

NBER WORKING PAPER SERIES

WHITE SUBURBANIZATION AND AFRICAN-AMERICAN HOME OWNERSHIP,
1940-1980

Leah Platt Boustan
Robert A. Margo

Working Paper 16702
<http://www.nber.org/papers/w16702>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 2011

We acknowledge the able research assistance of Mary Ann Bronson and financial support from the Ziman Center for Real Estate at UCLA. Nathaniel Baum-Snow generously shared data with us. Comments from Tara Watson and workshop participants at the 2010 ASSA meetings and the University of Pittsburgh are gratefully acknowledged. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 16702
January 2011
JEL No. J71,N92,R21

ABSTRACT

Between 1940 and 1980, the rate of homeownership among African-American households increased by close to 40 percentage points. Most of this increase occurred in central cities. We show that rising black homeownership was facilitated by the filtering of the urban housing stock as white households moved to the suburbs, particularly in the slower growing cities of the Northeast and Midwest. Our OLS and IV estimates imply that up to one half of the national increase in black homeownership over the period can be attributed to white suburbanization.

Leah Platt Boustan
Department of Economics
8283 Bunche Hall
UCLA
Los Angeles, CA 90095-1477
and NBER
lboustan@econ.ucla.edu

Robert A. Margo
Department of Economics
Boston University
270 Bay State Road
Boston, MA 02215
and NBER
margora@bu.edu

I. Introduction

In 1940, only 21 percent of black households lived in owner-occupied housing. By 1980, 58 percent of black households owned their home.¹ Approximately three quarters of the rise in black homeownership from 1940 to 1980 occurred by 1970, well before the federal effort to combat racial discrimination in housing markets could have had much effect.² Furthermore, unlike the contemporaneous rise in white homeownership, black homeownership increased without significant mobility to the suburbs, an area which is characterized by detached, single family dwellings.³ In 1980, only 28 percent of metropolitan blacks lived in the suburban ring, compared with 66 percent of metropolitan whites.

In this paper, we explore how black homeownership increased so dramatically from 1940 to 1980 despite the limited presence of African-Americans in the suburbs. We focus on the relationship between white departures from the central city and black homeownership. Most central cities had an ample stock of single-family dwellings that could be occupied by either white or black owners.⁴ As the urban black population grew over time, the geographic boundaries of black neighborhoods encroached upon existing white areas, leading many white households to leave these boundary neighborhoods, often for the suburbs (Card, Mas and Rothstein, 2008; Boustan, 2010). As white households departed, the demand for – and hence the prices of – housing units in these areas fell. Some of these homes were purchased and occupied

¹ These figures apply to households headed by adult men who were (a) not in school (b) in the labor force (c) between the ages of 25 and 64; see Collins and Margo (2011).

² We refer here to the passage of the Fair Housing Act of 1968 and subsequent legislation and regulatory efforts. 29 of the 37 percentage point increase in black homeownership from 1940 to 1980 took place before 1970.

³ Owner-occupancy is closely tied to building type: in 1960, over 80 percent of single-family dwellings were owner-occupied regardless of their location, compared with less than 20 percent of multi-family dwellings. 79 percent of the suburban housing stock consisted of detached, single-family dwellings in that year. Glaeser and Shapiro (2002) argue that owner-occupancy is the optimal contractual form for single family housing because of the maintenance costs of rental units. The legal apparatus supporting the conversion of multi-family units into condominiums was developed late in this period. In 1980, condominiums made up only 2.5 percent of the housing stock.

⁴ In 1960, 42 percent of housing units in central cities were detached, single family dwellings.

by black households. In other words, racial transition enabled some black households to become home owners as white departures reduced housing prices relative to household income in certain urban neighborhoods.⁵

Our paper is related to a rich theoretical and empirical literature on the “filtering” of the urban housing stock. In the standard filtering model, new housing units are constructed at the highest quality level and are purchased (and occupied) by high income households (Sweeney, 1974). After some period of occupancy, the original owner vacates for a newer unit and the housing “filters” down to a lower income household. Because American cities tend to be built from the center outward, this filtering process produces a positive relationship between household income and distance from the city center, with higher income households living in newer housing on the urban periphery and lower income households living in older housing in the city center. Previous studies of filtering have focused on household income and paid only limited attention to race (see, for example, Weicher and Thibodeau, 1988; Brueckner and Rosenthal, 2009). With the notable exception of Berry’s (1967) study of Chicago (see section II), there are no empirical studies to our knowledge that directly link black homeownership in central cities with white suburbanization.

We estimate the relationship between black homeownership in the central city and white suburbanization using both aggregate household counts by city and decade for 1940 to 1980 and household-level Census records for 1940 and 1980. Our regressions include year and metropolitan area fixed effects to control for time-invariant unobserved characteristics of an area that may be associated with both suburbanization and black homeownership. That is, we ask

⁵ Boustan (2010) documents that white departures led to falling housing prices in central cities, particularly in otherwise slow-growing metropolitan areas. Cutler, Glaeser, and Vigdor (1999, p. 34) note that white suburbanization may have encouraged black homeownership through its effect on prices but do not explore the relationship empirically.

whether the rate of black homeownership *increased faster* during periods in which a metropolitan area experienced larger increases in white suburbanization.

In our OLS analysis, we find a positive relationship between white suburbanization and the rate of black homeownership in central cities – but only in the Northeast and Midwest. In these regions, our preferred estimate indicates that a 10 percentage point increase in the share of whites who lived in the suburban ring increased the rate of black homeownership in the central city by 3 to 4 percentage points. A significant portion of the regional difference can be accounted for by two related factors: population density in the central city and the overall rate of growth in the metropolitan area. The older, denser, and slower-growing cities of the Northeast and Midwest had lower rates of new housing construction during this period. As a result, prospective black homeowners relied more heavily on the supply of housing generated by racial turnover of the existing housing stock rather than on new construction.

Our OLS analysis assumes that the location decisions of white households are uncorrelated with time-varying unobserved characteristics of the city that may be associated with black homeownership. Potential omitted variables may bias our coefficient estimates either upwards or downwards. On the one hand, in metropolitan areas where access to credit is expanding, white households can finance moves to the suburbs and black households may have been able to borrow to purchase a home, leading to an upward bias. Alternatively if white households were more likely to leave central cities populated by poor black households (who were also less likely to become homeowners) we would face a downward bias. In addition, the relationship of interest may suffer from reverse causality; prospective black homeowners may increase the demand for (and thus the prices of) the owner-occupied housing stock in the city, thereby encourage some existing white homeowners to move elsewhere.

To address these endogeneity problems, we look for an instrumental variable that influences white suburbanization but otherwise has no effect on black homeownership. We instrument for white suburbanization with the predicted number of new highway rays passing within one mile of the central city by decade. We predict the number of highway rays in a given city by interacting the number of rays proposed in the 1947 Interstate Highway System plan with the national highway construction rates in that decade. Using this “simulated” instrumental variable, Baum-Snow (2007) demonstrates that highway construction encouraged suburbanization in general. We show that this instrument also works well in predicting white suburbanization. The second stage coefficient from this IV procedure is larger than the analogous OLS treatment effect, suggesting that, if anything, our OLS estimates are biased downward.

A large literature in economics and sociology argues that white suburbanization harmed blacks in the central city by reducing the urban tax base and increasing racial segregation across jurisdictional lines (Massey and Denton, 1993; Cutler, Glaeser, and Vigdor, 1999; Ananat, 2007). However, our paper demonstrates that suburbanization may have also had countervailing positive effects on black residents by increasing black owner-occupancy in the central city. At the household level, higher rates of homeownership contribute to wealth accumulation and improved child outcomes and, at the neighborhood level, higher rates of homeownership may have forestalled urban decline (Green and White 1997; Dietz and Haurin, 2003; Rosenthal 2008; Turner and Luea, 2009).

II. Race and Suburbanization in the United States, 1910-1980

Over the twentieth century, the population of the United States transformed from predominately rural to predominately urban. Table 1 displays statistics on the geographic

location of the white and black population from 1910 to 2000 computed from the IPUMS samples (Ruggles, et al., 2008). In 1910, only 40 percent of the white population lived in a metropolitan area; the remainder lived in rural places. By 2000, the white metropolitan share increased to 80 percent (column 1). The urbanization of the black population was even more rapid. Only 19 percent of blacks lived in a metropolitan area in 1910; by 2000, the black metropolitan share reached 87 percent (column 3).

Within metropolitan areas whites increasingly settled in the suburbs as the century progressed, while blacks continued to reside in central cities. In 1910, 70 to 75 percent of the metropolitan population of both racial groups lived in the central city. In 1980, 72 percent of metropolitan blacks still lived in central cities, compared with only 34 percent of metropolitan whites (columns 2 and 4). The vast majority of white suburbanization took place in the decades following World War Two. The share of metropolitan whites living in the central city fell by seven percentage points in every decade between 1940 and 1980. By contrast the share of metropolitan blacks living in the central city remained above 75 percent until 1970.⁶ A key consequence of these population flows is that the black population share has long been higher in central cities than in the surrounding suburbs (columns 5 and 6). By 1980, 26 percent of central city residents were black, compared with only six percent of suburban residents. The central city-suburban divide in racial population shares contributed significantly to the rise in racial residential segregation over the twentieth century, particularly after World War Two (Cutler, Glaeser, and Vigdor 1999; Fischer, et al., 2004).

There is considerable qualitative evidence that, until recent decades, overt acts of racial discrimination hampered the ability of black households to purchase single-family dwellings in

⁶ The first quantitatively important decade of black suburbanization took place in the 1970s, when the share of metropolitan blacks living in the city fell from 80 percent to 72 percent. This movement has continued to the present.

the suburbs (see, for example, Sugrue, 1996 and Wiese, 2004). Indeed, prior to the passage of federal legislation in 1968, private individuals in many states – real estate agents, bankers, owners of housing developments – were legally free to steer black customers away from white neighborhoods or to refuse to sell or rent property to black households outright (McAllister, 2009).⁷ Various cities and states passed laws against housing discrimination before 1968; however, Collins (2004) finds little evidence that these laws had quantitatively significant effects on African-American housing outcomes, including homeownership

Despite acute residential segregation by race, black and white housing decisions took place in a well-articulated housing market. The dynamics of racial transition created a link between the supply of and demand for housing in black and white neighborhoods. Although most cities contained distinct black and white neighborhoods the zone at or near the boundary of these neighborhoods was contested terrain. Because the housing in white areas was typically of higher quality, housing prices in black neighborhoods often increased with proximity to a white area. Whites, however, were willing to pay a premium to avoid contact with blacks and so, in white neighborhoods, housing prices fell with proximity to the border zone.

This dynamic suggests that blacks were often willing to pay more than whites for a housing unit near the boundary of black and white neighborhoods. If black demand exceeded white demand by a sufficient margin, white households would “sell out” to black households and the boundary of the black ghetto would expand. For whites, the decision to leave a boundary area

⁷ While the Supreme Court ruled in the 1948 *Shelley v. Kraemer* decision that racial “restrictive covenants” written into property deeds were unenforceable in court, the *Shelley* decision did not make private acts of housing discrimination illegal per se at the federal level.

depended on the next best housing alternative, which included both other white neighborhoods in the central city and, increasingly, neighborhoods in the burgeoning suburban ring.⁸

As white households suburbanized, some homes in the boundary area between white and black neighborhoods became available for purchase by black households. Berry (1976) provides evidence consistent with this racial “filtering” process for the Chicago metropolitan area in the 1960s. Prior to World War Two, the black population in Chicago grew substantially but black neighborhoods were geographically constrained and housing prices in the ghetto were high relative to household income. After the war, “there was a vast increase in housing available in the metropolitan area, and a combination of accelerated filtering and rapid residential relocation produced a substantial sag in demand in areas of traditional minority residence” (Berry, p. 417). Berry classifies 76 percent of the housing transactions in central city Chicago from 1968 to 1972, a four year period of (very) rapid change, as sales from white to black households. He calculates that approximately 37,000 black households in the central city purchased their own home between 1960 and 1970 as a result of this racial transition.

However, note that the racial dynamic that Berry charted in Chicago need not have been present in every city undergoing white suburbanization. Most urban whites did not live in the immediate vicinity of black neighborhoods. When these households left for the suburbs, their homes would more likely have been purchased by other white households. Larger homes, even those near black neighborhoods, may have been converted into apartments or other types of multi-family housing. Rural whites moving into metropolitan areas for the first time may have bypassed central cities entirely, opting to buy owner-occupied dwellings in the suburbs (Gregory,

⁸ Over time, white households increasingly opted to live to the suburbs, rather than in central cities. One factor encouraging suburban moves was the falling time cost of commuting to the central city associated with the diffusion of the automobile and large state and federal road building programs (LeRoy and Sonstelie, 1983; Baum-Snow, 2007; Kopecy and Suen, 2009). The demand for commuting was also falling as firms also began moving out to the suburban ring (Boustan and Margo, 2009).

2005). In all of these cases, the share of white households living in the suburbs could have increased without expanding the stock of owner-occupied housing available to black households. Furthermore, the existing stock of single family homes was not the only source of owner-occupied housing to black households; some cities had available land proximate to existing black neighborhoods on which to build owner-occupied housing. In these cities, black households would have been able to purchase new homes directly from developers rather relying on the existing stock. Thus, any link between white suburbanization and black owner-occupancy is ultimately an empirical matter.

III. Empirical Analysis

A. Data and estimating equations

We use two data sources to examine the empirical relationship between white suburbanization and black homeownership. The first is aggregate counts of the number of black households that live in owner-occupied housing by city. We compile these figures for 101 metropolitan areas over five Census decades (1940 to 1980).⁹ We supplement this analysis with household-level records from the Integrated Public-Use Microdata Series (IPUMS) in 1940 and 1980.¹⁰ This sample includes 53,000 African-American households that were living in a central city in one of the 108 metropolitan areas that can be consistently identified in the micro-data in 1940 and 1980 and that had at least 50 black households in the micro data in both years.

⁹ Our sample of 101 metropolitan areas covers all areas that: (1) were anchored by one or more of the 100 largest cities in 1940 or (2) had at least 250,000 residents by 1980.

¹⁰ Ideally, we would also use the intervening Census samples (1950-70) but data limitations make it impossible to simultaneously select the population at risk (black households in central cities), identify the metropolitan area of residence, and measure the relevant housing outcome (owner-occupancy). Housing information is not included in the 1950 IPUMS. The 1960 IPUMS identifies a household's location within a metropolitan area (central city versus suburb) but does not identify the metropolitan area itself. One version of the 1970 IPUMS identifies a household's metropolitan area but not its central city status; another, as in 1960, identifies central city status but does not identify the metropolitan area.

In our household-level regressions, we stack the micro data from 1940 and 1980 and estimate:

$$\text{OWN}_{ijt} = Z_{ijt}\beta + \gamma(\text{WHITE_SUBURB})_{jt} + \alpha_j + \delta_t + \varepsilon_{ijt} \quad (1)$$

where i indexes households in the central city of metropolitan area j at time t . OWN is a dummy variable equal to one if the household owns the home that it occupies; Z is a vector of characteristics of the household head; and WHITE_SUBURB is the proportion of the metropolitan area's white population that lives in the suburban ring.¹¹ The vector of household-level controls includes a quadratic in the age of the household head, dummy variables for the head's gender, marital status, and educational attainment, and the logarithm of household income. By including metropolitan area (α_j) and decade (δ_t) fixed effects, our coefficient of interest (γ) indicates whether the black homeownership rate increased faster from 1940 to 1980 in metropolitan areas that lost a larger share of their white population to the suburban ring. If $\gamma > 0$, we will conclude that white suburbanization is positively associated with black homeownership.

In our aggregate regressions, we replace the household-level indicator of homeownership with the share of black households in the central city that live in owner-occupied housing at time t (equation 2a).

$$\text{SHARE_OWN}_{jt} = \gamma(\text{WHITE_SUBURB})_{jt} + \alpha_j + \delta_t + \varepsilon_{jt} \quad (2a)$$

$$\text{NUM_OWN}_{jt} = \theta_1(\text{NUM_WH_CC})_{jt} + \theta_2(\text{NUM_BL_CC})_{jt} + \alpha_j + \delta_t + \varepsilon_{jt} \quad (2b)$$

¹¹ In 1980, the Census adopted the "householder" definition of household headship – the household head was the person who either owned the home or, if the dwelling was rented, the person in whose name the unit was leased. Prior to 1980, the Census did not adopt a formal rule linking headship to ownership although it is widely presumed by scholars that, in the case of owner-occupied housing, the person designated as head was an owner; see Collins and Margo (2011).

We also use the aggregate data to consider the relationship between the number of black home owners and the number of white households in the central city over time (equation 2b). In this case, we predict that black homeownership should increase as whites *depart* from the central city (that is, $\theta_l < 0$). An advantage of this specification is that the magnitude of θ_l is easily interpretable. For every white household that leaves the central city, θ_l indicates the number of units that are converted into black owner-occupied housing stock, rather than into a vacancy or into rental housing for either a white or black household.

The aggregate data have two key advantages relative to the micro data. First, the aggregate counts allow us to incorporate the intervening Census years between 1940 and 1980. Second, with the aggregate data, we can use household counts by Census tract to adjust for changes in central city boundaries due to annexation, ensuring that we are comparing the same physical unit of land over time. Annexation of peripheral land was a common means of city growth during the 1950s and 1960s, particularly in the South and West. In our sample, the average southern and western city tripled in land area between 1950 and 1980 from 54 to 168 square miles. In contrast, the average northern city only increased by 50 percent from 44 to 66 square miles. As a city expands in land area, the share of whites living in the suburban ring will fall, masking white mobility out of neighborhoods near the urban core. We use Census tract data to calculate population and household counts within the 1950 central city boundaries in 1960, 1970 and 1980. We rely on Baum-Snow's (2007) division of Census tracts into those inside and outside of the 1950 city boundaries. By this definition, any household living outside of the 1950 central city is considered to live in the suburbs even if the land was later annexed into the city.

B. OLS estimates of the relationship between suburbanization and black homeownership

Table 2 contains OLS estimates of γ using both the aggregate and household-level data. The first two rows of Table 2 present estimates of equation 2a using aggregate population and household counts. There is no discernable relationship in the aggregate data between the share of whites in a metropolitan area that live in the suburban ring and the share of black households in the central city that own their own home. However, this national estimate is a weighted average of a large positive relationship between white suburbanization and black homeownership in the Northeast and Midwest and a small negative (but not statistically significant) relationship in the South and West.¹² In the typical northern or Midwestern city, we estimate that a 10 percentage point increase in the share of white metropolitan households living outside of the city increased the black homeownership rate in the city by 3.5 to 4.4 percentage points depending on the specification.

The third row of Table 2 presents estimates of equation 1 using household-level Census records. The dependent variable is a dummy variable equal to one if the household owns their own home. Compared with the aggregate data, adding the household-level controls available in the micro data does not appreciably change the magnitude of the relationship between the white suburban share and black homeownership.¹³ We continue to find a strong positive relationship between white suburbanization and black homeownership in the North and Midwest and a negligible relationship between these two variables in the South and West.

¹² We classify the following Census regions as southern or western: South Atlantic (except Maryland and Delaware); East South Central; West South Central; Mountain and Pacific.

¹³ We also estimate a version of equation 1 in which the dependent variable is the logarithm of the value of owner-occupied housing in the central city. The coefficient on the share of whites living in the suburban ring is -0.863 (s.e. = 0.408), consistent with the hypothesis that housing prices in the central city fell as whites left for the suburbs. This result should be viewed with some caution as we are unable to control for any housing characteristics (for example, the number of bedrooms or the presence of indoor plumbing) due to limitations of the 1940 IPUMS.

Our OLS estimates suggest that white suburbanization had a sizeable impact on black homeownership rates but that this relationship is concentrated in the North and Midwest. In these regions, the share of the metropolitan white population located in the suburban ring increased by 31 percentage points between 1940 and 1980. Using our preferred estimate from Table 2, we calculate that black owner-occupancy would have increased by 10.9 percentage points in these regions due to white departures for the suburbs ($= 0.349 \cdot 31$ percentage points). By this measure, the departure of whites for the suburbs can explain two thirds of the 17 percentage point increase in urban black homeownership in the North and Midwest. Overall, 40 percent of black households lived in these regions by 1980, suggesting that filtering of the urban housing stock can account for one quarter of the increase in black homeownership nationwide.

To verify that the relationship of interest is not being driven by a few outliers, Figure 1 plots the white suburban share and the black homeownership rate in our sample of northern and Midwestern metropolitan areas, net of metropolitan area and decade fixed effects. The graph suggests that the positive relationship between the white suburban share and the black homeownership rate is a general phenomenon, rather than being driven by a single city like New York City that has both a low black homeownership rate and a low share of whites living in the suburban ring.

Table 3 reports estimates from an alternative specification (equation 2b), in which the dependent variable is the *number* of black households living in an owner-occupied dwelling (rather than the share) and the key independent variable is the number of white households living in the city. Because the number of white households is closely associated with city size, the regression also controls for the number of black households in the central city. Recall that we expect a negative relationship between the number of white households in the city and the

number of black homeowners; that is, black homeownership should increase as the number of white households in the city declines. Indeed, for cities in the Northeast and Midwest, we estimate a coefficient of -0.079 ; in other words, one black household transitioned into owner-occupancy for every 12 white households that left the central city ($= 1/0.079$). While this number seems small, consider that only 45 percent of white households in the central city owned their own home in this period. Therefore, our estimate implies that one black household became an owner-occupier for every five white homeowners who left the city, with the remainder of the owner-occupied stock either being converted to rental units or standing vacant. As before, we find no relationship between the number of white departures from the city and the number of black homeowners in the South and West.

C. Regional differences in the white suburbanization-black homeownership relationship

White departures from the central city are strongly related to black homeownership in northern and Midwestern cities but have no discernable effect on black homeownership in the South and West. This discrepancy could be driven by general differences in the history, geography or economic structure of the regions' cities or by specific differences in black access to the owner-occupied housing market by region. This section explores the extent to which differences in city structure can account for regional differences in the effect of white suburbanization on black homeownership.

First, we should point out that the observed regional differences cannot be driven by disparities in city size (in land area). Throughout our analysis, we restrict cities to their 1950 boundaries. Although southern and western cities were more likely to annex land over the 1950s

and 1960s and, therefore, were substantially larger than their northern counterparts in land area by 1980, there was no statistical difference in the city size by region in 1950.¹⁴

Despite having similar land areas, southern and western cities were notably smaller in population at the beginning of the period, but grew rapidly over the subsequent decades. From 1940 to 1980, the typical northern or Midwestern city had 2,600 households per square acre and was located in a slow growing metropolitan area with a decadal growth rate of 20 percent. In contrast, the typical southern or western city had only 1,700 households per square acre and was located in a metropolitan area that was growing at 42 percent per decade. Older, denser cities tend to have more restrictions on new housing construction, while growing cities have higher rates of new construction. Therefore, in older cities, the housing stock available to prospective black homeowners would have been primarily composed of units “inherited” from white homeowners departing for the suburbs. In contrast, in growing cities, new construction could satisfy the demand for black homeownership without the need for a filtering process.

Table 4 presents new estimates of equation 2a that allows the effect of white suburbanization on black homeownership to vary with either a city’s population density or the growth rate of its metropolitan area. For comparison, the first column presents separate coefficients for the main effect of white suburbanization by region. As before, the white suburban share has a stronger effect on black homeownership in the North and Midwest. The second column adds the main effect of population density and an interaction between population density and white suburbanization. The third column conducts the same exercise for population growth.

¹⁴ A regression of city land area in 1950 on a dummy for being in either the South or West produces a coefficient of 9.717 (s.e. = 12.779) relative to an average land area in the Northeast and Midwest of 44 square acres.

We find that black homeownership is both less overall and more responsive to white suburbanization in denser, slower growing cities. The main effect of population density implies that adding 1,000 households per square acre, roughly the difference between the North/Midwest and the South/West, reduces the black homeownership rate by 8 percentage points. Lowering the growth rate by 23 percentage points (again, the relevant regional difference) reduces black homeownership by 3 percentage points. More importantly for our purposes, we find a positive (negative) interaction between population density (population growth) and the white suburban share. That is, in denser cities with slower growth, prospective black homeowners are more reliant on white departures to open up existing units for purchase.

Adding either the population density or population growth variables reduces the gap in the region-specific coefficients on the white suburban share by around one third.¹⁵ The bottom row of the table tests the hypothesis that the coefficient for the North and Midwest is statistically equivalent to the coefficient for the South and West. We can reject that the two coefficients are the same in both cases but adding the population density variables reduces that statistical precision of the difference. We conclude that one third of the regional difference in the effect of white suburbanization on black homeownership can be explained by city structure and up to two thirds (though perhaps less) can be explained by differential access to the housing market, perhaps due to more pervasive racial discrimination in the South.

D. Using highway rays to instrument for the white suburban share

Thus far, we have estimated a sizeable positive relationship between white suburbanization and black homeownership, especially in the slower growing metropolitan areas

¹⁵ We also experimented with including both population density and population growth (and their interactions) into the same regression. However, the two measures are closely correlated and hence compete for explanatory power.

in the North and Midwest. However, our OLS estimates will be biased if white location decisions are correlated with unobserved characteristics of the city that are associated with black homeownership. According to Boustan (2010), white households were more likely to leave central cities as black migrants arrived from the rural South. This “white flight” may have been particularly strong when the black arrivals were poor and thus unable to afford owner-occupancy. In this case, our OLS estimates will be biased downward. To correct for this bias, we need an instrumental variable that is correlated with the share of whites living in the suburban ring but is otherwise uncorrelated with the black homeownership rate.

We instrument for the white suburban share using the “simulated” (or predicted) number of interstate highway rays built within one mile of the central city between 1950 and 1980 (NUMBER_RAYS). The original plan for the interstate highway system was drafted in 1947 with the dual goals of serving national defense and inter-city commerce. Baum-Snow (2007) calculates the total number of rays that were assigned to each central city in the 1947 plan. We simulate the number of rays built in each city j by time t by multiplying the number of assigned rays by the national share of highway construction completed by date t . Because construction of the interstate highways began in 1954, we set the number of highway rays in every city at zero in 1940. We use predicted, rather than actual, highway rays because local politicians could lobby the federal government to build extra highway miles through their city and were more likely to do so if there was a high demand for suburbanization in their area.

Our first stage regression relates the white suburban share to the predicted number of highway rays passing through the central city, controlling for vectors of metropolitan area and decade fixed effects:

$$\text{WHITE_SUBURB}_{jt} = \rho(\text{PREDICTED_NUMBER_RAYS})_{jt} + \alpha_j + \delta_t + \varepsilon_{jt} \quad (3)$$

Baum-Snow (2007) demonstrates that this simulated IV predicts the extent of suburbanization overall; thus, not surprisingly, we find a strong first stage. The second row of Table 5 presents estimates of ρ from equation 3. The coefficient is positive and large nationwide and is of a similar magnitude in both the North and Midwest and the South and West. Our estimates suggest that one new planned highway predicted to be built through the central city increases the share of whites living in the suburbs by 2.5 percentage points (on a base of around 50 percent for the period).

The third row of Table 5 presents the second stage relationship between black homeownership and white suburbanization; for comparison, the first row reproduces the OLS coefficients from the aggregate, decade-by-decade regressions. The second stage coefficient for the full sample is positive, significant and economically large. As before, the national coefficient is a weighted average of a large effect in the Northeast and Midwest and a positive but smaller and statistically insignificant effect in the South and West. The IV coefficients imply that a 10 percentage point increase in the share of white metropolitan households living outside of the city increased the black homeownership rate in the city by 7.4 percentage points in the Northeast and Midwest. Taken at face value, the 2SLS coefficient implies that white suburbanization can account for the entire increase in black homeownership in northern and Midwestern cities over our sample period and around one half of the rise in black homeownership nationwide. However, while the 2SLS coefficient is significantly different from zero, the standard error is large enough that we cannot rule out effects on the order of the OLS estimates.

The identifying assumption for the instrumental variables procedure is that highway construction is only related to black homeownership through its effect on white suburbanization. Some scholars argue that interstates were disproportionately built through black neighborhoods,

thereby reducing the stock of housing available to black households (Sevilla, 1971; Frieden and Sagalyn, 1989; Lewis, 1997). The evidence cited in these earlier studies is largely anecdotal; however, in a recent paper, Collins and Shester (2010) show that urban renewal projects, also long accused of clearing black neighborhoods had no effect on a city's black population share or its degree of racial residential segregation. In addition, if highways did reduce opportunities for black homeownership, we would expect the coefficient in the instrumental variables specification to be lower than its OLS counterpart, yet we find the opposite.

V. Concluding Remarks

This paper documents a causal link between the suburbanization of white households after World War Two and the rise in black homeownership in central cities. Although city neighborhoods were residentially segregated by race, black and white neighborhoods were connected through the housing market. As white households left for the suburbs, housing prices in transition neighborhoods fell, thereby lowering the cost of homeownership for black households. This relationship was stronger in the older and denser cities of the Northeast and Midwest where new construction was more difficult and prospective black homeowners depended more heavily on "inheriting" housing units from white homeowners. In this region, we find that a 10 percentage point increase in the white suburban share led to a 4 to 7 percentage point increase in black homeownership. The larger estimates derive from our instrumental variables regressions, which use new highway construction as an instrument for white suburbanization. Overall, these estimates suggest that 25 to 50 percent of the increase in black homeownership nationwide from 1940 to 1980 can be attributed to the indirect effect of white suburbanization through urban housing markets.

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Table 1: Race and Metropolitan Population, 1910-2000

	(1)	(2)	(3)	(4)	(5)	(6)
	<u>White:</u> Share in metro area	<u>Metro white:</u> Share in central city	<u>Black:</u> Share in metro area	<u>Metro black:</u> Share in central city	<u>Central city:</u> Share black	<u>Suburbs:</u> Share black
1910	0.40	0.70	0.19	0.75	0.06	0.04
...						
1940	0.53	0.62	0.41	0.78	0.10	0.05
1950	0.67	0.55	0.47	0.78	0.15	0.06
1960	0.69	0.48	0.69	0.81	0.17	0.04
1970	0.71	0.41	0.76	0.80	0.22	0.05
1980	0.74	0.34	0.82	0.72	0.26	0.06
...						
2000	0.80	0.26	0.87	0.62	0.27	0.09

Notes: Computed by the authors from IPUMS samples. The calculation of variables referring to the central city or suburbs excludes individuals who were metropolitan residents but whose place of residence was not reported.

Table 2: White Suburbanization and Black Central City Homeownership, 1940-1980

Coefficient: Share of white households in metropolitan area living in suburban ring

	Full sample	Northeast and Midwest	South and West
1. Aggregate data, 1940-80 by decade <i>N (metro areas)</i>	0.076 (0.049) 101	0.349* (0.080) 55	-0.057 (0.062) 46
2. Aggregate data, 1940-80 end points <i>N (metro areas)</i>	0.123 (0.106) 101	0.437* (0.138) 55	-0.004 (0.156) 46
3. Micro data, 1940-80 end points <i>N (metro areas)</i>	0.246* (0.090) 108	0.347* (0.091) 45	0.139 (0.100) 63

Notes: * = significant at 5 percent level. All regressions include metropolitan area (SMSA) and year fixed effects. Standard errors are shown in parentheses and are clustered by metropolitan area.

Rows 1-2: Reports estimates of equation 2a in text. Dependent variable = share of black households in central city living in owner-occupied dwelling. The key independent variable is the share of white households living in the suburban ring.

Rows 3: Reports estimates of equation 1 in text. Dependent variable = 1 if home is owner-occupied. Sample includes 7,911 black households in 1940 and 44,907 households in 1980 from the IPUMS. Individual observations are weighted by $1/N$, where N = number of black households in the metropolitan area. Regressions also control for a quadratic in the age of the household head, dummy variables for head's gender, marital status and educational attainment (9-11 years of schooling, 12 years of school, ≥ 13 years of school) and the logarithm of household income.

Table 3: Alternative Specification for Relationship between White Suburbanization and Black Central City Homeownership, 1940-1980

Dependent variable: Number of black households in central city who own home

	Full sample	Northeast and Midwest	South and West
# of white hh in city	-0.047* (0.007)	-0.079* (0.011)	-0.002 (0.004)
# of black hh in city	0.292* (0.008)	0.269* (0.011)	0.344* (0.008)
<i>N (metro areas)</i>	101	55	46

Notes: * = significant at 5 percent level. All regressions include SMSA and year fixed effects. Standard errors are shown in parentheses and are clustered by metropolitan area. This table reports estimates of equation 2b in text. The dependent variable is the number of black households in the central city living in an owner-occupied dwelling. The key independent variable is the number of white households in the central city.

Table 4: Explaining the Regional Difference in the Relationship between White Suburbanization and Black Central City Homeownership

Dependent variable = Share of black households living in owner-occupied dwelling

	(1)	(2)	(3)
		Add population density	Add population growth
Suburban share * North/Midwest	0.239 (0.062)	0.102 (0.090)	0.324 (0.070)
Suburban share * South/West	0.051 (0.049)	-0.017 (0.061)	0.173 (0.069)
Added variable		-0.078 (0.021)	0.149 (0.076)
Suburban share * Added variable		0.039 (0.023)	-0.283 (0.111)
F-stat: Sub * N/M = Sub * S/W	16.61	5.00	8.47

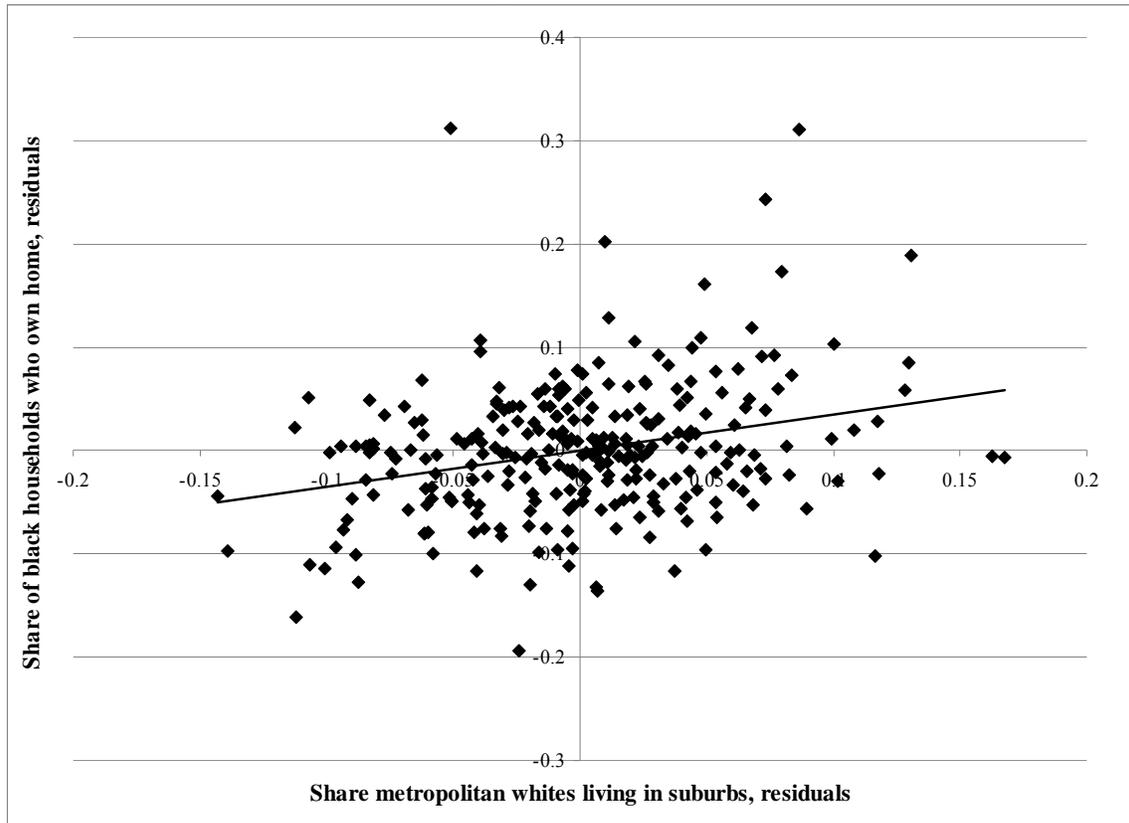
Notes: * = significant at 5 percent level. All regressions include SMSA and year fixed effects. Standard errors are shown in parentheses and are clustered by metropolitan area. Column 1 reports estimates of a version of equation 2a with the white suburban share interacted with two regional dummies. Column 2 adds a measure of population density and an interaction between population density and the white suburban share. Population density is measured as households per square acre (in 1,000s). Column 3 adds a measure of population growth at the metropolitan area level and an interaction between population growth and the white suburban share.

Table 5: Instrumental Variable Estimates Using Predicted Highway Rays

	Full sample	Northeast and Midwest	South and West
1. OLS	0.076 (0.049)	0.349** (0.080)	-0.057 (0.062)
2. First stage	0.025** (0.005)	0.025** (0.006)	0.028** (0.008)
3. Second stage	0.663** (0.242)	0.737** (0.284)	0.449 (0.311)
<i>N (metro areas)</i>	101	55	46

Notes: Pooled decadal data from 1940 to 1980. Row 1 presents OLS estimates of equation 2a. Row 2 contains the coefficients from equation 3, the first stage equation relating the share of whites in the metropolitan area who live in suburbs to the predicted number of highway rays through central city. The number of highway rays in 1940 is set to zero. In Row 3, the predicted number of highway rays is used to instrument for the share of whites in the metropolitan area who live in suburbs. In all rows, standard errors are clustered by metro area. See text for discussion of the construction of the predicted highways variable.

Figure 1: Relationship Between the White Suburban Share and Black Central City Homeownership: Northeast and Midwest



Notes: Each point indicates the share of whites in a metropolitan area who live in the suburban ring and the share of black households in the central city who live in an owner-occupied dwelling, net of a series of year and metropolitan area fixed effects. The sample is restricted to metropolitan areas in the Northeast and Midwest. This figure can be compared to the regression in Table 2, column 2.