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WAS POSTWAR SUBURBANIZATION "WHITE FLIGHT"? EVIDENCE FROM
THE BLACK MIGRATION

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ABSTRACT

Residential segregation across jurisdiction lines generates disparities in public services and education by race. The distinctive American pattern -- in which blacks live in the center city and whites in the suburban ring -- was enhanced by black migration from the rural South from 1940-1970. I show that urban whites responded to this black influx by relocating to the suburbs and rule out the indirect effect on urban housing prices as a cause. Black migrants may have been attracted to areas already undergoing suburbanization. I create an instrument for changes in urban diversity that predicts black migrant flows from southern states and assigns these flows to northern cities according to established settlement patterns. The best causal estimates imply that "white flight" explains around 20 percent of suburban growth in the postwar period.

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I. Introduction

American cities have long been characterized by racial residential segregation, not only

by neighborhood but also across jurisdiction lines. Blacks are more likely to live in central cities

and whites in suburban towns. In 1980, after a century of suburbanization, 72 percent of

metropolitan blacks lived in central cities, compared to 33 percent of metropolitan whites.

Because many public goods are locally financed, this segregation can generate disparities in

access to public services by race, of which education may be the most important (Benabou,

1996; Bayer, McMillan and Rueben, 2005).

These distinctive residential patterns are the result of two population flows: black

migration from the rural South to industrial cities and white relocation from central cities to the

suburban ring. Both flows peaked in the decades following World War II. This paper asks

whether urban whites responded to black in-migration by relocating to the suburbs.

Cities that experienced increasing racial diversity from 1940 to 1970 lost a larger share of

their white population to the suburban ring. In interpreting this correlation, one concern is the

potentially endogenous location decisions of black migrants. Migrants may have sought out areas

with high wages or centrally-located manufacturing jobs, factors that also underlie the demand

for suburban residence.[1] In addition, migrants may have been attracted by lower urban housing

prices left in the wake of white departures.[2]

I test these alternatives with an instrumental variables procedure. The concept behind the

procedure is that northern cities received exogenous flows of black migrants when their

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[1] Margo (1992) provides empirical evidence on the relationship between income and suburban residence. Steinnes (1977) and Thurston and Yezer (1994) demonstrate that a concentration of manufacturing employment in the central city encourages suburbanization, perhaps because the noise and pollution of factories outweigh the desire to live close to manufacturing employment.

[2] Relative housing prices are an important determinant of interregional migration (Gabriel, Shack-Marquez and Wascher, 1992). Gamm (1999) argues that black migrants to Boston were attracted to the Dorchester and Roxbury neighborhoods by the lower housing prices there left in the wake of Jewish suburbanization.

traditional southern sending states underwent agricultural and economic change (Fligstein, 1981; Wright, 1986; Grove and Heinicke, 2003, 2005). I use variation in local agricultural conditions to predict black out-migration from southern states and assign these flows to northern cities based on earlier migration patterns. These simulated changes in black population serve as an instrument for actual changes in urban diversity.

Even after accounting for migrant location choices in this manner, I detect a strong, positive relationship between changes in a city's racial composition and changes in the white suburban share of the surrounding metropolitan area. A one standard deviation increase in the black population share in the center – the equivalent of 6,000 migrants for the average city – is associated with half a standard deviation increase in the white suburban share. This translates into a move of 11,000 whites into the suburban ring, a more than one-for-one suburbanization response.[3]

This disproportionate outflow suggests that white households were not simply responding to higher housing prices accompanying a migration-induced increase in housing demand, but were also repelled from the city by characteristics of the migrants themselves. Direct evidence for this conjecture can be found in urban housing prices. If residents had no preference for racial homogeneity, suburbanization would have continued only until the initial balance between city and suburban housing prices was restored. In this case, black migration would be associated with (weakly) higher relative housing prices in the city. However, if the marginal resident disliked racial diversity, urban housing prices could fall with black in-migration (Saiz and Wachter,

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[3] Imagine that the median resident dislikes racial diversity. In a simple model of the housing market with perfectly elastic housing supply, this disamenity would be fully capitalized into the prices of urban housing and we would not predict any population mobility to the suburbs. Glaeser and Gyourko (2005) propose a more realistic model in which housing supply has a kinked shape: higher prices generate more construction, but lower prices do not lead to an immediate destruction of the existing housing stock. In this case, a negative shock to the relative demand for the city should lead to new suburban construction and a redistribution of *population* to the suburbs, moderated by a decline in housing *prices* in the city.

2006). Indeed, I find that black in-migration leads to declining urban prices even after controlling for changes in housing quality.

Black migration changed both the racial composition and the income distribution of the typical American city. It is likely that both of these factors played a role in the mobility decisions of white households. An extensive literature documents a preference among white households for predominately white neighborhoods.[4] However, because cities were highly segregated, many urban whites lived in areas where they had few, if any, black neighbors.[5] Boustan (2007) shows that, for this population, the suburbs became a haven from the increasing property tax rates and levels of social spending that accompanied growing urban poverty. In this paper, I use the term "white flight" interchangeably to refer to concerns about the racial or income composition of the central city with black in-migration.

Previous empirical work on the decentralization of urban areas focuses on forces that attracted households to the suburbs.[6] While many studies speculate that changes to the city itself – including a rise in crime, fiscal mismanagement, and a growing concentration of racial minorities and the poor in urban areas – hastened suburbanization, it has been hard to pin down the causal connection, if any, between these trends (Bradford and Kelejian, 1973; Guterbock, 1976; Frey, 1979; Marshall, 1979; Grubb, 1982; Mills and Price, 1984).[7] This challenge is particularly acute because suburbanization can enter a vicious cycle, by which the initial departure of the middle class augments urban problems, eventually leading to a downward spiral

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[4] See Ellen, 1999; Crowder, 2000; Emerson, Chai and Yancey, 2001 and the references contained therein. Card, Rothstein and Mas (2007) demonstrate that, once a neighborhood reaches a critical minority share, it rapidly loses white population, thereby "tipping" from a white to a minority area.

[5] In 1960, after 20 years of black in-migration, 55.8 percent of Census tracts in central cities were at least 99 percent white, declining from only 60.3 percent in 1940 (Cutler, Glaeser and Vigdor, 1999).

[6] Margo (1992) and Frey (1984) highlight rising real income and the baby boom respectively, two reasons for an increasing demand for space. Baum-Snow (2007) emphasizes the decline in commuting costs following the construction of the interstate highway system.

[7] In contrast, historians have readily drawn a connection between urban racial change and suburbanization. See, for example, Sugrue, 1996 and Meyer, 2000.

of population loss and urban decline (Baumol, 1967). This paper represents one of the first

attempts to document a suburbanization response to an exogenous change in central cities. My

estimates suggest that, if not for the four million southern blacks who migrated to urban areas

between 1940 and 1970, suburban growth would have been 20 percent slower than it was.

II. Measuring Urban Diversity and White Suburbanization

A. Econometric framework

Let w be a measure of white suburbanization and b be a measure of urban racial diversity.

I stack data for 68 large metropolitan areas (SMSAs) in the North and West over four Census

years (1940 to 1970) and estimate:

$$w_{mrt} = \alpha + \beta(b_{mrt}) + \Gamma'X_{mrt} + \mu_m + (\upsilon_r \cdot \delta_t) + \varepsilon_{mrt} \qquad \textbf{(1)}$$

where m indexes metropolitan areas and t and r indicate Census decades and regions

respectively.[8] X_{mrt} is a vector of other metropolitan area characteristics. The specification

includes SMSA fixed effects and region-specific time trends. β is thus estimated from changes in

urban diversity within a metropolitan area over time, compared to other such areas in the region.

The benefit of using a panel of metropolitan areas is twofold: first, the size of a city's

black population may be correlated with fixed aspects of an area's industrial base, transportation

network, or housing stock. Such characteristics may also encourage suburban development,

leading to a spurious correlation in the cross section. Secondly, the size of central cities – in land

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[8] The sample includes all non-southern SMSAs that had at least 250,000 residents in 1970. I exclude the South because the vast majority of black migrants into southern cities came from the surrounding state. Thus, it is particularly difficult to separate changes in urban diversity from periods of local economic change. The four slightly-modified Census regions used here include the Northeast (with Delaware, DC, and Maryland); the East North Central; the West North Central; and the West. I group Delaware, DC, and Maryland with the Northeast rather than the South because they are net recipients of black migration in this period.

area – relative to their metropolitan areas varies widely. This variation can obscure comparisons of suburbanization across metropolitan areas. A city's relative size, which is determined, in large part, by geographic constraints and local political history, is largely fixed over time and will thus be absorbed into the SMSA fixed effect.[9]

I measure urban diversity (b) as the share of a city's residents that are black. Due to strict immigration quotas in place from 1924 to 1965, internal migration was the dominant source of variation in racial composition across American cities during the period.[10] The literature is divided over the best measure of suburbanization. A number of studies rely on the population density gradient, a measure of sprawl which captures the rate at which density falls with distance from a central business district (Mills and Price, 1984; Thurston and Yezer, 1994, and so on). This measure is grounded in the monocentric city model, in which location choice is determined by the tradeoff between proximity to work and housing prices (Mills, 1972). In this model, space is a featureless plane, rather than a series of politically-defined jurisdictions.

Instead, to account for the fiscal division between cities and suburbs, I measure white suburbanization (w) as the share of whites in the metropolitan area who live outside the political boundary of the central city. In a similar fashion, recent studies have used absolute declines in the city's population as the variable of interest (Cullen and Levitt, 1999; Baum-Snow, 2007). One concern with this specification is that both the white suburban share and the urban black population share contain a common term – namely, the number of whites living in the city – in their denominator, which could generate a spurious relationship between the two measures. I lag

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[9] City boundaries can expand over time with annexation. This concern is addressed in section II.B.
[10] The immigration quota system did not apply to the Western Hemisphere. As a result, there were large inflows from Puerto Rico and the Dominican Republic during the 1940s and 1950s, which were heavily concentrated in New York City. Many Mexicans also entered the country in this period under the auspices of the Bracero program, but most worked in agricultural labor in rural areas.

the denominator of the black population share by ten years, capturing the city's population before the current decade of suburbanization took place.

B. Addressing Changes in Political Boundaries Over Time

While SMSA fixed effects absorb any cross-sectional differences in the relative size of cities, the borders of central cities and of their suburban rings may change over time in ways that are arguably endogenous to the flow of black migration.

Metropolitan expansion: An SMSA is defined as a collection of economically-integrated counties.[11] As settlement around an urban center expands outward, the Census Bureau redraws SMSA boundaries accordingly. Growing areas, including those that are attracting internal migrants, are likely to undergo such administrative expansion. This process could induce a positive (and artificial) relationship between black migration and suburbanization, given that, by definition, all residents of the newly-included counties will be suburban residents. Thus, rather than use the contemporary SMSA boundaries in each decade, I apply the 1970 county-based metropolitan area definition in all years.

Annexation: The 1950s and 60s was a period of intense annexation activity.[12] Austin (1999) argues that politicians in diversifying cities have a stronger incentive to annex neighboring land in order to retain a majority-white electorate. In contrast, Alesina, Baqir and Hoxby (2004) find that racial diversity reduces the number of successful annexations, particularly in states that require both city and suburb to agree to a consolidation. In this case, the

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[11] Because SMSAs in New England often include fractions of counties, I use the New England County Metropolitan Area (NECMA) definitions instead.

[12] For the rise and fall of annexation as a political tool in the late nineteenth and early twentieth centuries, see Jackson (1985, p. 138-156). Dye (1964) addresses the renewed annexation activity of the 1950s and 60s.

relationship between diversity and suburbanization could be biased upward because the inability

to annex land results in a smaller central city surrounded by a larger suburban ring.

To adjust for differential annexation, I create a parallel set of measures that define central

cities according to their 1940 borders. Using Census counts, I reassign residents *who would have*

lived in the suburban ring if not for annexation back to the suburbs.[13] The choice between actual

and counterfactual borders entails a tradeoff. The consistent boundary measure will misclassify

moves to the suburbs from annexed city territory as suburb-to-suburb moves. However, in its

ability to reverse decades of suburbanization, annexation can conceal individual responses to

urban diversity. For comparison, I present results using both measures.

III. The correlation between urban diversity and white suburbanization

Figure 1 presents an initial look at the correlation between changes in the black share of

(lagged) central city population and changes in the share of whites who live in the suburban ring

over the 1950s. The relationship is positive and significant, with a 10 point increase in black

population share associated with an 8.4 point increase in the white suburban share. Center city

Detroit, for example, experienced a 14 point increase in its black population share;

correspondingly, the white suburban share in the Detroit metropolitan area increased by 23

points (from 42 to 65 percent). In contrast, cities like Duluth, MN and Worcester, MA received

few black migrants and retained most of their white population over the decade.

Table 1 presents estimates of the relationship between a city's black population share and

the white suburban share of its metropolitan area from 1940 to 1970. The first column relies on

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[13] The Census Bureau estimated the number of individuals drawn into the central city through annexation from block level data (Bogue, 1953; US Census, 1960, 1970). Because these calculations are not done separately by race, I create two measures. The first (second) assumes that the population living in the annexed area had the same white share as the suburban ring (city).

actual city boundaries, which can change with annexation, while the second and third use

consistent city boundaries over time. Across all measures, increasing a city's black population

share by one percentage point is associated with a 0.7-0.9 point increase in the fraction of white

residents living in the suburban ring.[14] The coefficients are not statistically different from one

another. If anything, using the actual city boundaries generates stronger estimates of white flight.

This pattern may point to a positive annexation bias.

The second row of the table replaces the somewhat arbitrary Census designation of a

"central city" with an alternative definition by which any municipality that had 50,000 or more

residents in 1940 is considered part of the urban core.[15] This measure implies a somewhat

stronger white response, suggesting that whites were leaving all parts of the inner ring, not just

the officially defined "central city." To be consistent with the literature, I retain the Census

definition of a central city throughout the paper. Furthermore, to avoid bias from endogenous

annexation, I rely on the first consistent area measure. Summary statistics for this preferred

measure are presented in Appendix Table 1.

The base specification includes only one time-varying aspect of a metropolitan area – the

black share of its central city. Black migrants may have been attracted to omitted, time-varying

characteristics of an area that are also correlated with the demand for suburban residence. Table

2 adds two sets of SMSA-level covariates: the first are available in all decades, and the second

only from 1950 on.[16]

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[14] I experimented with using the logarithm of the black population share or adding higher order terms in the black population share on the right hand side (not shown). However, white residents appear to respond to absolute rather than proportional changes in black population and one cannot reject that they do so in a linear fashion.

[15] For example, the Census Bureau considers Albany, Schenectady, and Troy, NY to be central cities of a unified SMSA, whereas Cambridge, MA is simply part of the Boston metropolitan area, and thus technically a "suburb."

[16] In order to conform with the 1970 SMSA definitions, covariates are built up to the SMSA level from the county data in the *County and City Data Books*. I use only SMSA level covariates because the compositional change of city population that accompanies the loss of white middle class complicates the interpretation of any city-level measures.

Growing areas and areas that experience increases in their stock of human capital are more likely to suburbanize, but these factors do not significantly change the coefficient on the black population share (column 2). Column 4 adds covariates that are available from 1950 onward. Median family income is positively associated with mobility to the suburbs. A greater share of elderly residents reduces suburban growth, perhaps because young families prefer the large houses and higher quality school districts in the suburbs. The number of miles of interstate highway that run through the center city has a strong effect on suburbanization, with a one standard deviation increase (50 miles) associated with half a standard deviation uptick in the white suburban share.[17] However, including these covariates only reduces the point estimates on the black population share by 10 percent relative to the baseline. There is no first-order evidence that the correlation between diversity and suburbanization is primarily driven by migrants' attraction to areas with rising real incomes or an expanding transportation network.

IV. Using southern black migration to instrument for racial composition in northern cities

A. Historical context and conceptual approach

The increase in urban black population after the second World War was driven by rural-to-urban migration. Rural blacks were attracted northward by economic opportunities in the manufacturing and service sectors. The demand-pull component of this migrant flow is undoubtedly correlated with economic conditions in destination cities, some of which may have also encouraged suburbanization.

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[17] Because longer stretches of road are needed to facilitate commuting in cities covering a larger land area, I interact the number of interstate miles with the size of the center city. The calculation above assumes the average city of 58 square miles. Major (two-digit) interstates and branch (three-digit) highways have qualitatively similar effects on the white suburban share. I thank Nathaniel Baum-Snow for sharing his data on highway miles.

Southern conditions can be used to create an instrument for changes in urban diversity *in the North*. I predict migrant flows from each southern state using local push factors that are unlikely to be correlated with northern economic conditions. I then assign these predicted flows to northern destinations using settlement patterns established by an earlier wave of black migrants.[18] The simulated black population share in a northern city that would have pertained if these predicted migration flows had been the only source of black population growth are used to instrument for the actual black population share.

Key to this procedure is the fact that blacks leaving particular southern states concentrated in certain northern cities. These settlement patterns were highly persistent, in part due to the stability of train routes and community networks.[19] Much of the variation in source/destination pairs occurs *between* regions, with migrants simply moving due North – say, from the Mississippi Delta to industrial cities in the Midwest. However, there is also considerable variation *within* regions. Consider the case of Alabama and Mississippi, two neighboring, cotton-producing states in the traditional "black belt." Figure 2 displays the share of all black migrants who left these two states between 1935-40 and settled in one of 53 non-southern cities. Migration from Mississippi to the North was overwhelmingly concentrated in two destinations, Chicago and St. Louis. While Chicago was also the top destination for Alabamans, it received a much smaller share of the total, with Detroit and Cleveland taking close second.

The difference in migration patterns between these neighboring states is consistent with disparities in their railroad infrastructure, which had been in place long before 1940. The black

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[18] The first wave of black migration corresponded to the growth in industrial employment during World War I and the introduction of immigration quotas, which slowed migration from Europe (Collins, 1997).

[19] Carrington, Detragiache, and Viswanath (1996) model this type of chain migration as a reduction in the uncertainty costs of migration.

population in Mississippi was clustered along the Mississippi river. This region was served by only one inter-state railroad, the Illinois Central, whose main hubs were St. Louis and Chicago. In contrast, the large cities in Alabama, Mobile and Birmingham, were each served by two major railroads – the Gulf, Mobile, and Ohio railroad, which connected to the Illinois Central network in St. Louis, and the Alabama Great Southern Railroad, which brought riders east to Cincinnati and on to Cleveland and Detroit.[20]

B. Building the instrument from historical data

The instrument is made up of two components: predicted migrant flows from southern states and a pre-established settlement pattern of migrants leaving these states. I begin by modelling net black migration rates in the South at the county level from time *t* to *t+10* as a function of initial agricultural and industrial conditions:

$$mig\_rate_{c,t,t+10} = \alpha + \gamma(\text{push factors})_{c,t} + \varepsilon_{c,t} \qquad \textbf{(2)}$$

Agricultural push factors include the share of tilled land planted in cotton, the share of the labor force in agricultural production, and the share of farmers operating as tenants. Industrial factors include the share of the labor force in mining and the dollar expenditure on defense contracts per capita from 1940-45.[21] I use only initial levels rather than contemporaneous changes in these push factors. Changes may be a response to, rather than cause of, migration. Consider the cotton

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[20] Grossman (1989, p. 99) writes that "the first [migrant from Mississippi] to leave for Chicago probably chose the city because of its position at the head of the Illinois Central." A map of rail links from the South c. 1915 can be found at http://alabamamaps.ua.edu/historicalmaps/railroads/. See Grossman (1989, p. 66-119) and Gottlieb (1987, p. 39-62) for a broader discussion of the role of train routes and information networks in the destination choices of black migrants.

[21] Source details and summary statistics can be found in the Data Appendix.

share: planters may scale back cotton production if wages rise after a loss of labor to northern

industry.

The counterfactual migration flow from each county is derived by multiplying the fitted

migration rate by the county's initial black population. These predicted flows are then aggregated

to the state level (*pred_mig$_{st}$*).[22] I allocate predicted migrant flows to northern cities according to

the settlement patterns of blacks who left the state between 1935-40. Let w_{ns} be the share of

blacks who left state *s* after 1935 and reside in city *n* in 1940. w_{ns} can be calculated from

aggregate mobility tables produced from the 1940 Census, which are available by race for 53

sample cities. The number of black migrants predicted to arrive in city *n* at time *t* is thus the sum

of migrants leaving *s* and settling in *n* over the 14 southern states:

$$pred\_mig_{nt} = \Sigma_{s=1\ldots14} \; (w_{ns} \cdot pred\_mig_{st}) \qquad\qquad \textbf{(3)}$$

I use this predicted in-flow to advance a city's black population forward from 1940, with the

resulting black population share becoming the instrument for the endogenous share.[23]

Card (2001), Lewis (2005), and Doms and Lewis (2006) use a similar approach to study

the effect of immigration on local labor markets. One important difference, however, is that these

papers allocate the *actual* inflow of immigrants to cities rather than predicting the inflow from a

set of local push factors. As a result, the method assumes that the "total number of immigrants

from a given source country who enter the United States is independent of….demand conditions

in any particular city" (Card 2001, p. 43). Given that migrants cluster, we might reasonably

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[22] While intra-state migration will net out when aggregating actual county-level migration to the state level, the same may not be true with predicted migration. Thus, the predicted state aggregates may erroneously include and assign to the North some internal migrants.

[23] I use the city's population in 1940 as the denominator of the predicted black population share in all years to prevent a mechanical correlation arising between the instrument and the endogenous black population share.

expect that a positive economic shock in a destination city could stimulate additional migration flows from source areas. I present results using both actual and predicted migration flows.

Table 3 displays the determinants of net black migration rates from southern counties by decade (equation 2). A county's cotton share strongly predicts black out-migration in the 1940s, as the planting and weeding components of cotton production were mechanized, and again in the 1960s, when a viable cotton harvester diffused throughout the South – but not in the stable decade of the 1950s (Grove and Heinicke, 2005).[24] Tenancy rates, which were highest in cotton-growing areas, are also important in the 1940s, when the traditional sharecropping system was giving way to wage labor arrangements (Alston, 1981). In contrast, agricultural counties in tobacco-growing states, which were slow to mechanize, lost a large share of their black population only in the 1960s (Wright, 1986). Industrial change was also an important factor in black migration rates. Counties that received federal funds for war-related industry in the 1940s attracted black migrants, though the effect of this war-time spending dissipated by the next decade. And, while mining counties lost black population, on average, over this period, the discovery of major oil fields and the expansion of natural gas attracted black entrants to mining counties in Oklahoma and Texas in the 1950s.

V. The causal relationship between diversity and suburbanization

The stability of migrant settlement patterns generates a strong association between actual changes in black population and changes due to predicted black in-migration alone. The first column of Table 4 reports results from a series of first stage regressions. In the first row, the

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[24] Federal cotton policy may have spurred the first wave of cotton mechanization in the late 1930s and 1940s. The Agricultural Adjustment Act (AAA) of 1933 encouraged cotton growers to leave fields fallow, a burden they often imposed on their tenants. This policy inadvertently increased the average size of cotton farms, thus providing an incentive to invest in high fixed cost capital goods. See Fligstein (1981, p. 137-151), Lemann(1991), Whatley (1983), and Wright (1986, p. 226-238).

instrument is generated by allocating *actual* southern flows to the North akin to Card (2001) and others. The second row uses predicted migrant flows based on southern push factors. Not surprisingly, the magnitude of the relationship is larger when relying on actual rather than predicted migration flows. A one standard deviation increase in the simulated black population share is associated with a 0.8 standard deviation increase in the actual share (row 1) or a 0.6 standard deviation increase in the actual share (row 2) depending on the type of southern migration used. The coefficient is highly significant in both cases.

Figure 3 graphs the first stage relationship for the instrument using predicted migrant flows in the 1950s. Larger positive deviations from the regression line correspond to cities – like Flint, MI and Los Angeles, CA – that experienced more black population growth than would be predicted by migration from their typical sending states. These deviations may be due to positive economic shocks that attracted arrivals from new source areas. The reverse is true of cities with large negative deviations like St. Louis, MO and Pittsburgh, PA. In general, though the positive relationship between actual and predicted black population growth is quite strong and is not driven by any obvious outliers.

The remainder of Table 4 conducts the IV analysis. The data necessary to construct the instrument are only available for 53 (large) SMSAs. The coefficients are qualitatively similar to the baseline when I re-estimate OLS regressions for this diminished sample (column 2). A comparison with column 3 reveals that the IV point estimates are never statistically different from their OLS counterparts and are slightly larger in absolute value. If migrant location choice were driving some of the correlation between urban diversity and white suburbanization, we would have expected the IV estimates to be *smaller* than OLS. Interestingly, the results are not

qualitatively different when relying on actual or predicted migrant flows to generate the instrument.

If economic shocks are serially correlated, migrants' destination choices in the late 1930s could be related to local economic conditions in subsequent decade(s). To address this concern, the third row presents IV results for 1950-1970, leaving a full decade between the pre- and post-periods. The pattern is identical, with an IV coefficient that is slightly larger than but not statistically different from OLS.

To interpret the magnitude of this effect, consider the median city in the sample, which had around 200,000 residents and was located in a metropolitan area of 500,000. A one standard deviation increase in the black population share over a decade – equal to three percentage points, or around 6,000 black arrivals – is associated with a 2.5 point increase in the white suburban share. This effect translates into the relocation of 11,000 white residents from the city to the suburban ring, a more than one-for-one suburbanization response.

Even after predicting black migrant flows from southern states and constraining black migrants to follow settlements patterns established in the 1930s, I find a similar suburbanization response among white households to changes in urban diversity. There is no evidence that the correlation between black population share and white suburbanization is due to the endogenous location choices of black migrants.

VI. The effect of racial diversity on housing prices in the central city

A causal relationship between black migration and white suburbanization cannot be automatically attributed to white flight. Black migration might encourage white households to leave central cities indirectly by increasing urban housing prices. Imagine a marginal urban

resident who is indifferent between staying in the city or moving to the suburbs. If black arrivals

bid up the price of centrally-located units, then this resident would strictly prefer the suburbs.

While the white flight and housing market hypotheses generate the same prediction on

population flows, they lead to different predictions on housing prices. In the housing market

scenario, whites have no preference for the racial composition of their neighborhood or

jurisdiction. As black migrants arrive in the city, urban housing prices rise and existing residents

depart for the suburbs. Suburbanization will continue until the equilibrium price of housing in

the city relative to the suburbs is restored. Because suburban relocation "spreads" the price effect

throughout the metropolitan area, we would expect an increase in price *levels* in the metropolitan

area but no change in *relative* city prices. However, if white households have an additional

preference for segregation, they would continue to leave the city even after the initial balance

between city and suburban housing prices was regained. In this case, we would predict relative

city prices to fall (Saiz and Wachter, 2006).

I estimate the relationship between the value of urban owner-occupied housing and the

city's black population share:

$$\text{city price}_{mrt} = \alpha + \beta(b_{mrt}) + \eta(\text{metro price})_{mrt} + \Gamma'X_{mrt} + \mu_m + (\upsilon_r \cdot \delta_t) + \varepsilon_{mrt} \qquad \textbf{(4)}$$

where 'city price' and 'metro price' refer to the central city and the whole metropolitan area,

respectively. New migrants to a metropolitan area increase the demand for area housing. Thus,

without the inclusion of average trends in housing prices, the coefficient on the black population

share will be biased upwards. β measures the effect of urban diversity on the prices of city

housing relative to metropolitan area-wide trends.

The first column of Table 5 contains this basic specification; the second adds all available housing quality controls for the Census of Housing (which includes the median number of rooms in city units; the share of units that are in single family, detached homes, and so on); and the third adds all of the SMSA-level demographic and socio-economic characteristics present in Table 2. In each case, an increase in a city's black population share significantly *reduces* its housing prices relative to the area as a whole.

Again, one concern might be that black migrants are attracted to areas with falling housing prices. However, the negative relationship between urban diversity and housing prices holds even after instrumenting for changes in a city's black population share (columns 5 and 6). A one standard deviation increase in black population share (3 percentage points) is associated with a 1.4–2.1 percent decline in relative housing prices. This price decline is not consistent with a pure housing market story, in which relative urban prices are predicted to increase in the short-run and to equilibrate in the longer-run, but points instead to white flight.

VII. Heterogeneous effects by region, period, and population sub-group

In the average postwar city, each black arrival led to the departure of more than one existing white resident and to associated declines in urban housing prices. However, this response was not equally strong in all times and places. This section explores variation in the suburbanization response by decade, region, and population sub-group.

The first column of Table 6 estimates a separate response to urban diversity by region. Cities in the Northeast experience the strongest suburbanization response to diversity, with the Midwest close behind. In contrast, changes in urban diversity have *no* effect on suburbanization in the West. The lack of response in western cities, which were developed after the advent of the

automobile, could be due to their larger land area and lower population densities. I test this

proposition by adding a city's initial land area and population density as well as their interactions

with black population share to the base specification (not shown). The suburban rings of larger

central cities grow more slowly, perhaps because leaving the city requires a longer commute.

Population density (as measured in 1940) also deters suburbanization. However, neither factor

affects the white flight response to a given change in urban diversity and, thus, cannot explain

the western anomaly. The lack of a white flight response in the West may reflect lower levels of

racial antipathy in a region that is also distinguished by low levels of residential segregation by

neighborhood (Glaeser and Vigdor, 2001).

 The second column of Table 6 compares the white response to urban diversity over time.

I estimate a regression in first-differences that allows a separate "white flight" effect by decade:

$$\Delta w_{mrt} = \alpha + \Sigma_t \, \beta_t (\Delta b_{mrt} \cdot \delta_t) + \delta_t + \varepsilon_{mrt} \qquad\qquad\qquad \textbf{(5)}$$

The association between suburbanization and urban diversity is strong in both the 1940s and the

1950s, despite the wartime construction freeze from 1940-45 (Jackson, 1985, p. 231-45). There

is still a discernable suburbanization response in the 1960s, though it is significant smaller than

in either of the previous decades.[25]

 The urban riots of the 1960s may have amplified the response to black population of a

given size. Collins and Margo (2007) document a negative relationship across cities between riot

activity and owner-occupied housing values, suggesting that violence depressed the demand for

urban residence. I adopt Collins and Margo's index of riot severity and define an indicator

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[25] By the 1960s, suburbanization had been in process for at least twenty years. The smaller coefficient in this decade could simply be due to the fact that the white suburban share is bounded above. However, I find statistically smaller coefficients for areas with both high and low initial suburbanization rates, suggesting that the pattern is not due to this mechanical feature alone (not shown).

variable equal to one for cities with above-median levels of riot activity.[26] Using data from 1960

and 1970, I estimate:

$$w_{mrt} = \alpha + \beta(b_{mrt}) + \gamma(b_{mrt} \cdot I[\text{high riot}]) + \mu_m + (\upsilon_r \cdot \delta_t) + \varepsilon_{mrt} \qquad \textbf{(6)}$$

The main effect of having experienced a riot is absorbed in the SMSA fixed effect. The

coefficient of interest is γ, indicating whether a given black population share is associated with

more suburbanization in a high riot city. I find suggestive evidence that the riots augmented

white flight. γ is positive and significant over the 1960s (coeff. = 0.437, s.e. = 0.225).

Furthermore, adding the riot interaction wipes out the main effect of black population share,

indicating that only riot-torn cities continued to face white flight in this decade. As a placebo

test, I also run this specification for the previous decade, before the riots occurred. There is no

discernable relationship between riots that have yet to occur and white flight in the 1950s (coeff.

= 0.039, s.e. = 0.389).

An increase in the white suburban share can be due either to net in-migration from the

central city or to new arrivals from outside the SMSA (or both). Table 7 uses aggregate mobility

data from the 1960 Census to examine these channels.[27] A further benefit of the five-year

mobility data is that it is available for different sub-groups of the population.

The first two columns of Table 7 consider the probability of moving from the central city

to the suburban ring between 1955 and 1960, estimating:

$$\text{pr(live in suburb in 1960} \mid \text{in city in 1955)} = \alpha + \beta(\Delta b_{mrt}) + \varepsilon_{mrt} \qquad \textbf{(7)}$$

---

[26] Data on the location of 1960s riots was generously provided by Gregg L. Carter. The index considers five components of severity – deaths, injuries, arrests, arsons and days of rioting – indexed by i, and assigns to each riot j a value $S_j = \Sigma_i (X_{ij} / X_{iT})$ where X_{iT} is the sum of component i across all riots. The index value for a city measures the share of all riot damage occurring in that city. The median index value is 1.1 percent.
[27] Mobility data are only published by detailed category for 62 of the 68 SMSAs in the sample.

Columns 3 and 4 repeat the analysis for new arrivals to the SMSA:

$$\text{pr(live in suburb in 1960 | outside SMSA in 1955)} = \alpha + \beta(\Delta b_{mrt}) + \varepsilon_{mrt} \qquad \textbf{(8)}$$

Changes in urban diversity are associated with a similar pattern of mobility for city residents and new arrivals, but the effect on intra-SMSA moves are two to three times as large in standard deviation terms. In a similar vein, Cullen and Levitt (1999) find that changes in urban crime rates elicit a stronger mobility response among current city residents than among new entrants, a disparity they attribute to information about local conditions.

An increasing black population share had no effect on the likelihood that blacks already living in the central city relocate to the suburbs (row 2). Perhaps as a result, the lowest income group, which was disproportionately composed of African-Americans, did not respond to changes in urban diversity.[28] Black arrivals to the central city had a stronger effect on the mobility of higher income households (rows 4-5). A one standard deviation increase in the black population share over the 1950s was associated with suburban mobility equivalent to 23 percent of a standard deviation for middle income households and 38 percent for high income households.[29]

VIII. Assessing the quantitative role of white flight

We have seen that white households left cities in the postwar period as black migrants arrived. Because the housing stock was slow to adjust, urban housing prices also fell. In this section, I assess the quantitative importance of white flight as an explanation for postwar

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[28] The limited response of the lowest income groups to black in-migration is not entirely compositional. I observe a similar income gradient in 1970, when mobility data are available by race-income cell (not shown).
[29] Middle income households are defined as those earning $22,000-52,000 in Y2000 dollars. High income households earned more than $52,000.

suburban growth. Let's begin with an extreme thought experiment: what if there had been no black in-migration to the North and West during this period? Three million African-Americans lived in these regions in 1940. By 1970, the black population rose 10.5 million, due, in part, to an influx of four million black southerners. By the most conservative estimate, which ignores any northern-born offspring of southern migrants, migration contributed slightly more than half of the region's total black population growth.

In the average city, black population rose by 11.7 percentage points from 1940 to 1970. Without migration, this increase would have been only 6.2 percentage points. In this case, I estimate that the growth in the white suburban share would have been 4.5 points lower than it was [= 0.823 · (0.117-0.062)], reducing the level of the white suburban share from 70 to 65.5 percent in 1970. The actual white suburban share increased by 25 points from 1940 to 1970. These estimates imply that the white response to southern black migration can account for 18 percent (=4.5/25) of the growth in white suburbanization.

This no-migration counterfactual, while large, is not out of sample. For example, in 1940, both Detroit and Pittsburgh were 10 percent black. Detroit's black population grew five times as fast as Pittsburgh's over the next thirty years. By 1970, Detroit was 39.5 percent black. These estimates suggest that if Detroit's black population had instead grown at Pittsburgh's rate, the growth of suburban Detroit would have been *40 percent lower*.[30] While the Detroit/ Pittsburgh comparison is extreme, if Detroit's black population had instead grown at Chicago's rate, its white suburban share would have been 10 percent lower. All in all, the 18 percent figure for the nation as a whole appears reasonable.

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[30] Pittsburgh's black population share increased by 7.4 percentage points, while Detroit's increased by 29.5 points, a difference of 22.1 points. If Detroit's black population followed Pittsburgh's trends, I estimate that Detroit's white suburban share would have been 18.2 points (= 0.823 · 22.1) lower than its actual 75.3 percent.

In conducting a historical counterfactual, we must consider that many blacks were attracted to the North by the availability of manufacturing work. If blacks had not filled these positions, others may have. Given the strict quotas on immigration, these workers most likely would not have come from Europe or Asia. One possibility is that blacks would have been replaced by Mexicans, possibly through an expansion of the Bracero guest worker program into urban areas. The effect of these "replacement" migrants on suburbanization is unknown.

IX. Conclusion

Black migration from the rural South to industrial cities in the North and West coincided with the development of postwar suburbs. The resulting configuration of urban space – with blacks living in the center city and whites in the suburban ring – gave rise to substantially separate school districts and public services by race. Did black migrants just arrive in cities at the wrong time as suburbanization got underway? Or was their arrival an important explanation for why the suburbs grew at the time and in the places where they did?

This paper has shown that cities that experienced increasing racially diversity lost a greater share of their white population to the suburban ring from 1940 to 1970. I rule out explanations for this pattern based on the endogenous location decisions of black migrants or the effect of migration on urban housing prices. I conclude that this relationship is evidence of "white flight," which includes a desire to avoid black (or poor) neighbors or to escape the fiscal decisions and local policy associated with a racially (or economically) diverse electorate. My estimates suggest that the increase in urban black population in the postwar period can explain around 20 percent of suburban expansion from 1940 to 1970.

An ancillary goal of this paper has been to develop an instrument for changes in urban diversity in American cities over time. The instrument exploits shocks to southern industry and persistent black migration patterns between southern states and northern cities. This method has many additional applications to questions in urban and public economics as well as to the economic history of American cities in the 20th century.

Data Appendix

Net black migration rate by county:

Black migration rates are approximated using forward census survival ratios (Gardner and Cohen, 1971; Bowles, et al., 1990). Because true inter-county migration is unknown, this approach compares the actual population in a race-sex-age cohort in county c at time t to a counterfactual population determined by multiplying that cohort's population at time $t-10$ by its national survival ratio. The difference between the actual and predicted population counts are attributed to in- or out-migration.

Even when measured by race, the national survival ratio may understate mortality in the South, leading to an over-estimate of out-migration. Fishback, Horrace and Kantor (2005) calculated improved migration estimates for the 1930s using births and deaths collected in the national vital statistics registry. It would be worthwhile to extend their methods forward through 1970.

Agricultural data by county:

All southern, county-level variables are from the electronic *County and City Data Books*, with the exception of cotton acreage. Information on cotton acreage is available electronically for some states at the National Agricultural Statistical Service's historical data website (http://www.usda.gov/nass/pubs/histdata.htm) and for others at the website of the Population and Environment in the US Great Plains project of the ICPSR (http://www.icpsr.umich.edu/PLAINS/). The remainder were collected by hand from the Censuses of Agriculture.

Summary statistics for 1940-1960, 1350 southern counties

	Mean	Std. Dev.	Min	Max
Net black migration rate	1.811	147.253	-100	4400
% land in cotton	0.329	0.397	0	1
% farmers as tenant	0.312	0.195	0	0.942
% LF in agriculture	0.335	0.183	0.001	0.885
% LF in mining	0.028	0.074	0	0.818
$ in defense *pc*, 1940-45	0.162	0.599	0	9.025

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Figure 1: Correlation between change in black population share and change in white suburban share, 68 northern/western SMSAs, 1950-60
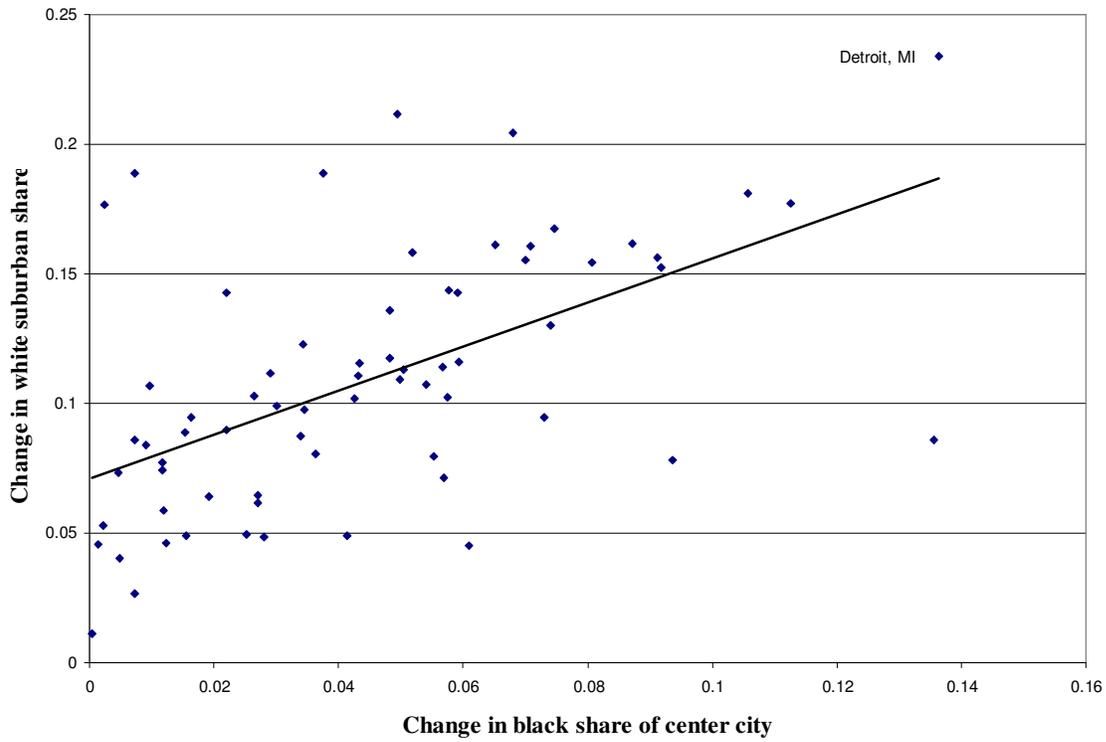
Notes: The figure plots data from all SMSAs in the North or West with more than 250,000 residents in 1970. The black share of the city's population is calculated as the number of black residents at time *t* divided by the city population time *t-10*.

Figure 2: Share of black migrants from Alabama and Mississippi who settled in 53 non-southern cities, 1935-40
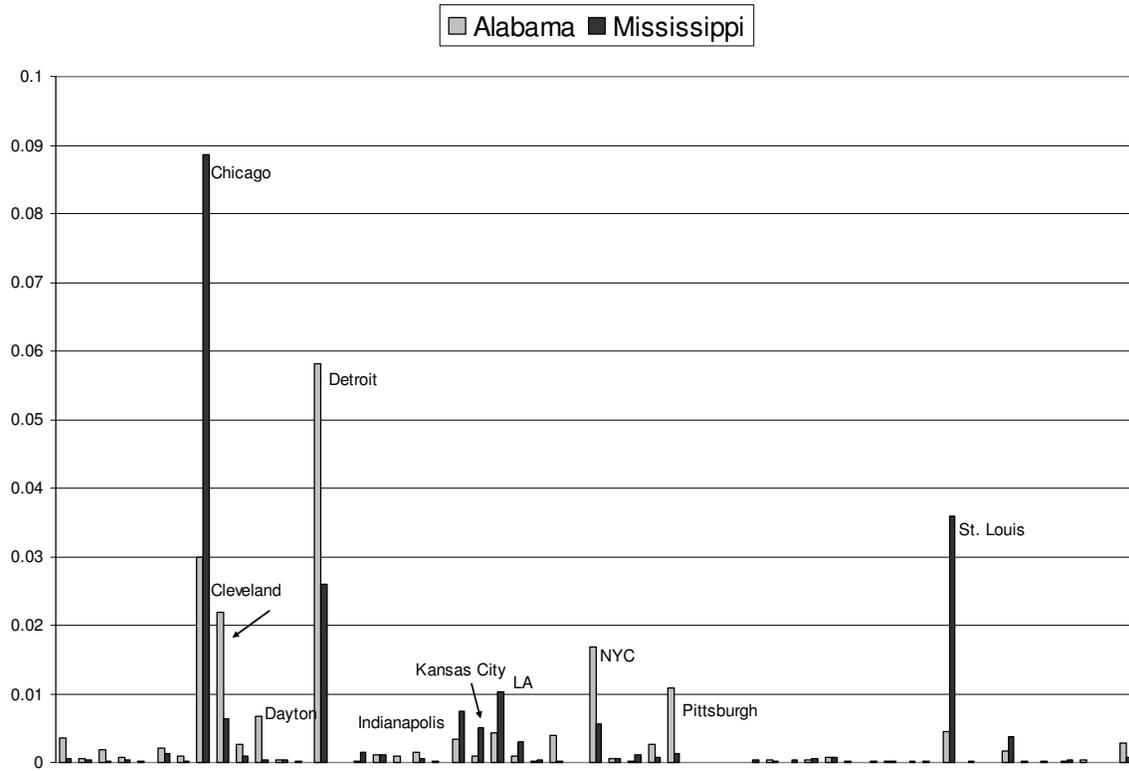
Notes: Data on migration flows are calculated from aggregate mobility tables in the 1940 Census. The number of migrants settling in each city is expressed as a share of *all* migrants leaving Alabama or Mississippi, rather than as a share of migrants from these states who settled in the North.

Figure 3: First stage, Predicted versus actual change in black population share, 1950-60
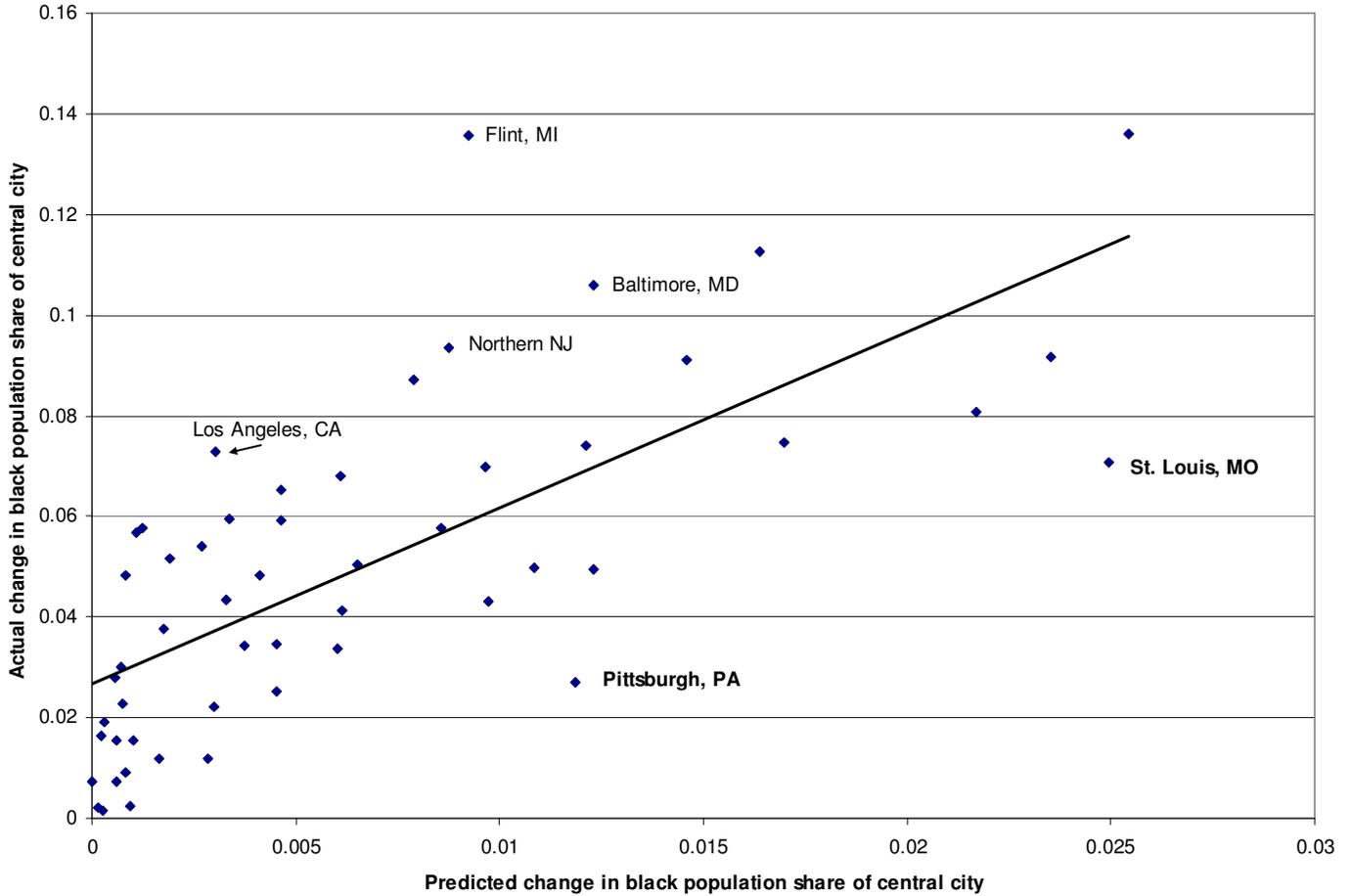
Notes: The sample includes the 53 SMSAs with available mobility counts by race in 1940. The predicted change in black population share is calculated by assigning predicted migration flows from southern states to northern cities using 1935-40 settlement patterns. See Section IV.B. for a detailed description of the instrument's construction. The four cities indicated in regular type have the largest positive deviation from the regression line (Baltimore, Northern New Jersey, and Los Angeles are in a three-way tie for second place). The two cities in bold type have the largest negative deviations.

Table 1: OLS relationship between the black share of central cities and the white suburban share of metropolitan areas, 1940-70

Dependent variable = White suburban share; RHS variable = Black population share in central city

City definition	Treatment of city borders		
	Actual borders	Consistent borders 1	Consistent borders 2
Census definition	0.899	0.754	0.741
	(0.175)	(0.152)	(0.152)
Pop > 50,000, 1940	0.971	0.822	0.808
	(0.167)	(0.143)	(0.143)
N	272	272	272

Notes: Standard errors are clustered by SMSA and reported in parentheses. The sample includes all SMSAs in the North or West with more than 250,000 residents in 1970. The black share of the city's population is calculated as the number of black residents at time *t* divided by the city population time *t-10*. The specification includes a vector of metropolitan area dummies and region-specific year dummies. The second and third column use a consistent set of city borders created by reassigning residents who *would have lived in the suburbs* if not for annexation back to the suburbs. The first measure (consistent borders 1) assumes that the population living in the annexed area had the same white share as the suburban ring, while the second measure (consistent borders 2) assumes that the population living in the annexed area had the same white share as the city.

Table 2: OLS relationship between black share of central city and white suburban share, Additional covariates, 1940-70

Dependent variable = Share of whites in suburban ring

	(1)	**(2)**	**(3)**	**(4)**
% black	0.759	0.697	0.652	0.606
	(0.153)	(0.151)	(0.163)	(0.171)
Share high school grad, SMSA		0.300		
		(0.256)		
ln(SMSA population)		0.086		-0.074
		(0.051)		(0.051)
ln(median family income), SMSA				0.103
				(0.104)
Share age > 65, SMSA				-2.825
				(0.701)
Interstates (in 100s miles)				0.054
				(0.017)
Interstates x city area (sq. miles)				-0.0001
				(0.00005)
Decades	1940-70	1940-70	1950-70	1950-70
N	272	272	204	192

Notes: Standard errors are clustered by SMSA and reported in parentheses. The notes to Table 1 provide details on the sample and specification. The indicator variable for high (low) initial suburbanization equals one if the suburban share was above (below) the median (43 percent) in 1940. The number of highway miles includes both two- and three-digit interstates that run through the center city. The central city's area is measured in square miles as of 1940. The sample size is reduced in the fourth column because highway data are missing for four metropolitan areas. These are: Lorain-Elyria, OH; northern New Jersey (Newark-Jersey City-Paterson), NJ; Wilkes-Barre, PA; and Worcester, MA.

Table 3: Determinants of net black migration rates by southern county over three decades, 1940-1970

	1940-50	1950-60	1960-70
% land in cotton	-80.315 (14.506)	-9.717 (7.410)	-61.859 (20.715)
% farmers as tenants	-101.608 (35.304)	-20.699 (17.155)	-47.439 (49.143)
% LF in agriculture	72.824 (28.602)	-180.791 (117.477)	92.647 (53.702)
% ag · (= 1 if tobacco state)	-80.712 (50.813)	233.538 (190.015)	-244.492 (83.164)
% LF in mining	-15.542 (89.206)	-61.526 (42.359)	-1.782 (82.135)
% min · (= 1 if TX, OK)	133.717 (185.241)	259.997 (81.529)	-87.932 (104.456)
$ in defense *pc*, 1940-45	20.065 (7.000)	1.837 (3.976)	2.720 (8.566)
N	1378	1352	1350

Notes: The data sources underlying this table are described in the data appendix, which also provides summary statistics. Specifications also include a vector of state dummy variables. The coefficients in shaded cells correspond to historical descriptions of black migration patterns. See IV.A. for more detail.

Table 4: Comparing OLS and IV estimates. Black population share, white suburbanization and the value of owner-occupied housing, 1940-70

	Actual % black	White suburban share	
Instrument type	First stage	OLS	IV
Actual migration	3.465	0.753	0.841
	(0.334)	(0.169)	(0.247)
Predicted, 1940-70	2.703	---	0.823
	(0.450)		(0.195)
Predicted, 1950-70	3.178	0.637	0.724
	(0.624)	(0.174)	(0.249)

Notes: Standard errors are clustered by SMSA and reported in parentheses. The sample includes the 53 SMSAs with available mobility counts by race in 1940. The notes to Table 1 provide details on the specification. The instrument in the first row assigns actual migration flows out of southern states to northern cities according to the 1935-40 settlement patterns. The instrument in the second and third rows assigned predicted migration flows in the same manner. See Section IV.B. for a detailed description of the instrument's construction.

Table 5: OLS relationship between the black share of central cities and the value of owner-occupied housing in the city (relative to the metropolitan area), 1950-70

	OLS				IV	
					Actual	Predicted
Black share, city	-0.643	-0.401	-0.467	-0.629	-0.578	-0.719
	(0.258)	(0.200)	(0.196)	(0.293)	(0.372)	(0.387)
Housing controls	N	Y	Y	N	N	N
Demographic controls	N	N	Y	N	N	N
N	204	204	204	159	159	159

Notes: Standard errors are clustered by SMSA and are reported in parentheses. The notes to Table 1 provide details on the sample and specification. Data on housing prices at the city level are available from 1950-70. The housing controls in column 2 include the median number of rooms and the median number of residents per central city dwelling and the share of such dwellings that are single-family detached units, owner occupied, and that have full plumbing. The demographic controls in column 3 include all variables in the specification underlying the fourth column of Table 2.

Table 6: OLS relationship between black share of central city and white suburban share, Heterogeneity by decade and region, 1940-70

By region		By decade	
Dependent variable = white suburban share		Dependent variable = Δ white suburban share	
Northeast	0.880	1940-50	0.688
	(0.213)		(0.148)
West	-0.153	1950-60	0.865
	(0.424)		(0.199)
E. North Central	0.884	1960-70	0.319
	(0.198)		(0.146)
W. North Central	1.128		
	(0.706)		
SMSA dummies	Y	SMSA dummies	N
Year, region x year	Y	Year, region x year	Y
N	272	N	204

Notes: Standard errors are clustered by SMSA and reported in parentheses. The notes to Table 1 provide details on the sample and specification. In the left-hand panel, the dependent variable is the white suburban share, which is regressed on the black population share interacted with a regional indicator. In the right-hand panel, the dependent variable is the change in the white suburban share, which is regressed on the change in the black population share interacted with decade indicators.

Table 7: OLS relationship between change in black share of the central city and mobility to the suburbs, 1955-60

Population sub-group	pr(suburb 1960 | city 1955)		pr(suburb 1960 | out SMSA, 1955)	
	Coefficient	SD response to 1 SD change	Coefficient	SD response to 1 SD change
All whites	0.744 (0.222)	0.387	0.961 (0.652)	0.183
All blacks	-0.019 (0.141)	0.016	---	---
By family income				
< 22,000 ($, 2000)	-0.006 (0.187)	0.000	-0.591 (0.697)	-0.106
22k-52k ($, 2000)	0.464 (0.233)	0.229	0.409 (0.691)	0.073
>52,000 ($, 2000)	0.807 (0.248)	0.376	1.386 (0.745)	0.229
N	62	62	62	62

Notes: Standard errors are reported in parentheses. The sample includes the 62 SMSAs in the North or West with available aggregate mobility data from the 1960 Census. The dependent variables are the probability of living in the suburbs in 1960 conditional on having lived in the center city (panel A) or outside the SMSA (panel B) in 1955. These probabilities are calculated from aggregate mobility counts. For example, p(suburb 1960 | city 55) = # who lived in city in 1955 and moved to suburb / (# who lived in city in 1955 and still live in same house + # who lived in city in 1955 and moved within the city + # who lived in city in 1955 and moved to suburb). The right-hand side variable is the change in black population share over a decade.

Appendix Table 1: Summary statistics, 1940-1970

	Mean	Standard Deviation
Population shares		
White suburban share	0.565	0.159
Δ White sub share, *t-t+10*	0.078	0.046
Black share of center city	0.096	0.087
Δ Black pop share, *t-t+10*	0.039	0.030
SMSA covariates		
Share high school grad	0.414	0.124
Population	1,076,394	1,673,143
Med family income ($2000)	$28,268	$18,719
Share age > 65	0.068	0.041
Interstate hwy in 100s miles	0.323	0.527
City area, square miles	58.281	77.393
Instruments		
Predicted Δ black pop share, *t-t+10*	0.005	0.007

Notes: Statistics presented for the 68 SMSAs in the North or West with more than 250,000 residents in 1970. The black share of the city's population is calculated as the number of black residents at time *t* divided by the city population time *t-10*. The white suburban and black population shares are calculated using counterfactual city borders. The borders are created by reassigning residents who *would have lived in the suburbs* if not for annexation back to the suburbs, under the assumption that the population living in the annexed area had the same white share as the suburban area as a whole.