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Can you move to opportunity? Evidence from the Great Migration

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Abstract

This paper shows that racial composition shocks during the Great Migration (1940-1970) reduced the gains from growing up in the northern United States for Black families and can explain 27% of the region's racial upward mobility gap today. I identify northern Black share increases by interacting pre-1940 Black migrants' location choices with predicted southern county out-migration. Locational changes, not negative selection of families, explain lower upward mobility, with persistent segregation and increased crime and policing as plausible mechanisms. The case of the Great Migration provides a more nuanced view of moving to opportunity when destination reactions are taken into account.

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1 Introduction

Childhood location has long run effects on adult outcomes. This fact has become the basis for "moving to opportunity" policies that aim to reduce poverty by moving families from disadvantaged neighborhoods to better ones (Chetty and Hendren, 2018a; Bergman et al., 2019). Using arguably the largest natural experiment in "moving to opportunity" in US history, this paper assesses the general equilibrium effects of policies of this type.

Between 1940 and 1970, during the Great Migration,[1] four million African Americans left the US South, where they faced severe restrictions on their social, political, and economic rights under Jim Crow. They settled in urban areas in the north and west of the United States, where racial hierarchies were substantially less pronounced. This massive population movement radically transformed the racial demographics of destination cities, prompting white flight from urban neighborhoods and potentially altering the policies of local governments (Boustan, 2010; Tabellini, 2019).

This paper shows that northern cities' responses to the Great Migration (also termed "Migration") ultimately reduced the gains from growing up in destination locations. The effects have been particularly detrimental for Black men. Those growing up in former Great Migration commuting zones ("CZs") today have lower adult income than those from similarly resourced families, but in locations less affected by the Migration. The channel appears to be changes in the environment for families, rather than ex-post sorting of negatively selected families into destinations. In response to Black migrant arrivals in the mid-century, white families withdrew from shared urban neighborhoods and public schools. By the late 1960s, riots broke out in Great Migration urban areas, and in the subsequent decades destination cities increased police spending, suffered from higher murder rates, and incarcerated a greater share

[1]The first wave of the Great Migration took place between 1915 and 1930 and was substantially smaller, numbering approximately 1.5 million individuals and affecting fewer cities to a lesser degree. The focus of this study is the larger second wave of the Great Migration, which I refer to from here on out simply as "the Great Migration."

of the population. Today, roughly 27% of the gap in upward mobility between Black and white families in the urban North can be attributed to changes induced by the Great Migration.

I draw on a large number of data sources to conduct the analysis in this paper. To establish the main results on upward mobility, I use the complete count US censuses from 1900 to 1940 and contemporary measures from Chetty and Hendren (2018b) and Chetty et al. (2020a). To understand mechanisms, I assembled a new database on local government expenditures, private schools, crime, incarceration, and other characteristics of destinations spanning the period 1920-2015. I digitized or harmonized data on local government spending from the Financial Statistics of State and Local Governments and the Census of Local Governments; data on schooling from the Biennial Statistics of Education and the Census; urban murder rates from the Uniform Crime Reports; Census reports on local county jail populations; and data on the county of commitment of federal and state prisoners from the Vera Institute of Justice's In Our Backyards database. This newly harmonized database is now available on my website for other researchers to use.

The empirical strategy makes use of the fact that Black southern migrants settled in northern cities where previous migrants from their communities had moved, giving rise to highly specific linkages between southern locations and northern destinations (Boustan, 2010; Black et al., 2015; Stuart and Taylor, 2021b). To address omitted factors that may codetermine increases in the urban Black population during the Great Migration and declines in upward mobility, I use a "shift-share" approach. I combine information on pre-1940 Black southern migrants' location choices with supply-side variation in county outmigration from 1940-1970, predicted from southern economic variables.[2] As the set of these variables is potentially large, I use a machine learning technique, Least Absolute Shrinkage and Selection Operator ("LASSO"), to

[2]One example is variation in the share of agricultural land planted in cotton. Cotton mechanization accelerated after World War II, contributing to Black outmigration from the South (Whatley, 1985); variation in cotton acreage thus provides plausible variation in southern county migration rates.

optimize the set of predictors of net-migration rates from the South. Assigning inflows to cities according to historical settlement patterns yields the predicted increase in the Black population from southern variation alone, which I normalize by the initial 1940 urban population. Black in-migration is a right-skewed distribution, so I define the Migration shock to a CZ to be the percentile of predicted Black population increase.

Using this strategy, I show that the Migration led to a reduction in observed upward mobility in destination CZs in the North today. A 1-standard-deviation larger increase in the historical Black population, approximately a 29-percentile increase in the shock, lowered adult income rank of children from low-income families by 3.6 percentiles, approximately an 11.3% drop in adult income. As a benchmark, a 1-standard-deviation increase in residential racial segregation lowers adult income by about 5.2% (Chetty and Hendren, 2018b).

Two potential mechanisms underlie this effect: selection, or changes in the characteristics of the average resident family, and location, or changes in local public goods or neighborhood quality. To disentangle these two channels, I use data on the childhood exposure effects of commuting zones from Chetty and Hendren (2018b). These data contain estimates of each commuting zone's causal effect on children's adult outcomes today. I examine whether the causal effect of a commuting zone varies with exogenous historical increases in the Black population. The interpretation is as follows: if an arbitrary child were to spend one additional year in a Great Migration CZ versus one less affected by the Migration, how does this affect his or her income as an adult? I estimate a robust negative effect of the Migration on this measure of upward mobility. My estimates suggest that the cumulative effect of spending one's entire childhood in a Great Migration city accounts for all of the negative impact of the Migration on observed upward mobility. In other words, I find no evidence that negative selection of families contributes to the association between historical racial composition shocks and declines in upward mobility.

Next I explore which groups of children were affected by the Migration. The largest negative effects manifest for Black men, who earn less growing up in

major Great Migration CZs compared to areas less affected by the Migration. I find much more muted effects on the earnings of Black women. This evidence is consistent with prior literature that finds that boys' outcomes are more responsive to family and environmental factors than girls' (Bertrand and Pan, 2013). Marriage rates are also lower in Great Migration CZs. This, combined with the deleterious effects on Black men's earnings, contributes to reduced Black household income in destination locations.

To understand what characteristics of locations changed as a result of the Migration and thus potentially explain the Migration's persistent effect on upward mobility today, I use the data I assembled on local governments, schools, and crime in commuting zones from 1920-2015. I use the same empirical strategy described above to estimate the impact of the Great Migration on potential mechanisms over time. Pre-1940 outcomes serve as placebo checks. My analysis reveals significant and persistent increases in the following areas: the racial gap in public school enrollment; white suburban residence within the commuting zone; murder rates; and rates of incarceration. The late 1960s were a turning point. Race riots broke out across major American cities and were more severe in Great Migration CZs. The racial attitudes of voters in the late 1960s aligned more closely with southern segregationist political views. Finally, local government responses to urban decline may have also exacerbated the racial gap in upward mobility. City governments on net increased spending on policing, but did not increase education, health, or infrastructure expenditures.

I rule out several alternative explanations for upward mobility reductions in Great Migration CZs. Many Black southerners moved to manufacturing centers during the 1950s and 1960s, and these may have undergone greater job loss due to deindustrialization. In all specifications, I control for the share of the labor force in manufacturing in 1940, which largely accounts for variation in manufacturing shares in subsequent decades. Results are also robust to including a Bartik instrument for employment changes using variation in industry composition interacted with national leave-one-out changes in industry-level

employment between 1940 and 1970. Furthermore, I find much smaller, statistically insignificant effects of the Migration on white men from low-income families, a group that would have been strongly affected if the findings were driven by deindustrialization alone. What is more likely is that a restructuring of economic activity within Great Migration CZs left Black families in the urban core without adequate opportunities while white families potentially followed jobs by moving to growing suburban areas, a finding in line with the historical and sociological literature on this topic (Sugrue, 1996; Wilson, 1987).

I investigate the extent to which the results reflect responses to southern Black migration specifically. White southerners also migrated to northern cities over the 20th century. I instrument for white southern inflows and show that these have no effect on Black upward mobility or on the gains to growing up in specific commuting zones. Second, European Mass Migration affected many northern cities in the late 19th and early 20th century. My results are robust to controlling for historical European migration into Great Migration destinations. To determine whether declines in upward mobility reflect fixed characteristics of locations with high Black population shares, I show consistent results using first-differenced measures of Black men's upward mobility, suggesting that changes in the racial composition, not simply the levels of the Black population or other immutable destination features, help explain the findings.

A large literature seeks to identify neighborhood effects and the impact of residential segregation and urban poverty on children's outcomes.[3] More recently, both experimental and quasi-experimental studies have shown childhood location to be an important determinant of adult outcomes and that substantial variation in these effects exists across the US (Chetty et al., 2016; Chetty and Hendren, 2018a,b). However, the stability of these effects in response to shocks is much less understood. I show that large mid-century shifts in the racial composition of northern cities altered the effects locations had on

[3]For literature on this topic, see Ananat (2011); Andrews et al. (2017); Cutler and Glaeser (1997); Massey and Denton (1993); Graham (2016); Sampson et al. (2002); Wilson (1987).

children, turning high opportunity locations into opportunity deserts, particularly for Black families.

This paper provides a new, long-run intergenerational perspective on the Great Migration. Papers studying the contemporaneous effects of the Great Migration found largely positive impacts on migrants themselves, particularly in terms of income (Collins and Wanamaker, 2014; Boustan, 2016a). An exception is Black et al. (2015) who find increased mortality and lower longevity of Black migrants in the urban North, relative to stayers from the deep South. To my knowledge, this is the first paper to consider the long-run impacts of the Great Migration on outcomes for the third generation living in the North.[4] The results of this study suggest that across the North, responses to the Great Migration worsened neighborhood environments. These changes were so dramatic that outcomes for the third generation in the North look no better today than for Black children growing up in the South.

An important component of the relationship between the Great Migration and intergenerational mobility that this paper does not speak to, however, is the causal effect of the Migration on the descendants of migrants themselves. The best estimates suggest that moving North nearly doubled the wages of migrants compared to those who stayed behind in the South (Boustan, 2016a). Thus, the children and grandchildren of migrants living in the North likely benefited from their parents and grandparents moving up in the national income distribution. Losses incurred through northern cities' responses to the Migration must be placed in context with overall improvements in Black economic status from moving North.

The rest of the paper is structured as follows. Section 2 gives an overview of the historical context. Section 3 describes the data sources, including on upward mobility and Black population change in northern cities and provides

[4]Leibbrand et al. (2019) consider the differences in neighborhood of residence at older ages between children of migrants in the North and those of non-migrants in the South. The study concludes that the children of migrants live in better neighborhoods but that some of this difference can be explained by positive selection of the migrants.

some descriptive evidence on the relationship between the two. Section 4 describes my empirical strategy for identifying the causal impact of the Migration. In Section 5, I present the main results on upward mobility and on the contribution of selection versus location to these findings. In Section 6, I present results on potential mechanisms behind the persistent effects of the Migration. Section 7 concludes.

2 Historical background

"My mother was my inspiration... she was one of those 6,000,000 Black people who left the South so that her children wouldn't have to grow up and put up with what she had to grow up and put up with."

- Helen Singleton, civil rights activist from Los Angeles.[5]

Starting in the 1910s, Black Americans migrated in large numbers from southern states to northern states, a phenomenon known as the Great Migration. By 1970, so many had moved that the percent of Black Americans living in the South fell to just over 50%, from around 90% in 1910. The Migration took place in two distinct waves, the first from around 1915 to 1930, with moves slowing considerably during the Great Depression, and the second from 1940 to 1970, the focus of the current study. After this, net flows of Black Americans reversed direction, with the South gaining more Black migrants than the non-South (Boustan, 2016a).

Before the 1960s and the ensuing changes ushered in by civil rights era activism and legislation, Black Americans faced significant limitations on their political, social, and economic freedoms in the US South (Wright, 2013). Declining labor demand in southern agriculture gradually loosened the largely rural Black population's ties to the land. Further, job opportunities for Black

[5]This quote is excerpted from a speech Singleton gave to Los Angeles high school students in 2012. Footage of the speech can be accessed here: `https://www.youtube.com/watch?v=gEotBOdh9_0`.

workers opened up in many northern cities. As a result of these changes, Black migrants increasingly undertook the journey north. In doing so, they sought better lives for themselves and their children, and for many decades, the North appeared to deliver on this promise.[6]

Helen Singleton, the daughter of a migrant and later an activist in the civil rights movement, recalled her surprise hearing about *Brown v. Board of Education*, the US Supreme Court ruling that rendered segregated schooling unconstitutional. Having attended high school in Los Angeles, California, the concept of a segregated school was foreign to her. By contrast, for many Black children in the South, even those from educated families, the paucity of public Black high schools made secondary schooling very costly (Margo, 1990, 1991a). Singleton's experience was reflected more broadly in educational patterns for Black children across the US in 1940.

Figure 1a shows the fraction of Black teenagers from median-educated households who obtained 9 or more years of schooling. The map illustrates stark differences in upward mobility for Black children in the North compared to the South. A major shift in the geography of upward mobility for Black Americans appears to have taken place in the decades after 1940.

Figure 2b illustrates the current geographic distribution of Black upward mobility in the US. Depicted in the map is average income rank for Black men and women who grew up in low income families in each commuting zone in the 2000s. Several northern locations that exhibited high outcomes for Black children in 1940 exhibit some of the worst outcomes for Black children today. The fact that the peak of the Great Migration took place in between motivates an empirical investigation of the Migration's role in the decline in Black upward mobility in the North.

[6]See Whatley (1985); Collins (1997); Hornbeck and Naidu (2014) for further discussion of the economic and political determinants of the Great Migration. For example, Collins (1997) shows how northern industrialists' hiring and recruiting Black workers hinged on reduced presence of and access to European immigrant labor due to World War I and immigration controls put in place in the 1920s. For an overview of the Migration's effects on Black workers' earnings, see Boustan (2016a).

3 Data and descriptive statistics

Documenting changes in upward mobility in Great Migration destinations requires both historical and contemporary measures of intergenerational mobility by location. I discuss the construction and sources for these measures below, followed by a description of the cities and commuting zones in the sample. More details on the data and sample are provided in Appendices A and B.

3.1 Upward mobility

Historical upward mobility To measure upward mobility in commuting zones prior to the 1940-1970 wave of the Great Migration, I use the Integrated Public Use Microdata Series ("IPUMS") version of the 1900-1940 complete count US censuses. I calculate the fraction of teens attending school among low socioeconomic status fathers or the fraction of teens with 9 or more years of schooling among parents with a median level of education for the US at the time. Teenagers typically reside in the same households as their parents, obviating the need to match them across censuses to observe parent economic status. At the same time, teenagers are old enough that their educational attainment is likely predictive of their adult educational attainment and future labor market outcomes. Observing outcomes for the near universe of enumerated teenagers reduces the scope for sampling bias in constructing upward mobility measures at fine geographies. Finally, teenager upward mobility can be constructed separately by race without differential selection bias across groups arising from lower name-based match rates for African Americans, who have fewer unique surnames as a legacy of slavery.

Contemporary upward mobility For modern measures of upward mobility, I use income upward mobility measures made publicly available by Chetty and Hendren (2018b) and Chetty et al. (2020a) (downloadable at `www.opportunityinsights.org`). Based on the universe of federal income

tax records from 1996-2012, these data contain measures of 1980s birth cohorts' income rank conditional on parent income rank. Measures are available separately for the 25th, 50th, and 75th percentile of parent income and by race and gender group.

How comparable are educational upward mobility in 1940 and income upward mobility in the 2000s? Across CZs where both measures are available, the two are strongly correlated, with a correlation coefficient of 0.49. Additionally, income upward mobility is strongly correlated with high school graduation rates in low income families today, with a correlation coefficient of 0.65.

The cohorts whose outcomes I analyze primarily correspond to the grandchildren of the Great Migration generation. I'm unable to observe upward mobility for earlier cohorts due to lack of suitable data—neither post-1940 complete count census nor pre-1990s IRS tax records are readily available. Instead, I assembled a new database of local public finance and neighborhood quality measures for commuting zones spanning the years 1920-2015, the details of which I describe in full in Appendix E. My analysis of these data in Section 6 shows when cities began changing in response to the Migration, shedding light on whether earlier cohorts would also have been affected.

3.2 Great Migration CZs: sample, measurement, and descriptive statistics

My analysis sample consists of 130 non-southern commuting zones for which data on the urban Black population in 1940 and 1970 could be collected from the census and from the City and County Data Books 1944-1977 series ("CCDB"). These commuting zones represent a significant share of both the overall population in the US as well as the Black population, specifically. About 86% of the non-southern US population and 96% of the non-southern US Black population lives in one of these commuting zones. Appendix B provides more details on the construction of the sample.

I define Black population change in a commuting zone during the Great Migration as the 1940 to 1970 increases in the urban Black population as a share of the initial 1940 urban population:

$$\Delta\text{Black pop}_{CZ}^{1940-1970} = \frac{b_{\text{urban},CZ}^{1970} - b_{\text{urban},CZ}^{1940}}{\text{pop}_{\text{urban},CZ}^{1940}} \tag{1}$$

where $b_{\text{urban},CZ}^{t}$ is the total Black population in all sample cities in commuting zone CZ in year t.

Functional form Because the distribution of Black population increases is highly right-skewed, I define the quantile function GM_{CZ}, or the percentile of the increase, to be the key independent variable in the empirical analysis.[7] Figure 2 depicts GM_{CZ} across northern commuting zones during the Great Migration. Plotted on the y-axis is the measure in equation 1, multiplied by 100 so that the units are percentage points. The x-axis measures GM_{CZ}, the quantile function or the percentile of urban Black population increase.

The median increase across commuting zones in the sample was 5.6 percentage points. As the figure demonstrates, however, historical Black share increases were very unevenly distributed across the North, even among commuting zones in the same region. Take for example, two commuting zones in the Midwest—Pittsburgh, PA and Detroit, MI. Both were major manufacturing centers in the 1940s. Pittsburgh's urban Black population share increased by 6.6 percentage points (corresponding to the 53rd percentile) while Detroit's increased by 29.3 percentage points (corresponding to the 97th percentile). Salt Lake City, UT saw almost no increase in its Black population while Washington, DC saw an increase of roughly 53.2 percentage points.

The descriptive relationship between Black population change during the Great Migration and average income upward mobility today can be seen in

[7] This scaling is similar to that used by Sequeira et al. (2020) who study the long-run effect of historical European immigration into the US, which also exhibits a right-skewed distribution.

Figure 3. The relationship is strikingly negative and linear.[8] A 1-percentile greater Black population increase between 1940 and 1970 is associated with a decline of -0.08 percentiles in adult income rank for individuals with lower income parents. However, as discussed below and in Section 4, this relationship cannot be interpreted as causal given that correlates of Black population change may drive this relationship. Moving towards a causal framework requires understanding the historical forces behind migration during this period.

Why did urban Black populations in the North increase so dramatically between 1940 and 1970? After a period of reduced mobility during the Great Depression, Black outmigration from the South resumed at an accelerated pace after 1940. War-time jobs in the defense industry and in naval shipyards led to substantial Black migration to California and other Pacific states for the first time since the Migration began. Migration continued apace to midwestern cities in the 1950s and 1960s, as the booming automobile industry attracted millions more Black southerners to the North, particularly to cities like Detroit or Cleveland. Of the six million Black migrants who left the South during the Great Migration, four million of them migrated between 1940 and 1970 alone.

As is clear from the discussion above, mid-century economic conditions in northern cities influenced where migrants moved and are likely correlated with increases in the Black population during this period. They may also determine the dynamics of upward mobility in destinations. For example, Black urban populations increased more in places with higher levels of educational upward mobility (correlation: 0.27). If higher educational upward mobility reflects better school quality that may persist over time, then OLS estimates of the Great Migration's impact on upward mobility will be biased towards zero.

[8]The linearity of the relationship suggests that very large increases in the Black population share at the tail end of the distribution in Figure 2 had similar effects as smaller increases at the bottom and middle of the distribution. This may in part be due to the positive relationship between levels of the Black population share and changes in the Black population between 1940 and 1970. Small absolute increases which nevertheless took place in locations with small Black population shares may still have prompted large responses. As I discuss in Section 5, my results are robust to flexibly controlling for the level of the Black population share in 1940.

At the same time, Black population increases are positively correlated with the share of the labor force in manufacturing in 1940 (correlation: 0.18). Former manufacturing centers form today's Rust Belt, an area of low upward mobility. Thus, deindustrialization could confound the effects of the Great Migration. Finally, migrant inflows were larger in locations that already had a large population of recent Black southern migrants (correlation: 0.56),[9] raising questions about the characteristics of destinations that led them to be hubs for Black southerners prior to 1940. Given that these destination-level factors may influence both Black population increases and future levels of upward mobility, I construct an instrument for the former that is plausibly exogenous with respect to pre-1940 destination characteristics.

4 Empirical Strategy

The intuition behind the empirical strategy is well captured by the migration histories of Detroit and Baltimore. Both were major destinations during the Great Migration as well as major industrial centers in 1940. However, Black migrants arriving in these locations in 1940 came from parts of the South that experienced very different patterns of outmigration between 1940 and 1970. Figure 4 depicts variation in Black migration for these two cities. Detroit drew the plurality of its migrants from Alabama while Baltimore drew the plurality from Virginia. Migrants from Alabama tended to come from counties specialized in cotton production, and negative shocks to cotton spurred outmigration from these areas. Virginia, by contrast, was a major recipient of war production spending during World War II. War production jobs attracted Black workers and consequently lowered outmigration rates.

[9] Data on recent Black southern migrants come from the 1940 complete count census. The 1940 census was the first census to systematically record internal migration. Enumerators asked individuals about their prior residence (city, county, and state) in 1935. I define recent southern Black migrants as those who reported a southern county of residence in 1935 and lived in an northern city as of 1940. Here, southern is defined as being from the following states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

The empirical strategy generalizes from the example above and builds on the classic shift-share instrument used to estimate the local labor market impacts of migration (Altonji and Card, 1991). The technique was first adapted to the Great Migration context by Boustan (2010). Black southern migrants tended to move where previous migrants from their communities had settled, thus generating correlated origin-destination flows similar to those observed in the international migration context. Shocks to migrants' origin locations ("push factors") are plausibly orthogonal to shocks to the destinations ("pull factors") that could also influence the location choices of future migrants. Interacting exogenous shifts in migration at the origin level with historical migration patterns in the destinations yields a potential instrument for Black population changes in the North.

To construct my instrument for Black population change in northern cities, I interact variation in the cities' pre-1940 migrant composition with variation in outmigration from southern counties driven by push factors alone. These push factors include defense facility spending in southern counties during World War II and shocks to cotton and other economic sectors in the South, e.g., tobacco and mining. More precisely, I replace the numerator in Equation 1 with the predicted, as opposed to actual, increase in the Black population:

$$\text{Predicted Black pop}_{CZ}^{1940-1970} = \frac{\hat{\Delta}b_{\text{urban},CZ}^{1940-1970}}{\text{pop}_{\text{urban},CZ}^{1940}} \tag{2}$$

where $\hat{\Delta}b_{\text{urban},CZ}^{1940-1970}$ denotes the predicted increase, which I define as follows:

$$\hat{\Delta}b_{\text{urban},CZ}^{1940-1970} = \sum_{j \in S} \sum_{c \in CZ} \omega_{jc}^{1935-1940} \times \hat{m}_j^{1940-1970}. \tag{3}$$

The term $\hat{m}_j$ is predicted Black migration from southern county j over the decades 1940 to 1970; ω_{jc} is the share of recently migrated pre-1940 Black southern migrants from county j living in city c in 1940. The term $\hat{m}_j^{1940-1970}$ consists of the sum of fitted values of decadal predictions of southern county net migration (from 1940-1950, 1950-1960, and 1960-1970) using lagged southern

economic predictors of migration:

$$\hat{m}_j^{1940-1970} = \sum_{t=1950}^{1970} \hat{\text{mig rate}}_{jt} \cdot \text{Black pop}_{jt}$$

where fitted values, $\hat{\text{mig rate}}_{jt} = \text{mig rate}_{jt} - \varepsilon_{jt}$, come from the following prediction of net-migration rates:

$$\text{mig rate}_{jt} = \beta_0 + Z'_{jt-10}\beta_1 + \varepsilon_{jt}.$$

Appendix C describes the construction of ω_{jc} and $\hat{m}_j^{1940-1970}$ and the procedure for choosing predictors Z'_{jt-10} in detail. After computing predicted increases in the urban Black population in northern CZs using this method, I use the percentile of predicted increases, $\hat{GM}_{CZ}$, to instrument for the percentile of observed increases in the Black population, GM_{CZ}.

My empirical strategy builds off of the identification strategy developed by Boustan (2010) and used in subsequent papers on the Great Migration (Tabellini, 2019; Fouka et al., 2021), but introduces two key innovations. As I show below, these innovations enhance the credibility of my estimates, by allowing for multiple alternative instruments, and increase precision by leveraging rich, county-level variation in migration patterns.

First, I use the complete count 1940 census, which contains microdata on the universe of recent Black southern migrants into northern cities, including their county of residence in 1935. Using county of residence in 1935 and city of residence in 1940, I construct a matrix of southern-county-to-northern-city linkages containing the share of each southern county's outmigrants who settled in each northern city. This detailed linkage contrasts with the state-level linkage used in the prior literature.[10] Using the complete count census

[10]Exceptions include Black et al. (2015), Stuart and Taylor (2021a), and Stuart and Taylor (2021b), who use the Duke SSA/Medicare dataset, no longer available to new researchers. Boustan (2010) uses census tabulations with migrants' 1935 state of residence to construct southern-state-to-northern-city migration shares. The 1940 census was declassified in 2012, so the empirical strategy used in the present study was not feasible then.

data, I am able to leverage shocks to over 1200 origin counties as opposed to just 14 southern states. A large number of shocks is important for the validity of the empirical strategy when identification relies on shocks to origin locations being orthogonal to shocks to the destinations (Goldsmith-Pinkham et al., 2018; Adão et al., 2019; Borusyak et al., 2021).

The second innovation is that I use machine learning to improve the prediction of net migration from southern counties. The motivation for this approach is that the set of potential predictors from southern county variables is large. Given that the first stage prediction of an endogenous variable by an instrument can be viewed as a pure prediction problem (Belloni et al., 2011), I select among the predictors for migration used by Boustan (2010) using a Post-LASSO estimation procedure. In this procedure, for each decade of migration between 1940 and 1970, I use LASSO to select predictors among county characteristics in the previous decade with a penalty on the absolute number of predictors, where the tuning parameter has been chosen by 5-fold cross-validation. I then use the variables chosen by this procedure to estimate their relationship with county net-migration rates using OLS.

To focus on variation from specific southern-county shocks, I control for the total share of the 1940 urban population made up of recent Black migrants from any southern county. I also include the following baseline 1940 characteristics for robustness: educational upward mobility and the share of the labor force in manufacturing. These regressions can be interpreted as estimating the effect of historical Black population change on the change in upward mobility in destinations, where I allow for dynamics in upward mobility.[11] Finally, I include census region fixed effects. The inclusion of these controls does not significantly alter the point estimates, and I report key results with and without this baseline set of controls in Tables 8 and 9.[12]

[11]If upward mobility changed in the treated commuting zones for reasons other than the Great Migration, forcing the coefficient on historical upward mobility to be 1 may be a misspecification of the true relationship between the Migration and upward mobility. Results are robust to an alternative specification where I estimate the Great Migration's impact on the 1940-2015 change in upward mobility for Black men (see Section 5.3).

[12]Including census region fixed effects leads to more precise and larger IV estimates of the

Estimating equation I estimate the relationship between the Great Migration and upward mobility using the following empirical framework:

$$\bar{y}_{p,CZ} = \alpha + \beta GM_{CZ} + \mathbb{X}'_{CZ}\Gamma + \varepsilon_{CZ} \tag{4}$$

$$\text{First Stage: } GM_{CZ} = \gamma + \delta \hat{GM}_{CZ} + \mathbb{X}'_{CZ}\mu + \epsilon_{CZ} \tag{5}$$

In equation 4, the coefficient β represents the OLS estimate of the effect of GM_{CZ}, the percentile of a commuting zone's 1940-1970 Black population increase, on $\bar{y}_{p,CZ}$, the average adult income rank of children with parents at income rank p, conditional on baseline characteristics and census region fixed effects represented by the control vector X_{CZ}. Equation 5 estimates the first stage relationship between the instrument, the percentile of predicted Black population change $\hat{GM}_{CZ}$, and the percentile of actual Black population change, GM_{CZ}. The reduced form equation is as follows:

$$\bar{y}_{p,CZ} = \tilde{\alpha} + \tilde{\beta} \hat{GM}_{CZ} + \mathbb{X}'_{CZ}\tilde{\Gamma} + \tilde{\varepsilon}_{CZ} \tag{6}$$

where $\tilde{\beta}$ represents the reduced form impact of the Great Migration instrument on upward mobility. For all main results, I report the estimated OLS (β), reduced form ($\tilde{\beta}$), and two-stage least squares or 2SLS ($\frac{\tilde{\beta}}{\delta}$) coefficients.

impact of the Great Migration on upward mobility. However, the point estimate without controls is not statistically different from the point estimate with census region fixed effects or with the full set of baseline controls. See columns 1, 2, and 3 of Table 8. A potential reason for the difference in the point estimates between columns 1 and 2 is that the instrument for Black population increases leverages linkages between southern origin locations and northern destinations made between 1935 and 1940. Relatively few Black southern migrants had settled in the West by 1940, thus, relative to the endogenous variable, the instrument reallocates migrants towards the Midwest as opposed to the West. It would be ideal to use the 1950 census to establish the migrant network for the West as many African Americans moved west for the first time during World War II. The required micro data from the 1950 census will be available in 2022. Given these data constraints, inclusion of census region fixed effects reduces the noise introduced by pre-1940 migrant networks.

Identifying assumption and validity checks In order for the above approach to identify the causal impact of the Great Migration, conditional on the specified baseline 1940 characteristics, my instrument for Black population increases must be orthogonal to omitted characteristics that are correlated with changes in upward mobility after 1940. This identifying assumption can be stated formally as:

$$\mathbb{E}[\hat{GM}_{CZ} \cdot \tilde{\varepsilon}_{CZ} | \mathbb{X}_{CZ}] = 0 \tag{7}$$

Although this assumption cannot be directly tested, relying on shocks to southern counties assuages concerns that my instrument for Black in-migration is correlated with unobserved determinants of upward mobility in the North. Still, I provide further corroborating evidence of this assumption in two ways: testing for pre-trends and evaluating whether correlated shocks to northern cities and southern counties plausibly explain my results.

Conditional on baseline controls, the instrument for the Great Migration based on shocks to southern counties is uncorrelated with educational upward mobility prior to 1940. Table 3 reports the coefficients on $\hat{GM}$ from the reduced form model in Equation 6. The coefficients are very small in magnitude relative to dependent variable means, statistically insignificant, and similar across the decades 1900 to 1940. The Migration also does not predict any differences in adult median educational attainment in 1940.[13]

A new literature on shift-share instruments highlights two paths to identification: quasi-randomness of shares versus quasi-randomness of shifters. In the context of the Great Migration, early southern migrants were not choosing northern locations at random, as I show in Section 3.2. Rather, it is shocks to migrants' home counties that generates exogenous shifters of the Black population in the North. A key assumption of this latter approach is that shocks to the South are not correlated with shocks to the North (Borusyak et al., 2021).

[13]Appendix Table D4 shows the instrument also does not predict other baseline socioeconomic characteristics of destination CZs, including average marriage rates, occupational status, or income.

To support the assumption that the results are not simply generated by correlated shocks to origins and destinations, I construct alternative instruments and conduct an over-identification test. In addition to the baseline instrument, I construct a second instrument using southern county outmigration rates that are first residualized on state fixed effects. This version of the instrument accounts for correlated shocks to southern states and northern destinations (e.g., Virginia and Baltimore, which both have a substantial defense industry). Note that shocks must be negatively correlated to generate both outmigration from the origin location and endogenous in-migration to the northern destination. A third instrument uses variation in state of birth across the southern-born Black population in northern cities in 1940 interacted with state-level net migration. This instrument leverages northern cities' exposure to a different set of origin shocks: shocks to the birth states of southern-born northern Black residents as opposed to southern counties of prior residence for recent Black migrants identified through the 1940 census migration lookback question.[14] Appendix Figure D16 shows that the results using each of these instruments are extremely similar, and a formal over-identification test fails to reject the null that the estimated effects on upward mobility are statistically indistinguishable from each other (Hansen J statistic p-value of .20).

Adão et al. (2019) note that in the case of shift-share instruments, standard inference procedures, such as geographic clustering, may result in standard errors that are too small. This will be the case, for example, if a set of southern counties bears similar importance across multiple northern cities, generating correlation at the origin county level across destinations. Following Adão et al. (2019), I run a placebo analysis interacting recent Black southern migrant location choices with random shocks. The resulting coefficients are significantly negative at the 1% level just 6.1% of the time, suggesting that the impact of the Great Migration on upward mobility is unlikely to be driven by noise. More details are provided in the online appendix, section D.7.7.

[14]The fact that this instrument yields similar results as the baseline provides reassurance that results are not driven by the specific shares constructed using recent Black southern migrants' origin locations as opposed to those of longer-term Black residents of the North.

First-stage results Figure 5 shows a binned scatterplot of the relationship between GM, the percentile of actual Black population increase, and $\hat{GM}$, the percentile of predicted Black population increase, where both measures have been residualized on census region fixed effects and the set of 1940 baseline controls: educational upward mobility, the share of the labor force in manufacturing, and the share of the 1940 urban population made up of recent southern Black migrants from any southern county. The y-axis plots mean percentile of Black population change within 20 5-percentile bins of predicted Black population change. The slope of the regression line is equivalent to the coefficient $\hat{\delta}$ from equation 5. A 1-percentile larger predicted Black population increase is associated with a 0.30 percentile greater actual Black population increase over the time period. The F-statistic on the first stage is 15.3.

5 Results on upward mobility

The Great Migration represented a large-scale movement to opportunity for Black Americans. In the North, jobs were far better paying, Black children could attend public high school, and racial equality was taken for granted in many facets of northern life.[15] From the vantage point of 1940, there was every reason to believe future generations of Black children would continue to reap the benefits of their parents and grandparents having migrated. The results from the empirical analysis in this paper suggest otherwise. While the focus of my study is how the Migration altered opportunities within the North, depending on the degree of in-migration, the effects were so large as to bring average outcomes in the North in line with those of an improving South.

[15]See Wilkerson (2011) for accounts and experiences of individual migrants arriving in and navigating new lives in the North.

5.1 Impact on raw vs. causal upward mobility estimates

A key contribution of this paper is to provide causal evidence of the Great Migration's effect on the gains from growing up in specific locations, thus illustrating the endogeneity of location effects with respect to changes in local racial composition. Doing so requires separating out the Migration's effects on the composition of local families, which may alter average outcomes, from effects on the environment or locational factors. I illustrate this below in a simple framework.

Let the outcome for a child i with parent household income rank p living in commuting zone CZ be the sum of a pure location component, $\mu_{p,CZ}$, and an idiosyncratic family component, $\theta_{ip,CZ}$:

$$y_{ip,CZ} = \mu_{p,CZ} + \theta_{ip,CZ} \tag{8}$$

Recall, I observe mean outcomes in a location at a given parent rank p:

$$\bar{y}_{p,CZ} = \mu_{p,CZ} + \bar{\theta}_{p,CZ} \tag{9}$$

The Migration's effect on average upward mobility, or $\frac{d\bar{y}_{p,CZ}}{dGM_{CZ}}$, can be decomposed into its constituent effects on the composition of families living in a destination, $\frac{d\bar{\theta}_{p,CZ}}{dGM_{CZ}}$, versus the effect of the Migration on the gains from growing up in specific commuting zones, $\frac{d\mu_{p,CZ}}{dGM_{CZ}}$, the key parameter in this study:

$$\frac{d\bar{y}_{p,CZ}}{dGM_{CZ}} = \frac{d\mu_{p,CZ}}{dGM_{CZ}} + \frac{d\bar{\theta}_{p,CZ}}{dGM_{CZ}} \tag{10}$$

One example of $\bar{\theta}$ includes the racial composition of families, which if not taken into account, could explain a substantial portion of the Migration's estimated impact on $\bar{y}_{p,CZ}$. Several studies have found persistent differences in intergenerational mobility by race, even among those growing up in the same

census tract (Mazumder, 2014; Davis and Mazumder, 2018; Chetty et al., 2020a). Because the Migration increased the fraction Black in destination locations, average upward mobility may be mechanically lowered through this channel. In Section 5.2, I show how the estimates in this section indeed reflect in part this composition effect. Using race-specific mobility outcomes purges the data of this composition effect; however, it does not address other sources of unobserved heterogeneity across families, such as a differential propensity to invest in children's education.

Examples of μ, by contrast, include any and all location factors that influence children's long-run outcomes outside of one's own family, such as schools or other local public goods; neighborhood quality and crime rates; or peer effects.[16] By altering incumbent residents' location choices, giving rise to segregation, or by changing the equilibrium bundle of public goods voted on by local residents (Alesina et al., 2004), the Migration may affect children's outcomes independent of their families' characteristics.

My analysis focuses on two measures of upward mobility to distinguish these channels and to probe the robustness of my findings—the raw, average outcomes of children with low or high income parents by location and the causal effect of location on children's outcomes, encompassing the myriad factors listed above.

Figure 6 shows a binned scatterplot of the relationship between $G\hat{M}$ and average outcomes for individuals with low income parents (at the 25th percentile of the parent income distribution). The outcome variable is the estimated mean household income rank of individuals with parents at income rank p by childhood commuting zone. Both the outcome and $G\hat{M}$ have been residualized on the baseline set of controls discussed in Section 4. Each dot represents average outcomes across commuting zones within 5-percentile bins of the shock. As in the raw data reported in Figure 3, Figure 6 shows a strik-

[16]Note that I have modeled the effect of family and location factors additively. I do not include an interaction term reflecting potentially different causal effects of location by family type or characteristics as differentiated estimates such as these are not available.

ing negative relationship between historical Black migrant inflows and average outcomes for individuals from low income families in destination CZs today.

Table 4 reports 2SLS estimates of the relationship. A 1-percentile increase in the historical Black population lowered household income rank by 0.125 percentile points (s.e. = 0.033). OLS estimates are reported in Table 4 as well.[17] Scaling this effect by a 1-standard-deviation increase in the Black population share, the estimated coefficient represents an 11.3% drop in adult income. The results show that historical Black migrant inflows reduced average upward mobility for low income families in the destination CZs today, which may stem from composition effects or locational factors.

I then estimate the Great Migration's impact on the causal effect of childhood locations, a proxy for $\mu_{p,CZ}$ in equation 8, which I take from Chetty and Hendren (2018b). The authors estimate CZ effects on children's adult income using families that moved across CZs and exploiting variation in children's ages at the time their families moved. Details on the construction and validity of these measures are available in Appendix D.4. The impact of the Great Migration on this alternative measure of upward mobility can be interpreted as follows: a child randomly assigned to spend an additional year in a CZ that experienced a large Great Migration shock versus one that experienced a smaller shock has greater or lower adult income rank.[18]

Figure 7 shows a binned scatterplot of the impact of the Great Migration on CZ childhood exposure effects for individuals with parents from the 25th

[17] Appendix Table D5 reports the results for individuals with high income parents. I find more modest effects of $\hat{GM}$ on the outcomes of individuals with high income parents (at the 75th percentile of the parent income distribution). For this group, a 1-percentile increase in the historical Black population lowered household income rank by 0.054 percentile points (s.e. = 0.023). See Appendix Section D.2 for more details.

[18] One downside of these measures is that they are not available separately for Black and white children, preventing me from exploring potentially heterogeneous impacts of the Migration on $\mu_{pr,CZ}$, or location effects by racial group r. This means I identify impacts of the Migration on childhood exposure up to an average effect across racial groups. In Section 5.2, I directly estimate the effect of the Migration on upward mobility for Black and white families separately and discuss how the population-weighted average of these effects compares to the estimates for all racial groups discussed in this section.

percentile of the parent income distribution. Both the outcome and $\hat{GM}$ have been residualized on the baseline set of controls discussed in Section 4. Each dot represents average outcomes across commuting zones within 5-percentile bins of the shock. The figure shows a strong negative relationship between historical Black migrant inflows and the effects of childhood exposure to destination CZs. Just one year in a CZ with a larger Great Migration influx lowers adult income relative to a year in a less affected CZ.

Table 5 reports OLS and 2SLS estimates of the relationship. The 2SLS estimates can be interpreted as follows: a 1-percentile larger increase in the historical Black population lowers household income rank by 0.0087 percentile points (s.e. = 0.0028) per year of childhood exposure.[19] The 2SLS coefficients are larger in magnitude than the OLS although they are not statistically indistinguishable from each other at the 5% level. Nevertheless, the differences in the magnitudes may once again indicate that omitted characteristics are positively correlated with both childhood exposure effects and Black population change, biasing the OLS estimates towards zero.

Interpretation of results on childhood exposure effects The results thus far support the hypothesis that one way responses to the Great Migration lowered upward mobility was through a changing environment for families. These estimated impacts on childhood environment can be combined with the first set of results on average upward mobility to quantify the impact of the Migration through location ($\mu_{p,CZ}$) versus selection ($\bar{\theta}_{p,CZ}$).

I do this by scaling the effect on one year of childhood to represent full childhood exposure to a Great Migration destination and comparing this to the effect on average outcomes. I make two increasingly conservative assumptions to arrive at an appropriate scaling factor. First, I follow Chetty and Hendren (2018a) and Chetty and Hendren (2018b), who assume constant location effects

[19]For individuals from high income families, I find effects of about half the size—consistent with the results on average upward mobility. See Appendix Table D6 for these results and Appendix Section D.2 for more details.

over each year of childhood and multiply exposure effects by 20 to approximate full childhood exposure.[20] Next, I apply a smaller scaling factor of 15.53 based on evidence from Chetty et al. (2020a) and Deutscher (2020), who demonstrate a kink in exposure effects around age 13, with pre-teen years of exposure having a smaller effect than post-teen years (see Appendix Figure D5).[21]

The table below reports these results. All estimates have been scaled to represent the effects of a 1 s.d. increase in Great Migration inflows.[22] Column 1 reports the effect of the Great Migration on adult income rank solely through childhood exposure to the location. Column 2 reports the same effect on average upward mobility. The latter estimate combines the Migration's effects through selection and location. The ratio of Column 1 estimates to Column 2 estimates gives a sense of what share of the impact of the Migration is driven by location versus selection effects.

Using the least conservative assumption, 120% ($\frac{-4.3}{-3.6} \times 100\%$) of the impact of the Migration on upward mobility can be attributed to location channels, consistent with positive selection bias on net. The second row takes into account more muted impacts of early years of childhood exposure. In this case, I find that the location channels explain 93% of the Migration's effect on upward mobility.

[20] Using 20 years as a scaling factor makes my results comparable to, for example, the decomposition from Chetty and Hendren (2018b) that 80% of the correlation between upward mobility and segregation is due to location effects while 20% is due to sorting.

[21] In Appendix D.4, I discuss a third, arguably overly conservative scaling factor that takes into account limitations in the data used to estimate causal location effects. Family location is only observed starting at age 16 for the oldest cohorts of children in the tax records data. Using information on the share of 16 year-olds in the data who lived in the same location at age 8 and making the extreme assumption that of those, none were in that location before age 8, and of the others, none were exposed until age 16, I apply a smaller scaling factor of 14.52. Even under this assumption, 87% of the Great Migration's impact is via location not family composition effects. Appendix Section D.4 provides additional details, including the exact numbers and calculations used to derive these alternative scaling factors.

[22] For column 1 results where precision weights are used, a 1 s.d. increase in Migration inflows is a 25-percentile increase in the historical Black population. For column 2, a 1 s.d. increase in the Migration is a 29-percentile increase. See the bottom row of Tables 4 and 5.

Table 1: Contribution of location versus selection in Great Migration effects

	CZ Childhood Exposure Effects	Average Upward Mobility
20 years	-4.3	-3.6
15.53 years	-3.4	-3.6

All 2SLS specifications include region fixed effects as well as baseline controls from 1940, including total 1935-1940 Black southern migrant share of the population, share of the labor force in manufacturing, and educational upward mobility.

Given the degree of uncertainty in these estimates, I cannot entirely rule out negative selection; however, the results strongly indicate that changes in childhood environment are the primary mechanism for Great Migration's impact on upward mobility. In what follows, I provide additional evidence for this hypothesis through two entirely separate analyses. First, in the next section, I show that among Black children, those growing up in places with larger historical Great Migration inflows have lower income as adults than Black children from similarly resourced families growing up in less affected locations. Thus, the results are not simply driven by increasing the share of Black families, who have lower upward mobility regardless of location, in destination CZs. Second, in Section 6, I document clear changes in public spending, segregation, and neighborhood quality in Great Migration CZs that accord with destinations altering substantially in response to the Migration.

5.2 Heterogeneity by race and gender

To assess whether different groups of children were more or less affected by the Migration, I estimate the long-run impact of $\hat{GM}$ on average upward mobility in CZs for Black and white individuals separately. The outcome variable is average individual income rank by childhood commuting zone and parent

income group. Due to data limitations, I am unable to separate Black descendants of Great Migrants versus descendants of northern Black residents. Thus, estimated effects should be interpreted as the average effect on these two groups. I am also only able to observe outcomes for those families who remained in destination commuting zones. This may be a concern due to reverse migration by Black Americans to the South after 1970. However, because of low migration rates during the years when the children in the sample were born (1978-1983), I do not believe these migratory patterns greatly influence the results. Finally, both Black and white families migrated from urban to suburban areas over the sample period. Because I examine outcomes at the commuting zone level, however, these within-metropolitan-area migrants are still included in the sample.[23]

Figure 8 summarizes the results from 2SLS regressions of the Migration's impact on race-specific upward mobility, where the shock has been scaled to represent a 1-standard-deviation increase in the historical Black population. Black men face the largest reductions in individual income rank from having grown up in Great Migration commuting zones, and this is true for those with both low and high income parents. The effect on Black women with low income parents is negative and statistically insignificant while the effect on Black women with high income parents is positive and statistically significant at the 10% level.[24] I find smaller and statistically insignificant effects on white

[23]Note, the term "white" refers to the non-Hispanic white individuals. It should also be noted that outcomes by subgroup from Chetty et al. (2020a) are only available for geographic areas with a sufficient number of individuals from the subgroup so as to not compromise privacy. Data on Black individuals from Butte, MT is not available for this reason. Outcomes are available for the other 129 commuting zones in the sample.

[24]Large standard errors for those with high income parents may reflect the small number of Black men and women with parents at the 75th percentile of the parent income distribution. In Appendix Figure D2, I report results from regressions weighted by the number of individuals whose tax records underlie the upward mobility estimates. Results are qualitatively similar using weights, but the coefficient is smaller for Black women with high income parents and larger for white men with from low income parents. Because the focus of the paper is on how the Migration alters *locations* as opposed to the average treatment effect on individuals, I report results from unweighted regressions in the main text. Appendix Section D.3.1 reports results where regressions are instead weighted by the number of individuals underlying each CZ's upward mobility estimates.

men and women from low income families; a small negative and statistically insignificant effect on white women from low income families; and a small positive and statistically insignificant effect on white women from high income families.

Tables 6 and 7 report the OLS, reduced form, and 2SLS results for the each subgroup. Table 6 shows that a 1-percentile increase in the historical Black population lowers the income rank of Black men with low-income parents by 0.085 percentile points (s.e. = 0.033) (column 2), with larger effects on Black men with higher income parents, who experienced reductions of 0.125 percentile points (s.e. = 0.050) (column 6). By contrast, in Table 7, I find a smaller and statistically insignificant negative effect on white men with low income parents and an even smaller effect of the Migration on the individual earnings of white men with high income parents. Tables 6 and 7 also report the effect of the Migration on household income by race, pooling across gender groups. A 1-percentile larger Migration shock lowered Black household income rank by 0.059 percentile points (s.e. = 0.026) for those from low income families. The effect on white households is smaller and statistically insignificant, at -0.025 percentile points (s.e. = 0.035).

How do the estimates for Black and white households compare to the estimates for all racial groups discussed in Section 5.1? The direct effect of the Migration on the share of Black families at given parent income percentiles may introduce a "composition" effect in estimates of the Migration's impact on average upward mobility, making the effect on the latter larger than that on Black or white individuals separately. This composition effect stems from lower upward mobility for Black households than white across the US, an effect of systemic disadvantage and nationwide factors affecting opportunity for Black families. In Appendix Section D.3.2, I directly estimate this composition effect and show that taking this effect into account reconciles the difference between race-specific and pooled upward mobility.[25]

[25]I also compare the population-weighted average of the Migration's effect on Black and white households to the impact on childhood exposure effects for all racial groups, the latter

What explains the larger effects of the Migration on Black men compared to Black women? There are two potential explanations. Black women who marry men typically form households with Black men. Given that Black men's income is lower in Great Migration destinations, women may increase their labor supply to compensate for missing men's income, explaining negligible or even positive effects of the Migration on their earnings rank. Alternatively, family and environmental factors have been shown to have stronger effects on boys versus girls. Certain family characteristics, such as the presence of both parents in the household, have been shown to have much stronger effects on boys versus girls (Bertrand and Pan, 2013). Other research has shown that boys' outcomes are also more elastic than girls' to other inputs as well, for example, school quality (Autor et al., 2016).

I explore these hypotheses in Appendix Tables D7, D8, and D9, using data from the Opportunity Insights website (`https://opportunityinsights.org/`), which provides tabulated statistics of family structure and labor market outcomes by race, gender, and parent income group at fine geographic levels. I do not find evidence that the Migration increased Black women's propensity to report positive earnings or work greater hours. At the same time, I find strong evidence that the Migration is associated with lower father presence for Black men and women from all parent income groups. Finally, I find that the educational outcomes of Black men from low income families are worse in CZs with higher historical Black migration, but this is not the case for Black women. These results point towards the greater responsiveness of boys' outcomes to family and environmental factors as a potential explanation for the Migration's more negative effect on Black men.

of which is purged of the composition effects biasing the Migration's impact on average upward mobility. Given the confidence intervals, I cannot reject that the two effects are the same. Still, the magnitude of the estimated effect via childhood exposure is larger than the weighted-average of the effect on Black and white households. I discuss race-specific selection stories that may account for the differences in the magnitudes.

Implications for the racial gap The fact that Black children have lower household incomes as adults, but white children are less affected by the Migration has implications for the racial gap in income upward mobility in the US. In this section, I conduct a counterfactual exercise to quantify the contribution of the Great Migration to the gap in upward mobility between Black and white individuals with low, median, and high income parents.

The counterfactual seeks to address the following question: what would the racial gap in upward mobility in the North be without the changes induced by the Great Migration? I define the counterfactual as one in which Black families grow up in locations that receive the lowest percentile of shock.[26] I compute the average racial gap under this counterfactual and compare it to the observed average racial gap in the region.[27]

The results are reported in the table below.

Table 2: Great Migration contribution to northern racial upward mobility gap

	Parent Income		
	25th pctile	50th pctile	75th pctile
Observed	12.03	13.45	15.30
CF w/o GM (se)	9.10 (3.12)	9.83 (2.76)	11.01 (2.63)
Pct Change	-24%	-27%	-28%

[26] Alternatively, I can compute counterfactual upward mobility for both Black and white families and take the difference. The point estimate for the Migration's effect on white men is negative but close to zero, and this approach ignores the fact that the effect is statistically insignificant. Taking this effect on white families as the true effect, the gap in upward mobility for individuals growing up in median income families is 21% rather than 27%.

[27] The standard error for the counterfactual racial gap at a given parent income percentile equals the square root of the sample variance of the counterfactual racial gap, or $\frac{1}{N_c}\sum_{c=1}^{N_c}\left(RG_{c,p}^{cf}-\overline{RG}_{c,p}^{cf}\right)^2$, where N_c is the number of commuting zones in the sample, $RG_{c,p}^{cf}$ is the counterfactual racial income rank gap in commuting zone c for individuals with parents at income rank p, and $\overline{RG}_{c,p}^{cf}$ is the mean of the counterfactual gap across the commuting zones in the sample.

The first row reports the average observed racial gap, ranging from 12.03 income rank percentiles for individuals with parents at the 25th percentile to 15.30 income rank percentiles for men with parents at the 75th percentile. The second row reports the counterfactual average gap where northern Black families experience the lowest percentile of Great Migration shock. Under this counterfactual, the average racial gap across northern commuting zones ranges from 9.10 percentiles (s.e. = 3.12 percentiles) for individuals with low income parents to 11.01 percentiles (s.e. = 2.63 percentiles) for individuals with high income parents. These estimates suggests the Migration increased the racial gap by 24% for low income families, 27% for median income families, and 28% for high income families.

5.3 Alternative explanations

I examine numerous alternative explanations for the negative association between the Great Migration and upward mobility in destinations. Results from these robustness checks are reported in in Tables 8 and 9, and additional details are provided in Appendix D.6.

Deindustrialization Many Black southerners were drawn north by manufacturing jobs in cities like Gary, Detroit, and Baltimore. These once booming industrial centers subsequently underwent devastating job loss, with the US losing 2 million manufacturing jobs between the 1970s and 2000 (Charles et al., 2019). In all specifications, I control for the share employed in manufacturing in 1940, which largely accounts for the manufacturing shares in subsequent decades. I also instrument for employment changes in the destination CZs using a Bartik demand shock. Including this demand shock as a control does not greatly alter the magnitude or precision of my estimates (see column 8 of Tables 8 and 9). I also find muted effects of the Great Migration on white men from low income families, a demographic group likely to be strongly affected if the findings were driven by deindustrialization alone. Lastly, Black

men from higher income families in Great Migration CZs also fare worse than those from locations with less historical Black in-migration, inconsistent with a shock only affecting families with manufacturing workers.

Other migrations It's possible that the effect of the Great Migration confounds the loss of European immigrant labor supply during World War I and after the Immigrant Exclusion Act of 1924, which induced these areas to begin hiring Black workers from the South. I control for historical European immigration in column 7 and do not find evidence of this driving my findings. White southern migration was also significant during the Great Migration. I construct a shift-share instrument for white southern migration into destination CZs and find this has no impact on childhood exposure effects. Appendix Figure D14 shows the reduced form relationship between white southern inmigration and Black men's outcomes in binned scatterplots. The relationship is insignificant and the coefficient has the opposite sign as the effect of Black population increases. The main results on upward mobility are also robust to including predicted white southern migration as a control; the main coefficient on the Great Migration is similar in magnitude and precision (see column 6 of Tables 8 and 9).

Selection of migrants and fixed characteristics of CZs I show in Appendix Figures C2 and C3 that Black southern migrants had high levels of education relative to Black southerners overall, and the children of Black southerners tended to remain in school longer than those from incumbent Black households in the North. This belies the notion that Black migrants from the South were negatively selected in terms of education or investment in children. I also construct a measure of Black southern upward mobility in northern CZs by taking the migrant-share-weighted average of county-level upward mobility for Black families in the South in 1940. Detroit's measure strongly reflects upward mobility patterns in Alabama, while Baltimore's strongly reflects those in Virginia (see Appendix Figure C1 for the distribution of migrant origin lo-

cations across major destination cities). If the Migration's primary effect was through increasing the share of Black southerners, then including this measure as a control should attenuate the Migration's effect on upward mobility. I show that this is not the case in column 5 of Tables 8 and 9.

Finally, results are also highly robust to including flexible controls for the Black population share in 1940 (see column 4 of Tables 8 and 9).[28] I also show consistent results using a first-differenced specification where the main outcome is the difference between standardized educational upward mobility for Black boys in 1940 and standardized income upward mobility for Black men in the 2000s. I find a strong negative relationship which supports the notion that the Migration's impacts are not driven by fixed characteristics of the CZs in the pre-1940 period.

6 Evidence on local mechanisms

Why did the northern United States cease to be a land of opportunity for Black families in the wake of the Great Migration? The historical and sociological literatures on urban crisis point to the role of white flight combined with declining economic opportunity in the urban core. Wilson (1987) highlighted the importance of economic factors: reduced prospects for Black men in the labor market, and subsequently in the marriage market, contributed to increased crime and the rise of single households headed by women. Sugrue (1996) also points to the confluence of the isolating effects of urban segregation and a long trend of manufacturing jobs relocating out of predominantly Black central cities into white suburban and rural locations.

Contemporaneous government reports also attest to the extreme inequality in US cities in the 1960s. The 1968 "Report of the National Advisory Commission on Civil Disorders," popularly known as the Kerner Commission Report,

[28]For Black men's upward mobility, the coefficient attenuates, and I lose precision; however, the point estimate is still negative and sizable.

analyzed the riots occurring in major cities at the time and concluded that they were the culmination of decades of segregation, discrimination, and racial inequality. Despite the fact that the Black population made up a majority of the urban population in several northern cities, Black residents largely lived in cities with all-white governments and interacted with all-white police forces, escalating racial tensions in the North.

Guided by this historical and sociological literature, I focus my analysis on rising segregation, racial tensions, urban decline, and the policy choices of local governments as plausible mechanisms. I assembled a database on these outcomes for urban northern commuting zones, spanning the period 1920 to 2015. Details on the specific measures and the construction of this database are in Appendix E.

I estimate the following reduced form relationship between historical Black in-migration and local mechanisms:

$$M_{CZ}^{t} = \eta + \mu G\hat{M}_{CZ} + \mathbb{X}'_{CZ}\phi + \nu_{CZ} \tag{11}$$

where t refers to the period the mechanism is measured, and M refers to the mechanism of interest. I standardize all mechanism variables and scale the Migration shock $G\hat{M}_{CZ}$ so that the units are one standard deviation. I estimate the effect of the Great Migration on average pre-1940 mechanisms (1920-1940) to check for trends prior to the wave of migration I focus on and average post-period (1970-2015) mechanisms to assess the long-run impacts of the Migration.

Figure 9 summarizes the results from this analysis. Panel (a) of Figure 9 documents the lack of a pre-trend across a large number of potential mechanisms, suggesting that the Migration shifted the nature of the urban environment in key ways. I find no clear association between the Migration and the share of all public spending in a CZ allocated to education or police, private school enrollment rates, or incarceration rates in commuting zones. I do find that the Migration is associated with higher average urban murder rates across

1931 and 1943, potentially due to the Migration's greater incidence in more urbanized areas of the non-South. I control for these early period murder rates when analyzing the post-1970 period. I also show in Appendix Figures D11, D12a, and D13b that the impact of the Migration on childhood exposure effects of CZs today and on Black men's upward mobility is robust to controlling for pre-1940 murder rates.

Panel (b) of Figure 9 shows the effect of the Migration on mechanisms in the post-1970 period. Analysis of various measures of neighborhood quality suggest that urban decline followed the Great Migration. Destinations exhibit higher murder rates, and local governments increased investment in police (measured as police per capita and the share of public spending allocated to police) and incarcerated at higher rates. I find suggestive evidence that destinations are more segregated by income and exhibit greater economic sprawl, though the effect is not statistically significant. Compared to locations less affected by the Migration, destination commuting zones remain more racially segregated as indicated by opposite effects on white and Black private school enrollment (with a highly statistically significant effect on the gap) and residential segregation.

By contrast, I see no systematic re-allocation of spending towards or away from other types of spending over which local governments exercise discretion.[29] There is no statistically significant impact of the Migration on educational expenditures per capita or on the share of total spending by local governments in the CZ devoted to education. The standard errors are large, however, and these aggregate effects may mask differences or reallocation across local governments within commuting zones. For example, school spending may have decreased in urban school districts and simultaneously increased in suburban school districts. Private school enrollment rates tend to be higher in urban areas, which may indicate lower quality in urban public school districts. Further analysis utilizing individual school district data is needed to test whether

[29]Appendix Table E1 provides a breakdown of local, state, and federal contributions to different public spending categories.

this reallocation within commuting zones explains the null results on education. Finally, a lack of an increase in education spending may be telling in and of itself. If the Migration increased the share of children coming from disadvantaged educational environments, one might expect responsive local governments to increase investments in education rather than keep spending at the same level.

In Appendix F, I conduct a year-by-year analysis of the Great Migration's effects on local mechanisms, and show that segregation worsened over the course of the Migration (see Appendix Figure F2) while the 1960s marked an important turning point for policing, crime, and incarceration in destination CZs (see Appendix Figures F3, F9, and F7).

To understand the underlying context, I also explored racial tensions and attitudes in the destinations during this period. White residents exhibited more racially conservative attitudes in major Great Migration destinations, as measured by their support for segregationist presidential candidate George Wallace in 1968 (see Appendix Table F1). I find suggestive evidence of persistent racist animus in northern Great Migration CZs, based on Google search trends data (see Appendix Figure F10). Rising racial tensions in cities across the US erupted in major riots in the late 1960s, and these riots were of greater intensity in Great Migration cities, lasting longer and involving more injuries and arrests (see Appendix Table F2).

Finally, I assess the extent to which sorting within commuting zones contributes to disparate outcomes for Black and white individuals growing up in destination locations. The Migration's negative effects on upward mobility are indeed concentrated in urban areas as opposed to non-urban areas in the CZ (see Appendix Figure D3). At the same time, segregation and sorting into different locations within a CZ is not the only mechanism through which the Migration worsened Black outcomes. I compute the census-tract-level racial gap in income for Black and white men from across the parent income distribution and estimate the impact of the Migration on the population-weighted average within-census-tract racial gap. The within-census-tract racial gap is

larger in Great Migration destinations, suggesting that Black boys in predominantly white neighborhoods face a different effective environment than their white counterparts. The criminal justice system, for example, may disproportionately affect Black boys, no matter the neighborhood in which they reside. Appendix Figure D4 reports these results.

6.1 Discussion of local mechanisms

The results above point to a role for segregation, reallocations of government spending, and urban decline through rising crime as potential mechanisms for the Migration's effect on upward mobility. However, I am limited in my ability to identify the relative importance or contribution of these individual mechanisms. Doing so would require additional natural experiments or instruments to separately estimate each mechanism's causal effect, which is beyond the scope of this paper. Still, the economics and sociological literatures suggest these local changes are likely to have played a role in worsening racial inequality in destination CZs.

A large literature—too large to be summarized in full here—documents the effects of segregation on outcomes and racial inequality.[30] Other studies find positive effects on neighborhood outcomes, earnings and lower rates of incarceration for Black children exposed to school desegregation, suggesting that policies encouraging integration may mitigate negative responses to the Great Migration (Tuttle, 2019; Johnson, 2019). Exposure to crime increases individual criminal behavior, which has consequences for one's probability of incarceration and traditional employment (Case and Katz, 1991; Damm and Dustmann, 2014; Heller et al., 2016; Sviatschi, 2020). Crime and residential racial segregation are highly correlated across urban areas, which suggests that Black children are disproportionately exposed to crime and violence compared to white children growing up in the same commuting zones. Childhood ex-

[30] A non-comprehensive list includes Massey and Denton (1993); Ananat (2011); Andrews et al. (2017); Chetty et al. (2014) and Chetty et al. (2020a).

posure to higher crime rates may thus directly reduce Black men's income upward mobility relative to their white counterparts in Great Migration cities.

In light of this, effective criminal justice policy may be a solution. Norris et al. (ming) find evidence of deterrence effects of sibling incarceration on criminal justice outcomes in Ohio.[31] Sharkey and Torrats-Espinosa (2017) find that crime decreases upward mobility, using increased funds for community policing as an instrument, thus indicating that certain forms of policing improve upward mobility through reduction in crime. At the same time, a growing literature points to negative spillovers of the criminal justice system on and discrimination against Black communities. Rising incarceration has increased Black-white inequality (Western, 2006). Ang (2021) finds that police-involved shootings of civilians have deleterious effects on the Black and Hispanic students' educational outcomes in the same neighborhood. Chalfin et al. (2020) show that while increased policing reduced violent crime, it also increased arrests for non-violent offenses with disproportionate effects on Black Americans. Finally, Liu (2020) documents the mass incarceration's effects on Black families, suggesting deleterious effects on the family stucture and educational outcomes.

More work is needed to disentangle the relative importance of each of these potential mechanisms. One path forward is to identify and exploit exogenous variation in white flight, policing, criminal justice policy, and education policy across locations to separately identify the Migration's impact on these factors.

6.2 Discussion of the aggregate effects of the Migration

An important question this paper abstracts from is the aggregate effect of the Great Migration on Black economic status, including the South. In a simple counterfactual exercise conducted in Appendix Section D.5, I explore these

[31] By contrast, Dobbie et al. (2018), studying Sweden, finding that parental incarceration increases teen crime and pregnancy and lowers subsequent employment for youths from disadvantaged families.

aggregate effects by plotting intergenerational mobility curves by race and region, including the counterfactual curve for Black families in the North had the Migration not taken place. The latter is shifted up based on the estimated negative effect of the Migration on Black children with different parent incomes. I conclude that while the Migration likely did reduce gains to parent income for Black children in the North—a downward shift in intergenerational mobility—only 23% of Black children would have enjoyed those higher gains in the absence of the Migration. This combined with the Migration's large positive effect on grandparent income, which moved Black children *up* the intergenerational mobility curve, is likely to have resulted in a net positive gain. Any positive impacts of Black emigration from the South, which improved in upward mobility in the late 20th century, would only magnify this positive effect.

7 Conclusion

Over the 20th century, Black Americans engaged in perhaps the largest natural experiment in "moving to opportunity" in US history. This unique episode in history provides a setting to test the general equilibrium effects of families moving to locations with better average outcomes, the basis for many popular anti-poverty policies today.

Using exogenous variation in the extent to which northern locations became destinations during the Great Migration, I show that racial composition changes during this period ultimately reduced northern cities' ability to promote positive outcomes for today's cohorts, especially for Black men growing up in affected locations.

In response to mid-century increases in the Black population share, white families withdrew from shared public schools and urban neighborhoods, leading to persistent educational and residential segregation. Starting in the 1960s, the quality of the urban environment in destinations sharply deteriorated, with

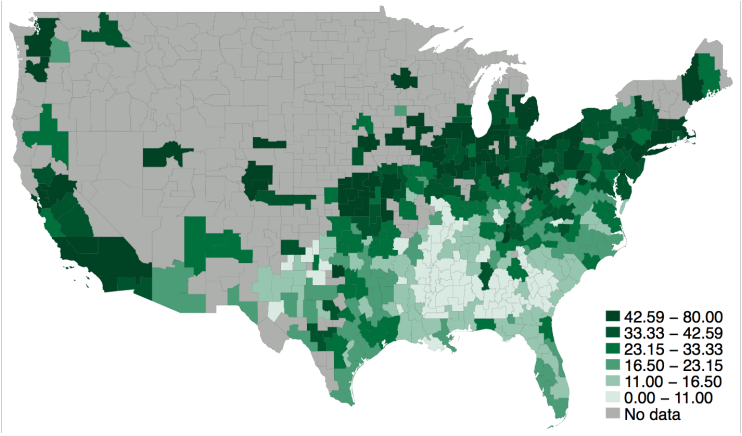
severe race riots and higher urban crime. Local governments increased public spending on police in both absolute and relative terms, remaining differentially invested in policing over the next several decades. Although certain forms of policing have been shown to benefit intergenerational mobility, a number of studies also document negative effects of greater police presence on the outcomes of Black students.

At the height of rising incarceration in the 1980s and early 1990s, major Great Migration destinations sent substantially more of the Black population to federal and state prison than locations less affected by the Migration. Cohorts growing up in the 1960s and 1970s would have been particularly at risk for incarceration. Many studies show that contact with the criminal justice system reduces Black men's employment prospects and increases the prevalence of single-parent families, effects that may propagate to future generations. Further research will have to disentangle the long-run impact that increased crime, the race riots of the 1960s, and local governments' responses to each have had on Black men's outcomes. A key question is whether alternative strategies for reducing racial inequality in cities can be identified given the sizable gaps under the existing set of policies.

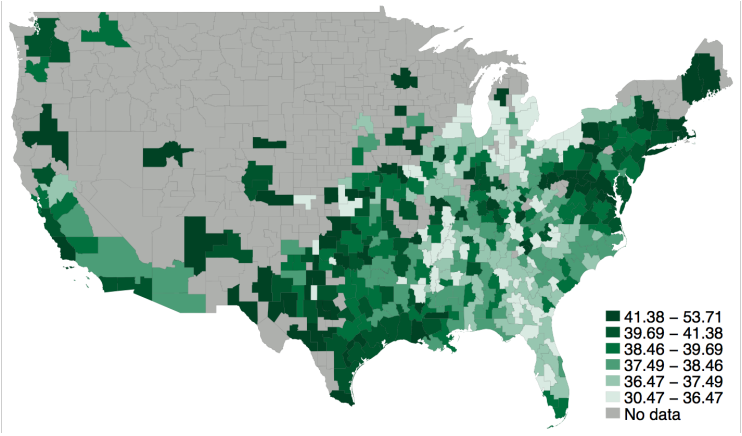
My findings have important implications for policies that incentivize families to move to opportunity and, in particular, the limitations of scaling such programs. They may also have implications for responses to economic and political migration into Europe and ethno-nationalist backlash. During the Great Migration, millions of Black migrants moved North to improve their economic outcomes, and in response, northern cities changed in ways that eventually shuttered Black economic progress. These results highlight the importance of understanding the specific mechanisms through which locations facilitate or inhibit intergenerational mobility, particularly for marginalized groups. In light of the sensitivity of location effects to large shifts in population composition, more concerted efforts aimed at reducing disparities within locations, rather than relocating disadvantaged families, may be warranted.

Figures and tables

FIGURE 1: BLACK UPWARD MOBILITY IN 1940 AND 2015



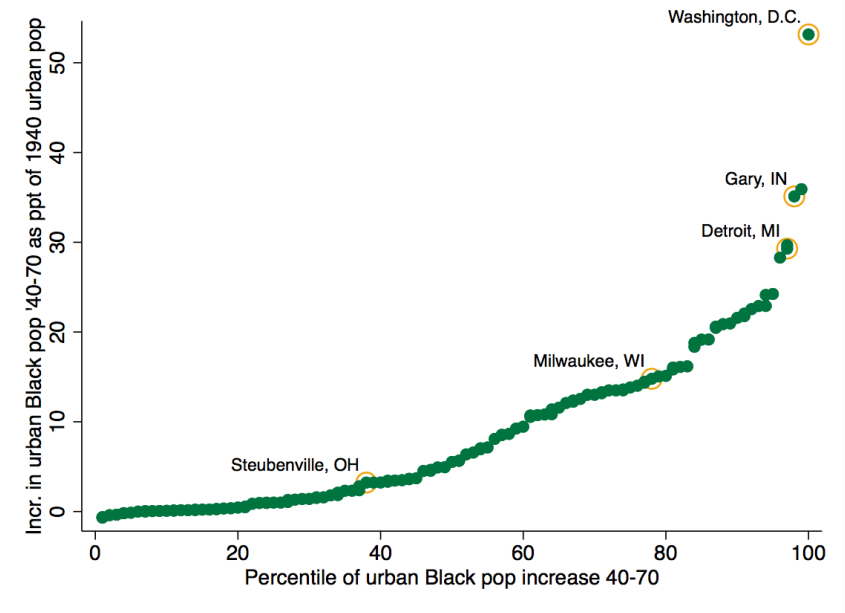
(a) Percentage Black teens in median-educ. families with 9-plus years of schooling, 1940



(b) Household inc. rank of Black individuals from below-median-income families, 2015

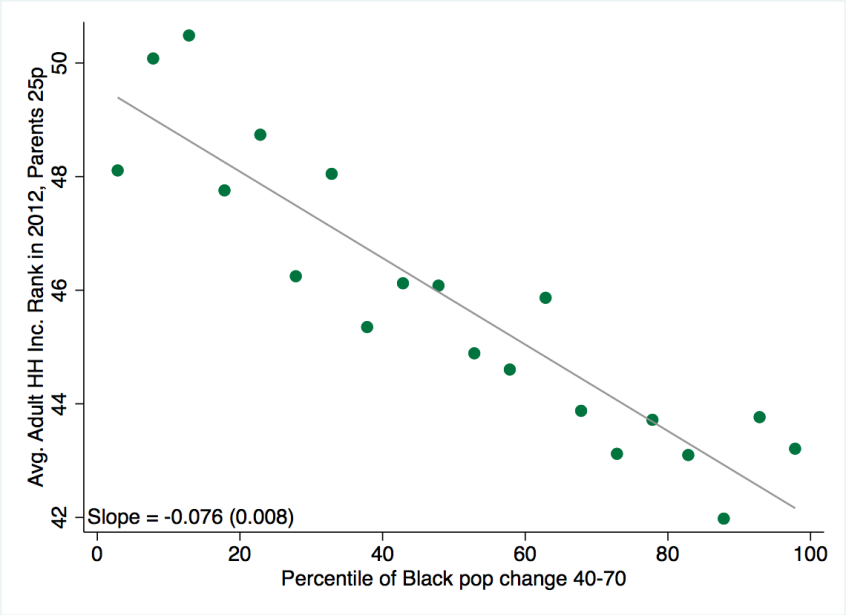
Notes: This figure depicts geographic patterns in Black upward mobility in 1940 and 2015. Panel (a) depicts Black educational upward mobility in 1940 defined as the percentage of 14-18 year-old boys and 14-16 girls who have at least 9 years of schooling, from households where the household head has between 5 and 8 years of schooling. Panel (b) shows expected mean household income rank in 2015 by childhood commuting zone for the 1978-1983 birth cohorts of Black men and women from families at the 25th percentile of the parent income distribution. Darker shades indicate commuting zones with higher levels of upward mobility. *Data sources*: IPUMS 1940 complete count census for panel (a), measure following Card et al. (2018) and Chetty et al. (2020a) for panel (b).

FIGURE 2: QUANTILES OF URBAN BLACK SHARE INCREASES, 1940-70



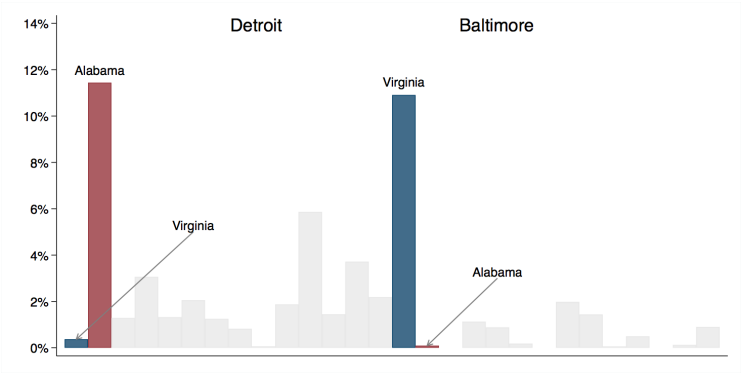
Notes: This figure plots the quantile function of 1940-1970 increases in the urban Black population in commuting zones as a share of the total initial 1940 urban population, multiplied by 100 so that the units are percentage points. The CZs in sample are those containing the 296 non-southern mainland cities with information on the Black population in both 1940 and 1970 from the *City and County Data Books, 1944-1977* ("CCDB"). Non-southern mainland excludes cities in the following states: Alabama, Alaska, Arkansas, Florida, Georgia, Hawaii, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. Note, Washington, D.C. and cities in Delaware and Maryland were net-receivers of Black migrants during the Great Migration and are included in the sample. The city of New Albany, IN is in the Louisville, KY commuting zone, which is included in the sample. Results are robust to excluding this commuting zone. *Data sources*: CCDB.

FIGURE 3: RELATIONSHIP BETWEEN 1940-1970 BLACK POPULATION CHANGE AND UPWARD MOBILITY IN 2012

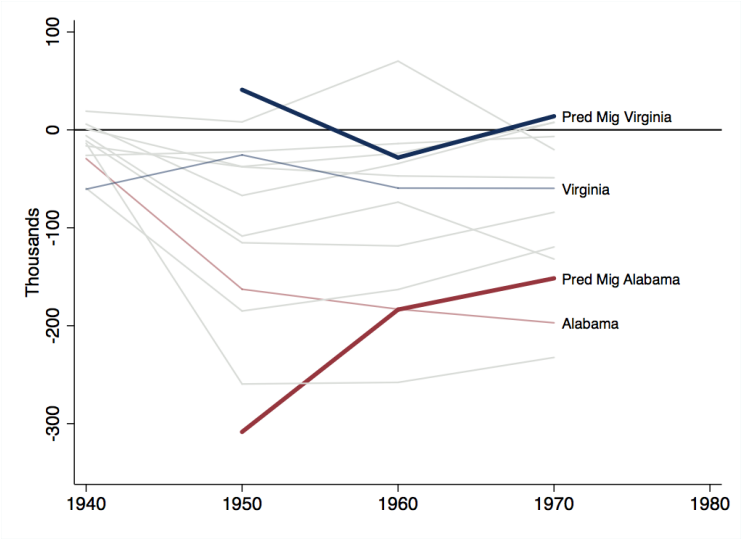


Notes: This binned scatterplot depicts the relationship between average upward mobility in the 2000s for men and women with low income parents and the percentile of actual Black population increase during the Great Migration (1940 to 1970) for northern commuting zones. The unit of observation is a CZ. The right hand side variable is grouped into 20 bins (5 percentiles each). Upward mobility is defined as expected mean household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. *Data sources*: IPUMS complete count 1940 US census; CCDB.

FIGURE 4: GREAT MIGRATION SHIFT-SHARE INSTRUMENT



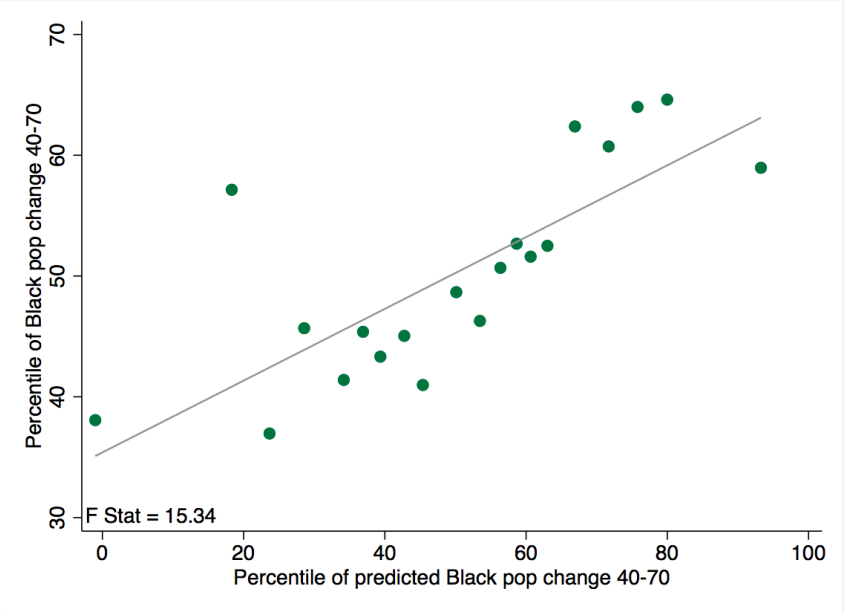
(a) 1935-1940 Black southern migrants' origin counties, Detroit vs. Baltimore



(b) Southern state net-migration, 1940-1970

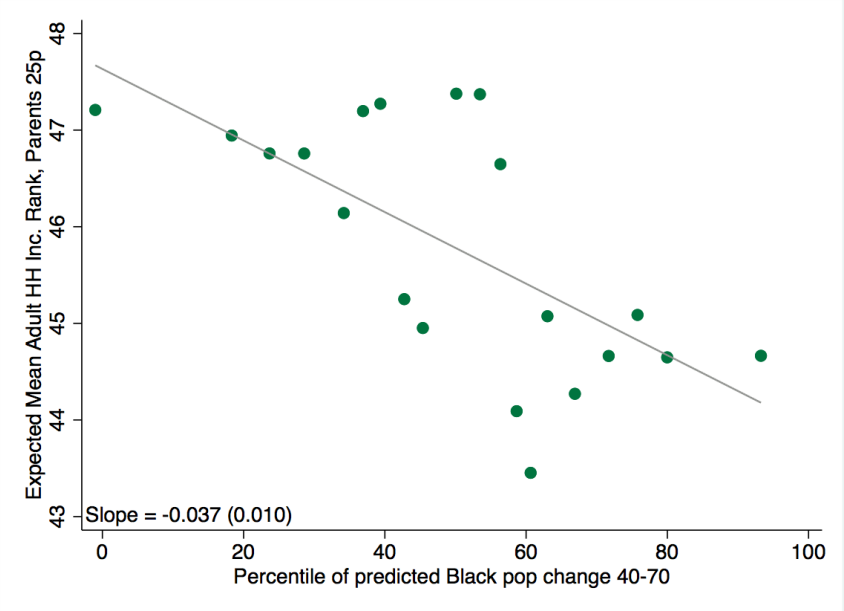
Notes: This figure illustrates the variation underlying the shift-share instrument for urban Black population change in northern commuting zones. Panel (a) shows the share of recent Black southern migrants (those who migrated between 1935 and 1940) living in Detroit and Baltimore from the largest sending county in each southern state. For Alabama and Virginia, these are Jefferson County (Birmingham) and Richmond City County, respectively. Detroit received the plurality of its migrants from Alabama, Baltimore from Virginia. Panel (b) shows net-migration and predicted net-migration for southern states each decade from 1940-1970, with Alabama and Virginia highlighted. Negative numbers indicate outmigration. Darkened lines indicate net-migration predicted using one-decade lagged southern county agricultural and World War II spending measures. Appendix C describes the construction of the instrument based on this variation. I use LASSO to select predictors each decade, interacting predicted migration with the share of recent Black southern migrants from each county, summing up over all southern counties. The procedure yields counterfactual increases in the urban Black population from 1940-1970. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); Fouka et al. (2021).

FIGURE 5: FIRST STAGE ON BLACK POPULATION CHANGE



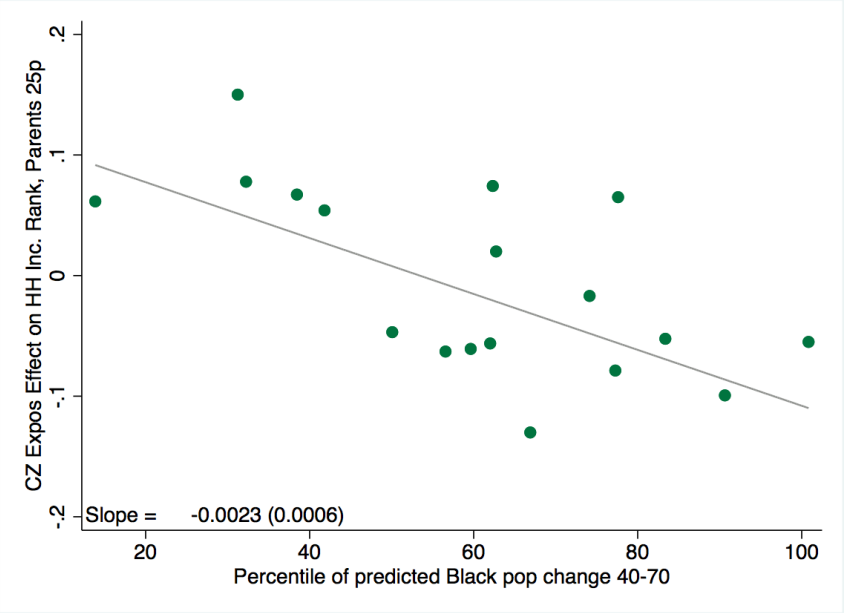
Notes: This binned scatterplot depicts the relationship between the percentile of actual Black population increase during the Great Migration (1940 to 1970) for northern commuting zones and the instrument for Black population increase over the same period. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. The unit of observation is a CZ. The right-hand-side variable is grouped into 20 bins (5 percentiles each). Both the left-hand- and right-hand-side variables have been residualized on the set of baseline 1940 controls, including share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a).

FIGURE 6: GREAT MIGRATION REDUCED AVERAGE UPWARD MOBILITY IN NORTHERN COMMUTING ZONES



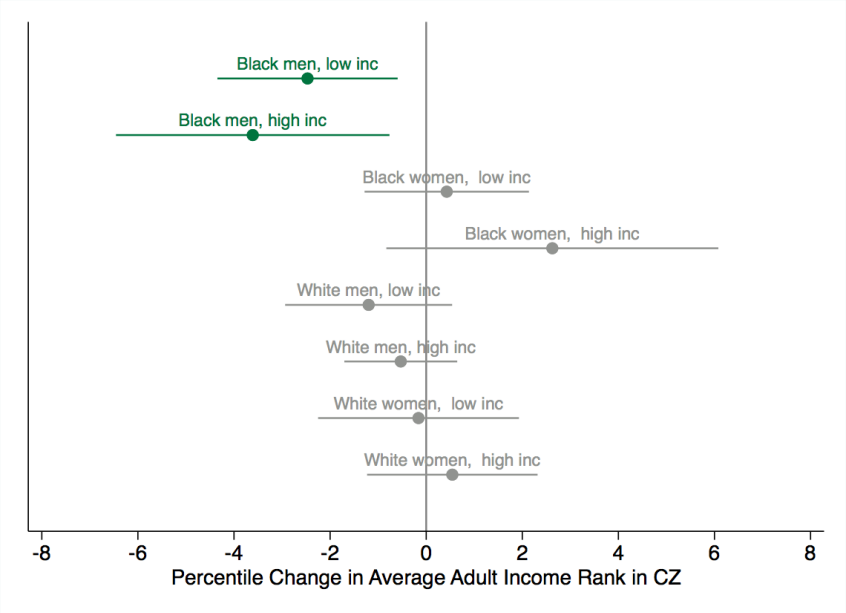
Notes: This binned scatterplot depicts the relationship between average upward mobility in the 2000s for men and women with low income parents and the instrument for Black population increases during the Great Migration. The unit of observation is a CZ. The right hand side variable is grouped into 20 bins (5 percentiles each). Upward mobility is defined as expected mean household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Both the left hand and right hand side variables have been residualized on the set of baseline 1940 controls, including share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

FIGURE 7: CHILDHOOD IN GREAT MIGRATION CZS LOWERS ADULT INCOME OF CHILDREN FROM LOW INCOME FAMILIES



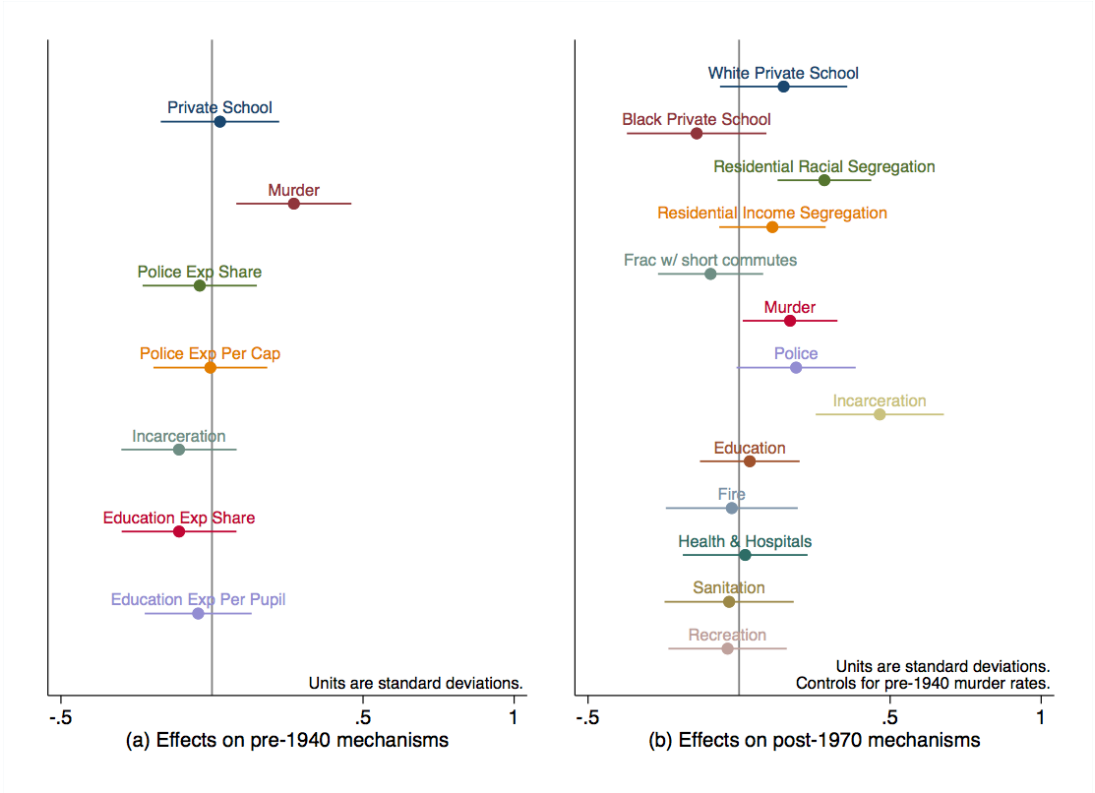
Notes: This binned scatterplot depicts the relationship between commuting zone childhood exposure effects in the 2000s for men and women with low income parents and the instrument for Black population increases during the Great Migration. The unit of observation is a CZ. The right hand side variable is grouped into 20 bins (5 percentiles each). Childhood exposure effects are the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Both the left hand and right hand side variables have been residualized on the set of baseline 1940 controls, including share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

FIGURE 8: RACE AND GENDER HETEROGENEITY IN IMPACT OF GREAT MIGRATION ON UPWARD MOBILITY



Notes: This figure plots coefficients from regressions of average upward mobility in the 2000s for men and women from low and high income parents on the instrument for Black population increases during the Great Migration, in approximately one standard deviation units. The unit of observation is a CZ. Upward mobility is defined as expected mean household income rank where income is measured from IRS tax returns for cohorts born between 1978 and 1983. Pooled income refers to mean household income rank, pooling across men and women. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. A one standard deviation increase is approximately 30 percentiles. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

FIGURE 9: GREAT MIGRATION CZS HAVE HIGHER SEGREGATION, CRIME, AND POLICING



Notes: This figure plots the coefficient on the instrument for Black population increases during the Great Migration, in approximately one standard deviation units, in separate regressions. The dependent variables in Panel (a) are standardized 1920 private school enrollment rates; mean 1931-1943 urban murders per 100,000 of the urban population; mean 1920-1940 local jail rate per 100,000; and mean government expenditure shares and per capita or per pupil spending. The dependent variables in Panel (b) are standardized mean 1970-2000 white and Black private school enrollment rates; the Theil indices in residential racial and income segregation in 2000; the fraction of families in 2000 with commute times less than 15 minutes; mean 1977-2002 murders per 100,000 of the population; mean 1983-2000 incarcerated per 100,000 of the population; and mean 1972-2002 government expenditure shares by category. The unit of observation is a commuting zone. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. A one standard deviation increase is approximately 30 percentiles. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Panel (b) includes controls for the average 1931-1943 murder rate. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); see Appendix E for the full list of data sources on each of the mechanisms.

Table 3: Placebo test of identification strategy using pre-1940 upward mobility and educational attainment

	Percentage of teens with low occ. score fathers attending school					Median adult education
	1900	1910	1920	1930	1940	1940
$\hat{GM}$	0.011	0.025	0.011	0.023	0.014	-0.013
	(0.033)	(0.027)	(0.024)	(0.029)	(0.016)	(0.009)
Baseline mean	55.514	75.662	65.477	74.912	80.668	27.355
SD Dep Var	9.712	8.026	7.425	8.674	5.773	2.863
SD GM	28.976	28.976	28.976	28.976	28.976	28.976
Observations	130	130	130	130	130	130
Baseline Controls	Y	Y	Y	Y	Y	Y

Notes: This table reports the effect of the Great Migration on pre-1940 educational upward mobility and attainment. The unit of observation is a CZ. In columns 1 through 5, the dependent variable is the school attendance rate (in percentage points) of 14-17 year-old boys and girls with below-median occupation score fathers from 1900 to 1940, respectively. In column 6, the dependent variable is median education attainment of adults aged 25 and older in 1940. Independent variable is the instrument for Black population increase from 1940 to 1970: the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: IPUMS complete count 1900-1940 US censuses; Boustan (2016a).

Table 4: Lower average upward mobility in 2000s for low income families in Great Migration CZs

	First Stage on GM					
$\hat{GM}$	0.297	0.297	0.297	0.297	0.297	0.297
	(0.0759)	(0.0759)	(0.0759)	(0.0759)	(0.0759)	(0.0759)
F-Stat	15.34	15.34	15.34	15.34	15.34	15.34
	Household Income Rank			Individual Income Rank		
	Pooled	Women	Men	Pooled	Women	Men
	Ordinary Least Squares					
GM	-0.0655	-0.0570	-0.0742	-0.0331	-0.00375	-0.0618
	(0.00995)	(0.0101)	(0.0104)	(0.0108)	(0.0137)	(0.0108)
R-squared	0.571	0.528	0.593	0.345	0.254	0.492
	Reduced Form					
$\hat{GM}$	-0.0370	-0.0308	-0.0432	-0.0282	-0.0128	-0.0439
	(0.00974)	(0.00973)	(0.0103)	(0.00965)	(0.0121)	(0.0101)
R-squared	0.481	0.451	0.495	0.341	0.260	0.443
	Two-stage least squares					
GM	-0.125	-0.104	-0.145	-0.0950	-0.0432	-0.148
	(0.0328)	(0.0318)	(0.0354)	(0.0353)	(0.0410)	(0.0386)
none						
N	130	130	130	130	130	130
Mean Rank	45.79	47.04	44.55	45.54	42.74	48.29
SD Rank	3.379	3.283	3.617	2.972	3.527	3.375
SD GM	28.98	28.98	28.98	28.98	28.98	28.98

Notes: This table reports the estimated impact of the Great Migration on average upward mobility in the 2000s for men and women with low income parents. The unit of observation is a CZ. Dependent variable is expected mean individual or household income rank for individuals with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. Pooled income refers to household income, pooling across men and women. Independent variable is the percentile of Black population increase during the Great Migration. The instrument for Black population increase is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

Table 5: Childhood exposure to Great Migration CZs lowers upward mobility for low income families

	First Stage on GM					
$\hat{GM}$	0.266	0.263	0.269	0.264	0.263	0.269
	(0.0640)	(0.0639)	(0.0645)	(0.0641)	(0.0642)	(0.0645)
F-Stat	17.27	16.91	17.38	16.99	16.72	17.35
	Household Income Rank			Individual Income Rank		
	Pooled	Women	Men	Pooled	Women	Men
	Ordinary Least Squares					
GM	-0.00256	-0.00169	-0.00438	-0.00210	0.000437	-0.00433
	(0.000848)	(0.00125)	(0.00126)	(0.000865)	(0.00125)	(0.00134)
R-squared	0.224	0.115	0.233	0.190	0.0345	0.208
	Reduced Form					
$\hat{GM}$	-0.00232	-0.00209	-0.00318	-0.00189	-0.00111	-0.00276
	(0.000631)	(0.000930)	(0.000967)	(0.000647)	(0.000939)	(0.00103)
R-squared	0.249	0.138	0.226	0.206	0.0445	0.188
	Two-stage least squares					
GM	-0.00871	-0.00794	-0.0118	-0.00716	-0.00424	-0.0103
	(0.00279)	(0.00381)	(0.00393)	(0.00271)	(0.00368)	(0.00397)
none						
N	130	130	130	130	130	130
Precision Wt	Y	Y	Y	Y	Y	Y
Mean Expos FX	-0.0160	-0.0151	-0.0303	0.0223	0.0236	-0.0000692
SD Expos FX	0.172	0.235	0.259	0.172	0.226	0.271
SD GM	24.82	24.42	24.84	24.99	24.76	24.95

Notes: This table reports the estimated impact of the Great Migration on childhood exposure effects. The unit of observation is a CZ. Dependent variable is the estimated causal impact of an additional year of childhood in the CZ on adult income rank for those with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for the 1980-1986 birth cohorts. Independent variable is the percentile of Black population increase during the Great Migration. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

Table 6: Great Migration impact on Black families

	First Stage on GM					
$\hat{GM}$	0.310	0.310	0.310	0.310	0.310	0.310
	(0.0741)	(0.0741)	(0.0741)	(0.0741)	(0.0741)	(0.0741)
F-Stat	17.49	17.49	17.49	17.49	17.49	17.49
		Low Income			High Income	
	Pooled	Women	Men	Pooled	Women	Men
	Ordinary Least Squares					
GM	-0.0563	0.0215	-0.0652	-0.0767	0.0356	-0.0894
	(0.00956)	(0.0110)	(0.0120)	(0.0147)	(0.0218)	(0.0181)
R-squared	0.428	0.245	0.316	0.358	0.117	0.227
	Reduced Form					
$\hat{GM}$	-0.0183	0.00458	-0.0264	-0.0269	0.0281	-0.0386
	(0.00930)	(0.00976)	(0.0114)	(0.0140)	(0.0190)	(0.0169)
R-squared	0.286	0.223	0.185	0.237	0.114	0.110
	Two-stage least squares					
GM	-0.0591	0.0148	-0.0852	-0.0869	0.0906	-0.125
	(0.0260)	(0.0301)	(0.0330)	(0.0401)	(0.0608)	(0.0501)
none						
N	129	129	129	129	129	129
Mean Rank	0.332	0.403	0.389	0.453	0.493	0.515
SD Rank	0.0275	0.0276	0.0315	0.0398	0.0504	0.0448
SD GM	28.80	28.80	28.80	28.80	28.80	28.80

Notes: This table reports the estimated impact of the Great Migration on average upward mobility in the 2000s for Black men and women born between 1978 and 1983. The unit of observation is a CZ. The dependent variable is expected mean income rank for those with parents at the 25th and 75th percentile of parent income. Income is measured from IRS tax returns. The independent variable is the percentile of Black population increase during the Great Migration. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 migrant outflows predicted by southern economic variables. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

Table 7: Great Migration impact on white families

	First Stage on GM					
$\hat{GM}$	0.297	0.297	0.297	0.297	0.297	0.297
	(0.0759)	(0.0759)	(0.0759)	(0.0759)	(0.0759)	(0.0759)
F-Stat	15.34	15.34	15.34	15.34	15.34	15.34
		Low Income			High Income	
	Pooled	Women	Men	Pooled	Women	Men
	Ordinary Least Squares					
GM	-0.0155	0.00128	-0.0141	-0.0218	-0.00673	-0.0193
	(0.0120)	(0.0127)	(0.0103)	(0.00793)	(0.0105)	(0.00713)
R-squared	0.284	0.252	0.269	0.374	0.371	0.280
	Reduced Form					
$\hat{GM}$	-0.00757	-0.00164	-0.0123	-0.00238	0.00558	-0.00542
	(0.0108)	(0.0113)	(0.00913)	(0.00726)	(0.00936)	(0.00651)
R-squared	0.277	0.252	0.268	0.336	0.371	0.241
	Two-stage least squares					
GM	-0.0255	-0.00551	-0.0413	-0.00802	0.0188	-0.0183
	(0.0350)	(0.0368)	(0.0306)	(0.0233)	(0.0312)	(0.0207)
none						
N	130	130	130	130	130	130
Mean Rank	0.452	0.405	0.490	0.606	0.517	0.630
SD Rank	0.0316	0.0326	0.0267	0.0223	0.0295	0.0187
SD GM	28.98	28.98	28.98	28.98	28.98	28.98

Notes: This table reports the estimated impact of the Great Migration on average upward mobility in the 2000s for white men and women born between 1978 and 1983. The unit of observation is a CZ. The dependent variable is expected mean income rank for those with parents at the 25th and 75th percentile of parent income. Income is measured from IRS tax returns. The independent variable is the percentile of Black population increase during the Great Migration. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 migrant outflows predicted by southern economic variables. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

Table 8: Robustness of effects of childhood exposure to Great Migration CZs

GM (2SLS)	-0.00538	-0.00574	-0.00871	-0.0111	-0.00982	-0.00828	-0.00848	-0.00867
	(0.00174)	(0.00118)	(0.00279)	(0.00400)	(0.00318)	(0.00255)	(0.00277)	(0.00275)
First Stage F-Stat	23.34	64.01	17.27	13.46	14.60	20.71	16.96	17.80
GM (OLS)	-0.00324	-0.00313	-0.00256	-0.00253	-0.00259	-0.00261	-0.00253	-0.00264
	(0.000669)	(0.000667)	(0.000848)	(0.00108)	(0.000860)	(0.000867)	(0.000848)	(0.000861)
R-squared (OLS)	0.158	0.211	0.224	0.256	0.224	0.225	0.233	0.226
N	130	130	130	130	130	130	130	130
Precision Wt	Y	Y	Y	Y	Y	Y	Y	Y
Census Div FE	N	Y	Y	Y	Y	Y	Y	Y
Baseline Controls	N	N	Y	Y	Y	Y	Y	Y
1940 Black Share Quartile FEs	N	N	N	Y	N	N	N	N
Southern Mob	N	N	N	N	Y	N	N	N
White South Mig	N	N	N	N	N	Y	N	N
Eur Mig	N	N	N	N	N	N	Y	N
Emp Bartik	N	N	N	N	N	N	N	Y

Notes: This table reports robustness of the estimated impact of the Great Migration on commuting zone childhood exposure effects to several alternative specifications. The unit of observation is a CZ. Dependent variable is commuting zone childhood exposure effects in the 2000s for men and women with low income parents. Childhood exposure effects are the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. Pooled income refers to household income, pooling across men and women. Independent variable is the percentile of Black population increase during the Great Migration. The instrument for Black population increase is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

Table 9: Robustness of Great Migration's effects on Black men's upward mobility

GM (2SLS)	-0.100	-0.0769	-0.0852	-0.0689	-0.0819	-0.0845	-0.0816	-0.0994
	(0.0242)	(0.0191)	(0.0330)	(0.0432)	(0.0376)	(0.0320)	(0.0358)	(0.0368)
First Stage F-Stat	31.09	43.54	15.34	10.30	12.14	18.56	13.02	12.90
GM (OLS)	-0.0614	-0.0648	-0.0652	-0.0488	-0.0639	-0.0656	-0.0640	-0.0741
	(0.0104)	(0.0103)	(0.0120)	(0.0136)	(0.0122)	(0.0125)	(0.0122)	(0.0124)
R-squared (OLS)	0.227	0.279	0.316	0.354	0.318	0.316	0.318	0.344
N	129	129	129	129	129	129	129	129
Precision Wt	Y	Y	Y	Y	Y	Y	Y	Y
Census Div FE	N	Y	Y	Y	Y	Y	Y	Y
Baseline Controls	N	N	Y	Y	Y	Y	Y	Y
1940 Black Share Quartile FEs	N	N	N	Y	N	N	N	N
Southern Mob	N	N	N	N	Y	N	N	N
White South Mig	N	N	N	N	N	Y	N	N
Eur Mig	N	N	N	N	N	N	Y	N
Emp Bartik	N	N	N	N	N	N	N	Y

Notes: This table reports robustness of the estimated impact of the Great Migration on Black men's upward mobility to several alternative specifications. The unit of observation is a CZ. Dependent variable is expected mean individual income rank for individuals with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1978 and 1983. Independent variable is the percentile of Black population increase during the Great Migration. The instrument for Black population increase is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

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Online Appendix

to

"Can you move to opportunity? Evidence from the Great Migration"

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Appendix A Historical and contemporary measures of upward mobility

This appendix describes the construction of the historical measures of upward mobility used in the analysis as well as details on contemporary measures from Chetty and Hendren (2018c) and Chetty et al. (2020b).

Educational upward mobility in 1940 I follow Card et al. (2018) and define educational upward mobility as the fraction of 14-18 year-old boys and 14-16 year-old girls in each commuting zone with 9 or more years of schooling from households where the most educated parent has between 5 and 8 years of schooling, or the median for adults in the US at the time.[32]

Alternative historical measures of upward mobility Prior to 1940, the Census did not record years of schooling attained. For the years 1900-1940, I measure educational upward mobility as the school attendance rates of teenagers with low income fathers using the Integrated Public Use Microdata Series (IPUMS) version of the complete count US censuses (Ruggles et al., 2021). For 1900, I do so by creating a binary indicator for having attended school defined as reporting a positive number of months of school attendance during the year ending June 1, 1900, the Census day that year. In 1910, Census enumerators asked whether respondents of school age had attended school between September 1, 1909 and April 15, 1910 (the Census day in 1910), a period of 9 months. In 1920, by contrast, the analogous question asked about school attendance between September 1, 1919 and January 1, 1920 (the Census day that year), a period of 4 months. Mean school attendance for all teens (reported at the bottom of Table 3) is higher for 1910 (75%) than for 1920 (65%), likely due to the above discrepancy.

[32]Card et al. (2018) show that up to age 18 for boys and up to age 16 for girls, there is little selection on observable characteristics into living with one or more parent (Card et al., 2018, p. 14).

Income upward mobility for 1980s birth cohorts For contemporary measures of upward mobility in commuting zones, I use data made available by Chetty and Hendren (2018b) and Chetty et al. (2020a). Based on the universe of federal income tax records from 1996-2012, the data contain measures of income upward mobility by childhood commuting zone for individuals born between 1980 and 1986. Parents and children in these records were linked via dependent claiming. The key measure of upward mobility is estimated mean individual or household income rank, conditional on parent household income rank. Household income measures for parents and children are drawn from Adjusted Gross Income on 1040 tax returns, and individual income rank is measured using income reported on W-2 forms, unemployment or disability insurance benefits, or half of household self-employment income where relevant.

Income for individuals in this sample is income at age 26, during the years 2006-2012, and income rank is rank in the national income distribution for individuals from the same birth cohort. Parent income is measured using returns filed when individuals were between the ages of 14 and 20, and parent income rank is rank in the national parent income distribution by child birth cohort. Separate upward mobility estimates are available for individuals from the 25th and 75th percentile of the parent income distribution. Estimates are also available separately by gender.

Childhood exposure effects of commuting zones I use an alternative measure of upward mobility in the 2000s from Chetty and Hendren (2018c): the childhood exposure effects of commuting zones. Starting from the universe of tax filers described above, the authors restricted the sample to individuals whose parents moved once across commuting zones during their childhood. They then compare the outcomes of children exposed for more or less time to a given commuting zone based on children's ages at the time their families moved. I use these outcomes estimated solely off of these mover families. The estimates reflect the causal effect of one additional year of childhood in a given

commuting zone relative to an average commuting zone, for an arbitrary child. The outcome of interest is adult income rank at age 26. The estimates and assumptions behind them are discussed in greater detail in Section D.4.

Race-specific measures of upward mobility Race-specific measures of upward mobility come from Chetty et al. (2020b). These data are based on the same universe of federal income tax records as the measure described above; however, they cover a slightly different set of birth cohorts: 1978-1983. Individual federal income tax records were linked to the US Census in order to retrieve information on race as well as additional outcomes measured by the Census. The data contain the estimated mean individual or household income rank, conditional on parent household income rank, of Black and white men and women at the 25th and the 75th percentiles of the parent income distribution by childhood commuting zone. In this dataset, outcomes are measured in 2015 when individuals were between the ages of 32 and 37.

Appendix B City demographics (1940-1970), CZ sample construction and descriptive statistics, and geographic crosswalks

The following section provides additional details on the construction of the analysis sample of cities and commuting zones described in Section 3.2. I applied two selection criteria for CZs in the sample. First, following prior literature on the Great Migration, I restrict to locations in states that were net receivers of Black migrants. These include states in the northeastern, midwestern, and western census regions plus Maryland, Delaware, and Washington, D.C., which are located in the Southern census region, but on net received Black migrants between 1940 and 1970 (see Boustan (2016a)).

Second, I restrict to CZs for which I'm able to obtain data on their urban Black population between 1940 and 1970. I draw on two main sources of data to construct historical Black population measures for cities in northern commuting zones in 1940 and 1970: the complete count 1940 US census and the County and City Data Books 1944-1977 series (CCDB) available from the Inter-university Consortium for Political and Social Research (ICPSR), which contains information on cities with a population of 25,000 or more in the survey year (U.S. Census Bureau, Department of Commerce, 2008, 2012).

I obtain measures of the 1940 Black population from census, as the CCDB only report information on the number of white and non-white individuals in cities that year. Information on the Black population in cities in 1970 is obtained from the CCDB. My sample is therefore restricted to cities in the CCDB that can be matched to the 1940 census and to those with non-missing Black population data in 1970, a total of 294 cities. Approximately 78% of the Black population in the commuting zones in the sample resided in one of these 296 cities while 56% of the overall population did so.

The following cities from the CCDB could not be identified in the 1940 census: Boise City, ID; East Providence, RI; Huntington Park, CA; West Haven, CT; and Warwick, RI. I drop these cities from the analysis due to missing data. I also supplement my sample with two cities for which I manually recorded the Black population data using the 1970 Census: Butte, MT and Amsterdam, NY. Both cities received Black southern migrants between 1935 and 1940, but data on their Black population in 1970 was not available in the CCDB. Including these two cities brings the total number of cities to 296 from 294 and the total number of commuting zones in the sample to 130 from 128. Finally, the city of New Albany, IN is in the Louisville, KY commuting zone, which is included in the sample. Results are robust to excluding this commuting zone (see Figure D7).

B.1 Sample commuting zones and their demographic characteristics

Table B1 lists the commuting zones in the sample.

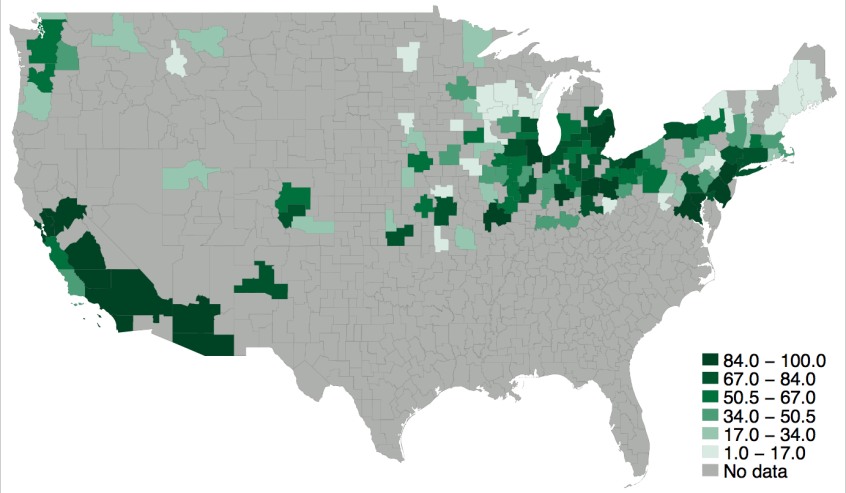
Table B1: Commuting zones in sample

Phoenix, AZ	Rockford, IL	Joplin, MO	Youngstown, OH
Tucson, AZ	Springfield, IL	Kansas City, MO	Zanesville, OH
Bakersfield, CA	Center, IN	Springfield, MO	Eugene, OR
Fresno, CA	Concord, IN	St. Joseph, MO	Portland, OR
Los Angeles, CA	Evansville, IN	St. Louis, MO	Allentown, PA
Sacramento, CA	Fort Wayne, IN	Butte-Silver Bow, MT	Altoona, PA
San Diego, CA	Gary, IN	Great Falls, MT	Erie, PA
San Francisco, CA	Indianapolis, IN	Fargo, ND	Hagerstown, PA
San Jose, CA	Lafayette, IN	Lincoln, NE	Harrisburg, PA
Santa Barbara, CA	Muncie, IN	Omaha, NE	Philadelphia, PA
Colorado Springs, CO	South Bend, IN	Manchester, NH	Pittsburgh, PA
Denver, CO	Terre Haute, IN	Newark, NJ	Reading, PA
Pueblo, CO	Wayne, IN	Albuquerque, NM	Scranton, PA
Bridgeport, CT	Hutchinson, KS	Albany, NY	Williamsport, PA
Washington, DC	Topeka, KS	Amsterdam, NY	Providence, RI
Wilmington, DE	Wichita, KS	Buffalo, NY	Sioux Falls, SD
Burlington, IA	Louisville, KY	Elmira, NY	Salt Lake City, UT
Cedar Rapids, IA	Boston, MA	New York, NY	Burlington, VT
Clinton, IA	Pittsfield, MA	Poughkeepsie, NY	Bellingham, WA
Des Moines, IA	Springfield, MA	Syracuse, NY	Seattle, WA
Dubuque, IA	Baltimore, MD	Union, NY	Spokane, WA
Mason City, IA	Cumberland, MD	Watertown, NY	Yakima, WA
Ottumwa, IA	Bangor, ME	Canton, OH	Eau Claire, WI
Sioux City, IA	Portland, ME	Cincinnati, OH	Green Bay, WI
Waterloo, IA	Detroit, MI	Cleveland, OH	Kenosha, WI
Bloomington, IL	Grand Rapids, MI	Columbus, OH	La Crosse, WI
Chicago, IL	Jackson, MI	Dayton, OH	Madison, WI
Davenport, IL	Kalamazoo, MI	Lima, OH	Milwaukee, WI
Decatur, IL	Lansing, MI	Lorain, OH	Oshkosh, WI
Edwardsville, IL	Saginaw, MI	Mansfield, OH	Sheboygan, WI
Galesburg, IL	Duluth, MN	Scioto, OH	Wausau, WI
Peoria, IL	Minneapolis, MN	Steubenville, OH	
Quincy, IL	Rochester, MN	Toledo, OH	

Notes: Name refers to largest city in the commuting zone.

Figure C4 shows the distribution of Black population change throughout the commuting zones in the sample. As indicated by the figure, there is within region variation in the intensity of the Migration. Table B2 shows the CZ Black population share as well as the urban Black population share in the sample of cities within the sample CZs. The CZ Black population share more than doubles from 1940 to 2000, from 2.38% to 5.85% while the urban Black population share increases fivefold over the period, from 3.14% to 15.88%.

FIGURE B1: MAP OF 1940-70 CHANGE IN THE BLACK POPULATION



Notes: This map depicts Great Migration commuting zones and each CZ's percentile change in the Black population between 1940 and 1970. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a).

Table B2: Black share in sample

	1940	1970	2000
CZ Black population share	2.382	4.160	5.854
	(8.11)	(10.57)	(11.89)
Observations	130	130	130
City Black population share	3.135	10.03	15.88
	(12.80)	(13.45)	(14.81)
Observations	296	296	296

Notes: This table reports the mean percentage (and standard deviation in parentheses) of the Black population in the analysis sample of 130 Great Migration commuting zones and the 296 cities for which the instrument for historical Black migration is constructed. Section 3 and 4 explain the criteria for selection of the sample and the construction of the instrument, respectively. *Data sources*: IPUMS complete count 1940 US census; CCDB; Boustan (2016a).

B.2 Geographic crosswalks

B.2.1 Historical county to 1990 CZ crosswalks

To construct the geographic crosswalks used in the analysis, polygon shapefiles for US geographic areas were downloaded from IPUMS *National Historical Geographic Information Systems* (NHGIS) (Manson et al., 2021) and merged based on spatial location using ArcGIS software. Listed below are the raw files and the website where they can be downloaded.

Raw data files from NHGIS and Census (U.S. Census Bureau, 2001, 1998)

1. US_county_1940.shp
2. US_county_1990.shp
3. US_msacmsa_1990.shp
4. US_necma_1990.shp

The following procedure was used to crosswalk between historical county boundaries (1920-1940) and 1990 commuting zones. Using ArcGIS, polygon shapefiles were converted to points representing the centroid of the polygon and then merged to the commuting zone polygon containing the centroid.[33]

Because CZs are aggregations of 1990 counties, historical counties are matched to the CZ in which the geographic centroid of their 1940 borders falls. This procedure allows me to rapidly assign many historical county-level datasets to 1990 commuting zones. However, this procedure may result in assignment errors if county borders change substantially over time.

The vast majority of the counties in the paper's sample did not experience boundary changes over the timeframe of analysis. The ICPSR code assigned to each county has a numeric flag for counties that were dissolved and/or merged before 1970 (a final digit of 5); no counties in the sample fall into this category.

Data on changes in county boundaries can be obtained from the Atlas of Historical County Boundaries at the Newberry Library.[34] Of the 776 counties in the sample, only 32 had mapped boundary changes, representing 4.12 percent. The majority of these boundary changes are referred to by the Newberry Library researchers as "small," many too small to map. While most counties in the sample changed boundaries rarely if at all, one notable outlier is the Denver, Colorado metro area, where Denver, Jefferson, Adams, and Arapahoe Counties swapped patches of land at a sustained pace between 1940 and 1970. However, these counties fall within the Denver-Boulder-Longmont, CO commuting zone, therefore their border changes do not affect the accuracy of the matching procedure.

[33]The commuting zone polygon was created by dissolving borders between counties in the commuting zone using the crosswalk between 1990 counties and commuting zones from Autor and Dorn (2013).

[34]See the information available at the following webpage: `https://publications.newberry.org/ahcbp/`.

B.2.2 City name standardizing

Names of cities in all city-level data digitized or collected for this paper were first standardized to be consistent with those in the 2010 U.S. place point shapefile from NHGIS. Places in the 2010 US place point file were matched to the county or CZ they fell within, allowing for the matching of city-level datasets to counties and commuting zones. In instances where a city did not appear in the 2010 US place point file, the city was assigned to the same CZ as places geographically close to the city in the 2010 US place point file.

Appendix C Great Migration shift-share instrument

This appendix details the construction of the shift-share instrument for the Great Migration, beginning with the construction of the shares from pre-1940 migrant location choices and following with the prediction of migration from southern counties using a machine learning approach.

C.1 Pre-1940 Black southern migrant shares

I measure Black southern migrant shares using the IPUMS version of the complete count 1940 census (Ruggles et al., 2021). The 1940 census was the first census in which enumerators asked individuals to report their place of residence in 1935. There are several advantages to this approach of measuring pre-1940 Black migration patterns. The first is that I am able to observe the universe of enumerated recent Black southern migrants, generating a nearly complete picture of recent migration flows into northern cities. The second is that the census microdata allow me to observe fine geographies for individuals' 1935 place of residence, including city and county. I define a recent Black southern migrant as a Black individual who reported a southern county of residence in 1935, but was enumerated in a different county (whether southern or not) in 1940. There are over 340,000 such individuals.

Using this population of recent Black southern migrants, I construct the share of migrants from each 1935 southern county j who settled in a northern city c by 1940:

$$\omega_{jc}^{1935-1940} = \frac{b_{cj}}{b_j} \tag{12}$$

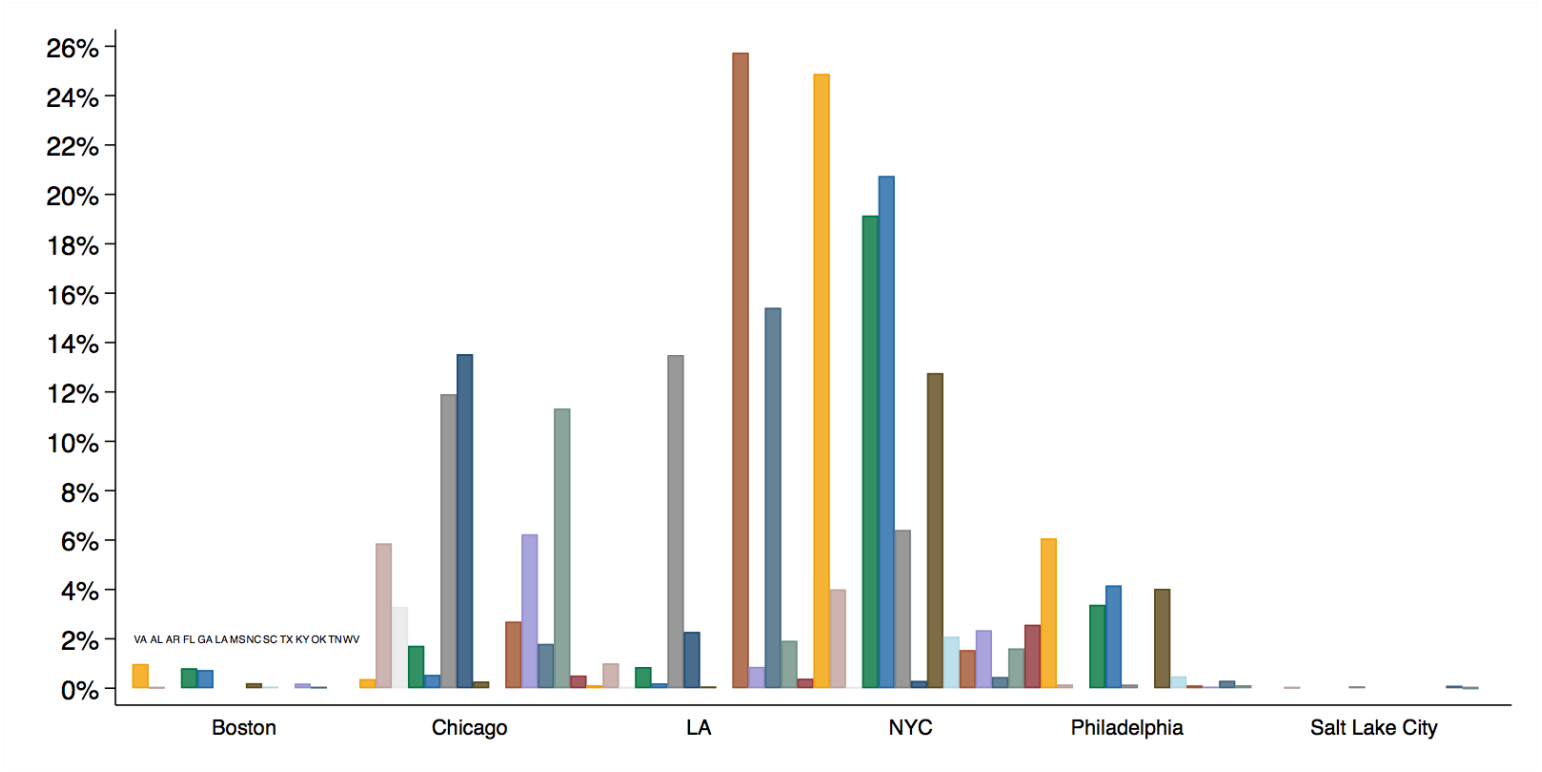
where b_j is the number of Black individuals who listed j as their county of residence in 1935, and b_{cj} is the number of Black individuals who were enumerated

in city c.

Figure C1 depicts $\omega_{jc}^{1935-1940}$ for a select group of cities and southern counties. Depicted is the share of 1935-1940 Black migrants from the largest sending county for each southern state who settled in the following cities: Boston, Chicago, Los Angeles, New York, Philadelphia, and Salt Lake City. The figure captures the immense heterogeneity in settlement patterns across and volume of migration into the cities in question.

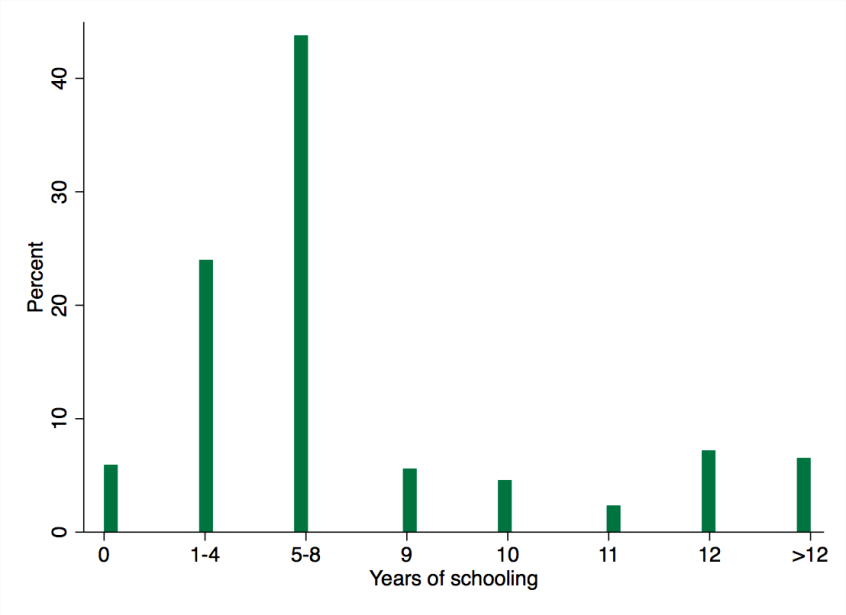
Descriptive evidence on migrant characteristics Figure C2 shows the educational distribution for 1935-1940 Black southern migrants aged 25 plus. The median Black southern migrant moving between 1935 and 1940 had at least 5-8 years of schooling, comparable to the national median. This is striking given low levels of education among Black children in the South at this time (Margo, 1990). Finally, Figure C3 explores selection of migrants relative to northern incumbent Black families in the North. If anything, Black children from low socioeconomic status families whose parents were southern born had better educational outcomes than those whose parents were northern born.

FIGURE C1: 1935-39 BLACK SOUTHERN MIGRANT COMPOSITION IN SELECT NORTHERN CITIES



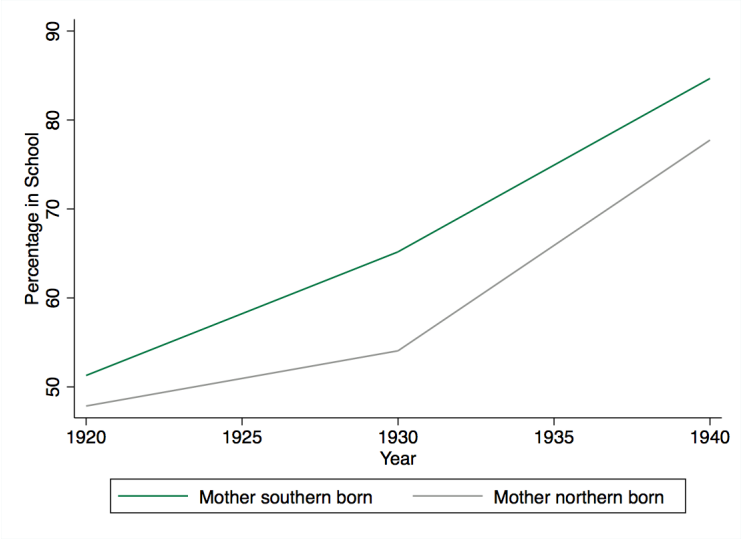
Notes: This figure shows the share of 1935-1939 Black migrants from the largest sending county for each southern state who settled in the following cities: Boston, Chicago, Los Angeles ("LA"), New York City ("NYC"), Philadelphia, and Salt Lake City. *Data source*: IPUMS Complete Count 1940 US Census.

FIGURE C2: 1935-1940 BLACK SOUTHERN MIGRANT EDUCATIONAL ATTAINMENT

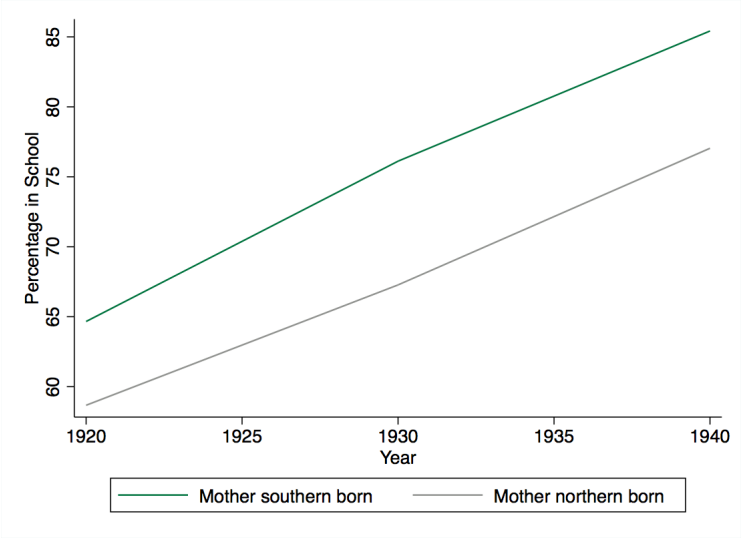


Notes: Histogram of years of schooling for 1935-1940 Black southern migrants aged 25 plus. *Data source*: IPUMS Complete Count 1940 US Census.

FIGURE C3: SCHOOL ATTENDANCE FOR BLACK TEENS IN NORTH WITH SOUTHERN- VS. NORTHERN-BORN MOTHERS



(a) Black teens with illiterate mothers



(b) Black teens with low-occ-score fathers

Notes: 1920-1940 school attendance rates (in percentage points) for Black 14-17 year-old boys and girls by mother birth region. *Data sources*: IPUMS Complete Count 1920-1940 US Censuses.

C.2 Post-LASSO prediction of southern county net migration

Under the assumption that county-level variation in southern economic indicators from 1940-1970 is uncorrelated with northern destination city characteristics for migrants from those counties, I view estimating southern county net migration rates as a pure prediction problem. Belloni et al. (2011) propose a machine-learning-based estimation of the first stage in an instrumental variables context where the number of instruments is large relative to the number of observations. In my case, I use this approach to select predictors in the "zero" stage prediction of net migration from southern counties using southern push factors[35]:

$$\text{mig rate}_{jt} \quad = \quad \beta_0 + Z'_{jt-10}\boldsymbol{\beta} + \varepsilon_{jt}, \tag{13}$$

for $t \in \{1950, 1960, 1970\}$ where m_{jt} is net migration for southern county j from the decade of $t-10$ to t and $\mathbf{Z}'_{jt-10}$ is the set of predictors measured in $t-10$. Using LASSO, I shrink the set of predictors to an optimal subset. Excluding a predictor from the subset corresponds to setting the respective element of $\boldsymbol{\beta}$ to zero. More explicitly, LASSO solves the following problem:

$$\min_{\beta_0,\boldsymbol{\beta}} \left\{ \frac{1}{N} \sum_{j=1,..,1223} \left(\text{mig rate}_{jt} - \beta_0 - Z'_{jt-10}\beta + \varepsilon_{jt}\right) \right\} \quad \text{subject to} \quad \sum_{k=1}^{9} |\beta_k| \leq p,$$

In a "zero stage," I predict where p is the tuning parameter and β_k are the coefficients on each of the nine predictors in Z'_{jt-10} as suggested by Boustan (2010): the percent acreage in cotton; percent tenant farms; share of the labor force in agriculture; indicator for being in a tobacco-growing state and the interaction between tobacco growing state and share in agriculture; WWII spending per capita; share of the labor force in mining, an indicator for being in a mining state (OK and TX), and the interaction between the two.

[35]Southern county net-migration rates are taken from Boustan (2016b).

For each decade, I use five-fold cross-validation to choose the tuning parameter p that minimizes the expected prediction error.

In my case, LASSO selects the following for each year:

Variables selected in 1940:

- Percent tenant farms
- Share of the labor force in agriculture
- WWII spending per capita
- Percent acreage in cotton
- Share of the labor force in agriculture $\times$ Tobacco growing state
- Indicator for mining state
- Indicator for mining state $\times$ Share of the labor force in mining

Variables selected in 1950:

- Percent tenant farms
- Share of the labor force in agriculture
- WWII spending per capita
- Percent acreage in cotton
- Percent acreage in tobacco
- Indicator for mining state
- Indicator for mining state $\times$ Share of the labor force in mining
- Share of the labor force in mining

Variables selected in 1960:

- Percent tenant farms
- Share of the labor force in agriculture

- Indicator for tobacco growing state
- Share of the labor force in agriculture × Tobacco growing state
- Percent acreage in cotton
- Indicator for mining state
- Indicator for mining state × Share of the labor force in mining
- Share of the labor force in mining

Using LASSO-selected variables improves the F-statistic for county outmigration prediction from 1940-1950 from 11.56 to 14.78. The F-statistics in the models for county outmigration prediction from 1950-1960 and 1960-1970 are identical using the original set of variables in Boustan (2010) and the LASSO-selected set.[36]

Given this choice of included predictors, I estimate Equation (13) using OLS to predict net migration from county j, $\hat{m}_{jt}$, for each decade $t \in \{1950, 1960, 1970\}$.[37] Next, I generate predicted migration into northern city c, $\hat{m}_{ct}$, by multiplying the share of pre-1940 migrants from each county by the predicted number of migrants leaving that county between 1940 and 1970:[38]

$$\hat{m}_{ct} = \sum_{j=1,..,1223} (\omega_{cj}^{1935-40} \cdot \hat{m}_{jt})$$

where $\omega_{cj}^{1935-40}$ is the share of Black migrants from southern county j living in city c. The estimated total Black in-migration is calculated as $\hat{m}_c =$

[36]Chernozhukov et al. (2018) discuss inference adjustment in empirical settings where machine learning is used; they show that in a variety of empirical examples, qualitative conclusions of results remain unchanged after inference adjustment.

[37]Direct measures of county-level in-migration and out-migration are not available for this time period, so I use net migration estimates produced by Boustan (2010) and made available in Boustan (2016a).

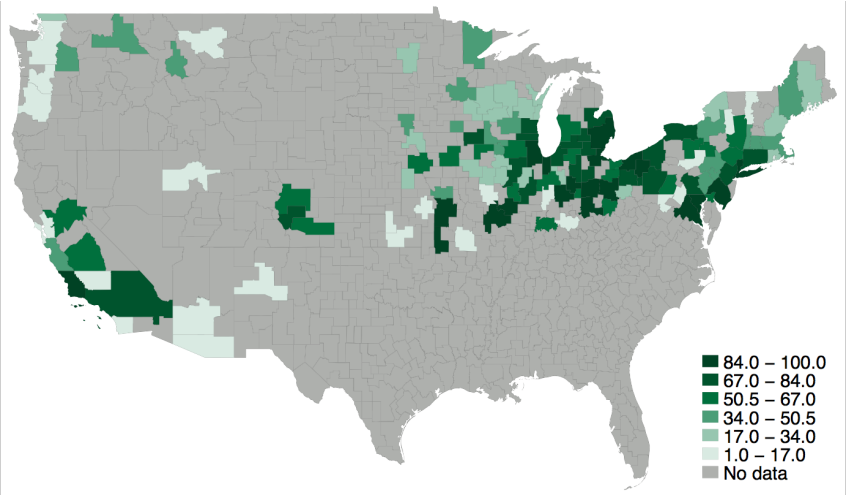
[38]Because the available figures are net migration figures, and some southern counties experienced positive net migration (in-migration) as opposed to negative (out-migration), this procedure may result in predicted *decreases* in the Black population. This is the case for a small share of the commuting zones in the sample, particularly those in western states that are more likely to be connected to counties in Oklahoma or Texas, for example, some of which experienced net in-migration between 1940 and 1970.

$\sum_{t\in\{1950,1960,1970\}} \hat{m}_{ct}$. Finally, I update the estimated share of Black residents in city c, $\hat{b}_{c,t}$, as

$$\hat{b}_{c,t} = \hat{b}_{c,t-10} + \hat{m}_{c,t} \tag{14}$$

where $\hat{b}_{c,1940} = b_{c,1940}$ as observed in the data.

FIGURE C4: MAP OF GREAT MIGRATION INSTRUMENT



Notes: This map depicts Great Migration commuting zones and each CZ's predicted percentile change in the Black population between 1940 and 1970, predicted using the methods described in Appendix C. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a).

Appendix D Additional upward mobility results and robustness

This appendix provides additional results on upward mobility as well as further robustness checks on the main findings. I begin with descriptive analysis of the change in the geography of upward mobility between 1940 and 2015. I then provide additional results and supporting evidence on the impact of the Great Migration on upward mobility for recent cohorts.

D.1 Long run change, 1940-2015

In this section, I provide correlations between measures of educational upward mobility in 1940 with income upward mobility in 2015. Following a method similar to Card et al. (2018), I measure the fraction of teenagers from households in which the household head has 5-8 years of schooling[39] who obtain at least 9 years of education. The measure of income upward mobility in 2015 consists of estimated average adult income rank at the commuting zone level, for children from different parent income percentiles, where adult income is measured between the ages of 32 and 37.[40] Section 3.1 describes these data in much greater detail.

In Table D.1, I report the correlation coefficients between historical and contemporary upward mobility measures separately by race and gender. For white men and women, historical educational upward mobility is positively correlated with income upward mobility across commuting zones today. However, for Black men and women, these measures are virtually uncorrelated. This racial difference is particularly pronounced among men. Figures D1 shows the correlation between the historical measure and the contemporary measure for Black men in the top panel and for white men in the bottom panel.

Table D1: Correlation between historical and contemporary upward mobility measures, by race and gender

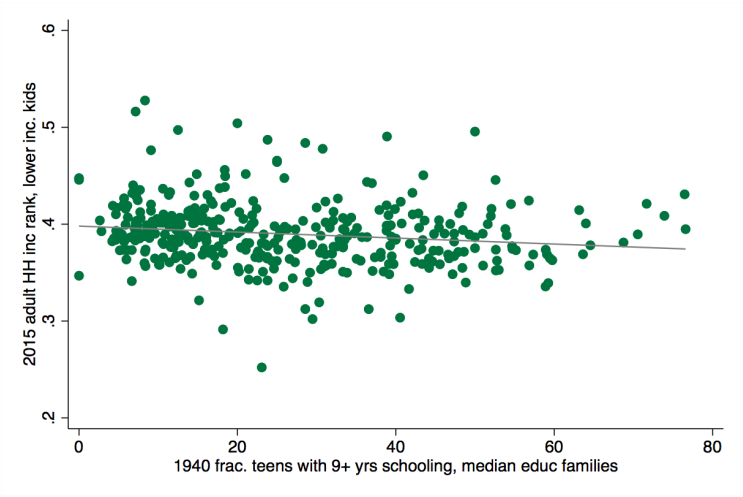
	Men	Women
Black	-0.18	0.28
White	0.43	0.54

Notes: Correlation coefficients between 1940 and 2015 measures of upward mobility, by race and gender. The sample in each column is the set of CZs within each gender for which both Black and white upward mobility measures can be computed.

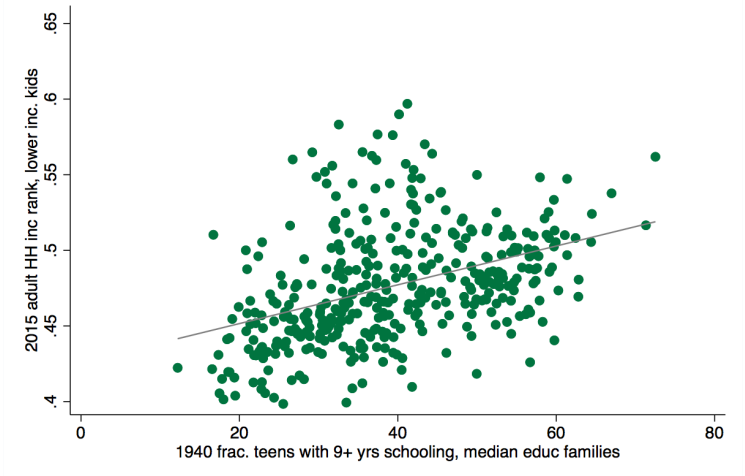
[39] Approximately the median of adult education in 1940.

[40] The children come from 1980s birth cohorts (1978-1983).

FIGURE D1: CORRELATION 1940 & 2015 UPWARD MOBILITY



(a) Black men



(b) White men

Notes: This figure depicts scatter plots of the relationship between historical upward mobility and contemporary upward mobility for Black and white men. In panel (a), the right hand side ("RHS") is 1940 educational upward mobility defined as fraction of 14-18 year old Black boys who have at least 9 years of schooling, from families where the household head has 5-8 years of education. The left hand side ("LHS") is expected average individual adult income rank based on 2014-2015 IRS tax returns of Black men from 1978-1983 birth cohorts who come from families at the 25th percentile of the parent income distribution. Panel (b) shows the same relationship as in panel (a) for white men. In order to compare the same set of commuting zones and to minimize the influence of CZs with small numbers of Black children, I restrict the sample of CZs in both panels to those with at least 10 14-17 year old Black boys in 1940 and at least 10 Black men in the IRS sample. The correlations between historical and contemporary upward mobility are reported for Black and white women in Appendix Table D1. *Data sources*: IPUMS for 1940 measure; and Chetty, Hendren, Jones, and Porter (2018) for 2015 measures.

D.2 Supporting evidence and additional results

This section provides supporting evidence for the upward mobility results in the paper as well as results on additional outcomes or subgroups.

D.2.1 Coefficients on baseline controls

Table D2 provides the coefficients on the controls in the baseline specification of the reduced form effect of the Great Migration instrument on upward mobility. Two controls are worth noting. First, the share of the labor force in manufacturing is negatively correlated with average upward mobility for low income families and upward mobility for Black men and women from low income families, but uncorrelated with childhood exposure effects. This suggests sorting of families who tend not to produce better outcomes for their children in places with historically high manufacturing employment (today's Rust belt locations). The other control that is negatively correlated with all four outcomes is the share of the urban population in 1940 made up of Black southern migrants from any southern state. Including this control is important for restricting to the idiosyncratic variation between Great Migration destination cities and southern origin counties and subsequent shocks to the latter as drivers of in-migration as opposed to destinations that were markedly different at baseline.

Table D2: Upward mobility results with coefficients on baseline controls

	Average	Expos. Effects	Black, p25	Black, p75
$\hat{GM}$	-0.0370	-0.00232	-0.0264	-0.0386
	(0.00974)	(0.000631)	(0.0114)	(0.0169)
Edu. Upward Mobility 1940	0.0163	-0.000572	0.00554	-0.0348
	(0.0391)	(0.00212)	(0.0457)	(0.0679)
Share of LF employed in manufacturing, 1940	-0.152	-0.00323	-0.0835	-0.00524
	(0.0271)	(0.00192)	(0.0317)	(0.0471)
Black Southern Mig 1935-1940	-4.312	-0.0820	-0.383	-2.014
	(1.446)	(0.0671)	(1.698)	(2.523)
Midwest	-0.536	0.0981	-1.449	-0.870
	(0.603)	(0.0365)	(0.705)	(1.048)
South	-2.004	0.167	-0.294	1.430
	(1.306)	(0.0758)	(1.527)	(2.270)
West	-2.682	-0.100	-1.575	-1.691
	(0.872)	(0.0459)	(1.028)	(1.528)
R-squared	0.481	0.249	0.185	0.110

Notes: This table reports coefficients on the baseline controls from the key analyses in the paper. In column 1, the outcome is average upward mobility for low income families; in column 2, the outcome is childhood exposure effects; in column 3, the outcome is average upward mobility for Black men from low income families; in column 4, the outcome is average upward mobility for Black men from high income families. The unit of observation is a CZ. Independent variable is predicted change in Black population share between 1940 and 1970. Baseline controls include share of CZ population made up of 1935-1939 Black southern migrants from any southern county, median education levels in 1940, share of employment in manufacturing in 1940, and census region fixed effects. The omitted region is the Northeast. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b); Chetty et al. (2020a).

D.2.2 Alternative measures of father economic status for historical measures of upward mobility

Table D3 reproduces the results in Table 3 using alternative measures of father socioeconomic status. Columns 1-5 use the Lasso Industry Demographic and Occupation (LIDO) Score from Saavedra and Twinam (2020a). The LIDO score improves on the occupational income score by using additional variables,

namely including industry and demographic characteristics, and a machine learning approach to predict earnings. Column 6 uses wage income from the 1940 Census as the measure of father's socioeconomic status. As in Table 3, the results show no relationship between the instrument for Black migration and historical measures of educational upward mobility.

Table D3: Placebo test of identification strategy using pre-1940 upward mobility with alternative measures of father SES

	Percentage teens with low SES fathers attending school					
	LIDO score					Wage Income
	1900	1910	1920	1930	1940	1940
$\hat{GM}$	0.009	0.033	0.030	0.023	0.012	0.007
	(0.030)	(0.027)	(0.027)	(0.026)	(0.016)	(0.014)
Baseline mean	53.652	74.532	62.824	73.222	80.854	81.441
Std Dev	9.239	8.221	8.219	8.209	5.793	5.296
Observations	130	130	130	130	130	130
Baseline Controls	Y	Y	Y	Y	Y	Y

Notes: This table reports the effect of the Great Migration on pre-1940 educational upward mobility and attainment. In columns 1 through 3, the dependent variable is the school attendance rate (in percentage points) of 14-17 year-old boys and girls with below-median Lasso Industry Demographic and Occupation (LIDO) score fathers in 1920, 1930, and 1940, respectively. The LIDO score, developed by Saavedra and Twinam (2020b), uses industry and demographic information, in addition to occupation, from the 1950 Census to predict earnings. In column 6, father's wage income is used as a measure of father's socioeconomic status. Independent variable is the instrument for black population increase from 1940 to 1970: the percentile of predicted black population increase, defined as the interaction between pre-1940 black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a).

D.2.3 Relationship between Great Migration instrument and 1940 CZ characteristics

Table D4 examines the relationship between the instrument for the Great Migration and socioeconomic characteristics of the destination CZs in 1940, including marriage rates, log mean occupation score, and log mean wage income. The results show no systematic relationship between the instrument for Black migration and these socioeconomic characteristics of the destination CZs.

Table D4: Great Migration instrument association with destination CZ characteristics in 1940

	Married	Married, Spouse Present	Mean Occscore	Mean wage inc.
$\hat{GM}$	-0.001	-0.005	0.000	0.004
	(0.008)	(0.009)	(0.000)	(0.002)
Baseline mean	74.388	71.185	2.580	11.426
Std Dev	2.326	2.900	0.085	0.640
Observations	130	130	130	130
Baseline Controls	Y	Y	Y	Y

Notes: This table reports the relationship between the instrument for the Great Migration and baseline 1940 socioeconomic characteristics of commuting zones. CZ characteristics are measured on adults aged 25 and older. The dependent variable in column 1 is the marriage rate; in column 2, the share of adults who are married with a spouse present in their household; in column 3, the log mean OCCSCORE; and in column 4, log mean wage income. Independent variable is the instrument for black population increase from 1940 to 1970: the percentile of predicted black population increase, defined as the interaction between pre-1940 black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a).

D.2.4 Great Migration effect on high income families

In Table D5 below, I report estimates of the effect of the Great Migration on average upward mobility for individuals with parents from the 75th percentile of the parent income distribution ("high income" families). The results show

more modest impacts on this group relative to individuals from low income families (see Section 5.1 in the main text). A 1-percentile increase in the historical Black population lowered household income rank by 0.054 percentile points (s.e. = 0.023). The effect varies across gender groups and measures of income. Both men's and women's household income is lower in places that experienced greater Black in-migration historically, but only men's earnings (individual income in columns 4-6) are affected.

I next examine the effect of the Migration on CZ childhood exposure effects for individuals from high income families. Consistent with the patterns described above, the Great Migration's impact on childhood exposure effects of commuting zones is more muted for high income compared to low income families, with effects on household income of about one half the size while the effects on individual earnings are more comparable.

Table D5: Great Migration impact on average upward mobility of high income families in 2000s

	First Stage on GM					
$\hat{GM}$	0.297	0.297	0.297	0.297	0.297	0.297
	(0.0759)	(0.0759)	(0.0759)	(0.0759)	(0.0759)	(0.0759)
F-Stat	15.34	15.34	15.34	15.34	15.34	15.34
	Household Income Rank			Individual Income Rank		
	Pooled	Women	Men	Pooled	Women	Men
	Ordinary Least Squares					
GM	-0.0413	-0.0373	-0.0453	-0.0169	-0.00149	-0.0316
	(0.00793)	(0.00789)	(0.00828)	(0.00796)	(0.0102)	(0.00809)
R-squared	0.529	0.521	0.530	0.503	0.467	0.470
	Reduced Form					
$\hat{GM}$	-0.0161	-0.0137	-0.0184	-0.00839	-0.000228	-0.0165
	(0.00766)	(0.00752)	(0.00804)	(0.00717)	(0.00911)	(0.00748)
R-squared	0.445	0.448	0.438	0.490	0.467	0.426
	Two-stage least squares					
GM	-0.0541	-0.0462	-0.0618	-0.0283	-0.000768	-0.0556
	(0.0232)	(0.0230)	(0.0244)	(0.0233)	(0.0297)	(0.0243)
none						
N	130	130	130	130	130	130
Mean Rank	58.82	60.40	57.28	57.95	55.39	60.44
SD Rank	2.570	2.533	2.684	2.510	3.118	2.470
SD GM	28.98	28.98	28.98	28.98	28.98	28.98

Notes: This table reports the estimated impact of the Great Migration on average upward mobility in the 2000s for men and women with high income parents. The unit of observation is a CZ. Dependent variable is mean income rank for individuals with parents at the 75th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. Pooled income refers to pooling across men and women. Independent variable is the percentile of Black population increase during the Great Migration. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

Table D6: Great Migration impact on childhood exposure effects for high income families

	First Stage on GM					
$\hat{GM}$	0.274	0.273	0.274	0.273	0.274	0.274
	(0.0618)	(0.0617)	(0.0619)	(0.0618)	(0.0619)	(0.0618)
F-Stat	19.68	19.53	19.65	19.56	19.63	19.71
	Household Income Rank			Individual Income Rank		
	Pooled	Women	Men	Pooled	Women	Men
	Ordinary Least Squares					
GM	-0.00119	-0.0000847	-0.00267	-0.000736	0.00134	-0.00278
	(0.000829)	(0.00115)	(0.00111)	(0.000804)	(0.00121)	(0.00113)
R-squared	0.305	0.233	0.154	0.472	0.388	0.204
	Reduced Form					
$\hat{GM}$	-0.00131	-0.00104	-0.00153	-0.00203	-0.00171	-0.00241
	(0.000604)	(0.000839)	(0.000827)	(0.000564)	(0.000880)	(0.000823)
R-squared	0.320	0.243	0.138	0.520	0.400	0.219
	Two-stage least squares					
GM	-0.00479	-0.00382	-0.00557	-0.00742	-0.00622	-0.00877
	(0.00232)	(0.00313)	(0.00297)	(0.00262)	(0.00361)	(0.00325)
none						
N	130	130	130	130	130	130
Precision Wt	Y	Y	Y	Y	Y	Y
Mean Expos FX	-0.00323	-0.0253	-0.0162	0.0305	0.0182	-0.00525
SD Expos FX	0.175	0.228	0.212	0.195	0.270	0.222
SD GM	24.40	24.08	24.29	24.52	24.33	24.38

Notes: This table reports the estimated impact of the Great Migration on commuting zone childhood exposure effects. The unit of observation is a commuting zone. Dependent variable is the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 75th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. The unit of observation is a commuting zone. Pooled income refers to household income, pooling across men and women. Independent variable is the percentile of Black population increase during the Great Migration. The instrument for Black population increase is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

D.2.5 Great Migration effect on labor market outcomes

Table D7 reports the effects of the Migration on measures of labor market outcomes, using data from Chetty et al. (2020b).

With the exception of the indicator for having positive W-2 tax form earnings, all other labor market measures come from the ACS[41] and are not available for Black men and women in over a third of the commuting zones in the sample due to the limited sample.

The results suggest that Black men from low income families growing up in major Great Migration destinations today work fewer hours per week and are less likely to have positive W-2 earnings. I also find that white men from low income families are less likely to have positive W-2 earnings, though the effect is smaller than on Black men from similar parent income. I do not see significant effects for white men from low income families on hours worked although the coefficient is negative. Despite this negative effect on the probability of working for white men from low income families, I do not observe significant reductions in their adult income rank—the results reported in the main paper in Table 7. This may be due to other non-W-2 sources of income, for example self-employment or other kinds of earnings that are not reported on the W-2 form. There are no significant effects on other subgroups.

Of interest is the lack of an effect on the percent with positive W-2 earnings or on hours worked for Black women from low income families growing up in major Great Migration commuting zones. These results are consistent with Figure 8, which show that income rank based on individual earnings is not lower for Black women from low income families in Great Migration commuting zones. There is a small, positive effect of the Great Migration on the individual income rank of Black women from high income families, also reported in Figure 8, although this effect is not significantly different from zero. The results on labor supply suggest this is not a mechanism for their higher

[41] See Chetty et al. (2018), specifically Online Appendix A on data and variable construction, for details.

individual earnings. One potential explanation is that they have higher non-W-2 income through self-employment, for example, and this increased income is not captured through labor supply responses measured through positive W-2 earnings or hours worked.

Table D7: Effects of the Great Migration on children's labor market outcomes

	Low Parent Income				High Parent Income			
	Black Men	Black Women	White Men	White Women	Black Men	Black Women	White Men	White Women
	Dep var: Fraction with positive W-2 earnings at age 32							
GM (IV)	-0.158***	0.00303	-0.0932**	-0.0670	-0.171**	-0.0143	-0.0250	-0.00361
	(0.0443)	(0.0492)	(0.0302)	(0.0415)	(0.0605)	(0.0591)	(0.0164)	(0.0314)
Dep var mean	69.27	78.91	76.95	72.92	80.63	84.33	87.63	81.34
N	129	129	130	130	129	129	130	130
F-Stat	17.49	17.49	15.34	15.34	17.49	17.49	15.34	15.34
R-squared	0.387	0.246	0.343	0.377	0.0539	0.160	0.589	0.567
	Dep var: Mean weekly hours worked in past year							
GM (IV)	-0.229**	-0.0677	-0.0354	0.00114	-0.0714	0.0177	-0.0113	0.00341
	(0.0717)	(0.0450)	(0.0223)	(0.0262)	(0.0848)	(0.0600)	(0.0143)	(0.0215)
Dep var mean	23.57	25.88	33.56	25.22	30.43	29.89	38.79	29.91
N	87	89	130	130	87	89	130	130
F-Stat	8.963	12.17	15.34	15.34	8.963	12.17	15.34	15.34
R-squared	0.0154	-0.0454	0.461	0.259	0.284	0.0853	0.533	0.427
	Dep var: Fraction with positive hours in past year							
GM (IV)	-0.209	-0.0587	-0.0429	-0.0152	0.0860	-0.0421	-0.0131	0.0240
	(0.176)	(0.110)	(0.0331)	(0.0551)	(0.204)	(0.184)	(0.0172)	(0.0386)
Dep var mean	67.92	78.65	86.92	77.28	81.21	86.74	94.62	85.85
N	87	89	130	130	87	89	130	130
F-Stat	8.963	12.17	15.34	15.34	8.963	12.17	15.34	15.34
R-squared	0.0317	0.0590	0.429	0.279	-0.0262	0.0450	0.437	0.370
	Dep var: Hourly wage rank							
GM (IV)	0.122	0.0669	0.0316	0.0230	0.266	-0.164	0.00210	0.0547
	(0.145)	(0.122)	(0.0377)	(0.0457)	(0.205)	(0.177)	(0.0282)	(0.0365)
Dep var mean	37.76	37.70	44.92	39.93	46.35	47.32	56.36	50.98
N	83	84	130	130	83	84	130	130
F-Stat	7.143	7.420	15.34	15.34	7.143	7.420	15.34	15.34
R-squared	0.187	0.370	0.480	0.493	-0.00976	0.124	0.450	0.475
SD GM	20.88	21.37	28.98	28.98	20.88	21.37	28.98	28.98

Notes: This table reports the estimated impact of the Great Migration on average educational upward mobility in the 2000s for men and women with low income parents. The unit of observation is a commuting zone. Dependent variables are listed at the top of each panel. Independent variable is the percentile of Black population increase during the Great Migration. The instrument for Black population increase is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

D.2.6 Great Migration effect on incarceration and family outcomes

Table D8 reports the effects of the Migration on measures of incarceration and family structure, using data from the Opportunity Insights website (`www.opportunityinsights.org`).

Information on incarceration comes from the 2010 Census and indicates whether an individual is incarcerated as of April 1, 2010. Note that this measure is likely a noisy measure of interaction with the criminal justice system as it only measures incarceration for those in jail or a correctional institution on the day of the Census enumeration. Other types of interaction with the criminal justice system or those incarcerated on other days of the year but not April 1, 2010 will not be picked up by this measure.[42]

The results indicate that growing up in a Great Migration CZ is associated with reduced father presence for both Black women and men from low income families—and to a reduced extent, for Black men from higher income families. I also find large effects on the probability of being married both for Black men and women from lower and higher parent income backgrounds. Finally, I find marginally significantly higher probability of giving birth as a teen for Black women from both higher and lower income families growing up in Great Migration commuting zones.

[42]See Chetty et al. (2018), specifically Online Appendix A on data and variable construction, for details.

Table D8: Effects of the Great Migration on children's incarceration and family structure

	Low Parent Income				High Parent Income			
	Black Men	Black Women	White Men	White Women	Black Men	Black Women	White Men	White Women
	Dep var: Fraction incarcerated on April 1st, 2010							
GM (IV)	0.0326	-0.0280*	0.0166	0.00511	0.0762	0.00887	0.00129	-0.0000359
	(0.0549)	(0.0114)	(0.0117)	(0.00274)	(0.0484)	(0.0115)	(0.00270)	(0.000806)
Dep var mean	13.59	0.976	3.074	0.412	5.197	0.358	0.690	0.101
N	129	129	130	130	129	129	130	130
F-Stat	17.49	17.49	15.34	15.34	17.49	17.49	15.34	15.34
R-squared	0.0974	0.0118	0.165	-0.0432	-0.0736	0.0642	0.272	0.0767
	Dep var: Father likely present							
GM (IV)	-0.269***	-0.299***	0.00758	-0.00542	-0.155*	-0.167	-0.0206	-0.0271
	(0.0716)	(0.0793)	(0.0657)	(0.0669)	(0.0752)	(0.0900)	(0.0165)	(0.0175)
Dep var mean	40.21	39.58	64.90	62.37	92.49	91.90	97.67	97.35
N	129	129	130	130	129	129	130	130
F-Stat	17.49	17.49	15.34	15.34	17.49	17.49	15.34	15.34
R-squared	0.575	0.644	0.201	0.220	0.382	0.343	0.582	0.586
	Dep var: Fraction married in 2015							
GM (IV)	-0.0937*	-0.173***	-0.00605	-0.00800	-0.256***	-0.250*	-0.0148	-0.00234
	(0.0408)	(0.0514)	(0.0378)	(0.0422)	(0.0744)	(0.101)	(0.0362)	(0.0334)
Dep var mean	18.71	18.00	41.36	47.72	32.20	31.77	56.44	63.50
N	129	129	130	130	129	129	130	130
F-Stat	17.49	17.49	15.34	15.34	17.49	17.49	15.34	15.34
R-squared	0.587	0.551	0.435	0.360	0.365	0.390	0.539	0.513
	Dep var: Fraction gave birth as a teen							
GM (IV)		0.169*		-0.0241		0.164*		-0.0349
		(0.0716)		(0.0561)		(0.0789)		(0.0260)
Dep var mean		42.44		22.40		21.13		8.837
N		129		130		129		130
F-Stat		17.49		15.34		17.49		15.34
R-squared		0.537		0.363		0.447		0.288
SD GM		28.80		28.98		28.80		28.98

Notes: This table reports the estimated impact of the Great Migration on incarceration and family structure in the 2000s for men and women with low income parents. The unit of observation is a commuting zone. Dependent variables are listed at the top of each panel. Independent variable is the percentile of Black population increase during the Great Migration. The instrument for Black population increase is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

D.2.7 Great Migration effect on educational upward mobility

Table D9 reports the effect of GM on educational upward mobility for different racial and gender groups, using data from the Opportunity Insights website (`www.opportunityinsights.org`). Educational upward mobility is defined as the fraction of individuals with a high school diploma or GED, a community college degree, some college, or a college degree conditional on parent income rank.[43] Estimates for some groups are imprecise as data on educational outcomes are only available for individuals who received the ACS or Census long form in 2000 and CZ-level outcomes are only available in commuting zones with a sufficient number of the race and gender group in question. These restrictions decrease the number of commuting zones with outcome data for Black men and women in particular, to 98 and 102 commuting zones out of 130, respectively.

Still, the results are strongly consistent with the results on income upward mobility by race and gender group. Growing up in a Great Migration destination CZ lowers educational attainment for Black men from low income families, and the effects are significant at the 5%- or 10%-level, except for the college graduation outcome. The magnitudes suggest that a 1-percentile increase in historical Black migration leads to a decrease in high school graduation rates of 0.261 pp, in community college graduation rates of 0.246 pp, in the fraction obtaining some college education of 0.319 pp, and in college graduation rates of 0.108 pp (though not statistically different from zero). Effects on Black women from low income families tend to have the opposite sign but are less precise. There are no precisely estimated effects on Black women or men from high income families though the impacts on Black men are consistently negative while those on Black women are not. Across the board, the Great Migration has no effect on the educational outcomes of white men or women irrespective of parental income. Overall, these results are consistent with stronger effects on Black men and, in the case of educational attainment, appear to be an

[43] See Chetty et al. (2018), specifically Online Appendix A on data and variable construction, for details.

important driver for the effects on Black men from low income families but—with the exception of the college margin—are less likely to be important for explaining the effects on Black men from high income families.

Table D9: Effects of the Great Migration on educational mobility

	Low Parent Income				High Parent Income			
	Black Men	Black Women	White Men	White Women	Black Men	Black Women	White Men	White Women
	Dep var: Fraction graduated from high school							
GM (IV)	-0.261*	0.101	0.00164	0.0281	-0.0623	-0.114	0.0285	0.0136
	(0.111)	(0.0999)	(0.0469)	(0.0468)	(0.110)	(0.112)	(0.0190)	(0.0146)
Dep var mean	73.16	81.05	78.54	84.32	85.64	91.31	90.96	94.04
N	114	113	130	130	114	113	130	130
F-Stat	11.18	8.961	15.34	15.34	11.18	8.961	15.34	15.34
R-squared	-0.00901	0.0138	0.196	0.141	0.0643	-0.108	0.00835	0.117
	Dep var: Fraction graduated from community college							
GM (IV)	-0.246**	0.0581	0.00706	0.0462	-0.121	0.123	-0.0136	0.0243
	(0.0908)	(0.125)	(0.0597)	(0.0801)	(0.147)	(0.185)	(0.0520)	(0.0585)
Dep var mean	17.63	29.63	24.57	36.29	37.32	51.59	51.73	64.80
N	98	102	130	130	98	102	130	130
F-Stat	12.54	10.98	15.34	15.34	12.54	10.98	15.34	15.34
R-squared	0.0124	0.199	0.307	0.221	0.220	0.0947	0.349	0.312
	Dep var: Fraction with some college							
GM (IV)	-0.319*	0.199	-0.0213	0.00981	-0.0285	0.116	0.0132	0.0248
	(0.145)	(0.120)	(0.0684)	(0.0766)	(0.195)	(0.142)	(0.0414)	(0.0366)
Dep var mean	44.50	61.99	47.55	62.75	65.76	78.84	75.98	85.38
N	98	102	130	130	98	102	130	130
F-Stat	12.54	10.98	15.34	15.34	12.54	10.98	15.34	15.34
R-squared	0.0109	-0.0469	0.419	0.232	0.0686	0.00604	0.218	0.0711
	Dep var: Fraction graduated from college							
GM (IV)	-0.108	0.126	0.0540	0.0608	-0.125	-0.0313	0.0437	0.0706
	(0.0703)	(0.103)	(0.0498)	(0.0680)	(0.164)	(0.174)	(0.0512)	(0.0581)
Dep var mean	11.23	18.85	15.79	23.81	28.79	41.27	39.98	51.66
N	98	102	130	130	98	102	130	130
F-Stat	12.54	10.98	15.34	15.34	12.54	10.98	15.34	15.34
R-squared	0.123	0.0204	0.312	0.310	0.204	0.144	0.222	0.281
SD GM	24.57	25.30	28.98	28.98	24.57	25.30	28.98	28.98

Notes: This table reports the estimated impact of the Great Migration on average educational upward mobility in the 2000s for men and women with low income parents. The unit of observation is a commuting zone. Dependent variables are the fraction of individuals with parents at the 25th percentile of the parent income distribution who graduated from high school, from community college, with some four-year college, and from a four-year college. Independent variable is the percentile of Black population increase during the Great Migration. The instrument for Black population increase is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

D.3 Heterogeneity by race, gender, and geography

This section explores further heterogeneity in the effects of the Great Migration by race, gender, and geography.

D.3.1 Regression results weighted by number of individuals underlying mobility estimates

Below I report the effect of the Migration on different race, gender, and parent income subgroups where the regressions are weighted by the number of individuals off of which upward mobility statistics are based on to address the fact that some CZ-level estimates are based off of relatively small numbers of individuals. Tables D10 and D11 report the OLS, reduced form, and 2SLS effects of a 1-percentile increase in the historical Black population on both household and individual income rank of Black and white men and women, respectively. Figure D2 reports the 2SLS effect of the Migration on individual income rank of different subgroups where the coefficient on the Great Migration has been scaled to represent a 1-standard-deviation increase. Overall, results are similar to unweighted estimates reported in Tables 6 and 7 and Figure 8 in the main text, with slightly larger negative effects on white men with low income parents and a smaller positive effect on Black women with high income parents.

Table D10: Great Migration impact on Black families, using weights

	First Stage on GM					
$\hat{GM}$	0.272	0.273	0.270	0.272	0.273	0.270
	(0.0542)	(0.0541)	(0.0542)	(0.0542)	(0.0541)	(0.0542)
F-Stat	25.16	25.45	24.86	25.16	25.45	24.86
		Low Income			High Income	
	Pooled	Women	Men	Pooled	Women	Men
	Ordinary Least Squares					
GM	-0.0567	-0.0108	-0.0591	-0.0651	0.00550	-0.0586
	(0.00992)	(0.0106)	(0.0113)	(0.00979)	(0.0128)	(0.0111)
R-squared	0.797	0.802	0.699	0.797	0.777	0.637
	Reduced Form					
$\hat{GM}$	-0.0264	-0.0117	-0.0271	-0.0190	0.00437	-0.0205
	(0.00691)	(0.00688)	(0.00783)	(0.00729)	(0.00840)	(0.00785)
R-squared	0.770	0.805	0.665	0.737	0.777	0.578
	Two-stage least squares					
GM	-0.0973	-0.0428	-0.100	-0.0699	0.0160	-0.0758
	(0.0247)	(0.0255)	(0.0280)	(0.0229)	(0.0299)	(0.0263)
none						
N	129	129	129	129	129	129
Mean Rank	0.332	0.403	0.389	0.453	0.493	0.515
SD Rank	0.0275	0.0276	0.0315	0.0398	0.0504	0.0448
SD GM	28.80	28.80	28.80	28.80	28.80	28.80

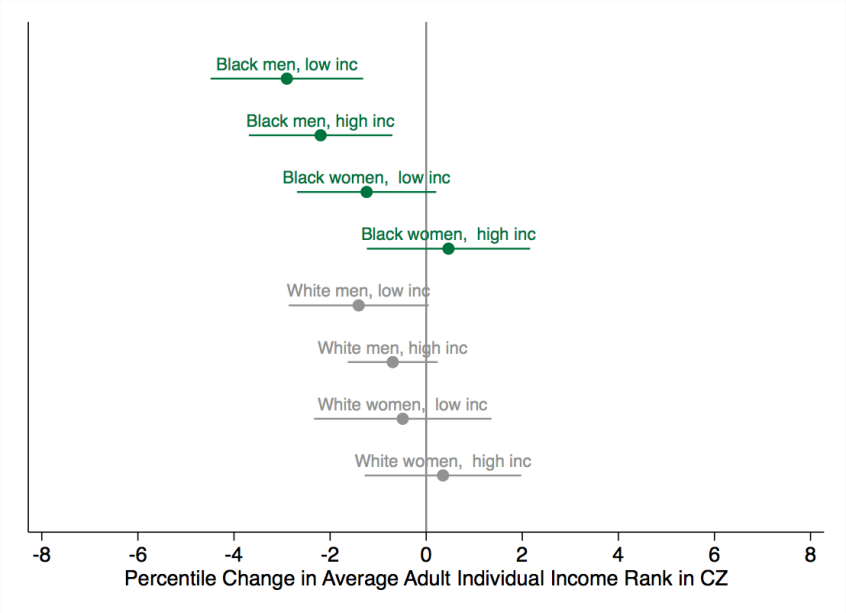
Notes: This table reports the estimated impact of the Great Migration on average upward mobility in the 2000s for Black men and women born between 1978 and 1983. The unit of observation is a CZ. The dependent variable is expected mean income rank for those with parents at the 25th and 75th percentile of parent income. Income is measured from IRS tax returns. The independent variable is the percentile of black population increase during the Great Migration. Regressions are weighted by the number of individuals per subgroup whose tax records where used to construct outcome measures. The instrument is the percentile of predicted black population increase, defined as the interaction between pre-1940 black southern migration patterns and post-1940 migrant outflows predicted by southern economic variables. Baseline 1940 controls include share of urban population made up of 1935-1940 black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

Table D11: Great Migration impact on white families, using weights

	First Stage on GM					
$\hat{GM}$	0.326	0.326	0.327	0.326	0.326	0.327
	(0.0653)	(0.0653)	(0.0652)	(0.0653)	(0.0653)	(0.0652)
F-Stat	25.02	25.00	25.05	25.02	25.00	25.05
		Low Income			High Income	
	Pooled	Women	Men	Pooled	Women	Men
	Ordinary Least Squares					
GM	-0.0120	0.0129	-0.0194	-0.0143	0.0193	-0.0198
	(0.0123)	(0.0136)	(0.0106)	(0.00769)	(0.0122)	(0.00701)
R-squared	0.531	0.531	0.516	0.624	0.573	0.590
	Reduced Form					
$\hat{GM}$	-0.0101	-0.00550	-0.0158	-0.00385	0.00394	-0.00784
	(0.00970)	(0.0108)	(0.00839)	(0.00616)	(0.00975)	(0.00568)
R-squared	0.531	0.528	0.517	0.614	0.565	0.570
	Two-stage least squares					
GM	-0.0309	-0.0168	-0.0485	-0.0118	0.0121	-0.0240
	(0.0291)	(0.0325)	(0.0257)	(0.0181)	(0.0287)	(0.0165)
none						
N	130	130	130	130	130	130
Mean Rank	0.452	0.405	0.490	0.606	0.517	0.630
SD Rank	0.0316	0.0326	0.0267	0.0223	0.0295	0.0187
SD GM	28.98	28.98	28.98	28.98	28.98	28.98

Notes: This table reports the estimated impact of the Great Migration on average upward mobility in the 2000s for white men and women born between 1978 and 1983. The unit of observation is a CZ. The dependent variable is expected mean income rank for those with parents at the 25th and 75th percentile of parent income. Income is measured from IRS tax returns. The independent variable is the percentile of black population increase during the Great Migration. Regressions are weighted by the number of individuals per subgroup whose tax records where used to construct outcome measures. The instrument is the percentile of predicted black population increase, defined as the interaction between pre-1940 black southern migration patterns and post-1940 migrant outflows predicted by southern economic variables. Baseline 1940 controls include share of urban population made up of 1935-1940 black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

FIGURE D2: RACE AND GENDER HETEROGENEITY IN IMPACT OF GREAT MIGRATION ON UPWARD MOBILITY, USING WEIGHTS



Notes: This figure plots coefficients from regressions of average upward mobility in the 2000s for white and Black men and women from low and high income parents on the instrument for Black population increases during the Great Migration, in approximately one standard deviation units. The unit of observation is a commuting zone. Upward mobility is defined as expected mean individual income rank where income is measured from IRS tax returns for cohorts born between 1978 and 1983. Regressions are weighted by the number of individuals per subgroup whose tax records where used to construct outcome measures. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. A one standard deviation increase is approximately 30 percentiles. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

D.3.2 Race-specific versus pooled upward mobility results

In this Appendix section, I show that the effect of the Migration on average upward mobility can be decomposed into an effect on Black and white individuals separately plus a "composition effect"—the effect of increasing the Black share of low income families in a CZ. Because Black children have lower upward mobility than their white counterparts across the US—potentially driven by factors such as systemic racism—this may lead to a divergence between the Great Migration's impact on race-specific average upward mobility versus av-

erage upward mobility pooled across racial groups. I formalize this issue into a decomposition between the effect of the Migration on the upward mobility of each group and the effect of the Migration on the Black share of low or high income families. In what follows, for simplicity of notation, I suppress place and parent income subscripts c and p, respectively.

To see this decomposition, first assume the Migration has no effect on the racial composition of low-income families by the 1990s when parent income for the cohorts in the mobility data is measured (in other words that the historical shock of the Great Migration to a local area's racial composition has faded by the 1990s). I construct the "average effect" of the Migration (β_{avg}) under this assumption by taking the weighted average of the estimated effect on Black and white individuals where the weights are the average Black and white shares of low income parents, for simplicity denoted as $\mathbb{E}[s]$ and $1-\mathbb{E}[s]$ below,[44] across the CZs in my sample:

$$\beta_{\text{avg}} = \frac{\text{Cov}(y_{\text{avg}}, \hat{GM})}{\text{Var}(\hat{GM})} = \mathbb{E}[s] \cdot \frac{\text{Cov}(y_b, \hat{GM})}{\text{Var}(\hat{GM})} + (1 - \mathbb{E}[s]) \cdot \frac{\text{Cov}(y_w, \hat{GM})}{\text{Var}(\hat{GM})}.$$

I then compare this to the impact of the Great Migration on the locally population-weighted average of Black and white outcomes in a CZ (β_{pooled}) where population weights equal the local Black share and white share of parents of national income rank p:

$$\beta_{\text{pooled}} = \frac{\text{Cov}(y_{\text{pooled}}, \hat{GM})}{\text{Var}(\hat{GM})} = \frac{\text{Cov}(s \cdot y_b + (1-s) \cdot y_w, \hat{GM})}{\text{Var}(\hat{GM})}$$

These two effects are equal only if the following holds:

$$\frac{\text{Cov}\left((s - \mathbb{E}[s]) \cdot y_b + (1 - s - (1 - \mathbb{E})) \cdot y_w, \hat{GM}\right)}{\text{Var}(\hat{GM})} = 0$$

[44] When I estimate the pooled effect and the effect assuming no composition effect, I use the actual white share, not 1 minus the Black share. These shares do not sum to 1 due to the presence other racial groups in the same commuting zone. However, results are similar when I set the white share equal to 1 minus the Black share.

This can be seen by subtracting and adding y_{avg} from y_{pooled}:

$$y_{\text{pooled}} = y_{\text{avg}} + s \cdot y_b + (1-s) \cdot y_w - \mathbb{E}[s] \cdot y_b + (1 - \mathbb{E}[s]) \cdot y_w,$$

which implies

$$\begin{aligned} \beta_{\text{pooled}} &= \frac{\text{Cov}\left(y_{\text{pooled}}, G\hat{M}\right)}{\text{Var}(G\hat{M})} = \frac{\text{Cov}\left(y_{\text{avg}}, G\hat{M}\right)}{\text{Var}(G\hat{M})} \\ &+ \frac{\text{Cov}\left((s - \mathbb{E}[s]) \cdot y_b + (1 - s - (1 - \mathbb{E})) \cdot y_w, G\hat{M}\right)}{\text{Var}(G\hat{M})} \\ = \beta_{\text{avg}} &+ \frac{\text{Cov}\left((s - \mathbb{E}[s]) \cdot y_b, G\hat{M}\right)}{\text{Var}(G\hat{M})} + \frac{\text{Cov}\left(1 - s - (1 - \mathbb{E})) \cdot y_w, G\hat{M}\right)}{\text{Var}(G\hat{M})} \end{aligned} \quad (15)$$

These last two terms make up the "composition effect": the impact of the Migration driven by changes in the composition of families. The Great Migration increased the Black share of low income parents, which lowers average upward mobility irrespective of locations. Note, this can be attributed to a "systemic racism" component. Black children from families with similar income to white families still face barriers throughout the US, and these barriers can affect outcomes cumulatively through the life cycle. They include, for example, lower starting wealth or discrimination faced by their parents in the housing market, both of which may affect long-run investments in children despite similar income levels.

To quantify this composition effect empirically, I use county-level Census aggregates on the income distribution by race in 2000 from NHGIS (Manson et al., 2021) to construct the CZ-level Black (white) share of households in approximately the bottom quartile of the income distribution. I convert the bins to 2015$ using the CPI-U-RS. I use the crosswalk from parent income ranks to 2015$ levels available in Chetty et al. (2020a) to identify the bins in approximately the bottom quartile of the national parent income distribution in 2000. I can then estimate each component of equation 15.

Column 1 of Table D12 reports the estimated reduced form effect of the

Migration on Black individuals (from column 1 of Table 6) and column 2 on white individuals (from column 1 of Table 7). Column 3 reports the average of these estimates assuming no composition effect, β_{avg}. Column 4 reports this average effect plus the composition effects, $\frac{\text{Cov}\left((s - \mathbb{E}[s]) \cdot y_b, G\hat{M}\right)}{\text{Var}(G\hat{M})}$ and $\frac{\text{Cov}\left(1 - s - (1 - \mathbb{E})) \cdot y_w, G\hat{M}\right)}{\text{Var}(G\hat{M})}$, reported further down in the same column as "Black Comp Effect" and "White Comp Effect." Column 5 reports the effect on locally weighted average outcomes, β_{pooled}, and column 6 the effect on the pooled mobility estimate from Chetty et al. (2020a).[45]

The results are consistent with the effect of the Migration on pooled mobility (columns 5 and 6), capturing both the effect on Black and white individuals separately, plus an effect of the change in the racial composition of low income parents in Great Migration CZs. Separately estimating the effect of the Migration by racial group purges the estimates of this racial composition effect. However, this procedure does not address other sources of unobserved heterogeneity across families that may affect children's long-run outcome. These additional sources of selection may be positive or negative. My comparison of the Migration's impact on average upward mobility versus the childhood exposure effects of CZs in Section 5.1 provides suggestive evidence that selection of families into Great Migration CZs is on net modest. However, given the noise in upward mobility estimates based on childhood exposure effects, I cannot rule out some negative selection.

[45]Note that this pooled mobility measure also includes outcomes for Asian Americans, Native Americans, and Hispanic individuals (all other groups do not include those identifying as Hispanic) whereas I focus specifically on the effects on Black versus white families. Given the relatively smaller sizes of these other demographic groups, however, I expect and in fact show, that the results on pooled Black and white mobility look very similar to the results on pooled mobility from Chetty et al. (2020a).

Table D12: Comparison of race-specific vs. pooled effects of Great Migration on upward mobility

	Black	White	Weighted Avg No Comp FX	Weighted Avg + Comp FX	Pooled B & W: Weighted by Local Shares	Pooled CHJP (2019)
$\hat{GM}$	-0.0183	-0.00761	-0.00835	-0.0253	-0.0253	-0.0257
	(0.00930)	(0.0108)	(0.00625)	(0.0140)	(0.0140)	(0.00961)
Lower Bound	-0.0366	-0.0288	-0.0206	-0.0528	-0.0527	-0.0445
Upper Bound	-0.0000895	0.0136	0.00389	0.00214	0.00203	-0.00686
Black Comp Effect				0.0481		
White Comp Effect				-0.0651		
N	129	129	129	129	129	129
Dep var mean	33.19	45.22			38.49	42.12
GM SD	29.56	29.56			29.56	29.56
R-squared	0.286	0.275			0.572	0.417

Notes: This table compares the Migration's effect on upward mobility for Black individuals with low income parents; the Migration's effect on white individuals with low income parents; the average of these effects weighted by each racial group's sample average share of low income households in 2000, i.e., ignoring the "composition effect" or the Migration's causal effect on the latter; the coefficient in the previous column plus the composition effect; the effect on the locally weighted average of Black and white individuals from low income families; and the effect on mobility for all racial groups pooled together from Chetty et al. (2020a). The unit of observation is a commuting zone. Dependent variable is expected mean household income rank for individuals with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1978 and 1983. Independent variable is the percentile of Black population increase during the Great Migration. The instrument for Black population increase is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

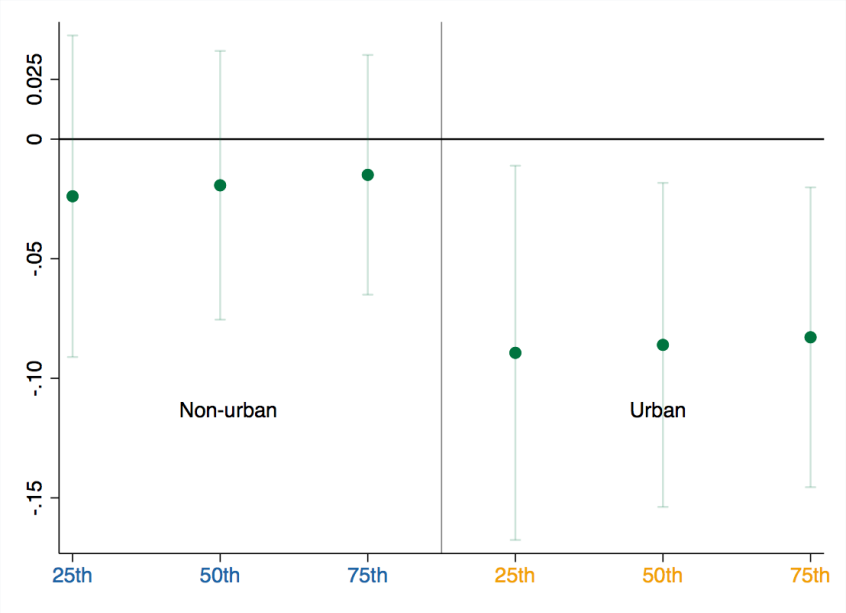
D.3.3 Heterogeneity by geography

This section explores geographic mediators of the Migration's effect on upward mobility. The deleterious effects of the Great Migration are more pronounced in urban areas of commuting zones than non-urban areas, as shown in Figure D3. The dependent variable on the left side of the panel in the figure is the population-weighted average of upward mobility for non-urban census tracts in a commuting zone only. The dependent variable on the right side of the panel in the figure is the population-weighted average of upward mobility for urban census tracts in a commuting zone only. I define a census tract as urban if 100% of the population in that census tract is part of an urban area.[46] The effect on non-urban upward mobility in the commuting zones in the sample is muted and statistically indistinguishable from zero while the effect on urban upward mobility in commuting zones is close to the baseline effect reported in Table 8 and is statistically significant at the 5% level.

At the same time, sorting into different types of neighborhoods by race within destination CZs does not fully explain the Migration's disparate impact on Black families. Figure D4 reports the effect of the Great Migration on the racial gap in upward mobility in commuting zones versus the average racial gap by census tract within commuting zones. The Great Migration exacerbated gaps in upward mobility between Black and white families in the same census tract. This suggests that Black families and Black boys in particular growing up in the same census tract as white boys and from the same family income experience an effectively different environment. This may be driven, for example, by increased interaction with the criminal justice system or differential access to networks and resources within census tracts that promote upward mobility.

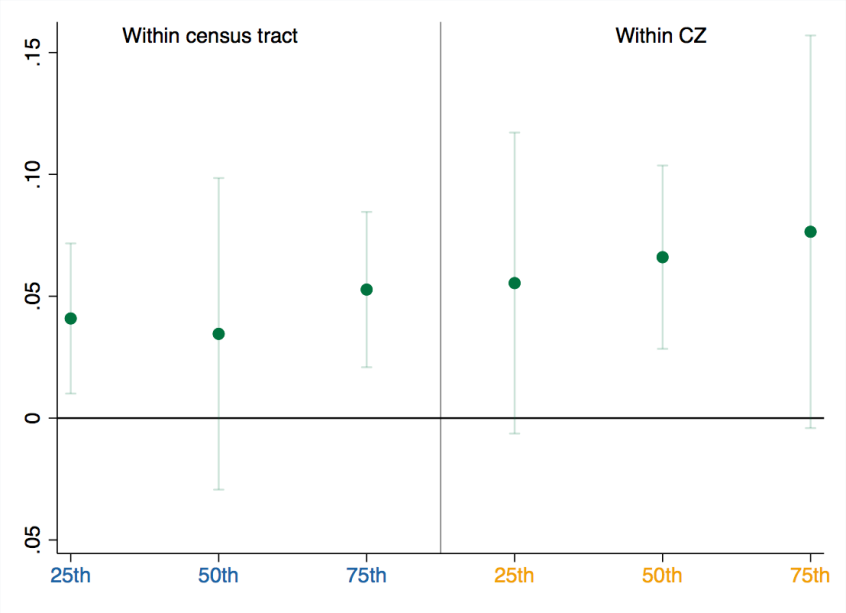
[46] In the sample, about 72% are urban according to this definition. Data on urban and rural populations in census tracts are from NHGIS (Manson et al., 2021).

FIGURE D3: IMPACT OF GREAT MIGRATION ON URBAN VS. NON-URBAN UPWARD MOBILITY IN CZS



Notes: This figure plots the 2SLS coefficient on the Great Migration in separate regressions where the dependent variable is upward mobility for different geographies and parent income levels. The dependent variable is the mean household income rank pooling all racial groups and men and women. Income is measured from IRS tax returns for cohorts born between 1978 and 1983. The first three coefficients reflect the Great Migration's impact on individuals in non-urban census tracts with parents at the 25th, 50th, and 75th percentile, weighted by total number of individuals per census tract. The last three coefficients plot the analogous effects for individuals from urban census tracts. Independent variable is the percentile of Black population increase during the Great Migration. Baseline controls included. 95% confidence intervals indicated. *Data sources*: Chetty, Hendren, Jones, and Porter (2018); IPUMS Complete Count 1940 US Census; Boustan (2016a).

FIGURE D4: IMPACT OF GREAT MIGRATION ON WITHIN-CENSUS-TRACT RACIAL GAP



Notes: This figure plots the 2SLS coefficient on the Great Migration in separate regressions where the dependent variable is the racial gap in upward mobility for different geographies and parent income levels. The dependent variable is the difference in mean household income rank between Black and white individuals, pooling men and women. Income is measured from IRS tax returns for cohorts born between 1978 and 1983. The first three coefficients reflect the Great Migration's impact on the CZ-average within-census-tract racial gap for individuals with parents at the 25th, 50th, and 75th percentile, weighted by total Black plus white population per census tract whose tax returns were used to construct the estimates. The last three coefficients plot the CZ-level gap. Independent variable is the percentile of Black population increase during the Great Migration. Baseline controls included. 95% confidence intervals indicated. *Data sources*: Chetty, Hendren, Jones, and Porter (2018); IPUMS Complete Count 1940 US Census; Boustan (2016a).

D.4 Supplementary information on childhood exposure effects measures

This section provides background information on causal place effect estimates from Chetty and Hendren (2018b). To construct measures of the causal effect of childhood location on adult outcomes, the authors study families that moved across commuting zones as observed from address changes in US federal tax records. Exploiting variation in children's ages at the time different families moved, the authors estimate the effect of an additional year of childhood

exposure to a location on children's adult income. Under the assumption that the age of a child at the time a family moved is orthogonal to unobserved family characteristics θ_i, estimating the effect of one additional year of childhood exposure to a location and multiplying this effect by number of years of childhood provides a direct estimate of $\mu_{p,CZ}$ from equation 8. This assumption may not be appropriate when comparing families with school age children to those with younger children as the former may systematically select into locations with better school quality. However, the assumption is far more plausible when making comparisons narrowly across one-year age differences, e.g., 8 year-olds versus 9-year-olds and 14 year-olds versus 15 year-olds.[47] Chetty and Hendren (2018b) use variation in age of child at time of family's move to purge place effect estimates of bias from sorting on family unobservables, θ_i:

$$\begin{aligned} y_i &= \delta_c + \theta_i \\ &\downarrow \\ \Delta y_i &= \alpha_c \Delta t_i \end{aligned}$$

α_c is an unbiased estimate of the effect of an additional year of childhood exposure to location c on adult outcome y_i.

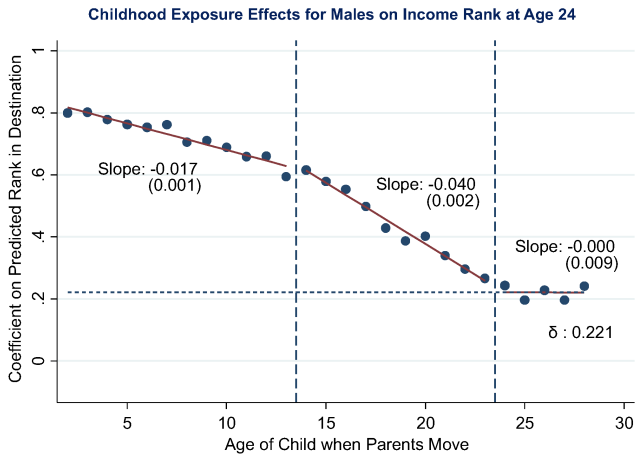
Scaling childhood exposure effects Assuming muted effects for early years according to Figure D5 from Chetty et al. (2020a), the effect of full childhood exposure for 23 years should be adjusted in the following manner[48]:

$$\text{Years} = (23 - 13) + (17/40) * 13 = 15.53$$

[47]The specifications the authors use to estimate place effects include origin-destination CZ-pair fixed effects, so comparisons are made across children moving to and from identical locations. Chetty and Hendren (2018a) also provide several checks of the identifying assumption stated above, including instrumenting for moves with displacement shocks to families and the inclusion of family fixed effects.

[48]Deutscher (2020) replicates this finding using data from Australia, finding that on all outcomes, childhood location has its biggest effect during one's teen years.

FIGURE D5: HETEROGENEITY IN CHILDHOOD EXPOSURE EFFECTS BY AGE OF CHILD (CHETTY ET AL., 2020A)



Notes: This figure from Chetty et al. (2020a) depicts heterogeneity in childhood exposure effects by age of exposure. Early years of childhood exposure have more muted impacts compared to teen years of exposure.

An even more conservative scaling factor might take into account that observational upward mobility estimates reflect the adult outcomes of children born between 1980 and 1988 whose parents remained in the same commuting zone from 1996 to 2012, as measured in their tax records. Thus, the oldest children are age 16 when their parent's location is first measured while the youngest are age 8. I use the information from footnote 17 on p.12 in Chetty and Hendren (2018a) to make extreme, conservative assumptions regarding average years of exposure for the children in the sample. The footnote explains that among families who remain in the same location while their children are between the ages of 16 and 24, "81.5% of them lived in the same CZ when their children were age 8." I first compute average years of exposure at age 16 making the following two assumptions: of the 81.5% of 16 year-olds observed in the same CZ at age 8, none had exposure before age 8 and thus were exposed for a total of 16 years while the other 18.5% had zero years of exposure before the age of 16 and were only exposed from age 16 to 24, or 8 years. This implies an average exposure of 14.52 years for the oldest children in the sample. Using this multiplier for *all* children in the sample implies that a 1-s.d. increase in

Great Migration inflows is associated with a 3.1-percentile reduction in income rank via location channels alone, compared with a 3.6-percentile reduction in average income rank (including both location and selection channels). Thus, with this assumption, 87% of the Great Migration's impact is explained via location channels and the remaining portion by selection.

D.5 Net effect of the Great Migration

This appendix discusses the overall impact of the Great Migration on Black economic status over the 20th century, through the lens of intergenerational mobility. The main analysis in the paper poses the counterfactual of upward mobility for children in the northern US had they grown up in locations less affected by the Great Migration. This counterfactual does not consider the impact of the Migration on earlier generations, which affects the adult income of Black children today through their parents and grandparents, or on southern stayers, who may have been affected by Black *emigration* from South.

The Great Migration moved Black grandparents dramatically up in the national income distribution: estimates suggest that migrants could approximately double their earnings by moving North (Collins and Wanamaker, 2014; Boustan, 2016a). At the same time, racially segmented labor markets in the North led to increased competition between Black incumbents and new arrivals such that racial earnings convergence in the destinations slowed (Boustan, 2009). Evidence on the timing of changes in conditions in northern cities, presented in Appendix F, suggests that the cohorts growing up in the 1970s would have been exposed to negative environmental factors including extreme segregation, high crime rates, and spillovers from greater greater police presence. Nonetheless, the sharp increase in average grandparent income through migration likely outweighed the competition effect in the North, and potentially even the harsher environment faced by the second generation.

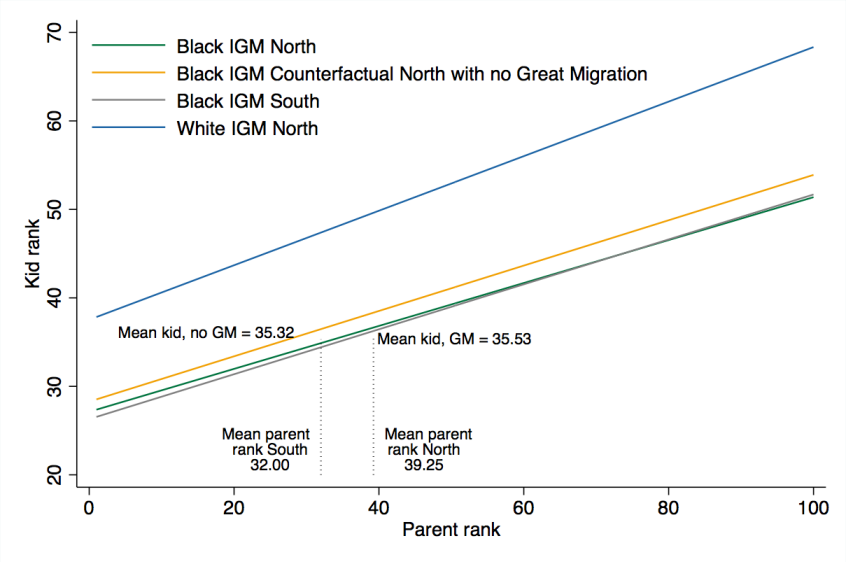
A final relevant factor for understanding the effect of the Migration is the

impact of Black emigration on southern locations. For the Great Migration to have had a net negative impact on Black economic status, it would be necessary to assume that in the absence of Black emigration, southern locations would have been better off. There are two key reasons why this is unlikely to be the case. First, emigration put direct pressure on southern jurisdictions to offer better amenities for Black workers. Boustan and Tabellini (2018) find that votes for segregationist policies decreased in places where Black migrants left in greater numbers. This echoes the "voting with one's feet" hypothesis explored by Margo (1991b). Second, Calderon et al. (2019) find that the Great Migration may have played a role in bringing civil rights issues to the national stage and helped civil rights legislation get passed. The effects of civil rights legislation were felt more strongly in the South than in the North, so this suggests another mechanism through which the Migration may have improved southern conditions.

In a simplified counterfactual exercise, I explore the aggregate effect of the Great Migration while making several conservative assumptions. First, I assume a zero effect of the Great Migration on the South and that the net effect of the Great Migration on parent income (inclusive of the effects on grandparents) is reflected in the difference in average Black parent income rank in the North and the South today. In the absence of the Great Migration, 23% of Black grandchildren would experience the counterfactual northern intergenerational mobility curve had the Migration not occurred while 77% would remain on the southern curve. This exercise suggests a positive net effect of the Great Migration on Black income of 0.2 income percentiles.

I conclude that while the Migration eventually reduced the gains to parent income for Black children in the North, the large positive effect the Migration had on the income of earlier generations (moving Black children *up* the IGM curve) makes up for these losses. Any additional positive impacts on the South would only magnify a positive net effect of the Great Migration.

FIGURE D6: INTERGEN. MOBILITY BY RACE AND REGION



Notes: This figure plots intergenerational mobility curves by race and region. The y-axis plots the income rank of individuals from the 1978-1983 birth cohorts and the x-axis plots the income rank of their parents. Income is measured from IRS tax returns. The green line plots the intergenerational mobility curve for Black families in the North; the gray line plots the intergenerational mobility curve for Black families in the South; and the gold line plots a counterfactual intergenerational mobility curve for Black families in the North in the absence of the Great Migration. Average parent income rank in the North and South are indicated on the plot. The counterfactual line is plotted using estimates of the Migration's impact on Black men from the 25th, 50th, and 75th percentiles of the parent income distribution from regressions described in Section 4. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

D.6 Additional details on robustness checks in Section 5.3

This section provides further details on the robustness checks discussed in Section 5.3.

Deindustrialization As discussed in the main text, I control for the manufacturing share of the labor force in 1940 to assess deindustrialization as a potential confound for the Great Migration's impact on upward mobility. The 1940 manufacturing share is strongly predictive of the manufacturing share

in following decades. Specifically, The correlation between 1950 share of the labor force in manufacturing and the baseline period share is 0.97. By 1970, this drops only slightly, to 0.85. To further address this concern, I control for a Bartik demand shock from 1940-1970. I construct this demand shock by interacting industry shares with national, leave-one-out changes in manufacturing employment between 1940 and 1970, using data from Ruggles et al. (2021) and Manson et al. (2021).

Other migrations To control for an exogenous measure of historical European migration and assess whether or not this confounds my estimates, I use data from Sequeira et al. (2019) that contains instruments for historical European migration based on whether a county was connected to railways during migration booms versus busts during the Age of Mass Migration. I also examine white southern migration over 1940-1970 as a potential confound by developing a shift share instrument for this type of migration, that combines 1935-1940 white southern migrant settlement patterns with white southern county outmigration. As discussed in the main text, white southern migration does not lead to changes in the gains from growing up in destination CZs today. Interestingly, white southern migration appears associated with lower outcomes for white men and women from lower income parents. The lack of an effect on childhood exposure effects suggests that the channel is the composition of the average white child as opposed to changes in local public goods or neighborhood quality in response to historical in-migration of white southerners.

D.7 Additional robustness checks

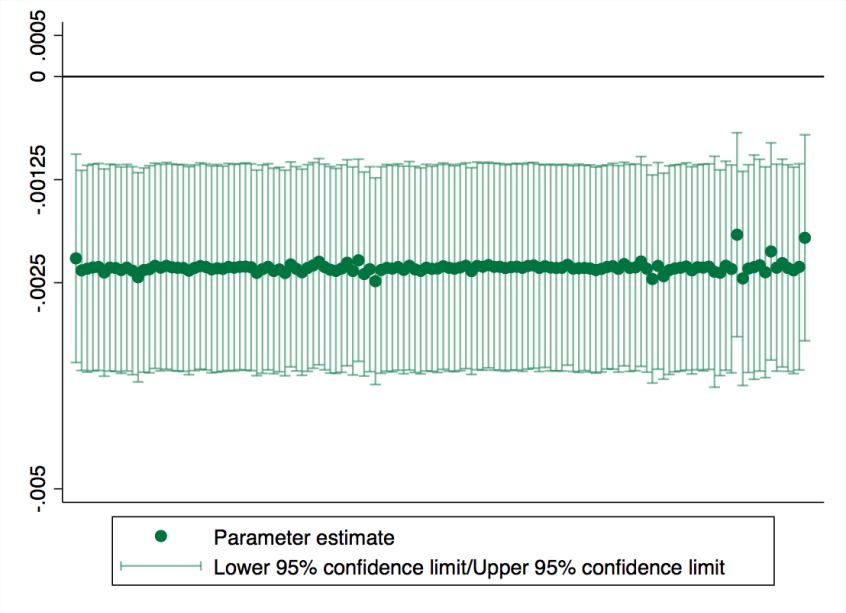
This section reports additional robustness checks on the core result that the Great Migration reduced gains from growing up in northern commuting zones in the US. All of the results report the reduced form relationship between the instrument for the Great Migration and upward mobility. I briefly discuss each

of the results in turn.

D.7.1 Robustness to dropping each CZ once

To insure that my results are not driven by any particular commuting zone, I rerun the analysis of the Great Migration's impact on childhood exposure effects for low income families dropping one CZ at a time. The results are shown in Figure D7. The coefficient on the Great Migration is highly consistent across all 130 regressions dropping one CZ from the sample each time, indicating that no single CZ drives the relationship between the Great Migration and upward mobility.

Figure D7: Great Migration effect robust to leaving out each CZ once from sample

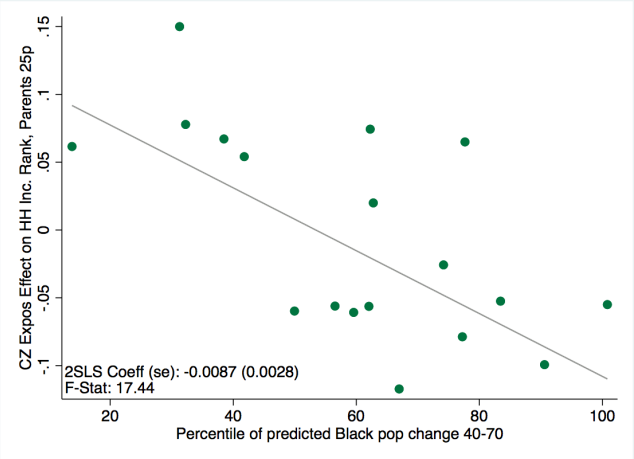


Notes: This figure plots the coefficient on percentile of predicted Black population change in 130 separate regressions where each CZ in the sample has been left out of the regression once. 95% confidence intervals indicated. The unit of observation is a commuting zone. Dependent variable is the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

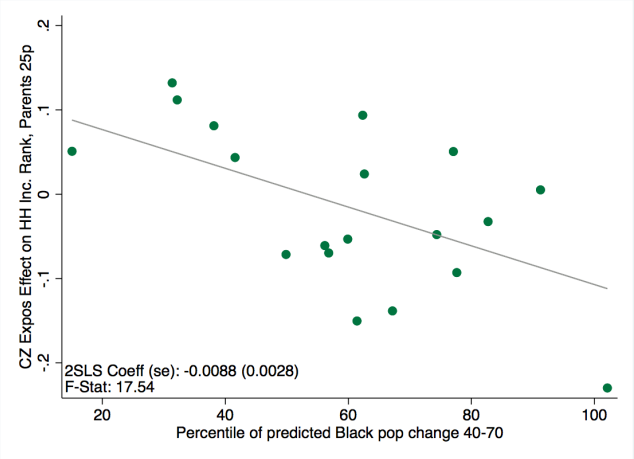
D.7.2 Controls for CZ urbanicity

The next set of robustness checks explore robustness to baseline population characteristics of the commuting zones in the sample, including the share of the population that was urban in 1940 and log population density. Figures D8a and D9b report the results. Controlling for the CZ's urban share in 1940 or log population density does not affect the results suggesting that mere urbanicity (and the trajectory of upward mobility in urban areas) is not driving the Great Migration's impact on upward mobility in the CZ.

FIGURE D8: GREAT MIGRATION IMPACT ON CHILDHOOD EXPOSURE EFFECTS, POPULATION CONTROLS



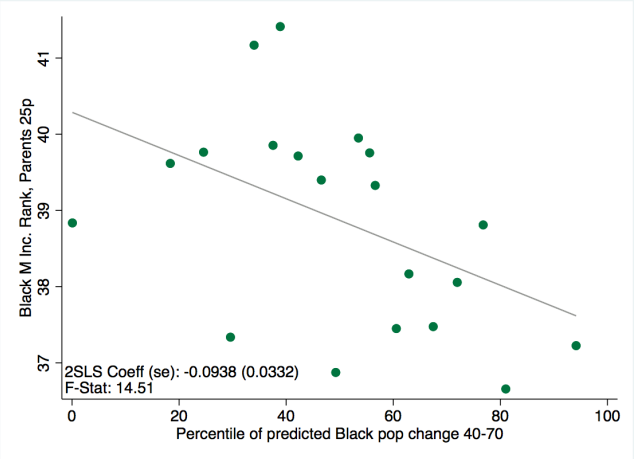
(a) Controlling for CZ urban share in 1940



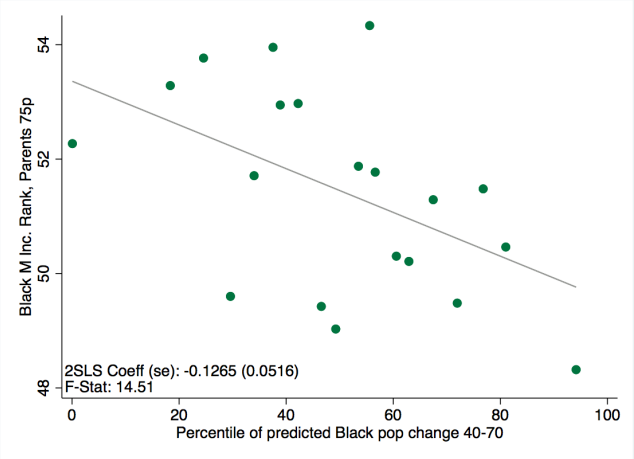
(b) Controlling for log population density in 1940

Notes: Panel (a) depicts a binned scatterplot of the reduced form relationship between the instrument for the Great Migration and CZ childhood exposure effects for individuals from low income families, controlling for the urban population share in the CZ in 1940. Panel (b) depicts the same but with log population density in 1940 in the CZ as a control. The right hand side variable is grouped into 20 bins (5 percentiles each). The unit of observation is a commuting zone. Dependent variable is the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. The Great Migration instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. The 2SLS coefficient and the first-stage F-statistic are also reported. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty and Hendren (2018b).

FIGURE D9: GREAT MIGRATION IMPACT ON BLACK MEN'S UPWARD MOBILITY, CONTROLS FOR URBAN SHARE



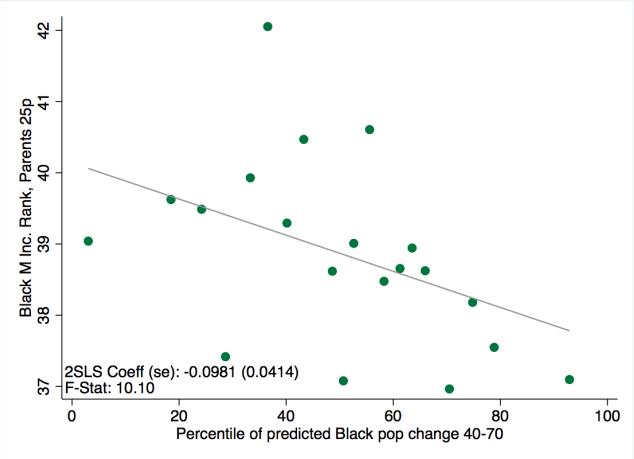
(a) Parents 25th percentile



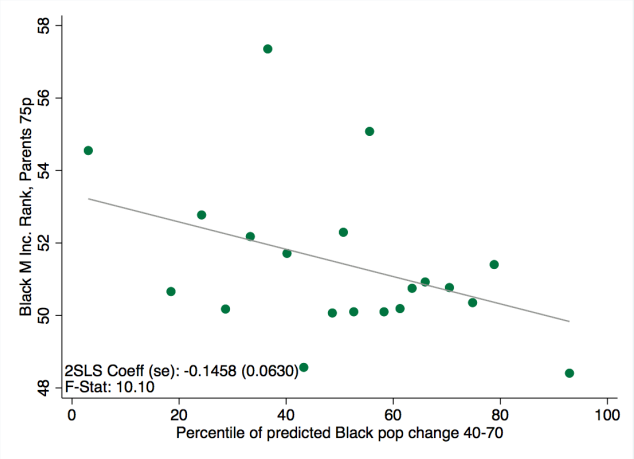
(b) Parents 75th percentile

Notes: Panel (a) depicts a binned scatterplot of the reduced form relationship between the instrument for the Great Migration and Black men's upward mobility (25th percentile of parent income distribution), controlling for the urban population share in the CZ in 1940. Panel (b) depicts the same for Black men from the 75th percentile of parent income distribution. The right hand side variable is grouped into 20 bins (5 percentiles each). The unit of observation is a commuting zone. Upward mobility is defined as mean individual or household income rank by childhood commuting zone where income is measured from IRS tax returns for cohorts born between 1978 and 1983. The Great Migration instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. The 2SLS coefficient and the first-stage F-statistic are also reported. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

FIGURE D10: GREAT MIGRATION IMPACT ON BLACK MEN'S UPWARD MOBILITY, CONTROLS FOR 1940 LOG POPULATION DENSITY



(a) Parents 25th percentile



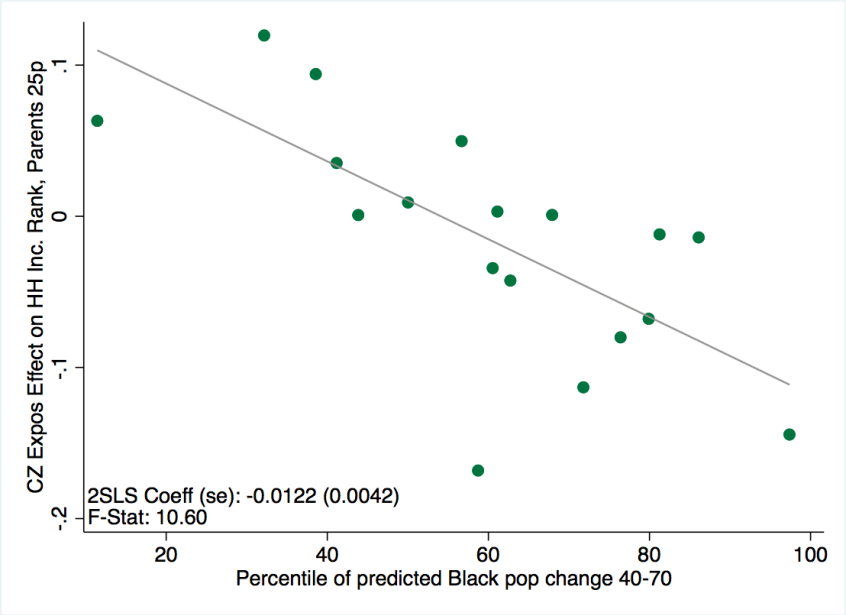
(b) Parents 75th percentile

Notes: Panel (a) depicts a binned scatterplot of the reduced form relationship between the instrument for the Great Migration and Black men's upward mobility (25th percentile of parent income distribution), controlling for log population density in 1940 in the CZ in 1940. Panel (b) depicts the same for Black men from the 75th percentile of parent income distribution. The right hand side variable is grouped into 20 bins (5 percentiles each). The unit of observation is a commuting zone. Upward mobility is defined as mean individual or household income rank by childhood commuting zone where income is measured from IRS tax returns for cohorts born between 1978 and 1983. The Great Migration instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. The 2SLS coefficient and the first-stage F-statistic are also reported. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); Chetty et al. (2020a).

D.7.3 Robustness to inclusion of pre-1940 murder rate control

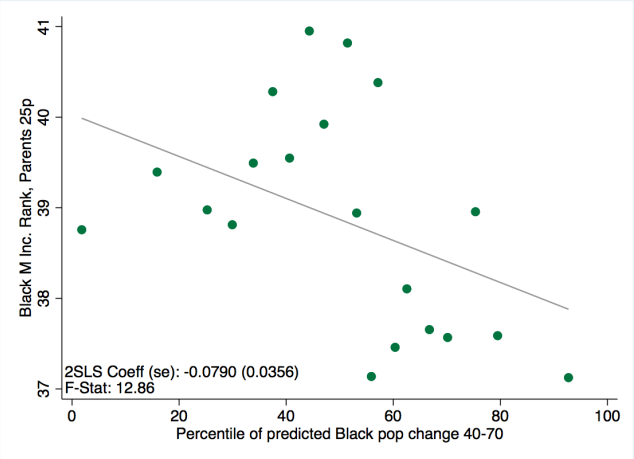
Figure 9 shows that the Black in-migration into cities between 1940 and 1970 was correlated with the urban murder rate prior to 1940. However, controlling for pre-1940 murder rates does not alter the relationship between the Migration and post-period police spending, murder rates, or incarceration. In this section, I examine whether my main results on upward mobility are also robust to controlling for pre-1940 murder rates (average of 1931 and 1943 murder rates). Figures D11 and Figures D12a and D13b show binned scatter plots of the reduced form relationship between the Great Migration shock and childhood exposure effects of CZs for low income families and upward mobility for Black men from low and high income families. Results are robust to controlling for pre-1940 urban murder rates.

FIGURE D11: GREAT MIGRATION IMPACT ON CHILDHOOD EXPOSURE EFFECTS, CONTROLS FOR 1931-1943 URBAN MURDER RATE

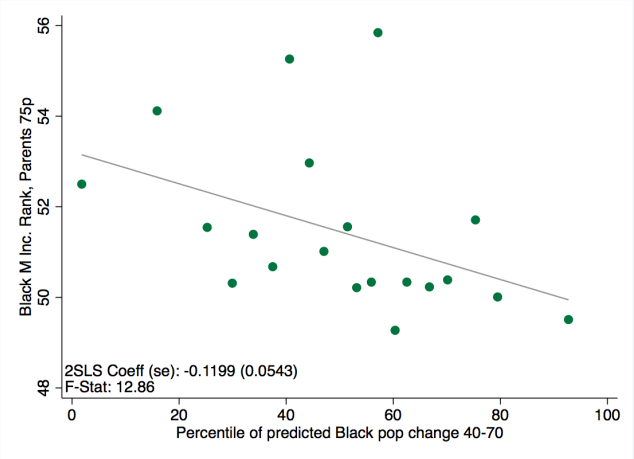


Notes: The figure depicts a binned scatterplot of the reduced form relationship between the instrument for the Great Migration and CZ childhood exposure effects for individuals from low income families, controlling for the average urban murder rate in the CZ from 1931 to 1943. Dependent variable is the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. The right hand side variable is grouped into 20 bins (5 percentiles each). The unit of observation is a commuting zone. The Great Migration instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. The 2SLS coefficient and the first-stage F-statistic are also reported. *Data sources*: CCDB; IPUMS complete count 1940 US census; Boustan (2016a); see Appendix E for the full list of data sources on each of the mechanisms.

FIGURE D12: GREAT MIGRATION IMPACT ON BLACK MEN, CONTROLS FOR 1931-1943 URBAN MURDER RATE



(a) Parents 25th percentile



(b) Parents 75th percentile

Notes: Panel (a) depicts a binned scatterplot of the reduced form relationship between the instrument for the Great Migration and Black men's upward mobility (25th percentile of parent income distribution), controlling for the average urban murder rate in the CZ from 1931 to 1943. Panel (b) depicts the same for Black men from the 75th percentile of parent income distribution. The unit of observation is a commuting zone. Upward mobility is defined as mean individual or household income rank by childhood commuting zone where income is measured from IRS tax returns for cohorts born between 1978 and 1983. The right-hand side variable is the Great Migration instrument: the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. The right hand side variable is grouped into 20 bins (5 percentiles each). Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. The 2SLS coefficient and the first-stage F-statistic are also reported. *Data sources*: Chetty, Hendren, Jones, and Porter (2018); IPUMS Complete Count 1940 US Census; Boustan (2016).

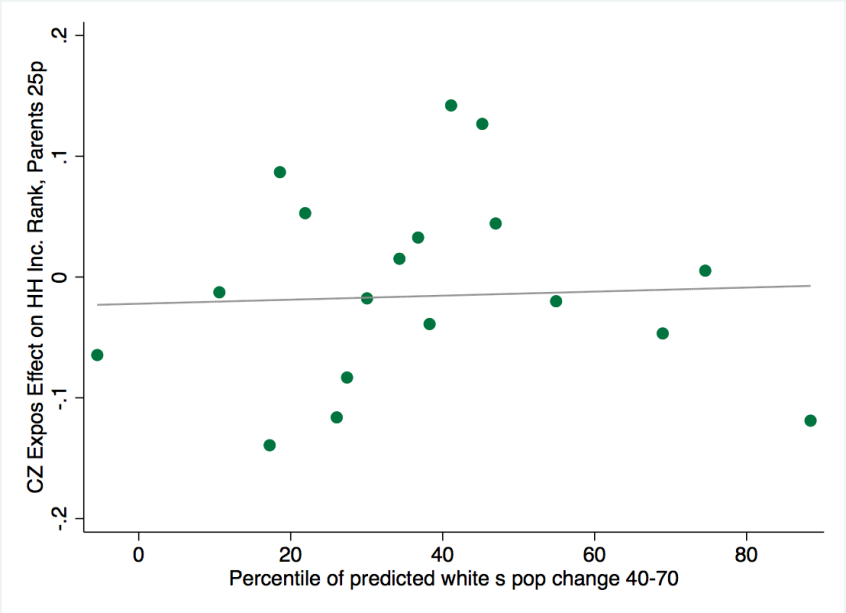
D.7.4 Placebo check using white southern migration

I next regress upward mobility (childhood exposure effects and Black men's upward mobility) on an instrument for white southern migration into non-southern cities as a placebo check.[49] The results are reported in Figures D13, D14a, and D15b. There is no relationship between white southern migration between 1940 and 1970 and the returns to growing up in northern locations. The relationship between historical white southern migration and Black men's upward mobility is statistically insignificant and slightly positive.

These results indicate that the Migration's impact is not simply reflecting increases in the southern migrant population more generally, but rather that racial composition shocks through Black migration are what altered northern locations and reduced upward mobility for low income families.

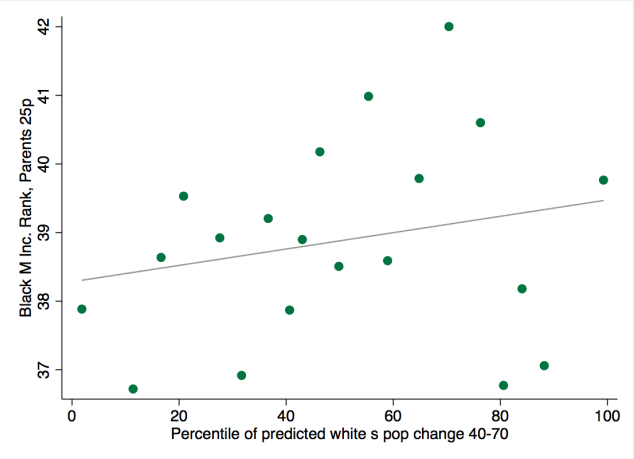
[49]Data on white southern migration come from Gardner and Cohen (1992) and Bowles et al. (2016).

FIGURE D13: WHITE SOUTHERN MIGRATION IMPACT ON CHILDHOOD EXPOSURE EFFECTS

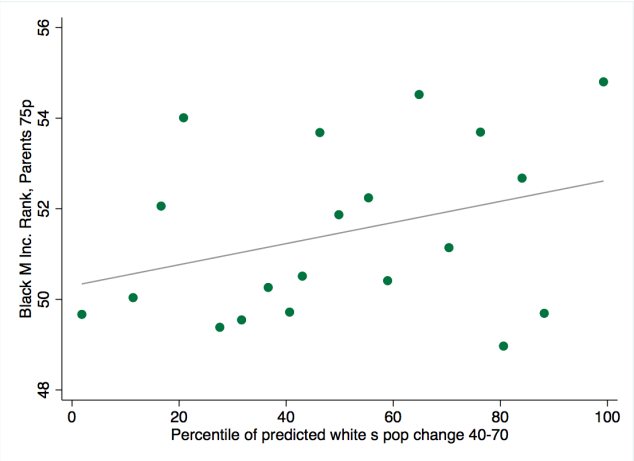


Notes: This figure depicts a binned scatterplot of the relationship between the percentile of predicted white southern in-migration and CZ childhood exposure effects for individuals from low income families. The unit of observation is a commuting zone. Dependent variable is the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. The right-hand side variable is the instrument for white southern migration: the percentile of predicted white population increase, defined as the interaction between pre-1940 white southern migration patterns and post-1940 outflows of white migrants. The right hand side variable is grouped into 20 bins (5 percentiles each). Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Chetty, Hendren, Jones, and Porter (2018); IPUMS Complete Count 1940 US Census; Boustan (2016).

FIGURE D14: WHITE SOUTHERN MIGRATION IMPACT ON BLACK MEN'S UPWARD MOBILITY



(a) Parents 25th percentile



(b) Parents 75th percentile

Notes: Panel (a) depicts a binned scatterplot of the relationship between the percentile of predicted white southern in-migration and Black men's upward mobility (25th percentile of parent income distribution). Panel (b) depicts the same for Black men from the 75th percentile of parent income distribution. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. Upward mobility is defined as mean individual or household income rank by childhood commuting zone where income is measured from IRS tax returns for cohorts born between 1978 and 1983. The right-hand side variable is the instrument for white southern migration: the percentile of predicted white population increase, defined as the interaction between pre-1940 white southern migration patterns and post-1940 outflows of white migrants. The right hand side variable is grouped into 20 bins (5 percentiles each). Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Chetty, Hendren, Jones, and Porter (2018); IPUMS Complete Count 1940 US Census; Boustan (2016).

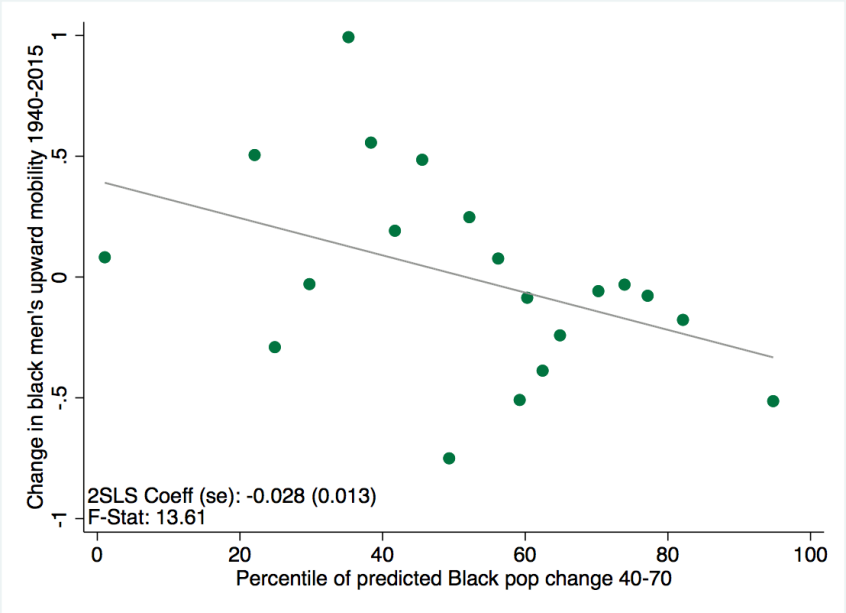
D.7.5 Impact of the Great Migration on change in Black men's upward mobility

Results on Black men's upward mobility are robust to examining the effect of the Migration on the long-run change in Black men's upward mobility within CZs, assuaging the concern that unobserved fixed characteristics of CZs confound the effect of the Great Migration on upward mobility.

To construct the long difference in Black men's upward mobility, I take the difference in the Z-score of Black men's income upward mobility in 2015 (for men from parents at the median of the national parent income distribution) and the Z-score of Black boys' educational upward mobility in 1940 (for boys whose parents had 5-8 years of schooling, the national median for adults). I then standardize this difference, so that the units of outcome variables are standard deviations.

Figure D15 shows a binned scatter plot of the reduced form relationship between the instrument for the Great Migration and the change in Black men's upward mobility. The 2SLS coefficient and first-stage F-statistic are also reported in the figure. Consistent with the baseline specifications, the results show the Migration is associated with reductions in Black men's upward mobility between 1940 and 2015.

FIGURE D15: GREAT MIGRATION IMPACT ON CHANGE IN BLACK MEN'S UPWARD MOBILITY, 1940-2015



Notes: This figure depicts a binned scatterplot of the reduced form relationship between the instrument for the Great Migration and the change in Black men's upward mobility between 1940 and 2015. The unit of observation is a commuting zone. Upward mobility in 1940 is the fraction of children from median-educated households with more years of education than their parents. Upward mobility in the 2000s is defined as mean individual or household income rank by childhood commuting zone where income is measured from IRS tax returns for cohorts born between 1978 and 1983. Units of the outcome variable are standard deviations. The right-hand side variable is the Great Migration instrument: the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. The right hand side variable is grouped into 20 bins (5 percentiles each). Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, the share of labor force in manufacturing, and census region fixed effects. The 2SLS coefficient and the first-stage F-statistic are also reported. *Data sources*: Chetty, Hendren, Jones, and Porter (2018); IPUMS Complete Count 1940 US Census; Boustan (2016).

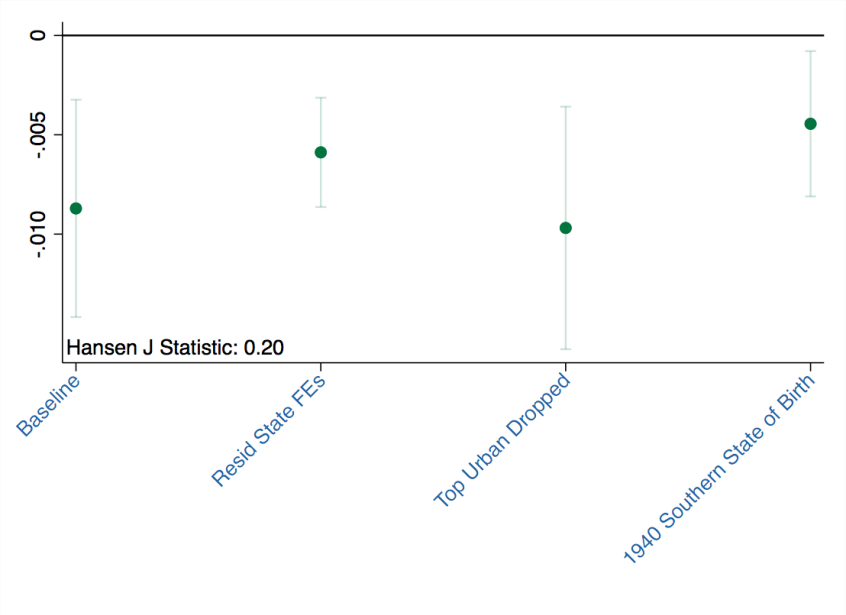
D.7.6 Robustness to using alternative instruments

Figure D16 shows robustness of the main result to the use of alternative instruments intended to address the concern of correlated shocks to southern origin counties and northern destination cities. The first coefficient shown in the figure is the coefficient on the baseline instrument for the Great Migration, the interaction between pre-1940 Black southern migration patterns and post-1940 southern county net-migration as predicted by local economic

factors alone. The second point estimate represents the the coefficient on an instrument formed using southern county net-migration first residualized on southern state fixed effects to address correlated shocks to northern destinations and southern states. The third point estimate reports the coefficient on the instrument formed by first dropping the 15 southern counties coded as central in MSAs containing a population of 1 million or more in 1990.[50] This instrument takes into account potential correlated shocks to major urban areas in the South and northern cities. Version 4 of the instrument leverages an alternative set of shocks by using state of birth of southern-born Black individuals in the North as of 1940 to link southern shocks to northern cities. Predicted southern county outflows between 1940 and 1970 are aggregated to the state level and assigned to northern cities using the state origins of southern-born Black residents in northern cities. This last instrument, by exposing northern cities to an alternative set of shocks, takes into account potential correlated shocks to the original set of counties in the other forms of the instrument and northern destination cities. As the figure shows, results are extremely similar across the different types of instruments. A formal over-identification test yields a Hansen J statistic of 0.20; thus, I fail to reject the null that the estimated effects are statistically indistinguishable.

[50]Data on urbanicity of US counties come from CDC (2021).

FIGURE D16: ALTERNATIVE INSTRUMENTS FOR THE GREAT MIGRATION



Notes: This figure plots the 2SLS coefficient on the Great Migration using alternative instruments for historical Black population change, where the dependent variable is commuting zone childhood exposure effects in the 2000s for men and women with low income parents. The unit of observation is a commuting zone. Childhood exposure effects are the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. The instrument is the percentile of predicted Black population increase, defined in versions 1-3 as the interaction between pre-1940 Black southern migration patterns and 1) post-1940 southern county net-migration as predicted by local economic factors alone; 2) southern county net-migration residualized on state fixed effects; and 3) southern county net-migration from less urban counties (dropping the counties coded as central in MSAs with populations of 1 million or more in 1990 – 15 counties total). In version 4, predicted southern county outflows between 1940 and 1970 are aggregated to the state level and assigned to northern cities according to the share of the Black population born in that southern state and living in the destination city in 1940. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Chetty, Hendren, Jones, and Porter (2018); IPUMS Complete Count 1940 US Census; Boustan (2016).

D.7.7 Alternative inference on Great Migration shift-share instrument

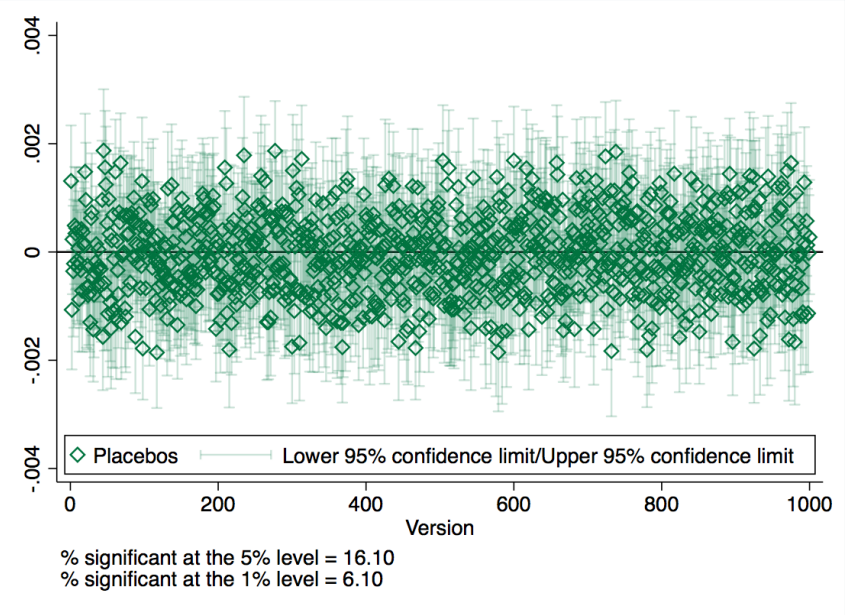
Adão et al. (2019) show that standard inference procedures result in standard errors that may be too small in the case of shift-share instruments due to correlated errors across observations that are similarly exposed to the same set of shocks. To assess whether my results are driven by noise, I follow Adão

et al. (2019) and interact shares with shocks drawn from a random normal distribution. For simplicity, I use the same mean and variance as Adão et al. (2019): 0 and 5, respectively. Because I use a rank transformation of Black migration, the ranking of migration inflows is invariant to the specific variance chosen.

I iterate this procedure 1,000 times and document the fraction of times results show significant effects at the 5% and 1% level. Figure D17 reports the results of this analysis. I show that the coefficients on the resulting placebo instruments are significant in either the positive or negative direction 16.1% of the time at the 5% level, compared to 55% of the time in the application discussed in Adão et al. (2019). Furthermore, the coefficients are significant in the negative direction just 6.1% of the time at the 1% level. The results from this placebo analysis suggest that while the standard errors likely warrant adjusting, the impact of the Great Migration on upward mobility is unlikely to be driven by noise and would remain highly significant.

The robust inference procedure that generates alternative p-values from Adão et al. (2019) applies only to linear shift-share instruments and is thus not applicable in the context of this paper, which uses a nonlinear transformation of the standard shift share (percentile ranks of historical Black in-migration). A new working paper by Borusyak and Hull (2020), however, provides a robust inference procedure that generalizes to the case of nonlinear shift-share instruments, and which is based on randomization inference. Following their procedure, I permute observed county-decade net-migration across southern counties and interact these permuted shocks with migration shares to generate counterfactual shocks to northern locations. I repeat this procedure 1,000 times and implement the two-sided significance test of Borusyak and Hull (2020). Using this procedure, I obtain a p-value of 0.054. Thus, with this alternative inference procedure, my results are robust at the 10% level.

FIGURE D17: PLACEBO MIGRATION SHOCKS



Notes: This figure plots the coefficient on placebo shocks in 1,000 separate regressions, where the dependent variable is commuting zone childhood exposure effects in the 2000s for men and women with low income parents. The unit of observation is a commuting zone. Childhood exposure effects are the estimated causal impact of one additional year of childhood in the commuting zone on adult household income rank for men and women with parents at the 25th percentile of the parent income distribution. Income is measured from IRS tax returns for cohorts and parents of cohorts born between 1980 and 1986. The placebo shock is the percentile placebo increase in the Black population, defined as the interaction between pre-1940 Black southern migration patterns and a normally distributed random variable with mean 0 and variance 5. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Chetty, Hendren, Jones, and Porter (2018); IPUMS Complete Count 1940 US Census; Boustan (2016).

Appendix E Public Finance and Neighborhoods Database, 1920-2015

This section explains the construction of the new database of local public finance and neighborhood quality measures I assembled for commuting zones spanning the years 1920-2015. The database covers statistics on schooling, demographics, racial tension and voting behavior, local government expenditures, incarceration, and crime, among other characteristics.

I digitized and harmonized data from a variety of sources. Below I describe the data sources and construction of measures from each category of local public finance and neighborhood quality covered in the database.

Private school enrollment rates

Data on private school enrollments come from two different sources depending on the time period. For pre-1940 statistics on private school enrollment, I digitized tabulations on city school systems from the 1922 Biennial Survey of Education report (U.S. Office of Education, Department of the Interior, 1924). This report contains the total number of elementary and high school students enrolled in private schools in that city as well as total school enrollment in the city.

For 1970 onwards, I use county-level counts of private school enrollments from IPUMS NHGIS (Manson et al., 2021), which I aggregate up to the CZ level. Starting in 1970 through 2010, enrollment is also reported separately for elementary and high school students and separately by race from 1970 to 2000.

Incarceration rates

For 1920 and 1930, I use the complete count censuses (Ruggles et al., 2021) to construct the percent of the population in a county that is incarcerated in jails or local correctional institutions. I do not include inmates in federal or state prison in these estimates as it is not possible to allocate state and federal prisoners back to localities they came from. For 1940, I digitized data from a census report on the incarcerated population (U.S. Census Bureau, 1943). For 1960, I digitized data from the published 1960 US Decennial Census, which includes a table on the incarcerated population and reports the non-white and white incarcerated population by county separately (U.S. Census Bureau, 1963).

For the post-1970 period, I use a rich new dataset from the Vera Institute of Justice In Our Backyards Symposium (IOB), which provides counts of federal and state prisoners by their county-of-commitment to federal and state prison (Kang-Brown et al., 2020). These data begin in the year 1983. These figures are available separately by race. Due to reliability issues for the local jail population in these data, I focus on total jail rates rather than jail population breakdowns by race.

Crime rates

For crime rates, I focus on murder rates as these are less subject to reporting bias than other crime categories, such as property crime or non-fatal violent crimes. I digitize murder rates for cities with a population of 25,000 or more from the Uniform Crime Reports (UCR) series of the FBI in 1931, 1943, and 1950 (U.S. Department of Justice, FBI, 1950).[51] For the years 1958 to 1969, I use city-level tabulations of murder rates from UCR available from ICPSR (ICPSR, 2005). Finally, for the post 1970 period, I use county-level tabulations of UCR murder rates available from the IOB database (Kang-Brown et al., 2020).

In addition to looking at crime rates as a measure of neighborhood quality, I also use data on the intensity and duration of race riots in major cities in the 1960s.[52]

[51]Some large cities did not report to the FBI UCR series in these years. A notable case is New York City in 1931 and in 1950. For these cities in 1931, I supplement using data generously shared by Price Fishback (Fishback et al., 2010). I drop 1950 from the analysis due to missing data from New York City.

[52]These data were generously shared by William Collins and Robert Margo (Collins and Margo, 2007a) and are based on the work of based on the work of Carter (1986).

Local government expenditures

Data on local government expenditures come from surveys of state and sub-state level governments conducted by the US Census Bureau.

The first full set of such data are available in the 1932 publication of *Financial statistics of state and local governments* (U.S. Census Bureau, Department of Commerce, 1933). I digitized county aggregate and individual local government expenditures from this report. Individual Government Finances data (U.S. Census Bureau, c); County Government Finances data (U.S. Census Bureau, b); and City Government Employment data (U.S. Census Bureau, a).

For post-migration years, I use individual government expenditure data in digital format for roughly 15,000 local governments across the United States from 1967 to 2012 (U.S. Census Bureau, c). I also include data on city government expenditures available for intermittent years from 1948 to 1975 from U.S. Census Bureau, Department of Commerce (2008) and county aggregates of expenditures on different categories from U.S. Census Bureau, Department of Commerce (2012) and U.S. Census Bureau (b). In the case of police expenditures, I supplement these two measures with counts of police officers per capita using the complete count censuses available from IPUMS for the years 1920, 1930, and 1940 and US Census Bureau data surveying public sector employment in cities from 1951-2007 (U.S. Census Bureau, a).

For each dataset, I construct commuting zone area aggregate expenditures by all local governments for the expenditure categories of interest. The advantage to this approach is that changes in which levels or types of government are responsible for providing a certain public good will not affect this measure of spending. I focus on expenditures per capita (or per student) and the share of total expenditures devoted to that expenditure category.

For example, for police spending, CZ-area local government expenditure

share is defined as

$$\text{Pol. Exp. Share}_{CZ} = \frac{\text{\$Spent on Police by All Local Governments}_{CZ}}{\text{\$Spent by All Local Governments}_{CZ}}$$

and per capita expenditures at the CZ-area level are defined as

$$\text{Per Cap Pol. Exp.}_{CZ} = \frac{\text{\$Spent on Police by All Local Governments}}{\text{Population}_{CZ}}$$

Finally, I focus on categories of expenditures over which local governments have a large degree of discretion: police expenditures, education expenditures, and fire expenditures. Table E1 shows the the contribution of different levels of government (e.g., federal, state, county, etc.) to direct expenditures for each category of government spending.

Table E1: Expenditure by government type by spending category

Govt Type	Revenue	Rev (Own)	Dir Exp	Elem + HS	Fire Prot	Health + Hosp	Highway	Parks & Rec	Police	Pub. Welf	Sanitation
Fed	18.93%	24.90%	22.95%	0.00%	0.00%	6.12%	0.36%	3.24%	3.73%	6.27%	0.82%
State	42.92%	42.76%	34.17%	1.14%	0.00%	42.77%	60.37%	14.44%	13.31%	79.42%	5.13%
County	8.73%	7.40%	9.51%	7.84%	13.83%	26.71%	14.76%	16.76%	23.77%	10.33%	16.03%
Muni	12.45%	12.72%	13.90%	8.31%	67.90%	10.64%	19.41%	51.29%	54.80%	3.78%	56.82%
Town	1.19%	1.22%	1.31%	2.24%	6.29%	0.25%	3.79%	3.75%	4.36%	0.09%	5.40%
Spec. Dist.	4.15%	4.13%	4.79%	0.24%	11.99%	13.51%	1.32%	10.52%	0.03%	0.11%	15.81%
School Dist.	11.64%	6.87%	13.38%	80.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Notes: This table shows the breakdown in spending by government type for different spending categories, averaged across all reporting years from 1967-2012. Column 1 lists the government types: federal, state, county, municipality, town, special district, and school district. Column 2 shows the total breakdown of government revenue by government type. Column 3 shows this number net of intergovernmental transfers. Column 4 shows total direct government expenditures by government type. Starting with Column 5, the categories of spending from left to right are education for elementary and high school districts; fire protection services; health and hospitals; highways; parks and recreation; police protection; public welfare; and sanitation. Sanitation spending includes sewage and waste management. *Source*: US Census Bureau Individual Government Finances data (1967-2012).

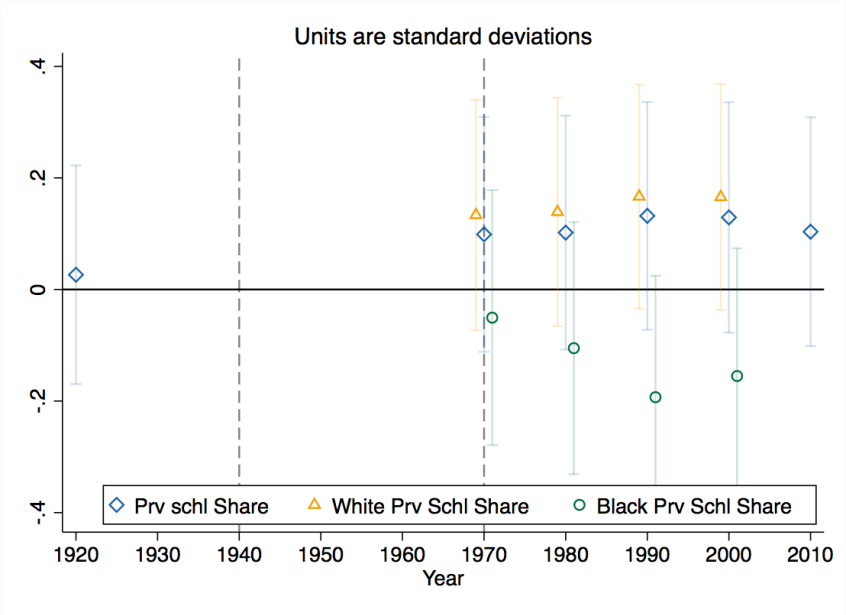
Appendix F Additional results on local mechanisms

F.1 Impact on private schooling and residential segregation

In this section, I report additional results on private schooling and residential segregation. Figure F1 plots the coefficients on predicted Black population increases on standardized measures of private school enrollment rates separately for each year that data are available. The outcome variable is the share of elementary and high school students enrolled in private school. Beginning in 1970, these measures are available separately by race. I find no impact of the 1940-1970 Migration shock on private school enrollment rates in 1920. In 1970, the next year that data are available,[53] a 1-standard-deviation increase in the Great Migration shock is associated with approximately a 0.2 standard deviation increase in white private school enrollment rates and a 0.2 standard deviation decrease in Black private school enrollment rates by 1990. Individually, these results are not statistically significantly different from zero. However, the black-white gap in public school enrollment is significantly larger in Great Migration CZs.

[53]Starting in 1960, the Census began asking about the type of school households enrolled their children in; however, aggregate statistics for children attending high school as well as breakdowns by race are only available through NHGIS until 1970. See Appendix E for more details.

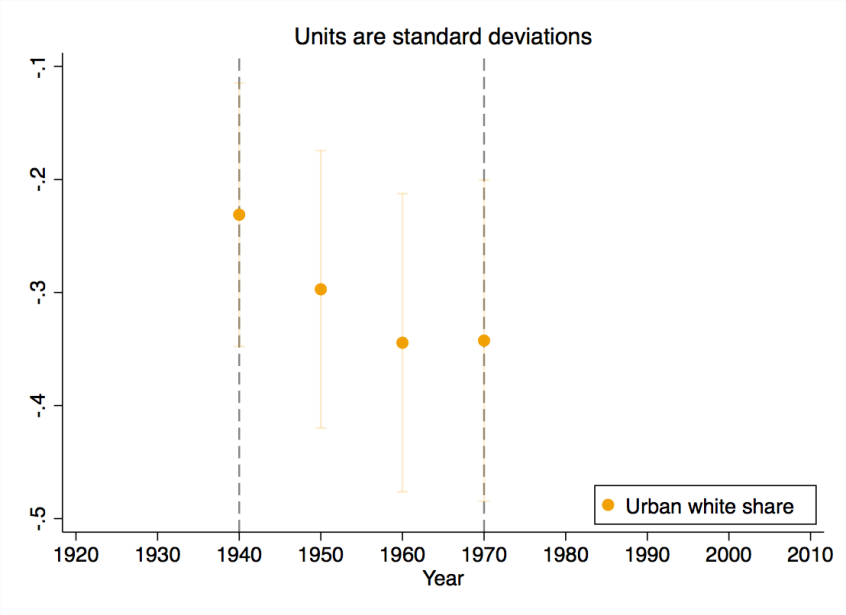
FIGURE F1: GREAT MIGRATION IMPACT ON PRIVATE SCHOOLING



Notes: This figure plots the coefficient on the instrument for Black population increases during the Great Migration, in approximately one standard deviation units, in separate regressions for each year where the dependent variable is private school enrollment rates. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. A one standard deviation increase is approximately 30 percentiles. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Biennial Statistics of Education, 1920-1922; NHGIS county-level aggregates of elementary and high school enrollment by school type (public or private), 1970-2010; IPUMS complete count 1940 US census; Boustan (2016a).

Consistent with Boustan (2010) and Tabellini (2019), I find that Black population increases also predict large declines in the urban white share at the commuting zone level. These results are shown in Figure F2.

FIGURE F2: GREAT MIGRATION IMPACT ON URBAN WHITE SHARE



Notes: This figure plots the coefficient on a 1 s.d. increase in predicted Black population change in separate regressions for each year where the dependent variable is the urban white population share. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: County Data Books 1947-1977.

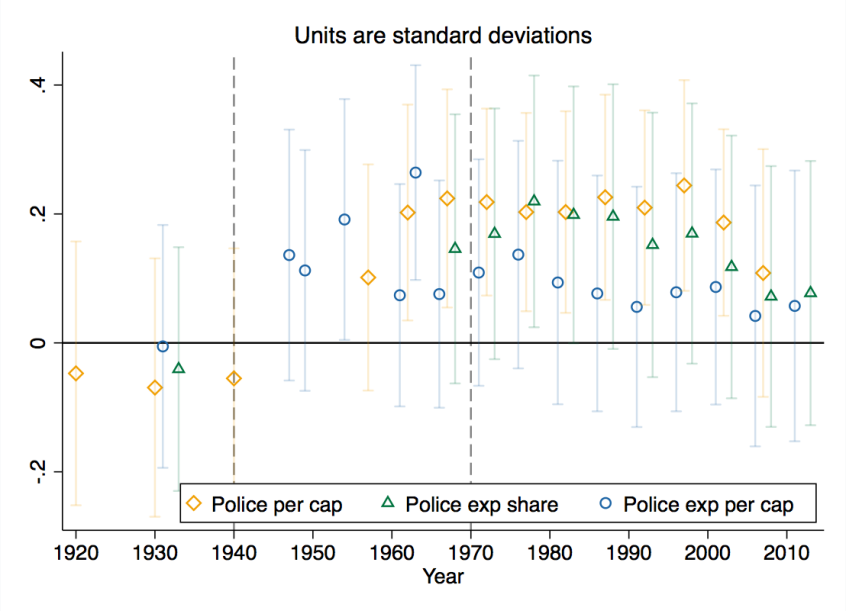
F.2 Impact on local government expenditures

Next, I examine the impact of the Migration on the public spending patterns of local governments. I focus on categories of public expenditures over which sub-state governments have a large degree of discretion. Appendix Table E1 shows the contribution of different levels of government to each of several main categories of public expenditures. I focus on two categories in particular, police and school expenditures. Spending on police indicates levels of neighborhood safety and crime, but also may have direct effects on the outcomes of Black male youth in particular, which I discuss further in the main text (see Section 6). School spending has natural implications for the average outcomes of children in a given location.

Figure F3 plots the coefficients on predicted Black population increases on standardized measures of police investments separately for each year that the data are available. The outcome variables are police expenditures per capita, the share of local government expenditures on police, and police officers per capita. As can be seen in the Figure, the Migration from 1940-1970 had no statistically significant or large effects on police investments from 1920-1940. Starting after 1940, the association between the Migration and police spending increases, peaking in the late 1970s and persisting for several decades after. At the peak of the association between the Migration and police investments, a 1 standard-deviation increase in the Migration shock increased the police expenditure share and police expenditure per capita by just over 0.2 standard deviations.

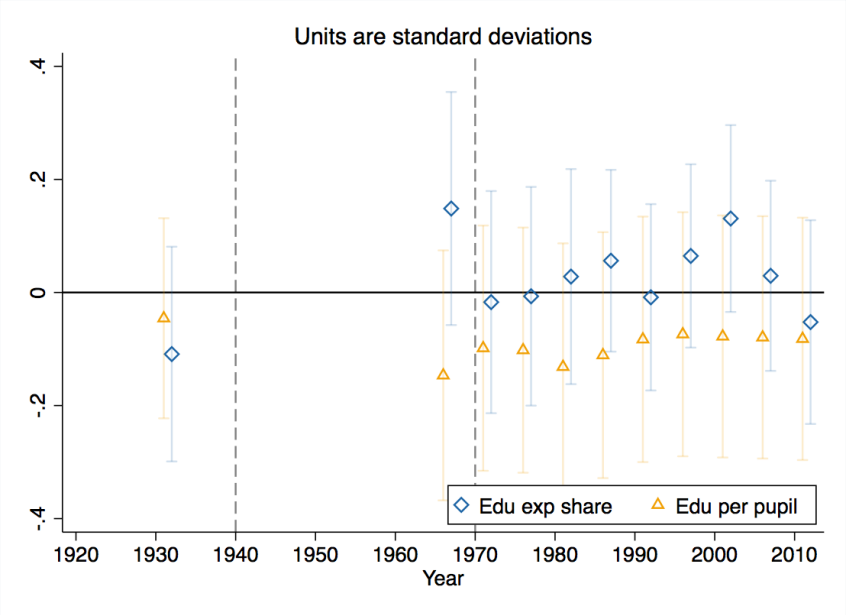
I then look at the impact of the Great Migration on educational investments in affected commuting zones. These investments include direct educational expenditures by school districts, both as a share of all local government expenditures in commuting zones and per pupil. Figures F4 and F5 report these results. I estimate a noisy negative association between the Migration on pre-1940 (1932) aggregate educational expenditure shares. In F5, I control for 1932 educational expenditure shares and estimate the Migration's impact on post-1970 educational investments. I find no impact of the Migration on aggregate education expenditures at the commuting zone level in the post-Migration period. I discuss the implications of these findings in the main text (see Section 6).

FIGURE F3: GREAT MIGRATION IMPACT ON POLICING INVESTMENTS



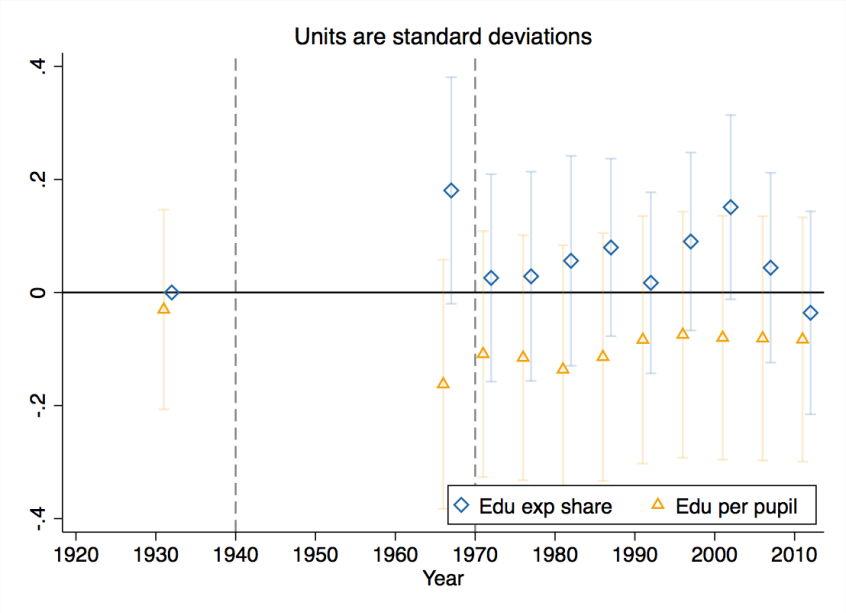
Notes: This figure plots the coefficient on a 1 s.d. increase in predicted Black population change in separate regressions for each year where the dependent variable is either the share of local government expenditures on policing, police expenditures per capita, or city police employees per 100k urban population. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. A one standard deviation increase is approximately 30 percentiles. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Financial statistics of state and local governments, 1932; US Census Bureau Annual Survey of Local Governments (1967-2012);Census of Governments, 1952-1989; IPUMS complete count US censuses (1920-1940); Boustan (2016a).

FIGURE F4: GREAT MIGRATION IMPACT ON SCHOOLING INVESTMENTS



Notes: This figure plots the coefficient on a 1 s.d. increase in predicted Black population change in separate regressions for each year where the dependent variable is either the share of local government expenditures on education or education expenditures per student. Education expenditure data are for elementary and high school districts. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Financial statistics of state and local governments, 1932; US Census Bureau Annual Survey of Local Governments (1967-2012); IPUMS complete count US censuses (1920-1940); Boustan (2016a).

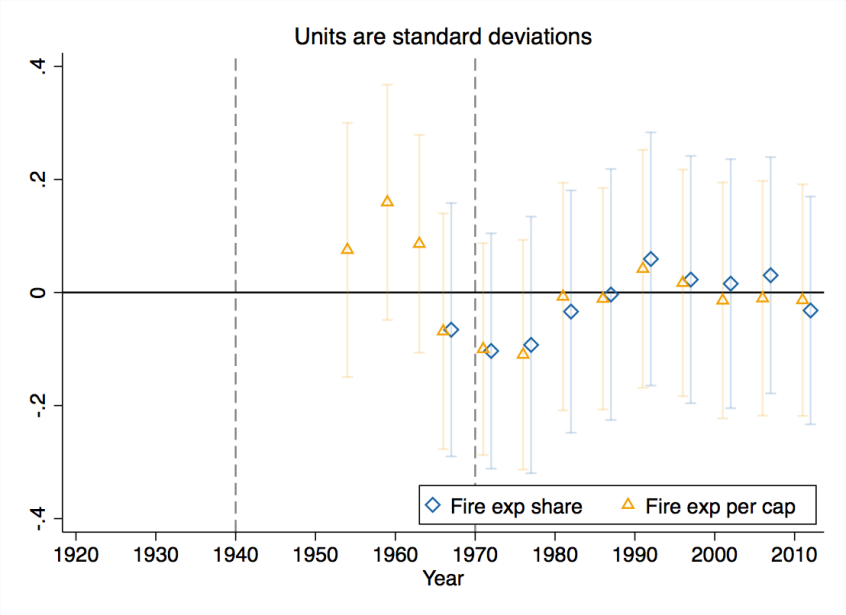
FIGURE F5: GREAT MIGRATION IMPACT ON SCHOOLING INVESTMENTS, WITH PRE-1940 CONTROL



Notes: This figure plots the coefficient on a 1 s.d. increase in predicted Black population change in separate regressions for each year where the dependent variable is either the share of local government expenditures on education or education expenditures per student. Education expenditure data are for elementary and high school districts. All regressions include controls for the 1932 share of local government expenditures on education. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Financial statistics of state and local governments, 1932; US Census Bureau Annual Survey of Local Governments (1967-2012); IPUMS complete count US censuses (1920-1940); Boustan (2016a).

To check whether the effect of the Migration on police expenditures is simply driven by increases in municipal spending in Great Migration destinations, I estimate the impact of the shock on fire fighting expenditures. Figure F6 reports these results. I find no impact of the Migration on fire-fighting expenditures. Higher police expenditures may be associated with higher crime and incarceration rates. I investigate these below.

FIGURE F6: GREAT MIGRATION IMPACT ON FIRE-FIGHTING INVESTMENTS



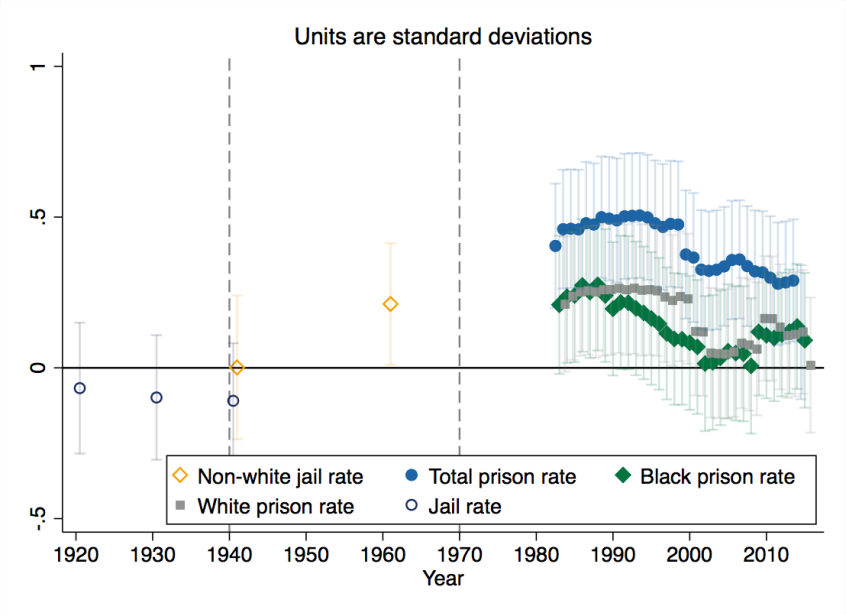
Notes: This figure plots the coefficient on a 1 s.d. increase in predicted Black population change in separate regressions for each year where the dependent variable is either the share of local government expenditures on fire-fighting or fire-fighting expenditures per capita. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: US Census Bureau Annual Survey of Local Governments (1967-2012); IPUMS complete count US censuses (1920-1940); Boustan (2016a).

F.3 Impact on incarceration rates

Figure F7 plots the coefficients on predicted Black population increases on standardized measures of incarceration separately for each year. The outcome variables are the local correctional institution population per 100,000, the non-white local correctional institution population per 100,000 of the non-white population, and the state and federal imprisoned population by commuting-zone-of-commitment per 100,000, for all individuals aged 15-64 and then separately for this group by race. As can be seen in the Figure, the Migration had no statistically significant effects on pre-1940 incarceration. The Migration is most strongly associated with incarceration in the 1980s and 1990s, during the rise of incarceration rates nationally.

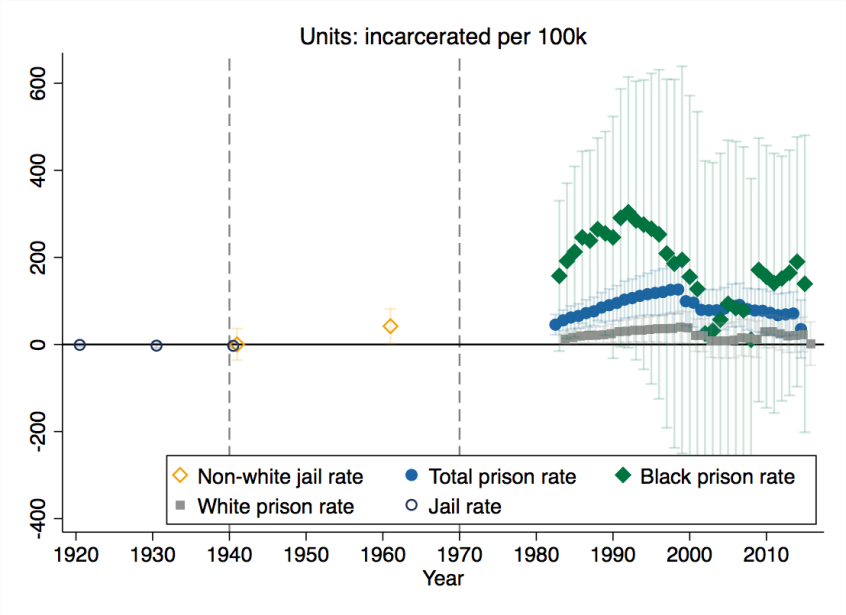
In Figure F8, I report the impact of the Migration on the incarceration rate in levels. At the peak of the association between the Great Migration and Black incarceration rates, in 1992, a 1 standard-deviation increase in predicted Black population increases was associated with 300 more Black people per 100,000 being committed to federal and state prison. The impact for whites was an increase of approximately 30 per 100,000.

FIGURE F7: GREAT MIGRATION IMPACT ON INCARCERATION RATES



Notes: This figure plots the coefficient on a 1 s.d. increase in predicted Black population change in separate regressions for each year where the dependent variable is county jail population per 100,000 (1940 and 1960) or federal and state prison population by 100,000 by county-of-commitment from 1983-2015. Each jail or prison population group is normalized by the population for that group. Federal and state prison rates are for Black and white men aged 15-64. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. A one standard deviation increase is approximately 30 percentiles. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: 1960 US Census; Vera Institute of Justice In Our Backyards Database; IPUMS complete count 1940 US census; Boustan (2016a).

Figure F8: Great Migration impact on incarceration rates, levels



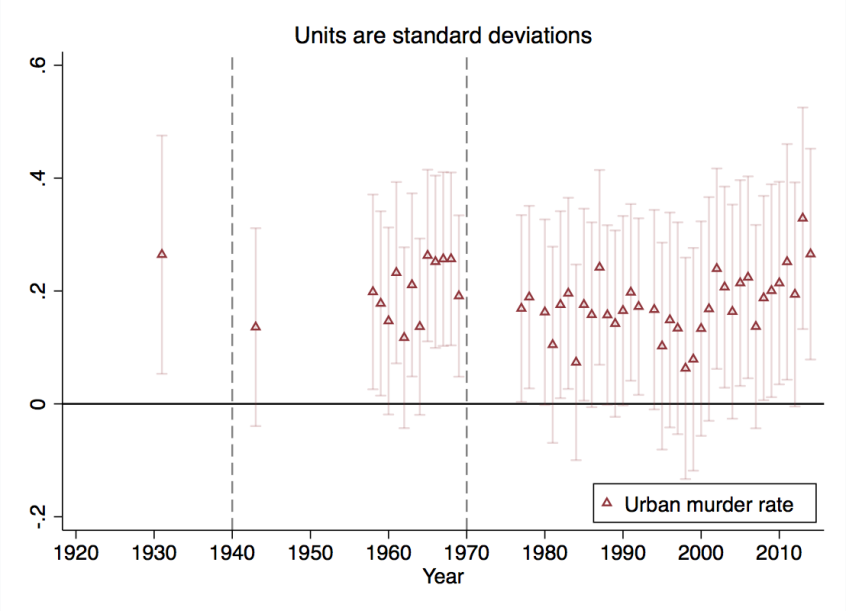
Notes: This figure plots the coefficient on a 1 s.d. increase in predicted Black population change in separate regressions for each year where the dependent variable is county jail population per 100,000 (1940 and 1960) or federal and state prison population by 100,000 by county-of-commitment from 1983-2015. Each jail or prison population group is normalized by the population for that group. Federal and state prison rates are for Black and white men aged 15-64. The unit of observation is a commuting zone. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: 1960 US Census; Vera Institute of Justice In Our Backyards Database; IPUMS complete count 1940 US census; Boustan (2016a).

F.4 Impact on murder rates

Figure F9 shows the impact of the migration on standardized measures of murder rates between 1931 and 2015. A 1 standard-deviation increase in the Great Migration shock is associated with just under 0.3 standard deviations higher murder rates in 1931, before the period of Black population change predicted by the shock, but is not associated with higher murder rates in 1936 or 1943. Murder rates are not significantly associated with the Migration again until the late 1960s. In the post-1970 period, a 1 standard-deviation increase in the migration shock is associated with a 0.2 standard deviation increase

in murder rates. Controlling for the 1931 murder rate attenuates some of the impact of the Migration on post-1970 murder rates, but the effect on late 1960s murder rates remains positive and statistically significant.

FIGURE F9: GREAT MIGRATION IMPACT ON MURDER RATES



Notes: This figure plots the coefficient on a 1 s.d. increase in predicted Black population change in separate regressions for each year where the dependent variable is urban murder rates per 100,000 in commuting zones. The unit of observation is a commuting zone. Units of outcome variables are standard deviations. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. A one standard deviation increase is approximately 30 percentiles. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: Uniform Crime Reports; IPUMS complete count 1940 US census; Boustan (2016a).

F.5 Impact on racial animus

In a final set of results, I explore the effect of the Migration on racial attitudes, both at the end of the 1960s and in the 2000s. To proxy for racial animus in the 1960s, I use the the share of votes for segregationist presidential candidate George Wallace in the 1968 election from Clubb et al. (2006). White voters would still have made up the majority of the electorate in most cities in the sample at the time, thus votes for Wallace may reflect increased racial animus among white voters.[54] Table F1 reports the OLS, reduced form, and 2SLS results. Baseline controls are included. Focusing on the reduced form results, I find that a 1 standard-deviation increase in the instrument for the Great Migration increases George Wallace's vote share per 1,000 voters by 12.2 pp. Alternatively, normalizing votes by 1,000 of the white population, the effect is an increase of 4.8 pp. These are sizable relative to the sample mean of each variable, 58.5 votes per 1,000 voters and 24.2 votes per 1,000 white population.

The late 1960s were also marked by a series of race riots that erupted in urban areas across the US. As another measure of racial tension, I explore whether the Migration affected the intensity of these riots. Table F2 reports these results. I find that Great Migration destination cities experienced longer riots and that riots in these areas involved more deaths, injuries, and arrests than places with fewer Black migrant inflows. Focusing on the reduced form, a 1 standard-deviation increase in the Migration shock is associated with over 12 more arrests per 100,000 during the 1960s riots. Both of these events may have contributed to rising police investments during this period. Both the impact on police expenditures and incarceration rates appear to have persisted for several decades afterwards.

Next I provide suggestive evidence that the Migration is associated with greater levels of racial animus today. I examine the reduced form relationship between the instrument for the Great Migration and Google searches for racist terms between 2004 and 2007 from Stephens-Davidowitz (2014b). To construct

[54] Voter registration data come from ICPSR (1991).

a CZ-level index, I take the population-weighted average of the Racial Animus Index, which is available at the media market level. The regression is weighted using the CZ population in 2000, and baseline controls are included. The results show a positive relationship between the percentile of predicted Black population between 1940 and 1970 and racial animus in CZs today, suggesting potential long-lasting effects of the Migration on racial attitudes.

Table F1: Great Migration and votes for George Wallace, 1968

	Ordinary Least Squares	
	Wallace Vote Per 1k Voters	Wallace Votes Per 1k White Pop
GM	12.41	4.812
	(4.058)	(1.713)
R-squared	0.518	0.514
	Reduced Form	
$\hat{GM}$	12.20	4.840
	(3.642)	(1.536)
R-squared	0.525	0.521
	Two-stage least squares	
GM	40.39	16.03
	(13.87)	(5.771)
none		
N	130	130
Mean Dep Var	58.49	24.17
SD Dep Var	44.87	18.85
SD GM	28.98	28.98

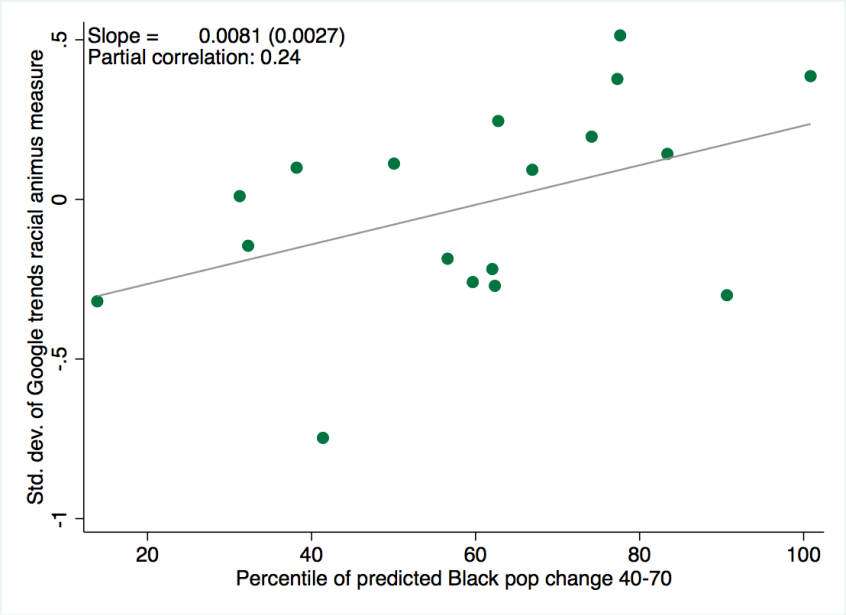
Notes: This table reports the estimated impact of a 1 s.d. increase in Great Migration inflows on votes for George Wallace, pro-segregation former governor of Alabama and third-party presidential candidate in 1968. Dependent variable is votes for Wallace per 1000 voters in column 1 and votes for Wallace per 1,000 white population in column 2. The unit of observation is a commuting zone. $\hat{GM}$ is the instrument for the Great Migration, or predicted Black population increase through variation in Black southern migration alone. OLS, Reduced Form, and 2SLS estimates are reported. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: Clubb et al. (2006); CCDB; IPUMS complete count 1940 US census; Boustan (2016a).

Table F2: Great Migration CZs experienced more severe 1960s riots

	Ordinary Least Squares					
	Killed Per 100k	Arson Per 100k	Arrests Per 100k	Days of Riots Per 100k	Injured Per 100k	Riots Per 100k
GM	0.0403	2.189	13.43	0.767	2.801	0.314
	(0.0175)	(0.970)	(4.824)	(0.158)	(1.018)	(0.0619)
R-squared	0.308	0.440	0.605	0.292	0.461	0.311
	Reduced Form					
$\hat{GM}$	0.0240	1.424	12.38	0.291	2.264	0.120
	(0.0160)	(0.886)	(4.354)	(0.153)	(0.926)	(0.0606)
R-squared	0.291	0.429	0.606	0.179	0.455	0.191
	Two-stage least squares					
GM	0.0795	4.715	41.00	0.962	7.496	0.396
	(0.0518)	(2.890)	(15.74)	(0.460)	(3.198)	(0.181)
none						
N	130	130	130	130	130	130
Mean Dep Var	0.0589	4.697	24.91	0.950	4.474	0.413
SD Dep Var	0.162	9.952	58.87	1.437	10.65	0.572
SD GM	28.98	28.98	28.98	28.98	28.98	28.98

Notes: This table reports the estimated impact of a 1 s.d. increase in Great Migration inflows on 1960s race riots and riot severity. Dependent variables in columns 1-5 are individual measures of the severity of riots, including number of individuals killed, number of arson incidents, number of arrests, the duration of the riot in days, and the number of injuries; the final column is total number of riots. All outcomes are normalized by the total CZ population in 1960 and multiplied by 100,000, so they are in per 100,000 of the population units. The unit of observation is a commuting zone. $\hat{GM}$ is the instrument for the Great Migration, or predicted Black population increase through variation in Black southern migration alone. OLS, Reduced Form, and 2SLS estimates are reported. Baseline 1940 controls include share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. Standard errors are in parentheses. *Data sources*: Collins and Margo (2007b); Carter (1986); CCDB; IPUMS complete count 1940 US census; Boustan (2016a).

FIGURE F10: ASSOCIATION BETWEEN GREAT MIGRATION AND RACIAL ANIMUS IN THE 2000S



Notes: This binned scatterplot depicts the relationship between the Stephens-Davidowitz (2014a) Racial Animus Index based on Google searches for racist terms from 2004-2007 and the instrument for Black population increases during the Great Migration. The unit of observation is a CZ. The right hand side variable is grouped into 20 bins (5 percentiles each). A population-weighted average of the Racial Animus Index at the CZ level was taken and the measure standardized across the CZs in the sample. The regression is weighted by the CZ population in 2000. The instrument is the percentile of predicted Black population increase, defined as the interaction between pre-1940 Black southern migration patterns and post-1940 outflows of migrants as predicted by southern economic factors alone. Both the left hand and right hand side variables have been residualized on the set of baseline 1940 controls, including share of urban population made up of 1935-1940 Black southern migrants, educational upward mobility, share of labor force in manufacturing, and census region fixed effects. *Data sources*: IPUMS complete count 1940 US census; Boustan (2016a); Stephens-Davidowitz (2014a).

Appendix G Additional data sources

In addition to the data sources described in the preceding appendices, population data used in various measures were obtained from Haines (2010), data from Schpero (2016) were used in geographic crosswalks, and data from Fouka et al. (2018) were used in the analysis.

Appendix H Replication files

Replication files for this study are available at `https://doi.org/10.3886/E147963V1`.

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