Exposure, Integration, and Interracial Marriage: Evidence from The Great Migration and Residential Segregation

Cameron Deal*

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Abstract

Interracial marriage offers a measure of social integration between racial groups. This paper studies the effects of exposure on racial integration in the marriage market using two historical quasi-experiments. I use a shift-share instrument to find that the Great Migration increased the prevalence of interracial marriage but the magnitude of this increase is small relative to the change in Black population. This relationship is muted in high-segregation cities, suggesting that residential segregation limited the social integration response to the Great Migration. Additionally, I use railroad track placement to instrument for residential segregation and find that residential segregation decreased interracial marriage. Together, this evidence suggests that exposure contributed to rising interracial marriage rates in the non-Southern United States.

Keywords: Interracial Marriage, Segregation, Great Migration, Marriage Markets

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*Vanderbilt University. cameron.h.deal@vanderbilt.edu. I thank Bhash Mazumder, Daniel Aaronson, William Collins, Christopher Carpenter, Michelle Marcus, Marcus Dillender, Steven Hill, Ben Harrell, Samuel Mann, Laura Nettuno, Santiago Deambrosi, Geoffrey Kocks, Arthur Wickard, Craig Sylvera, Claire Chen, Ellora Derenoncourt, Benny Goldman, and especially Brian Beach for their comments, feedback, and guidance, as well as seminar participants at ASHEcon 2023, SEA 2023, and the Federal Reserve Bank of Chicago. I also thank Ellora Derenoncourt for graciously sharing data.

1 Introduction

In 1950, the interracial marriage rate (IMR) between Black and white Americans was approximately 1.5 per 1000 marriages—50 years later, it was 18 times higher at 26.5 per 1000 marriages.[1] However, this is still only a fifth of the IMR expected under random assignment to spouses. Evidently, the US marriage market has made significant progress toward social integration but remains far from achieving it.

Interracial marriage is a useful marker of social integration—perhaps the most intimate decision one makes in their life is who their partner will be. Beyond this, the segregation of the marriage market contributes to the well-documented and persistent racial gaps in economic outcomes by strengthening the intergenerational transmission of wealth within racial groups (Margo, 2016; Derenoncourt et al., 2023).[2] While substantial research has described trends in interracial marriage rates and estimated structural models of interracial marriage markets (see, for example, Wong (2003); Fryer (2007)), little is known about the causal historical forces that shaped interracial marriage and social integration.

In this study, I explore the effects of exposure on interracial marriage and marital integration in the United States. While previous scholarship has recorded the large increase in the interracial marriage (Fryer, 2007; Gullickson, 2006), various explanations have been proposed (Wong, 2003; Chiappori et al., 2016). Contemporaneous historical trends such as decreasing residential segregation and internal migration may have increased the social interactions and integration of Black and white Americans. The Great Migration, for instance, caused large increases in Black population share across the non-South, potentially increasing interaction opportunities for Black and white Americans. Additionally, large increases in interracial marriage coincided with broad decreases in residential segregation.[3] I use causal empirical frameworks to assess the role of historical forces such as the Great Migration and residential segregation in explaining the prevalence of interracial marriage in the United States.

I use data from the US Decennial Census from 1850-2000, a population enumeration every 10 years that records the demographic and economic characteristics of the American population. I use two designs to assess the effects of social interaction on interracial marriage; I first evaluate the effects of increasing Black population shares using a shift-share instrument constructed with the Second Great Migration. I highlight heterogeneity in effects by the residential segregation of receiving commuting zones (CZs). Then, I conduct a complementary analysis to examine the role of residential segregation using the placement of railroads as an

[1] I define the interracial marriage rate (IMR) to be the share of Black same-race marriages, Black and white marriages, and white same-race marriages that are between Black and white spouses. For more detail, see Section 3.

[2] As Margo (2016) highlights, low levels of racially mixed households can, in combination with high intergenerational transmission and large initial gaps of human capital, create "intergenerational drag," making racial inequality persistent. While economic and health disparities between Black and white Americans have reduced, they remain high—the white-to-Black wealth ratio remains at 6 to 1 and Black Americans live on average 3.6 fewer years than their white counterparts (Schwandt et al., 2021; Derenoncourt et al., 2023). Marriage can be one pathway to reducing these inequalities.

[3] See Figure 1 and Appendix Figure A1.

instrument for contemporary segregation. In addition to evaluating the prevalence of interracial marriage, I construct a marital integration outcome to account for differences in population racial composition (for example, comparing a city that is 50% Black and 50% white to one that is 5% Black and 95% white). This outcome can be thought of as the fraction of interracial marriages expected under random assignment that are observed in the data.[4]

I find increasing residential contact positively impacts interracial marriage and marital integration. A 20-percentile increase in Black population change causes 2.64 additional interracial marriages per 1000 marriages (and these effects are substantive across 1970-2000). I show that these effects are driven by less racially segregated cities and are muted in high segregation cities. Additionally, I find that a 1 standard deviation increase in the dissimilarity index (a measure of residential segregation) causes 3.47 less interracial marriages per 1000 marriages and a decrease of 0.61 points of marital integration in 1990. Taken together, this evidence suggests that changing residential segregation and internal migration have substantively shaped interracial marriage in the United States. However, I also find that a 20-percentile increase in Black population change causes a 0.31-point decrease in marital integration in 1990—seemingly in contrast to the positive effects on interracial marriage. This pattern can be attributed to the fact that while interracial marriage increases in cities that receive more Great Migration migrants, this increase is an order of magnitude lower than expected given the magnitude of black population change. These results align with related research on how the Great Migration affected economic opportunity and demographic changes, which finds evidence of a white backlash to Black economic progress and "white flight" out of urban centers in destination cities (Derenoncourt, 2022; Boustan, 2010). My results suggest that these coordinated actions to reduce interaction with and economic progress for Black Southern migrants also extended to the marriage market.[5] Because my identification strategies rely on exogenous Black population shifts and variation in residential segregation that are unique to the non-South, my findings are limited to interracial couples and social dynamics outside the South, where there is also a rich history of interracial relationships (Mills, 1981).[6]

Additionally, I decompose these effects and find that the Great Migration increased outmarriage and

[4]I focus on marriage as my primary outcome rather than a broader definition of interracial relationships, in part because marriage is consistently recorded in the population Censuses for the time period I study. The 1990 Census added "unmarried partner" as an option for relationship status, but there is concern that this measure will not cover many cohabiting couples who would instead prefer terms like "boyfriend" or "fiancè" (Manning and Smock, 2005; Kennedy and Fitch, 2012). Additionally, historians have argued that the formality of marriage conveys something substantively different about social integration in relation to more illicit or informal relationships between races, which occur frequently throughout history (Hodes, 1999b). To the extent this affects my estimates, it suggests my findings are a lower bound for the true effects of the Great Migration and residential segregation on interracial relationships more broadly.

[5]One potential concern is that concurrent legal changes might confound the relationships I establish, as legal access to interracial marriage was greatly expanded in the mid-20th century. Some claim this changing legal landscape lifted previously binding constraints, allowing interracial couples who previously desired marriage to realize it (Moran, 2003; Newbeck, 2008). Relatedly, studies of access to same-sex marriage find increases in marriage for same-sex couples following expansion of legal access (Dillender, 2014). In related work, I find little evidence that permanent repeals of anti-miscegenation statutes affect the rate of either interracial marriage or marital integration. See Deal (2024) for more details and results.

[6]In related work, I show that trends in the prevalence of interracial marriages are qualitatively similar across regions, suggesting that understanding trends outside the South may have implications for national trends (Deal, 2024).

decreased same-race marriage for white individuals, while it had opposite effects for Black individuals (perhaps expected given the large increases in Black population). In the aggregate, the prevalence of interracial marriage increased because the white population is much larger. Interestingly, I also find increases in white nonmarriage in response to Black population increases, suggesting some white individuals were induced into remaining unmarried when there was a large influx of Black migrants into their geographic area. When I decompose the effects of segregation, I find increases in same race marriage among both Black and white individuals, and these are offset by decreases in outmarriage and other race marriage among Black individuals.

My findings contribute to the economic literature on interracial marriage. Descriptive research has recorded broad increases in interracial marriage over time and found support for the Becker model of marriage in cross-sectional data (Fryer, 2007). Koh (2024) and Wong (2003) used structural models of the marriage market to analyze the determinants of interracial marriage and the marital welfare benefits from increasing IMRs. In the quasi-experimental realm, Gevrek (2014) studied the effects of anti-miscegenation laws on migration, and found that their repeal impacted the locational distribution of married Black males. Additionally, other work has analyzed the effects of school desegregation, finding no effects on interracial marriage rates (Gordon and Reber, 2017; Shen, 2018). I build on this literature by examining the effects of several historical forces on interracial marriage and marital integration using quasi-experimental methods, and find some evidence that contrasts previous work—while others have discounted the role of social interactions in determining interracial marriage, I find that residential segregation and internal migration both affected interracial marriage and marital integration (Wong, 2003). Additionally, I build on work that broadly considers historical forces that affected the marriage market and how those effects may have translated into economic inequality by studying decisions to enter interracial marriage (Ager et al., 2021; Carlana and Tabellini, 2018).[7]

I also contribute to the growing literature on the effects of the Great Migration. The Great Migration was a mass movement of four million African Americans from the US South to the North and West of the United States (Collins, 2021). There were two "waves" of heightened migration, interrupted by the Great Depression in the 1930s. My design focuses on the Second Great Migration, stretching from 1940 to 1970. Previous research has examined how these movements reshaped the demographics and politics of destination

[7]Concurrent work by Goldman et al. (2023) studies how marriage market tightness and thickness in young adulthood affects rates of interclass and interracial marriage in a more contemporary setting. They use an instrumental variable for marriage market tightness in a neighborhood to find that increased market tightness across race lines does not increase interracial marriage. Then, they use these causal estimates to calibrate a spatial model of the marriage market and simulate the effects of changing residential segregation. They conclude that increases in the share of neighbors from other race groups increase the rate of interracial marriage, but suggest that these responses largely come from smaller changes because fewer additional relationships will be induced by larger shifts in exposure. The present study offers a historical and quasi-experimental approach to measuring the effect of exposure changes on interracial marriage rates that can capture equilibrium effects within cities.

cities, prompting white flight and increasing support for civil rights (Boustan, 2010; Calderon et al., 2022; Shi et al., 2022).[8] I document how the Great Migration increased interracial marriage in destination communities and show that this effect is driven by less segregated cities. In general, the migrants themselves experienced large increases in income (Collins, 2021). However, the Great Migration also had deleterious effects on African Americans in destination communities—Derenoncourt (2022) documents how the Great Migration reduced the upward mobility of Black families in the North as community backlash limited the gains that Black migrants could achieve (see also Boustan (2009)). Additionally, Boustan (2010) finds a "white flight" response to Black in-migration, wherein white families moved out of the urban core to the suburbs. I show that these coordinated actions to reduce interaction with Black migrants and limit their economic success are reflected in the social integration response—while the IMR increased in response to the Great Migration, it did so at an order of magnitude lower than the increase expected under randomization, leading to decreases in the marital integration of these destination cities. Additionally, I evaluate the Great Migration shift-share design using several tools recently developed in the econometrics literature and find strong support for its validity (Borusyak et al., 2021; Goldsmith-Pinkham et al., 2020; Borusyak et al., 2024).

Finally, I contribute to the literature on the effects of residential segregation, which has been studied extensively in economics and social science. Most of this work has focused on economic and political outcomes. Early work on segregation found strong relationships between residential segregation and adverse economic outcomes for Black residents in the later part of the 20th century (Cutler et al., 1999; Collins and Margo, 2000). Several papers have used quasi-experimental designs to evaluate residential segregation and found that higher segregation reduces upward mobility for Black children and lowers academic achievement while increasing Black poverty and overall Black-white income disparities (Ananat, 2011; Chyn et al., 2022). Additionally, recent work has found that segregation impacts crime and political efficacy for Black residents (Ananat and Washington, 2009; Cox et al., 2022). While these papers evaluate the role of segregation in explaining economic and mortality disparities between Black and white residents, I evaluate its role in limiting the amount of social integration between racial groups.

The remainder of this paper proceeds as follows. In Sections 2 and 3, I describe the setting and data, respectively. I outline my empirical strategy in Section 4 and present the main results and robustness tests in Section 5. Section 6 concludes.

[8] Social integration (and fear thereof) is one potential mechanism through which these effects might emerge.

2 Historical Context

2.1 Interracial Marriage

Interracial marriage has a long history in the Americas, with the earliest recorded unions coming from the Colonial Chesapeake (Hodes, 1999b). Throughout this timeframe, interracial couples have faced a variety of legal constraints, popular reactions, and opportunities for success. Historians and sociologists generally agree that interracial relationships were more common during the Colonial Slavery period, when white indentured servants and Black enslaved people shared similar social class and thus had more opportunity to initiate relationships (Gullickson, 2006; Hodes, 1999b). Additionally, as rigid racial boundaries emerged in response to Reconstruction, the rate of interracial marriage reached a low in the first half of the 20th century, before rapidly increasing in the second half (Fryer, 2007; Gullickson, 2006).

Much of the historical scholarship on interracial marriage has focused on the legal history of anti-"miscegenation" laws, which prohibited interracial marriage (or sexual contact). These laws were often borne of fears of racial mixing and the threat that it could pose to rigid systems of racial hierarchy (Hodes, 1999a,b; Pascoe, 2009). Punishments varied greatly—in some states, interracial marriage was a felony, in others a misdemeanor (Browning, 1951). Additionally, some scholars have used the development and application of these laws to study how the legal system conceptualized and defined the boundaries of race in the 19th and 20th centuries (Pascoe, 2009; Berry, 1991; Johnston, 1970).

Additionally, both qualitative and quantitative evidence from specific geographic areas and time periods allows us to examine portraits of interracial couples in a certain context. Mills (1981), for example, focuses on identifying interracial couples in antebellum Alabama and finds many living in both urban and rural areas. He documents long lengths of interracial relationships and suggests that this points to an absence of community pressure against interracial marriage. Studies of newspapers and other media of the time suggest that there was widespread curiosity about interracial marriages, rather than pure antagonism (Sheffer, 2013; Lemire, 2002). While the legal environment indicates some level of hostility towards interracial couples, popular reactions appear to be more mixed.

As the data landscape for studying interracial couples has improved significantly in the past 20 years, several important quantitative patterns have emerged. First, the prevalence of interracial marriages has increased rapidly since the middle of the 20th century (Fryer, 2007). It appears that interracial relationships are descriptively more likely to divorce, but this pattern may be due to compositional differences (Zhang and Hook, 2009). Additionally, newly available data has enabled the study of historical characteristics of this population—in general, they fell in between Black and white same-race couples on most measures of economic success and health (see (Deal, 2024) for more information). However, a question that remains is

what historical forces drove the large changes in interracial marriage over this period.

2.2 Great Migration

The Great Migration was a mass migration of several million Black people from the Southern United States to the North (and West, to a lesser extent) throughout the middle of the 20th Century (Collins, 2021). This movement fundamentally changed the racial composition of the country, leading to large increases in Black urban populations in the North as well as corresponding decreases in the South, especially in rural areas. There is a long tradition of research in economics and history focused on studying the Great Migration (Scroggs, 1917), and topics of interest have ranged from the timing of the Great Migration (Collins, 1997) to the selection of and effects on migrants (Collins and Wanamaker, 2014; Eriksson, 2019; Black et al., 2015) to the effects of the migration on both sending and receiving communities (Boustan, 2010; Black et al., 2015).

One fundamental question relevant to this analysis is the composition of the migrants—who were they and why did they leave the South? With respect to the first question, the most recent evidence suggests that the migration was fairly broad-based, with some minor positive selection on education and human capital (Collins and Wanamaker, 2014). These migrants tended to be both families and individuals, often following the railroad routes that connected their origin community to the North. With respect to the second, explanations tend to emphasize a combination "push" and "pull" factors. Negative shocks to Southern agriculture, including the boll weevil, led to diminished economic opportunity for both Black and white Southerners, which was exacerbated by Jim Crow laws and widespread racial discrimination in the South (Collins, 2021; Lange et al., 2009). These conditions created an environment which many Black Southerners sought to flee. In addition, vibrant labor markets in Northern cities had relatively more economic opportunities, and the widespread distribution of the Northern Black press offered information and encouragement to Black Southerners about the North and their prospects for advancement (Collins, 2021). Finally, previous bouts of migration had created ties that stretched across the North and South, allowing many potential migrants to follow a family member or friend to Northern cities (Derenoncourt, 2022). Importantly, these historical factors will be leveraged to construct an instrument for Black in-migration in Northern cities.

There has been much prior work on the effects these migrants had on their Northern destination communities across fields (and comparatively little about the effects on sending communities). In economics, research has found that the Great Migration caused reductions in wages for some Black workers and upward mobility for Black children in Northern destination cities (Derenoncourt, 2022; Boustan, 2009). Those effects may have emerged in response to the reductions in government investment and increased support for Civil Rights that accompanied Black in-migration (Calderon et al., 2022; Derenoncourt, 2022; Shi et al.,

2022). Beyond this, a large interdisciplinary literature has recorded how coordinated responses to the Great Migration contributed to the rise of residential segregation, shaping the spatial population distribution of many American cities today. Cutler et al. (1999) and Massey and Denton (1993) both discuss how the use of restrictive residential covenants and other forms of racial discrimination emerged in response to the influx of Black people into Northern cities, which then precipitated the rise of residential segregation (Akbar et al., 2022). Additionally, there is evidence of a "white flight" response in which white residents of destination communities moved out of central cities into suburbs when large inflows of Black migrants occurred (Boustan, 2010). These residential and demographic realignments highlight how the Great Migration reshaped the structure of American cities. Beyond these effects, others have studied how the Great Migration shaped music, arts, and culture—many prominent Black artists, musicians, and leaders in the North were descendants of Southern migrants or migrants themselves, and the Great Migration is cited as a contributing factor to the Harlem Renaissance (Wilkerson, 2020).

Comparatively less attention has focused on the social responses to the Great Migration, in part because of a paucity of data on the social interactions of Black and white Americans throughout this time period. However, there is some evidence that the social divide between races was more porous in the North than the South (Grossman, 2011), indicating that migrants might see more interaction with their white neighbors. Importantly, Cook et al. (2023) find that Northern businesses increased their provision of nondiscriminatory services in response to Black in-migration from the Great Migration, suggesting that access to shared public accommodations increased (and potentially offering more opportunities for interracial couples to form). It was not easy by any means—Jackie Robinson's family, for example, moved to an all-white neighborhood in Pasadena, California and faced threats from their new community (Wilkerson, 2020). Despite this, he attended an integrated school and went on to break the color barrier in professional baseball (Wilkerson, 2020). Most related to my study, Fouka et al. (2022) find that the First Great Migration increased intermarriage between European immigrants (who had previously experienced marital segregation from the native population) and native-born US people, because newly arriving Black migrants were defined as a new "other" category, flattening the perceived distance between immigrants and natives. A question that remains to be explored is the Black-white social integration response to the Great Migration—I study this topic using interracial marriage as a proxy for social integration.

I focus on the Second Great Migration (1940-1970) for several reasons. First, the availability of a 5-year residence lookback question in the 1940 full-count Census enables the use of a complete county-level migration matrix to construct my shift-share instrument (Derenoncourt, 2022; Boustan, 2016). This methodological advantage makes it possible to construct a much stronger instrument for Black migration flows, as leveraging pre-1930 migration patterns would require linking across Censuses or coarser definitions of sending and

receiving regions. Additionally, interracial marriage rates are relatively flat across this earlier period (see Figure 1a), suggesting that these earlier migration flows did not induce additional interracial marriages. In contrast, the end of the Second Great Migration coincides with large increases in the prevalence of interracial marriage.

2.3 Segregation

Residential segregation is the spatial separation of different groups and their living spaces, and in the US context primarily focuses on differences between Black and white Americans. Residential segregation has deep roots in the United States, and there are historical accounts of many spatial configurations—one, for example, involves white families living on larger, well-maintained streets while (predominantly) Black servants live in alleys and side streets that allow them to locate near their employers' houses (Massey and Denton, 1993). There are many quantitative measures that capture evenness, isolation, and other aspects of spatial population distribution, but the implication remains similar: segregated groups do not interact with each other often, and may face restricted opportunities due to their isolation (Massey and Denton, 1993). Logan and Parman (2017) use the order of enumeration in Census manuscripts to highlight how segregation was not unique to urban areas, and was already present in the late 19th and early 20th century US. Over time, it seems that residential segregation grew through the first two thirds of the 20th century, and peaked in the 1970s before declining since. The Great Migration, combined with a suite of collective actions that white families used to maintain rigid residential separation, contributed to this growth in the middle of the twentieth century (Cutler et al., 1999). Massey and Denton (1993) provide a vivid account of how restrictive residential covenants, reduced access to homeownership, and discrimination by real estate agents and boards allowed white Americans to maintain segregation despite large inflows of Black migrants.

Economists have studied how this historical pattern has contributed to contemporary racial disparities, identifying increases in racial economic inequality as well as decreases in black political efficacy and economic opportunity (Chyn et al., 2022; Ananat and Washington, 2009; Ananat, 2011). The effects on social interactions have received less attention within economics, though Massey and Denton (1993) describe how extreme social isolation accompanied extreme spatial isolation, where many Black residents of highly segregated areas (what the authors term "hypersegregated") rarely ventured outside of their communities. One can imagine that rarely interacting with people of different races would greatly reduce the chances that one marries outside their race.

Residential segregation has often followed natural sites of demarcation, such as rivers and railroad tracks, which served as coordination devices for whites seeking to demarcate "Black" and "white" areas of geographic

areas (Cutler et al., 1999; Ananat, 2011). Indeed, to quote Massey and Denton (1993), "The expansion of the ghetto generally followed the path of least resistance, slowing or stopping at natural boundaries such as rivers, railroad tracks, or major thoroughfares, and moving toward low status rather than high status areas." Especially as Northern cities went through rapid residential transitions in the latter half of the 20th century, many whites would flee neighborhoods once they reached a certain "tipping point" of Black population share, so the natural demarcation features (e.g., railroads and rivers) of a city allowed for easier coordination and control over the racial population distribution within a city. I will leverage this pattern to identify exogenous variation in residential segregation.

3 Data

My primary data source is the US Decennial Census, conducted every 10 years by the US Census Bureau, and publicly available through IPUMS-USA at the University of Minnesota Population Center (Ruggles et al., 2021, 2023). This population enumeration measures the demographic and economic characteristics of the US population. For 1850-1940, I use the full-count data, which allows me to capture a sizeable sample of interracial couples in those years. Additionally, I use the 1950 1%, 1960 5%, 1970 2%, 1980 5%, 1990 5%, and 2000 5% samples to complete a time series from 1850-2000. For my main empirical exercises, I will focus on the 1970-2000 data, though the full series is used for descriptives.[9]

In 1970 and later years, an individual's race was reported by someone in the household or group quarters. I measure my primary variable of interest, the IMR, by linking the race of the spouse and estimating the fraction of Black and white marriages that are between a Black and white spouse. In this project, I focus on Black-white interracial couples, as the historical forces, legal environments, and popular reactions affecting this population were distinct from those of other interracial couples. In practice, I restrict to Black and white respondents that are identified as the head of the household or the spouse of the household head and drop any respondents for whom the race of spouse is a race other than Black or white.[10] More formally, for a geographic unit g and Census year t, the observed IMR (μ^o_{gt}) is simply the fraction of marriages that are interracial:

$$\mu^o_{gt} = \frac{m_i}{m_i + m_w + m_b}$$

where m_i is the count of interracial marriages, m_w is the count of white marriages (both spouses are white), and m_b is the count of Black marriages (both spouses are Black), all within geographic unit g and Census

[9] While my main time period of interest is the aftermath of the Great Migration and the decline in residential segregation (e.g., the 1970s and 1980s), which coincide with rapid increases in the prevalence of interracial marriage, I provide results for 1990 and 2000 to trace out the time path of these effects.

[10] Because race is one of the required fields in the Census, and the race of the spouse is imputed using the spouse's location in the Census form, I do not have any missingness in these variables.

year t.

While the above outcome captures the IMR, it may not describe meaningful variation in social integration. Imagine two geographic units where the observed IMR is 5%, but 10% of the marriage market is Black and 90% is white in the first, while 50% of the marriage market is Black and 50% is white in the second. Evidently, the first is more integrated than the second, but the observed IMR would be the same. To overcome this problem, I create a measure of expected interracial marriages—the IMR expected under random assignment. It takes the form of a weighted average of the outmarriage rates for four race-gender groups. The IMRs under random assignment at the level of geographic unit g at time t (μ^r_{gt}) begins with finding four key quantities among the married couples (presumably composing the marriage market) in a geographic unit g: $\text{share}_g^{\text{white, men}}$—the percent of the marriage market in geographic unit g that consists of white men, $\text{share}_g^{\text{white, women}}$—the percent of the marriage market in geographic unit g that consists of white women, $\text{share}_g^{\text{black, men}}$—the percent of the marriage market in geographic unit g that consists of Black men, and $\text{share}_g^{\text{black, women}}$—the percent of the marriage market in geographic unit g that consists of Black women. Once I have these quantities, the IMR under random assignment of marriage for a certain group is the fraction of the opposite gender that has the opposite racial identity. For Black men, for example, the predicted IMR would be $\frac{\text{share}_g^{\text{white, women}}}{\text{share}_g^{\text{white, women}}+\text{share}_g^{\text{black, women}}}$. Thus, I calculate this predicted rate for each group and then construct a weighted average for the geographic unit:

$$\mu^r_{gt} = \text{share}_g^{\text{white, men}} \frac{\text{share}_g^{\text{black, women}}}{\text{share}_g^{\text{black, women}} + \text{share}_g^{\text{white, women}}} + \text{share}_g^{\text{white, women}} \frac{\text{share}_g^{\text{black, men}}}{\text{share}_g^{\text{black, men}} + \text{share}_g^{\text{white, men}}}$$

$$+\text{share}_g^{\text{black, men}} \frac{\text{share}_g^{\text{white, women}}}{\text{share}_g^{\text{white, women}} + \text{share}_g^{\text{black, women}}} + \text{share}_g^{\text{black, women}} \frac{\text{share}_g^{\text{white, men}}}{\text{share}_g^{\text{white, men}} + \text{share}_g^{\text{black, men}}}$$

In the numerical example above, the first scenario would have $\mu^r_{gt} = 0.18$ and the latter would have $\mu^r_{gt} = 0.5$. Finally, I construct a measure of marital integration m_{gt} for a geographic unit g and time t that is the ratio of these two measures:

$$m_{gt} = \frac{\mu^o_{gt}}{\mu^r_{gt}}$$

I plot a national time series of these three outcome measures in Figure 1. There are marked increases in both the raw interracial marriage rate and the marital integration rate (which adjusts for population composition) in the latter half of the 20th century. Additionally, the interracial marriage rate expected under random assignment shows a discontinuous jump in 1870 before decreasing throughout the 20th century. The jump is due to data—in the 1850 and 1860 population Censuses, enslaved African Americans were enumerated separately (and merely counted—very minimal demographic information was recorded). Thus, the Black

population is artificially deflated in those years. Afterwards, this quantity declines as the Black population share of the US falls (due in part to mass European emigration). Throughout my analysis, I estimate these quantities at different levels of geography g depending on the level of my independent variable of interest.

Additionally, while the interracial marriage rate offers an intuitive summary measure of the prevalence of Black and white interracial marriages, it is useful to decompose this measure to assess whether the effects I find are coming from increases in interracial marriages or changes on the extensive margin of marriage, for example. To do this, I code four mutually exclusive indicators by race. For Black respondents, these are the outmarriage rate (fraction married to a white spouse), fraction unmarried, fraction married to someone of the same race (married to a Black spouse), and fraction married to someone of another race (for example, Asian). They are defined symmetrically for white respondents. These measures have the desirable property of summing to 1, so decreases in one must be offset by others, allowing me to study "substitution" effects of exposure and segregation.

There are some limitations to this data, especially in the historical Censuses (which aren't the focus of my main results). Before 1960, the race of respondents was assessed by the Census enumerator rather than self-reported by the respondent or the household head. Thus, these racial categorizations reflect the assessment of the Census enumerator and may differ from how respondents would characterize themselves (though that information still likely connotes something valuable about perception of racial discordance between spouses). Additionally, transcription errors (a mistaken "B" for "W" in the race field) could bias results by creating false interracial couples. While there's no reason to believe that these differences vary systematically across my treatment measures, Deal (2024) conducts several additional checks, including linking to race self-reports from Social Security Applications, and finds that the majority of interracial couples, even in historical Censuses, are not transcription errors.

Additionally, because I rely on place of residence rather than place of marriage for computing my expected measure of interracial marriage, there is likely some error in that the individual's relevant marriage market may be elsewhere if they moved after marriage. However, both historical and contemporary measures of internal migration emphasize that the majority of people settle relatively close to where they grow up (Molloy et al., 2011; Sprung-Keyser et al., 2022; Bernard, 2017). Additionally, I replicate the main analyses using only respondents between 16 and 35 to minimize this error and the results are substantively similar.

I use several other datasets to estimate the effects of segregation and the Great Migration. For segregation, I use the sample of 121 non-Southern metropolitan areas for which Ananat (2011) located 19th-century maps needed to construct the railroad placement instrumental variable. This sample of cities was constrained in part by whether maps of railroad placement were available, but Ananat (2011) shows that this sample is similar to the full sample of cities for which segregation measures are estimable in their Table A.

Additionally, data from Cutler et al. (1999) is used to measure metropolitan residential segregation in the years 1970-2000.[11] I also use the sample of 130 non-southern commuting zones (CZs) used in Derenoncourt (2022) for which data on the urban Black population in 1940 and 1970 is collected from the census and from the County and City Data Book 1944–1977 (CCDB), which is used to construct the Great Migration shift-share instrument.[12] Finally, I create commuting-zone-level measures of residential dissimilarity to estimate heterogeneity in the effects of the Great Migration using tract-level racial composition data from the NHGIS.[13]

4 Empirical Strategy

Internal migration and declining residential segregation have greatly increased interaction opportunities for Black and white Americans. Thus, I use two approaches to assess the impact of plausibly exogenous variation in Black in-migration and residential segregation on interracial marriage outcomes. I use a shift-share approach with the Second Great Migration to explore the effects of increasing black population share and internal migration. Then, I use historical railroad placement to instrument for contemporary segregation and evaluate its relationship with interracial marriage and marital integration.[14]

These exercises offer complementary paths to identifying the effects of exposure on interracial marriage, as they rely on different sets of assumptions (and thus fail to identify a causal effect under different states of the world). The Great Migration shift-share design would fail if, for example, there were unobserved determinants of the pre-1940 distribution of Black Southern migrants in the North that were correlated with interracial marriage patterns in the latter half of the 20th century. One potential such determinant is racial attitudes—perhaps pre-1940 Black Southern migrants sought destinations that were more accepting of racial minorities, and those places were more conducive for interracial relationships and marriages 30+ years later.[15] In contrast, the segregation design relies on relevance, independence, and exclusion assumptions. While relevance is empirically testable, independence would fail if, for example, railroad density was caused by high local governance capacity and this quality was also correlated with interracial marriage outcomes.

[11] They provide data on the residential dissimilarity index, which is calculated as follows for city c:

$$\text{Seg}_c = \frac{1}{2} \sum_{n \in c} \left| \frac{\text{Black}_n}{\text{Black}_c} - \frac{\text{White}_n}{\text{White}_c} \right|$$

where Black_n and White_n are the population counts of Black and white people, respectively, in sub-city geographic area n (in this case Census tracts), while Black_c and White_c are population counts for Black and white people over the entire city c.

[12] A list and map of these commuting zones is available in Appendix B of Derenoncourt (2022). They are broadly distributed across the non-Southern United States.

[13] For the 1970 Census, I use county-subgroup level racial composition data because the tract data has low coverage.

[14] Appendix Figure A2 displays the reduced form relationships between these instruments and the interracial marriage rate in 1990.

[15] I provide evidence against these violations by testing the relationship between my instrument and pre-1940 IMRs. Effects are small and insignificant, providing evidence against differences in unobserved variables that impact IMRs.

Additionally, exclusion would fail if railroad density affected interracial marriage through channels other than residential segregation, such as increased marriage market access. In sum, while both designs rely on inherently untestable assumptions, they are sufficiently differentiated that the failure of an assumption for one design does not annul the other.

4.1 Great Migration

The Second Great Migration, one of the largest instances of internal migration in US history, consisted of more than 4 million African Americans who moved North in search of opportunity outside of the heavily segregated Jim Crow South. It offers an opportunity to examine the effects of exogenous increases in Black population share on marriage markets and marital integration in non-Southern areas. I follow Derenoncourt (2022) by measuring this population change at the Commuting Zone (CZ) level and define the Great Migration Black population change as the 1940 to 1970 increase in urban Black population as a share of initial 1940 urban population:

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

where $b_{\text{urban},CZ}^{t}$ is the total Black population in all sample cities in commuting zone CZ in year t. As Derenoncourt (2022) outlines, this distribution is highly right-skewed, so I instead use the percentile function of the increase (GM_{CZ}) as the key independent variable for the effects of the Great Migration. Thus, the naive OLS equation takes the following form:

$$\text{OLS: } y_{CZ} = \alpha + \beta GM_{CZ} + X'_{CZ}\rho + \varepsilon_{CZ} \tag{1}$$

The coefficient β from equation 1 represents the OLS estimate of the effect of GM_{CZ}, the commuting zone level percentile of Black population increase 1940-1970, on my three interracial marriage outcomes, conditional on the controls outlined above. However, the relationship between this variable and interracial marriage and marital integration cannot be interpreted as causal because many correlates of Black population change could drive this relationship (for example, the racial attitudes of receiving commuting zones). Thus, I instead use a shift-share approach, which has been used previously in the Great Migration context (Derenoncourt, 2022; Boustan, 2010). The intuition with a migration shift-share is that migration decisions are often due to a combination of "push" and "pull" factors of both origin and destination locations. Additionally, Black southern migrants tended to move where previous migrants from their communities had settled. Thus, when "pushes" from Southern counties cause outmigration, some component of the migration destination can be predicted with the pre-existing loctional distribution of Black Southern migrants. These

shocks to "push" factors are plausibly exogenous with respect to shocks to "pull" factors. Interacting exogenous shifts in migration from origin locations with historical migration patterns in destination locations yields a potential instrument for Black population changes in the North.

Shift-share designs can be formulated as a set of assumptions about the exogeneity of the shifts, shares, or both to yield a parameter of interest (Goldsmith-Pinkham et al., 2020; Borusyak et al., 2021; Adão et al., 2019). In my setting, I use shocks to Southern counties (push factors) as my "shifts" and the distribution of pre-1940 Southern migrants as my "shares." Because early Black Southern migrants were not choosing their destinations at random, these shares do not yield a path to identification (Derenoncourt, 2022). However, the shocks to Southern counties are plausibly exogenous to unobserved determinants of interracial marriage rates in Northern cities, and it is this design on which I rely for identification.

More formally, following Derenoncourt (2022) and Borusyak et al. (2021), I rely on two assumptions to identify the effects of the Second Great Migration on interracial marriage rates:

1. Conditional on baseline characteristics, the instrument for Black population increases is orthogonal to omitted characteristics that are correlated with changes in interracial marriage after 1940:

$$\mathbb{E}[\widehat{GM}_{CZ} \times \tilde{\varepsilon}_{CZ} | X'_{CZ}] = 0$$

2. A shock-level law of large numbers applies—there are sufficient independent shocks, each with sufficiently small average exposure (weight in the shift-share design).

While Assumption (1) is inherently untestable, I provide corroborating evidence by testing whether the instrument is associated with pre-Great Migration interracial marriage rates (in the spirit of testing pretrends in a difference-in-differences design). Appendix Table A6 displays results from these regressions—in all cases the coefficients are insignificant and small in magnitude. Additionally, they can be seen as a figure in Appendix Figure A3. Thus, the Migration does not predict interracial marriage rates 1900-1940.[16] Assumption (2) is supported by using shocks to over 1200 origin counties rather than a state-level analysis, enabled by Derenoncourt (2022)'s use of complete-count Census data. Thus, I rely on these two assumptions to identify the effect of the Second Great Migration on interracial marriage outcomes in the North with a shift-share approach.

The instrument is constructed as follows: I replace the numerator in the black population change measure

[16] Additionally, Derenoncourt (2022) highlights that a key component of this assumption is that shocks to the South are uncorrelated with shocks to the North. She provides evidence that identification with this instrument is not the result of correlated shocks to origin and destination locations by constructing alternative instruments and conducting an overidentification test.

above with the predicted, instead of observed, increase in the Black population:

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

where $\hat{\Delta b}_{\text{urban},CZ}^{1940-1970}$ is the predicted increase, defined as follows:

$$\hat{\Delta b}_{\text{urban},CZ}^{1940-1970} = \sum_{j \in S} \sum_{c \in CZ} \omega_{jc}^{1935-1940} \cdot \hat{m}_j^{1940-1970}$$

and $\omega_{jc}^{1935-1940}$ is the share of recently migrated pre-1940 Black southern migrants from county j living in city c in 1940.[17]

The term $\hat{m}_j^{1940-1970}$ is the predicted Black migration from southern county j, which comes from the sum of fitted values of decadal predictions of southern county net migration using lagged southern economic predictors of migration. This prediction stage uses economic characteristics of southern characteristics (such as reliance on cotton, or WWII spending per capita) to predict how many Black people leave each Southern county j each decade, which are then summed to compute $\hat{m}_j^{1940-1970}$, the aggregate predicted Black outmigration for Southern county j.[18]

These predicted values are the "push" component of the shift-share instrument, and are interacted with the distribution of pre-1940 Black Southern migrants (the "pull") to generate a predicted increase in Black population for destination cities in the North. Then, after computing predicted increases in the northern CZ-level Black population, I use the percentile of predicted increases, $\widehat{GM}_{CZ}$, to instrument for observed increases in the Black population.

The estimating equations are as follows:

[17] These shares are computed using the IPUMS version of the complete count 1940 Census (Ruggles et al., 2021; Derenoncourt, 2022). The 1940 Census required respondents to report their 1935 place of residence, so I classify Black Southern migrants as all Black Southerners whose place of enumeration in 1940 (whether in the South or not) does not match the Southern county of residence (j) reported in 1935. Among this population, the shares are defined as the ratio of Black Southern migrants from county j who are enumerated in a northern city c in 1940 over all Black Southern migrants from county j.

[18] More formally, $\hat{m}_j^{1940-1970} = \sum_{t=1950}^{1970} \widehat{\text{mig rate}}_{jt} \times \text{Black pop}_{jt}$, where decadal predictions of net migration rates from each Southern county ($\widehat{\text{mig rate}}_{jt}$) come from the following regression:

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

As Derenoncourt (2022) discusses, under the assumption that economic shocks to Southern counties are exogenous to receiving city characteristics, predicting outmigration using these factors is a pure prediction problem. Thus, she employs least absolute shrinkage and selection operator (LASSO) methods to select the set of lagged predictors, Z'_{jt-10}. The initial set of predictors that is selected from comes from Boustan (2010): percent acreage in cotton, percent tenant farms, share of labor force in agriculture, indicator for being in a tobacco-growing state, interaction between tobacco growing indicator and share of labor force in agriculture, WWII spending per capita, share of the labor force in mining, indicator for being a mining state, and interaction between mining state indicator and share of labor force in mining. Using LASSO to select the predictors for each decade, the regression predicts Southern county-level net migration figures from Boustan (2010, 2016). Then, the predicted values from these regressions are used for each decade and summed to construct the predicted outmigration from each Southern county j over the course of the Second Great Migration: $\hat{m}_j^{1940-1970}$. The main text and appendices of Derenoncourt (2022) contain more detail about this procedure, including which predictors were selected for each decade.

$$\text{First Stage: } GM_{CZ} = \gamma + \delta \widehat{GM}_{CZ} + X'_{CZ}\rho + \varepsilon_{CZ} \tag{2}$$

$$\text{Reduced Form: } y_{CZ} = \tilde{\alpha} + \tilde{\beta} \widehat{GM}_{CZ} + X'_{CZ}\tilde{\rho} + \tilde{\varepsilon}_{CZ} \tag{3}$$

The first stage equation 2 estimates the first stage relationship between the instrument, the percentile of predicted Black population change $\widehat{GM}_{CZ}$, and the percentile of actual Black population change GM_{CZ}. In equation 3, $\tilde{\beta}$ represents the reduced form impact of the Great Migration instrument on observed IMR, marital integration, and IMR expected under randomization. All specifications include the control vector X'_{CZ}, which consists of census region fixed effects and the share of the urban population made up of 1935–1940 Black southern migrants. For my main results, I report the reduced form ($\tilde{\beta}$) and 2SLS ($\tilde{\beta}/\delta$) coefficients outlined above, as well as OLS (β) coefficients from Equation 1. Additionally, I estimate heterogeneity in the 2SLS effects using commuting-zone-level measures of residential dissimilarity.

4.1.1 Shift-Share Checks

While this shift-share design (and its variants) have been extensively used in previous literature to study the effects of the Great Migration (Derenoncourt, 2022; Boustan, 2009, 2010; Chyn et al., 2022; Fouka et al., 2022), many recent methodological advances allow further study of this design and its validity (Borusyak et al., 2021, 2024; Goldsmith-Pinkham et al., 2020). First, given that the path to identification runs through exogenous shocks in this context, I can consider the ideal shock-level experiment in this setting and then evaluate the variation relative to that benchmark. I described above several potential confounders that might bias the relationship between observed Black population change and interracial marriage outcomes. To account for these confounders, the ideal experiment would involve randomly assigning Black outmigration to Southern counties, which would flow to Northern cities based on previous migrant networks and then result in a predicted change in Black population share for each Northern receiving area by summing over all Southern counties. Because this outmigration would be randomly assigned, it would be unrelated to the interracial marriage outcomes of Northern receiving cities, even if the shares are endogenous. Thus I instrument for observed population increases with predicted population increases and feel confident the exclusion restriction is satisfied. Additionally, the large number of Southern counties (over 1,000 in my context) yields sufficiently small average exposure for each shock so the pooled results are not driven too much by any one outmigration event.

In reality, of course, outmigration is not randomly assigned. Instead, I use outmigration from each Southern county predicted purely based on Southern economic factors (share of workforce in manufacturing, WWII spending per capita, etc.). Because this exercise isolates variation in outmigration that is purely due

to economic variables in the South, it should remain exogenous to Northern interracial marriage outcomes and confounders that might bias the results. Additionally, I include two unit-level controls to further isolate exogenous variation: census region fixed effects and the total share of the 1940 urban population made up of recent Black migrants from any southern county (Derenoncourt, 2022). These controls isolate the variation coming from Southern county shocks rather than Northern city characteristics by making the instrument only leverage residual variation conditional on region and pre-1940 migration patterns. Additionally, the instrument uses shares measured from 1935-1940 migrants to avoid concerns that the shares are shifting endogenously with the shocks (Borusyak et al., 2024). Because these shares were measured during a period of relatively low migration between the First and Second Great Migrations, the assumption that the shocks are not affecting the shares is plausible.

Recent work has emphasized that additional checks may be necessary in scenarios where the unit-level weights do not sum to 1 (Borusyak et al., 2021, 2024). In these cases, the shift-share instrument is no longer the weighted *average* of the shocks, but instead the weighted *sum*. Thus, if certain units have systematically higher weights, then even with random shocks, they would get systematically higher levels of the instrument, introducing endogeneity. In my setting, this would take the form of network centrality—if certain Northern cities, say Detroit and Chicago, tended to receive large shares of previous migrants from many Southern counties, then even randomly assigned outmigration would systematically propagate to those places. Indeed, my weights ω_{jc} do not sum to 1, and instead can be any scalar ≥ 0 because their sum is over ~ 1200 Southern counties. To give an intuition for what this captures, say that every Southern county sent 10% of its migrants to Detroit. If there were exactly 1200 counties, then $S_c = \sum_{j=1}^{1200} \omega_{jc} = 1200(0.1) = 120$, capturing that Detroit is very exposed to Southern outmigration shocks through its migrant network. Borusyak et al. (2024) highlight the solution of controlling for the sum of incomplete shares, as this will force the comparison to only exploit residual variation from Southern shocks that is unrelated to the network centrality of the receiving area. While I already control for the total share of the 1940 urban population made up of recent Black migrants from any southern county following Derenoncourt (2022), which offers a coarser measure of this share-related average exposure, I also control for the sum of shares S_c as a robustness check. Appendix Table A19 displays these results and shows that the coefficients for the effect of Black population change on interracial marriage rates 1980-2000 are substantively unchanged and remain statistically significant when controlling for the sum of shares.

Additionally, Borusyak et al. (2024) highlight the value of describing variation in the shocks. I present the distribution of predicted Black Southern outmigration by county in Appendix Figure A5. The mean predicted Black outmigration per county is approximately 3,000 people, and the standard deviation is approximately 12,000. These predicted values (based on a model using only Southern economic factors) represent the shocks

or shifts in my shift-share design. Additionally, I describe the distribution of importance weights (or mean average exposure for each Southern county shock—computed as $s_j = \frac{1}{N}\sum_{c=1}^{130}\omega_{jc}$) in Appendix Figure A6. These importance weights are all small, demonstrating that the design is not driven by a small number of highly weighted shocks. Additionally, the inverse Herfindahl index of these importance weights ($\frac{1}{\sum_j s_j^2}$) gives an "effective number of shocks"—in my setting this quantity is 60.39, offering reassurance that the findings are not driven by a few counties.

Finally, Adão et al. (2019); Borusyak et al. (2021) highlight that valid inference in shift-share settings requires adjusting for the "exposure" design, which must account for the fact that units with similar shares will mechanically have similar shocks and may have correlated error terms given the exposure to common shocks. This is especially difficult in my setting given that the independent variable (percentiles of Black in-migration) is a nonlinear transformation of the standard shift-share. Derenoncourt (2022) tackles this issue with the Great Migration design using a placebo permutation test and finds strong evidence that effects are unlikely to be driven by noise and remain statistically significant (Borusyak et al., 2021).

It is also worthwhile to assess what variation is composing my shift-share instrument and driving my results. Recent work by Goldsmith-Pinkham et al. (2020) formulates shift-share designs as a "pooled exposure design" in which the "shares measure differential exogenous exposure to shocks," which in my case are the shares of Black southern migrants living in a southern county in 1935 that report residing in a northern commuting zone in 1940. Following Goldsmith-Pinkham et al. (2020), I decompose my instrument into Rotemberg weights to assess what variation in the data is driving the estimates. Tables A20, A21 detail summary statistics about the Rotemberg weights. A majority of the weights (99%, Table A20) are positive and the weights are highly correlated with predicted migration flows from southern counties. The correlation between Rotemberg weights and predicted migration flows is 0.793 (Table A21) which means that the migration flows predicted by southern "push-factors" explain about 63% of the variation in the weights. Conversely, the weights are weakly correlated with variation in historical migration shares ($Var(z_k)$) with a low correlation coefficient of 0.158 (indicating they explain less than 3% of my variation) . This indicates that my identification is primarily driven by the shocks to Southern counties as opposed to historical migration shares, which is desirable because historical migration patterns to the North were much more likely to endogenous to potential interracial marriage outcomes in the North than economic shocks to Southern counties.

4.2 Segregation

Following prior literature, I measure segregation using the index of dissimilarity (Chyn et al., 2022; Ananat, 2011):

$$\text{Seg}_c = \frac{1}{2} \sum_{n \in c} \left| \frac{\text{Black}_n}{\text{Black}_c} - \frac{\text{White}_n}{\text{White}_c} \right|$$

where Black_n is the Black population in tract n, Black_c is the Black population in city c, and White_n and White_c are defined analogously for White population. This measure can be thought of as the share of the Black population that must relocate to achieve complete integration. It ranges between 0 and 1, indicating complete integration and segregation, respectively. To estimate the effects of segregation on interracial marriage, I could use a naive OLS regression of the following form:

$$\text{OLS: } y_c = \alpha + \beta \text{Seg}_c + X_c' \rho + \varepsilon_c \tag{4}$$

The coefficient β from equation 4 represents the OLS estimate of the effect of Seg_c, the city-level dissimilarity index, on two interracial marriage outcomes, conditional on the controls outlined above. However, interpreting the direct effects of segregation on interracial marriage is difficult, as there are many factors that might simultaneously cause segregation and have effects on IMRs—for example, local government policies, labor market geography, or racial attitudes. To address this potential endogeneity, I build on prior work by Ananat (2011), which constructs an instrumental variable (IV) for contemporary segregation in Northern cities using the historical placement of railroads. The basic intuition is that when Black migrants arrived in a city, preexisting railroad networks facilitated the division of cities into predominantly single-race areas through coordinated behaviors by white residents. To quote Massey and Denton (1993), "The expansion of the ghetto generally followed the path of least resistance, slowing or stopping at natural boundaries such as rivers, railroad tracks, or major thoroughfares, and moving toward low status rather than high status areas."[19]

To measure this activity, Ananat (2011) uses a railroad division index (RDI):

$$\text{RDI}_c = 1 - \sum_{r \in c} \left(\frac{\text{area}_r}{\text{area}_c} \right)^2$$

where r indexes "railroad neighborhoods" (the regions constructed by the intersection of historical railroad lines), area_r is the area of land in railroad neighborhood r, and area_c is the total area of land in city c. This captures the amount of subdivision generated by railroad track placement, so cities that had a greater

[19] Methodological concerns about use of rivers and other topographic figures motivates the use of railroad tracks in place of those sources of variation (Rothstein, 2007).

number of delineated areas had more potential for segregation. This measure ranges from 0 (representing a city with 1 railroad neighborhood) to 1 (representing a city with a nearly infinite number of railroad neighborhoods).

I follow Ananat (2011) and Chyn et al. (2022) in using RDI_c as an instrument for residential segregation and estimate using two-stage least-squares (2SLS). Additionally, I test the robustness of my results to controlling for historical railroad track per square kilometer, a measure that is correlated with RDI and could affect outcomes independently. Chyn et al. (2022) choose not to control for this, noting issues with the interpretation of linear IV estimates when controlling for covariates and an outlier in their data that causes substantial uncertainty across estimates. In general, my results are substantively unchanged whether controlling for this variable or not.

The main estimating equations take the following form:

$$\text{First Stage: } \text{Seg}_c = \gamma + \delta \text{RDI}_c + X_c'\rho + \varepsilon_c \tag{5}$$

$$\text{Reduced Form: } y_c = \tilde{\alpha} + \tilde{\beta} \text{RDI}_c + X_c'\tilde{\rho} + \tilde{\varepsilon}_c \tag{6}$$

The first stage equation 5 estimates the relationship between the instrument, the RDI index RDI_c, and the contemporary segregation of an area, measured with the dissimilarity index, Seg_c. In equation 6, $\tilde{\beta}$ represents the reduced form impact of the RDI instrument on the observed IMR and marital integration, respectively. Some specifications include the control vector X_c', which consists of historical railroad track length per square kilometer. For my main results, I report the reduced form ($\tilde{\beta}$) and 2SLS ($\tilde{\beta}/\delta$) coefficients outlined above, as well as OLS (β) coefficients from Equation 4.

More formally, this design relies on three crucial assumptions to identify the causal effect of segregation on interracial marriage outcomes:

1. The RDI serves as a valid instrument for the contemporary segregation, meaning it has a strong relationship with the causal variable of interest.

2. The RDI instrument is independent of potential outcomes (in this case potential rates of interracial marriage at the city level).

3. The RDI instrument only affects interracial marriage outcomes through segregation—the exclusion restriction.

Assumption (1) is equivalent to the strength of the first stage—I provide evidence in the results that the RDI instrument is strongly predictive of residential segregation, and the first-stage F-statistic for 1990 is 24.5.

Other work has also verified the strength of this relationship (Ananat and Washington, 2009; Ananat, 2011; Chyn et al., 2022; Cox et al., 2022). Assumption (2) is inherently untestable, but I provide some evidence by examining the relationship between the instrument and placebo interracial marriage outcomes in 1930, before the segregation differences between high RDI and low RDI cities emerge. Appendix Table A5 displays these results for my two main outcomes with and without controls for historical railroad placement. These coefficients are all insignificant and small in magnitude, suggesting that prior to segregation differences, interracial marriage outcomes across places with high and low RDIs were similar. In terms of magnitude, going from a city with 1 railroad neighborhood to infinite railroad neighborhoods is associated with 0.25 fewer interracial marriages per 1000 marriages. Given, the prevalence of interracial marriage at the time is rather low so this effect would be large in percent terms, but the coefficients are an order of magnitude smaller than those I find when examining outcomes later in the 20th century.

Assumption (3) states formally that historical railroad placement measured via RDI_c is only related to interracial marriage outcomes through segregation and is untestable. This identification rises in part from geographic factors like hill placement and distance that may have determined both the extent of railroad track development in a city and the layout of that track (Chyn et al., 2022). I present evidence that my results are robust to the inclusion of historical railroad track length as a control as support for this assumption.

Together, these assumptions enable me to identify the causal effect of segregation on interracial marriage outcomes, using the historical placement of railroad tracks as an instrument.

5 Results

5.1 Great Migration

The Great Migration was a mass movement of millions of African Americans who fled the restrictive racial hierarchies and lack of economic opportunities in the South. When they moved to their new communities, they provide an opportunity to see how marriage markets respond to an influx of racial minorities—does the IMR and marital integration of these communities increase in response?

Figure 2 displays the relationship between commuting-zone-level Black population change from 1940-1970 and three interracial marriage outcomes measured in 1990. Panel A displays the relationship between ventile of Black population change and the observed IMR. There is a linear and positive relationship between the two outcomes—it appears that higher Black population change is associated with higher rates of interracial marriage. Panel B displays the relationship between ventile of Black population change and marital integration—which deflates the observed IMR by the IMR expected under randomization. Strikingly, it

appears that this outcome is negatively associated with the ventile of Black population change. Panel C offers a potential explanation, showing that the IMR under randomization is increasing in ventile of Black population change—and that the slope of this relationship is much higher than that observed in Panel A. As a result, while the observed IMR increases in Black population change, the random rate increases at a greater magnitude, and thus the marital integration of those communities that had higher Black population change is lower.[20] Appendix Tables A14, A15, and A16 display the relationship between observed Black population increase and each of these outcomes, confirming the direction of the relationship established in Figure 2 across four decades. In 1990, a 10 percentile increase in observed black population increase is associated with approximately 0.7 additional interracial marriages per 1000 marriages. However, this increase is also associated with 12.1 additional expected interracial marriages per 1000 marriages. As a result, this level of Black population increases is associated with 0.03 points less marital integration.

However, this variation is not necessarily exogenous—there may be factors that would bias the relationship between Black population change and 1990 interracial marriage outcomes. As a result, I use the shift-share approach introduced in Derenoncourt (2022) to instrument for Black population change. Table 1 displays the first-stage relationship between the predicted Black population change and actual Black population change—there is a strong relationship between the two when controlling for region dummies and Black Southern Migration from 1935-1940 (F-statistic=43.56).[21]

Then, Table 2 displays the 2SLS relationship between instrumented Black population change and interracial marriage outcomes across four decades (1970-2000), allowing us to trace out the emergence and growth of these effects over time. Each column reports results for a different Census year. Panel A displays results for the observed IMRs. There is a positive and significant effect on IMRs across the four decades. In 2000, a 20-percentile increase in Black population change caused an additional 2.64 interracial marriages per 1000 marriages. Panel C displays the effects of Black population change on the IMR expected under random assignment. Again, there is a significant positive effect across decades. Indeed, this effect grows across decades, doubling or more every 10 years. One possibility is that the emergence of some interracial marriages may have spillover effects on future interracial marriages. For example, if younger people observe interracial couples, that could erode social norms against interracial marriage and make them more likely to consider a partner of a different race (Bursztyn et al., 2020). Regardless, the magnitude of this change in the prevalence of interracial marriage is much smaller than that expected under randomization to

[20]The discontinuity in Panel (c) can be attributed to the right skew of the distribution of black population change in destination cities.

[21]My first stage is stronger than that reported in Derenoncourt (2022) because I omit two controls that she includes in her specifications—education upward mobility in 1940 and the share of the labor force that is employed in manufacturing. In her setting, these controls are relevant for the primary outcome of upward mobility. In my setting, they are unnecessary for identifying effects on interracial marriage, and may instead serve as bad controls, if (for example) Black people who are more likely to interracially marry choose their destination due in part to its labor market or educational opportunities.

spouses. For example, in 1990, a 1-percentile increase in Black population changes causes an increase in IMR expected under randomization that is 27 times larger than the increase in observed IMR. In terms of the standard deviations of both variables, this increase is still 70% larger. Panel A displays the effects on marital integration—there is a significant negative relationship between Great Migration induced Black population change and the marital integration of those communities, corresponding to the discrepancy in magnitudes above. In 1990, a 20-percentile increase in Black population change caused a 0.31 point decrease in marital integration. Another possible interpretation is that because Black Southern migrants follow primarily Black migration networks (and my instrument relies on this fact for identification), they may have lower interracial marriage rates on arrival because they have more within-race ties in their destination community than unattached migrants.

Additionally, I can further decompose these effects by coding outcome variables from four mutually exclusive indicators for each race—unmarried, same race married, opposite race married, and other race married. Table 4 displays IV coefficients on these outcomes. I find that higher rates of Black population change caused increases in outmarriage rates for white individuals. However, when I divide the outmarriage rate by the rate expected under random assignment to spouses, these increases in outmarriage are dwarfed by those expected, resulting in a negative effect on the integration of these marriage markets. Interestingly, I also find increases in nonmarriage among the white population, suggesting that some white people are induced into remaining unmarried rather than marrying across race when the Black population in their commuting zone increases. These increases in outmarriage and nonmarriage are offset by decreases in same race marriages.

For Black populations, I find increases in same race marriage that are offset by decreases in outmarriage and marriage to other races (non white or Black). These effects are perhaps expected given the increase in Black population. However, in the aggregate, the prevalence of interracial marriage increases because the white population is much larger. Additionally, I find no effects on the extensive margin of marriage for Black individuals, suggesting the increase in marriage market thickness did not induce additional participation in the marriage market among Black indviduals.

Comparing the results from IV and OLS analyses, the magnitudes and direction of coefficients are broadly similar. In 1990, the instrumented effect of an increase in the Black population change is 11% smaller than the OLS relationship. Additionally, effects on marital integration are 7% smaller when instrumented. Finally, the effects on expected interracial marriage are 35% larger when instrumented. However, none of the point estimates are statistically distinct from each other. These differences might emerge from accounting for endogeneity that biases the OLS estimates, but the concordance of sign and (broadly) magnitude across OLS and IV approaches lends confidence that the true causal effect of black population accords with my

results. I also estimate results among 16-35 year olds (presented in Appendix Table A17) to address potential issues with differences between place of enumeration and the relevant marriage market and proxy for the flow of new marriages rather than the stock of marriages. These results are qualitatively and statistically similar to the main results, allaying concerns about these issues.

In Figure 3, I plot the reduced form relationship between percentile of predicted Black migration on the observed interracial marriage rate over time. This figure, in the spirit of an event study, confirms that there are not differential trends in interracial marriage outcomes between places that received more or less Great Migration migrants prior to the Second Great Migration. Additionally, it shows how the effect size grows over time after 1970.

Additionally, I examine heterogeneity in effect sizes using CZ-level measures of residential segregation, measured by the dissimilarity index. Figure A4 displays the CZ-level distribution of the residential dissimilarity index in 1990. There is significant variation between 0.2 and 0.8, and I leverage this variation to examine heterogeneity in Great Migration effects across the median of this distribution.[22] Table 3 displays 2SLS coefficients for high segregation CZs in Panel A and low segregation CZs in Panel B, highlighting how in 1970-2000, the effects are driven by low-segregation destination CZs, with coefficients substantively larger and insignificant results among high-segregation cities. This pattern corroborates a story of social interaction influencing interracial marriage and highlights how segregation may have limited the social integration response to the Great Migration.

Overall, these results reinforce that the observed patterns in Figure 2 correspond to significant causal effects on interracial marriage outcomes when instrumenting Black population change. I find that Great Migration induced Black population change increased both the observed IMR and the IMR expected under randomization, but decreased the marital integration of the communities that received these migrants. Additionally, I find that these effects are substantive and significant from 1970-2000. It should be noted that it is not necessarily the migrants themselves who are marrying in the "extra" interracial marriages formed—indeed, due to the timing of the Great Migration and when my interracial marriage outcomes are measured, it seems unlikely that this is the case. Instead, the effect could be driven by the children of these new migrants or less measurable changes in racial attitudes and social norms that result from Black population increases. For example, Calderon et al. (2022) find that the Great Migration increased support for Civil Rights and the Democratic Party in destination cities—they also find improvements in racial attitudes among whites, which may have increased the probability of entering an interracial relationship.

Additionally, one further question is the composition of these marginally induced interracial couples. Do

[22]Appendix Table A23 reports means of demographic and economic characteristics for above/below median segregation commuting zones. There are no significant differences in white share, share married, age, or occupational income across these groups. However, there is a significant difference in Black share.

they consist of Southern migrants? Are they younger? While I am unable to identify the "extra" interracial couples induced by the Great Migration, I take a step in this direction by regressing the predicted migration instrument on several demographic characteristics of interracial couples in receiving CZs. If, for example, the "extra" interracial couples tended to be younger, I might find a negative relationship between average age of interracial couples in CZ and the predicted migration to that CZ, as they would pull down the average. Appendix Table A22 displays the results from running this regression using indicators for being born in the South, having a birthplace that differs from reported state of residence, age, occupational income score, and number of children among the population of interracial couples in 1990. All of these regressions return insignificant and substantively small results, suggesting that the "extra" interracial couples did not differ demographically from other interracial couples on these dimensions. Alternatively, because the effect size on the prevalence of interracial marriage is not very large, it is possible that this method is not well-powered to detect changing composition of interracial couples.

5.2 Segregation

One factor that may impact the IMR is the opportunity that people of different races have to interact. Residential segregation could restrict this opportunity, and has been decreasing over the past 50 years (Chyn et al., 2022). Beyond segregation in people's residences, residential segregation is also closely related with the geographic location (and segregation) of spaces like churches, schools, and social locations—where one might meet their partner. As US residential segregation has declined dramatically in the past 50 years—from a dissimilarity index of 0.73 in 1950 to 0.49 in 2000—it is possible that this shift may have affected interracial marriage rates (see Appendix Figure A1). I investigate whether the large increase in IMRs might be related to the decrease in residential segregation using plausibly exogenous cross-sectional variation.

The OLS relationship between residential segregation (measured by the dissimilarity index) and observed IMR—presented in Appendix Tables A9 and A10—suggests that a negative, though statistically insignificant, relationship exists in 1980 and 1990, and this estimate becomes much larger and more precise in 2000. Moving from a completely unsegregated to a completely segregated city (or from 0 to 1 on the dissimilarity index) is associated with 21.9 less interracial marriages per 1000 marriages. Throughout the period, higher residential segregation is associated with lower marital integration as well.

There are many factors that might bias the relationship between residential segregation and interracial marriage, so I use the strategy introduced in Ananat (2011) to isolate exogenous variation in residential segregation using the placement of railroad tracks. Table 5 displays the first stage relationships between the RDI instrument and the dissimilarity index (a measure of residential segregation) from 1970-2000. This

relationship is strongly positive and statistically significant, with similar magnitude across the four decades. The 1990 first-stage F-statistic is 24.5.[23] Additionally, Appendix Table A1 reports these first stage results with an additional control for track length, and these results are very similar.

Table 6 displays the instrumented 2SLS relationship between the residential dissimilarity index and the observed IMR from 1970-2000. Each column reports results from a different regression equation. I find that residential segregation causes lower IMRs in 1990 and 2000. In 2000, a standard deviation increase in the dissimilarity index caused 3.47 less interracial marriages per 1000 marriages. Panel B displays the effects of residential segregation on marital integration. I find that increased residential segregation decreases the marital integration of that community in 1980-2000, and that this effect grows over time. In 2000, a standard deviation increase in the dissimilarity index causes a 0.61 point decrease in marital integration. Appendix Tables A2 and A3 display these results when controlling for track length, and they are very similar. A back of the envelope calculation suggests that in a counterfactual perfectly integrated world, the black-white interracial marriage rate in the 2000 Census for my sample of 95 non-Southern cities would be 30 per 1000 black and white marriages, as opposed to the 18 per 1000 that is observed. Comparing the effects from the OLS specifications to the IV estimates, I find that the IV estimates are generally larger, though not statistically distinct from the OLS estimates. This broad agreement aligns with the findings of Cutler et al. (1999), who find that OLS and IV estimates of the effects of segregation are very similar using a related (but distinct) topographical instrument. Any discrepancies may reflect that cities that were more segregated differed in unobservable ways that were conducive to interracial relationships, or that there is some measurement error in segregation that is accounted for with the instrument. I also estimate results among 16-35 year olds (presented in Appendix Table A4 to address potential issues with differences between place of enumeration and the relevant marriage market and proxy for the flow of new marriages rather than the stock of marriages. These results are qualitatively and quantitatively similar to the main results, albeit with lower statistical significance, allaying concerns about these issues.

Additionally, I can further decompose these effects by assessing four mutually exclusive outcome variables for each race—fraction unmarried, same race married, opposite race married, and other race married. Table 7 displays IV coefficients on these outcomes. I find that higher residential segregation had no effect on white outmarriage rates. However, when I divide the outmarriage rate by the rate expected under random assignment to spouses, I find a negative effect on the integration of these marriage markets. Interestingly, I also find decreases in nonmarriage among the white population and in marriage to other races, which are offset by increases in same race marriage. These results suggest that in more highly segregated places, white

[23]The segregation data comes from Cutler et al. (1999) and this data is only available for some of the 121 cities used by Ananat (2011) in years other than 1990, so the sample size changes by year.

individuals are much more likely to marry within race. For Black populations, I find large increases in same race marriage that are offset by decreases in outmarriage and marriage to other races (non white or Black). Both white and Black individuals seem to respond to residential segregation by becoming more endogamous.

Thus, I find that residential segregation does have a negative causal effect on interracial marriage and marital integration using the placement of railroads as an instrument and cross-sectional variation. The national decrease in residential segregation from 1970 onwards may play a role in the large contemporaneous increase in interracial marriage and marital integration. There are several potential mechanisms that might explain this effect. Perhaps the most immediate is that residential segregation determines the degree of interaction between people of different races—where one goes to church, walks their block, etc. Thus, more segregated cities may have lower interracial marriage rates given that Black and white residents do not interact as often. Indeed, Massey and Denton (1993) famously emphasize the extreme social isolation and lack of contact that occurred in cities with high segregation in the latter half of the 20th century (what they termed "hypersegregation"). However, there may also be less direct pathways from residential segregation to interracial marriage. Ananat (2011), for example, found that residential segregation increased racial economic inequality, which may have also decreased interracial marriage rates given patterns of assortative matching in the marriage market. Ananat and Washington (2009) found that segregation decreased Black political efficacy, which may also have had downstream impacts on interracial marriage and social integration.

6 Conclusion

Between 1950 and 2000, the Black-white IMR in the United States increased from 1.5 per 1000 marriages to 26.5 per 1000 marriages. Several historical events or patterns—the Great Migration and declining residential segregation—may have played a role in this increase. While previous studies have documented this increase or used structural models to study the determinants of interracial marriage, none have evaluated the historical forces impacting the prevalence of interracial marriage and marital integration (Wong, 2003; Fryer, 2007). As a result, I evaluate the roles of these various forces using two historical quasi-experiments.

I use shift-share and IV approaches to find that the Second Great Migration increased the IMR but decreased marital integration, while residential segregation decreased both. Additionally, I use a variety of econometric tools to assess the validity of the Great Migration shift-share design and find strong evidence in its favor. My results suggest that the Second Great Migration and the national decline in residential segregation have contributed to the large increase in interracial marriage, while an increasingly friendly legal regime did not. These results are complementary—using two different designs that rest on different assumptions, I find consistent evidence that interracial exposure and contact matters for integration in the

marriage market. However, the precise interpretation of the treatment differs. The Second Great Migration represented a large scale change in the "market thickness" of interracial exposure as large numbers of Black people moved to Northern cities. These results stratified by residential segregation highlight the limits of increases in "thickness"—if those migrants remain very spatially isolated from other races in their destination cities, there are not significant increases in interracial marriage. In contrast, the exogenous shifts in residential segregation I examine vary the evenness of population distribution between races within a city or metropolitan area, capturing increases in interaction independent of increases in black population. In both cases, exposure increases the prevalence of interracial marriage.

One question that remains is: why did it take so long for this marriage market integration to occur? Early 20th century European immigrants offer a contrasting case—while they were differentiated from native-born American (sometimes racially) and often lived in ethnic enclaves that would similarly limit contact, their integration in the marriage market occurred far quicker and much earlier than Black individuals (Guterl, 2002; Hatton and Williamson, 1998; Fouka et al., 2022). Although a more restrictive legal environment is a potential contributing factor, Deal (2024) finds evidence against this. One possibility is that the uniquely severe and persistent residential segregation of African Americans in the mid-to-late 20th century served as a persistent barrier to interaction (Massey and Denton, 1993). Fouka et al. (2022) document a distinct contributing factor: Black migrants themselves served to help European immigrants assimilate and intermarry natives, by creating a new "other" category. Finally, the unique history of racism and economic suppression against African Americans is likely also responsible.

My results on the effects of the Second Great Migration also highlight that while the IMR increased, this increase was an order of magnitude lower than that expected under random assignment—while there was an increase in integration, these migrants were not fully accepted into their destination communities, and their arrival was often met with flight or coordinated actions to limit success (Derenoncourt, 2022; Boustan, 2009, 2010, 2016). While there has been significant progress on this measure of social integration in the last 50 years as internal migration and residential desegregation have occurred, my results also serve as a reminder that the United States remains far from achieving equality and integration between racial groups.

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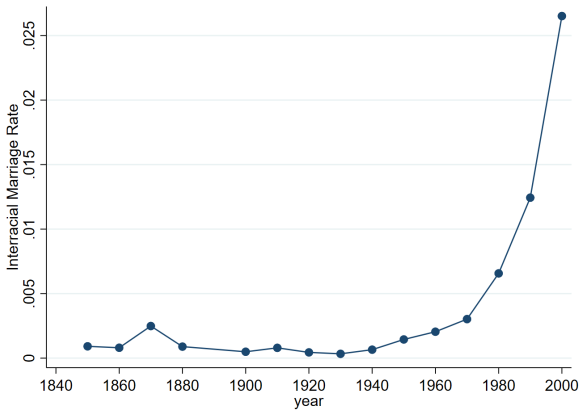
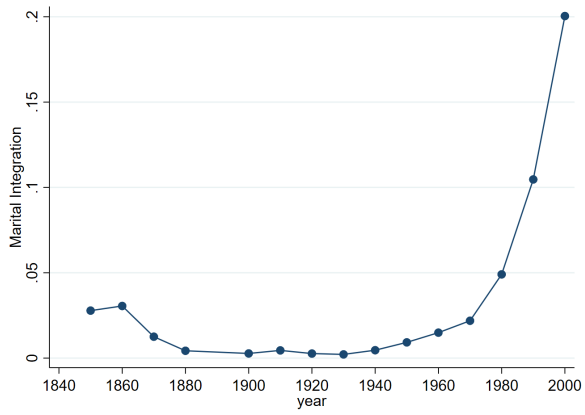
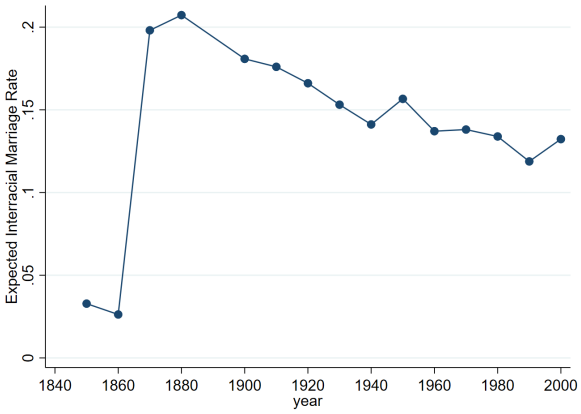
Tables and Figures



(a) Observed Interracial Marriage



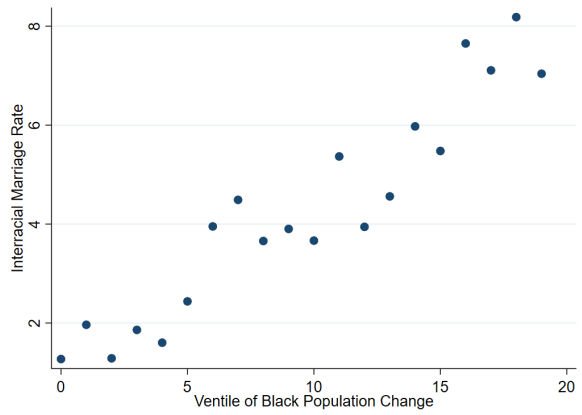
(b) Marital Integration



(c) Expected Interracial Marriage

Figure 1: Time Series of Interracial Marriage, Marital Integration, Expected Interracial Marriages

Source: IPUMS-USA Full Counts and Samples, 1850-2000; Authors' calculations. Interracial marriages as a fraction of all Black and white marriages. Marital integration is the observed interracial marriage rate scaled by the expected rate of interracial marriage.



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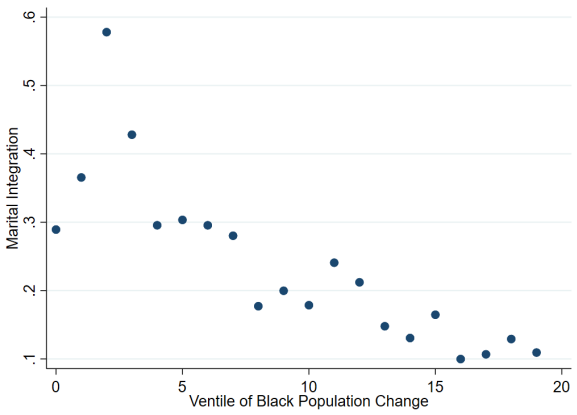
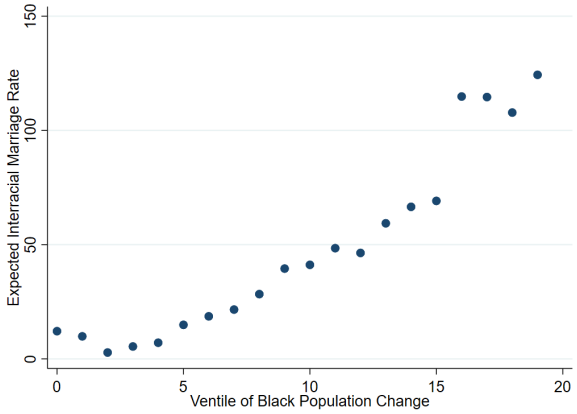


(b) Marital Integration



(c) Expected Interracial Marriage

Figure 2: Relationship between Black Population Change and Outcomes

Source: IPUMS-USA 1990 5% Sample; Authors' calculations. These binned scatterplots depict the relationship between interracial marriage outcomes and the percentile of actual Black population increase during the Great Migration (1940-1970) for northern CZs. The unit of observation is a CZ. The right-hand-side variable is grouped into 20 bins (5 percentiles each). Interracial marriages as a fraction of all Black and white marriages, dependent variable is IMR per 1000 marriages. Marital integration is the observed interracial marriage rate scaled by the expected rate of interracial marriage.

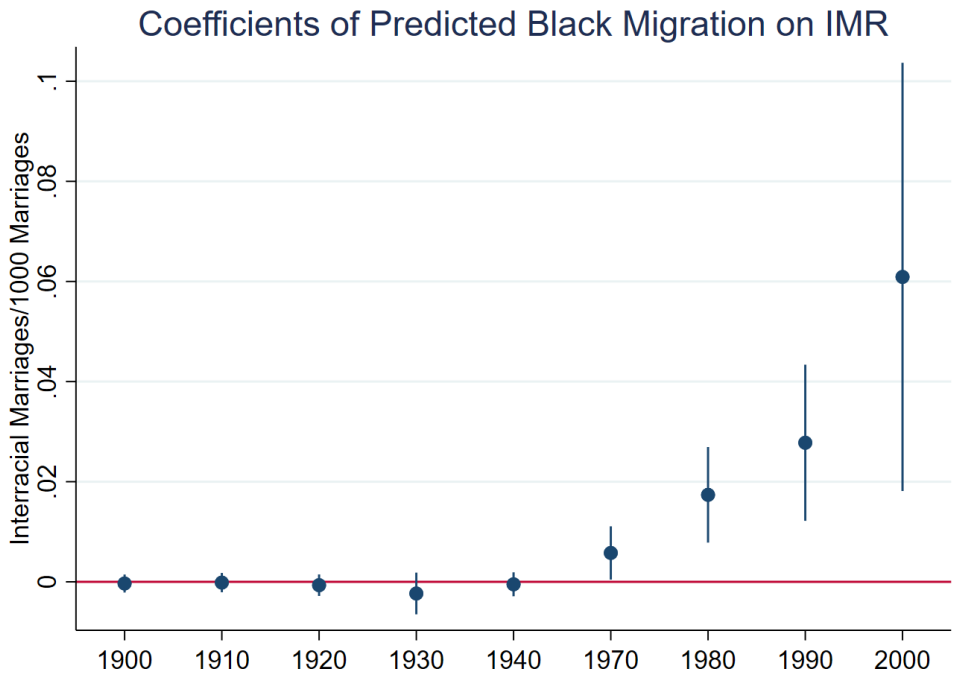


Figure 3: Regression of Great Migration Instrument on 1900-2000 IMR

Source: Data from Derenoncourt (2022), 1900-1940 Full-Count Censuses, and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. This table reports the estimated impact of the Great Migration on observed interracial marriage rates in 1900-1940 (a placebo outcome) and then 1970-2000 after the Great Migration has occurred. The unit of observation is a CZ. The dependent variable is the observed rate of interracial marriage per 1000 marriages. Interracial marriages as a fraction of all Black and white marriages. The independent variable is the instrument for Black population increase (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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects.

Table 1: First Stage on Black Population Change

	Percentile of Black Population Change
$\hat{GM}$	0.461^{***}
	(0.0699)
F	43.53

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Derenoncourt (2022), Author's calculations. This table reports the first stage relationship (coefficients and heteroskedasticity-robust standard errors) between the percentile of predicted Black population change and the actual Black population change 1940-1970, conditional on 1935-1940 Black Southern migration and region indicators. Unit of observation is a commuting zone ($N = 130$).

Table 2: Effects of Great Migration on Interracial Marriage Outcomes

	1970	1980	1990	2000
Panel A: Observed Interracial Marriage				
GM	0.0125**	0.0377***	0.0602***	0.132***
	(0.00614)	(0.00852)	(0.0138)	(0.0301)
ymean	1.26	2.43	4.28	14.1
N	130	130	130	130
Panel B: Marital Integration				
GM	-0.00287***	-0.00339***	-0.00316***	-0.0155***
	(0.00103)	(0.000927)	(0.00116)	(0.00375)
ymean	.0778	.109	.236	.667
N	128	129	130	130
Panel C: Expected IMR Under Randomization				
GM	1.880***	2.018***	1.633***	1.654***
	(0.248)	(0.234)	(0.176)	(0.173)
ymean	51.7	52.7	47.9	50.1
N	130	130	130	130

Source: Data from Derenoncourt (2022) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. This table reports the estimated impact of the Great Migration on observed interracial marriage rates, expected interracial marriage rates, and marital integration. The unit of observation is a CZ. The dependent variable in Panel A is of the observed rate of interracial marriage per 1000 marriages. The dependent variable in Panel B is marital integration. The dependent variable in Panel C is the expected rate of interracial marriage per 1000 marriages. Interracial marriages as a fraction of all Black and white marriages. Marital integration is the observed interracial marriage rate scaled by the expected rate of interracial marriage. The 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table 3: Heterogeneity of Great Migration Effects by Segregation

	1970	1980	1990	2000
Panel A: High Segregation Cities				
GM	0.00892	0.0241	0.0319	0.0405
	(0.00605)	(0.0164)	(0.0217)	(0.0497)
Observations	65	65	65	65
Panel B: Low Segregation Cities				
GM	0.0178	0.0477**	0.0903***	0.515***
	(0.0114)	(0.0195)	(0.0261)	(0.199)
Observations	65	65	65	65

Source: Data from Derenoncourt (2022) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Additionally, IPUMS NHGIS Extracts from 1970-2000 to calculate commuting-zone-level dissimilarity indices. Author's calculations. This table reports the estimated impact of the Great Migration on observed interracial marriage rates by above/below median segregation cities. The unit of observation is a CZ. The dependent variable in Table 3 is of the observed rate of interracial marriage per 1000 marriages. Interracial marriages as a fraction of all Black and white marriages. The 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table 4: Decomposing Great Migration Marriage Effects

	Outmarriage	Integration	Unmarried	Same Race	Other Race
Panel A: White Marriage Outcomes					
GM	0.00335***	-0.116***	0.0615***	-0.0687***	0.00391
	(0.000547)	(0.0318)	(0.0164)	(0.0175)	(0.00333)
ymean, %	.182	7.24	39.7	59	1.11
N	130	130	130	130	130
Panel B: Black Marriage Outcomes					
GM	-0.0869**	-0.0782**	-0.0349	0.138***	-0.0166*
	(0.0347)	(0.0350)	(0.0430)	(0.0389)	(0.00931)
ymean, %	9.46	9.76	64.6	24.1	1.84
N	130	130	130	130	130

Source: Data from Derenoncourt (2022) and the 2000 5% state IPUMS-USA sample. Author's calculations. This table reports the estimated impact of the Great Migration on five marriage outcomes for each race. The unit of observation is a CZ. Panel A reports marriage outcomes for white respondents, while Panel B reports marriage outcomes for Black respondents. The dependent variable in Column 1 is the number of respondents who are married to the opposite race (Black spouse for white respondents and vice versa) per 100 respondents. The dependent variable in Column 2 is the outmarriage rate (displayed in Column 1) divided by the outmarriage rate under random assignment to spouses. The dependent variable in Column 3 is the number of respondents per 100 respondents who are unmarried. The dependent variable in Column 4 is the number of respondents per 100 respondents who are married to someone of the same race. The dependent variable in Column 5 is the number of respondents per 100 respondents who are married to someone whose race is neither white nor Black. The 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table 5: First Stage on Residential Segregation

	1970	1980	1990	2000
RDI Instrument	0.355***	0.420***	0.406***	0.429***
	(0.0918)	(0.0794)	(0.0820)	(0.0956)
Observations	69	87	104	96
F	14.97	27.96	24.50	20.13

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Ananat (2011); Cutler et al. (1999), Author's calculations. This table reports the first stage relationship (coefficients and heteroskedasticity-robust standard errors) between the railroad density instrument and the dissimilarity index segregation measure by decade. Column 1 reports the results for 1970, 2 reports 1980, 3 reports 1990, and Column 4 reports 2000. The unit of observation is non-Southern metro areas for which both segregation and RDI are available.

Table 6: Effects of Residential Segregation on Interracial Marriage Outcomes

	1970	1980	1990	2000
Panel A: Observed Interracial Marriage				
Dissimilarity Index	1.196	-4.539	-8.425*	-24.82**
	(3.132)	(4.626)	(5.039)	(11.73)
Outcome Mean	1.49	3.45	5.46	18
Observations	48	80	104	95
Panel B: Marital Integration				
Dissimilarity Index	-0.0409	-0.487***	-0.933***	-4.420***
	(0.0749)	(0.158)	(0.333)	(1.429)
Outcome Mean	.0306	.0762	.16	.567
Observations	48	80	104	95

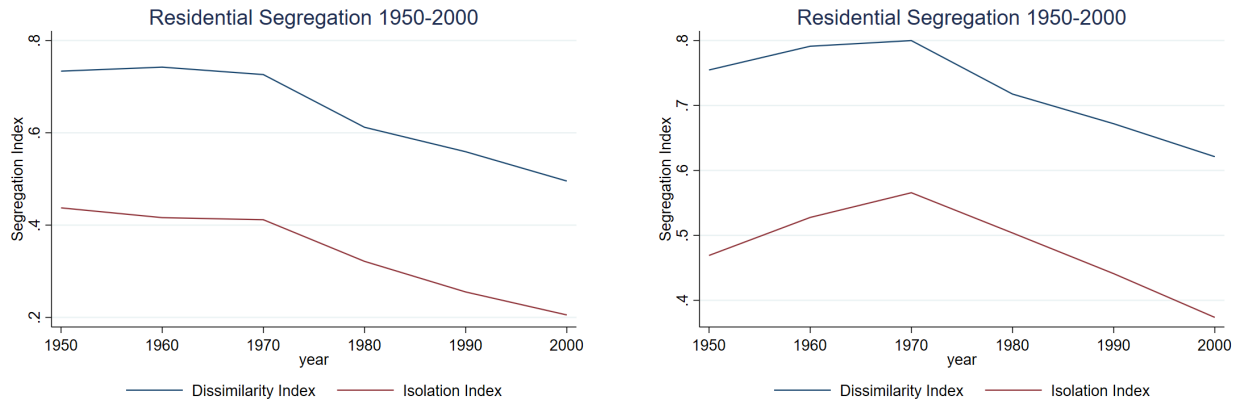
Source: Data from Ananat (2011); Cutler et al. (1999) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. This table presents point estimates and heteroskedasticity-robust standard errors (in parentheses) from 2SLS models in which the key independent variable is the dissimilarity index in that Census year, instrumented by the RDI variable. In Panel A the dependent variable is the observed interracial marriage rate per 1000 marriages in that Census year, and in Panel B the dependent variable is the marital integration in that Census year. Sample contains those non-Southern metro areas which can be matched to the Census MSA codes and are present in the Ananat (2011); Cutler et al. (1999) data.

Table 7: Decomposing Residential Segregation Marriage Effects

	Outmarriage	Integration	Unmarried	Same Race	Other Race
Panel A: White Marriage Outcomes					
Dissimilarity Index	0.108	-25.12***	-12.26*	17.11**	-4.960***
	(0.158)	(7.394)	(6.294)	(6.857)	(1.460)
ymean, %	.215	5.98	42.1	56.3	1.45
N	95	95	95	95	95
Panel B: Black Marriage Outcomes					
Dissimilarity Index	-25.62***	-25.51***	12.38	24.86**	-11.62***
	(7.547)	(7.498)	(8.687)	(11.41)	(2.653)
ymean, %	5.82	6.03	66.3	25.9	1.94
N	95	95	95	95	95

Source: Data from Ananat (2011) and the 2000 5% state IPUMS-USA sample. Author's calculations. This table presents point estimates and heteroskedasticity-robust standard errors (in parentheses) from 2SLS models in which the key independent variable is the dissimilarity index in that Census year, instrumented by the RDI variable. Panel A reports marriage outcomes for white respondents, while Panel B reports marriage outcomes for Black respondents. The dependent variable in Column 1 is the number of respondents who are married to the opposite race (Black spouse for white respondents and vice versa) per 100 respondents. The dependent variable in Column 2 is the outmarriage rate (displayed in Column 1) divided by the outmarriage rate under random assignment to spouses. The dependent variable in Column 3 is the number of respondents per 100 respondents who are unmarried. The dependent variable in Column 4 is the number of respondents per 100 respondents who are married to someone of the same race. The dependent variable in Column 5 is the number of respondents per 100 respondents who are married to someone whose race is neither white nor Black. Sample contains those non-Southern metro areas which can be matched to the Census MSA codes and are present in the Ananat (2011); Cutler et al. (1999) data.

Appendix A: Supplementary Figures and Tables

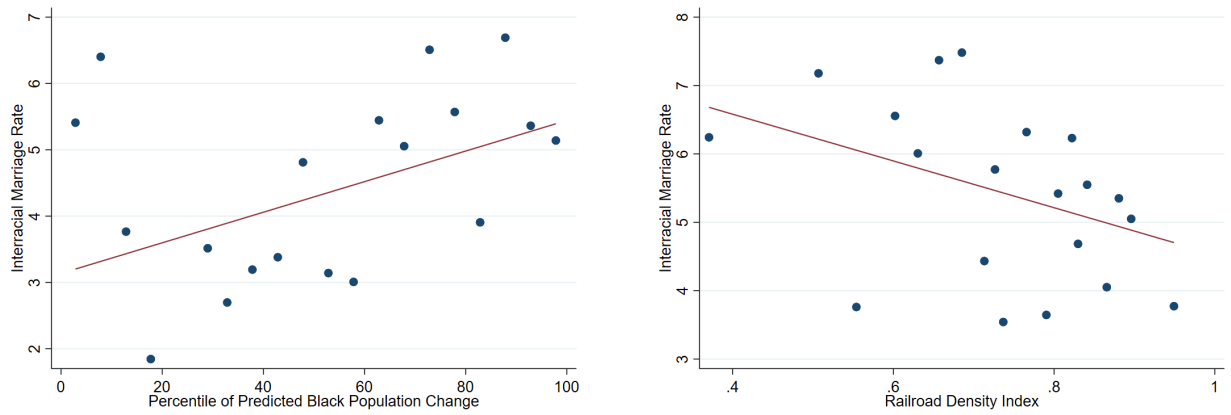


(a) Full Sample

(b) Consistent Panel 1950-2000

Figure A1: Time Series of Residential Segregation, 1950-2000

Source: Cutler et al. (1999); Authors' calculations. Dissimilarity index measures the percentage of a group's population that would have to change residence for each neighborhood to have the same percentage of that group as the metropolitan area overall. Isolation index measures minority-weighted average of the minority proportion in each area.



(a) Predicted Black Population Increase

(b) Railroad Density Index

Figure A2: Reduced Form Relationship between Instruments and IMR

Source: IPUMS-USA 1990 5% Sample; Authors' calculations. Panel A is a binned scatterplot that displays the relationship between IMR and the percentile of predicted Black population increase during the Great Migration (1940-1970) for northern CZs. Panel B is a a binned scatter plot that displays the relationship between IMR and the Railroad Density Index (RDI). Interracial marriages as a fraction of all Black and white marriages, dependent variable is IMR per 1000 marriages.

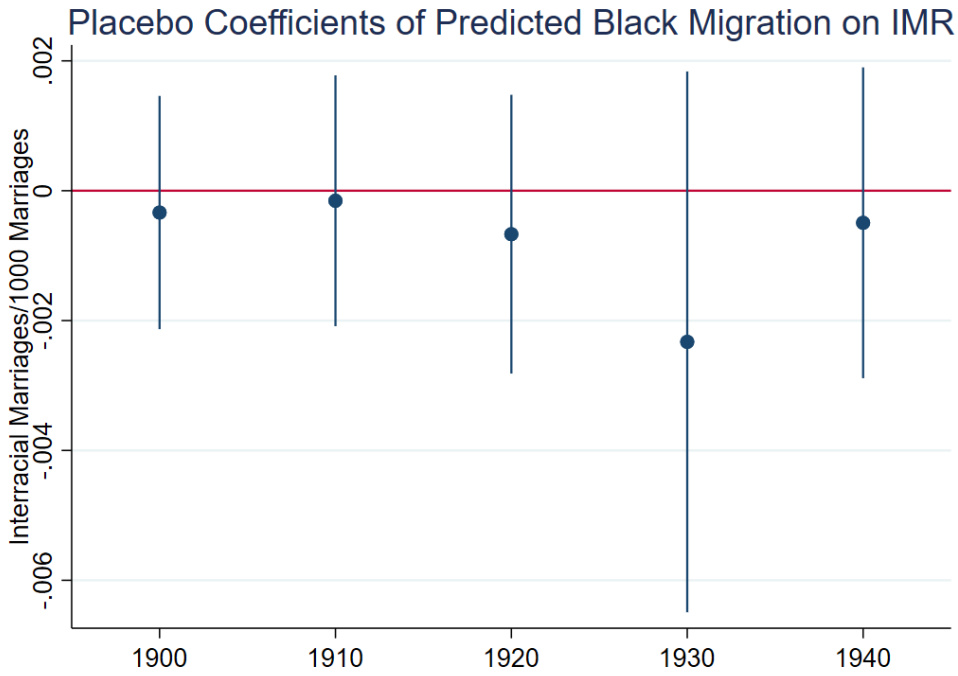


Figure A3: Placebo Test of Great Migration Instrument on 1900-1940 IMR

Source: Data from Derenoncourt (2022) and 1900-1940 Full-Count Censuses. Author's calculations. This table reports the estimated impact of the Great Migration on observed interracial marriage rates in 1900-1940 (a placebo outcome). The unit of observation is a CZ. The dependent variable is the observed rate of interracial marriage per 1000 marriages. Interracial marriages as a fraction of all Black and white marriages. The 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects.

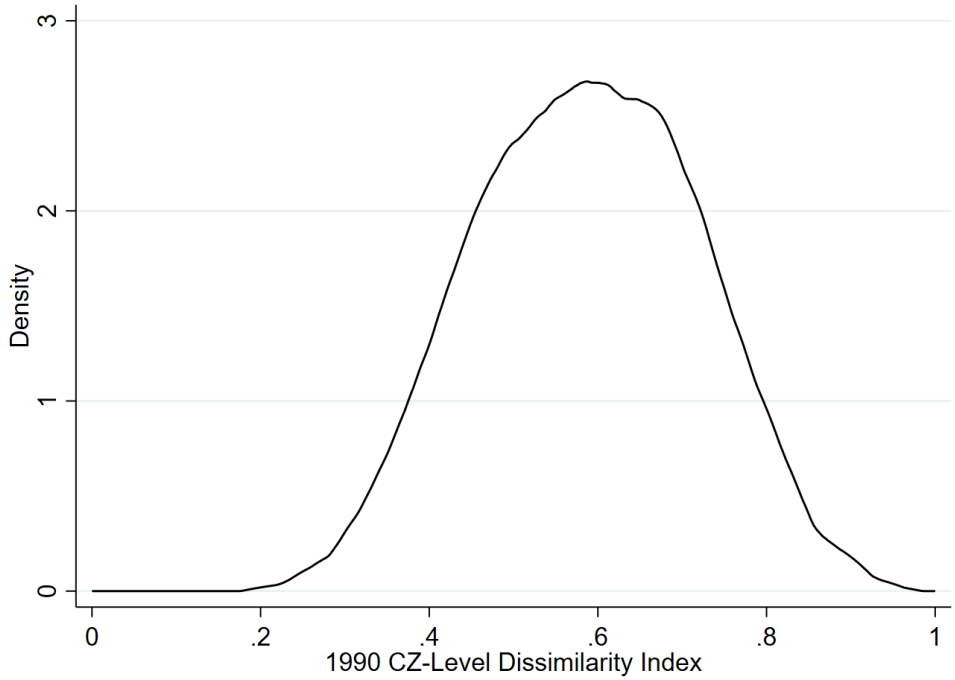


Figure A4: Distribution of Commuting Zone Residential Segregation

Source: IPUMS NHGIS Extracts from 1990. Author's calculations. This figure reports a kernel density plot of the black-white residential dissimilarity index. The unit of observation is a CZ. Dissimilarity index calculated over Census tracts. Kernel is Epanechnikov, and bandwidth set to 0.05.

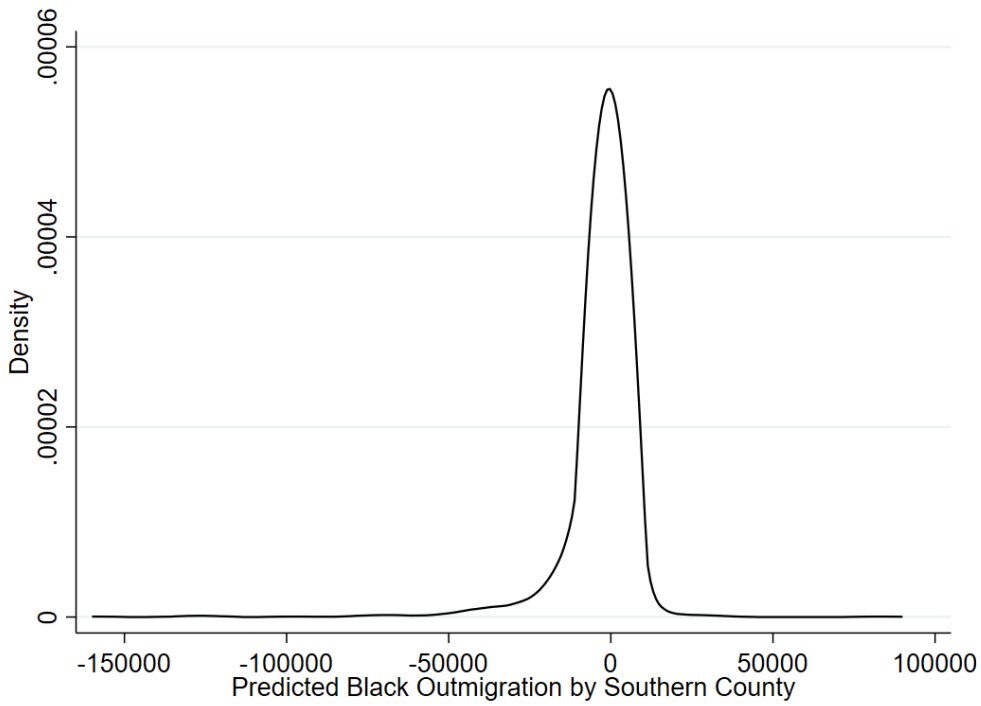


Figure A5: Distribution of Predicted Southern Outmigration (Shocks)

Source: Data from Derenoncourt (2022) Author's calculations. This figure reports a kernel density plot of the predicted county-level Black outmigration 1940-1970. The unit of observation is a Southern county. Kernel is Epanechnikov, and bandwidth set to 10,000.

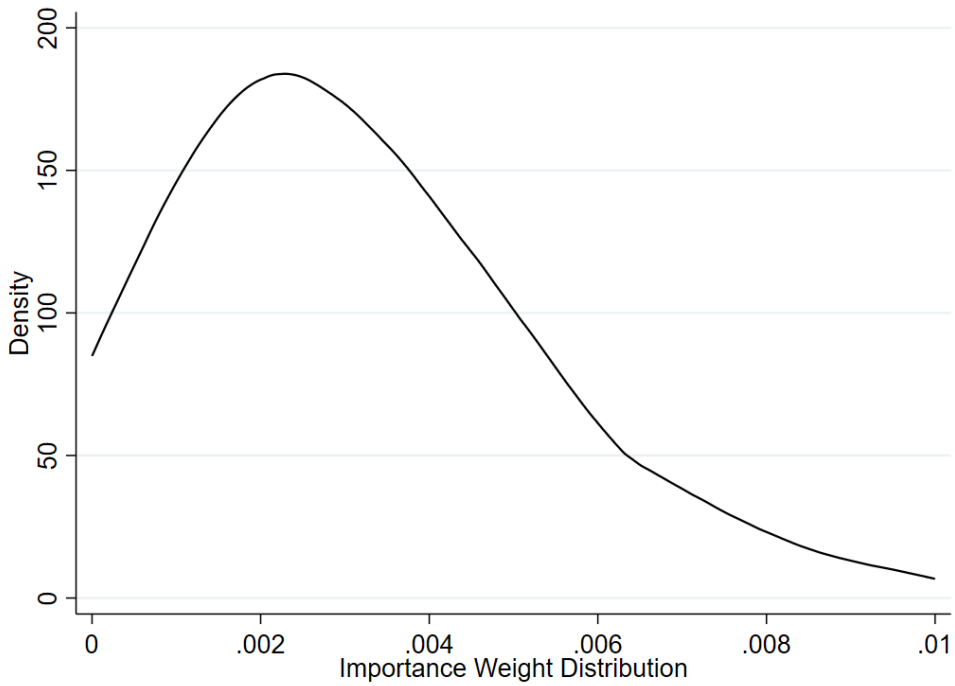


Figure A6: Distribution of Importance Weights (Average Exposure of Each Shock)

Source: Data from Derenoncourt (2022) Author's calculations. This figure reports a kernel density plot of importance weights (average exposure) for each shock. The unit of observation is a Southern county. Kernel is Epanechnikov, and bandwidth set to 0.001.

Table A1: First Stage on Residential Segregation (+Track Length)

	1970	1980	1990	2000
RDI Instrument	0.343***	0.386***	0.366***	0.386***
	(0.0922)	(0.0793)	(0.0832)	(0.0962)
Track Length	5.875**	14.21***	17.84*	19.08*
	(2.541)	(5.322)	(10.31)	(11.16)
Observations	69	87	104	96

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Ananat (2011); Cutler et al. (1999), Author's calculations. This table reports the first stage relationship (coefficients and heteroskedasticity-robust standard errors) between the railroad density instrument and the dissimilarity index segregation measure by decade, controlling for railroad track length. Column 1 reports the results for 1970, 2 reports 1980, 3 reports 1990, and Column 4 reports 2000. The unit of observation is non-Southern metro areas for which both segregation and RDI are available.

Table A2: Effect of Segregation on Observed IMR (+Track Length)

	1970	1980	1990	2000
Dissimilarity Index	1.026	-5.913	-9.568*	-25.76**
	(3.863)	(5.070)	(5.645)	(13.02)
ymean	1.49	3.45	5.46	18
N	48	80	104	95

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Effect of Segregation on Marital Integration (+Track Length)

	1970	1980	1990	2000
Dissimilarity Index	0.0408	-0.490***	-0.957**	-4.605***
	(0.124)	(0.168)	(0.381)	(1.635)
ymean	.0306	.0762	.16	.567
N	48	80	104	95

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Ananat (2011); Cutler et al. (1999) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. These tables present point estimates and heteroskedasticity-robust standard errors (in parentheses) from regression models in which the key independent variable is the dissimilarity index in that Census year, instrumented by the RDI variable. These tables also include a control for railroad track length. In Table A2, the dependent variable is the observed interracial marriage rate per 1000 marriages in that Census year, and in Table A3, the dependent variable is the marital integration in that Census year. Sample contains those non-Southern metro areas which can be matched to the Census MSA codes and are present in the Ananat (2011); Cutler et al. (1999) data.

Table A4: Effects of Residential Segregation on Interracial Marriage Outcomes (16 to 35 Year Olds)

	1970	1980	1990	2000
Panel A: Observed Interracial Marriage				
Dissimilarity Index	-2.511	-11.78	-13.77*	-31.24
	(6.269)	(8.200)	(7.773)	(19.12)
ymean	2.12	5.99	9.29	30
N	48	80	104	95
Panel B: Scaled Interracial Marriage				
Dissimilarity Index	-0.119*	-0.797***	-2.080**	-4.114***
	(0.0713)	(0.301)	(0.954)	(1.483)
ymean	.0288	.117	.255	.693
N	48	80	104	94

Source: Data from Ananat (2011); Cutler et al. (1999) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. Sample restricted to 16 to 35 year olds. This table presents point estimates and heteroskedasticity-robust standard errors (in parentheses) from regression models in which the key independent variable is the dissimilarity index in that Census year, instrumented by the RDI variable. In Panel A the dependent variable is the observed interracial marriage rate per 1000 marriages in that Census year, and in Panel B the dependent variable is the marital integration in that Census year. Sample contains those non-Southern metro areas which can be matched to the Census MSA codes and are present in the Ananat (2011); Cutler et al. (1999) data.

Table A5: Placebo Test of Segregation on 1930 IMR

	IMR	IMR	Integration	Integration
RDI Instrument	-0.255	-0.243	-0.0149	0.00261
	(0.252)	(0.252)	(0.0322)	(0.0410)
Track Length		-5.739		-8.079
		(6.034)		(6.274)
ymean	.346	.346	.0344	.0344
N	113	113	113	113

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Source: Data from Ananat (2011) and 1930 Full-Count Census. Author's calculations. This table presents point estimates and heteroskedasticity-robust standard errors (in parentheses) from regression models in which the key independent variable is the RDI variable. Columns 2 and 4 also include a control for historical railroad track length per square kilometer. In Columns 1 and 2, the dependent variable is the observed interracial marriage rate per 1000 marriages in that Census year, and in Columns 3 and 4, the dependent variable is the marital integration in that Census year. Sample contains those non-Southern metro areas which can be matched to the Census city codes in 1940 and are present in the Ananat (2011) data.

Table A6: Placebo Test of Great Migration on 1900-1940 IMR

	1900	1910	1920	1930	1940
$\hat{GM}$	-0.000336	-0.000155	-0.000669	-0.00233	-0.000494
	(0.000907)	(0.000976)	(0.00108)	(0.00210)	(0.00121)
ymean	.377	.564	.321	.254	.294
N	130	130	130	130	130

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Derenoncourt (2022) and 1900-1940 Full-Count Censuses. Author's calculations. This table reports the estimated impact of the Great Migration on observed interracial marriage rates in 1900-1940 (a placebo outcome). The unit of observation is a CZ. The dependent variable is the observed rate of interracial marriage per 1000 marriages. Interracial marriages as a fraction of all Black and white marriages. The 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table A7: Reduced Form of RDI on Observed IMR

	1970	1980	1990	2000
RDI Instrument	0.885	-0.315	-3.419	-10.70*
	(1.022)	(1.773)	(2.082)	(5.557)
Observations	50	88	104	95

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Reduced Form of RDI on Marital Integration

	1970	1980	1990	2000
RDI Instrument	0.000744	-0.155**	-0.379***	-1.905***
	(0.0269)	(0.0767)	(0.116)	(0.543)
Observations	50	88	104	95

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Ananat (2011) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. These tables present point estimates and heteroskedasticity-robust standard errors (in parentheses) from regression models in which the key independent variable is the RDI variable. In Table A7, the dependent variable is the observed interracial marriage rate per 1000 marriages in that Census year, and in Table A8, the dependent variable is the marital integration in that Census year. Sample contains those non-Southern metro areas which can be matched to the Census MSA codes and are present in the Ananat (2011); Cutler et al. (1999) data.

Table A9: OLS of Segregation on Observed IMR

	1970	1980	1990	2000
Dissimilarity Index	0.895	-1.205	-2.364	-21.88***
	(1.141)	(1.765)	(2.130)	(3.924)
Observations	48	80	104	95

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10: OLS of Segregation on Marital Integration

	1970	1980	1990	2000
Dissimilarity Index	-0.0802*	-0.329***	-0.555***	-2.825***
	(0.0465)	(0.0826)	(0.0969)	(0.520)
Observations	48	80	104	95

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Cutler et al. (1999); Ananat (2011) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. These tables present point estimates and heteroskedasticity-robust standard errors (in parentheses) from regression models in which the key independent variable is the dissimilarity index in that Census year, Seg_c. In Table A9, the dependent variable is the observed interracial marriage rate per 1000 marriagesin that Census year, and in Table A10, the dependent variable is the marital integration in that Census year. Sample contains those non-Southern metro areas which can be matched to the Census MSA codes and are present in the Ananat (2011); Cutler et al. (1999) data.

Table A11: Reduced Form of Predicted Migration on Observed IMR

	1970	1980	1990	2000
$\hat{GM}$	0.00577**	0.0174***	0.0278***	0.0609***
	(0.00269)	(0.00482)	(0.00788)	(0.0216)
Observations	130	130	130	130

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A12: Reduced Form of Predicted Migration on Expected IMR

	1970	1980	1990	2000
$\hat{GM}$	0.868***	0.931***	0.754***	0.763***
	(0.156)	(0.145)	(0.119)	(0.124)
Observations	130	130	130	130

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A13: Reduced Form of Predicted Migration on Marital Integration

	1970	1980	1990	2000
$\hat{GM}$	-0.00129***	-0.00156***	-0.00146***	-0.00714***
	(0.000454)	(0.000469)	(0.000534)	(0.00191)
Observations	128	129	130	130

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Derenoncourt (2022) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. These tables report the estimated impact of predicted migration on observed interracial marriage rates, expected interracial marriage rates, and marital integration. The unit of observation is a CZ. The dependent variable in Table A11 is the observed rate of interracial marriage per 1000 marriages. The dependent variable in Table A12 is the expected rate of interracial marriage per 1000 marriages. The dependent variable in Table A13 is marital integration. Interracial marriages as a fraction of all Black and white marriages. Marital integration is the observed interracial marriage rate scaled by the expected rate of interracial marriage. The independent variable is the percentile of predicted Black population increase during the Great Migration, 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table A14: OLS of Great Migration on Observed IMR

	1970	1980	1990	2000
GM	0.00996***	0.0394***	0.0676***	0.151***
	(0.00366)	(0.00501)	(0.00755)	(0.0219)
Observations	130	130	130	130

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A15: OLS of Great Migration on Expected IMR

	1970	1980	1990	2000
GM	1.299***	1.354***	1.208***	1.254***
	(0.144)	(0.134)	(0.0999)	(0.0978)
Observations	130	130	130	130

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A16: OLS of Great Migration on Marital Integration

	1970	1980	1990	2000
GM	-0.00214***	-0.00286***	-0.00339***	-0.0185***
	(0.000537)	(0.000676)	(0.000726)	(0.00252)
Observations	128	129	130	130

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Derenoncourt (2022) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. These tables report the OLS impact of the Great Migration on observed interracial marriage rates, expected interracial marriage rates, and marital integration. The unit of observation is a CZ. The dependent variable in Table A14 is the observed rate of interracial marriage per 1000 marriages. The dependent variable in Table A15 is the expected rate of interracial marriage per 1000 marriages. The dependent variable in Table A16 is marital integration. Interracial marriages as a fraction of all Black and white marriages. Marital integration is the observed interracial marriage rate scaled by the expected rate of interracial marriage. The independent variable is the percentile of Black population increase during the Great Migration. Baseline 1940 controls include the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table A17: Effects of Great Migration on Interracial Marriage Outcomes (16 to 35 Year Olds)

	1970	1980	1990	2000
Panel A: Observed Interracial Marriage				
GM	0.0140	0.0468***	0.0719***	0.238***
	(0.0123)	(0.0155)	(0.0234)	(0.0448)
ymean	1.96	4.23	7.09	23
N	130	130	130	130
Panel B: Scaled Interracial Marriage				
GM	-0.00400***	-0.00489***	-0.00266*	-0.0183***
	(0.00139)	(0.00109)	(0.00153)	(0.00511)
ymean	.101	.155	.316	.799
N	128	127	128	128
Panel C: Expected Interracial Marriage				
GM	2.163***	2.103***	1.586***	1.769***
	(0.280)	(0.244)	(0.188)	(0.193)
ymean	57.8	56.8	50.9	57.5
N	130	130	130	130

Source: Data from Derenoncourt (2022) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. Sample restricted to 16 to 35 year olds. This table reports the estimated impact of the Great Migration on observed interracial marriage rates, expected interracial marriage rates, and marital integration. The unit of observation is a CZ. The dependent variable in Panel A is of the observed rate of interracial marriage per 1000 marriages. The dependent variable in Panel B is marital integration. The dependent variable in Panel C is the expected rate of interracial marriage per 1000 marriages. Interracial marriages as a fraction of all Black and white marriages. Marital integration is the observed interracial marriage rate scaled by the expected rate of interracial marriage. The 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table A18: Great Migration Outmarriage Effect Heterogeneity

	White Outmarriage	Black Outmarriage
Panel A: High Segregation Cities		
GM	0.00243**	-0.0135
	(0.000968)	(0.0337)
ymean, %	.211	6.33
N	65	65
Panel B: Low Segregation Cities		
GM	0.00636***	-0.223
	(0.00235)	(0.150)
ymean, %	.153	12.6
N	65	65

Source: Data from Derenoncourt (2022) and the 2000 5% state IPUMS-USA sample. Author's calculations. This table reports the estimated impact of the Great Migration on outmarriage rates for Black and white respondents (e.g., the share of white married people who are married to a Black person, etc.). Panel A presents results for above-median segregation cities and Panel B presents results for below-median segregation cities. The unit of observation is a CZ. The 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table A19: Effects of Great Migration on Interracial Marriage (Controlling for Sum of Shares)

	1970	1980	1990	2000
GM	0.00496	0.0253***	0.0447***	0.104***
	(0.00649)	(0.00908)	(0.0151)	(0.0335)
Sum of Shares	Yes	Yes	Yes	Yes
Observations	130	130	130	130

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Derenoncourt (2022) and the following IPUMS-USA samples: 1970 2% metro, 1980 5% state, 1990 5% state, and 2000 5% state. Author's calculations. This table reports the estimated impact of the Great Migration on interracial marriage rates while controlling for the sum of shares in the shift-share design. The unit of observation is a CZ. The 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table A20: Rotemberg Negative and Positive Weights

	Sum	**Mean**	**Share**
Negative	-0.001	-0.000	0.001
Positive	1.001	0.001	0.999

Table A21: Rotemberg Correlations of Predicted Migration Aggregates

	α_k	g_k	β_k	F_k	Var(z_k)
α_k	1				
g_k	0.793	1			
β_k	-0.016	-0.010	1		
F_k	-0.036	-0.066	0.004	1	
Var(z_k)	0.158	-0.075	0.040	0.273	1

Notes: These tables summarize statistics about Rotemberg weights, where k indexes counties, following Goldsmith-Pinkham et al. (2020). Table A20 reports share of positive and negative Rotemberg weights. Table A21 reports correlation between the weights (α_k), predicted migration inflows into commuting zones (g_k), the just identified coefficient estimates (β_k), the first stage F-statistic of the historical settlement patterns of Black southern migrants (F_k), and the variation in the shares of Black southern migrants ($Var(z_k)$) residing in the north in 1940.

Table A22: Interracial Couple Characteristics and Predicted Migration

	Born in South	Birthplace Different	Occupational Score	Age	Number of Children
$\hat{GM}$	0.0000494	-0.000754	0.000207	0.0157	-0.00159
	(0.000320)	(0.000489)	(0.0144)	(0.0128)	(0.00131)
ymean	.185	.5	23.4	37.8	1.31
N	129	129	129	129	129

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Data from Derenoncourt (2022) and the 1990 5% state IPUMS-USA sample. Author's calculations. Sample restricted to interracial couples. This table reports the reduced form relationship between predicted migration and the demographic characteristics of interracial couples. The unit of observation is a CZ. The dependent variable in Column 1 is an indicator for whether the respondent was born in the South. The dependent variable in Column 2 is whether the respondent's birthplace differs from their state of residence. The dependent variable in Column 3 is the occupational income score of the respondent. The dependent variable in Column 4 is age of the respondent. The dependent variable in Column 5 is the number of own children in the household for the respondent. The independent variable is 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 the share of the urban population made up of 1935–1940 Black southern migrants and census region fixed effects. Standard errors are in parentheses.

Table A23: Observable Characteristics Across CZ-level Segregation

	Below Median Segregation	Above Median Segregation	Total
Black Share	0.0186	0.0610	0.0398
	(0.0200)	(0.0559)	(0.0469)
White Share	0.935	0.910	0.923
	(0.0693)	(0.0793)	(0.0752)
Married Share	0.692	0.688	0.690
	(0.0379)	(0.0376)	(0.0376)
Age	46.34	46.76	46.55
	(1.872)	(1.527)	(1.715)
Occupational Income Score	20.69	20.89	20.79
	(1.456)	(1.720)	(1.591)
Observations	130		

Source: IPUMS NHGIS Extracts from 1990 and 1990 Census. Sample is restricted to population 15 and older. Author's calculations. This table reports means and standard deviations of demographic and economic characteristics across the median of CZ-level segregation (measured by the residential dissimilarity index). Median of commuting zone residential dissimilarity index is 0.59. The unit of observation is a CZ.