Residents

	25^{th}					75^{th}				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	IV1	IV2	IV3	OLS	OLS	IV1	IV2	IV3
Homeownership Rate 2000	0.104	-0.154	-0.0523	-1.079	-0.371	0.955**	0.817*	1.343*	0.484	1.073**
	(0.244)	(0.248)	(0.329)	(0.858)	(0.227)	(0.418)	(0.465)	(0.719)	(1.122)	(0.544)
Number of Observations	718	718	718	718	717	718	718	718	718	717
R squared	0.00143	0.543	0.543	0.476	0.540	0.182	0.260	0.227	0.247	0.252
Type	OLS	OLS	IV	IV	IV	OLS	OLS	IV	IV	IV
Controls		X	X	X	X		X	X	X	X
Number of Clusters	51	51	51	51	51	51	51	51	51	51
Weighted	X	X	X	X	X	X	X	X	X	X

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

Table III. Intergenerational Mobility, Sprawl and Homeownership Rate 2000

This table presents estimates of the cross-sectional heterogeneity across sprawl of the effect of homeownership rate on intergenerational mobility. Columns 1 and 5 show the OLS results. Columns 2–4 and columns 6–8 show the instrumental variable regressions. The instruments in the first stage are CZ-level fraction of single family detached homes in 1990 (IV1), state-level lender rights index (IV2) and the difference in median house price value between 1980 to 1990 (IV3). All columns include the controls percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ. The dependent variable is the causal component of intergenerational mobility from Chetty and Hendren (2015) corresponding to the causal effect of growing up in a neighborhood for 20 years. We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile (columns 1–4) and 75^{th} percentile (columns 5–8) of the income distribution. All other data are from the US 2000 Census. All columns are weighted by the number of housing units in each CZ in 2000. The sprawl measures and homeownership rate variables have been standardized for ease of interpretation. Standard errors are clustered by state. The interaction term in Panel A is the our measure of sprawl defined as the fraction of people not working from home with greater than 15 minutes of commute time to work.

	25^{th}				75^{th}			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV1	IV2	IV3	OLS	IV1	IV2	IV3
Homeownership Rate 2000	1.731***	1.870	4.604	3.824***	2.487***	4.664***	7.813*	4.066***
	(0.578)	(1.260)	(3.494)	(0.976)	(0.632)	(1.354)	(4.480)	(1.054)
Fraction > 15 min * Homeownership Rate 2000	-1.090***	-1.520**	-2.333	-2.304***	-1.146***	-2.059***	-2.994	-1.968***
	(0.268)	(0.659)	(1.722)	(0.561)	(0.275)	(0.552)	(1.899)	(0.474)
Fraction > 15 min	-3.883***	-4.642***	-3.759***	-4.431***	-1.946**	-1.792**	-0.772	-2.165**
	(0.750)	(0.837)	(0.989)	(0.744)	(0.959)	(0.761)	(1.049)	(0.899)
Number of Observations	588	588	588	588	588	588	588	588
R squared	0.233	0.220	0.184	0.202	0.0898	0.0666	.	0.0776
Type	OLS	IV	IV	IV	OLS	IV	IV	IV
Controls	X	X	X	X	X	X	X	X
Number of Clusters	49	49	49	49	49	49	49	49
Weighted	X	X	X	X	X	X	X	X

Table IV. Intergenerational Mobility, Segregation and Homeownership Rate 2000

This table presents estimates of the cross-sectional heterogeneity across segregation of the effect of homeownership rate on intergenerational mobility. Columns 1 and 5 show the OLS results. Columns 2–4 and columns 6–8 show the instrumental variable regressions. The instruments in the first stage are CZ-level fraction of single family detached homes in 1990 (IV1), state-level lender rights index (IV2) and the difference in median house price value between 1980 to 1990 (IV3). All columns include the controls percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ. The dependent variable is the causal component of intergenerational mobility from Chetty and Hendren (2015) corresponding to the causal effect of growing up in a neighborhood for 20 years. We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile (columns 1–4) and 75^{th} percentile (columns 5–8) of the income distribution. All other data are from the US 2000 Census. All columns are weighted by the number of housing units in each CZ in 2000. In Panel A we interact homeownership rate with a measure of racial segregation based on the Theil (1972) Index. The Theil (1972) Index is calculated at the CZ level using Census 2000 data and is provided by Chetty and Hendren (2015). In Panel B we interact homeownership rate with a measure of segregation of income. Segregation of income is based on Reardon (2011) and calculated at the CZ level using Census 2000 data and is provided by Chetty and Hendren (2015). The segregation measures and homeownership rate variables have been standardized for ease of interpretation. Standard errors are clustered by state.

Panel A: Racial Segregation

	25^{th}				75^{th}			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV1	IV2	IV3	OLS	IV1	IV2	IV3
Homeownership Rate 2000	1.457***	3.070***	3.631*	2.913***	2.450***	4.329***	6.703**	3.142***
	(0.456)	(1.135)	(2.157)	(0.862)	(0.484)	(1.395)	(3.103)	(0.578)
Theil Index * Homeownership Rate 2000	-0.550***	-1.307***	-1.483	-1.379***	-0.962***	-1.545***	-2.459**	-1.318***
	(0.198)	(0.470)	(0.945)	(0.409)	(0.187)	(0.464)	(1.187)	(0.283)
Theil Index	-0.462	-0.652*	-0.641	-0.765**	-0.273	-0.226	-0.327	-0.382
	(0.328)	(0.343)	(0.430)	(0.382)	(0.291)	(0.318)	(0.488)	(0.325)
Number of Observations	588	588	588	588	588	588	588	588
R squared	0.154	0.125	0.104	0.125	0.0894	0.0559	.	0.0849
Type	OLS	IV	IV	IV	OLS	IV	IV	IV
Controls	X	X	X	X	X	X	X	X
Number of Clusters	49	49	49	49	49	49	49	49
Weighted	X	X	X	X	X	X	X	X

Panel B: Segregation of Income

	25^{th}				75^{th}			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV1	IV2	IV3	OLS	IV1	IV2	IV3
Homeownership Rate 2000	1.116**	3.474***	3.992	4.868***	2.328***	5.835***	10.45**	4.794***
	(0.478)	(1.240)	(2.972)	(1.252)	(0.562)	(1.982)	(5.214)	(1.091)
Segregation of Income * Homeownership Rate 2000	-0.464**	-1.570***	-1.423	-2.042***	-0.812***	-2.008***	-3.458**	-1.813***
	(0.182)	(0.512)	(1.066)	(0.529)	(0.208)	(0.644)	(1.645)	(0.457)
Segregation of Income	-1.635***	-1.970***	-1.316**	-1.829***	-1.214**	-0.875*	-0.194	-1.273**
	(0.521)	(0.570)	(0.625)	(0.558)	(0.541)	(0.468)	(0.924)	(0.546)
Number of Observations	588	588	588	588	588	588	588	588
R squared	0.177	0.128	0.128	0.0776	0.0902	0.0315	.	0.0575
Type	OLS	IV	IV	IV	OLS	IV	IV	IV
Controls	X	X	X	X	X	X	X	X
Number of Clusters	49	49	49	49	49	49	49	49
Weighted	X	X	X	X	X	X	X	X

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

Table V. Social Capital and Homeownership Rate 2000

The table below shows the OLS and instrumented results of social capital against homeownership rate in 2000 using CZ level data. Columns 1–2 show the OLS results. Columns 3–5 show the results for the instrumented regressions. The instruments in the first stage are CZ-level fraction of single family detached homes in 1990 (IV1), state-level lender rights index (IV2) and the difference in median house price value between 1980 to 1990 (IV3). Columns 3 uses the fraction of single family detached homes in 1990 to instrument for homeownership rate in 2000. Columns 4 uses lender rights index in Kulkarni (2015) to instrument for homeownership rate in 2000. Columns 5 show uses difference in the median house price value between 1980 to 1990 to instrument for homeownership rate in 2000. Columns 2–5 include the controls fraction with percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ. The dependent variable is the social capital index at the CZ level provided by Chetty and Hendren (2015) and is from Rupasingha and Goetz (2008). All other data are from the U.S. 2000 Census. All columns are weighted by the number of housing units in each CZ in 2000. Standard errors are clustered by state. Social capital index and homeownership rates have been standardized for ease of interpretation.

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	IV1	IV2	IV3
Homeownership Rate 2000	0.193***	0.160***	0.328**	0.236	0.176***
	(0.0471)	(0.0505)	(0.140)	(0.191)	(0.0601)
Number of Observations	588	588	588	588	588
R squared	0.135	0.558	0.498	0.546	0.558
Type	OLS	OLS	IV	IV	IV
Controls		X	X	X	X
Number of Clusters	49	49	49	49	49
Weighted	X	X	X	X	X

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

Table VI. Social Capital and Segregation

This table presents estimates of the cross-sectional heterogeneity across sprawl and segregation of the effect of homeownership rate on social capital. Column 1 shows the OLS results. Columns 2–4 show the instrumental variable regressions. The instruments in the first stage are CZ-level fraction of single family detached homes in 1990 (IV1), state-level lender rights index (IV2) and the difference in median house price value between 1980 to 1990 (IV3). All columns include the controls percentage below poverty level, percentage female, percentage divorced and percentage black in the CZ. The dependent variable is the social capital index at the CZ level provided by Chetty and Hendren (2015) and is from Rupasingha and Goetz (2008). All other data are from the US 2000 Census. All columns are weighted by the number of housing units in each CZ in 2000. The interaction term in Panel A is sprawl measure, the fraction of people not working from home with greater than 15 minutes of commute time to work. In Panel B we interact homeownership rate with a measure of racial segregation based on the Theil (1972) index. In Panel C we interact homeownership rate with a measure of segregation of income. Segregation of income is based on Reardon (2011) and calculated at the CZ level using Census 2000 data and is provided by Chetty and Hendren (2015). The segregation, sprawl and homeownership rate variables have been standardized for ease of interpretation. Standard errors are clustered by state.

Panel A: Commuting Time

	(1)	(2)	(3)	(4)
	OLS	IV1	IV2	IV3
Homeownership Rate 2000	0.204***	0.394***	0.176	0.185
	(0.0670)	(0.152)	(0.423)	(0.115)
Fraction > 15 min commute * Homeownership Rate 2000	-0.103***	-0.172***	-0.0271	-0.101**
	(0.0286)	(0.0551)	(0.177)	(0.0445)
Fraction > 15 min commute	-0.668***	-0.632***	-0.538***	-0.682***
	(0.108)	(0.0714)	(0.0892)	(0.101)
Number of Observations	588	588	588	588
R squared	0.719	0.703	0.694	0.718
Type	OLS	IV	IV	IV
Controls	X	X	X	X
Number of Clusters	49	49	49	49
Weighted	X	X	X	X

Panel B: Racial Segregation

	(1)	(2)	(3)	(4)
	OLS	IV1	IV2	IV3
Homeownership Rate 2000	0.316***	0.815***	0.542	0.423***
	(0.0771)	(0.248)	(0.384)	(0.163)
Theil Index * Homeownership Rate 2000	-0.0922***	-0.268***	-0.186	-0.147**
	(0.0289)	(0.0821)	(0.131)	(0.0671)
Theil Index	-0.0112	-0.0177	-0.0271	-0.0280
	(0.0432)	(0.0467)	(0.0453)	(0.0453)
Number of Observations	588	588	588	588
R squared	0.581	0.410	0.548	0.573
Type	OLS	IV	IV	IV
Controls	X	X	X	X
Number of Clusters	49	49	49	49
Weighted	X	X	X	X

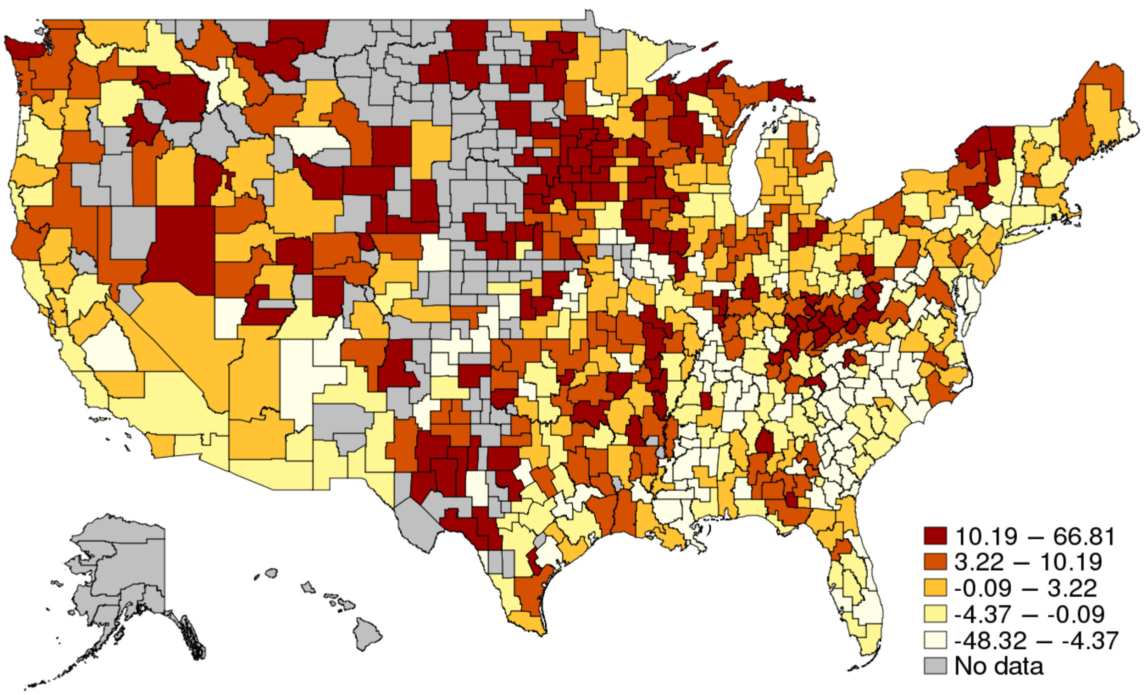
Panel C: Segregation of Income

	(1)	(2)	(3)	(4)
	OLS	IV1	IV2	IV3
Homeownership Rate 2000	0.229***	0.931***	0.444	0.557***
	(0.0677)	(0.348)	(0.520)	(0.204)
Segregation of Income * Homeownership Rate 2000	-0.0705***	-0.300***	-0.126	-0.202***
	(0.0234)	(0.109)	(0.151)	(0.0749)
Segregation of Income	-0.275***	-0.189***	-0.221**	-0.281***
	(0.0762)	(0.0702)	(0.0976)	(0.0814)
Number of Observations	588	588	588	588
R squared	0.622	0.437	0.602	0.578
Type	OLS	IV	IV	IV
Controls	X	X	X	X
Number of Clusters	49	49	49	49
Weighted	X	X	X	X

Figure 1. Map of Intergenerational Mobility

The figures below show the heat maps for causal component of intergenerational mobility at the 25^{th} and 75^{th} percentile (Panel A and Panel B) at the CZ level. Data are divided into 5 quintiles are shown. Intergenerational mobility is from Chetty and Hendren (2015). We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile and 75^{th} percentile of the income distribution. The causal component measure shows the casual effect of growing up for 20 years in a given CZ.

Panel A: 25^{th} **Percentile**



Panel B: 75^{th} **Percentile**

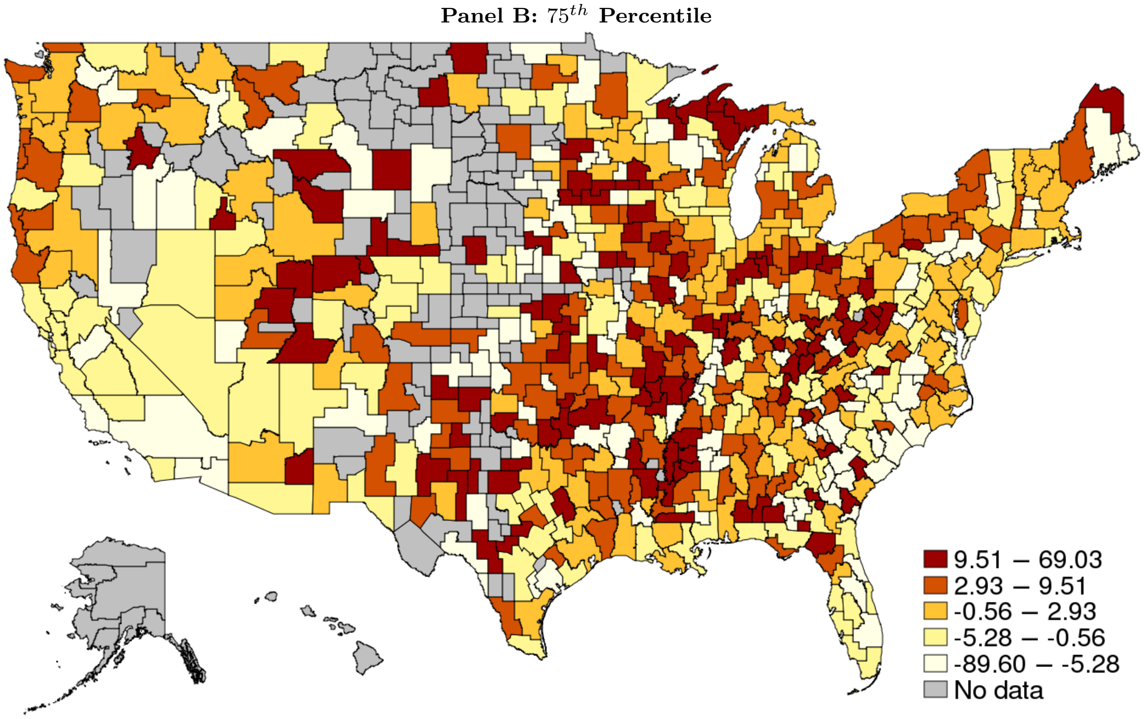


Figure 2. Map of Homeownership Rates 2000

The figures below show the heat maps for homeownership rate in 2000 at the CZ level. Data are divided into 5 quintiles are shown. Homeownership rates in 2000 are from the 2000 Census.

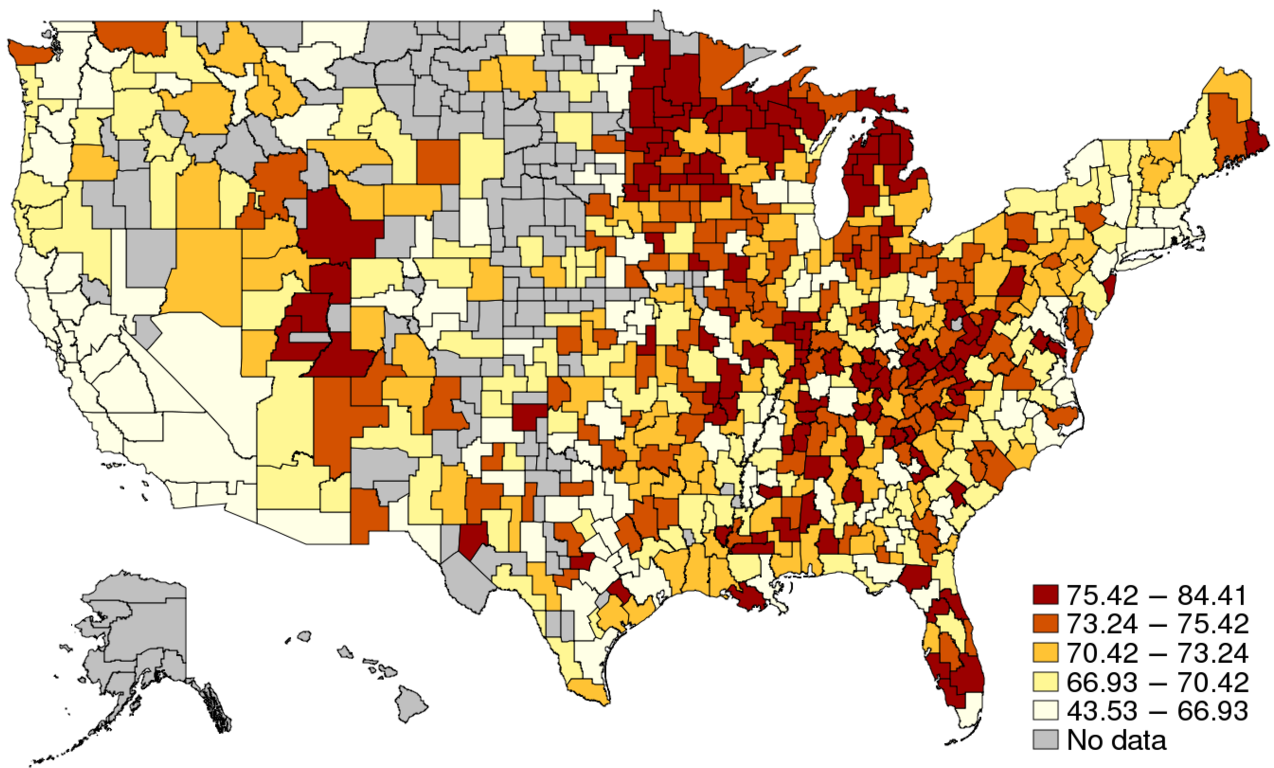
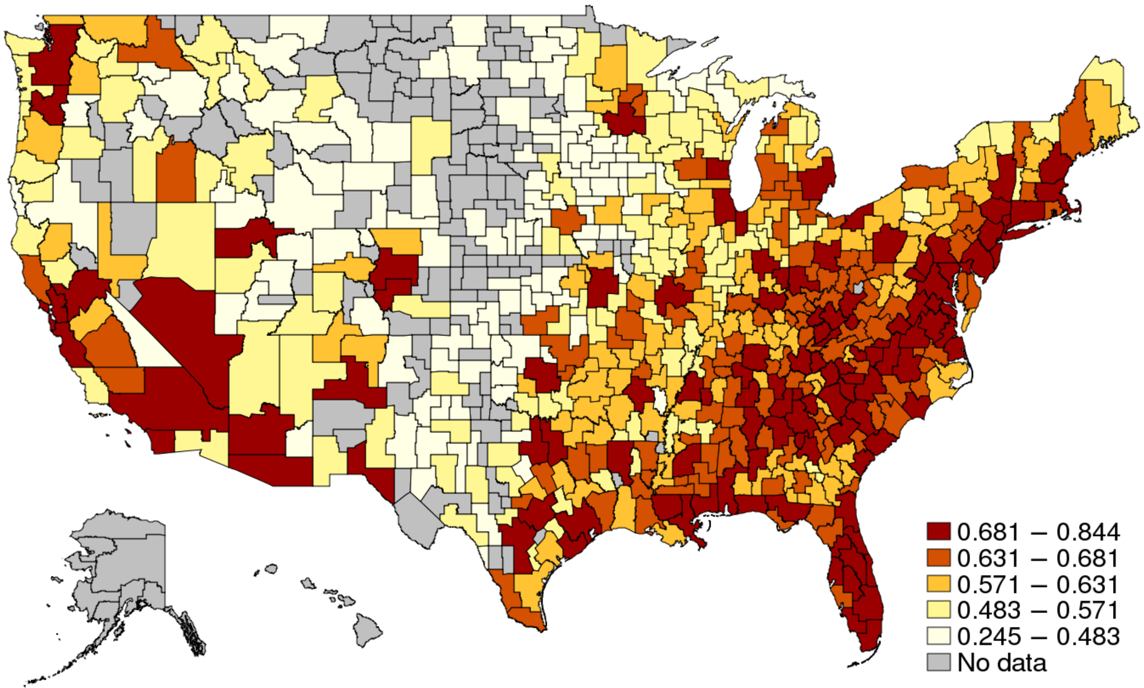


Figure 3. Map of Sprawl and Segregation

The figures below show the heat maps for the sprawl measure (Panel A) and segregation measure (Panel B) at the CZ level. Data are divided into 5 quintiles are shown. The sprawl measure we use is the fraction of people not working from home with more than 15 minutes of commute time to work. The segregation of income measures is based on Reardon (2011). Data is from the 2000 Census.

Panel A: Sprawl measure (Fraction of population with more than 15 minutes commuting time)



Panel B: Segregation of Income

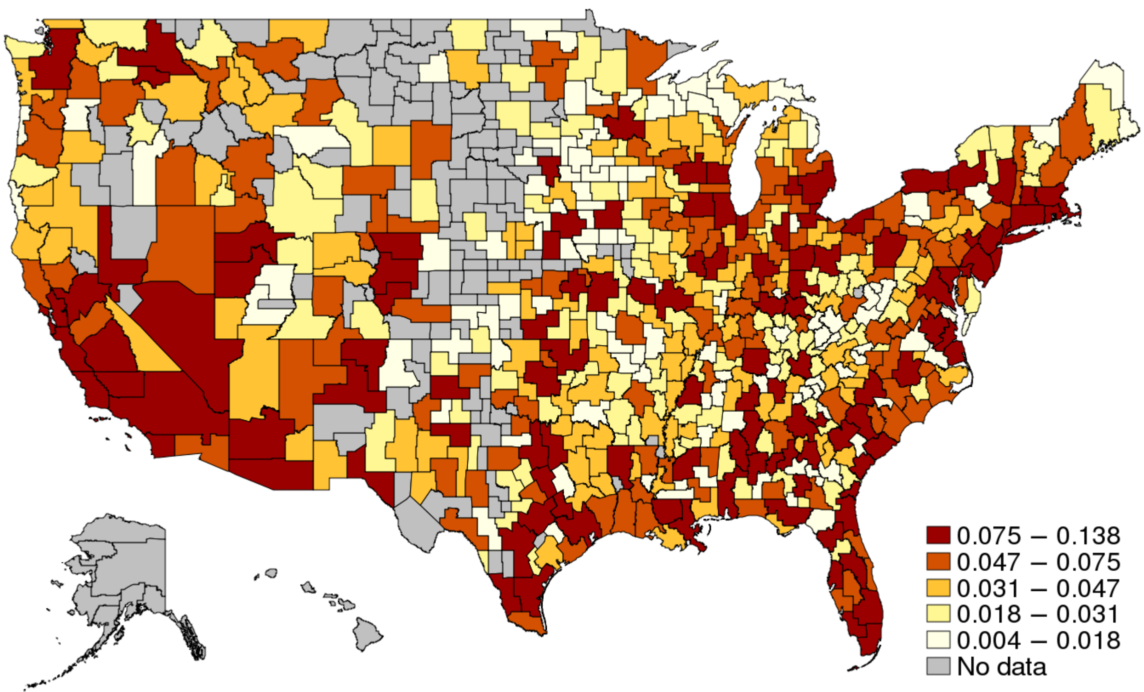
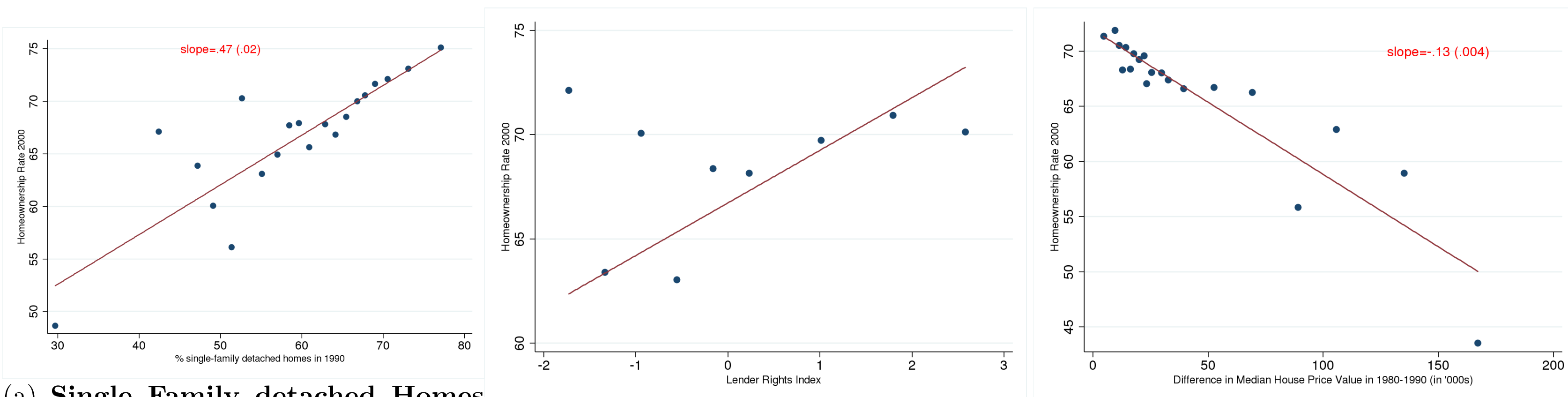


Figure 4. Fraction of Single family detached homes 1990, lender rights index and homeownership rates in 2000

The figures below graphically show the first stage of the two instruments we use — fraction of single family detached homes in 1990 and the lender rights index — to instrument for homeownership rates in 2000. Panel (a) shows the binned scatter plots of fraction of single family detached homes in 1990 against homeownership rates in 2000 weighted by total number of housing units in 2000. The binned scatter plots divide the variable along the x-axis (single family detached homes in 1990) into 5 percentile bins and plot the mean of the x-axis and corresponding mean of the y-axis (homeownership rates in 2000) respectively. Panel (b) shows the homeownership rates in 2000 for all states. Lender rights index from Kulkarni (2015) is a continuous index with higher lender rights corresponding to ease of foreclosure. Panel (c) shows the first stage for our third instrument, the difference in median house price between 1980 and 1990. Homeownership rates in 2000, total number of housing units in 2000 are from Census 2000. The fraction of single family detached homes in 1990 and median house price of from the 1990 Census. The median house price in 1980 is from the 1980 Census.



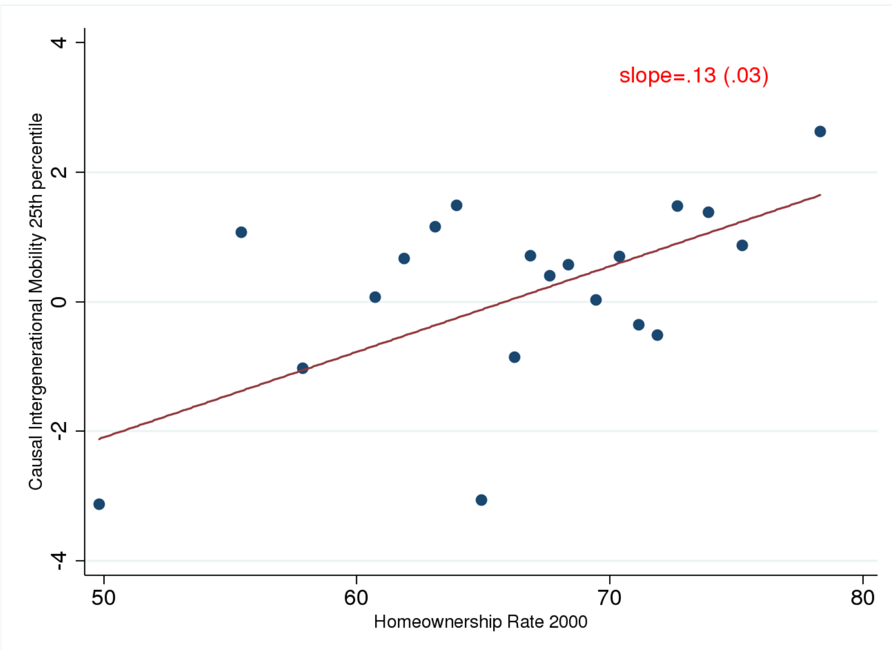
(a) **Single Family detached Homes 1990**

(b) **Lender Rights Index**

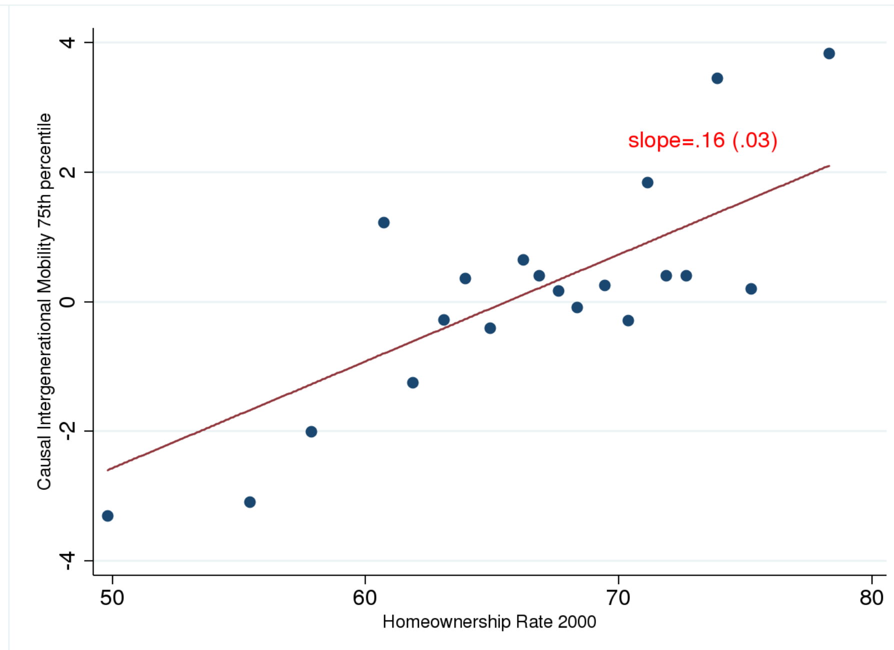
(c) **House Price Difference 1980–90**

Figure 5. Homeownership rates and Intergenerational Mobility

The figures below show the relationship between intergenerational mobility and homeownership rates using CZ level data. The vertical axis variable is the causal component of intergenerational mobility from Chetty and Hendren (2015) corresponding to the causal effect of growing up in a neighborhood for 20 years. We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile (panel (a)) and 75^{th} percentile (panel (b)) of the parents' income distribution. The homeownership rate is from the US 2000 Census. Data are weighted by the number of housing units in each county in 2000.



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

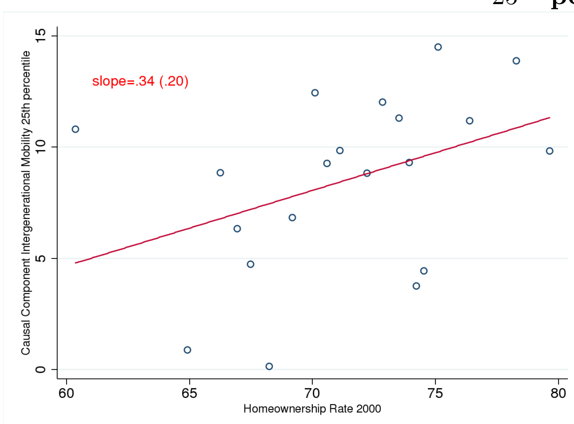


(b) 75^{th} **percentile**

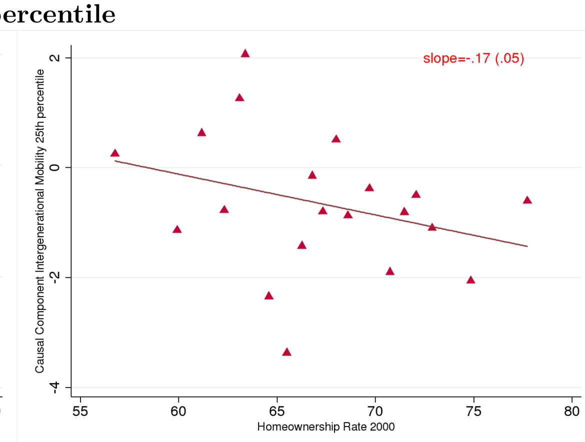
Figure 6. Heterogeneity across Sprawl

The figures below show the cross-sectional heterogeneity of the effect of homeownership rate in 2000 on intergenerational mobility using CZ level data. The sample is divided into terciles based on our measure of sprawl, the fraction of people not working from home with more than 15 minutes of commute time to work. The high sprawl ares refer to the top tercile of the sprawl measure and the low sprawl refer to the bottom tercile. The outliers corresponding to the top 1 percentile and bottom 1 percentile of homeownership rates have been dropped in this figure. The vertical axis variable is the causal component of intergenerational mobility from Chetty and Hendren (2015) corresponding to the causal effect of growing up in a neighborhood for 20 years. We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile (panel (a) and panel (b)) and 75^{th} percentile (panel (c) and panel (d)) of the parents' income distribution. The sprawl measure is from the US 2000 Census. Data are weighted by the number of housing units in each county in 2000.

25^{th} percentile

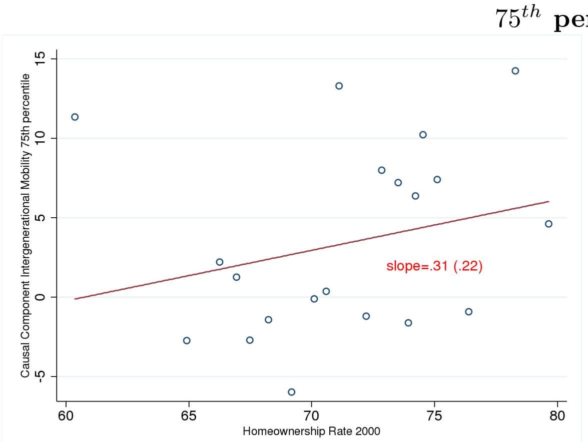


(a) **Low Sprawl**

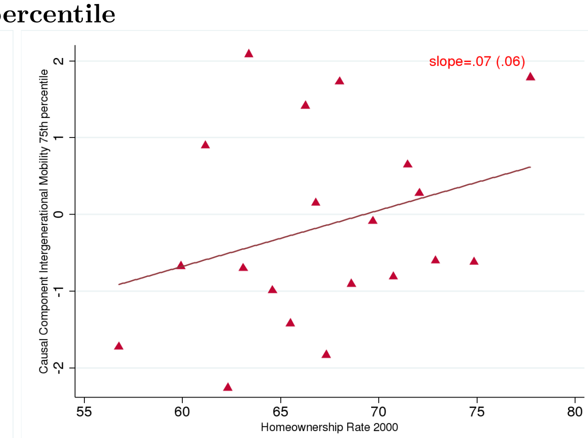


(b) **High Sprawl**

75^{th} percentile



(c) **Low Sprawl**

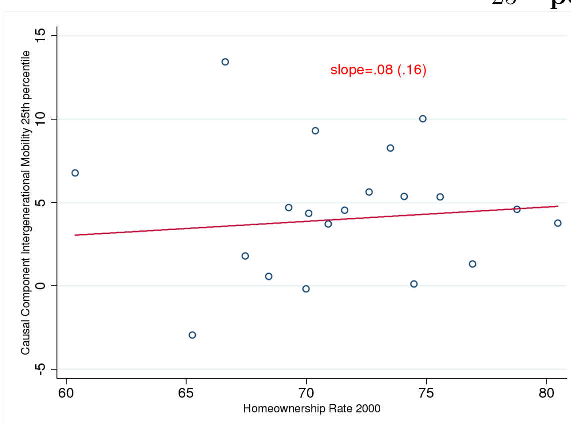


(d) **High Sprawl**

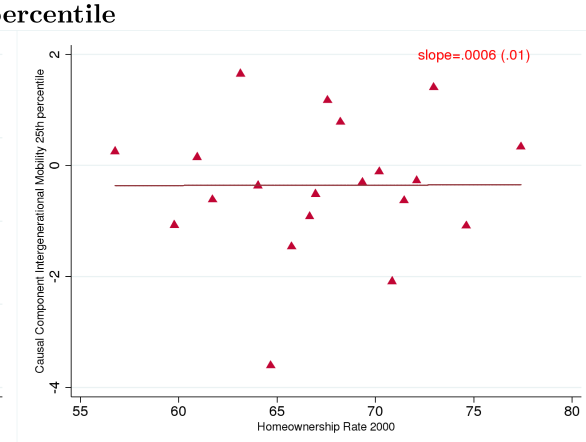
Figure 7. Heterogeneity across Racial Segregation

The figures below show the cross-sectional heterogeneity of the effect of homeownership rate in 2000 on intergenerational mobility using CZ level data. The sample is divided into terciles based on our measure of racial segregation. The high segregation ares refer to the top tercile of the racial segregation and the low segregation refer to the bottom tercile. The outliers corresponding to the top 1 percentile and bottom 1 percentile of homeownership rates have been dropped in this figure. The vertical axis variable is the causal component of intergenerational mobility from Chetty and Hendren (2015) corresponding to the causal effect of growing up in a neighborhood for 20 years. We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile (panel (a) and panel (b)) and 75^{th} percentile (panel (c) and panel (d)) of the parents' income distribution. The racial segregation measure is based on the Theil (1972) measure and calculated from data from the US 2000 Census. Data are weighted by the number of housing units in each county in 2000.

25^{th} percentile

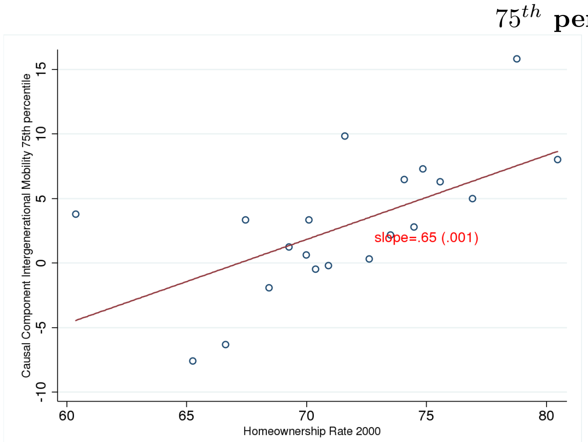


(a) **Low Segregation**

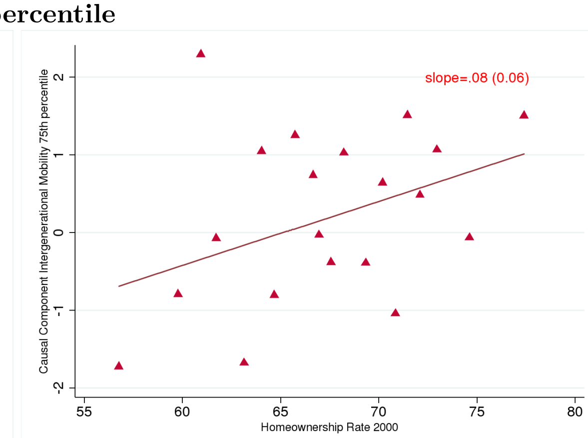


(b) **High Segregation**

75^{th} percentile



(c) **Low Segregation**

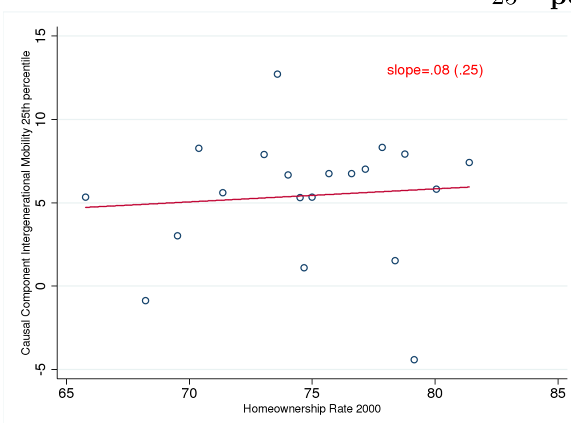


(d) **High Segregation**

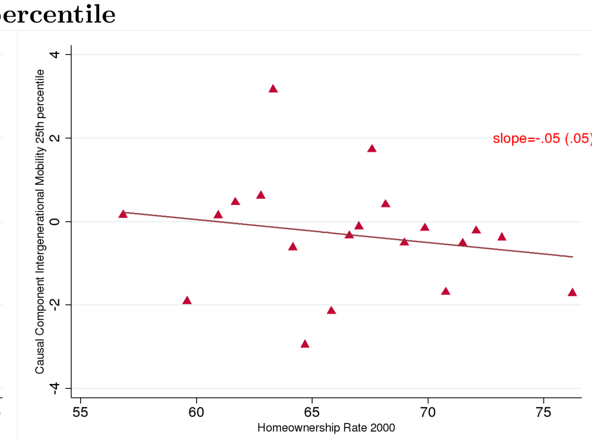
Figure 8. Heterogeneity across Segregation of Income

The figures below show the cross-sectional heterogeneity of the effect of homeownership rate in 2000 on intergenerational mobility using CZ level data. The sample is divided into terciles based on our measure of segregation of income. The high segregation ares refer to the top tercile of the segregation of income measure and the low segregation refer to the bottom tercile. The outliers corresponding to the top 1 percentile and bottom 1 percentile of homeownership rates have been dropped in this figure. The vertical axis variable is the causal component of intergenerational mobility from Chetty and Hendren (2015) corresponding to the causal effect of growing up in a neighborhood for 20 years. We focus on the causal effect on intergenerational mobility corresponding to the 25^{th} percentile (panel (a) and panel (b)) and 75^{th} percentile (panel (c) and panel (d)) of the parents' income distribution. The segregation of income measure is calculated from the US 2000 Census. Data are weighted by the number of housing units in each county in 2000.

25^{th} percentile

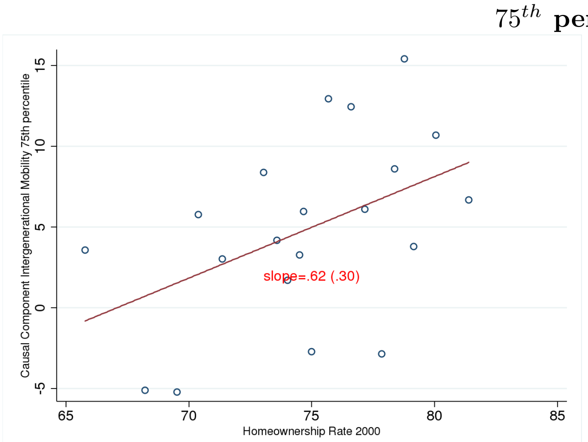


(a) **Low Segregation**

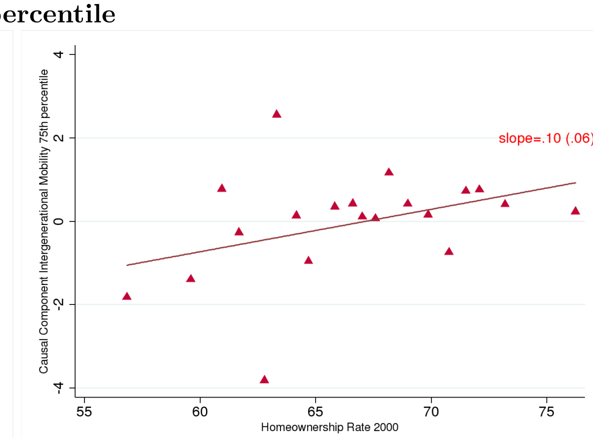


(b) **High Segregation**

75^{th} percentile



(c) **Low Segregation**



(d) **High Segregation**