Mortgage Policies and their Effects on Racial Segregation and Upward Mobility

Nirupama Kulkarni [*] Ulrike Malmendier [†]

[*]CAFRAL, Research Department, Reserve Bank of India Main Building, Fort, Mumbai 400 001. Email: nirupama.kulkarni@gmail.com

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

Mortgage Policies and their Effects on Racial Segregation and Upward Mobility

ABSTRACT

We document that housing policies aimed at increasing homeownership and reducing disparities can have adverse consequences, arising from sorting and deteriorating place-based factors. Exploiting variation in the ease of mortgage financing and targeting of underserved neighborhoods in the 1992 GSE Act, we show that, while Black homeownership increased in targeted neighborhoods, white families moved out, especially when mortgage financing became more accessible in the surrounding areas. Segregation increased and upward mobility deteriorated among low-income Black families and among those low-income white families who remained. We identify declining house prices, education spending, and school quality in targeted areas as plausible channels.

JEL Codes: D14, J15, R21, R23, R31

Keywords: Upward mobility, homeownership, segregation

1 Introduction

Increasing homeownership has been a major policy goal of the U.S. since the early twentieth century. Numerous benefits are attributed to homeownership, including wealth creation, consumption smoothing, and financial stability for families (Dietz and Haurin, 2003; Sodini et al., 2016b), higher educational attainment and fewer teenage pregnancies among their children (Green and White, 1997), as well as positive externalities for the surrounding neighborhood (DiPasquale and Glaeser, 1999). Moreover, policymakers and economists have long argued that reducing the racial disparity in homeowning can address the racial disparity in economic outcomes. These policies have had strong political support across the aisle. Both President Clinton's administration in the 1990s,[1] and President Bush's administration in the early 2000s[2] set the explicit goal to overcome the homeownership gap among minority and low-income families. Yet it remained an unsolved problem for the Biden administration in the 2020s.[3]

Two milestones in implementing these homeownership policy goals were the creation of the Government Sponsored Enterprises (GSEs) Fannie Mae in 1938 and Freddie Mac in 1970, which became the two largest sources of housing finance in the secondary mortgage market. Their policies largely determine who gets access to credit in the residential mortgage market and eventually becomes a homeowner. Since the 1990s, federal housing policy has focused on the dual goals of increasing aggregate homeownership rates and narrowing the persistent socio-economic and racial gap in homeownership (Gabriel and Rosenthal, 2008). The Federal Housing Enterprise Safety and Soundness Act of 1992 (also referred to as the 1992 GSE Act) formalizes the GSEs' responsibility for assisting low- and moderate-income families as well as underserved neighborhoods under the "Afforable Housing Goals". It mandates that the GSEs devote a percentage of their business to underserved groups and to target underserved census tracts (neighborhoods) under the "Underserved Area Goals" (UAG).[4]

[1] See www.huduser.gov/publications/txt/hdbrf2.txt.

[2] See www.whitehouse.gov/news/releases/2002/06/20020618-1.html.

[3] The "Biden plan for investing in our communities through housing" from January 2021 states that "Communities of color are disproportionately impacted by the failures in our housing markets, with homeownership rates for Black and Latino individuals falling far below the rate for white individuals. Because home ownership is how many families save and build wealth, these racial disparities in home ownership contribute to the racial wealth gap. "

[4] Prior to the 1992 GSE Act, HUD established affordable housing goals in 1978 for Fannie Mae that targeted borrowers

This paper analyzes the impact of the homeownership policies of the 1990s on the racial geographic pattern in homeownership and its impact on children's upward mobility. We focus on (i) the increased access to mortgage financing throughout the 1990s and its differential impact within and across cities, or so-called commuting zones (CZs), and (ii) the geographically targeted Underserved Area Goals (UAG) encouraging homeownership in disadvantaged and minority neighborhoods (census tracts). The interaction of those policies, affecting different geographical units (CZs versus census tracts) will be at the core of our main insight: the adverse effects of heterogeneous sorting out of census tracts and ensuing deterioration of place-based factors.

We first document a positive effect of these policies on homeownership rates overall; but, while Black homeownership increased in geographically targeted neighborhoods, these areas witnessed an outflow of white homeowners, especially if the larger city (commuting zone) also benefited from improved access to mortgage financing. As a result, racial segregation increased, as did income segregation, urban sprawl, and homeownership segregation, despite the intended policy goal of decreasing the geographic disparity in homeownership.

In the next step of the analysis, we show that the mortgage policies of the 1990s resulted in worsening low-income children's upward mobility, especially among Black households. White families also saw a negative impact on their children's upward mobility if they remained in the targeted neighborhoods. The adverse impact thus appears to reflect neighborhood (or locational) effects. We provide evidence for one major channel of these adverse effects: house prices in targeted neighborhoods declined, lowering property (and other) tax revenues, and resulting in lower education spending and lower-quality schools in these targeted neighborhoods. Overall, our paper reveals how homeownership policies, particularly geographically targeted homeownership policies, can inadvertently increase racial segregation within cities, worsening Black children's upward mobility.

Our main sources of data are the 1990 and 2000 Census and the upward-mobility data provided by Chetty and Hendren (2018a) and Chetty et al. (2019). The upward-mobility measures are based on confidential U.S. federal-income tax records of nearly 40 million children born be-

based on the price of the house they were purchasing and whether they lived anywhere in a central city but were largely ineffective Moulton (2008); Wallison (2001).

tween 1978 and 1986 and their parents' income measured as of 1996–2000. It is measured as the income percentile rank of the children relative to that of their parents. We focus on families with below-median incomes in the national distribution, for which Chetty et al. use the household income ranks of families at the 25^{th} percentile. Chetty and Hendren (2018a) also aim to identify the causal (location) effect of growing up in a CZ from variation in exposure (length of time lived in a commuting zone) among families that move, and provide upward mobility by race for families with kids born between 1978 and 1983 in Chetty et al. (2019). We also use the tract-level upward mobility measures provided by Chetty et al. (2020).

We merge the upward-mobility data with 1990 and 2000 Census data, which provides information on homeownership. For the census-tract level analyses, we combine the merged data with classification of census tract as underserved or targeted provided by the Department of Housing and Urban Development (HUD). For the analysis on the mechanisms driving our results, we combine with data on public finance provided by Derenoncourt (2019).

Our research design exploits two types of identifying variation. First, we use the nationwide variation in the conforming loan limit (CLL) to generate CZ-level variation in access to mortgage finance. The CLL limits the origination balance of loans eligible to be purchased by the GSEs. Over time, it has increased from $33,000 in the 1970s to more than $500,000 in the 2020s (for single-family properties). Since conforming-loan mortgages are easier to obtain for borrowers due to the GSE's participation in the secondary mortgage market, CLL increases improve access to mortgage financing. Specifically, we calculate the fraction of houses in a CZ that become conforming between 1990–2000. We exploit that CLL changes are determined at the national level to justify the assumption that our measure of changes in the ease of obtaining a mortgage loan in a region is quasi-exogenous. We also build a tract-level CLL-based instrument that captures access mortgage financing in surrounding tracts within the CZ. This tract-level instrument is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit between 1990–2000, excluding the census tract for which the measure is calculated. We will use this tract-level measure to answer the question: how does easier access to mortgage financing in surrounding tracts in a CZ influence homeownership in a given tract?

Second, we use tract-level variation under the UAG. The UAG target census tracts with a tract-to-MSA median-income ratio weakly smaller than 0.9 and tracts with a minority share weakly larger than 0.3 (and tract-to-MSA median-income ratio weakly smaller than 1.2). Our goal is to analyze both the effect of targeting and how the increased ease of mortgage financing interacts with the classification of certain neighborhoods as "targeted" under UAG. We will exploit the interaction of UAG targeting in a given tract with CLL-based changes in the ease of mortgage financing in the surrounding tracts.

Our analysis proceeds in two steps. We start by showing that increases in the ease of mortgage financing between 1990–2000 explain variation in change in homeownership between 1990–2000. A 1 percentile higher increase predicts a 0.112 pp higher change in homeownership between 1990–2000. Given our focus on racial disparity, we look at the race-specific patterns and find that Black homeownership increased by 0.025 pp and white homeownership increased by 0.086 pp. Thus, at face-value, the homeownership policies of the 1990s had limited impact on *reducing* racial disparity. This is consistent with prior work that has noted that while the racial homeownership gap has narrowed since the 1870s, most of the reduction in the gap occurred between 1870–1910 with very limited reductions in later periods (Collins and Margo, 2011).

Turning to the census-tract level, we document a strong pattern of segregation in response to the homeownership policies. Growth in Black homeownership is concentrated in the targeted tracts. In comparison, white homeownership in targeted census tracts declined, particularly when the ease of mortgage access in the remaining tracts in the CZ increased. It appears that easier access to mortgage financing in other tracts in a CZ allowed white homeowners to move out of targeted neighborhoods, increasing racial segregation. Thus, mortgage policies were somewhat successful in achieving their intended goal of increasing homeownership, but failed to decrease the racial gap.

Given the within-CZ sorting of Black and white homeowners, we then examine the effects on segregation directly. We calculate entropy-based measures of racial and income segregation as in Theil (1972) across tracts within a CZ level, using 1990 and 2000 Census data. We show that, while (raw) homeownership is not significantly related to racial segregation, both our CLL-

based measure of changes in the ease of mortgage financing and homeownership *instrumented* with the ease of mortgage financing strongly predict *increased* racial segregation. We find the same significantly positive relationship between income segregation and changes in the ease of mortgage financing or (instrumented) homeownership.

We also propose a novel, homeownership-based measure of segregation. This new measure is motivated by the 1992 GSE Act specifically focusing on geographic disparity in homeownership through the underserved area goals that targeted disadvantaged neighborhoods (Jaffee and Quigley, 2007). We construct an entropy-based measure of "homeownership segregation," similar to the racial segregation measure in Theil (1972), which captures geographic disparity in homeownership. Using our preferred estimate for instruments of the change in homeownership between 1990–2000 with the change in the ease of mortgage financing for the same period, we find that homeownership segregation was higher in CZs that saw higher homeownership change between 1990–2000 (even after controlling for the pre-existing homeownership segregation as of 1990).

Finally, we construct a proxy for urban sprawl, as captured by the time households spend commuting to work. Increased access to mortgage financing and resulting increases in homeownership are also associated with an increase in urban sprawl. Thus, across all dimensions we see that residential segregation increased in CZs that witnessed an increase in homeownership between 1990–2000.

Building on the sorting of Black and white homeowners, we turn to the impact of the homeownership policies on race-specific upward mobility among low-income families. First, we show that CZs with easier access to mortgage financing see a decline in upward mobility of Black children. A 1 pp larger increase in homeownership in 1990-2000 leads to a 0.117 SD decline in the upward mobility of the children from low-income Black families. We see no similar decline for the children of low-income white families. Overall, the race-gap of the upward mobility of white children relative to the Black children increases by 0.092 SD.

We next use the tract-level UAG variation and re-estimate the impact on upward mobility. We find that targeted tracts see a significant decline in upward mobility, especially when accompanied

by an increase in access to mortgage financing in the surrounding tracts in the CZ. Importantly, both Black and white children in these targeted tracts see a decline in upward mobility. The latter result is a first indication that place-based, rather than family-based channels are key to explaining the decline in upward mobility. In supplementary analyses, we show that the impact on low-income children is not offset with a corresponding increase in upward mobility of high-income children. That is, the increase in racial segregation is detrimental to all.

To further in distinguishing place-based determinants of upward mobility from other, family-based drivers, we use the childhood exposure measure of upward mobility from Chetty and Hendren (2018a,b), which captures the impact of spending one additional year in a CZ on a child's upward mobility. We estimate that a 1 pp higher change in homeownership between 1990–2000 predicts a 0.076 SD lower upward mobility for each year spent growing up in the CZ. For a child spending their entire childhood in a given CZ, this corresponds to a 0.639 percentile decline in children's income rank when adult (upward mobility). The point estimate implies that nearly all of the adverse effect of housing-policy induced homeownership changes on upward mobility is attributable to changes in neighborhood characteristics, i. e., place-based effects. Changes in the characteristics of the typical family residing in a CZ only account for a small positive effect of a 0.052 percentile increase in upward mobility. While the latter positive selection effect is consistent with homeowners investing more in their children's human capital (Green and White, 1997; Barker and Miller, 2009; Holupka and Newman, 2012), it cannot explain the overwhelming adverse effect on children's outcomes.

In a final step, we assess possible channels for place-based changes resulting from the housing policies. To guide this analysis, we examine the impact on local public-finance spending. We show that CZs with higher housing-policy induced homeownership changes between 1990–2000 saw a decline in the share of local-government spending on education, while there is no similar decline in spending in public health, police, fire, sanitation, or recreation. This decline in educational spending could be connected to the homeownership changes since, as we also show, house prices in targeted tracts decline. That is, while the CZ-level increase in the ease of mortgage financing is associated with higher house prices, targeted tracts see 0.1% lower house prices when

the surrounding tracts experience a 1 percentile increase in ease of mortgage financing. The lower house prices, in turn, affect school revenue from local sources, either directly through lower property values (e. g., property taxes) or indirectly through the local economy (Mian and Sufi, 2014) (e.g. sales and other local taxes). Indeed, we find that school revenues from local sources decline significantly in targeted tracts, especially if the remaining tracts in the CZ see an increase in the ease of mortgage financing. We also show that the lower education spending is accompanied by poorer quality schools: A 1 pp increase in homeownership between 1990–2000 is associated with a 0.09 SD higher student-per-teacher ratio (poor school quality) in a CZ. In particular, in line with the sorting of Black and white homeowners across targeted tracts within CZs, a 1 percentile increase in ease of mortgage financing in the surrounding tracts is associated with a 0.004 SD higher student-per-teacher ratio in targeted tracts. In addition, we find evidence for direct (housing) wealth effects for Black versus white homeowners, consistent with the main public finance channel above. We find limited evidence to support crime and social capital as the primary mechanism for lower upward mobility.

Related Literature. Our paper straddles several distinct strands of literature. The analyses are motivated by prior research that examines the impact of homeownership on economic outcomes, particularly on children's outcomes. Earlier papers find an association between homeownership and better educational outcomes as well as fewer teenage pregnancies (Green and White, 1997). While policy makers have often cited these findings as a rationale for increasing homeownership, later literature attributes the positive outcomes to selection effects in who becomes a homeowner (Barker and Miller, 2009; Holupka and Newman, 2012). Newer work and instrumental-variable approaches show that homeownership causes households to move up the housing ladder (from owning more affordable houses to more expensive houses), work harder, and save more (Sodini et al., 2016a). The literature has also hypothesized positive externalities of homeowners as they are more likely to invest in the surrounding neighborhood (DiPasquale and Glaeser, 1999; Glaeser and Shapiro, 2003). Our paper uses the homeownership policies of the 1990s to generate variation in access to mortgage financing and instrument for homeownership. Differently from prior literature, we identify negative externalities due to residential sorting that arise from homeownership

policies that target specific neighborhoods.

Our analyses exploit variation due to the homeownership polices of the 1990s. Prior literature on the 1990 housing policies has generally found only muted effects of the Affordable Housing Goals and specifically the UAG goals on homeownership and mortgage access. Ambrose and Thibodeau (2004) exploit the MSA-level variation in population share residing in UAG tracts and find only a small positive increase in mortgage credit. Moulton (2008) relates the GSE Act's affordable housing goals to foreclosures, vacancies, or other housing outcomes in the 2000s and finds no discernible effect, suggesting that the GSE affordable housing goals had a negligible effect on the housing crisis of 2007–2008. An et al. (2007) examine the pass through of GSE activity on mortgage supply, and find that while vacancies and home values increase, homeownership rates do not change. However, using an empirical design with a regression discontinuity specification, Bhutta (2009) find that bank mortgage origination volume is almost 4% higher in targeted UAG tracts in 1994–1996. We, too, find an impact on homeownership, but distinct from previous literature, we find strong sorting within CZs.

Other related work has tested whether the homeownership policies since the 1990s has decreased the overall racial gap in homeownership (Gabriel and Rosenthal, 2008), and found limited effects (Bostic and Gabriel, 2006). We also find that, while both Black and white homeownership increased, white homeownership increased considerably more than Black homeownership. Additionally, we highlight that the increase in homeownership for African-American families is concentrated in underserved neighborhoods.

Our paper is also related to literature that examines racial differences in economic outcomes. Prior literature has found that racial disparities in the U.S. are persistent (Myrdal, 1996; Duncan, 1968; Margo, 2016) and can perpetuate across generations (Chetty et al., 2019). Possible reasons and mechanisms include residential segregation (Wilson, 2012; Massey and Denton, 1993); discrimination (Bertrand and Mullainathan, 2004), and differences in family structure (McAdoo, 2002; Autor et al., 2019). We focus on the homeownership policies of the 1990s that inadvertently increased residential sorting by targeting disadvantaged neighborhoods and simultaneously increasing mortgage access at the CZ-level. Ouazad and Rancière (2016) have also documented an

outflow of white households from Black and racially mixed neighborhoods after 2000–2006 credit boom. We document similar effects in the 1990s and link this residential sorting to declines in children's upward mobility.

Finally, our paper is relevant to prior literature on GSE activity in the secondary mortgage market, particularly the CLL changes, and its influence on housing markets. Adelino et al. (2013) relate CLL changes to increasing house prices. DeFusco and Paciorek (2017) examine the interest-rate elasticity of mortgage demand using the CLL threshold, whereas Kaufman (2014) examine the impact on mortgage cost and contract structure. Loutskina and Strahan (2015) interact the CLL with regional constraints to document effects on house prices and on local economic activity. Grundl and Kim (2021) exploit the increased geographic variation in CLL post-2008[5] across border-counties and establish a substantial effect on house prices, house sales, and construction activity, though no effect on homeownership. In contrast to the focus on overall homeownership patterns in these prior papers, we show significant within-CZ sorting of homeowners and differential effects on Black and white homeowners.

Our paper is organized as follows. Section 2 provides institutional background of residential mortgage markets and homeownership policies. Section 3 describes the data as well as the construction of the homeownership, segregation, and upward mobility measures. After introducing our main empirical strategy in Section 4, we analyze the effect of housing policies on homeownership between 1990–2000 in Section 5, on segregation in Sections 6, and on upward mobility in Sections 7. Section 8 explores possible mechanisms, and Section 9 presents robustness checks and additional results. Section 10 concludes.

2 Institutional details

We briefly discuss the institutional details of the residential mortgage market and the homeownership policies of the GSEs in the 1990s, which give rise to our main two sources of variation – CZ-level changes in conforming loan limit (CLL) and tract-level variation in UAG targetting.

The GSEs, Fannie Mae and Freddie Mac, are the two largest sources of housing finance in the

[5]While the CLL has changed at the national level (barring Hawaii and Alaska, where it was 50% higher), post-2008 the CLL increases were larger in counties with higher median house prices.

secondary mortgage market. While their congressionally conferred charters prohibit them from directly lending to borrowers, they support the secondary mortgage market by (i) acting as a conduit and issuing mortgage-backed securities that can in turn be sold to investors in the capital markets, and (ii) holding these mortgages and mortgage-backed securities in their on-balance-sheet retained mortgage portfolios (Jaffee and Quigley, 2007). For example, the Federal National Mortgage Association Charter Act, which established Fannie Mae as a GSE in 1968[6], states that Fannie Mae's primary mission is to provide secondary market facilities and ongoing assistance for residential mortgages, especially for low- and moderate-income families and in underserved areas. The charter also authorizes the Secretary of the Department of Housing and Urban Development (HUD) to set goals to ensure that a portion of Fannie Mae's purchases of home mortgages satisfy its mission.

To fulfill their mission, GSEs purchase loans from primary market-mortgage originators, such as mortgage bankers and depository institutions, if they pass the standards of a "conforming loan." One important criterion for a mortgage to be conforming is loan size: it is required to be lower than the conforming loan limit, or CLL, in order to be eligible to be held or guaranteed by the GSEs. The CLL is designed to ensure that the GSEs satisfy their mission of promoting access to mortgage credit for low- and middle-income households, who likely invest in smaller value homes and apply for smaller-sized loans. Up until 2007, the loan limit was uniform at the national level.[7] It is updated every year, based on a survey of major lenders by the Federal Housing Finance Board, and reflects the national average change in single-family house prices during the prior year, assuming the standard loan-to-value of 80%. While the CLL was only $33,000 in the early 1970s, it increased to $417,000 in 2006-2008 for single-family homes. In 1990, the GSEs could only purchase or securitize loans below $187,450 for loans secured by single-family homes ($360,150 for four-family homes). In 2000 this limit increased to $252,700 (and $ 485,800 for four family homes).

The CLL can be used to determine houses or areas that can be purchased with GSE-conforming loans and are thus "cheap" to finance. (Adelino et al., 2013; Loutskina and Strahan, 2015). We use these national-level changes in CLL from 1990 to 2000 as the first source of variation

[6]See SEC. 301, www.sec.gov/Archives/edgar/data/310522/000031052215000179/fanniemaecharteractexhibit.htm.
[7]Conforming loan limit is 50% higher for Hawaii and Alaska during the period.

to measure the increased ease of mortgage financing at the CZ-level (see Section 4 for details).

Our second, tract-level source of variation exploits the enactment of "The Federal Housing Enterprise Safety and Soundness Act of 1992," also referred to as the 1992 GSE Act. The 1992 GSE Act aimed both to better implement the GSEs' mission of promoting access to mortgage financing for lower-income households and to better address the historical discrimination in mortgage access of minority borrowers. As for the first, the improvement in mortgage access for lower-income households, the HUD had attempted to make progress by proposing, in 1978, regulations that mandated that a fixed portion of GSE purchases be directed towards low- and middle-income housing and to properties in central cities. However, these regulations were not implemented. They became mandatory only after the passage of the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) of 1989 (Moulton, 2008; Jaffee and Quigley, 2007). The FIRREA then asked HUD to set affordable housing goals for GSEs. But before HUD could complete promulgating the goals, the 1992 GSE Act formalized the GSE responsibility for assisting low- and moderate-income families and underserved geographic regions.

The second goal of the GSE Act, to address discrimination against minority borrowers, reflected the persistent differences in homeownership rates by race. The historical context of these racial disparities is, as Rothstein (2017) notes, discrimination that was explicitly sanctioned by the government. Consider the Home Owners' Loan Corporation (HOLC), a government-sponsored corporation established in 1933 to refinance home mortgages currently in default to prevent foreclosure. HOLC created color-coded federal government maps of all metropolitan areas that were divided into four categories, ranging from 'best' to 'hazardous.' The presence of 'detrimental influences' and 'undesirable populations' relegated neighbourhoods to be classified as hazardous or 'red zones,' a practice known as redlining, and undesirable populations referred to Black, brown or Jewish households. Similar practices of the Federal Housing Administration (FHA), established in 1934 to provide insurance on mortgages made by private lenders, essentially allowed only white households to become homeowners. Explicit racial policies of the FHA included appraisers giving higher ratings to mortgage applications only if they were in racially homogeneous neighborhoods, stymieing homeownership growth among Black communities (Rothstein, 2017).

Even up until the 1960s, the Federal Housing Administration (FHA) denied mortgage insurance in certain high-minority or predominantly African-American neighborhoods.

The Fair Housing Act under Title VIII of the Civil Rights Act of 1968 put an end to legal discrimination in the sale, rental, and financing of homes (Shertzer et al., 2016, 2018; Been, 2018; Elmendorf, 2019; Fischel, 2004), but discrimination against minority borrowers continued well into the 1970s and 1980.[8] The UAG goals of the 1992 GSE Act were designed to help overcome these long-lasting reverberations and address the geographic disparity in homeowning that existed largely because of the redlining and other discriminatory practices of private lenders and government institutions in prior decades (Jaffee and Quigley, 2007).

The GSE Act specifies three goals for the specific mandates of the GSEs[9]: (1) The low- and moderate-income goal states that a HUD-determined proportion of mortgages purchased by the GSEs should finance properties that are either owned or rented by households with incomes less than or equal to the median income of the (metropolitan or defined non-metropolitan) area in which the property is located. (2) The geographically targeted or underserved areas goal asks that a HUD-determined proportion of mortgages purchased by the GSEs should be mortgaged by households located in (a) low income areas, defined as metropolitan-area census tracts with median family income less than or equal to 90% of area median, or (b) high minority neighborhoods, defined as metropolitan-area census tracts with minority population of at least 30% and with tract median income less than or equal to 120% of area median.[10] (3) The special affordable goals require mortgages with household family income less than or equal to 60% of area median or less than or equal to 80% of area median and located in low-income areas, defined as in (2) above. A single loan can count towards multiple goal categories above.

The GSE Act also authorized HUD to monitor whether the GSEs are meeting these policy goals. Moreover, after a two-year transition period, the Housing and Urban Department (HUD)

[8] In the 1980s, these discriminatory policies received wide attention. As Gabriel and Rosenthal (2008) note, the Atlanta Constitution published a four part series, "The Color of Money," and the Detroit Free Press published a similar series in July 1988 that received significant press attention.

[9] See Subpart B and Sec. 1331, Sec. 1332, Sec. 1333, and Sec. 1334 in the original 1992 GSE Act in https://www.govtrack.us/congress/bills/102/hr5334/text

[10] The criteria for non-metropolitan areas varies slightly, with eligible counties required to have median family income less than 95% of the greater of the state or national non-metropolitan area median income.

could establish annual affordable housing goals. In 1996, the numerical goal (1) for low- and moderate-income households was at 40%; (2) for "underserved areas" at 21%; and (3) for the "special affordable" goals at 12% (Gabriel and Rosenthal, 2005).

The above criteria lead to our second source of identifying variation. In particular, we rely on the classification of census tracts as "targeted" or underserved, i. e., criteria (2.a) and (2.b) under the geographically targeted or underserved areas goal, in the analysis of neighborhood-level (census tract) variation of homeownership and upward mobility. Our emphasis on criterion (2) is motivated by prior research documenting strongest (though overall muted) effects of the underserved areas goals compared to other mandates of the GSEs (Bhutta, 2009, 2008). Since the special affordable goals also rely on the low-income area classification, we also capture households targeted by these goals.

3 Data

3.1 Homeownership, house prices, and other covariates

Our first sources of data are tract- and county-level data from the 1980, 1990, and 2000 Census. To aggregate the data to the CZ-level, we use the county-to-CZ crosswalk from Chetty et al. (2015).

We extract tract-level and county-level data on tenure (homeowners and renters) by race of householder for occupied housing units. Our goal is to identify increases in the fraction of homeowners in a geographic area (census tract ct or commuting zone CZ), both due to existing residents buying a house for the first time and due to new residents moving into the area and purchasing a home. We define the change in homeownership in area $a \in \{ct, CZ\}$ as:

$$\text{Change in homeownership}_{a,1990-2020} = \frac{\text{Homeowners}_{a,2000} - \text{Homeowners}_{a,1990}}{\text{Homeowners}_{a,1990} + \text{Renters}_{a,1990}} \tag{1}$$

We calculate this variable both for all residents and separately by race (Black and white householders). In the latter case, we replace the numerator with the change in Black (white) homeowners, while the denominator remains the same. Note that, by holding the denominator fixed at 1990 levels, we capture how the improved ease of mortgage financing affected households' ability to become homeowners, with the denominator merely normalizing this count. A

measure using different denominators, instead, such as the difference in homeownership rates $\frac{\text{Homeowners}_{a,2000}}{\text{Homeowners}_{a,2000}+\text{Renters}_{a,2000}} - \frac{\text{Homeowners}_{a,1990}}{\text{Homeowners}_{a,1990}+\text{Renters}_{a,1990}}$, would be less well-suited to capture the economic phenomenonon we are trying to analyze, namely, the impact of GSE-eligibility on households' ability to become homeowners and on their differential sorting into homeownership within and across neighborhoods. For example, if a targeted (UAG) tract sees an outflow of Black renters, the difference in rates would incorrectly indicate an increase in Black homeownership. (Nevertheless, in Section 7, we will show that our baseline results are robust to this alternate definition.)

A second set of variables from the Census is data on house values for specified owner-occupied housing units, which we use to construct our instruments at the CZ and tract level, $\Delta\text{Ease of mortgage financing}_{CZ,1990-2000}$ and $\Delta\text{Ease of mortgage financing}_{-ct,1990-2000}$. The Census provides the number of houses in different house-price ranges in each census tract based on the Census respondents' estimates of how much their property would sell for, if it were for sale. Our CZ-level instrument, $\Delta\text{Ease of mortgage financing}_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in CLL from \$187,450 in 1990 to \$252,700 in 2000 for single-family homes. Assuming a loan-to-value of 80%, this change in CLL corresponds to houses price values between \$234,312 to \$315,872, and we use the closest \$200,0000–\$400,000 bucket from the 1990 Census to calculate the fraction of houses at the CZ-level that can be financed fully by GSE-eligible loans after the increase in CLL (but not in 1990).

Similarly, the tract-level instrument, $\Delta\text{Ease of mortgage financing}_{-ct,1990-2000}$, is the percentile of the fraction of houses that become GSE-eligible due to the change in the CLL between 1990–2000 in the surrounding tracts, that is, in the remaining CZ excluding the census tract being measured. For supplementary analysis, we also define the tract-level measure, $\Delta\text{Ease of mortgage financing}_{ct,1990--2000t}$, the percentile of the fraction of houses that become GSE-eligible in a census tract. We discuss the underlying variation in more detail in Section 4 and Section 5.3.

Our main tract-level instrument exploits the classification of census tracts as targeted. We obtain the information on whether a given tract (or sub-tract) is underserved from the Housing

and Urban Department data, which provides. The classification is at the tract-level for 99.78% of the data, but varies within-tract for 130 tracts (less than 1%) as they straddle one or more metropolitan/non-metropolitan areas. In such cases, we classify the entire tract as targeted if any of the sub-tract regions is classified as underserved. We use data as of 1996 (earliest available on the website) as eligibility status is based on the 1990 Census data and reflects the targeted status under the 1992 GSE Act for our period of interest between 1990–2000.

Finally, control variables in our analysis include house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. For weighting the data, we use the total number of housing units in each CZ from the Census 1990. In supplementary analysis, we also use the Census data to calculate the fraction of homeowners (or renters) that moved into their current residence between 1990–2000 and the change in the fraction of owners-occupied housing units with mortgages.

In addition to the Census data, we consider alternative data sources such as Infutor, combined with property-level data on transactions from ATTOM. These data provide more granular information, allowing us to track individual households transitioning from renting to homeowning and households that enter into homeownership across neighborhoods. Given that our analysis focuses on aggregate and, in particular, place-based effects of homeownership policies, though, the Census data turns out to be better suited for our purposes. We will show this also in supplementary estimations that rely on additional data from the Census (see Section 5.1 for further details). Similar reasoning applies to a second advantage of property-level data, namely, that while the census data is based on estimated house price values of owner-occupied housing, datasets such as ATTOM allow us to estimate house price values for all properties based on either assessment values or by using hedonic regressions combined with actual transactions (that reflect current market value of properties). Here, the focus of our analysis on homeownership expansion, diversity, and sorting makes this otherwise important extension less central. The third advantage of the alternative data is its year-by-year (rather than decennial) availability, which is attractive but less relevant in an analysis that focuses on the before-after comparison relative to the 1992 GSE act.

Two more advantages deserve mention: Data such as ATTOM reports transaction-based

house values, rather than survey responses; also, property-level analyses would potentially provide for a better handle on unobservables. By focusing on this narrow set of properties, we may control more convincingly for other factors that might differentially drive homeownership in treated and control groups. However, we also learned, from investigating these alternative proprietary datasets, that they vary in accuracy across geographies and time periods. Given our need for good quality data in the earlier 1990s, we concluded that the publicly available Census data allows us to better benchmark our baseline estimates, which is also easily replicable by other researchers. To address concerns about house value estimates and other data limitations of the Census data, we conduct robustness tests in Section 5.1 to ensure that they do not affect our baseline estimates.

3.2 Segregation measures

We use measures of segregation by race, income, homeownership, and urban sprawl. A novel contribution is the conception and construction of a measure of homeownership segregation, which captures how segregated homeowners are from renters. It reflects the effect of various explicit and implicit policies on the uniformity of homeownership across neighborhoods. For example, regulatory and land-use restrictions such as single-family zoning prevent communities from constructing other than single-family detached homes. This keeps not only homeownership rates, but also house prices high in these neighborhoods (Glaeser and Gyourko, 2002) and prevents poorer households from moving into these neighborhoods. Similarly, implicit and historically explicit redlining prevents homeownership access in certain neighborhoods (Rothstein, 2017), cementing the segregation of homeowners even today. The homeownership policies of the 1990s, especially the classification of certain neighborhoods as targeted under the UAG addressed the historically low levels of homeownership in disadvantaged neighborhoods (Jaffee and Quigley, 2007), motivating the construction of our novel homeownership segregation measure.

We construct the homeownership segregation measure as a two-group entropy-based measure similar to Theil (1972). Let $\phi_{CZ}(t)$ be the fraction of individuals of tenure t in a CZ, where

tenure refers to two groups, homeowners (HO) and renters (RE). The CZ-level entropy index is

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

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

$$E_{ct}^{Homeownership} = \sum_{t} \phi_{ct}(t) \log_2 \frac{1}{\phi_{ct}(t)}. \tag{3}$$

Homeownership segregation at the CZ-level is then given by

$$H_{CZ}^{Homeownership} = \sum_{ct} \frac{population_{ct}}{population_{CZ}} \frac{E_{CZ}^{Homeownership} - E_{ct}^{Homeownership}}{E_{CZ}^{Homeownership}} \tag{4}$$

where $population_{ct}$ and $population_{CZ}$ refer to the tract- and CZ-level population. Intuitively, homeownership segregation measures how different the homeownership (tenure) distribution of each census tract is from the CZ. $H = 1$ corresponds to the highest level of homeownership segregation, and $H = 0$ to no homeownership segregation at all.

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

$$E_{CZ}^{Racial} = \sum_{r} \phi_{CZ}(r) \log_2 \frac{1}{\phi_{CZ}(r)}. \tag{5}$$

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

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

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

$$H_{CZ}^{Racial} = \sum_{ct} \frac{population_{ct}}{population_{CZ}} \frac{E_{CZ}^{Racial} - E_{ct}^{Racial}}{E_{CZ}^{Racial}}. \tag{7}$$

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

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

$$H^{Income} = 2\ln(2) \int_{p} p E_{CZ}^{Inc}(p) H_{CZ}^{Inc}(p)\, dp. \tag{8}$$

This measure[11] is the weighted average of segregation at each percentile p, with greater weight placed on percentiles where entropy $E^{Inc}(p)$ is maximized. It calculates the segregation between

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

groups who have incomes above and below the 100 x p^{th} percentile of the income distribution. Here $H^{Inc}(p)$ is the CZ-level two-group Theil Index, which measures the extent to which the income distribution in each census tract deviates from the CZ-level income distribution. Entropy in a CZ, analogous to (2) and (5) is given by:

$$E_{CZ}^{Inc}(p) = p \log_2 \frac{1}{p} + (1-p) \log_2 \frac{1}{1-p} \tag{9}$$

And entropy in a tract, analogous to (3) and (6) is given by:

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

$H^{Inc}(p)$ is analogous to (4) and (7):

$$H_{CZ}^{Inc}(p) = \sum_{ct} \frac{population_{ct}}{population_{CZ}} \frac{E_{CZ}^{Inc}(p) - E_{ct}^{Inc}(p)}{E_{CZ}^{Inc}(p)} \tag{11}$$

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

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

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

The underlying data for all segregation measures are from the 1990 and 2000 Census.

3.3 Upward mobility measures

We use the upward mobility measures from Chetty and Hendren (2018a) and Chetty et al. (2019, 2020). These papers build, in turn, on Chetty et al. (2015), who use administrative records on the incomes of 40 million children born between 1980–91 and their parents to assess upward mobility in the United States. They define upward mobility as the rank percentile of children's income among themselves (when 26 years old) relative to the rank percentile of parents' average family income (in 1996–2000) among parents.[12] They then estimate the relationship between income rank of child i (in cohort s) (y_i) and parents' income rank (p_i) within a commuting zone CZ as:

$$y_i = \alpha_{CZ,s} + \psi_{CZ,s} p_i + \epsilon_i \tag{12}$$

They find that this rank-rank relationship is almost perfectly linear in all CZs. On average, 10 percentile-point increase in parent rank correlates with a 3.41 percentile increase in a child's income rank. Using the above coefficients, expected rank of a child in cohort s whose parents' national income rank is p and are permanent residents of CZ is then given by:

$$\hat{y}_{p,CZ,s} = \hat{\alpha}_{CZ} + \widehat{\psi}_{CZ,s} p \tag{13}$$

They provide proxies for upward mobility of children from low-income and high-income families, using their estimates for parents at the 25$^{\text{th}}$ and 75$^{\text{th}}$ income percentiles. We focus on the impact on children from low-income families.

Chetty and Hendren (2018a) build on this measure but contrast the upward mobility of permanent residents and households that move in order to decompose the upward mobility measure into the causal effect of growing up in a CZ ("childhood exposure effect") and a residual effect that reflects the sorting of families into different CZs. That is, the average upward mobility measure is based on the permanent residents, the childhood exposure effect is based on the movers, and the residual component is the difference. To claim that the childhood exposure effect is causal, they need to assume that the timing of the moves is orthogonal to the children's potential outcomes.[13]

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

[13] As an example, they consider two families who move from Phoenix to Oklahoma. If children who moved at younger ages had higher outcomes when adult than children who moved later, then, they posit, the causal effect is higher for Oklahoma than for Phoenix. More details of the childhood exposure effect follow in Section 7.7.3.

For these average upward mobility and childhood exposure measures, income data is from the IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. Parents' income is measured in 1996–2000. We use both the average upward mobility measures from Chetty and Hendren (2018a) based on the permanent residents of a CZ and the causal estimates of upward mobility of a CZ in our analyses.

Chetty et al. (2019) uses a similar procedure to measure the average upward mobility measures by race. We focus on the upward mobility measures for Black and white children from low-income families. As before these measures are the estimated mean household income rank of Black and white children, conditional on parent household income ranks, at the 25th and the 75th percentiles of the parent income distribution with children's income measured when the children are 26 years of age. For the race-based upward mobility measures, income is from the IRS tax returns for cohorts and parents of cohorts born between 1978 and 1983. Here, cohort earnings are measured using mean incomes in 2014-2015 and parents' incomes is measured using mean income over five years: 1994, 1995, and 1998-2000. Chetty et al. (2020) also provided the corresponding tract-level upward mobility measures by race. Only the average upward mobility, corresponding to the permanent residents, is available by race in Chetty et al. (2019) and Chetty et al. (2020). Chetty et al. (2020) add a small amount of noise to the tract-level estimates (usually less than one-tenth the size of the standard error of the estimate) to protect privacy.

For our analysis, we use four measures of upward mobility from the above papers. The first two are the average upward mobility measure and the childhood exposure measures based on the permanent residents and the movers respectively, from Chetty and Hendren (2018a). Third, we use the CZ-level upward mobility measures by race provided by Chetty et al. (2019). Lastly, we use the tract-level upward mobility measures by race from Chetty et al. (2020) which correspond to the CZ-level measures in Chetty et al. (2019). The upward mobility measures by race correspond to the non-causal estimates of the permanent residents and the childhood exposure measures by race or at the tract-level are not available.

3.4 Additional data on place-based factors

Our analyses of the different possible mechanisms use several additional sources of data.

First, we utilize the U.S. Census Bureau's Annual Survey of Local Governments, which provides public-finance data for around 15,000 local governments since 1967. To identify potential place-based factors, we rely on the government expenditure shares at the CZ-level as aggregated by Derenoncourt (2019) for the categories education, health and hospitals, police, fire, sanitation, and recreation. We use the average shares in 1992, 1997, and 2002 (closest to our baseline period of interest between 1990–2000) and also use the pre-period average of the shares in 1972, 1977, 1982, and 1987 as control variables in the analysis. For a given category, each share is calculated as

$$\text{Category expenditure share}_{CZ} = \frac{\$ \text{ spent on a category by local governments}_{CZ}}{\text{total } \$ \text{ spent by local governments}_{CZ}}.$$

To analyze the sources of educational spending, we utilize data on school spending and revenues from the National Center for Education Statistics' Common Core of Data for public schools. We calculate the school revenues that come from local sources per 1000 students from the school-district data for the 1996–1997 fiscal year (as it is representative of the sample period of 1990–2000). We map from school-district level to the tract level by weighting in proportion to the land area covered by a given school district in a tract.

The NCES Common Core of Data also provides several proxies for school quality. We use the standardized student-to-teacher ratio, provided at the school level, from 1996–97 (closest to our 1990–2000 sample period). We drop the top 0.1% of schools that have student-to-teacher ratios exceeding 100, and the bottom 10% of schools that report ratios of 0. We map schools' zip codes to census tracts to obtain the average student-to-teacher ratio at the tract level, weighted with the proportion of land area covered by a given zip code in a tract. The CZ-level measure is the mean student-to-teacher ratio across tracts within a CZ, weighted by number of students in each tract.

We supplement this "input-based" school-quality measure of student-to-teacher ratios with an "output-based" measure based on test scores. Following Chetty et al. (2020), we use district-level 3rd-grade math test scores from the Stanford Education Data Archive. Since reliable data is available only in 2013, we use this output-based measure of school quality only in supplementary analysis. For the mapping from the district-level to the tract level Chetty et al. (2020) use school-catchment areas (attendance boundaries) from 2017, weighting by the proportion of land area covered by a given school-district in a tract.

In supplementary analyses of alternative mechanisms, we also use the data on crime and incarceration rates from Derenoncourt (2019). The data comes from county-level tabulations of Uniform Crime Reporting murder rates which is provided by the Vera Institute of Justice In Our Backyards Symposium ("IOB"). Crime rate is measured as the number of murders per 100,000 of the population. Incarceration rates are the local correctional institution population per 100,000 based on counts of federal and state prisoners.

To examine the impact on social capital, we use county-level measures from Rupasingha and Goetz (2008). The authors construct a principal-components based social-capital index based on variables representing membership organizations from County Business Patterns for 1980–1990 and 1990–1997. They also include other county-level proxies for social capital such as response rate for the Census Bureau's decennial population and Housing Survey, the percentage of voters who voted in presidential elections, and per-capita non-profit organizations, obtained from the National Center for Charitable Statistics. We use the average of this social capital measure across all counties in a CZ in our analysis.

3.5 Summary statistics

In combining all of the above data sources, the main sample limitation is imposed by the number of CZs (551) for which the childhood-exposure measure of upward mobility from Chetty and Hendren (2018a) is available. At the tract-level, the sample further decreases when the upward mobility measures for both Black and white children from low-income families are missing in Chetty et al. (2020). The resulting sample consists of 36,056 census tracts, out of which 18,484 have data available for Black children's upward mobility. We winsorize all tract-level variables (except the upward mobility measures) at the 1% level to account for the influence of outliers.

Table 1, Panel A, provides the CZ-level summary statistics of the main variables used in our analyses, and Panel B shows the corresponding tract-level statistics. Panel C shows the summary statistics for additional demographic characteristics and housing variables.

At the CZ-level, the change in homeownership between 1990–2000 is on average 10.50% with a larger proportion attributable to the change in white homeownership (9.51%), about tenfold the change in Black homeownership (0.99%). At the tract-level, on average, the change in homeown-

ership is a much higher 37.28%, and here too, most of it is attributable to the change in white homeownership (34.54% compared to 2.50% for Black homeownership). The median changes in overall, white and Black homeownership are, instead, close the CZ-level medians, reflecting that the underlying distribution is highly skewed, with tracts in the higher end of the distribution exhibiting much higher white homeownership changes, e. g., a 28.77% change for tracts at the 75^{th} percentile. Another pattern that stands out is the negative change in homeownership for tracts at the 25^{th} percentile of the distribution, -0.72% overall and -0.88% among white households, especially compared to no decline in Black homeownership.

Our CZ-level instrument, ΔEase of mortgage financing$_{CZ,1990-2000}$, is the share of properties in 1990 that become eligible to be fully financed by GSE-conforming loans due to CLL changes between 1990–2000. It has an average of 2.84% with a standard deviation of 6.51%. The percentile-transformed variable has an average of 57.71, with an inter-quartile range of 37 to 79.

At the tract-level instrument we use two sources of variation. The first, ΔEase of mortgage financing$_{-ct,1990-2000}$, is the share of properties in 1990 in the remaining tracts of the CZ that become eligible to be fully financed by GSE-conforming loans due to CLL changes between 1990–2000. It has an average value of 9.84%, and its percentile-transformation amounts to an average change of 48.31 (with a standard deviation of 28.84). These average values are higher than those of the CZ-level instrument, reflecting that the CZ-level instrument is not a weighted average of the the tract-level instrument. In fact, if we calculate the average of the CZ-level instrument across all tracts, we get an average of 9.95%, close to the tract-level instrument mean.

Our second source of tract-level variation is the classification of tracts as targeted under the UAG. Nearly 51% of tracts become classified as targeted post the 1992 GSE Act. The percentage of targeted tracts is similar when we consider all tracts (as opposed to the tracts in the 551 CZs used in our analysis), where nearly 48.39% of the tracts are classified as targeted.

Our segregation measures are standardized (mean = 0, SD = 1), and display similar interquartile ranges, from -0.75 SD to 0.61 SD for racial segregation, from -0.83 SD to 0.66 SD for income segregation, and from -0.77 SD to 0.72 SD for our new measure of homeownership segregation that captures how segregated homeowners are from renters. Finally, urban sprawl, which mea-

sures segregation based on time spent commuting to work (fraction of households spending more than 15 minutes commuting) ranges from -0.61 SD to 0.70 SD.

Panels A and B also show several statistics describing the upward mobility of children in our sample. Average upward mobility of low-income children corresponds to the upward mobility of children from families at the 25th income percentile (given the linear rank-rank relationship between children and their parents' income). At the CZ-level, this average upward mobility was 45.67, and at the tract-level it was 40.32. For comparison, it is higher, 59.30 at the CZ-level and 55.12 at the tract-level, for children with high-income parents (at the 75th percentile of the income distribution). That is, on average across CZs, the children of low-income parents had (when adult) an income rank 13.63 (59.30-45.67) percentiles below the income rank of children from high-income parents. Across tracts, the corresponding difference in income rank is 14.80 (55.12-40.32).

The childhood exposure measure is the income rank of the children in percentiles — relative to the mean across all CZs — per year a child spends in a CZ. Here, the data from Chetty and Hendren (2018a) is available only at the CZ-level. Panel A shows that, for a child with parents at the 25th percentile of the national income distribution, spending 1 year of childhood in a one SD better CZ (population-weighted) increases household income at age 26 by 0.55 percentile points. To interpret the magnitude of these effects, note that Chetty and Hendren (2018a) and Chetty and Hendren (2018b) calculaute that a 1 percentile increase in income translates, on average, to an additional $818 at age 26. Given a mean income of $26,091 among children with below-median income parents, a 0.55 percentile increase corresponds to a 1.72% increase in annual income per year the child spends in a CZ. For a child with parents at the 75th percentile, spending an additional year in a one SD better CZ increases household income by 0.64 percentiles, equivalent to 2% increase in income suggesting that neighborhood effects matter for both poor and rich families.

The summary statistics also reveal strong racial differences in upward mobility. At the CZ-level, upward mobility for the children of low-income Black families is a 34.14 percentile income rank when adult, implying a 10.72 percentile racegap to their counterparts from low-income white families (at 44.86). At the 75th percentile of parents' income distribution, Black children have a higher 46.41 percentile income rank when adult, and the corresponding income rank for white

children is again higher, 60.16, corresponding to a racegap of 13.75

The same pattern holds at the tract-level, where the upward mobility children from low-income Black and white families (33.60 and 44.31 percentile income ranks) and those from high-income Black and white families (44.04 and 57.79) amount to virtually the same racegaps as calculated on the CZ level. At both CZ and tract-level, the upward mobility of high-income Black children in almost equal to the upward mobility of low-income white children.

Our baseline analysis focuses on low-income families, which are targeted by the housing policies. Figure 1 shows the spatial variation of upward mobility of Black children from low-income families in Panel A, and for children of low-income white families in Panel B. We see a high degree of correlation between the children of Black and white families. Thus, the improvement in the outcomes of the Black families in regions with high upward mobility is not coming at the expense of white children. However, there is also some variation in upward mobility of white and Black children. For example, in the northeast Black children have higher upward mobility compared to white children.

Panel C shows additional housing and demographic statistics for our sample. As discussed in Section 3.1, an alternative measure of homeownership changes is the difference in homeownership rates, $\frac{\text{Homeowners}_{CZ,2000}}{\text{Homeowners}_{CZ,2000}+\text{Renters}_{CZ,2000}} - \frac{\text{Homeowners}_{CZ,1990}}{\text{Homeowners}_{CZ,1990}+\text{Renters}_{CZ,1990}}$. On average, the homeownership rate increased 1.91% change in between 1990–2000, reflecting an increase of 2.18% in white homeownership rates, but a *decrease* by 0.48% among Black households. In Section 7 we will show that our baseline results are robust to this alternate definition of change in homeownership, though, as discussed in Section 3.1, changes in the denominator (in 2000) make it less well-suited to analyze the phenomenon of interest, the differential sorting into homeownership within and across neighborhoods.[14]

Among the other housing variables in Panel C, we show that, across the CZs in our data, median house prices stood at $75,197 in 1990 and grew by 70.24% between 1980–1990, closely

[14]These issues are even starker at the tract-level. Consider, for example, a targeted tract that sees an outflow of white renters. The difference in rates would indicate an increase in white homeownership despite no actual increase in white homeowners. The same holds if renters move out at faster rates than white homeowners (say, due to lock-in effects of homeowning). By holding the denominator fixed at 1990 levels we capture how the improved ease of mortgage financing affected households' ability to become homeowners; the denominator in the baseline (homeowners plus renters in 1990) merely normalizes this count.

matching the 68% nationwide increase in median house prices, from $47,200 in 1980 to $79,100 in 1990. The share of Black households in a CZ was 13.37% on average, and the share of households below the poverty line nearly 12%. Share of single-headed households with children was 21.29% on average across CZs.

Panel C also shows the summary statistics for an alternate measure of (educational) upward mobility, similar to Derenoncourt (2019) and Card et al. (2018a). It is defined as the fraction of 19-22 year-old children in a CZ (in 1990) with more than 13 years of education, who belong to households where the parents have between 12–13 years of education. We use the 5% sample from 1990 American Community Survey. Contrary to Derenoncourt (2019) who uses the complete count censuses from 1920 and 1930 to get the pre-1940 measures of educational upward mobility, we only have access to the 5% sample from American Community Survey for 1990 and hence we have the educational mobility measure for only 195 CZs. The educational mobility measures by race is even more sparse and hence not included in Panel C. We use the fraction of Black (white) people with a high school diploma [the median level of education in 1990] as an imperfect proxy for upward mobility in 1990. Panel C shows that in our sample the percentage of white high-school graduates was 44.97% and Black high-school graduates was a lower 34.79%.

Log of the median value of house prices in 2000 has an average value of 11.28 at the CZ-level and 11.54 at the tract-level. To measure school quality we use the student to teacher ratio. At the CZ-level, the mean is 17.15 students per teacher with a standard deviation of 2.08. The corresponding tract-level average was 18.34, with a slightly higher standard deviation of 3.23. School revenues from local sources per 1000 students was at 2.28 (SD=1.12) at the CZ-level and 2.79 (SD=1.72) at the tract-level.

4 Empirical Strategy

Our empirical strategy exploits two separate sources of CZ- and tract-level variation that capture how the GSE policies affect households' access to mortgage financing and determine homeownership, segregation, and upward mobility.

4.1 Identifying Variation

CZ-level variation. Our first source of variation exploits the regulatory cutoff in the size of loans (CLL), above which the GSEs cannot purchase or guarantee loans. The underlying principle is to ensure that the GSEs satisfy the goal of promoting mortgage financing for low- and moderate-income households who likely invest in smaller-value homes. The loan limit is updated every year and, until 2007, was uniform at the national level. The CLL changes reflect the national average change in house prices in the prior year. We combine these changes with the other important threshold for GSE-conforming mortgages, the 80% loan-to-value ratio (Adelino et al., 2013; Loutskina and Strahan, 2009),[15] and identify properties below 125% of the CLL that can be financed by GSE-conforming loans.

Our analysis exploits that both the availability and the cost of mortgage financing are significantly improved for GSE-conforming mortgages. On the extensive margin, availability improves since originators, such as banks, can more easily securitize loans below the CLL limit, either by selling them to the GSEs (in which case the loan issuing bank retains no stake in the mortgage) or by purchasing credit protection from the GSEs (in which case the banks bear the interest rate risk but can sell it off as mortgage backed securities). In contrast, mortgages above the CLL limit (jumbo mortgages) are either held by the original lender or sold to private securitizers, especially starting in the early 2000s (Adelino et al., 2013; Loutskina and Strahan, 2009; DeFusco and Paciorek, 2017). Even if securitized, the required capital for jumbo loans is much larger than the capital required for non-jumbo loans (Loutskina and Strahan, 2009). Further, because of the reduced liquidity of jumbo loans, the jumbo to non-jumbo mortgage rate spread is higher for financially constrained banks (Loutskina and Strahan, 2009). The latter directly feeds into the cost differences, i. e., the intensive margin. The Federal charters of the GSEs confer significant benefits on them, such as lower funding costs due to their agency status. Hence, GSE-conforming loans that can be purchased by the GSEs enjoy lower interest rates than jumbo loans (Adelino et al., 2015).

We construct the CZ-level instrument based on the CLL changes as follows. To measure the CZ-level increase in the ease of mortgage financing between 1990–2000, we calculate the change

[15] Mortgages above 80% loan-to-value require private mortgage insurance to qualify as GSE-eligible.

in the share of houses in a CZ in 1990 that became eligible for GSE-conforming loans in 2000, but were not eligible for GSE-conforming loans in 1990. The idea is that it became cheaper to finance houses that were just above the conforming loan limit in 1990 due to CLL increases during this period. Our identifying assumption relies on the fact that, since the CLL is determined at the national level, changes in *local* housing supply and demand conditions in a given CZ are not individually driving national-level conforming limits.

In 1990, the GSEs could only purchase or securitize loans below $187,450 ($360,150 for four-family homes) for loans secured by single-family homes. In 2000, this limit increased to $252,700 (and $485,800 for four-family homes). Since homeownership is closely tied to single-family homes, we focus on this cutoff as the baseline and consider the multi-family home cutoffs in robustness checks in Section 5.1. With a loan-to-value of 80%, this change in CLL between 1990–2000 corresponds to house price values between $234,312 to $315,872. We use the closest $200,0000–$400,000 bucket from the 1990 Census to calculate a proxy for the fraction of houses at the CZ-level that became eligible for GSE-conforming mortgages between 1990–2000. (We measure house prices as of 1990 to avoid confounds from possible house price increases due to higher credit supply arising from CLL increases.) Finally, we percentile-transform the resulting measure of the changes in the ease of mortgage financing since its distribution is highly right-skewed.[16] The percentile-transformed variable, ΔEase of mortgage financing$_{CZ,1990-2000}$, is the instrument we use in our analysis.

Panel A of Figure 2 plots the underlying raw measure against the percentile function. The median corresponds to a 0.93% increase in the ease of mortgage financing at the CZ-level, and the 75th percentile to a much higher 2.34% increase (see Table 1 summary statistics). Panel A also shows that CZs such as Los Angeles, New York, San Francisco, and Washington have higher measures for our CZ-level instrument compared to cities such as Portland, Detroit, and Indianapolis.

The figure also highlights that the CLL-based instrument targets, by construction, CZs with a higher proportion of properties "at the cusp" of jumbo and non-jumbo loans, and hence with relatively high house prices. The local average treatment effect (LATE) thus captures the effect on

[16] See Derenoncourt (2019) and Sequeira et al. (2020) for a similar scaling of right-skewed variables.

wealthier households, and by extension white households. Indeed, nearly 2.46% of white households had houses between 200K to 400K in 1990 compared to 0.46% of Black households.[17] As the focus of our analysis is the long-term consequences for low-income and minority families, it is important to "zoom in" and consider variation within CZ—at the tract level—using different sources of variation. At the same time, the differential effect on Black versus white owned properties is at the core of our research question. We will show that the 1990–2000 CLL changes not only increased ease of mortgage access differentially to wealthier households, but also allowed these households to move out of tracts that see homeownership access of poor households' increase between 1990–2000.

Tract-level variation Our first source of tract-level variation comes from the classification of census tracts as "targeted" or underserved under the UAG goals of the 1992 GSE Act, i. e., as detailed in Section 2, tracts with median family income $\leq$ 90% of the MSA median; or median family income $\leq$ 120% of the MSA median and minority share $\geq$ 30%. The GSEs are required to devote a percentage of their business to underserved groups, and the Department of Housing and Urban Development (HUD) monitors whether the GSEs are meeting these policy goals.

The classification of targeted tracts allows the GSEs to influence mortgage originations through their secondary mortgage market operations. Lenders are more likely to approve loans in targeted neighborhoods as they can sell these loans to the GSEs. Indeed, the proportion of loan purchases by the GSEs from targeted populations increased after the enactment of the 1992 GSE Act (Bunce et al., 1996; Bunce, 2002; Manchester et al., 1998).[18] The GSEs also increased their product offerings in the secondary mortgage markets that allowed for riskier underwriting standards in the primary market to facilitate their purchases from targeted communities (Listokin and Wyly, 2000; Temkin et al., 2000). The GSE presence also allows lenders to generate information, making future transactions in these otherwise thin markets less risky for prospective lenders. While high-minority and low-income communities often had low transaction volumes, post the 1992 GSE Act, GSE purchases helped reduce adverse informational externalities and increased primary-market

[17] Based on data from U.S. Census Bureau's 1991 American Housing Survey metropolitan and national samples.

[18] Case et al. (2002), however, compare the distribution of GSE purchases to the distribution of mortgage originations and find that the GSEs are less likely to purchase loans to borrowers in lower-income neighborhoods.

acceptance rates in these historically underserved neighborhoods (Harrison et al., 2002).

Our second source of variation exploits increases in the ease of mortgage financing due to CLL changes in the *remaining* tracts in a CZ, excluding the tract itself. Here, the identifying assumption relies on house-price levels in those remaining tracts being exogenous to local tract-level demand and supply housing conditions (after controlling for CZ fixed effects). That is, given our interest in sorting into and out of specific tracts, we construct ΔEase in mortgage financing$_{-ct,1990-2000}$, in order to capture how easy it became for households to *move out* of a given tract because properties in nearby tracts became easier to finance fully through GSE-eligible loans between 1990–2000. It thus helps predict the effect on the homeownership patterns in tract ct due to increases in the ease of mortgage financing in the remaining tracts of a given CZ, $-ct$, induced by CLL changes.

As before, we use the quantile (percentile) function since the distribution of the changes in the ease of mortgage financing is highly right-skewed. Panel B in Figure 2 illustrates the variation that we exploit when using this transformed variable in our within-CZ analyses, in relation to the underlying (raw) changes in percent. The figure plots the residuals from regressing the percentile transformed tract-level measure on CZ fixed-effects on the y-axis and the original non-transformed variable on the x-axis. Compared to Panel A in Figure 2, where expensive CZs such as Los Angeles, New York, San Francisco and Washington have higher values of the CZ-level instrument relative to cheaper cities such as Portland, Detroit and Indianapolis, the residual within-CZ measure in Panel B shows no similar systematic variation. For example, the increase in the ease of mortgage financing in surrounding tracts varies between -2.33 and 2.66 for New York, and between -4.33 and 0.667 for Cedar Rapids.

One might also consider an alternative tract-level measure that is analogous to the CZ-level measure and defined as the proportion of houses *in a given tract* that become eligible to be fully financed by GSE-conforming loans between 1990–2000 but were not eligible in the earlier period in 1990, ΔEase of mortgage financing$_{ct,1990-2000}$. However, the issue with that approach is that property prices are usually more homogeneous within narrow neighborhoods (such as census tracts or blocks) than within larger areas (such as CZs). Hence, the issue of capturing higher-wealth areas with higher-income families, that we discussed for the CZ-level instrument, would

be exacerbated. (Cf. Chetty et al. (2015), who use a similar argument to make a case for focusing on CZ-level upward mobility measures.) In Section 5.3, we empirically highlight differences between the variation captured by this alternative instrument and our baseline tract-level instrument. On the CZ-level instead, the correlation between the CZ-level instrument and property values does not pose a big problem at the CZ level, as CZ-level house prices are not as homogeneous. In Section 7 we will additionally argue that this concern biases us *against* finding a negative effect.

In our sorting analyses, we will exploit the interaction between both tract-level instruments, i. e., the classification as targeted under UAG and the increase in the ease of mortgage financing in the remaining tracts of the same CZ.

4.2 Empirical specifications

Our empirical strategy proceeds in two steps. First, we document the impact of the increase in ease of mortgage access between 1990–2000 on change in homeownership between 1990–2000. Second, we examine the impact of the change in homeownership between 1990–2000 on segregation and children's upward mobility. The first step establishes the variation captured by our CZ- and tract-level instruments. We then rely on the analysis from the first step to estimate the causal impact on segregation and children's upward mobility in the second step.

Homeownership. On the CZ level, the baseline model estimates:

$$\begin{aligned}\text{Change in homeownership}_{CZ,1990-2000} = \alpha_s + \beta \times \Delta\text{Ease of mortgage financing}_{CZ,1990-2000} \\ + \delta \times X_{CZ} + \epsilon_{CZ}\end{aligned} \tag{14}$$

for commuting zone CZ in state s. The dependent variable is the homeownership change (overall, and separately for Black and white families) between 1990–2000. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. The specification includes state fixed effects (α_s). All regressions are clustered at the state level and weighted by the total number of housing units in a CZ in 1990 to generate representative estimates for the U.S.. Control variables include house prices in 1990, house price growth between 1980–1990, and the fraction of high school graduates among Black households and white house-

holds. The coefficient of interest, β, captures the overall CZ-level impact of the increase in ease of mortgage financing between 1990–2000 on change in homeownership between 1990–2000.

We then estimate the effect of tract-specific variation in access to mortgage financing and examine the within-CZ sorting of homeowners across census tract data, using the specification:

$$\begin{aligned}\text{Change in homeownership}_{ct,1990-2000} \\ = \alpha_{CZ} + \beta \times \Delta\text{Ease of mortgage financing}_{-ct,1990-2000} + \eta \times \text{Targeted tract}_{ct} \\ + \gamma \times \text{Targeted tract}_{ct} \times \Delta\text{Ease of mortgage financing}_{-ct,1990-2000} + \epsilon_{ct},\end{aligned} \tag{15}$$

where ct is a census tract in state s and commuting zone CZ, and α_{CZ} are CZ-level fixed effects. The coefficient η measures the average of the dependent variable in the targeted census tracts. And the coefficient γ measures the impact of a 1 percentile higher ease of mortgage financing in the rest of the CZ, relative to a targeted census tract in the CZ, on the dependent variable. This regression allows us to examine how overall, and specifically for Black and white families, homeownership patterns changed within CZs in targeted census tracts when the remaining tracts in the CZ witness improvements in the ease of mortgage financing between 1990–2000.

Segregation. In the second step, we use the estimated relationship between the housing policies of the 1990s and the ensuing homeownership changes to assess their impact on segregation. That is, we instrument for the change in homeownership between 1990–2000 with the change in the ease of mortgage financing between 1990–2000 (based on whether houses in a CZ can be mortgaged with GSE-eligible loans). We show both the reduced form specification that directly examines the impact of eased access to GSE-eligible loans on segregation,

$$\text{Y}_{CZ} = \alpha_s + \gamma \times X_{CZ} + \beta \times \Delta\text{Ease of mortgage financing}_{CZ,1990-2000} + \epsilon_{CZ}, \tag{16}$$

and the instrumented 2SLS estimates, with first stage (14) and second stage

$$\text{Y}_{CZ} = \alpha_s + \gamma \times X_{CZ} + \beta \times \widehat{\text{Change in homeownership}}_{CZ,1990-2000} + \epsilon_{CZ}. \tag{17}$$

As an intermediate step, we also show the non-instrumented relation between change in homeownership between 1990–2000 and segregation,

$$\text{Y}_{CZ} = \alpha_s + \gamma \times X_{CZ} + \beta \times \text{Change in homeownership}_{CZ,1990-2000} + \epsilon_{CZ}. \tag{18}$$

The outcome variable Y_{CZ} is the entropy-based measure of racial, income, or homeownership segregation, or of urban sprawl as of 2000. All of these outcome variables are standardized (z-score), so that the coefficient of interest can be interpreted in terms of standard deviations. Regressions include state fixed effects (α_s) and the following control variables: the house prices in 1990, house price growth between 1980–1990, and the fraction of high school graduates among Black households and white households. In addition, we also control for the respective segregation measure (racial, income, homeownership, and urban sprawl) in 1990. All regressions are clustered at the state level and are weighted by the total number of homeowners and renters in a CZ in 1990 to get representative estimates. Since the segregation measures capture whether homeownership rates at the neighborhood level are similar to homeownership rates at the CZ level, the analysis is naturally restricted to the CZ level.

Upward Mobility In the next step, we examine the impact of the change in homeownership between 1990–2000 on children's upward mobility.

At the CZ-level, we examine the relationship between the change in homeownership between 1990–2000 and children's upward mobility using the same reduced form and 2SLS instrumental variable specifications as in equations (16)-(18). While the first-stage estimation from equation (14) remains identical, the dependent variable in the other three estimations is now replaced by the upward mobility of the children of the families with income distribution at the 25^{th} percentile. Given the linearity of the rank-rank condition, this corresponds to the average upward mobility for all children of parents with below-median income in the national income distribution.

We use three different measures of upward mobility: Average upward mobility is the expected mean household income rank for individuals with parents at the 25^{th} of the parent income distribution. The CZ-level data is from Chetty and Hendren (2018a) and the tract-level data from Chetty et al. (2020). We use a similar measure of upward mobility of the children of Black and white households at the 25^{th} percentile of the income distribution, which is provided by Chetty et al. (2019) and Chetty et al. (2020). Lastly, to decompose into place-based and family-based selection effects, we use the childhood exposure measure of upward mobility from Chetty and Hendren (2018a). The childhood exposure effect is the estimated causal impact of one additional

year of childhood in a CZ on children's household income rank when adult with parents at the 25th percentile of the parent income distribution. For relative comparisons, we also use the racegap variable, defined as the difference in upward mobility between white and Black children. For ease of interpretation we standardize the upward mobility measures, which allows comparisons of Black and white children.

In the tract-level analysis of upward-mobility effects, the reduced-form empirical specification is analogous to the tract-level analysis of homeownership, capturing the within-CZ sorting of Black and white homeowners across tracts within a CZ:

$$\begin{aligned} Y_{ct} = \; & \alpha_{CZ} + \beta \times \Delta\text{Ease of mortgage financing}_{-ct,1990-2000} + \eta \times \text{Targeted tract}_{ct} \\ & + \gamma \times \text{Targeted tract}_{ct} \times \Delta\text{Ease of mortgage financing}_{-ct,1990-2000} + \epsilon_{ct}. \end{aligned} \tag{19}$$

At the tract-level, we use two different measures of upward mobility Y_{ct}, average upward mobility and upward mobility by race, both for children from low-income families, as provided by Chetty et al. (2019) and Chetty et al. (2020) and again standardized (z-scored). Alternatively, we directly use the racegap in upward mobility as dependent variable, defined as the difference in upward mobility between white and Black children. The coefficient η measures the average of the dependent variable in the targeted census tracts. And the coefficient γ measures the impact of a 1 percentile higher ease of mortgage financing in the rest of the CZ, relative to a targeted census tract in the CZ, on the dependent variable. These regressions allow us to examine how overall, and specifically for Black versus white families, upward mobility changed within CZs in targeted census tracts when the remaining tracts in the CZ witness improvements in the ease of mortgage financing between 1990–2000.

We also use the estimated relationship between housing policies and homeownership changes to estimate a 2SLS IV specification, paralleling the CZ-level analysis. Now, we instrument for tract-level change in homeownership with first stage from (15). We instrument for the interaction between targeted tract and change in homeownership with the interaction between targeted tract and the tract-level instrument, ΔEase of mortgage financing$_{-ct,1990-2000}$, using a specification

analogous to (15). The second-stage estimation becomes

$$\begin{aligned} Y_{ct} = \; & \alpha_{CZ} + \beta \times \text{Change in } \widehat{\text{homeownership}}_{ct,1990-2000} + \eta \times \text{Targeted tract}_{ct} \\ & + \gamma \times \text{Change in } \widehat{\text{homeownership}}_{ct,1990-2000} \times \text{Targeted tract}_{ct} + \epsilon_{ct}. \end{aligned} \tag{20}$$

Correspondingly, the non-instrumented OLS specification is

$$\begin{aligned} Y_{ct} = \; & \alpha_{CZ} + \beta \times \text{Change in homeownership}_{ct,1990-2000} + \eta \times \text{Targeted tract}_{ct} \\ & + \gamma \times \text{Change in homeownership}_{ct,1990-2000} \times \text{Targeted tract}_{ct} + \epsilon_{CZ} \end{aligned} \tag{21}$$

5 Impact on Homeownership

We start from analyzing the relationship between change in the ease of mortgage access and the change in homeownership between 1990–2000. In particular, we highlight the distinct patterns in the change in Black and white homeownership and the within-CZ sorting during the period. The estimations in this section also provide the first-stage results for the analysis of the effects of (instrumented) homeownership on segregation and upward mobility. A valid instrument requires that the instrument be able to explain variation in the change in homeownership between 1990–2000 (rank condition).

5.1 Impact on CZ-level homeownership changes

We start from a graphic presentation of the relation between the change in the ease of mortgage financing and homeownership. Figure 3 shows the binscatter plot where each point represents the average change in homeownership (in 1990-2000) for each 5 percentile bin of the explanatory variable, the percentage increase in the houses eligible for non-jumbo loans in 2000 (but not in 1990). The figure reveals a strong positive relationship. The slope coefficient is 0.076 (s.e = 0.013), with the underlying linear regression also including state fixed effects.

Column 1 of Panel A in Table 2 shows the first-stage specification more formally, including additional controls. The specification is in equation (14). Since our instrument relies on areas where houses were at the cusp of non-jumbo to jumbo loans between 1990–2000, higher values of this ease-of-mortgage-financing instrument correspond to CZs with higher house prices as evident in Figure 2. Hence, in addition to state fixed effects, we control for the level of house prices in 1990

and for house-price growth between 1980–1990. The baseline controls also include the fraction of high school graduates, separately among Black and white households. Column 1 shows that a 1 percentile increase in the ease of mortgage financing is associated with a 0.112 pp greater change in homeownership between 1990–2000 and that the instrument has sufficient explanatory power (F-Stat=58.92).

We next turn to the racial differences in homeownership. From a historical perspective, we note that, according to Collins and Margo (2011), Black and white homeownership rates both increased from 1870–2019. Black homeownership rate increased by 36 pp, and white homeownership by 17 pp indicating a narrowing of the homeownership gap from 46 pp to 27 pp over the period. However, most of the reduction in the homeownership gap occurred during the early part of this period, in 1870–1910, when the homeownership gap fell from 46 pp to 28 pp. Though the homeownership rate increased between 1990–2000, the racial gap barely changed.

With this backdrop, we examine the change in white and Black homeownership rates between 1990–2000 (measured as the change in Black and white homeowners between 1990–2000 relative to the total homeowners and renters in 1990) against the change in the ease of mortgage financing at the CZ-level. The estimates in columns 2 and 3 of Table 2 indicate that a 1 percentile higher incremental ease of mortgage financing is associated with a much smaller 0.025 pp increase in Black homeowners relative to a 0.086 pp increase in white homeowners between 1990–2000. (When we look at the change in homeownership rates, defined as the difference between the homeowners to homeowners plus renters ratio in 2000 minus the analogous 1990 ratio in Table A.1, there is a similar change in Black and white homeownership rate of between 0.039 pp and 0.042 pp increase for a 1 percentile increase in ease of mortgage financing.) This is consistent with prior literature that has argued that the homeownership policies of the 1990s were not successful in decreasing the racial homeownership gap (Gabriel and Rosenthal, 2005). As opposed to the direct differential impact on Black and white homeownership, we instead hypothesize that the increase in ease of mortgage financing affected households' ability to sort across neighborhoods. We now turn to the tract-level analysis to test this hypothesis.

Before looking at the tract-level analysis, we conduct several robustness tests of these base-

line results. Our identifying variation at the CZ-level comes from the fraction of houses in a CZ that could be financed with GSE-eligible loans due to increases in the CLL from $187,450 in 1990 to $252,700 in 2000 for single-family homes. Assuming a loan-to-value of 80%, this corresponds to houses price values between $234,312 to $315,872, and we use the closest $200,0000–$400,000 bin from the Census 1990 data. In column 1 in Table A.3, we conduct a placebo test using the fraction of houses above $400,000 as a placebo instrument. While the coefficient on the placebo instrument is negative (at the 10% significance level), our baseline CZ-level ease of mortgage financing is a stronger predictor of the change in homeownership between 1990–2000 (column 1). This result also assuages concerns that we are capturing some specific homeownership trends in CZs with very expensive properties, which would be captured by the coefficient on the fraction of properties above $400,000. In the baseline, we use the cutoff for the single-family homes as it is closely related to homeownership. We build an alternate instrument including CLL thresholds for one-four family unit. CLL increased from $187,450 for single-family homes ($360,150 for four-family homes) in 1990 to $252,700 for single-family homes ($485,800 for four-family homes) in 2000. This change corresponds to houses price values between $234,312 to $607,250. We use the closest $200,0000–$500,000 bin[19] from the Census 1990 data and confirm that this alternate instrument is also a strong predictor of the change in homeownership between 1990–200. To address the concern that the Census data may not reflect actual house price values, in column 3, we confirm our baseline results with an alternate instrument based on house prices for vacant-for-sale housing units (that better reflect market value). All these results help validate our main CZ-level instrument for the increase in ease of mortgage financing between 1990–2000.

As a first step towards testing the selection hypothesis, even on the CZ level, we would ideally use property-level data combined with migration data and homeownership transitions. Such data would allow us to examine how the ease in mortgage financing affected both migration within CZs and homeownership transitions. While we do not have such data to identify migration and homeownership transitions, we are able to identify whether homeowners (as of 2000) moved to their current place of residence between 1990–2000. In Table A.4, column 1, we show that a 1

[19]Since data is from 1990 Census, we have limited granularity for prices above this range and exclude the topmost bin (greater than $500,000).

percentile increase in the ease of mortgage financing is associated with a 0.07 pp higher fraction of homeowners who moved into their current homes between 1990–2000.

We are also able to rule out broader trends of households (renters and owners) moving into certain CZs as the explanation for our results (not driven by the homeownership policies of the 1990s). When we include the fraction of renters who moved during the same period as an additional explanatory variable in column 2, the coefficient estimate is significantly negative. Moreover, as an additional placebo test, we repeat the estimations of columns 1 and 2, but using homeowners and renters who moved before 1990. Columns 3–4 indicate that CZs that witnesses an increase in the ease of mortgage financing had witnessed with a *decline* in homeowners who moved to their current place of residence before 1990 and that there is no relation to the fraction of renters, further assuring us that we are not capturing preexisting trends in homeownership patterns.

We also test and confirm that the increase in the ease of mortgage financing allows households to become homeowners by accessing mortgages. In Table A.6, we repeat the baseline analysis using the change in mortgaged homeowners between 1990–2000 to the total number of homeowners and renters in 1990 (as opposed to the baseline change in homeownership). The top panel indicates that a 1 percentile higher ease in mortgage financing is associated with a 0.130 pp increase in the fraction of mortgaged homeowners (F-stat of 47.84).

5.2 Impact on tract-level homeownership changes

The CZ-level analysis masks significant tract-level variation in homeownership. We turn to analyzing the within-CZ variation using model (15). The estimation assesses the impact of a tract being and of the ease of mortgage access in the surrounding tracts on tract-level homeownership.

The results are in Panel B of Table 2. In column 1, the coefficient of Targeted tract$_{ct}$ indicates a 7.792 pp decline in homeownership between 1990-2000 in targeted tracts. This estimate is broadly consistent with prior literature (Bostic and Gabriel, 2006), that finds only a limited (and even negative) impact of the UAG on homeownership, but it is counter to the intended goal of the UAG, which was specifically aimed at reducing the geographic disparity in homeownership.

Our other estimates help explain why: First, the coefficient on ΔEase of mortgage financing$_{-ct,1990-2000}$ indicates that a 1 percentile increase in the ease of mortgage financing in the

remaining tracts in a CZ is associated with a 3.41 pp decline in homeownership in a given tract. The negative estimate points to significant sorting across CZs, into tracts with easier access to mortgage financing. Second, the coefficient of the interaction term, ΔEase of mortgage financing$_{-ct,1990-2000}$ $\times$ Targeted tract$_{ct}$, reveals that the sorting is particularly pronounced in targeted tracts. A 1 percentile increase in the ease of mortgage access in the remaining census tracts in a CZ yields an additional 0.115 pp decline in homeownership in the targeted tracts.

The patterns for Black homeownership (in column 2) are in striking contrast to the overall pattern. First, there is a 0.804 pp *increase*, rather than a decrease, in Black homeowners in targeted tracts. Thus, consistent with the UAG goals, targeting of historically disadvantaged neighborhoods did increase homeownership for Black homeowners. Second, a 1 percentile increase in the ease of mortgage availability in remaining tracts has no significant effect on Black homeownership. The latter also holds for the subset of targeted tracts, as the interaction term indicates.

Column 3 shows that the decline in homeowners in column 1 is entirely driven by the white households. Average white homeownership declined by 8.776 pp in targeted tracts. When the ease of mortgage availability in the remaining CZ increases by 1 percentile, white homeownership falls by 3.49 pp. Importantly, targeted tracts witness an additional 0.104 pp decline in white homeowners between 1990–2000 when the ease of mortgage financing increases by 1 percentile rank. Thus, white homeowners move out when greater ease of mortgage financing in the surrounding neighborhoods allows them to, particularly in targeted neighborhoods, whereas Black homeowners show the opposite pattern and see an increase in homeownership in these tracts.

5.3 Robustness and Placebo Tests

Some comments are in order regarding the differences in the variation captured by the CZ- and tract-level instruments for ease of mortgage financing.

We discussed earlier that the CLL-based measure on the CZ level targets properties that are at the cusp of jumbo and non-jumbo loans, that is, higher priced properties, and the local average treatment effect (LATE) captures relatively wealthy households. As a result, the instrument differentially affects Black- and white-owned properties. This differential impact does not pose a problem for our analysis, but is at the core of our research question: what happens to targeted

tracts when possibly wealthier borrowers have easier access to mortgage access? [20]

On the tract-level, instead, we rely on distinctly different variation for identification: UAG targeting and changes in homeownership induced by CLL availability in *remaining* tracts in the CZ. Two reasons motivate the shift to *remaining* tracts in the latter variable: First, it is motivated by the economic phenomenon we want to capture, namely, the sorting across neighborhoods due to the effect of housing policies on nearby neighborhoods. That is, the tract-level measure allows us to capture the homeownership changes in a given CZ due to credit supply expansion in surrounding neighborhoods in the CZ. Second, we note that the construction of a CLL-based variable within a given tract (ΔEase of mortgage financing$_{ct,1990-2000}$) would be subject to the criticism that, since price levels are relatively homogeneous within tracts, the instrument may simply be a proxy for parents' income levels. Changes in the fraction of GSE-eligible loans in other tracts, instead, are arguably exogenous to local tract-level demand and supply housing conditions.

Panel A in Table A.7 illustrates the distinction between ΔEase of mortgage financing$_{ct,1990-2000}$ and ΔEase of mortgage financing$_{-ct,1990-2000}$. While an increase in the ease of mortgage financing in a tract due to the CLL changes (ΔEase of mortgage financing$_{ct,1990-2000}$) is associated with an increase in homeownership for white households, Black households see a decline. In contrast, increase in ease of mortgage financing in remaining tracts in the CZ (Ease of mortgage financing$_{-ct,1990-2000}$) is associated with a decline in homeownership, especially for white households. This distinction also helps us interpret the coefficients of ΔEase of mortgage financing$_{-ct,1990-2000}$ in columns 1–3 in Panel B in Table 5. While the interaction term focuses on the differential impact on targeted tracts, the coefficient on ΔEase of mortgage financing$_{-ct,1990-2000}$ shows that homeownership (column 1), especially white homeownership (column 3), in a tract declines if the ease of mortgage financing increases in the remaining tracts in the CZ. On the other hand, Black homeownership does not see a similar decline in homeownership due to an increase in the ease of mortgage financing in the remaining CZ.

We are also able to show that this sorting is not present in prior periods. In Panel B of Table A.7, we repeat the analysis from Panel B of Table 2, except that we replace the dependent

[20] In section 8 we will analyze the differential effect of the ease of mortgage financing on housing wealth of Black and white households as a mechanism.

variable with homeownership changes between 1980–1990. We find no similar sorting in the previous decade between 1980–1990. Although there is a 19.86 pp decline in homeownership in targeted tracts between 1980–1990 (column 1), contrary to 1990-2000 trends, the effect is entirely driven by the Black homeowners (column 2) whereas these same tracts saw Black homeownership increase in 1990–2000 (column 2, Panel B, Table 2). Thus, these effects affirm that we are not merely capturing Black and white homeownership trends from previous decades. Moreover, the coefficients on ΔEase of mortgage financing$_{-ct,1990-2000}$ and on the interaction term indicate no impact on homeownership between 1980–1990, further assuaging concerns about trends from the previous decades and bolstering our empirical identification.

The coefficient on ΔEase of mortgage financing$_{-ct,1990-2000}$ in Panel B of Table A.7, together with the estimates from Panel B of Table 2 also point to a second possible effect of the UAG. During the main period of interest, 1990–2000, white households move out of targeted tracts when mortgage access improved in the remaining CZ. These movements might have triggered subsequent *cascading* effects as existing households in those neighborhoods might have also moved out as the ease of mortgage financing increased in their surranding neighborhoods (as suggested by the negative coefficient on ΔEase of mortgage financing$_{-ct,1990-2000}$ in Panel B, Table 2). In contrast, during the prior decade between 1980–1990 as the dependent variable in Panel B of Table A.7, the coefficient on ΔEase of mortgage financing$_{-ct,1990-2000}$ indicate no similar flight of white households out of these same tracts. In other words, the movement of white households of targeted tracts, which then had a cascading effect leading to further flight out of non-targeted tracts, is not paralleled by any similar movement of white households in the previous decade.

A related question arising from the proposed sorting hypothesis is: Where did the households from targeted tracts move? To examine this question we construct additional measures of the increase in the mortgage financing, separately for the most expensive tracts and for the cheapest tracts in each CZ. We calculate these proxies as the fraction of properties that become eligible to be financed by GSE-conforming loans in the top 2 or the bottom 2 deciles of a CZ (in terms of median house prices). The idea is to capture different segments of the targeted population that move out, and it will later be useful in pinning down the mechanism in Section 7.

Panel A of Tables A.8 and of A.9 show that in both cases the pattern of decline in homeownership in targeted tracts (especially white homeownership) remains unchanged. The effect of eased access to mortgage financing in *other* tracts, however, remains unchanged (and negative overall and for white households, insignificant for Black households) only when using the top 20% most expensive tracts (corresponding coef=-3.180, s.e.=0.531 in column 1 in Table A.9). When we look at the bottom 20% (least expensive) tracts, the effect of eased access to mortgage financing changes becomes positive, overall and for white households (and remains insignificant for black households). This implies that white household leave when "better" (more expensive) tracts become available to them, but prefer to become homeowners in their own tract rather than leaving for "worse" (cheaper) tract. Finally, we observe that the interaction effects remain unchanged. That is, whether we look at increased ease of financing in the most expensive or least expensive tracts, white households tend to leave targeted tracts when outside options become available. Overall, the results lend further credence to the hypothesis of a cascading effect: Targeted tracts see a decline in homeownership irrespective of whether it is the cheapest or the most expensive tracts in the remaining CZ that see an increase in ease of mortgage financing. However, subsequent sorting in remaining tracts depends on whether it is the most expensive tracts also see an increase in ease of mortgage financing.

6 Impact on Segregation

We have seen that the increase in the ease of mortgage financing between 1990–2000 increased homeownership, but more so for white than for Black households. It also resulted in increased sorting within-CZs, with white households leaving targeted tracts when mortgages outside these tracts become more easily available, as documented in Table 2. Taken together these results imply that an (unintended) effect of the housing policies of the 1990s was an increase in segregation. In this section, we explore the effect on segregation in more detail, using the four measures of segregation defined in Section 3.2: racial segregation, income segregation, homeownership segregation, and urban sprawl.

In Table 3, we estimate the empirical model from equations (16), (18), and (17) in columns

1–3, respectively, with the dependent variable as the respective segregation measure as of 2000 (z-scored). All specifications include the full battery of fixed effects and control variables spelled out in Section 4.2, including the lagged respective segregation measures (as of 1990). Since the segregation measures capture whether homeownership rates at the neighborhood level are similar to homeownership rates at the CZ level, the analysis is naturally restricted to the CZ level.

Motivated by the distinct within-CZ patterns in Black and white homeownership, we begin by examining the impact on racial segregation in Panel A. The estimates in column 1 reveal that a 1 percentile increase in the ease of mortgage financing is associated with 0.026 SD higher racial segregation. Correspondingly, the change in homeownership induced by the same homeownership policies also predicts an increase in racial segregation. While non-instrumented homeownership changes have no significant predictive power (column 2), a 1% higher change in (instrumented) homeownership between 1990–2000 is associated with a significant and large 0.201 SD change in racial segregation (column 3).

The results on racial segregation are consistent with our finding from Table 2 that Black homeownership increased more in underserved (targeted) census tracts and was also accompanied by significant within-CZ sorting of Black and white homeowners.

We next turn to income segregation. Column 1 of Panel B shows that a 1 percentile increase in the ease of mortgage financing is associated with a 0.015 SD increase in income segregation. Using the OLS and the 2SLS in columns 1 and 3, a 1% higher change in homeownership is associated with a 0.013 SD and a 0.087 SD increase in income segregation, respectively.

One form of segregation that has not been much analyzed in prior literature, but is of increasing importance in policy discussions is homeownership segregation. We construct a new entropy-based measure of homeownership segregation, which captures how segregated homeowners are from renters as described in Section 3. Panel C, column 1 shows that a 1 percentile increase in the ease of mortgage financing is associated with a 0.004 SD higher homeownership segregation. A 1% higher change in homeownership between 1990–2000 is also associated with a 0.012 SD higher homeownership segregation in column 2. The point estimate becomes 0.030 SD when we instrument for the change in homeownership in column 3.

Similarly, Panel D show that the housing-policy induced changes in homeownership also led to an increase in the urban sprawl across all three specifications. A 1 percentile increase in the ease of mortgage financing is associated with a 0.024 SD increase in the urban sprawl. Using the reduced form and the 2SLS in columns 2 and 3, a 1% higher change in homeownership is associated with a 0.038 SD and a much higher 0.177 SD increase in sprawl, respectively.

In summary, the 1990s housing policies and ensuing sorting of households and homeownership changes increased racial and income segregation. Moreover, segregation also increased along dimensions that are closely related to housing, such as homeownership segregation and urban sprawl.

7 Impact on upward mobility

What was the impact of these changes on the upward mobility of children growing up in the affected households? In this section, we estimate the effects on children from low-income families, overall and separately for Black and white families, and we discuss place-based versus family-based factors as potential drivers of the results.

7.1 Average upward mobility

Before turning to the more formal regression analysis, we show the binned scatter plot of the relationship between ease of mortgage financing and low-income children's upward mobility in Figure 4. Each dot represents the average y-axis variable (upward mobility across CZs) within 5-percentile bins of the x-axis variable (increase in ease of mortgage financing) and controls for state fixed effects. Figure 4 shows a strong negative relationship between this increase in the ease of mortgage financing and the average upward mobility for children from low-income families.

In contrast, the upward mobility in 1990 (i. e., prior to the 1992 GSE Act) has no significant correlation with the increase in the ease of mortgage financing between 1990–2000. In Figure A.1, we use the educational mobility measure based on Derenoncourt (2019) and Card et al. (2018a), described in Section 3,[21] and show the binned scatter plot of the relation between educational upward mobility in 1990 and the change in the ease of mortgage financing between 1990–2000.

[21] Since the educational mobility measure is constructed from the 5% sample of the 1990 American Community Survey, it is available for only 195 CZs.

As before, state fixed effects are included. The plot shows that there is no significant correlation. If anything the coefficient is positive, though noisy (coef.=0.006, s.e.=0.004), in sharp contrast to Figure 4.

In Table 4, we examine the impact of the change in mortgage availability and homeownership on upward mobility of children from low-income families more formally. We start with the CZ-level analysis in Panel A, with the full set of controls and state fixed-effects (as described in Section 3.3, which also includes prior house prices, prior house-price trends, and educational controls).

Column 1 shows the reduced-form impact of our main instrument on upward mobility, using the specification from estimating equation (16). A 1 percentile increase in the ease of mortgage financing decreases average upward mobility by 0.014 SD. In terms of economic magnitude of the effect, an interquartile-range increase in the ease of mortgage financing corresponds to a 0.59 SD decline [=(79-37) * -0.014] in children's upward mobility from low-income families. Since 1 SD corresponds to a 4.85 increase in percentile rank of the income of the low-income children when adult (cf. Table 1, Panel A), this corresponds to 2.86 (=4.85*0.59) percentile decline in income of children when adult, roughly translating to a \$2,340 =(\$818*2.86) decline in annual income.[22]

The estimated effect size is of similar but larger in magnitude when using instrumented homeownership changes. While non-instrumented homeownership (in column 2) does not have significant predictive power, the 2SLS instrumented second-stage results from estimating equation (17), shown in column 3, indicate that a 1 pp higher change in homeownership in 1990–2000, as instrumented by the GSE-driven increase in the ease of mortgage financing, leads to a 0.123 SD decline in low-income children's upward mobility. Here, an interquartile change in homeownership corresponds to a 1.11 [=(14.19-5.15)*0.123] SD decline in upward mobility, and thus a 5.39 (=4.85*1.11) percentile decline in income when adult. The effect size roughly translates to a \$4,403 decline in annual income or, relative to an average income of \$26,091 among children with below-median income parents (Chetty et al., 2015), a 16.89% decline in income.

The difference in magnitude and significance between the OLS estimate in column 2 and the 2SLS IV estimate in column 3 of Panel A point to the presence of omitted or unobservable CZ

[22] From Chetty et al. (2015) a 1 percentile rank change corresponds to \$818 change in annual income in dollar terms.

characteristics that positively correlate with both the change in homeownership and upward mobility, such as school quality or investment in public infrastructure. Selection into homeownership might also play a role. For example, homeowners are households that more likely to invest in their children's human capital (Barker and Miller, 2009; Holupka and Newman, 2012). In these cases, our estimated coefficient $\hat{\beta}$ from the OLS specification in (18) will be equal to the true β and a bias term given by the $\frac{cov(\text{Change in homeownership}_{CZ,1990-2000}, \text{Unobservables})}{Var(\text{Change in homeownership}_{CZ,1990-2000})}$. If the true effect β of the change in homeownership between 1990–2000 on upward mobility is negative (as our 2SLS estimates suggest), and the covariance between homeownership and unobservables is positive (as prior literature and our reasoning above suggests), the estimated effect from the OLS specification is biased towards zero, as in column 2. This highlights the importance of instrumenting for the change in homeownership variable in our analysis.

We also note that the estimated negative relationship helps address a concern we highlighted in Section 4, namely, that the CZ-level instrument targets relatively more expensive properties and, by extension, wealthier households. However, if we were merely capturing the differential impact on homeownership of wealthier households, this should bias us against finding negative effects on upward mobility. Instead, the results so far are consistent with the proposed hypothesis that wealthier households sort into better neighborhoods within CZs. We now examine within-CZ differences in upward mobility using tract-level data to explore this hypothesis.

Panel B of Table 4 shows the results of the tract-level analysis. The reduced form estimates from model (19), shown in column 1, directly point to within-CZ sorting across tracts. Targeted tracts see on average a 0.320 SD decline in upward mobility of children from low-income families. This is striking considering the UAG goals were meant to address the geographic disparity in homeowning across neighbourhoods. We also see that when the ease of mortgage access increases in the remaining tracts in the CZ, upward mobility declines by 0.155 SD. Finally, the coefficient estimate of the interacted term indicates that a 1 percentile increase in the ease of mortgage financing is associated with an additional 0.007 percentile decline in upward mobility of low-income children in targeted tracts. That is, the interquartile range of the instrument measure corresponds to an additional decline in upward mobility of children from low-income families in targeted tracts

by 0.357 [=-0.007*(74-23)] SD. These patterns are consistent with the trends in Panel B in Table 2 where we see that there is significant sorting of (especially white) homeowners away from targeted tracts that witness increases in the ease of mortgage access in the surrounding tracts in the CZ; these same targeted tracts also witness a decline in upward mobility of children.

Turning to the OLS and 2SLS IV estimates in columns 2 and 3 (corresponding to equations (21) and (20)), we continue to estimate a significantly negative effect of UAG targeting on upward mobility. The non-instrumented estimates in column 2 indicate that targeted tracts have a 0.821 SD lower upward mobility. The estimates in column 2 also imply that targeted tracts that see a 1 pp *decrease* in homeownership witness a 0.158 SD decline in upward mobility. Similarly, we estimate a positive relationship when we instrument for homeownership change in column 3, using the tract-level measure of ease of mortgage access in the remaining CZ. (Table 2 Panel B in column 1 confirms that this instrument has sufficient explanatory power (F-stat=474.76)). In contrast to un-instrumented specification, the level effect of change in homeownership on the tract level is significantly negative. That is, while increases in homeownership are generally correlated with positive changes in upward mobility, they are correlated with negative changes in upward mobility to the extent that they are due to (worse) access to mortgages in surrounding tracts.

To further narrow down the channel, and in particular in light of the difference between the instrumented and non-instrumented estimates, we construct two variants of the tract-level instrument: first, the fraction of properties that become eligible to be financed by GSE-conforming loans in only the more expensive tracts (top two deciles in terms of median house prices) among the remaining tracts in a CZ, and second, the corresponding fraction in the least expensive tracts (bottom two deciles in terms of median house prices). The house-price deciles are calculated within each CZ, and the two instruments capture the increase in ease of the mortgage financing in the CZ's most expensive tracts and least expensive tracts with the aim to better understand what drives the sorting out of targeted neighborhoods.

Panel B in both Table A.8 and Table A.9 shows the results for the same specifications as in Panel B of Table 4, except employing the tract-level instruments for the increase in ease of mortgage financing in the cheapest and the most expensive tracts respectively. The coefficients on the

interaction term in column 1 of Table A.8 and Table A.9 indicate that targeted tracts see a similar additional decline in upward mobility of 0.006–0.007 SD, in line with the baseline estimate of 0.007 in column 1 in Panel B in Table 4. Thus, irrespective of whether it was the cheaper or more expensive tracts in the remaining tracts that see eased mortgage financing, children in targeted tracts suffer an additional decline in upward mobility. Similarly, the coefficient on targeted indicates that, again, upward mobility is lower for children in these tracts, consistent with the baseline in Table 4. Interestingly, the coefficient on the uninteracted term on the new tract-level instruments diverge. Table A.8 (column 1, Panel B) suggests that there is a minimal baseline effect on children's upward mobility due to the increase in ease of mortgage financing in cheaper neighborhoods. In contrast, Table A.9 (column 1, Panel B) shows a starker decline in upward mobility in (all including non-targeted tracts) if there is increased ease of mortgage financing in more expensive neighborhoods. All of these results line up with the baseline hypothesis: the decline in upward mobility is driven by the increased sorting across tracts within neighborhoods away from targeted tracts if the ease of mortgage financing in the remaining CZ increases. In addition, there is a subsequent cascading effect on remaining tracts due to ease of mortgage finances in more expensive tracts but not due to the cheaper tracts. That is, households (especially white households) move out of targeted tracts irrespective of whether cheap or expensive areas have increases in ease of mortgage financing. However, it is the easing of mortgage finance in richer neighborhoods that drives subsequent sorting.

7.2 Upward mobility of children from Black and white families

Given the historical context preceding the 1992 GSE Act and its dual focus on increasing homeownership and decreasing the racial disparity in homeowning, we now examine the impact on race-specific upward mobility for Black and white children from low-income families.

Figure 5 illustrates the reduced-form relationship between eased access to mortgage financing and race-specific upward mobility changes graphically using binscatter plots. Panel A shows that greater ease of mortgage financing is associated with lower upward mobility for children from low-income Black families. In contrast, Panel B shows a positive relationship for children from low-income white families.

Table 5, Panel A, examines this relationship more formally. Column 1 presents the reduced-form effects of the instrument and the change in the ease of mortgage financing between 1990–2000. It also shows that a one percentile rank increase in the ease of mortgage financing resulted in a 0.013 SD decline in Black children's upward mobility. This estimate corresponds to an economically meaningful decline of 0.546 SD [=(79-37)*0.013] in upward mobility when the ease of mortgage financing increases from the 25th percentile to the 75th. In contrast, the estimates in column 4 suggests no statistically significant or economically meaningful effect on the upward mobility of white children.

Turning to the impact of the change in homeownership on upward mobility, the OLS estimates in columns 2 and 5 show no statistically significant effect for both Black and white children. However, the IV 2SLS estimates in column 3 indicate otherwise. For Black children, the 2SLS estimates in column 3 show that a 1 pp increase in homeownership between 1990–2000 decreases upward mobility of low-income Black families by 0.117 SD. Moving from the 25th to the 75th percentile of change in homeownership corresponds to a 1.06 SD [=0.117*(14.19-5.15)] decline in Black children's upward mobility from low-income families. This translates to a 4.79 percentile (=1.06*4.53) decline in income rank of Black children when adult and corresponds to $3,919 or approximately 15.03% (=$3,919/$26,091) decline in income for CZs at the 75th percentile of the change in homeownership relative to CZs at the 25th percentile. For white children from low-income families, we see no statistically significant (or economically meaningful) effect on upward mobility (column 6).

The significant adverse effect on the upward mobility of low-income Black children, combined with the lack of an effect on white children, suggests that the homeownership policies of the 1992 GSE Act increased the racial gap between white and Black children. Columns 7–9 examine the racial gap between upward mobility of children from white and Black families directly, and show that a 1 percentile higher ease of mortgage financing increased the racial gap by 0.010 SD. Column 9 also suggests that the racegap widened by 0.092 SD for a 1 pp increase in homeownership between 1990–2000.

Next, we turn to the tract-level analysis and compare the impact on upward mobility of white children relative to the Black children from low-income families residing in the *same* tract. Panel B

of Table 5 shows in column 1 that upward mobility of Black children is 0.296 SD lower in targeted tracts and is 0.077 SD lower if the rest of the CZ sees an increase in ease of mortgage financing. In addition, the interaction term indicates that when the ease of mortgage financing increases by 1 pp in the remaining CZ, Black children in targeted tracts suffer an additional 0.002 SD decline in upward mobility (significant at only the 10% level).

Strikingly, when we look at the upward mobility of white children from low-income families, in column 4, we see that a 1 percentile increase in the ease of mortgage financing at the CZ-level is also associated with a decline in upward mobility (0.005 SD). Moreover, thee is an average the decline of 0.289 SD in targeted tracts, similar to the the Black children in column 1. Further a 1 percentile increase in the ease of mortgage financing in the remaining CZ leads to a 0.125 SD decline in upward mobility. Taking the lower of the two interaction estimates, moving from the 25^{th} to the 75^{th} percentile of the instrument measure, upward mobility of children from low-income families is 0.102 SD lower in the targeted tracts. The similar effect on upward mobility of Black and white children in targeted tracts is consistent with our main hypothesis that the CZ-level differences reflect white and Black households sorting differentially out of targeted tracts. Those who remain, however, suffer the same adverse effect. These adverse effects, in turn, could be due to changes in the characteristics of the neighborhoods or alternatively due to changes in the characteristics of the average family that resides in these neighborhoods. In the Section 7.3 we will disentangle between the two mechanisms.

We also examine the impact of homeownership growth using the OLS specification from equation (21). Targeted tracts see a 0.449 SD decline in upward mobility of Black children (column 2) and by 0.639 SD for white children (column 5). However, targeted tracts that see a decline in homeownership, also have lower upward mobility for children. A 1 pp lower tract-level change in homeownership between 1990–2000 is associated with a 0.069 SD lower upward mobility for Black children in targeted tracts (column 2). On instrumenting for homeownership with the tract-level increase in the ease of mortgage financing in the remaining tracts in a CZ (column 3), we see a 1.373 SD decline in upward mobility of Black children. The effects are also 0.105 SD lower for white children in targeted tracts that see an 1 pp decrease in homeownership in the tract (column

5). On instrumenting for homeownership with the tract-level increase in the ease of mortgage financing in the remaining tracts in a CZ, we see a 3.212 SD decline in upward mobility of white children (column 6). There is 0.057 SD decrease (column 8) in the racegap between white and Black children when homeownership decreases by 1 percentile in targeted tracts but this effect disappears when we instrument for homeownership in column 9. These findings are consistent with the reduced form estimates at the tract-level in columns 1–6. Thus, overall, Panel B suggests that both Black and white children remaining in targeted tracts see a similar decline in upward mobility when the remaining tracts in the CZ see an increase in ease of mortgage financing.

Heterogeneity by gender: We also detected a noticeable heterogeneity by gender and race, displayed in Figure 7. The estimates presented graphically in the figure correspond to estimating equation (17), similar to columns 3 and 6 in Panel A of Table 5, with the dependent variables beomg upward mobility for Black/white men/women from low-income families.

Panel A of Figure 7 reveals that the negative effects of the change in homeownership between 1990-2000 are starkest for Black men. There is also a negative effect on low-income Black women and low-income Black men, but no discernible effect on white women.

Panel B adds an additional dimension by measuring the impact on upward mobility based on individual income rank. As in Panel A, the adverse effect on upward mobility is highest for Black men. However, there is an increase in the individual rank of Black women. These differential effects on individual and household rank of Black women from low-income families could be due to an income effect wherein Black women married to Black men increase their labor supply to compensate for the lower income of Black men's income that we document.[23] Alternatively, unmarried Black women from low-income families may increase their labor supply, explaining the higher individual income compared to the household income.[24] Hence, the overall impact on household income of Black women from low-income families is negative (Panel A) whereas the impact on individual income is positive (Panel B).

[23] Derenoncourt (2019) also a similar differential effect in terms of household income and individual income for Black women due to Great Migration in 1940-1970 that lowered Black upward mobility in the northern United States.

[24] Indeed, in unreported results we find using the IV 2SLS specification that Black women in CZs with a 1 percentile higher change in homeownership between 1990–2000 are 0.15 pp less likely to file taxes as married when adult at age 32. That is, Black women in these CZs were more likely to be unmarried when adult (age 32).

Finally, Panel C in Figure 7 shows the tract-level estimates for heterogeneity by gender and confirms the adverse effects on upward mobility on children remaining in targeted tracts. The estimates presented are for the interaction term between tract-level increase in ease of mortgage access in the remaining CZ and the targeted tract from equation (19) and similar to columns 1 and 4 in Panel B of Table 5, but for Black/white men/women from low-income families. The adverse effect of homeownership is consistent across Black and white men and women from low-income families (though noisy and insignificant at the 10% level, likely due to imprecise estimates for Black women).[25]

Additional robustness tests: We also find that the baseline results of a decline in upward mobility of children from low-income families, particularly for Black children and a corresponding increase in the racegap between white and Black children in CZs that see increases in homeownership (instrumented by the CZ-level increase in ease of mortgage financing) are robust across various specifications and alternative variable definitions. First, we use an alternate dependent variable, fraction of homeowners who moved between 1990–2000 as the dependent variable in Table A.5 and confirm our baseline finding. Our results are also robust to using the changes in mortgaged homeowners between 1990–2000 as the dependent variable (Table A.6). In Section 3 we argued that our change in homeownership variable is better suited for our purposes as opposed to an alternate change in homeownership *rate* variable. Nonetheless, in Table A.2 we redo the estimation using a new dependent variable defined as the difference in the homeownership rate ($\frac{Homeowners}{Homeowners+Renters}$) in 2000 and corresponding homeownership rate in 1990 and confirm that the upward mobility measures are not sensitive to this change.

7.3 Isolating place-based and family-based mechanisms: childhood exposure effects

We distinguish between family-based and place-based channels that could explain the adverse impact of homeownership policies on upward mobility. Based on previous literature, changes in homeownership can affect children's upward mobility either by (i) changes in the characteristics of the average family that reside in the treated CZs ("selection effect"), or (ii) alternatively through

[25] Chetty et al. (2020) add noise to the tract-level upward mobility estimates to protect privacy and this may be particularly problematic when underlying data is sparse, such as for Black women.

place-based effects that change the characteristics of the places that witness higher homeownership changes between 1990–2000. We call the first effect family-based and the second place-based. Family-based effects of the homeownership policies occur, say if there are changes in the characteristics of the average resident such through increased propensity to invest in children's human capital (Green and White, 1997; Barker and Miller, 2009; Holupka and Newman, 2012). Place-based effects of homeownership include positive externalities of homeownership, say through greater homeowner investment in social capital (DiPasquale and Glaeser, 1999) of the surrounding neighborhoods. Alternatively homeowners could better maintain their properties, in turn leading to increases in housing wealth through higher house prices. Or, falling house prices can preventing households from moving to better opportunities as we saw during the Global Financial Crisis in 2008–2009 (Goodman and Mayer, 2018). Place-based effects could also be negative if the CZs that witness higher homeownership growth also see changes in investment in public goods or in house prices and subsequently on housing wealth (due to changes in neighborhood characteristics).

We utilize the childhood exposure effects from Chetty and Hendren (2018a,b) to delineate the place-based from the location-based mechanism. Chetty and Hendren (2018a,b) define the upward mobility measures for the permanent residents as the sum of the causal effect of growing up in a CZ and the selection (sorting) component:

$$y_{p,CZ} = \theta_{p,CZ} + T_C * \mu_{p,CZ} \tag{22}$$

They estimate average upward mobility $\bar{y}_{p,CZ}$ in a CZ function using the neighborhood effects $\hat{\mu}_{p,CZ}$, family characteristics $\hat{\theta}_{p,CZ}$, and the exposure time T_C. Examples of the family-based component $\theta_{p,CZ}$ include family characteristics that capture differences in propensity to invest in children's human capital. Examples of $\mu_{p,CZ}$ include the impact on the causal effect of growing in a neighborhood (neighborhood effects) that operate through the location (CZ). The authors identify $\mu_{p,CZ}$ by focusing on the population of residents who move across CZs under the assumption that the timing of the moves is orthogonal to the children's potential outcomes. To decompose the observed outcome of permanent residents into a sorting and causal component, the selection component of the permanent residents is then $\hat{\theta}_{p,CZ} = \bar{y}_{p,CZ} - T_C * \hat{\mu}_{p,CZ}$.

Building on the above equations, the procedure to estimate the family-based and place-based effect is as follows. We will first estimate the place-based effect based on the childhood exposure upward mobility measure. The previous sections showed the overall effect on average upward mobility. We use these estimates and calculate the residual component as the family-based effect. For this decomposition, we need to make an assumption about the total exposure time, T_C by which to scale the childhood exposure effect. Chetty and Hendren (2018a) and Chetty and Hendren (2018b) use $T_C = 20$ year exposure under the assumption that effect of spending an extra year in a CZ on children's outcomes is linear. However, in a subsequent paper, Chetty et al. (2016) use a similar movers strategy and show that there is a kink in the relationship between the age at which the family moves and the children's predicted income rank in the destination CZ at age 13. That is, place-based effects are greater in teenage and post-teenage years compared to pre-teen years. Based on this kink, Derenoncourt (2019) argues that the scaling parameter should be 15.525 years. We will estimate effects with both these assumptions for T. In addition, in our analysis, we focus on the upward mobility measure for children of parents with below median income distribution, which corresponds to the 25^{th} percentile.

The average upward mobility measure used in Table 4 includes effects due to growing up in a particular CZ as well as the family-based. In Table 6, we estimate the impact on the childhood exposure effects.[26]

Before turning to the more formal estimates, we provide a graphical illustration in Panel A of Figure 6. The plot shows that an increase in the ease of mortgage financing at the CZ-level is associated with lower childhood exposure effects. Correspondingly, the reduced-form estimates in column 1 in Table 6 suggest that a 1 percentile higher ease of mortgage financing between 1990–2000 leads to a 0.008 SD decline in childhood-exposure based mobility effects, or a 0.37 SD decline for CZs at the 75^{th} percentile of the ease in mortgage financing relative to a CZ at the 25^{th} percentile. Column 2 shows that a 1 pp higher change in homeownership between 1990–2000 is associated with a 0.013 SD lower impact on the childhood exposure measure, that is, on the causal

[26] Chetty et al. (2019) only provides the average upward mobility measures, but not the childhood exposure measures by race and hence we do not estimate the location and place-based effects separately by race. Similarly the tract-level measures are not available in Chetty et al. (2020) and hence we do have a corresponding tract-level analysis.

effect of growing up in a neighborhood.

Using our preferred, instrumented specification in column 3, we see that instrumenting for the percentage of homeowners using the changes in the ease of mortgage financing, the causal impact of growing up in a CZ with 1 pp higher change in homeownership between 1990–2000 is a 0.076 SD decline in upward mobility. Comparing a CZ at the 75th percentile relative to a CZ at the 25th percentile corresponds to a 0.687 SD [= (14.194-5.15)*0.076] or a 0.38 percentile (=0.55*0.687) decline in income rank per year spent in the CZ or a $309 decline per year or a 1.18% decline in annual income per year spent at the 75th of the change in homeownership between 1990–2000 relative to the CZ at the 25th percentile.

We now decompose the overall effect into the place-based and the family based component. Panel B in Figure 6 shows the below point estimates graphically. To get an estimate of the causal impact of growing up in a CZ, we need to scale the 2SLS estimated effect on 1 year of childhood exposure to a CZ to reflect the total impact of growing up in a CZ on children's outcomes. Using the scaling of 15.525 years as in Derenoncourt (2019) based on Chetty et al. (2016), the total impact of the increase in the ease of mortgage financing on the place-based effect (causal impact of growing up in a CZ on children's income) is a -0.639 percentile [=15.275*0.55*-0.076] change in income rank using the coefficient of -0.076 from column 3 in Table 6 and that 1 SD corresponds to 0.55 percentiles from Table 1. The average upward mobility is a -0.587 (=-0.123*4.85) percentile change in children's income rank when adult, using the estimate in column 1 in the bottom panel in Table 4 and that 1 SD of the average upward mobility measure corresponds to 4.85 percentile from Table 1. Thus, the impact of a 1 percentile change in homeownership on the causal effect of growing up in a neighborhood is nearly 109% (=-0.639/-0.587) of the average upward mobility, and the entire negative impact on upward mobility is driven by neighborhood effects, which is the causal component of growing up in a neighborhood. Hence, almost the entire adverse effect of the change in homeownership operates through place-based effects. The family-based component is a small positive impact of 0.052 [=-0.587-(-0.639)] percentile.

For robustness, we also recalculate estimates using the higher scaling of 20 years (instead of 15.275 years). The total impact of the increase in the ease of mortgage financing on children's

income is a -0.836 (=20*0.55*-0.076) change in income rank and corresponds to 142% (=-0.836/-0.587) of the effect on upward mobility stemming from place-based effects.

Overall, the overwhelming impact of the change in homeownership is the negative childhood exposure which dominates the overall effect on upward mobility. Hence in the next section, we examine what specific place-based factors could have led to this decline in upward mobility.

8 Mechanisms: House prices, local public finance spending, and school quality

Our findings so far attribute the observed lower upward mobility of children in targeted neighborhoods to place-based factors. But what exactly are these factors, and how do they change in response to housing policies? We start by examining the impact on local government spending in different categories to narrow down possible mechanisms that can explain the decline in children's upward mobility. Of particular interest are categories of expenditures over which local governments have greater discretion. We then examine the impact of the housing policies on house prices as they can affect local public finance through property taxes, which depend on property value assessments and local house prices, or sales tax revenues, which depend on effects on local consumption and employment (Mian and Sufi, 2014; Mian et al., 2020). We conclude by examining remaining mechanisms such as wealth effects, crime, and social capital.

Local government spending. To guide us in identifying the underlying mechanisms, we start by examining the share of local government expenditure in different categories: education, health, police, fire, sanitation, and recreation. Our focus on local spending is motivated by the fact that house price changes can affect local government revenues, and this is where local governments have discretion in allocating resources. Since specific categories of spending reflect different levels of federal/state/local spending, focusing on the share of local spending allows us to abstract away from these differences. The idea is to detect the dimensions along which local governments might be under-investing in specific neighborhoods. We are particularly interested in public expenditures such as education spending and police spending that affect outcomes of black men in particular who were most adversely affected (Section 7). Spending on education can affect school

quality that in turn can affect children's outcomes in a given location. Similarly, police spending can affect crime and incarceration rates of Black youth (Derenoncourt, 2019).

We start with the 2SLS estimation from equations (14) and (17) with the dependent variables replaced by the share of public expenditure in each category. As in our baseline, the first stage instruments the change in homeownership between 1990–2000 with the CZ-level increase in the ease of mortgage financing for the same period. Data for shares of public spending in the categories education, health, police, fire, sanitation, and recreation is for specific years between 1932-2012 and provided by Derenoncourt (2019). We use the average share in 1992, 1997, and 2002 as it is closest to our baseline period of interest between 1990–2000. It is standardized (z-scored) so that the coefficients can be interpreted as standard deviation changes in the dependent variable. We also include the pre-period average of the shares in 1972, 1977, 1982, and 1987 as a control variable, in addition to the full set of baseline control variables and state fixed effects.

The results with the share of local public expenditure as the dependent variables are shown in Figure 8. The figure displays the 2SLS IV coefficients of change in homeownership between 1990–2000 instrumented by the CZ-level increase in the ease of mortgage financing between 1990–2000. A negative coefficient indicates that the share of local public expenditure in a given category (education, health, police, fire, sanitation, and recreation) as a share of the total local public expenditure declines (even after controlling for the pre-1990 share). A positive coefficient analogously indicates an increase in the share of local public expenditure in a given category. The figure reveals a significantly negative effect on the share of local public spending in education. The remaining categories had either no significant change in spending (health, police) or obtain a higher share in local government expenditure (fire, sanitation, recreation), albeit with large standard errors.

House prices. To link the impact on public finance to homeownership changes, we next relate housing policies and the ensuing homeownership changes to house prices. In columns 1–3 of Panels A and B in Table 7, we look at the impact of both the CZ- and the tract-level housing policies and homeownership on house prices. We start from the CZ-level analysis in Panel A. We use log of median house prices in 2000 as the dependent variable and re-estimate the specifications from equations (16), (18), and (17), corresponding to the reduced form, OLS, and the 2SLS regression

where the first-stage equation (14) instruments for the change in homeownership between 1990–2000 with the CZ-level increase in ease of mortgage financing for the same period. All regressions include state fixed effects and the baseline control variables, house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990. The reduced-form estimates in column 1 shows that CZs with 1 percentile higher ease of mortgage financing have 0.6% higher median house price values in 2000. Similarly the OLS estimate in column 2 suggests that CZs with 1 pp higher change in homeownership have 1% higher median house prices in 2000. Using the instrumented 2SLS IV specification in column 3, we see that a 1 pp increase homeownership is associated with 5.2% higher median house prices in 2000. The higher house prices with increased credit expansion is consistent with prior literature such as Adelino et al. (2015) and Loutskina and Strahan (2015) have documented an increase in house prices and economic outcomes after the increase of mortgage financing due to the higher CLL thresholds in the early 2000s.

The tract-level analysis, however, reveals striking heterogeneity across tracts within CZs. In Panel B, with log median house prices in 2000 as the dependent variable, we re-estimate the specification from equation (19). Targeted tracts have 29% lower house prices and a 1 percentile increase in the ease of mortgage financing in surrounding tracts is associated with a 12.4% lower house prices. Further, targeted census tracts see an additional 0.1% decline in house prices when the ease of mortgage financing in the surrounding tracts in the CZ increases by 1 percentile, as the interaction term indicates (column 1).[27] That is, the tract-level analysis reveals significant within-CZ differences in house price effects. Indeed the OLS and 2SLS estimates in columns 2 and 3, corresponding to equations (21) and (20), indicate that targeted tracts with higher homeownership witnessed higher house price growth. As we documented previously, targeted tracts saw declines in homeownership, especially when the ease of mortgage financing in other tracts in the same CZ increased and consistent with the declining house prices in these neighborhoods.

School revenue from local sources. We now investigate whether house price declines can be

[27] While we focus on the level of house prices in 2000, results are similar when we using the tract-level change in log house prices between 1990 to 2000 as the dependent variable and re-estimate the specification in equation (19). Column 1 in Panel B in Table A.10 shows a 0.1% decline in house prices in targeted tracts that see a 1 percentile increase in the ease of mortgage financing in remaining tracts in the CZ.

linked to lower shares of public finance through declines in local revenues for schools. We hypothesize that house price declines in targeted tracts can lead to a decline in local school revenues either through the direct impact of lower house prices (e.g. property taxes) or through an indirect impact on the local economy (Mian and Sufi, 2014) that affects sales and other local tax revenue. Prior literature has shown that house prices declines can have a direct effect on housing net worth that reduces consumer demand either through wealth effects (Mian et al., 2013) or through tighter borrowing constraints (due to the fall in property values that are usually used as collateral) that can in turn affect the local economy and employment.

We obtain data on school revenue from local sources from the National Center for Education Statistics' Common Core of Data data for public schools and calculate revenue from local sources per student from the school-district data for the 1996-1997 fiscal year (as it is closest to our baseline period of 1990–2000).[28] We map this data to the CZ-level and look at the impact on average revenue from local sources per student in columns 4–6 of Panel A in Table 7, corresponding to the specifications in equations (16), (18), and (17) for the reduced form, OLS, and the 2SLS regression. The dependent variable is z-scored. Column 4 suggests that CZs with 1 percentile rank higher increases in the ease of mortgage financing have 0.019 SD higher revenues from local sources per student. Columns 5 and 6 show similar effects for the OLS and 2SLS IV estimates. Within-CZ tract level analysis in Panel B, reveals significant heterogeneity. Estimates corresponding to the specifications in equations (19), (21), and (20), are shown in columns 4–6 of Panel B. Column 4 suggests that targeted tracts see on average a 0.005 SD decline in school revenue from local sources per student for a 1 percentile increase in the ease of mortgage financing between 1990–2000 in remaining tracts in the CZ. While the OLS estimates in column 5 are noisy, the 2SLS IV estimates in column 6 similarly confirm that school revenue from local sources are lower in targeted tracts with decreases in homeownership between 1990–2000.

School Quality. We now examine whether the decline in the share of education spending in Figure 8 and the lower school revenue from local sources are reflected in school quality. As before,

[28]Specifically, the school local revenues include property taxes, general sales taxes, public utility taxes, individual and corporate income taxes, other taxes, revenue from other school systems, cities and counties, tuition fees from pupils and parents, school lunch, textbook sales and rentals, student activity receipts, student fees, other sales services, interest earnings, and miscellaneous.

the regression specifications at the CZ-level correspond to equations (16), (18), and (17), with the dependent variable replaced by our measure of school quality and first stage corresponding to equation (14). At the tract-level, we examine the interaction between targeted tracts and increases in the ease of mortgage financing in remaining tracts in the CZ, estimating (19), (21), and (20).

To measure school quality, we use a proxy for mean class size and map it to CZ-level student-to-teacher ratios. This is an input-based measure of school quality and higher values correspond to larger class sizes or poorer quality schools. The measure is suitable for our purposes since our analysis requires granular data at the tract level. We use the mean class sizes based on data from the National Center for Education Statistics (NCES) for the 1996-97 school year, closest to the period of 1990–2000 that we are interested in. Data is provided at the school-level with an identification of the zip code. We then map the zip codes to the census tracts to get the average student-to-teacher ratio. We follow Chetty et al. (2015) in using the CZ-level student-to-teacher ratio to measure school quality. We use the standardized (z-scored) measure of the student-to-teacher ratio so that the estimates in columns 7–9 in Panels A and B in Table 7 can be interpreted in standard deviations.

On the CZ level, column 7 in Panel A in Table 7 shows that a 1 percentile higher ease of mortgage financing between 1990–2000 is associated with a 0.010 SD higher student-to-teacher ratio, that is, poorer-quality schooling. The impact of homeownership changes on school quality in columns 8–9 show that, while the OLS estimates are noisy, instrumenting for the homeownership change between 1990–2000 with the change in the ease of mortgage financing in 1990–2000, reveals that a 1 pp change in homeownership between 1990–2000 is associated with a 0.090 SD lower higher student-to-teacher ratio or worse quality schools. In the tract-level analysis in Panel B, we examine within-CZ variation using the specification from equation (19). Column 7 shows that school quality is lower in targeted census tracts, especially if located in a CZ that sees higher ease of mortgage financing. That is, a 1 percentile increase in the ease of mortgage financing in the surrounding tracts in a CZ is associated with a 0.004 SD increase in the student-to-teacher ratio (poorer quality schools).

While the input-based measure of school quality based on mean class size indicates that CZs

with an increase in the ease of mortgage financing are associated with poorer quality schools, prior literature suggests that input-based measures do not adequately capture variation in school quality (Hanushek, 2003). Hence, as in Chetty et al. (2020), we also use output-based proxies for school quality based on 3rd grade Math test scores from the Stanford Education Data Archive. These district-level measures are mapped to the tract level by mapping districts to tracts weighted by the proportion of land area that a given school district covers in a tract. One issue is that this data is reliable only in later years in 2013, well after the children are grown up. We reason that these measures are persistent and proxy for school quality for the period of interest between 1990–2000. With this caveat in mind, we examine the impact on this output-based measure school quality and find similar effects. Though the CZ-level regressions in in Panel A in Table A.11 are noisy, our preferred tract-level estimation in column 1 in Panel B suggests that targeted tracts see a 0.005 SD lower mean test scores if the remaining CZ sees a 1 percentile rank increase in mortgage financing in 1990–2000. These results strengthen our hypothesis, that school quality measured using even output-based measures is lower in targeted tracts that experienced increase in mortgage availability in the remaining tracts in the CZ.

To sum, we find the evidence of lower house prices, lower school revenue from local sources, and poorer quality schools in targeted tracts that witness an increase in the ease of mortgage financing in the the remaining tracts in the CZ. These tract-level trends mirror the within-CZ differences in homeownership changes and the sorting of Black and white homeowners.

We also explore several other mechanisms, that are not related to education. In particular, we ask whether (part of) the underlying mechanism could be that increased CLL limits transferred wealth to rich households, and we explore the role of crime rates and social capital.

Direct wealth effect through house price changes. As noted previously, the LATE in the CZ-level instrument captures higher-valued properties at the jumbo to non-jumbo threshold, and thus, relatively wealthier households. Hence the CLL changes plausibly disproportionately benefit white households compared to Black households. Thus, one conjecture is that part of the mechanism for lower upward mobility of Black children relative to white children could be that

the CLL changes transferred wealth to the rich, and by extension, to white households. Prior literature argues that one of the benefits of homeowning is that it allows households to build wealth (Sequeira et al., 2020) and this may have allowed white parents to increase human capital investment in their children, but not done the same for Black households.

We hence examine the wealth effects for Black and white households. While we do not have access to individual property values for Black-owned and white-owned properties, the Census data provides the aggregate house price values for these respective groups. The aggregate house price values reflect both the extensive margin (number of homeowners) and the intensive margin (the house price values). We use this as the dependent variable in Table A.12. We use our baseline specifications in equations (16), (18), and (17) in Panel A for the CZ-level analysis and equations (19), (21), and (20) in Panel B for the tract-level analysis. The dependent variable in both panels is aggregate housing value for owner-occupied properties where the householder is Black (white) in columns 1–3 (4–6). Panel A, columns 1–3 show no statistically significant effect on aggregate housing value for Black-owned properties in CZs where the ease of mortgage financing increased between 1990–2000. In contrast, aggregate housing value for white-owned properties is higher by $1506 million (statistically significant at only the 10% level) in CZs with a 1 percentile increase in ease of mortgage financing. However, the OLS and 2SLS estimates in columns 5 and 6 are noisy. Panel B, shows that targeted tracts saw, on average, aggregate housing value of Black-owned properties decline by $1,000 (column 1) and by $3,000 on average for white-owned properties if the ease of mortgage financing increased in the remaining tracts in the CZ.

These CZ- and tract-level effects on aggregate housing wealth help us bolster the arguments for the proposed mechanism as both Black and white homeowners in targeted tracts (especially in CZs with increases in the ease of mortgage financing) see lower property values. This also supports the public finance channel from the previous subsection that linked house prices to lower school revenues from local sources, especially in targeted tracts. The wealth channel can affect consumer demand (Mian et al., 2013), local economy, and subsequently local tax revenues. While we focused on the public finance channel, our results are also consistent with Black homeowners experiencing diminished wealth effects compared to white households.

Crime. We next examine police funding that can lead to declines in upward mobility for Black men, who were most adversely affected due to the change in homeownership between 1990–2000 as shown in Section 7. This analysis is motivated by Derenoncourt (2019) who finds that increased police spending and high incarceration possibly explains the decline in upward mobility of Black men post the Great Migration. However, Figure 8 showed that the share of police spending does not increase in CZs which see an increase in homeownership between 1990–2000. We examine the incarceration rates, defined as the local correctional institution population per 100,000 separately for the white and Black population based on the state and federal imprisoned population by the CZ of commitment for individuals aged 15-64. This data is also from Derenoncourt (2019). We use the equation (17) with our usual first stage as in equation (14) and results are presented in columns 1–6 in Table A.13. The outcome variable is the average local correctional institution population per 100,000 separately for the Black population in the years 1990–2002 in columns 1–3. The outcome variable for the white population in analogously defined as the average local correctional institution population per 100,000 separately for the Black population in the years 1990–2002. The regressions include the baseline control variables and state fixed effects. In addition, in columns 1–3 (4–6) we include the pre-period average local correctional institution population per 100,000 for the Black (white) population in the years 1977–1989. Columns 1–6 in Table A.13 suggest that there was no statistically significant effect of the homeownership policies between 1990–2000 on incarceration rates of Black or white population, which is consistent with the muted effects on the share of police spending documented in Figure 8.

Since there is no impact on police spending, we see if crime was impacted, as proxied by murder rates. Results on murders per 100,000 of population between 1990–2000 in CZs with greater mortgage financing are shown in columns 7–9 in Table A.13. The preferred specification in column 9 corresponds to the 2SLS specification in equation (17) with our usual first stage as in equation (14). As before we include the baseline controls and state fixed effects. The dependent variable is the average murder rate per 100,000 for the years 1992, 1997, and 2002. We also control for the pre-period murder rate using the average murder rate between 1977–1987 (specifically 1977, 1978, 1980, 1981, 1982, 1983, 1984, 1985, and 1987). We see that crime was higher in CZs that experienced

an increase of mortgage financing between 1990–2000. These results challenge a mechanism that relates the adverse effects of the homeownership policies to crime and incarceration rates among Black youth.

Social Capital. In Table A.14, we examine the impact on social capital and crime. Glaeser and Sacerdote (2000) and DiPasquale and Glaeser (1999) find that there are social benefits to homeownership and homeowners invest more in local amenities. Columns 1–3 show the reduced form, OLS and 2SLS IV coefficients with the social-capital index in 2000 from Rupasingha and Goetz (2008) as the dependent variable. The specifications include the baseline controls, state fixed effect and the pre-period social capital in 1990. Indeed, as stipulated in Glaeser and Sacerdote (2000) and DiPasquale and Glaeser (1999), we see an increase in social capital at the CZ-level. However, the positive estimates also imply that social capital cannot explain the adverse place-based effects that our baseline results capture.

9 Additional Robustness Checks and Results

This section presents further robustness tests to alternative hypotheses, alternative instruments of ease of mortgage financing, and additional results examining upward mobility of rich households.

9.1 Robustness to alternative hypotheses

Our baseline results are robust to several alternate hypotheses studied in the previous literature. Table A.15 shows the results. We start with our preferred 2SLS IV specification in equation (17), corresponding to Table 4, Panel A, column 3 with the dependent variable: average upward mobility of children from low-income families. We modify this baseline specification to examine alternative hypotheses, as discussed below. We address the primary concern that the adverse effects on upward mobility that we capture is the continuation of pre-1990s trends.

Great Migration. Derenoncourt (2019) shows that racial composition shocks in the northern U.S. during the Great Migration between 1940–1970 adversely affected Black children's upward mobility. In column 1 in Table A.15, we show that our baseline adverse impact due to the change in homeownership between 1990–2000 is robust to controlling for the Great Migration. We use the

shift-share instrument combining pre-1940 black southern migrants' location choices with supply-side variation in county out-migration between 1940–1970 from Derenoncourt (2019) as a proxy for the effects of the Great Migration.

Suburbanization. Next, we examine whether our results hold after controlling for suburbanization trends between 1950–1990. In column 2, we show that our baseline result is robust to controlling for suburbanization trends, which we proxy with the 1950–1990 growth in aggregate population in central cities from Baum-Snow (2007). In column 3, we ask a different question. Were the suburbanization trends of the earlier decades exacerbated by the homeownership policies of the 1990s? We don't find evidence of this as seen by the interaction between our measure of suburbanization and the change in homeownership between 1990–2000.

Across-CZ migration flows. In column 4, we show that our results are robust to controlling for across-CZ migration inflows and outflows. We include the migration inflow (outflow) rate into (out of) a given CZ from (to) other CZs (divided by CZ population from 2000 Census) using the IRS Statistics of Income 2004-2005. Thus, the adverse effect on children's upward mobility cannot be explained by across-CZ changes in homeownership patterns.

Controlling for supply-side elasticity. Cities with lower housing supply elasticities may be more prone to boom-bust cycles as shown in the 2000s (Mian and Sufi, 2011). As in Mian and Sufi (2011), we see if the homeownership trends of the 1990s can be attributed to similar effects due to housing supply elasticities. First, using the housing elasticity instrument from Saiz (2010), we show that it is not a good predictor of the change in homeownership between 1990–2000 [specification similar to equation (14)] and hence the homeownership effects are not driven by land-unconstrained areas. We then use an alternate specification and show that our baseline results on upward mobility are also robust to controlling for the housing supply-side elasticity in column 6.

Deindustrialization. Finally, we show that we are not capturing the effects of deindustrialization that resulted in significant declines in manufacturing jobs between the 1970s to 2000s (Derenoncourt, 2019; Charles et al., 2019). In column 7, we show that the adverse effects of home-

ownership changes on children's upward mobility are robust to controlling for the share of the manufacturing labor force in 1970 in our baseline specification.

9.2 Alternative instrument based on the fraction of low/moderate-income households

In Table A.16 we use a different instrument based on the low- and moderate-income goal of the Affordable Housing Goals of the 1992 GSE Act (as described in Section 2). Under the low- and moderate-income goals, a HUD-determined proportion of mortgages purchased by the GSEs should finance properties that are either owned or rented by households with incomes less than or equal to the median income of the area in which the property is located. Exploiting this variation, we build an instrument that captures the fraction of households in a CZ that become eligible for GSE-conforming loans under this goal based on the increase in the median income for each CZ from 1990 to 2000. We use the 1990 median incomes to calculate the CZ-level exposure based on the households who are just above the median income in a CZ that become eligible for GSE-conforming loans in 1990 (in CZs that see an increase in the median income in 1990–2000). Using this instrument in Table A.16, we show that there is a strong first stage relationship between the instrument and the change in homeownership in 1990–2000 (F-stat=15.09). CZs associated with a higher change in homeownership lead to a decline in low-income children's upward mobility (column 1), especially for the Black children (column 2) compared to the white children (column 3, column 4) from low-income families. We do not use this instrument as the baseline since increases in median income for each metropolitan (and defined non-metropolitan) area from 1990–2000 could be driven by local changes in economic factors that affect the demand and supply of mortgages.

9.3 Impact on upward mobility of high-income families

Our focus on low-income children is motivated by the Affordable Housing Goals in the 1992 GSE Act that specifically targeted low- and moderate-income families. To complete the picture, Figure A.2 shows the effects on upward mobility for high-income families (defined as children with parents at the 75th percentile of the national income distribution) and specifications are analogous to Figure 7. The x-axis in each panel is the same as in Figure 7 to allow comparison of point es-

timates. In Panel A, the estimates presented correspond to equation (17), as in columns 3 and 6 in Panel A Table 5, for the Black/white men/women from high-income families. We find a statistically significant negative effect on both Black and white children from high-income families, especially males, though this effect is much smaller than the adverse effect on Black men from low-income families. Figure 7, Panel B measures the impact on this upward mobility based on individual income rank, and we find an increase in the individual rank of Black women as in Figure 7 (Panel B).

What explains the negative effect on both Black and white children from rich families at the CZ-level? Section 5 suggested that not only was there increased sorting of homeowners out of targeted tracts that saw increased access to mortgage financing, even remaining tracts see homeownership (especially of white households) fall as the ease of mortgage financing increases in the remaining CZ. In Section 6, we document an increase in segregation that could adversely affect even the rich households. Indeed, prior literature has pointed out that segregation could slow income growth and property value appreciation not just for minority families but for richer families too (Li et al., 2013). We also document an increase in the fraction of households that spent more than 15 minutes commuting to work, plausibly affecting high-income parents' access to jobs, and could explain the negative (though smaller) effect on the high-income children.

Panel C in Figure A.2 examines the tract-level estimates for children from rich families and presents the interaction term between tract-level increase in ease of mortgage access in the remaining CZ and the targeted tract in equation (20) (as in columns 1 and 4 in Panel B of Table 5), with adverse effects particularly concentrated on white children from rich families in targeted tracts though effects on Black children from rich families are more muted. These adverse effects on even the rich white children in targeted tracts that experience increases in mortgage access in the remaining CZ, further bolster our hypothesis that the place-based mechanisms primarily drive the adverse impact on children's upward mobility in targeted tracts that see increases in ease of mortgage financing in remaining CZ. The lack of an effect on Black children's upward mobility (especially compared to low-income Black children in Figure 7 may reflect rich Black families ability to counter the negative effects of homeownership policies.

10 Conclusion

In this paper we relate the homeownership policies of the 1990s that increased homeowners' ease of mortgage financing to segregation and children's upward mobility. While policy has focused on increasing homeownership rates for decades, especially in low-income areas, the benefits of these policies and of the ensuing homeownership changes have been difficult to determine. We use the increase in the ease of mortgage financing and classification of disadvantaged neighborhoods as targeted under UAG in the 1992 GSE Act to show that Black homeownership increased, whereas white homeownership decreased, in targeted neighborhoods, especially when the ease of mortgage financing increased in the remaining tracts in the CZ. Importantly, segregation, as measured by racial, income, homeownership segregation and urban sprawl increased. While at the CZ-level, upward mobility of Black children from low-income families declined, there is only a limited effect on white children's upward mobility. At the tract-level, upward mobility deteriorated among both Black and white children in targeted tracts, especially when the remaining tracts in the CZ saw an increase in mortgage availability. The adverse consequences on children's upward mobility arise from the sorting and deteriorating place-based factors. We find evidence for a potential channel operating through declining house prices, lower school revenues from local sources (which include property taxes and other taxes) and poorer school quality. Our paper highlights how geographically targeted homeownership policies can inadvertently increase geographic disparity in homeownership within CZs, worsening children's upward mobility.

The results in this paper challenges, to some extent, the promotion of homeownership in low-income census tracts as sorting effects and deteriorating place-based factors appear to overwhelm any positive implications. Perhaps alternate policies that encourage investment in human capital and "moving out" to better neighborhoods have higher marginal value in achieving the "American Dream" in the sense of opportunity for children, their education, and their careers. The analysis suggests that bans on exclusionary zoning are necessary and perhaps even the introduction of inclusionary zoning requirements, such as those implemented in New Jersey and Massachusetts would be more beneficial for improving children's outcomes. Additionally, as Rothstein (2017) suggests, homeownership policies should explicitly subsidize homeownership in the

suburbs from which they were historically banned.

Note that our findings do not imply that policy should not target low homeownership among Black households. Instead such policies ought to be coupled with the necessary investment in infrastructure and public finance, particularly in education. Indeed, preliminary evidence from the creation of “Opportunity Zones" from the “Tax Cuts and Jobs Act of 2017" that created tax advantages for investing in business or real estate targeted low-income census tracts have shown promising results on employment (Arefeva et al., 2020). Such concurrent investment in underserved neighborhoods could diminish the adverse effects of geographically targeted homeownership policies on children’s upward mobility that we observe.

References

Adelino, Manuel, Antoinette Schoar, and Felipe Severino, 2013, Credit Supply and House Prices: Evidence from Mortgage Market Segmentation, *NBER WP 17832*.

Adelino, Manuel, Antoinette Schoar, and Felipe Severino, 2015, House Prices, Collateral, and Self-employment, *Journal of Financial Economics* 117, 288–306.

Ambrose, Brent W, and Thomas G Thibodeau, 2004, Have the GSE Affordable Housing Goals Increased the Supply of Mortgage Credit?, *Regional Science and Urban Economics* 34, 263–273.

An, Xudong, Raphael W Bostic, Yongheng Deng, Stuart A Gabriel, Richard K Green, and Joseph Tracy, 2007, GSE Loan Purchases, the FHA, and Housing Outcomes in Targeted, Low-income Neighborhoods [with comments], *Brookings-Wharton Papers on Urban Affairs*, 205–256.

Arefeva, Alina, Morris A. Davis, Andra C. Ghent, and Minseon Park, 2020, Job Growth from Opportunity Zones, *SSRN WP 3645507*.

Autor, David, David Figlio, Krzysztof Karbownik, Jeffrey Roth, and Melanie Wasserman, 2019, Family Disadvantage and the Gender Gap in Behavioral and Educational Outcomes, *American Economic Journal: Applied Economics* 11, 338–381.

Barker, David, and Eric Miller, 2009, Homeownership and Child Welfare, *Real Estate Economics* 37, 279–303.

Baum-Snow, Nathaniel, 2007, Did Highways Cause Suburbanization?, *The Quarterly Journal of Economics* 122, 775–805.

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

Bertrand, Marianne, and Sendhil Mullainathan, 2004, Are Emily and Greg more Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination, *American Economic Review* 94, 991–1013.

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

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

Bostic, Raphael W., and Stuart A. Gabriel, 2006, Do the gses matter to low-income housing markets? an assessment of the effects of the gse loan purchase goals on california housing outcomes, *Journal of Urban Economics* 59, 458–475.

Bunce, Harold L, , and Scheessele Randall, 1996, The gses' funding of affordable loans, *Working Paper No. HF-001* .

Bunce, Harold L, 2002, The gses' funding of affordable loans: A 2000 update, *Working Paper No. HF-001* .

Burchfield, Marcy, Henry G Overman, Diego Puga, and Matthew A Turner, 2006, Causes of sprawl: A portrait from space, *The Quarterly Journal of Economics* 121, 587–633.

Card, David, Ciprian Domnisoru, and Lowell Taylor, 2018a, The Intergenerational Transmission of Human Capital: Evidence from the Golden Age of Upward Mobility, *NBER WP 25000* .

Card, David, Ciprian Domnisoru, and Lowell Taylor, 2018b, The Intergenerational Transmission of Human Capital: Evidence from the Golden Age of Upward Mobility, *NBER WP 25000*.

Case, Bradford, Kevin Gillen, and Susan M Wachter, 2002, Spatial variation in gse mortgage purchase activity, *Cityscape* 9–84.

Charles, Kerwin Kofi, Erik Hurst, and Mariel Schwartz, 2019, The transformation of manufacturing and the decline in us employment, *NBER Macroeconomics Annual* 33, 307–372.

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

Chetty, Raj, and Nathaniel Hendren, 2018a, The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects, *The Quarterly Journal of Economics* 133, 1107–1162.

Chetty, Raj, and Nathaniel Hendren, 2018b, The Impacts of Neighborhoods on Intergenerational Mobility II: County-level Estimates, *The Quarterly Journal of Economics* 133, 1163–1228.

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

Chetty, Raj, Nathaniel Hendren, and Lawrence Katz, 2016, The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment, *American Economic Review* 106, 855–902.

Chetty, Raj, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez, 2015, Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States, *The Quarterly Journal of Economics* 129, 1553–1623.

Collins, William J., and Robert A. Margo, 2011, Race and Home Ownership from the End of the Civil War to the Present, *American Economic Review* 101, 355–359.

DeFusco, Anthony A, and Andrew Paciorek, 2017, The Interest Rate Elasticity of Mortgage Demand: Evidence from Bunching at the Conforming Loan Limit, *American Economic Journal: Economic Policy* 9, 210–240.

Derenoncourt, Ellora, 2019, Can you Move to Opportunity? Evidence from the Great Migration, *University of California, Berkeley Working Paper*.

Dietz, Robert D., and Donald R. Haurin, 2003, The Social and Private Micro-level Consequences of Homeownership, *Journal of Urban Economics* 54, 401–450.

DiPasquale, Denise, and Edward L. Glaeser, 1999, Incentives and Social Capital: Are Homeowners Better Citizens?, *Journal of Urban Economics* 45, 354–384.

Duncan, Otis Dudley, 1968, Inheritance of Poverty or Inheritance of Race?, *On Understanding Poverty* 116, 149.

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

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

Gabriel, Stuart A, and Stuart Rosenthal, 2008, The GSEs, CRA, and Homeownership in Targeted Underserved Neighborhoods, *Conference on Built Environment: Access, Finance, and Policy*, 202–229.

Gabriel, Stuart A., and Stuart S. Rosenthal, 2005, Homeownership in the 1980s and 1990s: Aggregate Trends and Racial Gaps, *Journal of Urban Economics* 57, 101–127.

Glaeser, Edward L., and Joseph Gyourko, 2002, The impact of zoning on housing affordability, *NBER Working Paper* .

Glaeser, Edward L, and Matthew E Kahn, 2004, Sprawl and urban growth, *Handbook of regional and urban economics* 4, 2481–2527.

Glaeser, Edward L., and Bruce Sacerdote, 2000, The Social Consequences of Housing, *Journal of Housing Economics* 9, 1–23.

Glaeser, Edward L., and Jesse M. Shapiro, 2003, The Benefits of the Home Mortgage Interest Deduction, *Tax Policy and the Economy* 17, 37–82.

Goodman, Laurie S., and Christopher Mayer, 2018, Homeownership and the American Dream, *The Journal of Economic Perspectives* 32, 31–58.

Green, R. K., and M. White, 1997, Measuring the Benefits of Homeowning: Effects on Children, *Journal of Urban Economics* 41, 441–461.

Grundl, Serafin, and You Suk Kim, 2021, The Marginal Effect of Government Mortgage Guarantees on Homeownership, *Journal of Monetary Economics*.

Hanushek, Eric A, 2003, The failure of input-based schooling policies, *The economic journal* 113, F64–F98.

Harrison, David M, Wayne R Archer, David C Ling, and Marc T Smith, 2002, Mitigating information externalities in mortgage markets: The role of government-sponsored enterprises, *Cityscape* 115–143.

Holupka, Scott, and Sandra J. Newman, 2012, The Effects of Homeownership on Children's Outcomes: Real Effects of Self Selection?, *Real Estate Economics* 40, 566–602.

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

Kaufman, Alex, 2014, The Influence of Fannie and Freddie on Mortgage Loan Terms, *Real Estate Economics* 42, 472–496.

Li, Huiping, Harrison Campbell, and Steven Fernandez, 2013, Residential Segregation, Spatial Mismatch and Economic Growth across US Metropolitan Areas, *Urban Studies* 50, 2642–2660.

Listokin, David, and Elvin K Wyly, 2000, Making new mortgage markets: Case studies of institutions, home buyers, and communities, *Housing Policy Debate* 11, 575–644.

Loutskina, Elena, and Philip E Strahan, 2009, Securitization and the Declining Impact of Bank Finance on Loan Supply: Evidence from Mortgage Originations, *The Journal of Finance* 64, 861–889.

Loutskina, Elena, and Philip E. Strahan, 2015, Financial Integration, Housing and Economic Volatility, *Journal of Financial Economics* 115, 25–41.

Manchester, Paul B, Sue G Neal, and Harold L Bunce, 1998, *Characteristics of Mortgages Purchased by Fannie Mae and Freddie Mac, 1993-95* (Office of Policy Development and Research, US Department of Housing and . . .).

Margo, Robert A, 2016, Obama, Katrina, and the Persistence of Racial Inequality, *NBER WP 21933*.

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

McAdoo, Harriette P, 2002, African American Parenting, *Handbook of Parenting* 4, 47–58.

Mian, Atif, Kamalesh Rao, and Amir Sufi, 2013, Household balance sheets, consumption, and the economic slump, *The Quarterly Journal of Economics* 128, 1687–1726.

Mian, Atif, and Amir Sufi, 2011, House prices, home equity-based borrowing, and the us household leverage crisis, *American Economic Review* 101, 2132–56.

Mian, Atif, and Amir Sufi, 2014, What explains the 2007–2009 drop in employment?, *Econometrica* 82, 2197–2223.

Mian, Atif, Amir Sufi, and Emil Verner, 2020, How does credit supply expansion affect the real economy? the productive capacity and household demand channels, *The Journal of Finance* 75, 949–994.

Moulton, Shawn, 2008, The 1992 GSE Act and Loan Application Outcomes, *Wharton Working Paper*.

Myrdal, Gunnar, 1996, *An American Dilemma, Volume 2: The Negro Problem and Modern Democracy*, volume 2 (Transaction Publishers).

Ouazad, Amine, and Romain Rancière, 2016, Credit Standards and Segregation, *Review of Economics and Statistics* 98, 880–896.

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

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

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

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

Sequeira, Sandra, Nathan Nunn, and Nancy Qian, 2020, Immigrants and the Making of America, *The Review of Economic Studies* 87, 382–419.

Shertzer, Allison, Tate Twinam, and Randall P Walsh, 2016, Race, Ethnicity, and Discriminatory

Zoning, *American Economic Journal: Applied Economics* 8.3, 217–246.

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

Snyder, Thomas D, 1993, *120 Years of American Education: A Statistical Portrait* (US Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics).

Sodini, Paolo, Stijn Van Nieuwerburgh, Roine Vestman, and Ulf von Lilienfeld-Toal, 2016a, Identifying the Benefits from Home Ownership: A Swedish Experiment, *Columbia Working Paper*.

Sodini, Paolo, Stijn Van Nieuwerburgh, Roine Vestman, and Ulf von Lilienfeld-Toal, 2016b, Identifying the Benefits from Home Ownership: A Swedish Experiment, *NBER WP 22882* .

Temkin, Kenneth, Roberto G Quercia, and George C Galster, 2000, The impact of secondary mortgage market guidelines on affordable and fair lending: A reconnaissance from the front lines, *The Review of Black Political Economy* 28, 29–52.

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

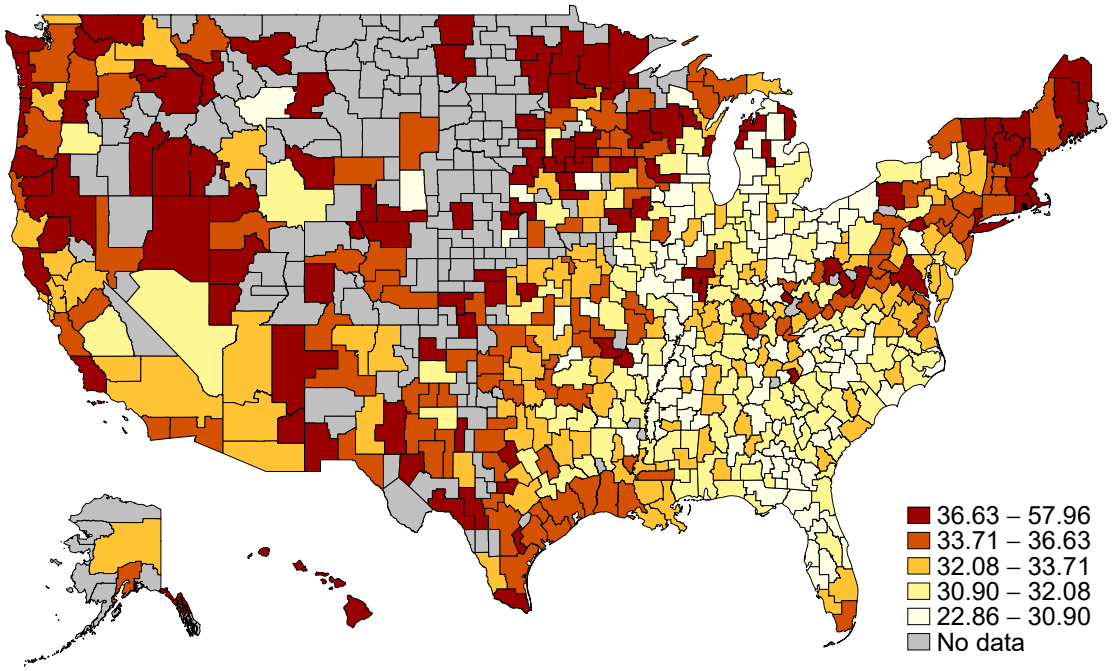
Wallison, Peter J, 2001, *Serving Two Masters, Yet Out of Control: Fannie Mae and Freddie Mac* (American Enterprise Institute).

Wilson, William Julius, 2012, *The Truly Disadvantaged: The Inner city, the Underclass, and Public Policy* (University of Chicago Press).

Figure 1
Map of Upward Mobility

This figure shows the heat maps for the average upward mobility for Black (Panel A) and white (Panel B) households at the CZ level. Data are divided into 5 quintiles for each racial group as shown. Average upward mobility for Black (white) children is the expected mean household income rank for households with parents' income at the 25th percentile of the parent income distribution. Data on average upward mobility by Black and white children is at the CZ-level from Chetty et al. (2019) and measures income from IRS tax returns for cohorts and parents of cohorts, for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000.

Panel A: Black Households



Panel B: White Households

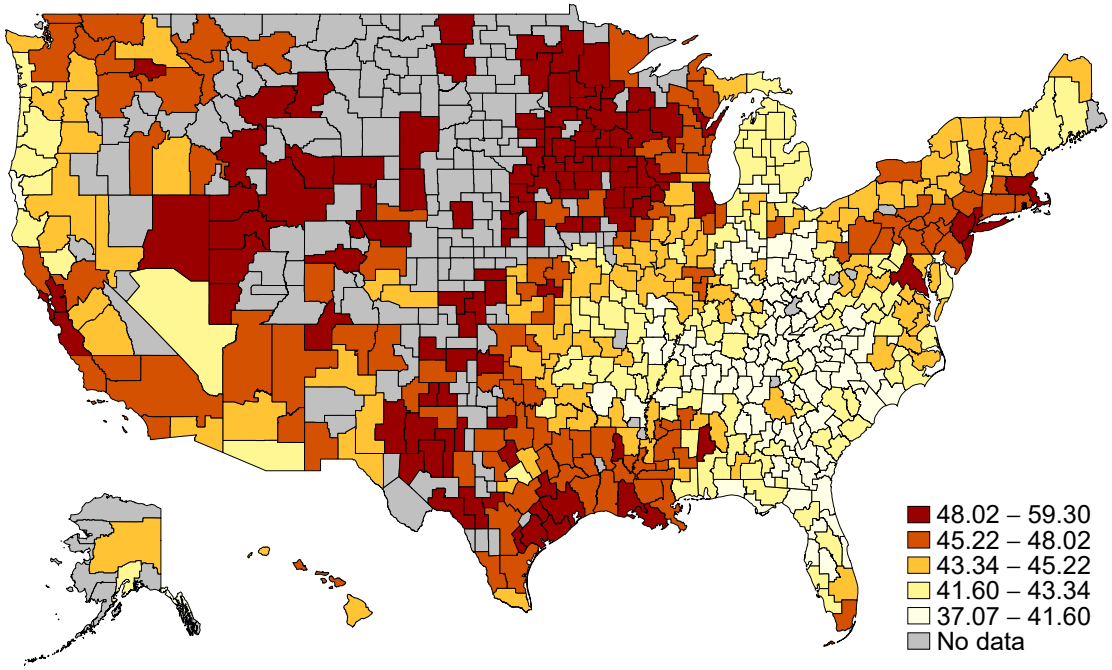
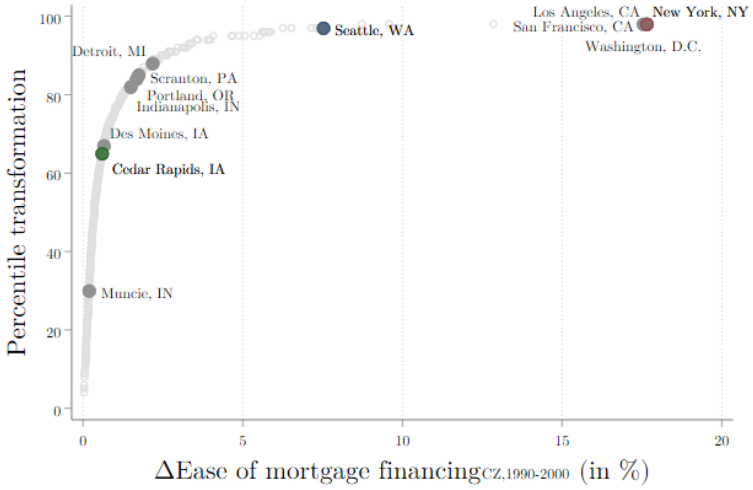
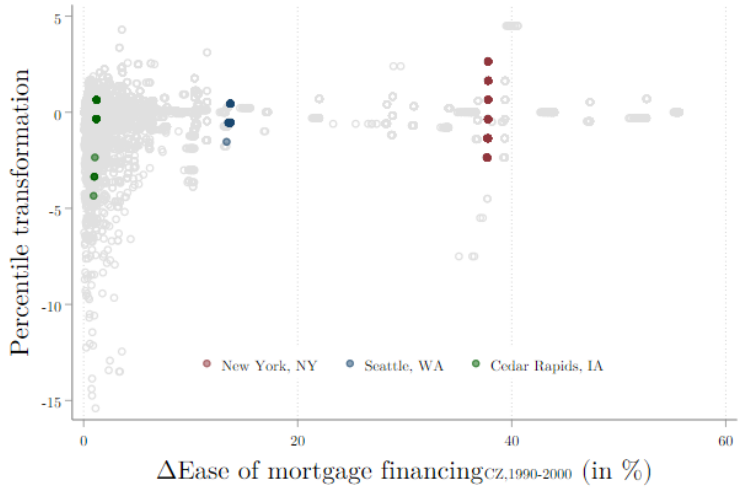


Figure 2
CZ-level and Within-CZ Tract-level variation: Percentiles of ease of mortgage financing variable

Panel A shows the quantile function of the increase in the ease of mortgage financing between 1990–2000 at the CZ-level. ΔEase of mortgage financing$_{CZ,1990-2000}$ is plotted in percentile rank on the y-axis and in % on the x-axis measured as the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Each circle represents a CZ and the names of select CZs are displayed. Panel B shows the quantile function of of the increase in the ease of mortgage financing between 1990–2000 at the tract-level, after controlling for CZ-fixed effects. ΔEase of mortgage financing$_{-ct,1990-2000}$ is plotted in % on the x-axis. ΔEase of mortgage financing$_{-ct,1990-2000}$ is the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ excluding the census tract being measured. The percentile rank of ΔEase of mortgage financing$_{-ct,1990-2000}$ is regressed against CZ-level fixed effects, and its residuals are plotted on the y-axis. Each circle represents a tract and the with the colored circles corresponding to select CZs displayed in Panel A. Data is based on Census 1990.



(A) CZ-level percentile transformation



(B) Within-CZ tract-level variation

Figure 3
First stage: Ease of mortgage financing and homeownership growth

This figure presents the binscatter plots for the change in homeownership between 1990–2000 (y-axis) against the ease of mortgage financing in 1990–2000 (x-axis). The binscatter plots show the average of the y-axis for each 5 percentile bin of the data along the x-axis. Change in homeownership is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. ΔEase of mortgage financing$_{CZ,1990-2000}$ on the x-axis is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Observations are weighted by the number of housing units in 1990 and control for state fixed effects.

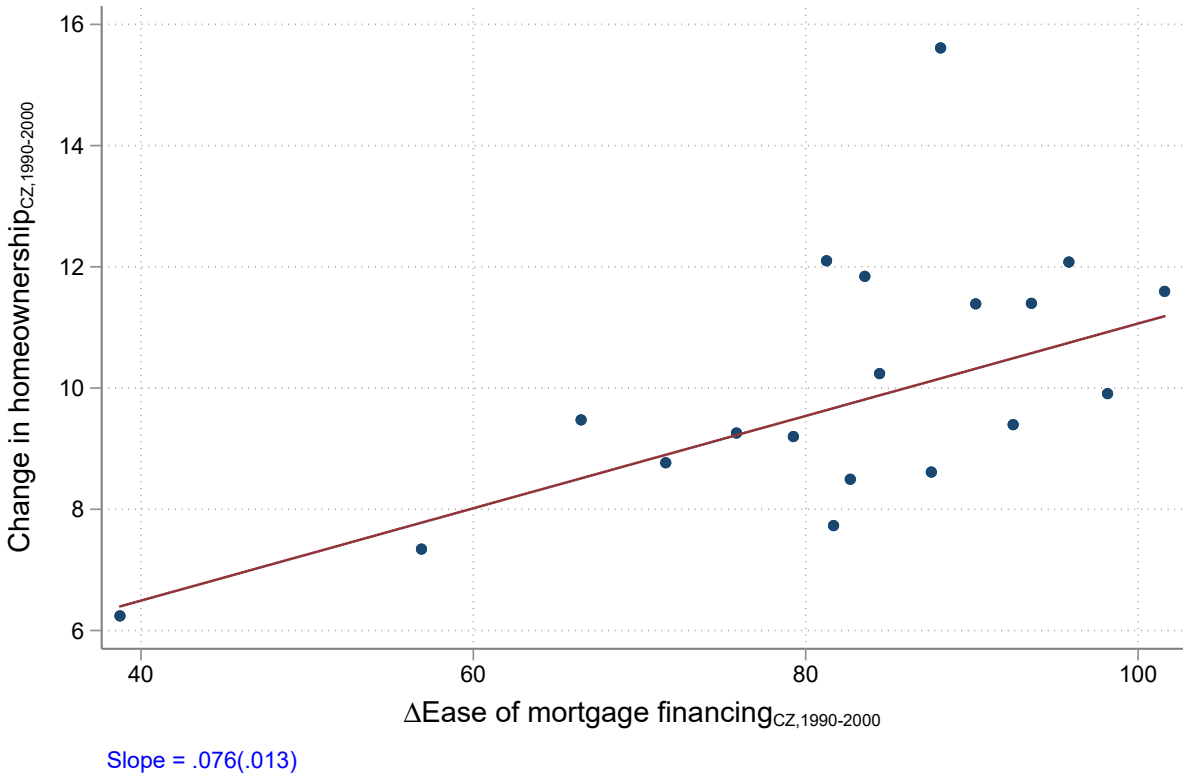


Figure 4
Impact on average upward mobility of low-income households

This figure presents the binscatter plots for average upward mobility for low-income children (y-axis) against the increase in the ease of mortgage financing between 1990–2000 (x-axis) at the CZ-level. The binscatter plots show the average of the y-axis for each 5 percentile bin of the data along the x-axis. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the fraction of houses in percentile rank that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Low income upward mobility is the average upward mobility at the 25th percentile measured as the expected mean household income rank for individuals with parents at the 25th percentile of the parent income distribution. Data on average upward mobility at the CZ-level is from Chetty and Hendren (2018a) and measures income from IRS tax returns for cohorts and parents of cohorts, for cohorts born between 1980 and 1986 and parents' income measured between 1996–2000. The y-axis variables has been standardized (z-scored). Observations are weighted by the number of housing units in 1990 and controls for state fixed effects. Remaining data are from Census 2000 and Census 1990.

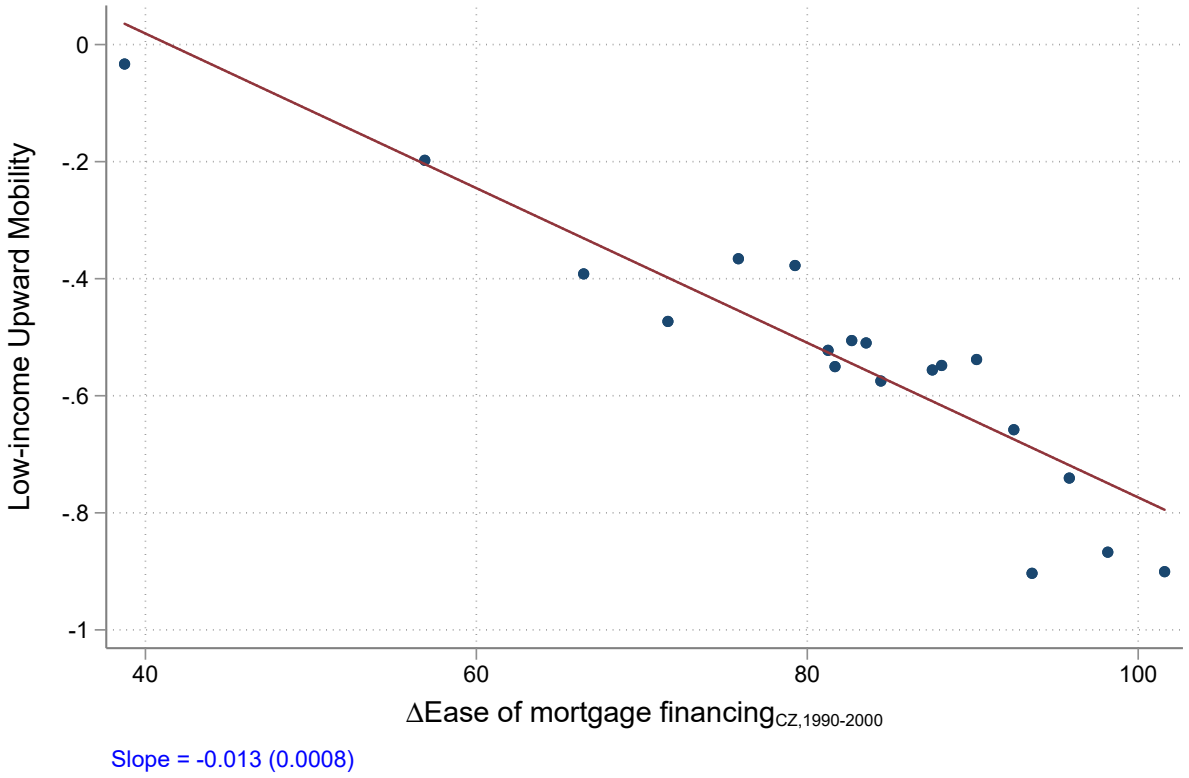
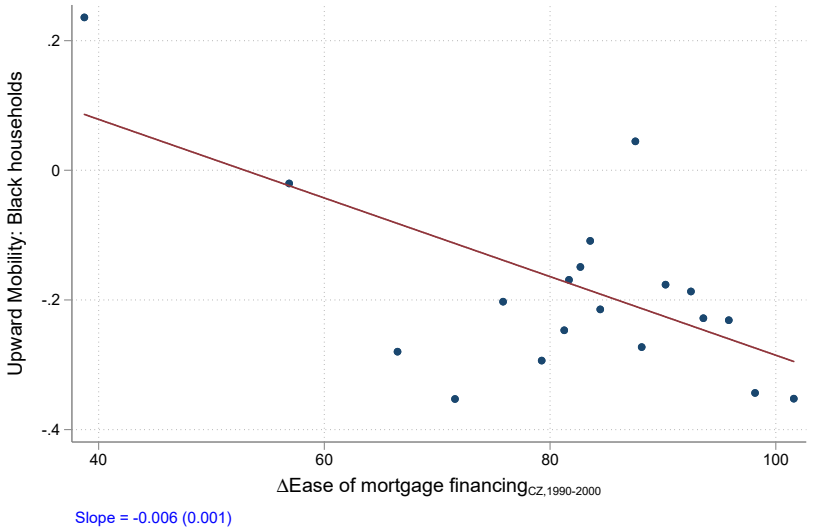
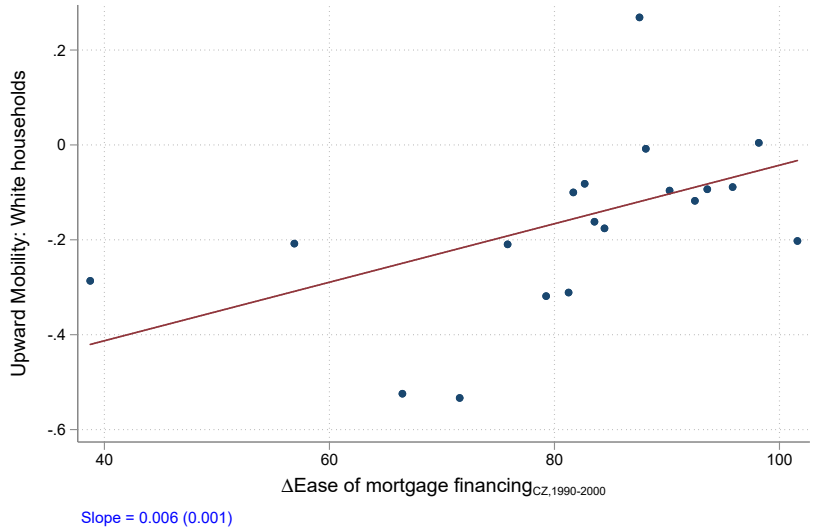


Figure 5
Impact on upward mobility of low- income households Black and white Households

This figure presents the binscatter plots for average upward mobility for low-income Black children in Panel A (y-axis) and white children in Panel B (y-axis) against the increase in the ease of mortgage financing between 1990–2000 (x-axis) at the CZ-level. The binscatter plots show the average of the y-axis for each 5 percentile bin of the data along the x-axis. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the fraction of houses in percentile rank that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Average upward mobility at the 25th percentile for Black (white) children, in Panel A (Panel B), is the expected mean household income rank for households with parents' income at the 25th percentile of the parent income distribution. Data on average upward mobility by Black and white children is at the CZ-level from Chetty et al. (2019) and measures income from IRS tax returns for cohorts and parents of cohorts, for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000. Observations are weighted by the number of housing units in 1990 and controls for state fixed effects. Remaining data are from Census 2000 and Census 1990.



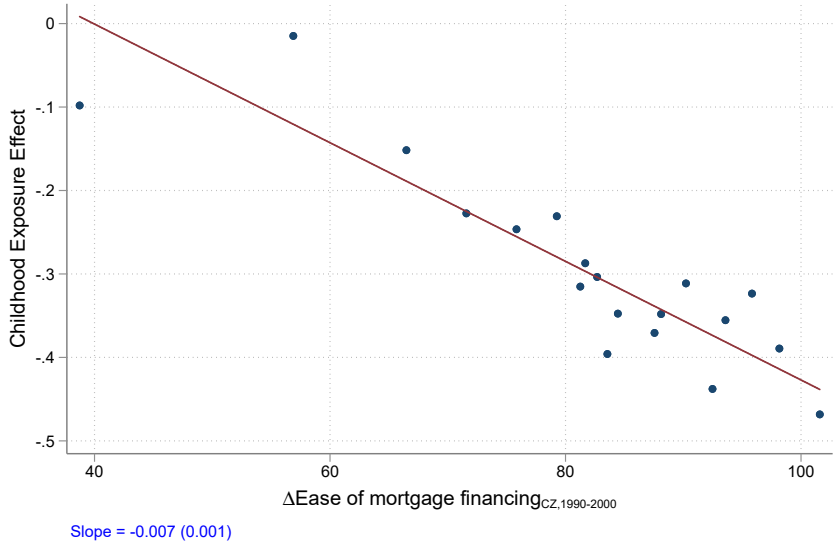
(A) Black households



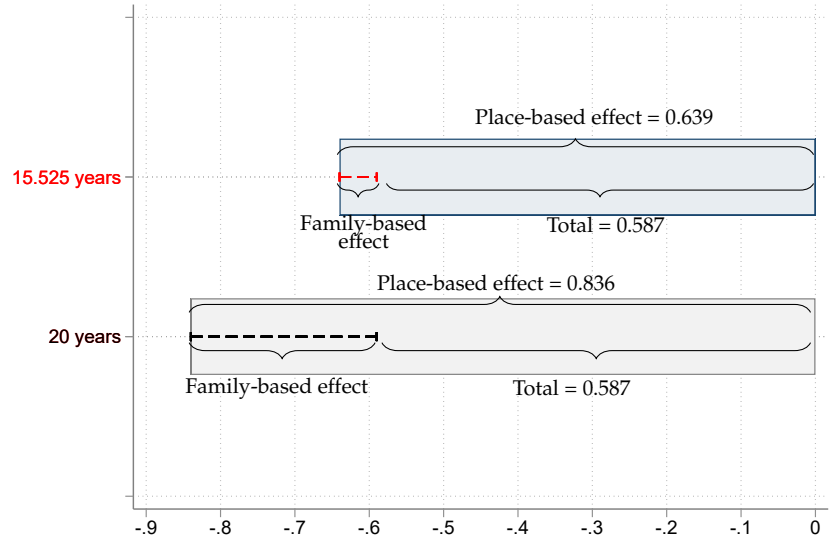
(B) White households

Figure 6
Childhood exposure effects of upward mobility for low-income households

Panel A below presents the binscatter plots for the childhood exposure effect of upward mobility for low-income children (y-axis) against the increase in the ease of mortgage financing between 1990–2000 (x-axis). The binscatter plots show the average of the y-axis for each 5 percentile bin of the data along the x-axis. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Childhood exposure effect, in Panel A, is the estimated causal impact of one additional year of childhood in a CZ on children's household income rank when adult, with parents at the 25th percentile of the parents' income distribution for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data is at the CZ-level from Chetty and Hendren (2018a) and measures income from IRS tax returns for cohorts and parents of cohorts. The y-axis variables has been standardized (z-scored). Observations are weighted by the number of housing units in 1990 and controls for state fixed effects. Remaining data are from Census 2000 and Census 1990. Panel B shows the decomposition of average upward mobility into a place-based effect and a family-based selection effect (in percentile ranks), assuming the scaling of childhood exposure effects by 15.525 years and 20 years. See Section 7.3 for further details.



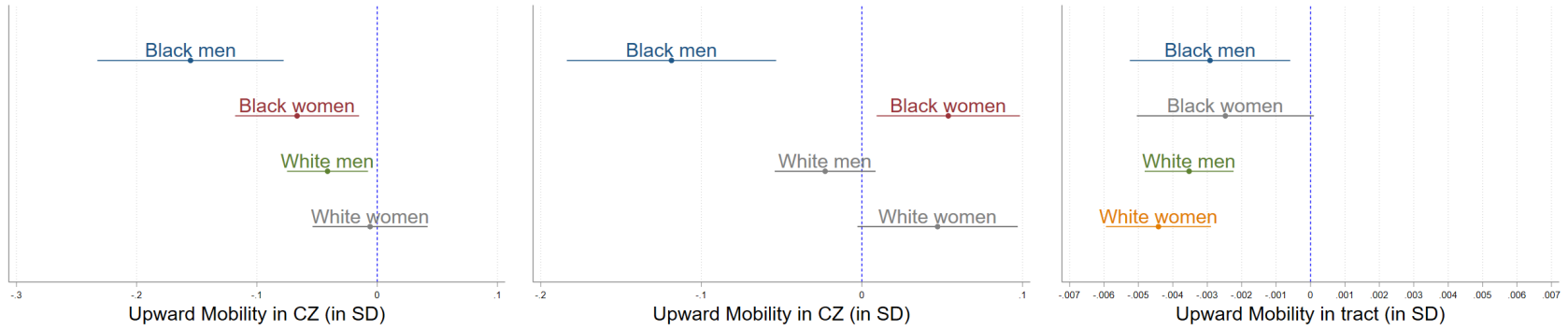
(A) Location effects



(B) Isolating selection vs. location effects

Figure 7
Heterogeneity in impact by race and gender on upward mobility of low-income households

Panel A and B show the estimates obtained from 2SLS regressions with the dependent variable, upward mobility by gender, race, and income against the change in homeownership between 1990–2000 at the CZ-level analogous to column 3 in Panel A in Table 5. Each point estimate in Panel A and B shows the coefficient on change in homeownership between 1990–2000 from equation (17) with the upward mobility for the particular race and gender with parents at the 25th percentile of the income distribution. Change in homeownership is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$ defined as the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Regressions include state fixed effects. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households separately in 1990 in a CZ. Average upward mobility at the 25th percentile for the respective groups at the CZ-level in Panel A (Panel B) and at the tract-level C are calculated as follows. Average upward mobility for the respective group is the expected mean household (individual) income rank for households with parents' income at the 25th percentile of the parents' income distribution. Data is from Chetty et al. (2019) and Chetty et al. (2020), for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000. Panel C presents the coefficient corresponding to the regression specification in column 1 in Panel B, Table 5 on the interaction between targeted tract and the tract-level measure of the ease of mortgage access with the tract-level upward mobility for children from low-income families for each group as indicated. ΔEase of mortgage financing$_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ excluding the census tract being measured. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification as of 2000. Dependent variables in all panels are standardized (z-scored). Confidence intervals for all point estimates are shown at the 5% level and are displayed in gray if not statistically significant at the 5% level.



(A) CZ-level upward mobility based on household income rank

(B) CZ-level upward mobility based on individual income rank

(C) Tract-level upward mobility based on household income rank

Figure 8
Local mechanisms: Impact on share of public finance spending

This figure plots the instrumental variable estimates obtained from 2SLS specification with the share of public finance spending in separate regressions against the change in homeownership, which is instrumented by the increase in the ease of mortgage financing at the CZ-level. Each point estimate shows the coefficient on change in homeownership between 1990–2000 from equation (17). The dependent variables are education, health and hospitals, police, fire, sanitation, and recreation share of public spending defined as the mean of the share of government spending in each of these categories in 1992, 1997, and 2002. Dependent variables are standardized (z-scored). The corresponding pre-period average of the corresponding shares in 1972, 1977, 1982, and 1987 are also included as control variables in each specification. Additional control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households separately in 1990 in a CZ. Data on public finance is from Derenoncourt (2019). Change in homeownership is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Regressions include state fixed effects. Standard errors are clustered at the state level. Data are weighted by the number of housing units in each CZ in 1990. Confidence intervals for all point estimates are shown at the 5% level and are displayed in gray if not statistically significant at the 5% level.

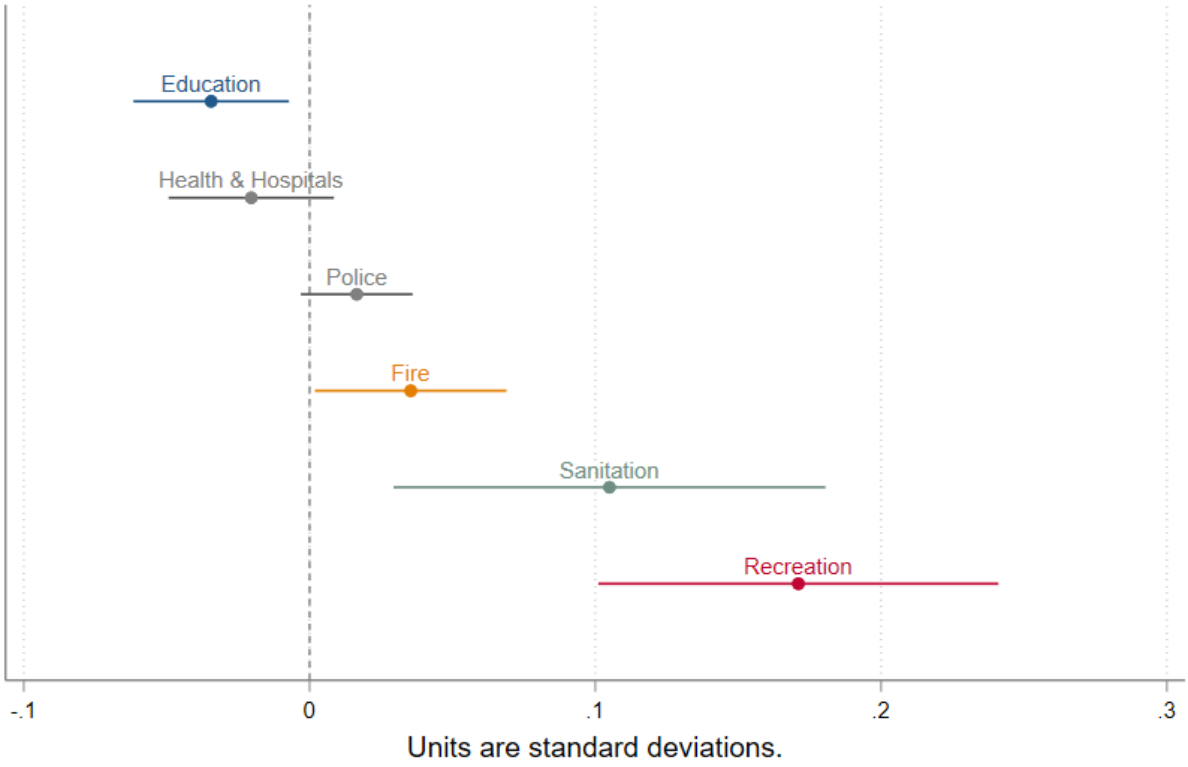


Table 1
Descriptive Statistics

Panels A and B show the summary statistics for select variables in our analyses on the CZ and on the census-tract level, respectively. Panel C shows additional statistics on demographic characteristics, housing, and other variables. Change in homeownership between 1990–2000 is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level in Panel A and tract-level in Panel B. Change in Black (white) homeownership is the change in the number of Black (white) homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level in Panel A and tract-level in Panel B. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the fraction of houses (shown both as % and as percentile rank) that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. ΔEase of mortgage financing$_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ excluding the census tract being measured. Racial, homeownership, and income segregation are entropy-based measures calculated at the CZ level based on the 2000 Census data. Urban sprawl is measured as the fraction of households that spend more than 15 minutes of time commuting to work and is from the 2000 Census data. Targeted tract in Panel B takes a value of 1 for tracts classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification in 1996. Average upward mobility at the 25th and the 75th percentile is the expected mean household income rank for individuals with parents at the 25th and the 75th percentile of the parents' income distribution, respectively. Data on average upward mobility at the CZ-level(Panel A) and at the tract-level(Panel B), is from Chetty and Hendren (2018a) and Chetty et al. (2020), respectively. Childhood exposure effect at the 25th (75th) percentile, in Panel A, is the estimated causal impact of one additional year of childhood in a CZ on children's household income rank when adult, with parents at the 25th (75th) percentile of the parents' income distribution. Data is at the CZ-level from Chetty and Hendren (2018a). Average upward mobility at the 25th and the 75th percentile for Black and white children at the CZ-level in Panel A and at the tract-level in Panel B is calculated as the expected mean household income rank for households with parents' income at the 25th and the 75th percentile of the parents' income distribution. Data for the CZ-level and tract-level respectively is from Chetty et al. (2019) and Chetty et al. (2020) Data from Chetty et al. (2019) and Chetty et al. (2020) is for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000. Data from Chetty and Hendren (2018a) is for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. All income data for cohorts and parents of cohorts are from IRS tax records. Racegap at the 25th (75th) percentile in Panels A and B is the difference in the upward mobility of white children relative to the Black children with parents at the 25th (75th) percentile of the national income distribution. Log of the median house price value is for all owner-occupied houses and from the 2000 Census. The student-to-teacher ratio and school revenues from local sources per 1000 students are calculated using National Center for Education Statistics' Common Core of Data for the fiscal year 1996–97. Remaining data is from the 1990 and 2000 Census. All tract-level data excluding the upward mobility measures are winsorized at the 1% level. ΔHomeownership Rate$_{CZ,1990-2000}$ in Panel C is the change in the homeownership rate in 2000 (homeowners to renters plus homeowners in 2000) minus the homeownership rate in 1990 (analogously defined). For Black households this is the change in the Black homeownership rate in 2000 (Black homeowners to Black renters plus Black homeowners in 2000) minus the Black homeownership rate in 1990 (analogously defined). Change in white homeownership rate between 1990–2000 is analogously defined. Share of black households, share below poverty line, share of single-headed households with children are from 1990 Census and from Chetty and Hendren (2018b). Educational Mobility is defined as the fraction of 19-22 year-olds in a CZ with more than 13 years education, who belong to households with parents between 12–13 years of education based on the 1990 American Community Survey data. Remaining data is from the 1990 and 2000 Census.

Panel A: Summary Statistics at the CZ level

	Mean	SD	p25	p50	p75
Change in homeownership$_{CZ,1990-2000}$ (in %)	10.50	8.06	5.15	9.52	14.19
Change in Black homeownership$_{CZ,1990-2000}$ (in %)	0.99	1.75	0.02	0.17	1.17
Change in white homeownership$_{CZ,1990-2000}$ (in %)	9.51	7.92	4.46	8.08	13.19
ΔEase of mortgage financing$_{CZ,1990-2000}$ (in %)	2.84	6.51	0.48	0.93	2.34
ΔEase of mortgage financing$_{CZ,1990-2000}$ (in percentile rank)	57.71	25.16	37.00	59.00	79.00
Racial segregation (standardized)	0.00	1.00	-0.75	-0.21	0.61
Income segregation (standardized)	0.00	1.00	-0.83	-0.28	0.66
Homeownership segregation (standardized)	0.00	1.00	-0.77	-0.17	0.72
Urban sprawl (standardized)	0.00	1.00	-0.61	0.13	0.70
Average Upward mobility (25th percentile)	45.67	4.85	42.36	45.42	48.26
Average Upward mobility (75th percentile)	59.30	3.32	56.89	59.05	61.40
Childhood Exposure effect (25th percentile)	0.14	0.55	-0.17	0.05	0.36
Childhood Exposure effect (75th percentile)	0.10	0.64	-0.19	0.05	0.34
Black Upward mobility (25th percentile	34.14	4.53	31.23	32.86	35.62
Black Upward mobility (75th percentile)	46.41	6.32	42.88	45.14	48.76
White Upward mobility (25th percentile)	44.86	3.94	42.04	44.06	47.20
White Upward mobility (75th percentile	60.16	3.07	57.97	59.81	62.02
Racegap (25th percentile)	10.72	4.24	8.64	10.89	13.10
Racegap (75th percentile)	13.75	6.15	11.64	14.30	16.81
Log (House prices$_{2000}$)	11.28	0.36	11.02	11.24	11.49
School revenues from local sources per student (in '000s)	2.28	1.12	1.49	2.07	2.85
Student-to-teacher ratio	17.15	2.08	15.74	16.96	18.28
Housing units in 1990	164,584	382,079	28,059	56,450	138,379
Observations	84,551				

Table 1
Descriptive Statistics (continued)

Panel B: Summary Statistics at the tract level

	Mean	SD	p25	p50	p75
Change in homeownership$_{ct,1990-2000}$ (in %)	37.28	96.57	-0.72	7.57	32.01
Change in Black homeownership$_{ct,1990-2000}$ (in %)	2.50	8.41	0.00	0.23	1.33
Change in white homeownership$_{ct,1990-2000}$ (in %)	34.54	91.80	-0.88	6.46	28.77
ΔEase of mortgage financing$_{-ct,1990-2000}$ (in %)	9.84	13.98	1.26	3.00	10.72
ΔEase of mortgage financing$_{-ct,1990-2000}$ (in percentile rank)	48.31	28.84	23.00	44.00	74.00
Targeted tract$_{ct}$ (indicator)	0.51	0.50	0	1	1
Average Upward mobility (25th percentile)	40.32	5.64	36.39	39.98	44.01
Average Upward mobility (75th percentile)	55.12	5.69	52.07	55.73	58.96
Black Upward mobility (25th percentile)	33.60	5.79	30.02	32.89	36.33
Black Upward mobility (75th percentile)	44.04	9.83	38.52	43.70	49.11
White Upward mobility (25th percentile)	44.31	6.02	40.34	43.94	47.98
White Upward mobility (75th percentile)	57.79	6.02	54.97	58.25	61.30
Racegap (25th percentile)	10.71	6.87	6.67	10.44	14.58
Racegap (75th percentile)	13.75	10.82	8.05	14.00	19.84
Log (House prices$_{2000}$)	11.54	0.62	11.13	11.46	11.90
School revenues from local sources per student (in '000s)	2.79	1.72	1.59	2.40	3.32
Student-to-teacher ratio	18.34	3.23	16.09	17.85	20.17
Housing units in 1990	1,697	975	1098	1569	2140
Observations	36,056				

Panel C: Demographic characteristics, housing and other variables

	Mean	SD	p25	p50	p75
ΔHomeownership Rate$_{CZ,1990-2000}$	1.91	1.63	0.89	1.82	2.86
ΔHomeownership Rate$_{CZ,1990-2000}$: Black	-0.48	10.26	-3.46	-0.09	2.91
ΔHomeownership Rate$_{CZ,1990-2000}$: White	2.18	1.65	1.13	2.09	3.16
House price growth 1980-1990	70.24	47.76	43.17	61.11	74.81
Median House prices, 1990 (in $)	75197	48717	48833	58675	72957
Median Household Income, 1990 (in $)	32489	6430	26563	32505	37181
Share Black, 1990 (in%)	13.37	8.50	6.76	10.28	19.59
Share Below Poverty Line, 1990 (in%)	12.44	4.41	8.93	11.75	14.74
Share of Single-Headed Households with Children 1990	21.29	2.31	20.03	21.12	22.67
Educational mobility, 1990*	41.79	5.88	38.30	41.69	44.93
% high-school graduates: white, 1990	44.97	5.11	41.95	44.78	46.71
% high-school graduates: Black, 1990	34.79	10.44	29.17	33.62	38.46
Observations	551				

*Only available for 195 CZs

Table 2
Impact of change in homeownership between 1990–2000

This table presents the impact of the increase in the ease of mortgage financing on change in homeownership between 1990–2000 at the CZ-level (Panel A) and tract-level (Panel B). The dependent variable in column 1 of Panel A and Panel B is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ- and tract-level, respectively. In column 2 (3) the dependent variable is the change in homeownership of Black (white) households from 1990 to 2000 relative to the total number of renters and homeowners at the CZ-level in Panel A and tract-level in Panel B. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. ΔEase of mortgage financing$_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ excluding the census tract being measured. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification in 1996. Control variables included are the house prices in 1990, median house price growth between 1980–1990, fraction of high school graduates among Black households and white households separately in 1990 in a CZ. In Panel A all regressions include state fixed effects. All columns in Panel B include CZ-fixed effects. Observations are weighted by the total number of housing units as of 1990 in both panels. The dependent variables for the tract-level regressions are winsorized at the 1% level. Standard errors are clustered at the state-level in Panel A and at the CZ-level in Panel B.

Panel A: CZ-level

	(1)	(2)	(3)
	Change in homeownership 1990–2000		
	Total	Black	White
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.112***	0.025***	0.086***
	(0.020)	(0.004)	(0.020)
R^2	0.715	0.799	0.693
F-Stat	58.917		
State FE	Y	Y	Y
Baseline controls	Y	Y	Y
N	551	551	551

Panel B: Tract-level

	(1)	(2)	(3)
	Change in homeownership 1990–2000		
	Total	Black	White
ΔEase in mortgage financing$_{-ct,1990-2000}$ $\times$ Targeted tract$_{ct}$	-0.115***	-0.009	-0.104***
	(0.026)	(0.006)	(0.028)
Targeted tract$_{ct}$	-7.792***	0.804**	-8.776***
	(1.578)	(0.312)	(1.608)
ΔEase in mortgage financing$_{-ct,1990-2000}$	-3.410***	0.089	-3.490***
	(0.509)	(0.081)	(0.531)
R^2	0.112	0.160	0.122
F-Stat	474.76		
CZ FE	Y	Y	Y
Baseline controls	Y	Y	Y
N	36054	36054	36054

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

Table 3
Impact on segregation

This table presents the results of the change in homeownership in 1990–2000 on segregation at the CZ-level. Columns 1, 2, and 3 present the reduced form (RF), OLS and 2SLS estimates, respectively. Change in homeownership between 1990–2000 is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$, defined as the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. The dependent variables are the homeownership (Panel A), racial (Panel B), income (Panel C) segregation, and urban sprawl (Panel D) as of 2000. Racial, homeownership and income segregation are entropy-based measures calculated at the CZ level. Urban sprawl is measured as the fraction of households that spend more than 15 minutes of time commuting to work. Dependent variables have been standardized (z-scored). Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households separately in 1990 in a CZ. Additional control variables included are homeownership/racial/income segregation and urban sprawl in 1990 in Panel A, Panel B, Panel C, and Panel D, respectively. All regressions include state fixed effects. Observations are weighted by the total number of housing units in a CZ as of 1990. Standard errors are clustered at the state level.

	(1)	(2)	(3)
	Segregation Measures in 2000		
	Panel A: Racial Segregation		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.0258***		
	(0.00435)		
Change in homeownership$_{CZ,1990-2000}$		-0.00799	0.201***
		(0.0112)	(0.0502)
R-squared	0.803	0.743	0.216
	Panel B: Income Segregation		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.0151***		
	(0.00202)		
Change in homeownership$_{CZ,1990-2000}$		0.0126**	0.0871***
		(0.00516)	(0.0134)
R-squared	0.935	0.921	0.830
	Panel C: Homeownership Segregation		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.00415***		
	(0.00116)		
Change in homeownership$_{CZ,1990-2000}$		0.0116***	0.0307***
		(0.00283)	(0.00957)
R-squared	0.977	0.978	0.973
	Panel D: Urban Sprawl		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.0244***		
	(0.00216)		
Change in homeownership$_{CZ,1990-2000}$		0.0387***	0.177***
		(0.00726)	(0.0245)
R-squared	0.821	0.749	0.283
N	551	551	551
State FE	Y	Y	Y
Baseline controls	Y	Y	Y
Type	RF	OLS	2SLS

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

Table 4
Impact on upward mobility of low-income households

This table presents the results of the change in homeownership between 1990–2000 on the average upward income mobility at the CZ-level (Panel A) and the census tract-level (Panel B). Columns 1, 2, and 3 present the reduced form (RF), OLS and 2SLS estimates, repspectively. Change in homeownership between 1990-2000 in Panel A and Panel B is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ- and tract-level, respectively. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$ in Panel A, and with ΔEase of mortgage financing$_{-ct,1990-2000t}$ in Panel B. ΔEase of mortgage financing$_{CZ,1990-2000}$ is defined as the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. ΔEase of mortgage financing$_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ, excluding the census tract being measured. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification in 1996. The dependent variable in all columns is the average upward mobility for low-income households. Average upward mobility at the 25th percentile is the expected mean household income rank for individuals with parents at the 25th percentile of the parents' income distribution, respectively. In Panel A, data on average upward mobility at the CZ-level, is from Chetty and Hendren (2018a) and measures incomes from IRS tax returns for cohorts and parents of cohorts. Parents' income is measured as of 1996–2000. In Panel B, data on average upward mobility at the tract-level is from Chetty et al. (2020), for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015 and parents' income is measured using mean income over five years: 1994, 1995, and 1998–2000. Dependent variables in both panels have been standardized (z-scored). Fixed effects and control variables are included as indicated. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households separately in 1990 in a CZ. Observations are weighted by the total number of housing units in 1990. Standard errors are clustered at the state level in Panel A and at the CZ level in Panel B.

Panel A: CZ-level analysis

	(1)	(2)	(3)
	Average Household Income Rank		
ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.014***		
	(0.001)		
Change in homeownership$_{CZ,1990-2000}$		-0.003	-0.123***
		(0.004)	(0.025)
R^2	0.808	0.713	.
N	551	551	551
State FE	Y	Y	Y
Baseline controls	Y	Y	Y
Type	RF	OLS	2SLS

Panel B: Tract-level analysis

	(1)	(2)	(3)
	Average Household Income Rank		
ΔEase in mortgage financing$_{-ct,1990-2000}$ $\times$ Targeted tract$_{ct}$	-0.007***		
	(0.002)		
Targeted tract$_{ct}$	-0.320***	-0.821***	-1.765***
	(0.080)	(0.069)	(0.422)
ΔEase in mortgage financing$_{-ct,1990-2000}$	-0.155***		
	(0.021)		
Change in homeownership$_{ct,1990-2000}$ $\times$ Targeted tract$_{ct}$		0.158***	4.412***
		(0.030)	(1.611)
Change in homeownership$_{ct,1990-2000}$		0.059***	-1.418**
		(0.014)	(0.591)
R^2	0.508	0.481	.
N	36056	36054	36054
CZ FE	Y	Y	Y
Type	RF	OLS	2SLS

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

Table 5
Impact on upward mobility of low-income households by race

This table presents the results for the change in homeownership between 1990–2000 on the average upward income mobility by race at the CZ-level in Panel A and at the tract-level in Panel B. Reduced form (RF), OLS and 2SLS estimates are presented as indicated. The dependent variables in columns 1–3 and 4–6 are the average upward mobility measures for Black and white children. Average upward mobility at the 25th percentile for Black (white) children at the CZ-level in Panel A and at the tract-level in Panel B is the expected mean household income rank for households with parents' income at the 25th percentile of the parents' income distribution. Data is from Chetty et al. (2019), for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014–2015 and parents' incomes is measured using mean income over five years: 1994, 1995, and 1998-2000. The dependent variable in both panels in columns 7–9 is the racegap measured as the difference in the average upward mobility of white children relative to the Black children. Dependent variables have been standardized (z-scored). Remaining variables and details on the empirical specification are as described in Table 4.

Panel A: CZ-level analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Average Household Income Rank by Race						Race gap = White-Black		
	Black			White					
ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.013***			-0.003			0.010***		
	(0.002)			(0.002)			(0.003)		
Change in homeownership$_{CZ,1990-2000}$		0.000	-0.117***		-0.003	-0.025		-0.005	0.092***
		(0.004)	(0.028)		(0.004)	(0.020)		(0.006)	(0.032)
R^2	0.608	0.549	.	0.856	0.854	0.837	0.641	0.613	0.294
N	551	551	551	551	551	551	551	551	551
State FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	RF	OLS	2SLS	RF	OLS	2SLS	RF	OLS	2SLS

Panel B: Tract-level analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Average Household Income Rank by Race						Race gap = White-Black		
	Black			White					
Δ Ease in mortgage financing$_{-ct,1990-2000}$ $\times$ Targeted tract$_{ct}$	-0.002*			-0.005***			0.001		
	(0.001)			(0.001)			(0.001)		
Targeted tract$_{ct}$	-0.296***	-0.449***	-0.723***	-0.289***	-0.639***	-1.347***	0.123**	0.240***	0.413***
	(0.058)	(0.030)	(0.148)	(0.048)	(0.037)	(0.253)	(0.050)	(0.028)	(0.144)
Δ Ease in mortgage financing$_{-ct,1990-2000}$	-0.077***			-0.125***			0.079***		
	(0.013)			(0.017)			(0.013)		
Change in homeownership$_{ct,1990-2000}$ $\times$ Targeted tract$_{ct}$		0.069**	1.373**		0.105***	3.212***		-0.057**	-0.855
		(0.031)	(0.621)		(0.020)	(0.961)		(0.023)	(0.605)
Change in homeownership$_{ct,1990-2000}$		0.093***	-0.335		0.055***	-1.020***		0.036	0.295
		(0.026)	(0.225)		(0.012)	(0.360)		(0.025)	(0.197)
R^2	0.203	0.201	.	0.456	0.441	.	0.142	0.137	.
N	18484	18482	18473	34719	34718	34718	17114	17113	17104
CZ FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	RF	OLS	2SLS	RF	OLS	2SLS	RF	OLS	2SLS

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

Table 6
Mechanism: Isolating the selection and sorting effects using childhood exposure measures for low-income households

This table presents the results of the change in homeownership between 1990–2000 on childhood exposure effects. Columns 1, 2, and 3 present the reduced form (RF), OLS and 2SLS estimates, respectively. Change in homeownership between 1990–2000 is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990. This is instrumented with the increase in the ease of mortgage financing in 1990–2000. ΔEase of mortgage financing$_{CZ,1990-2000}$, defined as the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. The dependent variable in all columns is the childhood exposure for low-income households. Childhood exposure effect is the estimated causal impact of one additional year of childhood in a CZ on children's household income rank when adult, with parents at the 25th percentile of the parents' income distribution for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data is at the CZ-level from Chetty and Hendren (2018a) and measures income from IRS tax returns for cohorts and parents of cohorts. Dependent variables have been standardized (z-scored). All regressions include the state fixed effects and all columns are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)
	Childhood exposure effects		
ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.008***		
	(0.001)		
Change in homeownership$_{CZ,1990-2000}$		-0.013**	-0.076***
		(0.005)	(0.019)
R^2	0.371	0.332	.
N	551	551	551
State FE	Y	Y	Y
Baseline controls	Y	Y	Y
Type	RF	OLS	2SLS

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

Table 7
Channel: House prices, school quality, and school revenue from local sources

This table presents the CZ- and tract-level estimates of the impact of the change in homeownership between 1990–2000 on school quality (columns 1–3) and house prices (columns 4–6). OLS, reduced form, and instrumented 2SLS estimates are as indicated. Change in homeownership between 1990–2000 is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990. Log of the median house price value is for all owner-occupied houses and from the 2000 Census. The student-to-teacher ratio and school revenues from local sources per 1000 students are calculated using National Center for Education Statistics' Common Core of Data for the fiscal year 1996–97. Dependent variables in columns 4–9 in both panels have been standardized (z-scored). Fixed effects and control variables are included as indicated. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households separately in 1990 in a CZ. Observations are weighted by the total number of housing units in 1990. Standard errors are clustered at the state level in Panel A and at the CZ level in Panel B. Remaining variables and details on the empirical specification are as described in Table 4.

Panel A: CZ-level analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Log (House prices$_{2000}$)			Local school revenue per student (in SD)			School quality: Student-teacher ratio		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.006***			0.019***			0.010***		
	(0.001)			(0.003)			(0.003)		
Change in homeownership$_{CZ,1990-2000}$		0.010***	0.052***		0.030**	0.174***		0.003	0.090**
		(0.002)	(0.010)		(0.012)	(0.032)		(0.008)	(0.039)
R^2	0.973	0.959	0.801	0.936	0.922	0.772	0.927	0.918	0.830
N	551	551	551	550	550	550	523	523	523
State FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	RF	OLS	2SLS	RF	OLS	2SLS	RF	OLS	2SLS

Panel B: Tract-level analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Log (House prices)$_{2000}$			Local school revenue per student (in SD)			School quality: Student-teacher ratio		
ΔEase in mortgage financing$_{-ct,1990-2000}$ $\times$ Targeted tract$_{ct}$	-0.001***			-0.005**			0.004***		
	(0.000)			(0.002)			(0.001)		
Targeted tract$_{ct}$	-0.276***	-0.418***	-0.664***	-0.011	-0.322***	-0.959**	-0.237***	0.011	0.522***
	(0.020)	(0.017)	(0.050)	(0.088)	(0.073)	(0.445)	(0.042)	(0.039)	(0.200)
ΔEase in mortgage financing$_{-ct,1990-2000}$	-0.117***			-0.095**			0.009		
	(0.015)			(0.037)			(0.019)		
Change in homeownership$_{ct,1990-2000}$ $\times$ Targeted tract$_{ct}$		0.037***	1.141***		0.046	2.868*		-0.074***	-2.350***
		(0.012)	(0.204)		(0.033)	(1.677)		(0.022)	(0.763)
Change in homeownership$_{ct,1990-2000}$		0.069***	-0.314***		-0.014	-1.005*		0.052***	0.844***
		(0.009)	(0.079)		(0.015)	(0.607)		(0.011)	(0.282)
R^2	0.729	0.704	.	0.680	0.668	.	0.781	0.779	.
N	35748	35747	35747	34551	34549	34549	32845	32843	32843
CZ FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	RF	OLS	2SLS	RF	OLS	2SLS	RF	OLS	2SLS

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

Mortgage Policies and their Effects on Racial Segregation and Upward Mobility

Online Appendix

Figure A.1
Impact on average upward mobility in 1990

The figure below presents the binscatter plots for the average educational upward mobility in 1990 (y-axis) against the increase in the ease of mortgage financing between 1990–2000 (x-axis). ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Average upward mobility is the expected mean household income rank for individuals with parents at the 25th of the parent income distribution. Educational Mobility in 1990 is defined as the fraction of 19-22 year-olds in a commuting zone with more than 13 years of education, who belong to households where their parents had between 12 to 13 years of education, which was the median level of education in 1990 according to Snyder (1993). This definition is similar to educational upward mobility as defined in Card et al. (2018b). The binscatter plots show the average of the y-axis for each 5 percentile bin of the data along the x-axis. The y-axis variables has been standardized (z-scored) for ease of interpretation and controls for state fixed effects. Observations are weighted by the number of housing units in 1990. Remaining data are from Census 2000 and Census 1990.

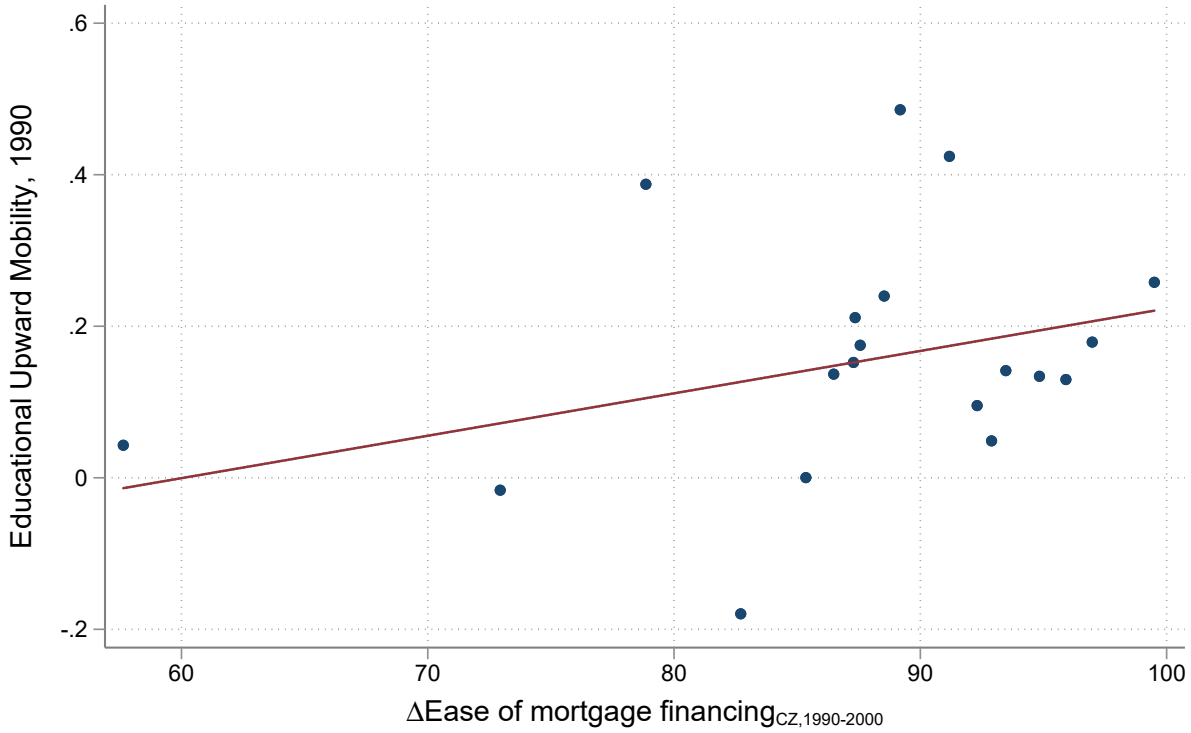
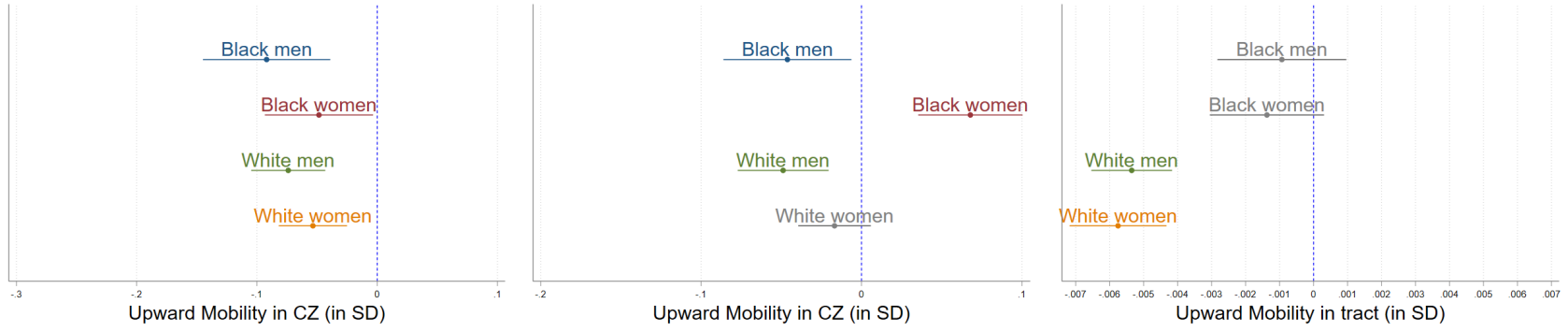


Figure A.2
Heterogeneity in the impact by race and gender on upward mobility of high-income households

Panel A and B show the estimates obtained from 2SLS regressions with the dependent variable, upward mobility by gender, race, and income for children from high-income families against the change in homeownership between 1990–2000 at the CZ-level analogous to columns 3 and 6 of Panel A in Table 5. Each point estimate in Panel A and B shows the coefficient on change in homeownership between 1990–2000 from equation (17) with the upward mobility for the particular race and gender with parents at the 75th percentile of the income distribution. Change in homeownership between 1990–2000 is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$ defined as the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Regressions include state fixed effects. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households separately in 1990 in a CZ. Panel C presents the coefficient corresponding to the regression specification in column 1 and 4 in Panel B, Table 5 on the interaction between targeted tract and the tract-level measure of the ease of mortgage access with the tract-level upward mobility for children from low-income families for each group as indicated. ΔEase of mortgage financing$_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ excluding the census tract being measured. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification as of 2000. Average upward mobility at the 75th percentile for the respective groups at the CZ-level in Panel A (Panel B) and at the tract-level in Panel C are calculated as follows. Average upward mobility for the respective group is the expected mean household (individual) income rank for households with parents' income at the 75th percentile of the parents' income distribution. Data on average upward mobility at the CZ-level and the tract-level is from Chetty and Hendren (2018a) and Chetty et al. (2020), respectively. Data from Chetty and Hendren (2018a) is for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data from Chetty et al. (2020) is for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000. All income data for cohorts and parents of cohorts are from IRS tax records. Dependent variables in all panels are standardized (z-scored). Confidence intervals for all point estimates are shown at the 5% level and are displayed in gray if not statistically significant at the 5% level.



(A) CZ-level upward mobility based on household income rank

(B) CZ-level upward mobility based on individual income rank

(C) Tract-level upward mobility based on household income rank

Table A.1
Robustness of impact on change in homeownership in 1990–2000 (first stage): Using change in homeownership rate between 1990–2000

This table measures the impact of the increase in the ease of mortgage financing between 1990–2000 on change in homeownership rate between 1990-2000. The dependent variable in columns 1, 2, and 3 is the change in homeownership rate between 1990–2000 overall, for Black, and white households respectively. Change in homeownership rate is defined as the difference in the homeownership rates ($\frac{Homeowners}{Homeowners+Renters}$) between 1990 to 2000. For Black households this is the change in the Black homeownership rate in 2000 (Black homeowners to Black renters plus Black homeowners in 2000) minus the Black homeownership rate in 1990 (analogously defined). Change in white homeownership rate between 1990–2000 is analogously defined. The increase in the ease of mortgage financing, ΔEase of mortgage financing$_{CZ,1990-2000}$, is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. All regressions include state fixed effects and all observations are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)
	Change in homeownership rate 1990–2000		
	Total	Black	White
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.030***	0.039**	0.042***
	(0.005)	(0.019)	(0.005)
R-squared	0.646	0.291	0.660
F-Stat	106.396		
State FE	Y	Y	Y
Baseline controls	Y	Y	Y
N	551	551	551

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

Table A.2
Robustness of impact on upward mobility using change in homeownership rate between 1990–2000

This table measures the impact of change in homeownership rate between 1990-2000 on upward mobility. Change in homeownership rate is defined as the difference in the homeownership rates ($\frac{Homeowners}{Homeowners+Renters}$) between 1990 and 2000. The first, second, third, and fourth panels present the first stage, OLS, reduced form, and 2SLS IV estimates respectively. Change in homeownership rate between 1990–2000 is instrumented by the increase in the ease of mortgage financing is used as an instrument in the Reduced Form and the 2SLS IV. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. The dependent variable in column 1 is the average upward mobility for low-income households, in columns 2–3 it is the upward mobility by race, and in 4, it is the race gap. Average upward mobility at the 25th percentile is the expected mean household income rank for individuals with parents at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty and Hendren (2018a). Average upward mobility at the 25th percentile for Black and white children is calculated as the expected mean household income rank for households with parents' income at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty et al. (2019). Data from Chetty and Hendren (2018a) is for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data from Chetty et al. (2019) is for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998–2000. All income data for cohorts and parents of cohorts are from IRS tax records. Racegap at the 25th percentile is the difference in the upward mobility of white children relative to the Black children with parents at the 25th percentile of the national income distribution. Upward mobility measures have been standardized (z-scored). All regressions include state fixed effects and all observations are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)	(4)
	Average Income Rank	Household Income Rank by Race		Race gap= White-Black
		Black	White	
	First Stage			
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.0305***	0.0305***	0.0305***	0.0305***
	(0.00483)	(0.00483)	(0.00483)	(0.00483)
R-squared	0.646	0.646	0.646	0.646
F-Stat	39.93	39.93	39.93	39.93
	Ordinary Least Squares			
Change in Homeownership Rate$_{CZ,1990-2000Z}$	-0.0751***	-0.0248	0.0113	0.0392
	(0.0215)	(0.0231)	(0.0220)	(0.0246)
R-squared	0.728	0.550	0.854	0.615
	Reduced Form			
ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.0138***	-0.0130***	-0.00277	0.0103***
	(0.00111)	(0.00213)	(0.00249)	(0.00267)
R-squared	0.808	0.608	0.856	0.641
	Two-stage least squares			
Change in Homeownership Rate$_{CZ,1990-2000}$	-0.452***	-0.427***	-0.0908	0.337***
	(0.0817)	(0.107)	(0.0803)	(0.100)
R-squared	0.322	0.230	0.837	0.479
N	551	551	551	551
State FE	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y

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

Table A.3
Robustness of impact on change in homeownership in 1990–2000 (first stage): Placebo tests and alternate instruments based on CLL cutoffs

This table shows robustness results for placebo conforming loan limit (CLL) cut-off and two alternate measures of the ease of mortgage financing. The dependent variable in all columns is the change in homeownership defined as the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. In column 1, ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible (between \$200,000-\$400,000) to be financed by GSE-conforming loans due to the change in the CLL of single-family homes between 1990–2000. Column 1 includes the percentile of the fraction of houses that are above a placebo cutoff of \$400,000. In column 2, the alternate instrument including multi-family units is defined as the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL for one-four unit homes between 1990–2000. In column 3, we use the same definition as for ΔEase of mortgage financing$_{CZ,1990-2000}$ but use the house prices based on vacant-for-sale housing units from the 1990 Census. All columns include state fixed effects and observations are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)
Dependent variable:	Change in homeownership 1990–2000		
	First Stage		
Placebo jumbo cutoff: $>$ 400K	-0.249*		
	(0.134)		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.813***		
	(0.186)		
Alt. instrument including multi-family units		0.439***	
		(0.0752)	
Instrument based on for-sale units			0.395***
			(0.0666)
R-squared	0.765	0.763	0.758
F-Stat	3.438	34.15	35.20
N	551	551	551
State FE	Y	Y	Y
Baseline controls	Y	Y	Y

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

Table A.4
Robustness of impact on change in homeownership in 1990–2000 (first stage): Using homeowners and renters who move between 1990–2000

This table measures the impact of the increase in the ease of mortgage financing on the fraction of homeowners who moved into their current place of residence between 1990–2000 (columns 1–2) and homeowners who moved into their current place of residence before 1990 (columns 3–4). ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. Fraction of renters who moved into their current place of residence between 1990–2000 is included in column 2 and fraction of renters who moved into their current place of residence before 1990 is included in column 4. All regressions include state fixed effects and all columns are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)	(4)
	Homeowners who moved in 1990–2000		Homeowners who moved before 1990	
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.0701***	0.108***	-0.134***	-0.145***
	(0.0166)	(0.0169)	(0.0256)	(0.0256)
Renters who moved in 1990–2000		-0.418***		
		(0.0885)		
Renters who moved before 1990				-0.389
				(0.367)
R-squared	0.841	0.877	0.799	0.805
F-Stat	17.75	40.85	27.46	31.93
N	551	551	551	551
State FE	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y

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

Table A.5
Robustness of impact on upward mobility using homeowners who move between 1990–2000

This table measures the impact on upward mobility in CZs due to the change in homeownership between 1990–2000, instrumented by the fraction of homeowners who moved into their current place of residence between 1990–2000. The first, second, third, and fourth panels present the first stage, OLS, reduced form (RF), and 2SLS IV estimates respectively. The increase in the ease of mortgage financing is used to instrument for the change in homeownership between 1990–2000. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. The dependent variable in column 1 is the average upward mobility for low-income households, in columns 2–3 it is the upward mobility by race, and in 4, it is the race gap. Average upward mobility at the 25th percentile is the expected mean household income rank for individuals with parents at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty and Hendren (2018a). Average upward mobility at the 25th percentile for Black and white children is calculated as the expected mean household income rank for households with parents' income at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty et al. (2019). Data from Chetty and Hendren (2018a) is for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data from Chetty et al. (2019) is for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000. All income data for cohorts and parents of cohorts are from IRS tax records. Racegap at the 25th percentile is the difference in the upward mobility of white children relative to the Black children with parents at the 25th percentile of the national income distribution. Upward mobility measures have been standardized (z-scored). All regressions include state fixed effects and observations are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)	(4)
	Average Income Rank	Household Income Rank by Race		Race gap= White-Black
		Black	White	
		First Stage		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.0701***	0.0701***	0.0701***	0.0701***
	(0.0166)	(0.0166)	(0.0166)	(0.0166)
R-squared	0.841	0.841	0.841	0.841
F-Stat	17.75	17.75	17.75	17.75
		Ordinary Least Squares		
Homeowners who moved in 1990–2000	-0.00145	-0.0109	-0.0152	-0.00671
	(0.00799)	(0.0107)	(0.00935)	(0.0124)
R-squared	0.712	0.551	0.857	0.613
		Reduced Form		
ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.0138***	-0.0130***	-0.00277	0.0103***
	(0.00111)	(0.00213)	(0.00249)	(0.00267)
R-squared	0.808	0.608	0.856	0.641
		Two-stage least squares		
Homeowners who moved in 1990–2000	-0.197***	-0.186***	-0.0395	0.146**
	(0.0519)	(0.0478)	(0.0297)	(0.0592)
R-squared	.	0.0664	0.849	0.325
N	551	551	551	551
State FE	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y

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

Table A.6
Robustness of impact on upward mobility using change in percentage of mortgaged homeowners between 1990–2000

This table measures the impact on upward mobility due to the change in percentage of owner-occupied housing units with mortgages in 1990–2000. The first, second, third, and fourth panels present the first stage, OLS, reduced form (RF), and 2SLS IV estimates respectively. Change in percentage of mortgaged homeowners between 1990 to 2000 is instrumented by the increase in the ease of mortgage financing. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. The dependent variable in column 1 is the average upward mobility for low-income households, in columns 2–3 it is the upward mobility by race, and in 4, it is the race gap. Average upward mobility at the 25th percentile is the expected mean household income rank for individuals with parents at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty and Hendren (2018a). Average upward mobility at the 25th percentile for Black and white children is calculated as the expected mean household income rank for households with parents' income at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty et al. (2019). Data from Chetty and Hendren (2018a) is for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data from Chetty et al. (2019) is for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014–2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000. All income data for cohorts and parents of cohorts are from IRS tax records. Racegap at the 25th percentile is the difference in the upward mobility of white children relative to the Black children with parents at the 25th percentile of the national income distribution. Upward mobility measures have been standardized (z-scored). All regressions include state fixed effects and all observations are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)	(4)
	Average Income Rank	Household Income Rank by Race		Race gap= White-Black
		Black	White	
		First Stage		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.130***	0.130***	0.130***	0.130***
	(0.0188)	(0.0188)	(0.0188)	(0.0188)
R-squared	0.670	0.670	0.670	0.670
F-Stat	47.84	47.84	47.84	47.84
		Ordinary Least Squares		
Change in % with mortgages$_{CZ,1990-2000}$	-0.0132**	-0.0135**	-0.00220	0.0115*
	(0.00513)	(0.00614)	(0.00655)	(0.00680)
R-squared	0.719	0.554	0.854	0.615
		Reduced Form		
ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.0138***	-0.0130***	-0.00277	0.0103***
	(0.00111)	(0.00213)	(0.00249)	(0.00267)
R-squared	0.808	0.608	0.856	0.641
		Two-stage least squares		
Change in % with mortgages$_{CZ,1990-2000}$	-0.106***	-0.100***	-0.0213	0.0790***
	(0.0189)	(0.0218)	(0.0178)	(0.0245)
R-squared	0.380	0.350	0.845	0.519
N	551	551	551	551
State FE	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y

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

Table A.7
Examining variation in tract-level ease of mortgage financing

Panel A shows the change in homeownership between 1990–2000 using two different definitions of ease in mortgage financing at the tract-level. Panel B shows the results corresponding to the specification in Panel B of Table 2 with the depdendent variable defined as the change in homeownership between 1980–1990. The dependent variable in column 1 in Panel A (Panel B) is the change in homeownership defined as the number of homeowners in 2000 (1990) minus the number of homeowners in 1990 (1980) relative to the total number of renters and homeowners in 1990 (1980). In columns 2 and 3 the dependent variable is the change in homeownership of white (Black) households from 1990 to 2000 (1980 to 1990) relative to the total number of renters and homeowners, in Panel A (Panel B). ΔEase of mortgage financing$_{ct,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000 in each tract. ΔEase of mortgage financing$_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ excluding the census tract being measured. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification as of 1996. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. All columns include CZ-fixed effects and observations are weighted by the total number of housing units in 1990. The dependent variables are winsorized at the 1% level. Standard errors are clustered at the at the CZ-level.

Panel A: Alternate tract-level instruments

	(1)	(2)	(3)
	Change in homeownership 1990–2000		
	Total	Black	White
ΔEase in mortgage financing$_{ct,1990-2000}$	0.266***	-0.014***	0.279***
	(0.038)	(0.003)	(0.036)
Δ Ease in mortgage financing$_{-ct,1990-2000}$	-2.297***	-0.052	-2.248***
	(0.711)	(0.112)	(0.623)
R^2	0.109	0.161	0.119
CZ FE	Y	Y	Y
N	36054	36054	36054

Panel B: Change in homeownership between 1980-1990

	(1)	(2)	(3)
	Change in homeownership 1980–1990		
	Total	Black	White
Δ Ease in mortgage financing$_{-ct,1990-2000}$ × Targeted tract$_{ct}$	-0.116	-0.089	0.017
	(0.135)	(0.117)	(0.024)
Targeted tract$_{ct}$	-19.860**	-19.539***	-0.073
	(7.770)	(7.172)	(1.399)
ΔEase in mortgage financing$_{-ct,1990-2000}$	7.125	1.964	1.147
	(11.166)	(6.562)	(0.934)
R^2	0.005	0.005	0.051
CZ FE	Y	Y	Y
N	22516	22516	22516

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

Table A.8
Using tract-level variation based on CLL cutoffs of only inexpensive tracts

This table presents the impact of the increase in the increase in ease of mortgage financing in the most inexpensive tracts in a CZ on change in homeownership between 1990–2000 in Panel A and on average upward mobility in Panel B, at the tract-level. In Panel A, the dependent variable in column 1 is the change in homeownership between 1990–2000 defined as the number of homeowners in 2000 minus the number of homeowners in 1990 relative to the total number of renters and homeowners in 1990. In columns 2 and 3 the dependent variable is the change in homeownership of white (Black) households from 1990 to 2000 relative to the total number of renters and homeowners. In Panel B, columns 1, 2, and 3 present the reduced form (RF), OLS and 2SLS estimates, respectively. The dependent variable is average upward mobility at the 25th measured as the expected mean household income rank for individuals with parents at the 25th percentile of the parents' income distribution. Data on average upward mobility is from Chetty et al. (2020). Data from Chetty et al. (2020) is for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$^{Inexpensive}_{-ct,1990-2000}$. ΔEase of mortgage financing$^{Inexpensive}_{-ct,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 (excluding the census tract being measured) in the bottom 2 quintiles of tract-level median house prices in a CZ, in both panels. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification as of 1996. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. All columns include CZ-fixed effects and observations are weighted by the total number of housing units in 1990. The dependent variables are winsorized at the 1% level. Standard errors are clustered at the CZ-level.

Panel A: Change in homeownership between 1990–2000

	(1)	(2)	(3)
	Change in homeownership 1990–2000		
	Total	Black	White
ΔEase in mortgage financing$^{Inexpensive}_{-ct,1990-2000}$ × Targeted tract$_{ct}$	-0.124***	-0.007	-0.115***
	(0.024)	(0.007)	(0.025)
Targeted tract$_{ct}$	-9.369***	0.801**	-10.316***
	(1.663)	(0.314)	(1.618)
ΔEase in mortgage financing$^{Inexpensive}_{-ct,1990-2000}$	0.606**	-0.043	0.639**
	(0.284)	(0.048)	(0.270)
R^2	0.109	0.160	0.118
CZ FE	Y	Y	Y
N	36054	36054	36054

Panel B: Average upward mobility

	(1)	(2)	(3)
	Average Household Income Rank		
ΔEase in mortgage financing$^{Inexpensive}_{-ct,1990-2000}$ × Targeted tract$_{ct}$	-0.006***		
	(0.002)		
Targeted tract$_{ct}$	-0.461***	-0.821***	-1.672***
	(0.092)	(0.069)	(0.444)
ΔEase in mortgage financing$^{Inexpensive}_{-ct,1990-2000}$	-0.005		
	(0.008)		
Change in homeownership$_{ct,1990-2000}$ × Targeted tract$_{ct}$		0.158***	3.994**
		(0.030)	(1.743)
Change in homeownership$_{ct,1990-2000}$		0.059***	-1.273**
		(0.014)	(0.635)
R^2	0.483	0.481	.
N	36056	36054	36054
CZ FE	Y	Y	Y
Type	RF	OLS	2SLS

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

Table A.9
Using tract-level variation based on CLL cutoffs of only expensive tracts

This table presents the impact of the increase in the ease of mortgage financing in the most expensive tracts in a CZ on change in homeownership between 1990–2000 in Panel A and on average upward mobility in Panel B, at the tract-level. In Panel A, the dependent variable in column 1 is the change in homeownership between 1990–2000 defined as the number of homeowners in 2000 minus the number of homeowners in 1990 relative to the total number of renters and homeowners in 1990. In columns 2 and 3 the dependent variable is the change in homeownership of white (Black) households from 1990 to 2000 relative to the total number of renters and homeowners. In Panel B, columns 1, 2, and 3 present the reduced form (RF), OLS and 2SLS estimates, respectively. The dependent variable is average upward mobility at the 75th measured as the expected mean household income rank for individuals with parents at the 75th percentile of the parents' income distribution. Data on average upward mobility is from Chetty et al. (2020). Data from Chetty et al. (2020) is for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998-2000. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$^{Expensive}_{-ct,1990-2000}$. ΔEase of mortgage financing$^{Expensive}_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 (excluding the census tract being measured) in the top 2 quintiles of tract-level median house prices in a CZ, in both panels. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification as of 1996. All columns include CZ-fixed effects and observations are weighted by the total number of housing units in 1990. The dependent variables are winsorized at the 1% level. Standard errors are clustered at the CZ-level.

Panel A: Change in homeownership between 1990–2000

	(1)	(2)	(3)
	Change in homeownership 1990–2000		
	Total	Black	White
ΔEase in mortgage financing$^{Expensive}_{-ct,1990-2000}$ × Targeted tract$_{ct}$	-0.116***	-0.009	-0.105***
	(0.026)	(0.007)	(0.028)
Targeted tract$_{ct}$	-7.950***	0.798**	-8.927***
	(1.592)	(0.310)	(1.632)
ΔEase in mortgage financing$^{Expensive}_{-ct,1990-2000}$	-3.180***	0.108	-3.283***
	(0.531)	(0.072)	(0.562)
R^2	0.112	0.160	0.121
CZ FE	Y	Y	Y
N	36054	36054	36054

Panel B: Average upward mobility

	(1)	(2)	(3)
	Average Household Income Rank		
ΔEase in mortgage financing$^{Expensive}_{-ct,1990-2000}$ × Targeted tract$_{ct}$	-0.007***		
	(0.002)		
Targeted tract$_{ct}$	-0.321***	-0.821***	-1.765***
	(0.080)	(0.069)	(0.419)
ΔEase in mortgage financing$^{Expensive}_{-ct,1990-2000}$	-0.156***		
	(0.022)		
Change in homeownership$_{ct,1990-2000}$ × Targeted tract$_{ct}$		0.158***	4.412***
		(0.030)	(1.599)
Change in homeownership$_{ct,1990-2000}$		0.059***	-1.418**
		(0.014)	(0.587)
R^2	0.508	0.481	.
N	36056	36054	36054
CZ FE	Y	Y	Y
Type	RF	OLS	2SLS

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

Table A.10
Impact on house price growth between 1990–2000

This table presents the results of the change in homeownership in 1990–2000 on the change in median house prices between 1990–2000 at the CZ-level (Panel A) and the census tract-level (Panel B). Columns 1, 2, and 3 present the reduced form, OLS and 2SLS estimates, respectively. The dependent variable in all columns is the change in log of median house price value for all owner-occupied houses from 1990 to 2000 at the CZ-level in Panel A and at the tract-level in Panel B. The dependent variable is standardized (z-scored). Change in homeownership$_{CZ,1990-2000}$ and change in homeownership$_{ct,1990-2000}$ is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ- and tract-level, respectively. In Panel A, change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$ and with ΔEase of mortgage financing$_{-ct,1990-2000}$ in Panel B. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. ΔEase of mortgage financing$_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ excluding the census tract being measured. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification as of 1996. Fixed effects and control variables are included as indicated. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Observations are weighted by the total number of housing units in 1990. Standard errors are clustered at the state level in Panel A and at the CZ level in Panel B.

Panel A: CZ-level analysis

	(1)	(2)	(3)
	ΔLog (House prices)$_{1990-2000}$		
ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.001		
	(0.001)		
Change in homeownership$_{CZ,1990-2000}$		0.004**	-0.006
		(0.002)	(0.005)
R^2	0.858	0.866	0.817
N	551	551	551
State FE	Y	Y	Y
Baseline controls	Y	Y	Y
Type	RF	OLS	2SLS

Panel B: Tract-level analysis

	(1)	(2)	(3)
	ΔLog (House prices)$_{1990-2000}$		
ΔEase in mortgage financing$_{-ct,1990-2000}$ × Targeted tract$_{ct}$	-0.001**		
	(0.000)		
Targeted tract$_{ct}$	0.020**	-0.004	-0.048
	(0.009)	(0.009)	(0.035)
ΔEase in mortgage financing$_{-ct,1990-2000}$	0.009**		
	(0.004)		
Change in homeownership$_{ct,1990-2000}$ × Targeted tract$_{ct}$		0.031***	0.229*
		(0.005)	(0.127)
Change in homeownership$_{ct,1990-2000}$		0.021***	-0.047
		(0.003)	(0.043)
R^2	0.558	0.561	.
N	35625	35624	35624
CZ FE	Y	Y	Y
Type	RF	OLS	2SLS

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

Table A.11
Robustness to using alternative measure of school quality based on mean test scores

This table presents the results of the change in homeownership in 1990–2000 on school quality at the CZ-level (tract-level) in Panel A (Panel B). Columns 1, 2, and 3 present the reduced form (RF), OLS and 2SLS estimates, respectively. Change in homeownership$_{CZ,1990-2000}$ and change in homeownership$_{ct,1990-2000}$ is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ- and tract-level, respectively. In Panel A, change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$ and with ΔEase of mortgage financing$_{-ct,1990-2000}$ in Panel B. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. ΔEase of mortgage financing$_{-ct,1990-2000}$ at the census tract level is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the CLL between 1990–2000 in the remaining tracts in a CZ excluding the census tract being measured. Targeted tract is 1 if the tract is classified as being under the "Underserved Areas Goal" based on Housing and Urban (HUD) classification as of 1996. The dependent variable in all columns is school quality measured using mean of district-level 3rd-grade math test scores from the Stanford Education Data Archive (in 2013), following Chetty et al. (2020). For the mapping from the district-level to tract-level, we use school-catchment areas (attendance boundaries) from 2017, weighting by the proportion of land area covered by a given school-district in a tract, following Chetty et al. (2020). Dependent variable has been standardized (z-scored). Fixed effects and control variables are included as indicated. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Observations are weighted by the total number of housing units in 1990. Standard errors are clustered at the state level in Panel A and at the CZ level in Panel B.

Panel A: CZ-level analysis

	(1)	(2)	(3)
	School quality: Mean test score		
ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.000		
	(0.002)		
Change in homeownership$_{CZ,1990-2000}$		0.019***	-0.003
		(0.005)	(0.017)
R^2	0.817	0.826	0.814
N	551	551	551
State FE	Y	Y	Y
Baseline controls	Y	Y	Y
Type	RF	OLS	2SLS

Panel B: Tract-level analysis

	(1)	(2)	(3)
	School quality: Mean test score		
ΔEase in mortgage financing$_{-ct,1990-2000}$ × Targeted tract$_{ct}$	-0.005***		
	(0.001)		
Targeted tract$_{ct}$	-0.156**	-0.450***	-1.042***
	(0.060)	(0.051)	(0.287)
ΔEase in mortgage financing$_{-ct,1990-2000}$	-0.072***		
	(0.015)		
Change in homeownership$_{ct,1990-2000}$ × Targeted tract$_{ct}$		0.058***	2.727**
		(0.022)	(1.092)
Change in homeownership$_{ct,1990-2000}$		0.065***	-0.860**
		(0.016)	(0.397)
R^2	0.464	0.455	.
N	35925	35923	35923
CZ FE	Y	Y	Y
Type	RF	OLS	2SLS

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

Table A.12
Alternative channel: Aggregate housing wealth channel

This table presents the results for the change in homeownership in 1990–2000 on aggregate housing value by race at the CZ-level in Panel A and at the tract-level in Panel B. The dependent variable in columns 1–3 (4–6) is aggregate housing value (in million of dollars in Panel A and in thousand of dollars in Panel B) in owner-occupied housing units for Black (white) homeowners at the CZ-level (Panel A) and tract-level (Panel B) between 1990–2000. Remaining variables and details on the empirical specification are as described in Table 4.

Panel A: CZ-level

	(1)	(2)	(3)	(4)	(5)	(6)
	Aggregate housing value (in $ million)					
	Black			White		
ΔEase of mortgage financing$_{CZ,1990-2000}$	99			1506*		
	(69)			(867)		
Change in homeownership$_{CZ,1990-2000}$		-136	888		-2421	13491
		(137)	(659)		(2166)	(8596)
R^2	0.709	0.697	0.480	0.688	0.674	0.393
N	551	551	551	551	551	551
CZ FE	Y	Y	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y	Y	Y
Type	OLS	OLS	2SLS	OLS	OLS	2SLS

Panel B: Tract-level

	(1)	(2)	(3)	(4)	(5)	(6)
	Aggregate housing value (in '000s)					
	Black			White		
ΔEase in mortgage financing$_{-ct,1990-2000}$ $\times$ Targeted tract$_{ct}$	-1***			-3***		
	(0)			(0)		
Targeted tract$_{ct}$	1	-46***	-217***	28**	-91***	-430***
	(12)	(12)	(41)	(11)	(16)	(58)
ΔEase in mortgage financing$_{-ct,1990-2000}$	-33***			-39***		
	(6)			(3)		
Change in homeownership$_{ct,1990-2000}$ $\times$ Targeted tract$_{ct}$		-82***	686***		-88***	1438***
		(17)	(153)		(20)	(213)
Change in homeownership$_{ct,1990-2000}$		144***	-123**		190***	-340***
		(19)	(55)		(24)	(95)
R^2	0.225	0.286	.	0.367	0.447	.
N	36056	36054	36054	36056	36054	36054
CZ FE	Y	Y	Y	Y	Y	Y
Type	RF	OLS	2SLS	RF	OLS	2SLS

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

Table A.13
Alternative channel: Impact on crime

The table presents the impact of the change in homeownership on crime. Columns 1, 4, and 7 present the reduced form (RF) estimates, columns 2, 5, and 8 present OLS estimates and columns 3, 6, and 9 present 2SLS estimates. Change in homeownership$_{CZ,1990-2000}$ is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. The dependent variable in columns 1–3 (4–6) is the average local correctional institution population per 100,000 separately for the Black (white) population in the years 1990–2002, while the dependent variable in columns 7–9 is average murders per 100,000 of population between for the years 1992, 1997, and 2002 in CZs with greater mortgage financing. Columns 1—3 (4—6) includes the average local correctional institution population per 100,000 for the Black (white) population in the years 1977–1989. Columns 7–9 includes the average murder rate between 1977–1987 (specifically 1977, 1978, 1980, 1981, 1982, 1983, 1984, 1985, and 1987). All regressions include the state fixed effects. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. All variables have been standardized (z-scored) for ease of interpretation. Standard errors are clustered at the state level. Observations are weighted by the total number of housing units in 1990.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Local correctional institution population per 100,000						Murder per 100,000		
	Black			White					
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.002			0.000			0.012***		
	(0.003)			(0.004)			(0.004)		
Change in homeownership$_{CZ,1990-2000}$		-0.001	0.015		-0.007	0.001		0.006	0.091***
		(0.004)	(0.025)		(0.006)	(0.032)		(0.006)	(0.033)
R^2	0.810	0.809	0.804	0.890	0.891	0.890	0.845	0.829	0.718
N	544	544	544	544	544	544	544	544	544
State FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Type	RF	OLS	2SLS	RF	OLS	2SLS	RF	OLS	2SLS

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

Table A.14
Alternative channel: Impact on social capital

The table presents the impact of the change in homeownership on social capital. Columns 1, 2, and 3 present the reduced form (RF), OLS and 2SLS estimates, respectively. The dependent variable is social capital index in 2000, from Rupasingha and Goetz (2008). Change in homeownership$_{CZ,1990-2000}$ is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. Change in homeownership between 1990–2000 is instrumented with ΔEase of mortgage financing$_{CZ,1990-2000}$. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of houses that become eligible to be financed by GSE-conforming loans due to the change in the conforming loan limit (CLL) between 1990–2000. All regressions include the CZ fixed effects. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ, and social capital index in the pre-period in 1990. All variables have been standardized (z-scored). Standard errors are clustered at the state level. Observations are weighted by the total number of housing units in 1990.

	(1)	(2)	(3)
	Social capital index		
ΔEase of mortgage financing$_{CZ,1990-2000}$	0.003**		
	(0.001)		
Change in homeownership$_{CZ,1990-2000}$		0.005	0.024***
		(0.004)	(0.009)
R^2	0.954	0.954	0.945
N	551	551	551
CZ FE	Y	Y	Y
Baseline controls	Y	Y	Y
Type	RF	OLS	2SLS

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

Table A.15
Robustness of impact on children's upward mobility to alternative hypotheses

This table presents robustness to alternate hypothesis for the impact of the change in homeownership between 1990—2000 on children's average upward mobility. In all columns, except column 5, the 2SLS IV estimates using equation (17) are shown with the average upward mobility as the dependent variable. Average upward mobility at the 25th percentile is the expected mean household income rank for individuals with parents at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty and Hendren (2018a) and is standardized (z-scored). Change in homeownership is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. Column 1 includes controls for Great Migration (1940-1970) using the variable from Derenoncourt (2019), which is a shift-share instrument that combines pre-1940 black southern migrants' location choices with supply-side variation in county outmigration between 1940–1970. Column 2 controls for suburbanization between 1990–2000 using the 1950–1990 growth in aggregate population in central cities variable from Baum-Snow (2007) and column 3 includes the interaction term with change in homeownership between 1990–2000. Column 4 includes the migration inflow (outflow) rate into (out of) a given CZ from (to) other CZs (divided by CZ population from 2000 Census) using the IRS Statistics of Income 2004-2005. Column 5 shows the change in homeownership between 1990–2000 as the dependent variable and with housing supply elasticity from Saiz (2010). Column 6 includes the Saiz (2010) instrument as a control. Column 7 includes the manufacturing share of the labour force in 1970 as a control variable. All regressions include state fixed effects and all columns are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:	Average Upward Mobility				Change in HO 1990-2000	Average. Upward Mobility	
Alternative hypotheses:	Great Migration	Suburbanization		Controlling for across-CZ migration	Housing supply Elasticity		Manufacturing
Change in homeownership$_{CZ,1990-2000}$	-0.091**	-0.046**	-0.048*	-0.317**		-0.051**	-0.080**
	(0.041)	(0.022)	(0.025)	(0.133)		(0.021)	(0.034)
Change in homeownership$_{CZ,1990-2000}$ × Central City Pop. gwt.$_{1950-1990}$			-0.019				
			(0.069)				
Housing supply elasticity					-0.165	0.007	
					(0.370)	(0.033)	
R^2	0.715	0.521	0.520	.	0.692	0.353	0.797
N	129	193	193	551	202	202	129
State FE	Y	Y	Y	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y	Y	Y	Y
Type	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS

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

Table A.16
Robustness to using alternative instrument based on low-income households

This table measures the impact on upward mobility in CZs with change in homeowners between 1990–2000, using an alternate instrument. The first, second, third, and fourth panels present the first stage, OLS, reduced form, and 2SLS IV estimates respectively. Change in homeownership is the change in the number of homeowners from 1990 to 2000 relative to the total number of renters and homeowners in 1990 at the CZ-level. Change in homeownership between 1990–2000 is instrumented with an alternative instrument. The instrument Alt. ΔEase of mortgage financing$_{CZ,1990-2000}$ is the percentile of the fraction of households that become eligible to be financed by GSE-conforming loans due to the change in median income in a CZ from 1990 to 2000. We use the fraction of households that fall in the income bucket corresponding to the increase in median income in 1990 from the 1990 Census. Median income by county is provided by the Housing and Urban Department. We calculate the mean fraction across counties within a CZ and use the percentile transformation to get the instrument of interest, Alt. ΔEase of mortgage financing$_{CZ,1990-2000}$. The dependent variable in column 1 is the average upward mobility for low-income households, in columns 2–3 it is the upward mobility by race, and in 4, it is the race gap. Average upward mobility at the 25th percentile is the expected mean household income rank for individuals with parents at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty and Hendren (2018a). Average upward mobility at the 25th percentile for Black and white children is calculated as the expected mean household income rank for households with parents' income at the 25th percentile of the parents' income distribution. Data is at the CZ-level from Chetty et al. (2019). Data from Chetty and Hendren (2018a) is for cohorts born between 1980 and 1986. Parents' income is measured as of 1996–2000. Data from Chetty et al. (2019) is for cohorts born between 1978 and 1983. Cohort earnings are measured using mean incomes in 2014-2015, and parents' incomes are measured using mean income over five years: 1994, 1995, and 1998–2000. All income data for cohorts and parents of cohorts are from IRS tax records. Racegap at the 25th percentile is the difference in the upward mobility of white children relative to the Black children with parents at the 25th percentile of the national income distribution. Upward mobility measures have been standardized (z-scored). All regressions include state fixed effects and observations are weighted by the total number of housing units in 1990. Control variables included are the house prices in 1990, house price growth between 1980–1990, fraction of high school graduates among Black households and white households in 1990 in a CZ. Standard errors are clustered at the state level.

	(1)	(2)	(3)	(4)
	Average Income Rank	Household Income Rank by Race		Race gap= White-Black
		Black	White	
		First Stage		
Alt. ΔEase of mortgage financing$_{CZ,1990-2000}$	0.267***	0.267***	0.267***	0.267***
	(0.0687)	(0.0687)	(0.0687)	(0.0687)
R-squared	0.739	0.739	0.739	0.739
F-Stat	15.09	15.09	15.09	15.09
		Ordinary Least Squares		
Change in homeownership$_{CZ,1990-2000}$	-0.00111	-0.000725	-0.00207*	-0.00168
	(0.00155)	(0.00147)	(0.00119)	(0.00153)
R-squared	0.713	0.549	0.856	0.614
		Reduced Form		
Alt. ΔEase of mortgage financing$_{CZ,1990-2000}$	-0.00264**	-0.00465***	-0.000735	0.00397***
	(0.00109)	(0.00165)	(0.00133)	(0.00147)
R-squared	0.718	0.562	0.854	0.620
		Two-stage least squares		
Change in homeownership$_{CZ,1990-2000}$	-0.00991**	-0.0174**	-0.00275	0.0149**
	(0.00424)	(0.00718)	(0.00459)	(0.00686)
R-squared	0.648	0.385	0.855	0.489
N	551	551	551	551
State FE	Y	Y	Y	Y
Baseline controls	Y	Y	Y	Y

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