Did Great Migration destinations become mobility traps?

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Abstract

Upward mobility rates in US locations are strongly negatively correlated with the black population share. However, a lack of experimental variation in racial composition and the sorting of families across space poses a dual challenge to identifying the causal links behind this relationship. I leverage a large scale historical natural experiment in "Moving to Opportunity" to overcome these challenges: the massive exodus of African Americans from the US south from 1940 to 1970 during the Great Migration. I use the idiosyncratic component of early migrants' location choices and shocks to the southern economy during this period to generate plausibly exogenous increases in the black population in northern cities. By combining these racial composition shocks with measures of neighborhood effects on mobility today, I show that two thirds of the relationship between historical black share changes and mobility can be attributed to the causal effect and one third to composition and selection effects. Persistently higher segregation and private school enrollment rates in these areas imply local public goods mediate the migration's causal impact on mobility.

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1 Introduction

The geography of economic opportunity in the US is highly uneven: where one grows up is a major determinant of one's outcomes later in life. Advances in the empirical literature on neighborhood effects suggest that these differences are not simply due to heterogeneous families sorting across space, but rather characteristics of the neighborhoods themselves that influence children's long-run outcomes (**???**). Less is known, however, about the root causes of why some locations facilitate upward mobility while others instead function as "mobility traps," inhibiting economic progress between generations.

One feature of locations that is strongly negatively correlated with upward mobility is the share of the population that is African American. Understanding the causality behind this relationship poses a challenge for researchers due to the lack of experimental variation in the black population share and the sorting of different types of families across locations. Over the course of the 20th century, however, demographics in major urban centers in the US shifted dramatically: millions of African Americans migrated out of the South, settling in cities in the north and west. Between 1940 and 1970 alone, 4 million black southerners relocated north. Features of this mass population redistribution, known as the Great Migration, can be thought of as a large-scale natural experiment in "moving to opportunity." In particular, I will argue that shocks to the local southern economy during this period interacted with idiosyncrasies in early migrant settlement to generate independent variation in where and in what volume migrants moved north.

By combining these quasi-experimental racial share changes with recent estimates of neighborhood exposure effects from US tax data, I am able to identify the causal effect of black share changes between 1940 and 1970 on the outcomes of low income children born in the 1980s, after the Great Migration ended. I show that the adult income ranks of these children are lower on average in areas that received a larger influx of black southern migrants historically. A 50-percentile increase in a location's Great Migration influx reduces adult income rank of low income children on average by 2 percentile points, equivalent to a 6.4% reduction in adult income.[1] When comparing this causal estimate to the "naive" specifications that ignore issues of selection and sorting, I find that the causal relationship between the Great Migration and mobility accounts for two thirds of the association between the raw historical demographic change and observed upward mobility in locations today. Persistently higher racial residential segregation and lower investment in public schools, as measured through private school enrollment rates, characterize Great Migration destinations.

[1] As a benchmark, **?** find that across the US overall, a similar increase in segregation (1.7 standard deviations) is associated with a 7.1% reduction in adult income.

Numerous papers explore the effects of racial composition and segregation in cities on racial inequality, children's outcomes, and, more recently, intergenerational mobility (???). Two challenges faced in this literature are the availability of quasi-experimental variation in racial shares and the ability to distinguish population composition effects from changes in location effects.[2] First, endogenous location choice and omitted factors could explain both where migrants moved and the development of opportunity in a location. For example, migrants may have specifically chosen destinations they hoped would improve the outcomes of their children and descendants. Alternatively, many migrants relocated to the midwest to take industrial jobs in former industrial centers that have now become part of today's Rust Belt, where economic opportunity is scarce. Second, places that saw an increase in the black share historically may exhibit different mobility rates purely due to underlying differences in mobility by race (see ?).

This paper seeks to causally identify the impact of increases in the black share on locations as facilitators of upward mobility. I address the first challenge by leveraging idiosyncratic migration links between southern counties and non-southern cities. This limits the bias from omitted factors that may codetermine the location choices of Great Migration movers and the future role of a location as aiding or inhibiting upward mobility. I address the second problem by using data on causal effects of childhood exposure to a location estimated off of children whose families moved during the period they're observed in the US tax data. By using estimates of neighborhood effects based on the outcomes of movers, I ensure my estimates do not simply reflect lower mobility rates among the population living in an area which could be mechanically driven by changes in racial composition as a result of the Great Migration.

The US Census Bureau began systematically collecting data on internal migration in 1940, asking a five-year look-back question on prior residence. I start my analysis period here to make use of the linkages between southern origins and northern destinations made available through these data. Using data on the universe of black individuals (N=320,000) who reported a southern county as their residence in 1935 and moved between 1935 and 1939, I am able to construct the share of a southern county's outmigrants who moved to a northern city by 1940.[3] Using data from ? on southern economic conditions and

[2]One channel through which the Great Migration could alter location effects is through peer effects driven by changes in the racial composition as a result of the migration. I do not examine peer effects in this paper; rather I look at the importance of measures of shared public investment in children in a location, through the prevalence of segregated neighborhoods and private schools.

[3]For simplicity, I refer to locations outside the south as the north. I follow the literature on the Great Migration and define the south as Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, West Virginia, and Virginia. This definition excludes Maryland and Delaware, which on net received migrants during the Great Migration.

outmigration rates, I predict migration out of southern counties using shocks to the agricultural economy that loosened black workers' ties to their home region. I assign a county's 1940-1970 outmigrants to northern cities according to their 1935-1939 settlement patterns. This procedure generates a predicted change in the black share in northern cities that I use to examine the long-run causal effect of the Great Migration on mobility today. I build on prior work assessing the impact of migration, including the Great Migration, on receiving destinations (**???**). To address any omitted factors that determine both these southern-northern linkages and a northern metropolitan area's path of future mobility, I control for the area's share of the labor force in manufacturing in 1939, the median educational attainment of the area's population by 1940, and the total share of the population comprised of 1935-1939 southern migrants.

Since families may have subsequently sorted across metropolitan areas since the Great Migration, I combine my measure of a metropolitan area's Great Migration shock with measures of the causal effect of childhood exposure to different locations in the US from **?**. After **?** found major differences in observed upward mobility rates across locations, **?** use a sample of movers to estimate the causal effect of an additional year of exposure to each US county and commuting zone on children's outcomes. The two measures I focus on are low income children whose parents belong to the bottom half of the parent national income distribution and high income children whose parents belong to the top half of the national parent income distribution. These measures represent unbiased estimates of the potential outcomes of an average child randomly assigned to a location, conditional on parent income rank. These estimates are purged of the type of bias that would be generated from families sorting on unobservables across locations. Thus, they do not suffer from the composition effects that would bias any estimates of the long run effect of the Great Migration on children's outcomes.

Using my measure of the migration shock experienced by metropolitan areas during the Great Migration, I find that larger increases in the black share during the Great Migration are associated with lower outcomes for subsequent cohorts of low income children. A 50-percentile point increase in the Great Migration influx is associated with a 2-3 percentile drop in the adult income rank of low income children. High income children experience a smaller estimated 1-2 percentile drop in adult income rank, but the confidence interval for each of these estimates prevents me from rejecting that the two effects are the same. These findings suggest a persistent effect of local responses to historical black in-migration on children's outcomes today, across the parent income distribution. Consistent with these results, the relative mobility or differential effect of a place on low and high income children is unaffected.

To shed light on mechanisms, I discuss some preliminary evidence on local responses to black in-migration that may have resulted in persistent negative effects on children's outcomes today. I study two intermediate outcomes: residential racial segregation and private school enrollment rates. I find that historical increases in the black share resulted in higher shares of students enrolled in private schools from 1960-1980. I also document that historical black in-migration had persistent effects on segregation, as measured by **?** post 1970.

This paper contributes to the literature on neighborhood effects by contributing causal identification to one of the major correlates of children's outcomes in urban areas, which is the racial composition of that location. Obtaining sizable exogenous variation in racial shares is a difficult task, and the racial composition of a place cannot be randomly assigned. Previous papers have attempted to establish a descriptive relationship between racial shares, segregation, children's outcomes, and upward mobility (**???**)[4] However, by taking a long-run view of demographic change in urban areas outside the south, I'm able to use exogenous variation in black settlement historically to address omitted factors that could explain both high black shares and lower mobility in a location. Further, identifying neighborhood effects rests on the key ability to remove selection on family unobservables (**?**). In this paper, I use childhood exposure effect measures for metropolitan areas in my sample and am thus able to identify the causal impact of historical black in-migration on low income children today.

My paper adds to the literature on the Great Migration in two ways. First, I contribute a long-run assessment of the effects of the Great Migration on neighborhoods. Previous work on the Great Migration has documented the effect of black in-migration on white flight from central cities (**?**). My paper asks what were the long-run consequences of this major re-sorting of families across space within metropolitan areas. Second, I focus on the way the Great Migration altered paths across metropolitan areas. Thus, rather than describe the contemporaneous within-MSA effects of increases in the black share, my research design allows me to ask to what extent the differences in mobility between Salt Lake City and Buffalo and Chicago are due to historical differences in black migration into these locations. By using plausibly exogenous increases in the black share during this period, I'm able to identify and quantify the effect of the migration on neighborhood mobility today.

A second literature my paper contributes to is the literature studying the effects of migration on places. **?** show that places that exogenously received more immigrants

[4] For example, **?** look at ZIP codes that are predominantly white within commuting zones with large African American shares to show that the effects of racial composition are not driven by the outcomes of minority children.

during the Age of Mass Migration show higher growth today with little of the ill effects of migration hypothesized by the literature. **?** show places in the US are more likely to receive foreign direct investment if they experienced higher shares of immigrants from investing countries. An ongoing literature seeks to estimate the wage effects of immigration on US labor markets (**??**). This paper looks at the mobility effects of a major internal migration in which the black population in the US, previously heavily concentrated in the south, relocated to the north in large waves. The historical shock studied in this paper thus combines the broader treatment of migration with race-specific components that induced higher segregation and white flight, with plausibly long-lasting effects on neighborhood quality.

A third literature my paper relates to is the work on local public finance (**??**). As I discuss briefly in Section 4, a simple model of local public goods that produce the children's outcomes in a location predicts that low skill black in-migration would prompt median white voters to substitute out of public goods and into private alternatives. The model is consistent with prior findings on the Great Migration that suggest white residents were motivated to move to the suburbs by the ability to separate themselves jurisdictionally from the growing black population in their metropolitan area (**?**). I'm able to shed light on which of these mechanisms is important for explaining my findings that the Great Migration lowered absolute upward mobility for low income children today. My exploration of intermediate effects of the Great Migration on the level of segregation in major cities or private school enrollment rates provides evidence on the rise of excludable goods, inaccessible to children from low income families.

An important component of the relationship between the Great Migration and mobility that this paper does not speak to is the effects of the migration on the mobility of the children of migrants themselves. If the Great Migration was indeed one of the largest natural experiments in Moving to Opportunity, my paper has considered what might be anticipated in terms of local outcomes in response to a scaled version of MTO (**???**). A natural first order question is the efficacy of these moves in bringing better opportunity to future generations. The evidence on reverse migration patterns in which black families forewent higher wages to return to the south after the 1960s race riots suggests that the promises of the north in terms of better opportunity were not met on all fronts. However, future work must consider the aggregate mobility effects of the Great Migration by comparing mobility in counties of origin to that of destination metropolitan areas. In an appendix, I provide some suggestive evidence that mobility in destination areas today look worse on average than in origin counties in the south.

The rest of this paper is structured as follows. Section 2 provides information on the historical context underlying the identification strategy. In Section 3, I describe the data sources used in the project to construct my measure of black population change in non-southern metropolises and my measures of intergenerational mobility by metropolitan area. In Section 4, I describe a simple econometric model for illustrating the challenges to identifying the effect of racial share changes on place-based mobility measures. The first part of Section 5.1 presents the main results of changes to the black share on absolute upward mobility for low income children. To explore channels through which the migration affected mobility, I then present results on residential racial segregation and private school enrollment rates in Great Migration destinations. Finally, Section 6 concludes.

2 Historical background

The Great Migration was a major shock to the racial composition of northern cities during the 20th century. An oft-cited descriptive fact highlights the stark nature of this change: at the beginning of the migration, nearly 90% of the African American population in the US resided in the south, by 1970, just over 50 percent did so (**?**). From 1910 to 1970, 6 million African Americans left the south, 4 million from 1940-1970 alone; the total number of migrants made up 4.5% of the total US 1940 population. Migrants settled primarily in Chicago, New York, Detroit, and Los Angeles, but also moved to numerous other cities throughout the northeast, midwest, and west.

The direction and timing of moves during the Great Migration was determined by factors endemic to migrants' destinations, including rising demand for black labor in industrial centers in the north resulting from sharp reductions in the European migrant labor supply during WWI and the Immigration Act of 1924 (**?**). Such demand factors may confound any effect I find of historical black in-migration on children's outcomes today.

However, moves to the north were also determined by shocks to southern agricultural and political economy that included, for example, the Boll Weevil infestation of the cotton crop, the mechanization of cotton, and Jim Crow. These aspects of the southern economy and southern institutions made migrants eager to start new lives in the north, where their moves were rewarded by large wage gains relative to southerners who stayed behind (**??**). A final feature of moves is idiosyncratic settlement before my period of analysis due to the location of late 19th century and early 20th century railroad lines and chain migration patterns that connected specific counties in the south to cities in the north (**??**).

? utilizes these idiosyncratic settlement patterns and southern shocks to understand the contemporaneous effects of the migration on the racial distribution within metropolitan areas. She finds that every black arrival led to a more than one-for-one departure of white residents to the suburbs from the central cities receiving migrants. My analysis picks up after the Great Migration has ended and asks what the long-run effect this population change has had on children's outcomes in these locations today. In the next section, I describe the data sources for my measures of historical changes in the black share and upward mobility before discussing my estimation approach in detail in Section 4.

3 Data

I draw on two main sources of data on historical demographics and characteristics of northern cities: the City and County Data Books 1944-1977 series ("CCDB") available from ICPSR and the Complete Count 1940 US Census (1940 Census) available from IPUMS. The criterion for inclusion in the CCDB is that the city have a population of at least 25,000 in the survey year. Thus, my sample is metropolitan areas consisting of cities that have at least 25,000 in 1940 and 1970.[5] I define metropolitan areas by their county-based definitions as of 1970. Data on southern county economic conditions and migration flows come from **?**. The total number of metropolitan areas in my analysis sample is 131.

Figure 1 illustrates the historical change in the black share during this period for the metropolitan areas in my sample. I measure the historical change during this period as the percentage point change from 1940-1970 in the black urban population of the total 1940 metropolitan area population. The x-axis, in percentile units, illustrates the distribution of this change across cities. As Figure 1 indicates, this period saw a substantial increase in the black share in many non-southern metropolitan areas. The median increase was 5 percentage points. As the figure demonstrates, however, historical black share increases were very unevenly distributed across metropolitan areas. For example, Salt Lake City, UT, at the 20th percentile, saw hardly any increase in its black population over this period while Buffalo, NY, closer to the 70th percentile saw an increase of 10 percentage points. At the tail end, places like Chicago, IL, Gary, IN, and Washington, DC, saw

[5] My measure of the 1940 black population in cities comes from the 1940 Census as the "CCDB" only report information on the number of whites and non-whites in cities in 1940. Additionally, I'm unable to locate a handful of cities from the CCDB in the 1940 census, so I drop these cities from my analysis. They include Boise City, ID; East Providence, RI; Huntington Park, CA; West Haven, CT; and Warwick, RI.

increases of 20-40 percentage points. Figure 2 shows the distribution of these changes across metropolitan areas on a map of the US. Most of the sample cities are in the midwest and northeast, with a smaller number in the west and a few areas of the mountain west region. Even within regions, however, the variation in the Great Migration influx is substantial.

For my measures of place-based upward mobility, I use data from **?** and **?** available from the Equality of Opportunity website. The concept of upward mobility in these data is the adult income rank of children whose parents earn below the national median in the parent income distribution. I focus on two measures of mobility: observed upward mobility for children whose families did not move during their childhood and the causal childhood exposure effects of growing up in a location estimated off of children whose families moved once across locations. The universe of individuals in the observed upward mobility estimates consists of children born in the years 1980 -1988 whose parents remain in the same county every year they are observed in US federal income tax records. The universe of individuals in the causal childhood exposure effects sample consists of children from the 1980-1988 birth cohorts whose families moved once across counties or across commuting zones.

Figure 3 shows the distribution of observed upward mobility rates on a map of non-southern metropolitan areas across the US. The map illustrates the spatial heterogeneity in outcomes even when excluding the south, a generally low mobility region. In contrast to observed upward mobility, I define metropolitan area effects as the causal effect of childhood exposure to a metropolitan area based on the sample of moving children. To construct these effects, I aggregate causal county-level childhood exposure effects to metropolitan areas using precision weighting, a procedure that I describe in greater detail in Appendix B. Figure 4 illustrates the distribution of metropolitan area effects, which are highly correlated with observed upward mobility rates.

4 Estimation framework

Throughout this paper, I am interested in estimating the long-run effect of historical changes in the black share on intergenerational mobility today. My baseline estimating equation is

$$y_{p,c} = \beta_0 + \beta_1 GM_c + \mathbb{X}_c' \beta_2 + \varepsilon_c \tag{1}$$

where y_{pc} is a measure of mobility (either observed average outcomes or metropolitan area effects), GM_c measures the Great Migration influx into a location (either the actual change in the black share or my exogenous measure of the change), and $\mathbb{X}'_c$ is a vector of area pre-characteristics, including the share of the labor force in manufacturing in 1939, the median educational attainment by 1940, and the total share of the 1940 population consisting of recent black southern migrants.

Figure 5 provides motivation for investigating this effect: being a Great Migration "destination" is associated with lower average outcomes for low income children today. The y-axis measures the average adult income rank of low income children in 2011-2012, and the x-axis measures the percentile of the predicted black share change in the metropolitan area between 1940 and 1970. The coefficient of -0.058 (std. error: .009) implies that a 50 percentile point increase in the Great Migration influx (equivalent to the difference between Buffalo and Salt Lake City in Figure 1 is associated with a 2.9 percentile point reduction in the adult income rank of low income children today.

Earlier in this paper, I've alluded to two problems in interpreting this descriptive result causally: 1) endogeneity and omitted factors determining where migrants moved and 2) selection of families into locations today. In this section, I lay out a stylized econometric framework to discuss these challenges in more detail before describing my approach for addressing the two major challenges to identification.

Econometric Model

Suppose the black share in location c randomly increases during the Great Migration. The outcomes of children in the location may shift in response to the migration due to a number of factors. Segregation within c could increase as families endogenously resort in response to the migration. Alternatively, if median voters pay a higher contribution to the public good or dislike sharing public goods with black families in c, they may vote to lower the tax rate and opt into private goods instead.[6] Absolute mobility will be lower in a location with less funding of public goods, whether through segregation or a lowering of the tax rate.[7] See Appendix A for illustration of a toy model that generates these key predictions.

[6] Alternatively, white families may "vote with their feet" and move to segregated suburbs with separate political jurisdiction where they can determine a level of public goods that will not be shared with black families.

[7] There is also a mechanical effect of an increase in the migrant share on the level of public good consumed by residents. This will also reduce children's outcomes in addition to the endogenous lowering of the tax rate for public goods.

More concretely, let w_c be the outcomes for white children in place c and b_c be the outcomes for black children in place c. The average child's outcome in c is the sum of white and black children's outcomes weighted by s_c, the white share in c, and $1 - s_c$, respectively:

$$A_c = s_c w_c + (1 - s_c) b_c.$$

Suppose place c received a historical black migration influx of m_c and for simplicity, first suppose there is no outmigration of either black or white families from c. I relax this assumption later. What is the effect of m_c on A_c? The derivative of A_c with respect to m_c can be written as follows:

$$\frac{dA_c}{dm_c} = \frac{ds_c}{dm_c} \Delta_c^{bw} + a_c^m, \tag{2}$$

where $\Delta_c^{bw} = (w_c - b_c)$, the racial gap in children's outcomes, and $a_c^m = s_c \frac{dw_c}{dm_c} + (1 - s_c) \frac{db_c}{dm_c}$, the sum of the migration-induced changes in white and black children's outcomes weighted by the racial shares. I refer to $\frac{ds_c}{dm_c} \Delta_c^{bw}$ as the "mechanical effect" on average outcomes in c due to the racial gap in outcomes and the change in racial composition while a_c is the local "behavioral response" to m_c affecting children's outcomes.[8] The parameter I wish to estimate is a_c, the local response to changes in the black share.

In the data, suppose I estimate a_c by regressing children's average outcomes A_c on the migration influx m_c. I get the expected value across locations of the slope on the left hand side in Equation 2:

$$\mathbb{E}\left[\frac{dA_c}{dm_c}\right] = \mathbb{E}\left[\frac{ds_c}{dm_c} \Delta_c^{bw}\right] + \mathbb{E}[a_c^m]$$

In expectation, the mechanical effect of the migration further decomposes into:

$$\mathbb{E}\left[\frac{ds_c}{dm_c} \Delta_c^{bw}\right] = \mathbb{E}\left[\frac{ds_c}{dm_c}\right] \cdot \mathbb{E}[\Delta_c^{bw}] + Cov\left(\frac{ds_c}{dm_c}, \Delta_c^{bw}\right)$$

The first of these terms is a pure composition effect: the average change in racial shares

[8] Note, I am abstracting here from any differences between incumbent black residents and recent migrants. The evidence on the labor market effects of the Great Migration suggests that black migrants were substitutes with black incumbent workers, so that the migration increased labor competition among black workers in the north, exerting a downward pressure on wages. It's possible that the same substitutability between black incumbents and migrants would hold outside of the labor market, in the housing market for example. Thus, for now I abstract from potential local behavioral responses arising within the mechanical effect due to differences between black migrants and incumbent black residents.

across locations times the average racial gap in outcomes across locations will contribute to the overall change in outcomes following a migration influx. Mechanically, $\mathbb{E}\left[\frac{ds_c}{dm_c}\right]$ is not zero.[9] The racial gap in permanent residents' outcomes may not be zero on average due to factors affecting racial differences other than location.The second term is the covariance of the migration influx with the racial gap in a location. Intuitively, this term captures any endogeneity in migrants' location choices that lead to their choices being correlated with the racial gap in children's outcomes or an omitted variable that affects both. For example, if black migrants choose locations where racial gaps are smaller, then this covariance term is positive: places where the white population shrinks more are the places where the racial gap in outcomes is smaller. Alternatively, if industrial jobs attract migrants to particular locations and these same locations then become economically depressed and exhibit worse outcomes for children later on, then industrial specialization is an omitted variable determining both migrant location choices and the racial gap in children's outcomes. Estimates of the local behavioral response $\mathbb{E}[a_c^m]$ generated from regressing observed outcomes A_c on the migration influx m_c are biased away from the true value by these two confounders. The parameter of interest is only identified when both $\mathbb{E}\left[\frac{ds_c}{dm_c}\right] \cdot \mathbb{E}[\Delta_c^{bw}] = 0$ and $Cov\left(\frac{ds_c}{dm_c}, \Delta_c^{bw}\right) = 0$.

My data and research design allow me to remove these confounders from my estimation, yielding an unbiased estimate $\mathbb{E}[a_c^m]$. I first discuss how I deal with endogeneity in migrants' choices and potential omitted variable bias. I then turn to the issue of the composition bias introduced by changes in metropolitan area race shares combined with latent gaps in children's outcomes by race.

Exogenous changes in the black share

I define the Great Migration influx into a metropolitan area as the percentage point change from 1940 to 1970 in the black share of the total 1940 metropolitan population.[10]

$$\text{GM influx}_c = \frac{b_c^{1970} - b_c^{1940}}{\text{pop}_c^{1940}}$$

[9] Furthermore, allowing for outmigration means the change in racial shares will be determined in equilibrium by the location choices of incumbent residents in response to the migration. The phenomenon of white flight, where white residents leave areas experiencing increases in the black population, is a key illustration of this. Empirical work on the contemporaneous impact of the Great Migration suggests that increases in the black population in non-southern cities led to a more than one-for-one departures of white residents from the central cities of metropolitan areas (Boustan, 2010).

[10] For each metropolitan area c, b_c^t is the black population in c in time period t and pop_c^{1940} is the total population in 1940. Normalizing by the initial population insures that my measure of the black population change does not reflect changes to the metropolitan population over this period.

To construct my exogenous measure of the Great Migration influx in a city, I use a procedure similar to **?**. I replace the actual black population change in a northern city with the change in the black population were it to grow solely through 1) black southern in-migration as predicted by "push" factors and 2) arriving in cities according to their 1935-1939 migration flows.[11]

I follow **?** and use one-decade lags of the following county-level variables to predict southern outmigration in each decade from 1940-1970: the percent acreage in cotton, share of tenant farms, agricultural labor force share, whether it's located in a tobacco-growing state (North Carolina, Kentucky, Tennessee), the amount of WWII spending per capita, the mining labor force share, and whether it's located in mining state (Oklahoma and Texas). Figure D1 shows the coefficients on each of these factors in the estimation of 1940-1950 outmigration rates. Figure D2 is a binned scatter plot of mean actual county outmigration rates conditional on predicted county outmigration rates, which illustrates the strong correlation between predicted and actual outmigration rates.

I then assign predicted outmigrant flows to northern cities using 1935-1939 migration weights. Let m_{ct} be historical black in-migration into city c in decade t, and let ω_{cj} be the share of county j's outmigrants between 1935 and 1939 who reside in city c by 1940. Predicted in-migration $\hat{m}_{ct}$ is the sum of predicted outmigration from southern counties, weighted by ω_{cj}:

$$\hat{m}_{ct} = \sum_{j=1,..,1386} (\omega_{cj}^{1935-40} \cdot \hat{m}_{jt}) \text{ and}$$
$$\hat{m}_{c,t+10} = \hat{b}_{c,t} + \hat{m}_{c,t+10} \ \forall t > 1940.$$
$$\text{For } t = 1940, \ \hat{b}_{c,1940} = b_{c,1940}.$$

Assuming the black population in a city c increases only from predicted in-migration generates the following measure of the long-run black population change:

$$\Delta \hat{b}_c^{1940-1970} = \frac{\hat{b}_{c,1970}}{\text{pop}_{c,1940}} - \frac{\hat{b}_{c,1940}}{\text{pop}_{c,1940}}$$

Figure D3 illustrates ω_{cj} for the biggest sending county in each southern state. The weights reflect the idiosyncratic links between specific southern counties and northern cities. For example, the largest sender in Mississippi, Coahoma county, sends predominantly to Chicago, while the largest sender in Alabama, Jefferson County, sent migrants

[11]The 1940 census microdata were declassified in 2012, making it possible to identify the precise 1935 county of residence in for the full US population. **?** uses tabulated census reports that report 1935 state of residence to construct southern-state-to-northern-city weights to assign post-1940 southern state outmigrants to northern cities.

primarily to Detroit. To the extent that these patterns reflect idiosyncratic transportation links followed by chain migration patterns from before and during the first wave of the Great Migration (1910-1930), they offer a source of exogenous variation in where migrants settled between 1940 and 1970. Figure D4 demonstrates the strong correlation between my constructed measure of black share increases and the actual historical black share increases during this period.

Finally, to insure that my measure of black share changes does not simply reflect omitted characteristics of destinations that also influence children's outcomes in these locations, I include controls for a number of city pre-characteristics, including the median educational attainment by 1940, the share of the labor force in manufacturing in 1939, and the total 1935-1939 southern migrant share of the 1940 city population. These variables are meant to control for the fact that long-run human capital accumulation, economic opportunity, and the presence of large historical black enclaves do not drive the estimated relationship between a location's Great Migration influx and upward mobility. Figure 11 shows the relationship between my exogenous measure of black share changes and average adult income rank of low income children in a metropolitan area today. The coefficient on the Great Migration influx drops to a 2.3 percentile point reduction in income rank suggesting that metropolitan areas are negatively selected into being Great Migration destinations.

Causal location effects

To address the second issue, composition bias, I use measures by **?** of the causal effect of growing up in particular locations in the US estimated off of movers in US tax records between 1996 and 2012. Given the linear rank-rank relationship between parent and child income rank within areas established in **?**, **?** modeling each location's effect as a linear function of parent income rank generates estimates of the effect of each location on children from each parent income percentile.

The key assumption required for their estimates to reflect causal location effects is that within origin-destination pairs, the age of a child at the time a family moves across two locations is not correlated with the other determinants of children's outcomes. The authors argue that family unobservables (selection effects) that would otherwise bias estimates of location effects do not systematically vary across children whose families moved when the child was age 10 versus age 11.[12] They are thus able to an unbiased

[12]The authors validate these assumptions through a series of robustness checks, for example, including household fixed effects and estimating location effects off of siblings exposed to locations for different amounts of time.

estimate the effect of one additional year of childhood exposure to particular location as fine-grained as counties.[13] Multiplying the effect size by 20 gives the approximate effect of spending one's entire childhood in a place. The authors estimation strategy allows them to identify the causal effect of exposure to a place up to deviations from the effect of growing up in an average place. Thus, the causal location effects estimates have mean zero across locations.

To illustrate how using these data address composition bias, define r_c to be the potential outcome of a low-income child of race r randomly assigned to place c, relative to an average place for a child of that race. By construction,

$$\mathbb{E}[r_c] = 0.$$

By linearity of expectations then, $\mathbb{E}[w_c - b_c] = \mathbb{E}[w_c] - \mathbb{E}[b_c] = 0$. Figure 7 shows a binned scatter plot of the relationship between metropolitan area effects on low income children and historical changes in the black share in these areas. A change of 50 percentile point increase in the Great Migration influx is associated with a 2.7 percentile point reduction in adult income rank. But these changes in the black share may still be endogenous if migrants selected places on a downward trajectory in terms of mobility. In the next section, I present results of the causal effect of the Great Migration on upward mobility in specifications that bring together the two strategies discussed in detail above.

5 Results

5.1 Long-run impact of Great Migration on upward mobility

In this section, I report results from estimation equation 1 using my exogenous measure of the black share change as the regressor and metropolitan area effects as the measure of upward mobility. Figure 8 illustrates the relationship between the Great Migration influx and metropolitan area effects in a binned scatter plot where the dependent variable has been residualized on the baseline controls described in the previous section. The coefficient of -.04 (std. error: .012) implies that a 50 percentile point increase in an area's Great Migration influx lowers adult income rank of low income children by 2 percentile points. In all upcoming specifications, I report results for a 50 percentile point increase in the Great Migration, akin to going from Salt Lake City's historical black share change

[13]Precise estimates of location effects rely on having a sufficient number of movers within origin and destination pairs. The authors do not report causal location effects below the county level.

to the change in Buffalo, NY.

Table 1 compares the coefficients from the four variants of estimation equation 1 presented thus far. Moving from row 1 to row 2 addresses omitted pull factors and potential endogeneity of migrant location choices during the Great Migration. Results on both permanent residents' outcomes and metropolitan area effects on mobility suggest that locations that become Great Migration destinations are slightly negatively selected, even after controlling for a set of baseline pre-characteristics that may influence migration choices and the mobility of future generations. Moving from column 1 to column 2 addresses composition bias from the selection of families on unobservables across different locations today. The decrease in the coefficients in both rows is suggestive of a slight composition bias in the specifications that rely on permanent residents' outcomes.

Table 1: Comparing biased and unbiased estimates of Great Migration effect on mobility

	Avg adult inc rank	Metro area effects
GM	-2.9	-2.7
Predicted GM	-2.3	-2.0

All specifications contain baseline controls: total 1935-1939 black southern migrant share of the 1940 population, 1939 share of the labor force in manufacturing, and median educational attainment by 1940.

5.2 Mechanisms

The previous section documented the extent to which the Great Migration reduced upward mobility in destination cities. My estimates suggest that the bulk of this relationship is made up of the causal response in children's outcomes to the change in the racial composition in these areas historically. In this section I investigate the channels through which historical black in-migration persistently lowered rates of upward mobility for low income children today. I first briefly describe a model of mobility traps that relates changes in racial composition to reductions in local public spending on all children through the rise of excludable public goods. I then test for evidence of this channel using data on segregation and private school enrollment rates in areas with different levels of historical black in-migration.

A simple model with few and reasonable assumptions can explain the basic logic of mobility traps arising in response to black in-migration (see A). Let white incumbents and black migrants reside in a location. Assuming white residents are richer and that the median voter is white, then public spending to produce children's outcomes in an area will be decided by white residents' utility. If white residents have utility over a private good and a publicly provided good paid for by a lump-sum tax on white residents, then under minimal assumptions, the optimal choice of tax is decreasing in the share of the population that is white.[14]

A small extension to this basic model is that white residents could opt into an alternative public good that they can exclude the new black migrants from consuming, such as segregated neighborhoods or private schools. These excludable public goods would be produced with some efficiency cost, but as long as this efficiency cost is lower than the fraction black in an area, white residents will fully substitute into the excludable public good and set the tax rate on the shared public good to zero.

One example of an excludable public good is a segregated neighborhood where discriminatory housing markets and high housing prices act as a bulwark against the racial integration of a neighborhood. Segregation in the US rose over the entire period of the Great Migration, but peaked around 1970 and declined thereafter (**?**). In this section, I examine the effect of the Great Migration on changes in segregation after 1970. I find that while segregation declined on average by 20 to 30 percent in the metropolitan areas in my sample over this period, it declined less in Great Migration destinations.

My measures of segregation come from **?**. I focus on the subset of the hundred largest metropolitan areas with at least 1000 black residents for which these measures of segregation are available. The isolation index measures the typical black residents' exposure to other black residents across census tracts in a metropolitan area. The dissimilarity index reflects the share of black residents who would have to move in order for black residents to be perfectly evenly spread across tracts within a metropolitan area. I run the following regression to understand the impact of historical changes in the black population and changes in segregation post 1970:

$$\Delta S_c = \alpha + \beta \hat{GM}_c + \mathbb{X}_c' \gamma + \varepsilon_c$$

where S_c is the segregation index used, $\hat{GM}_c$ is my exogenous measure of the historical Great Migration influx, and $\mathbb{X}_c'$ is the standard set of pre-period characteristics of Great Migration destinations. I find that the declines in both these measures post-1970 are muted in Great Migration destinations. On average increasing the Great Migration influx

[14] These assumptions are that utility must be concave over the private and public good, but not too curved over the public good. The latter assumption is equivalent to the notion that there is some subsistence level of children's outcomes below which residents prefer not to dip.

by 50 percentile points reduced the decline in the isolation and dissimilarity indices by 2 and 1 percentage points over a mean reduction of 29 and 19 percent, respectively.

The second mechanism I study is the share of students enrolled in private schools in each metropolitan area. I interpret private school enrollment as a rough proxy for investment and engagement in local public schools. In places where the private school enrollment rates are high, families are less invested in public school districts' performance and funding than in areas where few students are enrolled in private schools. Starting with the 1960 census, enumerators asked respondents whether they sent their children to private school and these responses were tabulated for cities in the City and County Data Books. From these sources, I collect private school enrollment shares in 1960, 1970, and 1980 and examine how changes in the black population within a city over time affect the private school enrollment share.

I run the following regression to estimate the effect of the black population on the private school enrollment share between 1960 and 1980:

$$S_{ct} = \alpha + \beta Log\hat{BlackPop}_{c,t-10} + \delta_t + \xi_c + \gamma Log\hat{Pop}_{c,t-10} + \varepsilon_{ct}$$

where S_{ct} is segregation in city c in time period t, $Log\hat{BlackPop}_{c,t-10}$ is the log of the black population in period $t-1$. Included in the regression are city and time fixed effects, ξ_c and δ_t, respectively. Finally, I include a control for the log of the total metropolitan population in $t-1$. The regression allows me to capture how increases in the black population that are not explained by fixed differences between cities or time trends in the urban black population affect private school enrollment rates. I find that a 25% increase in the black population increases private school enrollment rates by about 3 percentage points.

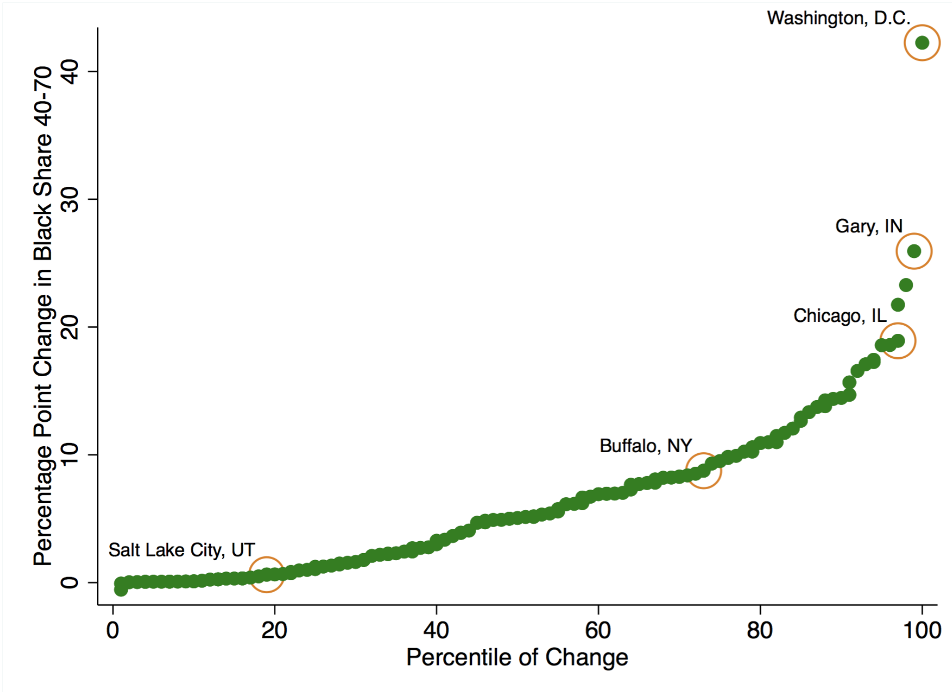
6 Conclusion

Geographic differences in upward mobility are strongly correlated with racial shares. However, a lack of experimental variation in racial shares and the selection of families across locations poses a dual challenge to estimating the causal relationship between racial composition and geography. This paper leverages a large scale historical natural experiment in "Moving to Opportunity" to overcome these challenges. During the Great Migration (1910-1970), six million African Americans left the south in search of better opportunities and social freedom in places like Chicago, New York City, Los Angeles, Philadelphia, Detroit, and Baltimore, many of which perform poorly in terms of upward mobility today.

I combine idiosyncratic variation in the locations where African American migrants settled during the second wave of the Great Migration (1940-1970) with measures of the causal childhood exposure effects of locations from **?** to estimate the causal impact of this major population movement on neighborhood mobility effects today. A 50 percentile point larger influx of black migrants during the Great Migration reduces adult income rank by approximate 2 percentile points for low income and high income children alike. These results suggest disinvestment from public goods in response to the Great Migration may have had persistent negative effects on upward mobility for children across parental backgrounds.

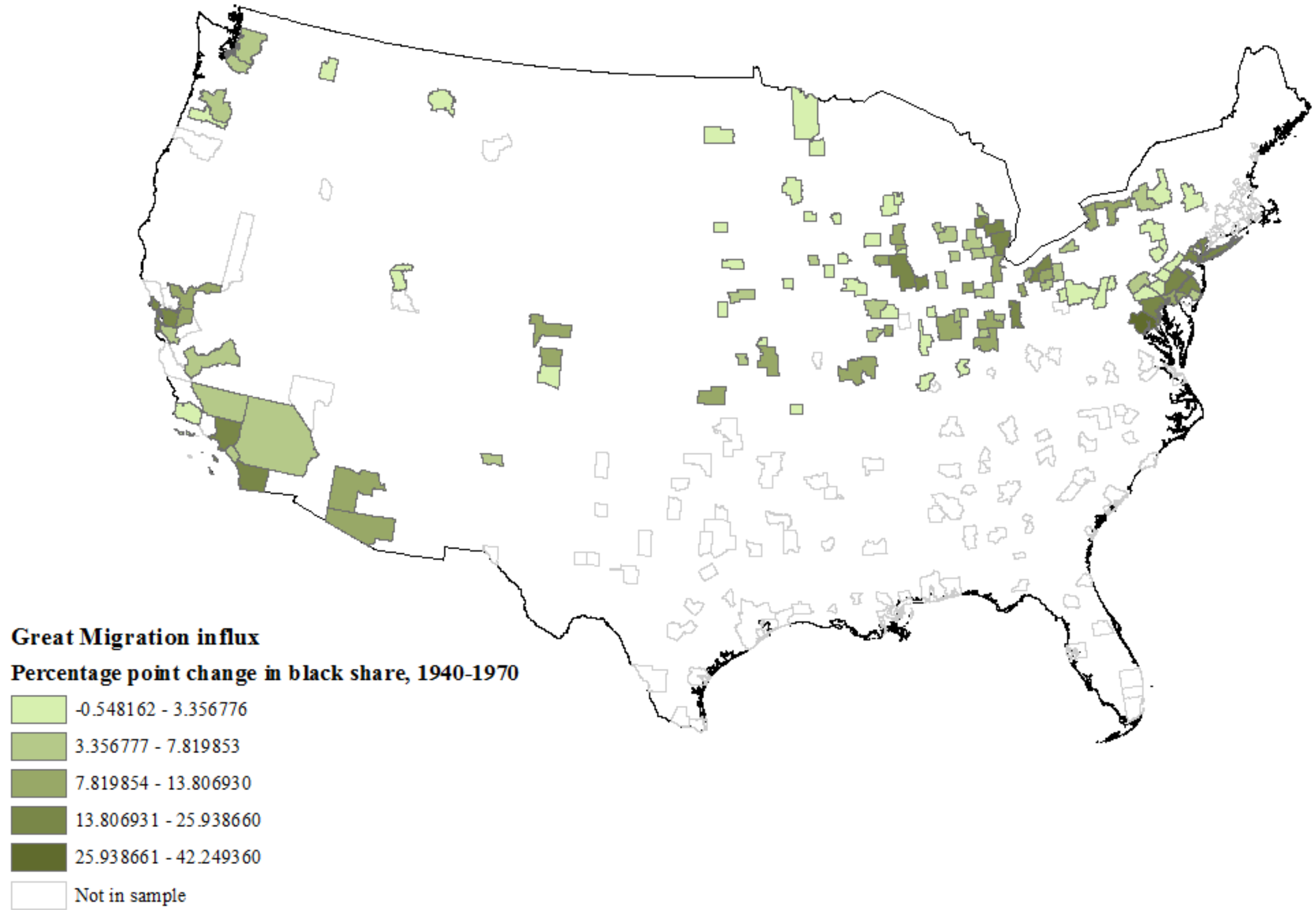
I find evidence in support of this looking at the metropolitan areas for which post-1970 measures of the black isolation and dissimilarity indices are available. Although segregation declined nationally during this period, it declined less in Great Migration destinations. Further evidence on private school enrollment rates from the period of the Great Migration suggests a reduction of engagement and investment in local public schools. Forthcoming analysis will shed light on further mechanisms behind the persistent effect of the Great Migration on children's outcomes and on the racial heterogeneity in the impact of the Great Migration on mobility.

Figure 1: Change in the black share in non-southern metropolitan areas, 1940-1970



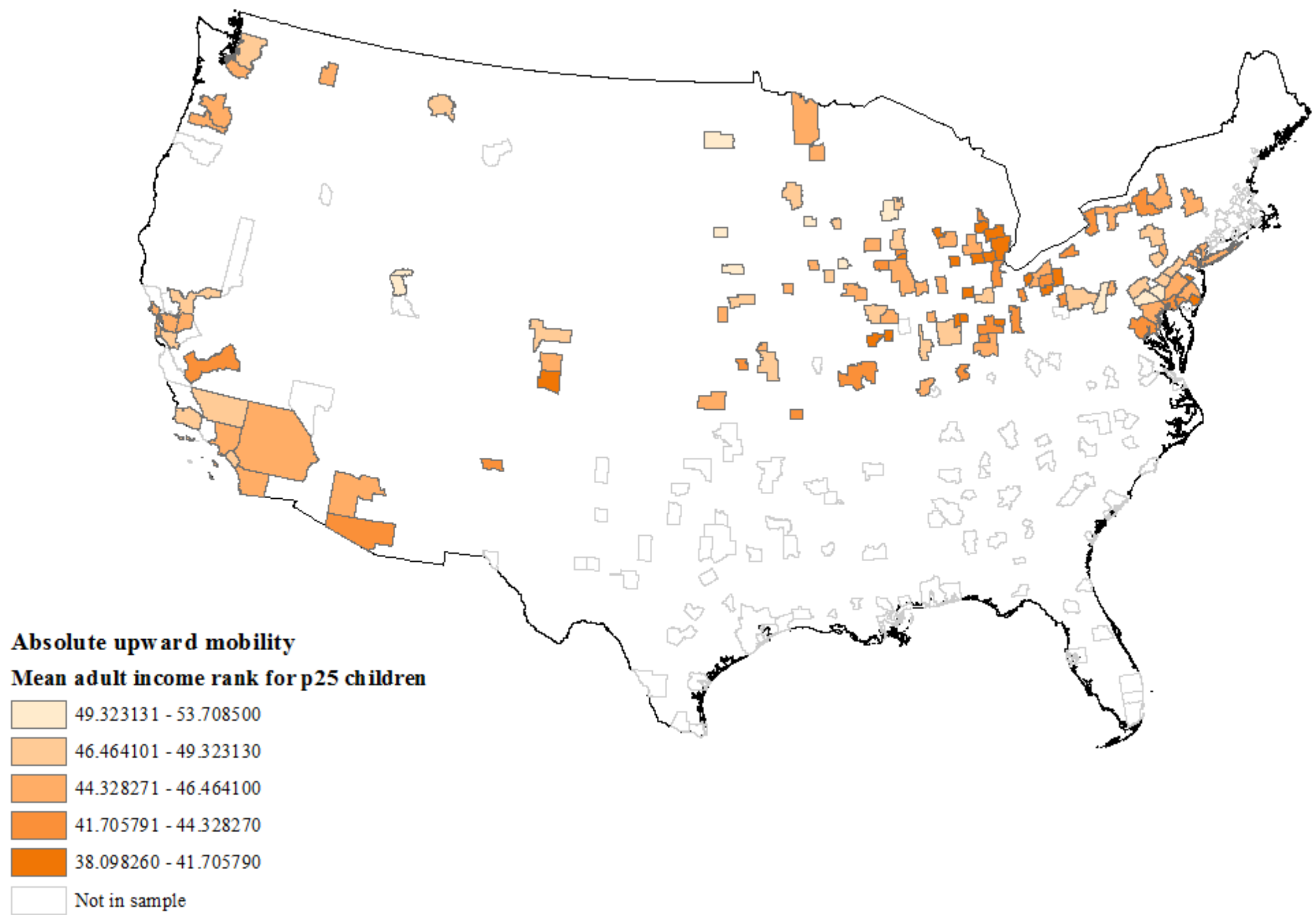
Percentiles of black population share change during the Great Migration in northern metropolitan areas, measured as the percentage point change between 1940 and 1970 in the black share of the total metropolitan area in 1940. ($N = 131$)

Figure 2: Change in the black share in non-southern metropolitan areas, 1940-1970



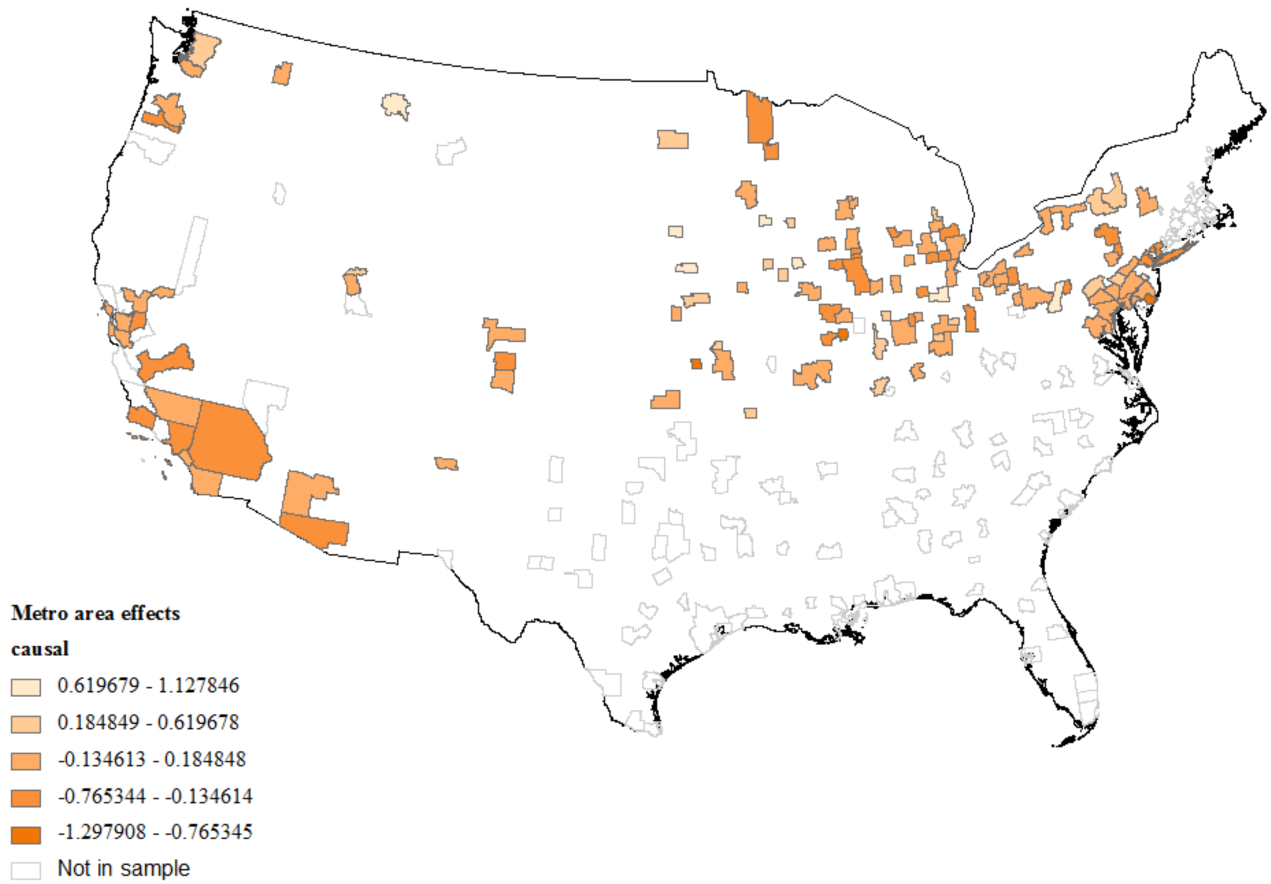
Distribution of the black population share change during the Great Migration across metropolitan areas in the US.

Figure 3: Average adult income rank of low income children, 2011-2012



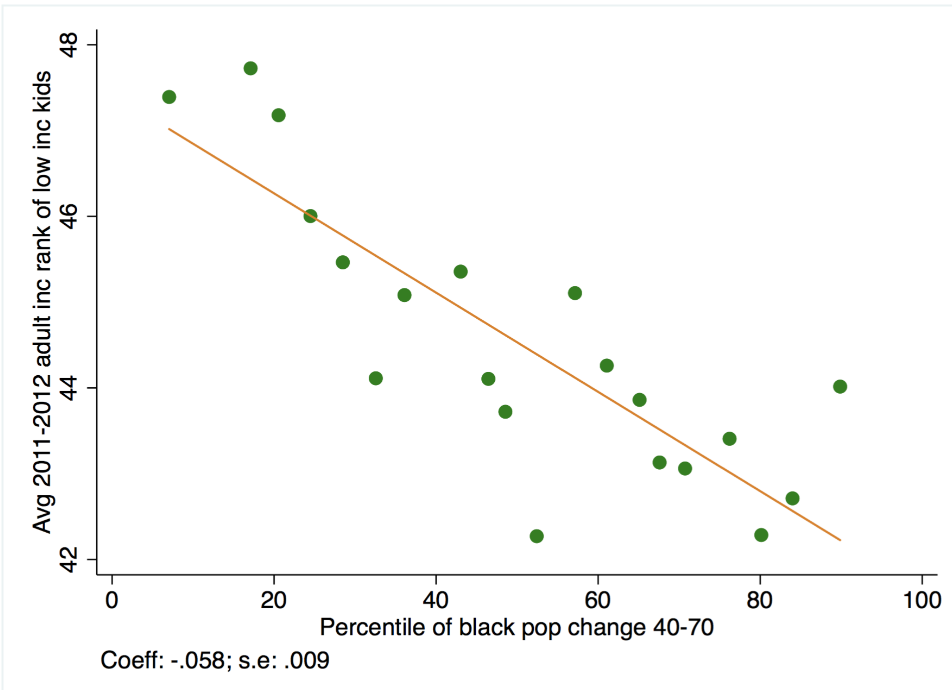
Average 2011-2012 adult income ranks of children born to the bottom half of their parents' national income distribution, measured for the 1980-1988 birth cohorts.

Figure 4: Metropolitan area effects on adult income rank of low income children, 2011-2012



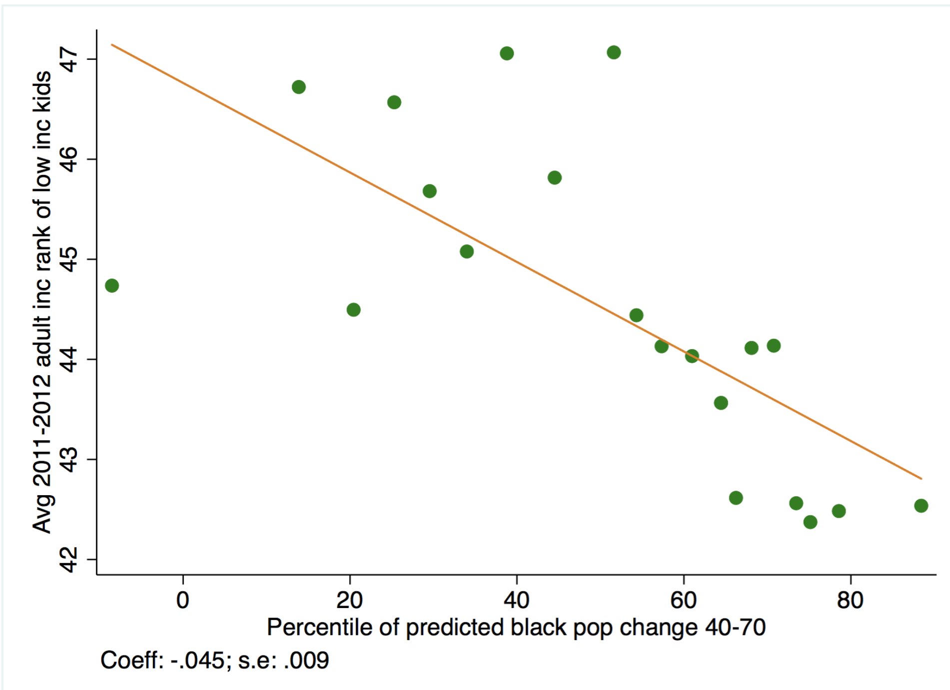
20-year metropolitan area exposure effects on the 2011-2012 adult income ranks of children born to the bottom half of their parents' national income distribution, measured for the 1980-1988 birth cohorts.

Figure 5: Observed upward mobility on Great Migration influx



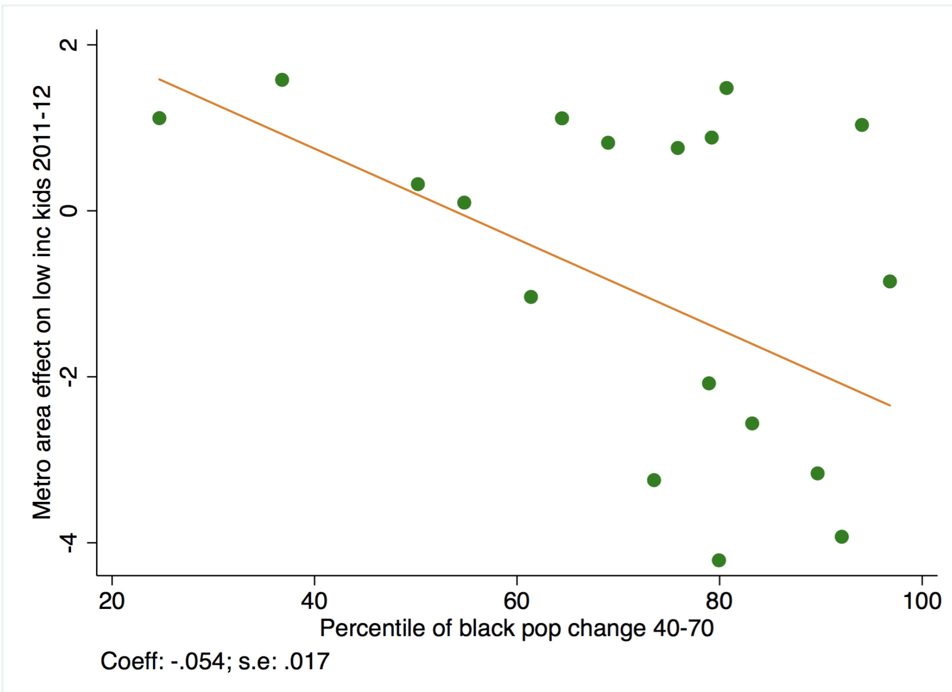
Binned scatter plot of metropolitan area average adult income rank of low income children conditional on 1940-1970 change in the metropolitan area black share and controls. The dependent variable has been residualized on the baseline set of controls: total 1935-1939 black southern migrant share of the 1940 population, 1939 share of the labor force in manufacturing, and median educational attainment by 1940. ($N = 131$)

Figure 6: Observed upward mobility on predicted Great Migration influx



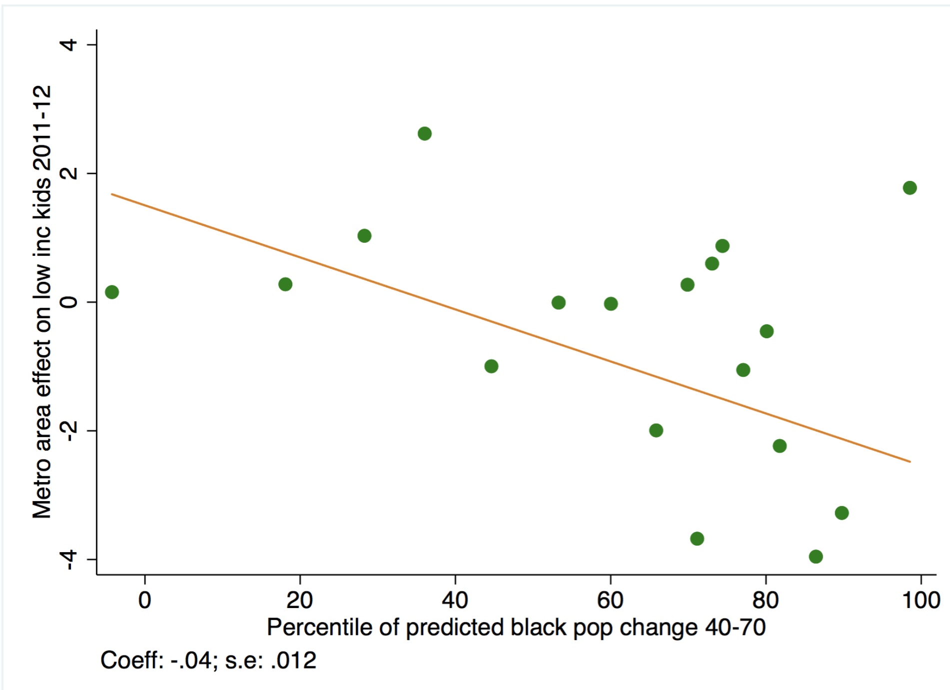
Binned scatter plot of metropolitan area average adult income rank of low income children conditional on predicted 1940-1970 change in the metropolitan area black share. The dependent variable has been residualized on the baseline set of controls: total 1935-1939 black southern migrant share of the 1940 population, 1939 share of the labor force in manufacturing, and median educational attainment by 1940. ($N = 131$)

Figure 7: Metropolitan area effects on Great Migration influx



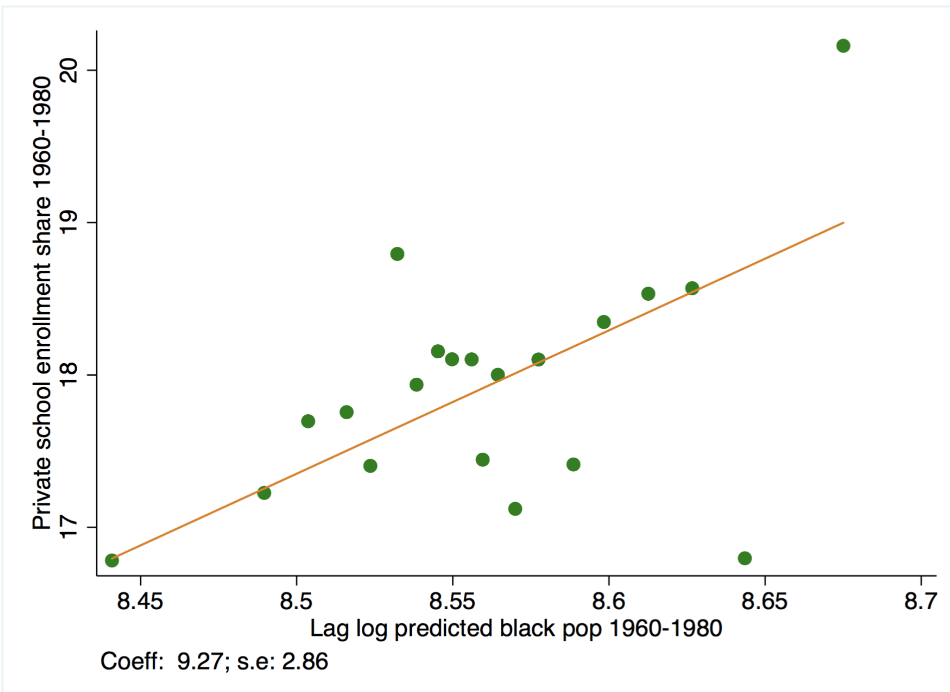
Binned scatter plot of 20-year metropolitan area exposure effects on low income children conditional on 1940-1970 change in the metropolitan area black share. The dependent variable has been residualized on the baseline set of controls: total 1935-1939 black southern migrant share of the 1940 population, 1939 share of the labor force in manufacturing, and median educational attainment by 1940. ($N = 131$)

Figure 8: Metropolitan area effects on predicted Great Migration influx



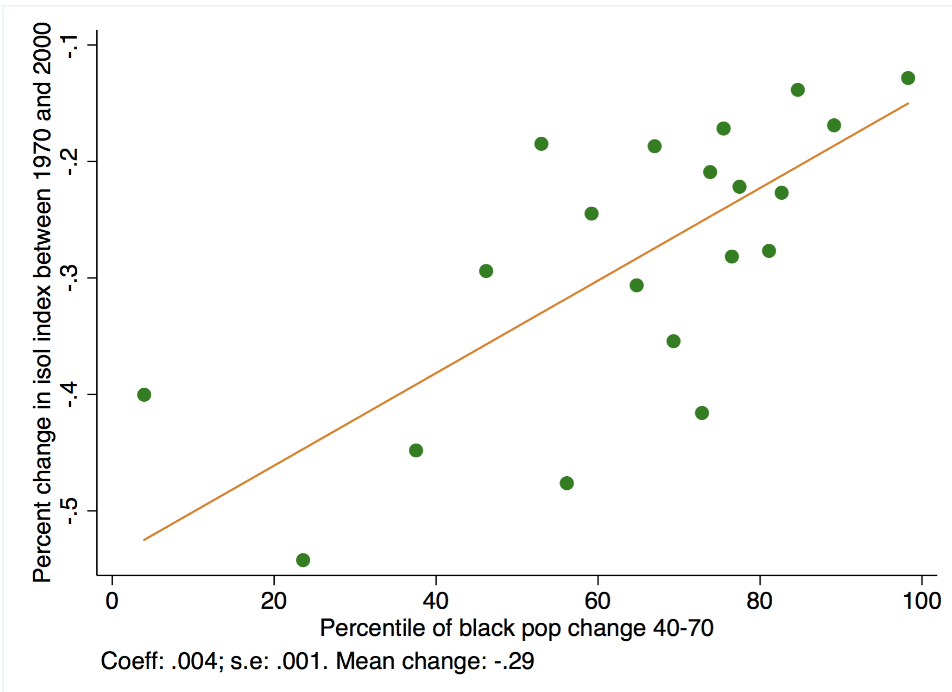
Binned scatter plot of 20-year metropolitan area exposure effects on low income children conditional on predicted 1940-1970 change in the metropolitan area black share. The dependent variable has been residualized on the baseline set of controls: total 1935-1939 black southern migrant share of the 1940 population, 1939 share of the labor force in manufacturing, and median educational attainment by 1940. ($N = 131$)

Figure 9: Private school enrollment rates in Great Migration destinations, 1960-1980



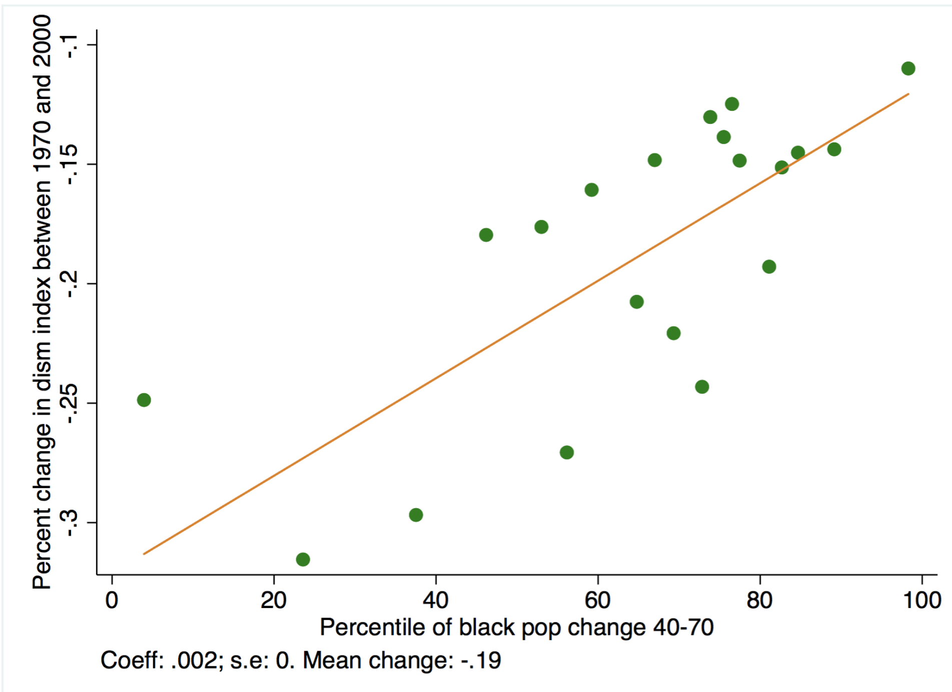
Binned scatter plot of private school enrollment rates in the 100 largest metropolitan areas on lag predicted log black population. The dependent variable has been residualized on city and time fixed effects. ($N = 100$)

Figure 10: Changes in the isolation index in Great Migration destinations, 1970-2000



Binned scatter plot of 1970-2000 changes in the black isolation index on predicted 1940-1970 change in the metropolitan area black share. The dependent variable has been residualized on the baseline set of controls: total 1935-1939 black southern migrant share of the 1940 population, 1939 share of the labor force in manufacturing, and median educational attainment by 1940. Data on the black isolation index in metropolitan areas from **?**. ($N = 54$)

Figure 11: Changes in the dissimilarity index in Great Migration destinations, 1970-2000



Binned scatter plot of 1970-2000 changes in the black dissimilarity index on predicted 1940-1970 change in the metropolitan area black share. The dependent variable has been residualized on the baseline set of controls: total 1935-1939 black southern migrant share of the 1940 population, 1939 share of the labor force in manufacturing, and median educational attainment by 1940. Data on the black dissimilarity index in metropolitan areas from **?**. ($N = 54$)

Appendix A Mobility traps

A.1 Optimal taxation chosen by median voter, with within-group homogeneity

Let there be two types of agents residing in a location, white and black households, where white households have, on average, greater exogenous income than black households ($Y_W > Y_B$), and the median voter is white. Assume each household has one child, and that there is no outmigration.[15] The population of households is measure 1 with $s_W \in [0, 1]$ equaling the number of white households and $s_B = 1 - s_W$ equaling the number of black households. White households have concave utility over a private good and an equal amount of the publicly provided good paid for by non-negative taxes. White residents choose a tax schedule $\tau(Y)$ to maximize their utility:

$$\max_{\tau} U(C, G) \text{ s.t.: } C \leq (1 - \tau(Y_W))Y_W$$
$$\text{where } G = \tau(Y_B)s_B Y_B + \tau(Y_W)s_W Y_W$$

For simplicity, I assume utility is concave over both arguments and separable.

Uniform linear tax schedule

With a uniform linear tax rate, $\tau(Y) = \tau$ and $\tau'(Y) = 0$. Assume $0 < \tau \leq 1$. Because the median voter is white, the optimal tax rate is the one that solves the following utility maximization problem for white households:

$$\max_{\tau} U((1 - \tau)Y_W, \tau((1 - s_W)Y_B + s_W Y_W))$$

The first order condition on τ is as follows:

$$\text{FOC}_\tau : \; -Y_W U_C + ((1 - s_W)Y_B + s_W Y_W)U_G = 0$$

Suppose we are interested in the comparative static $\dfrac{\partial \tau}{\partial s_B} \propto -\dfrac{\partial \tau}{\partial s_W}$.

[15] [Compare declines in MSA overall versus decline in CC populations.] If I take the location to be a metropolitan area, this assumption is not unreasonable. Although white residents moved out of central cities in response to the Great Migration, they tended to remain in the same metropolitan area [EVIDENCE? CITE]. Moves to separate political jurisdictions within a metropolitan area will be explored in the extension to the model that focuses on excludable versus non-excludable publicly provided goods.

The value function is

$$V((1-\tau(s_W))Y_W, \tau(s_W)((1-s_W)Y_B + s_W Y_W))$$
$$= \max_{\tau} U((1-\tau)Y_W, \tau((1-s_W)Y_B + s_W Y_W)),$$

so the first order condition can be rewritten as

$$V_\tau((1-\tau(s_W))Y_W, \tau(s_W)((1-s_W)Y_B + s_W Y_W)) = 0.$$

By the Implicit Function Theorem,

$$\frac{\partial \tau}{\partial s_W} = -\frac{V_{\tau s_W}}{V_{\tau\tau}} \propto V_{\tau s_W}$$

$$\implies \frac{\partial \tau}{\partial s_W} \propto (Y_W - Y_B)U_G + ((1-s_W)Y_B + s_W Y_W)\tau(Y_W - Y_B)U_{GG}$$

The sign of the comparative static is positive under the following condition:

$$U_G > -((1-s_W)Y_B + s_W Y_W)\tau U_{GG}$$

We can gain more intuition by rewriting this condition:

$$\gamma = -\frac{U_{GG}}{U_G} G < 1$$

Note that γ is a measure of the curvature of the utility function. Under log utility, $\gamma = 1$, so the above condition is equivalent to requiring utility be less curved than log. If this condition is met, then the optimal tax rate increases with the white fraction of the population, which implies the tax rate decreases as the black population increases.

A.2 Extension: excludable and non-excludable public goods

Suppose that instead of one type of publicly provided good, there are two types such that average children's outcomes are $a = a_1 + a_2$, where a_1 is produced through a non-excludable public good and a_2 through an excludable one (e.g., public schools vs. private schools or urban vs. suburban residence). The excludable good can be consumed by white residents only, the non-excludable good can be consumed by white residents and black migrants alike. As before, let the non-excludable good be $a_1 = s_W \tau_1$. Let the excludable good be produced at some efficiency cost such that residents pay tax rate τ_2

for it and receive $a_2 = \gamma\tau_2$, where $\gamma < 1$. Finally, assume that utility is separable in the private consumption and average children's outcomes, so that $U(Y-\tau_1-\tau_2, s_W\tau_1+\gamma\tau_2) = u(Y-\tau_1-\tau_2) + v(s_R\tau_1+\gamma\tau_2)$ and that there are no subsidies ($\tau_1 \geq 0$ and $\tau_2 \geq 0$). If residents first choose a financing method to maximize a, and the efficiency cost of the private good $(1-\gamma)$ is less than the share minority $(1-s_W)$, then residents will always choose $\tau_1 = 0$ and in equilibrium, only the excludable good will be produced. The model can be generalized to $v(s_W\tau_1, \gamma\tau_2)$ with $v_{a_1a_2} \neq 0$ to allow for cross price elasticities of demand for a_1 and a_2.

Appendix B Aggregating county exposure effects to metropolitan areas

Let $\hat{c}_j$ be the county-level causal effect estimate and let c_j be the true effect.

$$\hat{c}_j = c_j + \varepsilon_j$$
$$\text{where } \varepsilon_j \sim \text{i.i.d.} N(0, s_j^2)$$

As an estimate of the county-level variance, s_j^2, we take the sum of the variance of the county-within-CZ estimate plus the variance of the CZ-level estimate. (County-level effects are estimated within CZs.)

I will be aggregating the county-level effect to the 1970 and 1990 metropolitan areas, which have county-based definitions. The precision-weighted mean of the county-level causal effect at the MA level is as follows:

$$\bar{c}_{MA} = \frac{\sum_{j \in MA} \frac{1}{s_j^2} \hat{c}_j}{\sum_{j \in MA} \frac{1}{s_j^2}}$$

To calculate the variance, start with the numerator:

$$Var\left(\sum_{j \in MA} \frac{1}{s_j^2} \hat{c}_j\right) = Var\left(\sum_{j \in MA} \frac{1}{s_j^2} (c_j + \varepsilon_j)\right) = Var\left(\sum_{j \in MA} \frac{1}{s_j^2} \varepsilon_j\right)$$

$$= \sum_{j \in MA} Var\left(\frac{\varepsilon_j}{s_j^2}\right) = \sum_{j \in MSA} \frac{1}{s_j^4} Var(\varepsilon_j)$$

$$= \sum_{j \in MA} \frac{1}{s_j^4} s_j^2 = \sum_{j \in MA} \frac{1}{s_j^2}$$

Thus, we have $Var(\bar{c}_{MA}) = Var(\frac{\sum_{j \in MA} \frac{1}{s_j^2} \hat{c}_j}{\sum_{j \in MA} \frac{1}{s_j^2}})$

$$= \left(\frac{1}{\sum_{j \in MA} \frac{1}{s_j^2}}\right)^2 \sum_{j \in MA} \frac{1}{s_j^2} = \frac{1}{\sum_{j \in MA} \frac{1}{s_j^2}} \tag{3}$$

Thus, the precision weight for each MA-level observation is simply $\sum_{j \in MA} \frac{1}{s_j^2}$.

Appendix C Aggregate mobility effects of the Great Migration

In this section I explore a series of counterfactuals to assess the overall impact of the Great Migration on upward mobility. The estimates presented in Section 5.1 and summarized in Table 1 represent the partial equilibrium effect of the Great Migration on upward mobility. These results showed that local responses to the Great Migration lowered upward mobility for both low and high income children. Specifically, a 50-percentile increase in the Great Migration influx lowered adult income rank by 2 percentiles. However, the Great Migration itself was a large scale historical move to opportunity: the literature on the migration suggests that movers saw their wages double relative to stayers. Recent papers also suggests that, measured today, the children of movers appear to have better outcomes than the children of stayers.

I conduct a simple exercise to evaluate the following specific counterfactual: what is the average contribution of locations to children's adult outcomes if the black population were distributed the way it were in 1940? I compare this average locational effect to the locational effect on children using the 1970 and 2000 distributions of the black population.

1940 represents the start of the second wave of the Great Migration, 1970 represents the end of the Great Migration, and 2000 represents the distribution of the black population after the "reverse" Great Migration, which began in the 1980s.

Table 2: Counterfactual average mobility US black population

	Black pop 1940	Black pop 1970	Black pop 2000
County effect	-1.72	-2.14	-1.65
Raw average	-6.0	-5.5	-4.7

Row 1 shows the average 20-year county childhood exposure effect on 1980-1986 birth cohorts, weighted by various historical distributions of the black population in the US. Row 2 shows the deviation from average permanent residents' income in 2011-2012 weighted by various historical distributions of the black population in the US.

Appendix D Racial differences in intergenerational mobility in the NLSY 1997

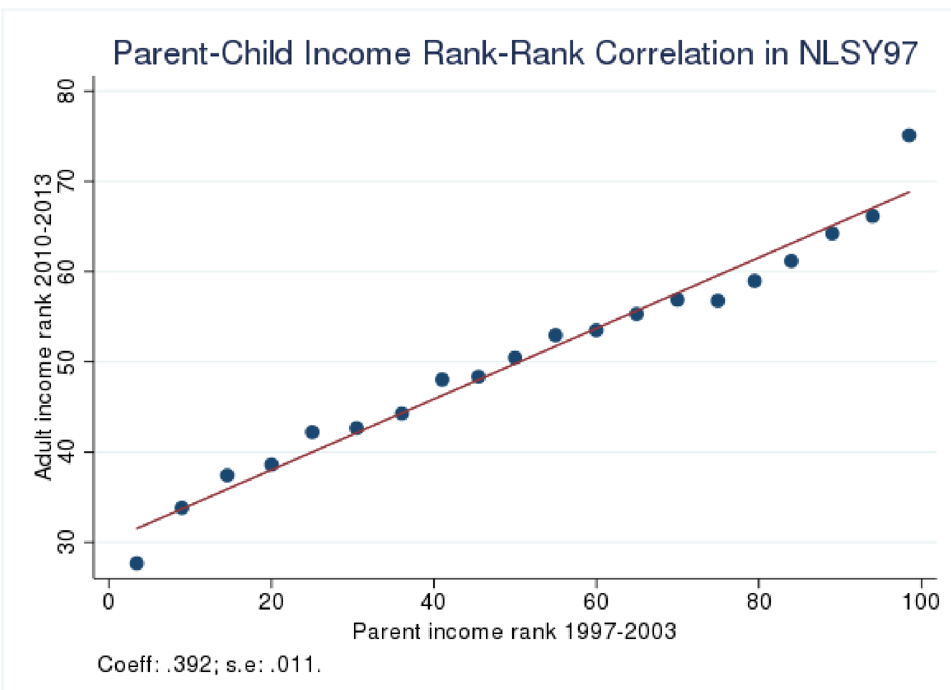


Figure C1: Parent-child income rank rank correlation in NLSY 1997

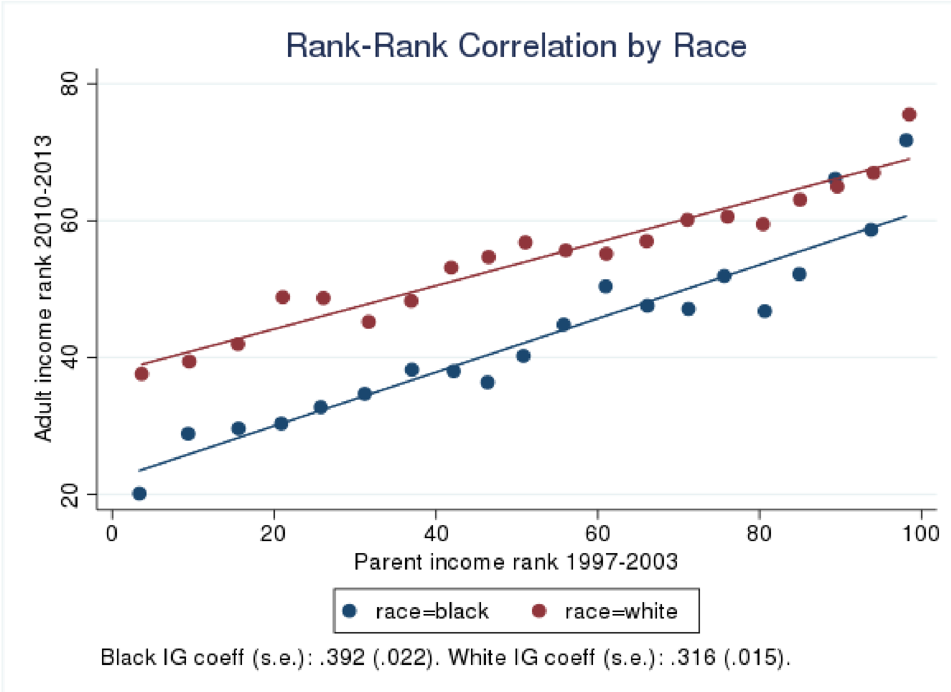


Figure C2: Parent-child income rank rank correlation by race, NLSY 1997

Appendix E Push factors and idiosyncratic settlement during the Great Migration

I estimate the following equation to predict southern outmigration each decade from 1940 to 1970:

$$m_{jt} = \alpha_0 + \mathbb{X}'_{jt-10}\alpha_1 + \xi_{jt},$$
$$\hat{m}_{jt} = m_{jt} - \xi_{jt}$$

where j is a southern county, $t \in \{1950, 1960, 1970\}$, m_{jt} and $\hat{m}_{jt}$ are the actual and predicted numbers of out-migrants from j between $t-10$ and t. $\mathbb{X}_{jt-10}$ is a vector of one-decade lags of push factors, including percent acreage in cotton, percent tenant farms, share of the labor force in agriculture, indicator for being in tobacco growing state, WWII spending per capita, share of the labor force in mining, and an indicator for being in a mining state (OK and TX).

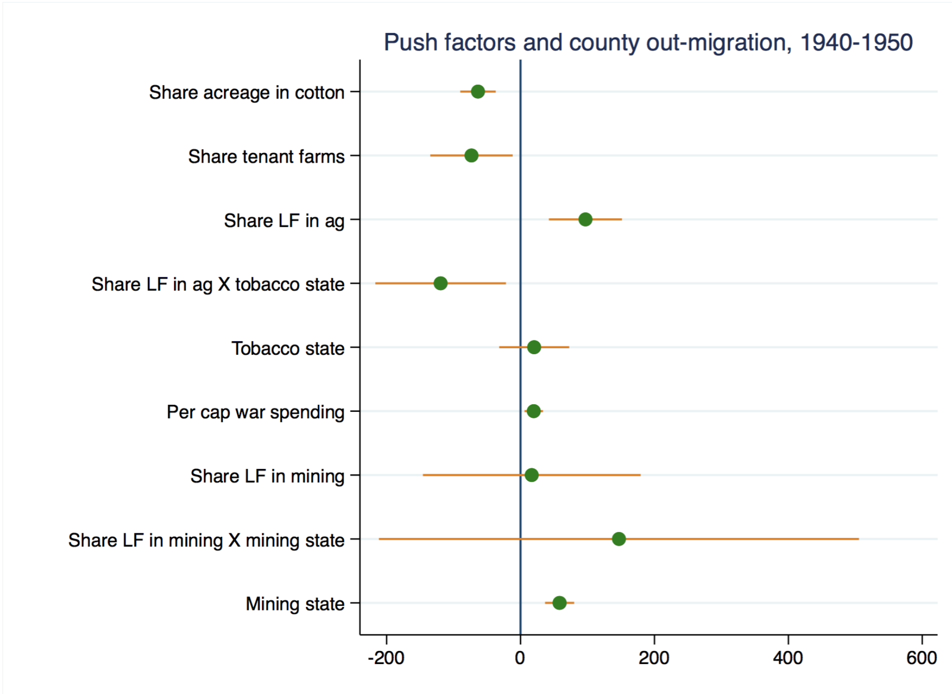


Figure D1: Southern push factors 1940-1950

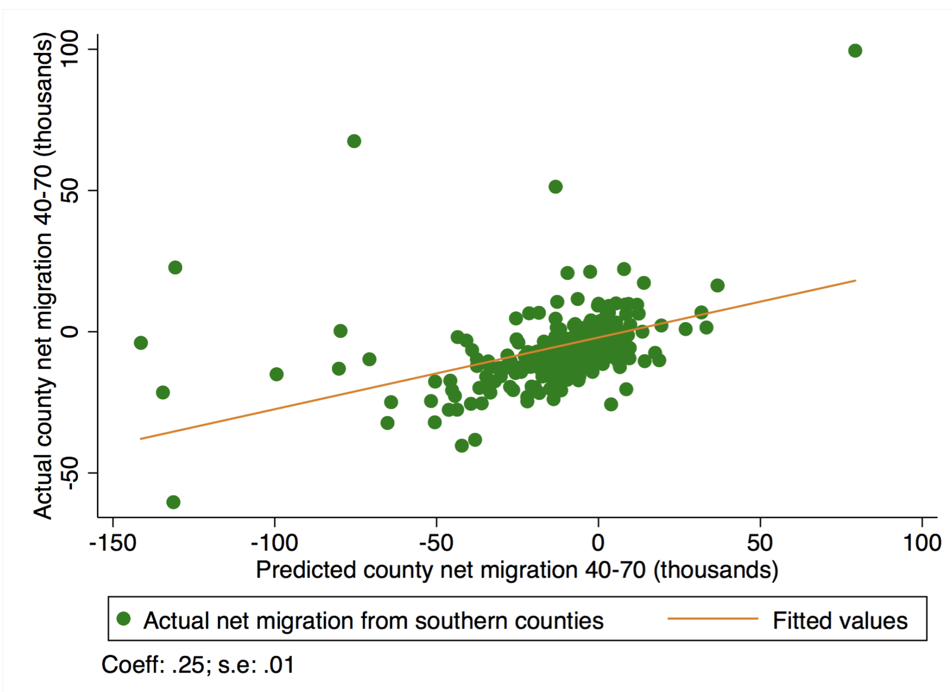


Figure D2: Correlation between actual and predicted county outmigration

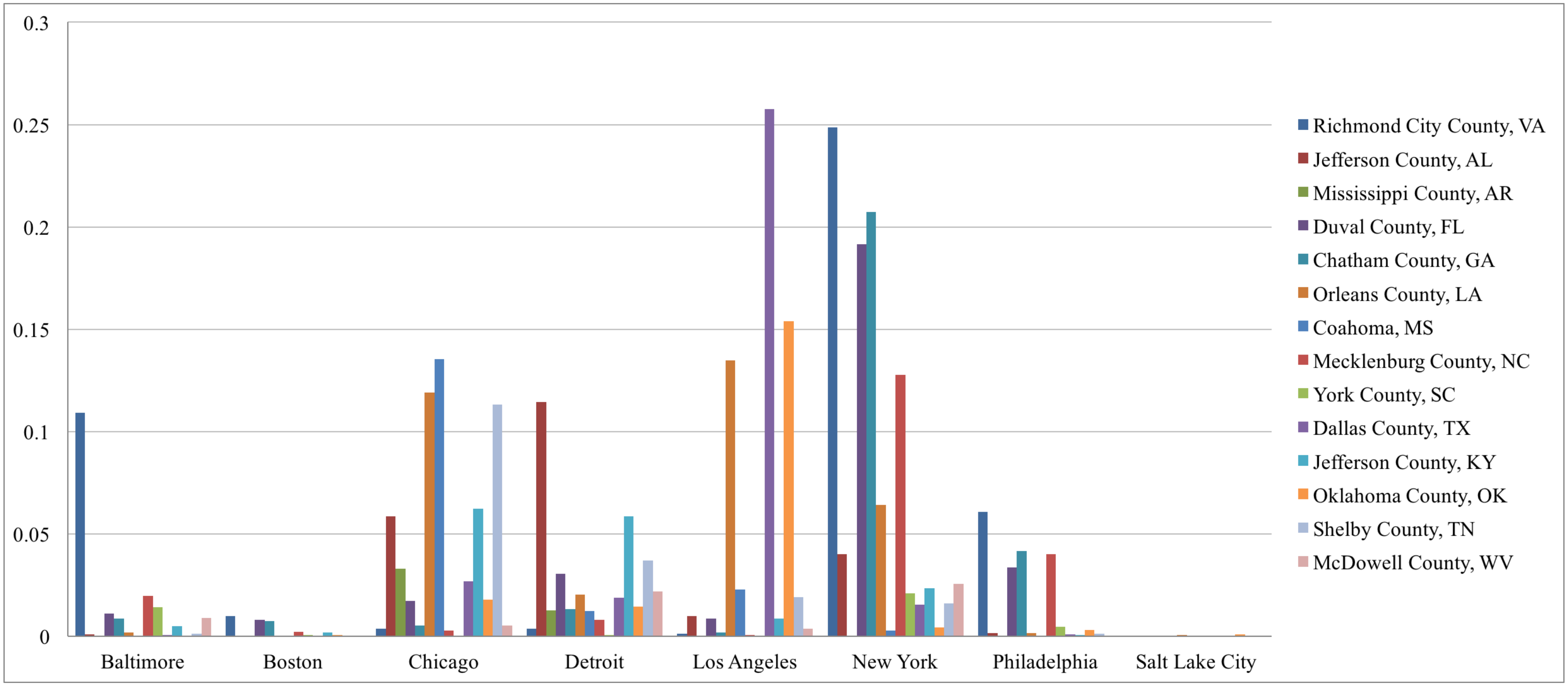


Figure D3: County-city migration weights, 1935-39

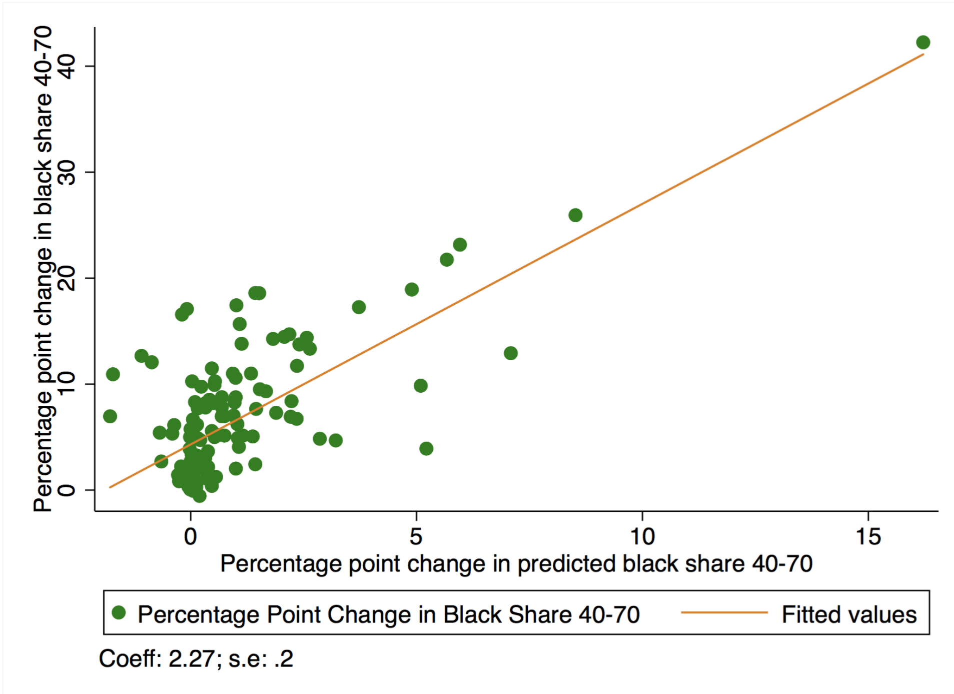


Figure D4: Correlation between actual and predicted black population change in cities, 1940-1970