The Wrong Side(s) of the Tracks:
Estimating the Causal Effects of Racial Segregation on City Outcomes

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Abstract

The strong negative correlation between a city's level of residential racial segregation and its outcomes, particularly for black residents, is well-established. The interpretation of this relationship, however, is confounded by the possibility that cities that have other negative characteristics tend also to be more segregated, leading to omitted variable bias. I address this concern by using the placement of railroad tracks in the 19th century as an instrument for a city's ability to segregate upon the arrival of significant African-American populations in the 20th century. I show that, conditional on actual quantity of railroad track, variation in the way tracks were configured predicts the level of segregation a city experienced after the Great Migration. Using two-stage least squares analysis, I find that more segregated cities have worse outcomes for high- and low-skilled blacks and for high-skilled whites, but better outcomes for low-skilled whites. Ordinary least squares estimates appear to bias the estimated effects of segregation on low-skilled outcomes downward, while biasing estimates of high-skilled white outcomes upwards, perhaps because endogenous segregation is related to broader inequality. I develop a model to help identify separate effects of randomized segregation on the production of human capital versus general equilibrium sorting by type. Using data on migration, I find that more segregated cities are in less demand and that the benefits of segregation to low-skilled whites do not result from sorting. The negative relationship of randomized segregation with the outcomes of other groups, however, may be at least partly the result of general equilibrium sorting of these groups away from segregated cities.

Introduction

Residential segregation by race is one of the most visible characteristics of many American cities. Although African-Americans represent just over one-tenth of the U.S. population, the average urban African-American lives in a neighborhood that is majority black (Glaeser and Vigdor 2001). Cities vary in the extent to which their black populations live in black neighborhoods, and more segregated cities on average have worse characteristics than less segregated cities, on measures ranging from higher infant mortality to lower educational achievement (Massey and Denton 1993).

In what ways, if any, racial segregation affects city outcomes is a longstanding question in economics. Two conceptual obstacles complicate identifying the answer: endogenous segregation and endogenous migration. First, cities may be endogenously segregated—that is, cities that are segregated may differ from cities that aren't segregated in many ways (political corruption, tastes for redistribution, industrial organization). Such differences will lead to omitted variable bias when estimating the relationship between segregation and outcomes. Second, individuals may respond to a given level of segregation and to any effects of segregation on city characteristics by sorting between cities in ways that alter average city characteristics. Therefore in cross-section, differences in city outcomes will represent a combination of the effects of segregation on individual city residents and the effects of selection through migration on average resident characteristics.

In this paper I address concerns about omitted variable bias by using 19th-century railroad configurations to instrument for the extent to which cities became segregated as they developed African-American populations during the 20th century. I show that the proverbial convention of the “wrong side of the tracks” is helpful in identifying segregation; the more subdivided a city was by railroads (i.e., the more total “sides” there were to the tracks) the more segregated the city became during the Great Migration. This result holds even when controlling for differences by city in total railroad length—meaning it does not reflect merely a difference in the use of railroads as a city characteristic—and is robust to a variety of specification tests.

Why would the division of a city by railroads into many small subunits affect segregation? As a city began to develop a significant black population during the Great Migration, African-Americans became isolated in ghettoes in part because demand among the broader community for residential segregation grew (Weaver 1955). As the black population continued to expand, the physical size of a ghetto had to increase if segregation was going to be maintained. In cities that were subdivided by railroads into many small insular neighborhoods, it was possible to expand a ghetto by one neighborhood at a time and still practice “containment,” whereby the black population remained concentrated and contiguous. On the other hand, in cities where expanding a ghetto meant breaching a main divide, then as the black population increased segregation could no longer be as easily maintained.

Figure 1 illustrates this concept. Binghamton, NY, and York, PA, were similar in total quantity of railroad tracks laid by 1900 (shown in red, circumscribed by a four kilometer-radius circle). They also had similar industrial bases and exogenous changes in African-American population (these characteristics are discussed in detail later in the paper). But York’s railroads were configured such that they created many insular neighborhoods, particularly in the center of the city. Its Census tracts, in the year 2000, show a black population more concentrated in this set of small, railroad-defined neighborhoods (tract percent black is represented by darkness of tract shading). In Binghamton, on the other hand, railroads are tightly clustered, leaving some areas too long and narrow to encompass neighborhoods and others too wide open to create meaningful population restrictions. In contrast to York, Binghamton's year 2000 Census tracts show its black population dispersed lightly and evenly throughout much of the city.

In short, I argue that railroad subdivision provided a technology for segregation. A railroad barrier lowered the cost of producing segregation because its visibility facilitated collective agreement on and enforcement of neighborhood boundaries by residents, real estate agents, police, and others. Even if tastes for segregation have faded since the early 20th century, neighborhood dividing lines oriented on railroad tracks may have persisted because the physical obstruction between homes restricts residential choice to be discontinuous.

This exogenous variation in railroad subdivision allows me to rule out the possibility that the segregation I measure is simply one city characteristic that tends to be bundled with other city characteristics. Instrumentation allows me to identify the extent to which cities that are randomly assigned greater segregation end up having more negative characteristics overall. That is, it identifies the causal effect of segregation on places.

In the latter part of the paper, I explore the interpretations of this relationship. That is, to what extent does the causal effect of segregation on places reflect differences in the productivity of segregation in generating capital, broadly speaking, for different groups of people? To what extent does the effect on places result from selection by members of race and skill groups between cities in reaction to levels of segregation?

The answers to both of these questions—the effect of segregation on individual outcomes, and the effect of segregation on aggregate group demand for cities—can help inform several economic discussions. First, they supply evidence for labor economics discussions of human capital production and selective migration by skill. Second, they are important to public finance discussions of the effect of demographic differences on the ability of cities to efficiently provide public goods. Third, policymakers want to know whether people have preferences over segregation (so that living in segregated cities reflects a difference in ability to pay), and whether, when addressing bad outcomes of African-Americans, they should think of segregation as a cause or an effect.

To help separate the results of endogenous migration from the effects of segregation on individual outcomes, I develop a simple model that has strong implications for the interpretation of equilibrium relationships between race, tastes, effects of segregation on outcomes, and housing demand. I then use data on migration and housing prices to separately identify the production effects of segregation on group characteristics from the selection effects.

Many other papers have attempted to identify the effects of segregation on outcomes (cf. Massey and Denton 1993, Wilson 1996, Polednak 1997). An influential contribution by Cutler and Glaeser (1997) notes the problems of endogenous segregation and endogenous migration. The paper has four limitations: first, its instrument, rivers, is not strongly predictive of segregation; second, the measure of rivers is known (Hoxby 1994) to be predictive of other city characteristics such as intergovernmental competition;

third, the substitute predictor that is used, number of governments, may both drive other outcomes such as competition and may itself result from segregation; finally, by looking at teenagers, it circumvents selective migration by the individuals observed in the data but leaves unaddressed selective migration by those individuals' parents.

Unlike rivers, railroads predict division on a small scale—at the neighborhood rather than municipal level. This means, first, that they do not separately predict confounding metropolitan characteristics such as intergovernmental competition. Secondly, it means that they identify neighborhood-level segregation, which is the level that the literature has generally considered relevant and is the level that segregation indices measure. Most importantly, railroad division strongly and robustly predicts segregation.

My results on the overall effects of exogenous segregation demonstrate that, consistent with observed correlation, greater segregation causes cities to have black populations with worse present-day characteristics, both at the top and the bottom of the education/income distribution. Within the white population, segregation results in worse characteristics at the top of the skill distribution and better characteristics at the bottom. This relationship is obscured in cross-section, probably because other local characteristics that lead to broader inequality also lead to more segregation.

My results when looking separately at production and migration suggest that better characteristics for low-skilled whites in more segregated cities result from differences in segregated production. For example, it may be that low-skilled whites benefit from exposure to more high-skilled individuals in segregated cities, since they are isolated in a racial group that has higher average skill. Alternatively, low-skilled whites in segregated cities may receive a larger portion of redistribution because segregation facilitates the targeting of resources by race.

Worse characteristics for high-skilled whites in more segregated cities result at least partly from high-skilled white migration away from those cities. Differential public goods production and migration cannot be distinguished as explanations for the worse characteristics of blacks in segregated cities. For all groups, there is no evidence of preferences for segregated cities, and there is some evidence that Americans on average prefer integration.

The evolution of U.S. segregation

In the 19th century, very few African-Americans lived outside of the South.[1] This changed rapidly during the Great Migration (roughly 1915 to 1950), when large numbers of African-Americans migrated into Northern and Western cities from the South. Cities became highly segregated as their urban black populations grew (Cutler, Glaeser, and Vigdor 1999).

The U.S. government has long been interested in housing segregation. In the first half of the 20th century, policy focused on the stability of the housing market: stable residential composition was considered both a private and a public good, and interracial movement was considered a negative externality on neighbors. Therefore segregation was encouraged by neighborhood policies, such as restrictive covenants; city-level policies, such as racial designation of public housing; and federal policies, such as

[1] In addition, the few that did weren't segregated (Weaver 1955).

racially targeted lending by the Federal Housing Administration[2] (Massey and Denton 1993).

Government policy towards segregation changed gradually during the civil rights era. A clear break in housing policy came in 1968 with the Fair Housing Act. This law, among other regulations, made it generally illegal for real estate agents to discuss a neighborhood's racial composition (Massey and Denton 1993). Subsequent stated government policies on housing segregation have been neutral or have explicitly endorsed integration.

It is unclear to what extent Americans have tastes for integration or segregation. Some research suggests tastes for integration. Survey data from the Multi-City Study of Urban Inequality (Bobo et al. 1994) show that many blacks and some whites state strong (i.e. not weak) preferences for non-homogeneous neighborhoods. Twenty percent of African-Americans and three percent of whites (roughly equal populations) state that they would be *unwilling* to move into a neighborhood that was 100% their own race, and would instead prefer a racially mixed neighborhood (Ananat and Siegel 2002). While survey data are of unknown reliability, at a macro level, the U.S. population has in recent years been migrating to less-segregated cities (Glaeser and Vigdor 2001).

At the neighborhood level, however, cities continue to have high degrees of segregation, even if those levels are decreasing slightly over time (Cutler, Glaeser and Vigdor 1999). Substantial empirical evidence suggests that Americans continue to choose homogeneous neighborhoods. A randomized-experiment telephone survey suggests that whites on average are less willing to hypothetically buy a house in a

[2] For example, the 1939 Federal Housing Adiministration *Underwriting Manual* states, "If a neighborhood is to retain stability, it is necessary that properties shall continue to be occupied by the same social and racial classes." Quoted in Massey and Denton (1993), p. 54.

neighborhood with some blacks than in a neighborhood with none, even when given the same information about property values, school quality, crime, and other neighborhood characteristics (Emerson et al. 2001).

Blacks may also have tastes for segregation. Bayer, Fang, and McMillan (2005) find that an increase in a city's black middle-class population exacerbates housing segregation. They argue that, upon achieving a critical mass, middle-class blacks move out of white and poor neighborhoods and form exclusively middle-class black neighborhoods. This finding suggests that many middle-class blacks prefer all-black middle-class neighborhoods to all-white middle-class neighborhoods. In addition, Goering et al. (2002) find that when low-income African-Americans are given housing vouchers as part of the federal Moving to Opportunity program and required to move to low-poverty neighborhoods, participants choose majority-black non-poor neighborhoods. This suggests that poor blacks may also prefer middle-class black neighborhoods to middle-class white neighborhoods.

Two explanations can reconcile the survey and macro-level evidence that people prefer integration with the micro-level evidence that they choose segregated neighborhoods. First, attempts to provide integration may suffer a collective action problem. Schelling's (1971) model of the collective-action problem of tipping originated in his study of neighborhood segregation: he found that even when agents have relatively weak tastes for those like themselves, cities with initially random racial distributions end up with perfectly segregated neighborhoods. Ananat and Siegel (2002) update this model to include the range of pro-diversity preferences reported in the Multi-City Study of Urban Inequality, and find that it still implies significant equilibrium segregation.

Further, they find that equilibrium segregation is significantly higher when agents start out partially segregated—as they were in the post-Fair Housing Act United States—rather than randomly distributed.

These theoretical findings suggest that if some or all of a city's residents have tastes for integration, but within the metropolitan area their housing consumption is constrained by a choice set of segregated neighborhoods, then individuals may be observed making segregation-reinforcing decisions. Such an explanation would reconcile expressed tastes for integration, and high demand for more integrated cities, with persistent neighborhood-level segregationist choices by individuals.

The other potential reconciliation of the conflicting evidence on tastes for integration places less emphasis on suspect self-reported preference data. Integrated cities may be more efficient than segregated cities. This would lead to higher demand for those cities. Higher efficiency could result from any number of processes. For example, integrated cities could generate more engaged citizens, reducing free-rider problems. Iintegrated neighborhoods could foster less crime. High and low skills could be substitutes in the production of public goods, so that separating blacks (relatively low-skilled) from whites (relatively high-skilled) in neighborhood public good production is inefficient.[3]

These two possibilities—that people have tastes for integration and that integration produces better outcomes—are complementary. After initial assignment to a city with a given level of segregation, rational agents sort away from that city based both

[3] In theory, the productivity of segregation relative to integration is ambiguous in sign. For example, Tiebout sorting suggests that, if demand for neighborhood public goods varies less within race than within an entire city, then segregation is efficient. Segregation would also be efficient if high and low skills are complements in the production of public goods. Only the hypothesis that segregation is less efficient, however, is supported by the empirical findings.

on tastes *and* on the efficiency cost of segregation. Since willingness to pay is a function of income, high types select into integrated cities, reinforcing the correlation of integration and productivity.

In order to understand why segregated cities have worse outcomes, it is first necessary to remove omitted variable bias in the form of unobserved city characteristics; doing so allows identification of the effects of segregation on specific *places*. In addition, it is necessary to sort out the production effects of segregation from the results of general-equilibrium sorting between cities by type; this additional step allows identification of the effects of segregation on individual *people*.

Part I. The Effects of Segregation on Cities

Empirical Strategy

Segregation can be modeled as a classic endogenous regressor affecting outcomes at the city level:

(1) $Seg = \alpha_1 Z + \alpha_2 X + \mu$

(2) $Y = \beta_1 Seg + \beta_2 X + \varepsilon$

and then estimated using two-stage least squares analysis. The right-hand side variable of interest in equation (2), Seg, represents a city's current level of segregation. Segregation is captured by a dissimilarity index, which measures the difference between the distribution of blacks by neighborhood and their total representation in the metropolitan area as a whole. Dissimilarity is defined as:

(3) Index of dissimilarity $= \frac{1}{2}\sum_{i=1}^{N}\left|\frac{black_i}{black_{total}} - \frac{nonblack_i}{nonblack_{total}}\right|$

where $i = 1 \ldots N$ is the array of census tracts in the area. It can be considered the answer to the question, "What percent of blacks (or non-blacks) would have to move to a different census tract in order for the proportion black in each neighborhood to equal the proportion black in the city as a whole?" Note that an index of zero is improbable in the absence of central planning.

Outcomes, represented by *Y* in equation (2), include the proportions of a city's blacks and whites who are poor, unemployed, high-school dropouts, college graduates, or who have household incomes above $150,000. The first three outcomes should reflect primarily characteristics of a city's low-skilled population, who are more likely to be on the margin of poverty, unemployment, and dropping out of high school. The last two outcomes should reflect primarily characteristics of a city's high-skilled population.

The instrument, *Z*, is a city's railroad-induced potential for segregation. Measuring *Z* requires quantifying the extent to which the city's land is divided into smaller units by railroads. I define a "railroad division index," or RDI, which is a variation on a Herfindahl index that measures the dispersion of city land into subunits.

$$(4) \quad RDI = 1 - \sum_i \left(\frac{area_{neighborhoodi}}{area_{total}} \right)^2$$

If a city were completely undivided by railroads, so that the area of its single neighborhood was 100% of the total city area, the RDI would equal 0. If a city were infinitely divided by railroads, so that each neighborhood had area near zero, the RDI would equal 1. The more subdivided a city, the more "sides" there are to its tracks, and the more possible boundaries between groups are available to use as barriers enforcing segregation. In particular, if railroads created many small neighborhoods that adjoin each other, it would have been possible during the Great Migration to relieve pent-up housing demand by allowing a ghetto to expand into an adjacent neighborhood, while still maintaining a new railroad barrier between the ghetto and the rest of the city. This should have facilitated persistent segregation even as the black population increased.

For variation in railroad configuration to be a valid instrument for segregation, it must result from random factors, such as minor variations in gradient, natural resource location, or direction to the next city—factors that amount to noise in aggregate. Any factors that drive both railroad configuration and city outcomes must be included as controls. X denotes a vector of city characteristics that affect railroad configuration and city outcomes. The most important of these is total track length, because there is a mechanical correlation between the total length of track and the division of the city by track. If total length of track is related to other features of the city, such as industrial composition or land quality, then length of track may predict city outcomes on its own, not because of the way track divides the city. Therefore all regressions in the paper control for total track length. The estimated causal effect of railroad division on outcomes through segregation can be interpreted as the effect conditional on total track.

Other possible confounding factors include: manufacturing share—more manufacturing-oriented cities may differ in their routing of railroads; region—cities in the Northeast or Midwest may have different geography and different outcomes from those in the West; and black population inflows—African-Americans may have chosen cities based on different tastes for railroad breakup. I perform specification checks to test for explanatory power of these possible confounders. I run regressions including either 1920 manufacturing share or region dummies. I also instrument for black population inflows using data from Dresser (1994). She demonstrates that during World War II, some cities received larger war contracts per capita than others, leading to larger labor shortages in some cities than in others. She further shows that larger per-capita war contracts predicted higher inflows of African-Americans during World War II. I draw on Dresser's work by using per-capita war contracts as an instrument for greater black inflows during the Great Migration and including it in reduced form as a control in the analysis.[4]

Railroad division would also be an invalid instrument if it predicted city outcomes prior to the Great Migration, since a necessary identifying assumption is that division affected cities only by facilitating segregation of significant African-American populations. To test this assumption, I estimate equations (1) and (2) using pre-Great Migration city characteristics as dependent variables. These pre-period "outcomes" include labor force participation rate, average income, population, physical city size, percent black, and literacy rate.

I examine the characteristics of cities' black and white populations separately, since these groups would not be expected to respond identically to segregation. The two-stage least squares estimate allows me to measure the causal effect of railroad-induced segregation on city outcomes. The difference between the two-stage and ordinary least squares estimates can provide a sense of whether segregation that occurs endogenously is

[4] Railroad-induced segregation technology should have proved differentially useful in cities with high exogenous inflows of blacks. In cities with large exogenous changes in African-American population, which therefore had high demand for segregation, available segregation technology would have made more of a difference in the resultant degree of separation of blacks and whites. In cities with low inflows, where segregation did not become a salient demand, differences in the technology for producing segregation would have been less relevant to the equilibrium dispersion of blacks and whites and to city outcomes. This has the empirical implication that railroad subdivision should matter more in cities where a rapidly increasing black population increased whites' utility of segregation. Unfortunately, the railroad division index and the proxy for WWII labor shortage do not provide enough power to estimate that interaction. I therefore confine my estimates to the main effect of each, by controlling for per-capita war contracts in the standard regression specification.

obscuring or intensifying the observed correspondence between segregation and group characteristics.

Data

Sample

My major data sources are U.S. Census Bureau reports on metropolitan demographics (various years), information on 19th century railroad configuration extracted from archival maps, measures of metropolitan segregation from Cutler and Glaeser (1997), and a replication of Dresser's data using city-level total war contracts and total population information from the 1947 County Data Book.

My sample of cities is chosen as follows. I limit the sample to urban areas that were designated as MSAs in at least one recent[5] decennial Census and have at least 1000 black residents. I also only include MSAs in states that were not slave-owning at the time of the Civil War, because these were the states that had few African-Americans prior to the Great Migration.[6] My sample was limited by the set of historical maps held by the Harvard Map Library.[7] My final sample consists of 134 urban areas.

Maps

The maps that provide railroad placement information were created by the U.S. Geological Survey as part of an effort to document the country's topography, beginning

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[5] 1980, 1990, or 2000.

[6] Specifically, I exclude Delaware, Maryland, Washington, DC, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Tennessee, Kentucky, Missouri, Texas, and Arkansas. Nearly 90% of African-Americans resided in one of these states in 1910 (author's calculation from 1910 IPUMS data).

[7] The library depends on donations and estate purchases, etc., to collect maps, and therefore there are gaps in its collection. The cities for which the library could not provide maps tend to have been smaller cities in the 19th century but otherwise do not appear different in either historical or current characteristics.

in the 1880s.[8] These maps display elevation, bodies of water, roads, railroads, and (in many cases) individual representations of non-residential buildings and private homes.[9] The edges of a 15-minute map are defined in round 15-minute units, so that, for example, a map will extend from -90°30'00" longitude and 43°45'00' latitude (in the southeast corner) to -90°45'00' longitude and 44°00'00' latitude (in the northwest corner) (approximately 22 kilometers by 28 kilometers).

The USGS completely surveyed the United States in 15' increments, but the Harvard Map Library collection does not include all of the maps that the USGS produced. Therefore there are 77 cities in non-South states available in the Cutler and Glaeser data for which I do not have the necessary map observations. In addition, in 15 cities I observe only some fraction of the four-kilometer-radius land area I wish to observe, since they overlap two or more 15-minute areas and I have maps only for some subset of those areas. Finally, in 40 cases the city overlaps multiple areas and I observe all of the areas.

The process of extracting railroad information from the maps is illustrated in Figure 2. For each city, its map or maps were used first to identify its physical size, shape and location at the time its map was made. A Geographic Information Systems program, ArcGIS, was used to create a convex polygon that was the smallest such polygon that could contain the entire densely inhabited urban area. Dense habitation, defined as including any area with houses and frequent, regular cross-streets, was

[8] The median map year in my sample is 1909, prior to the start of the Great Migration. The observations in the maps should primarily reflect 19th century railroads, since 75% of the total track laid in the United States was in place by 1900 (Atack and Passell 1994, p. 430)

[9] In some cities with relatively dense areas, some center-city blocks are marked as continuously inhabited, rather than showing individual structures. The outskirts of every inhabited area, however, do show individual structures.

identified by visual examination. ArcGIS was then used to identify the centroid of this polygon, and this point was defined as the historical city center. A four-kilometer radius circle around this point became the level of observation for the measurement of railroads. This approach meant that differences in initial city area would not distort the measurement of initial railroads: cities that were, at the time, very small would still be coded with railroads that affected later development, after the population had expanded; cities that were already large would have only those railroads in their center cities included. It should be noted, however, that about 75% of the cities were smaller than 16π square kilometers when mapped, and many were much smaller, so for most cities this measure includes railroads that were laid on unoccupied land without need to consider habitation.

Visual examination reveals that the historical city center created in this way is typically quite close to what would be identified as the current city center if using a current map. Within this four-kilometer circle, every railroad was identified, its length measured, and the area of the "neighborhoods" created by its intersections with each other railroad calculated. Historical railroads predict the borders of current neighborhoods as identified by the Census quite well. The actual land area within the circle was also calculated, so that measurement could be adjusted for available observed land when working with maps that truncate city observations or include substantial bodies of water.

Segregation Indices

I use the Cutler/Glaeser/Vigdor segregation data provided online by Vigdor (2001). These data come from various decennial Censuses, and include 19^{th} and 20^{th} century historical segregation indices and metropolitan characteristics from Cutler and Glaeser (1997), 1990 GIS-dependent measures of segregation based on Census data from Cutler et al. (1999), and additional data from the 2000 Census from Glaeser and Vigdor (2001). These data include dissimilarity indices for every decade from 1890 to 2000. In addition, they provide four other measures of segregation, all based on those developed in Massey and Denton (1988). These include an index of isolation, available for every decade from 1890 to 2000, which provides a different way to organize the same information contained in the dissimilarity index and is highly correlated with the dissimilarity index. Supplementary measures of clustering, concentration, and centralization—all of which rely on data about the geographical proximity, size, and location of a city's census tracts—are available for 1990. Dissimilarity is the standard measure of segregation in the literature, and I use the dissimilarity index throughout the paper, while also testing the robustness of my instrument to alternative segregation measures.

Census Measures of Urban Characteristics

I collect city outcomes from published Census reports (U.S. Census Bureau 2005). Although at the time that tracks were laid each of these cities was physically separated by open space from other cities, over the last century urban growth has meant that many once-distinct metropolitan areas are now conglomerates. To surmount this problem, I collect data for the reporting area which best centers on the original city center without containing other original city centers.

Thus I use MSA-level data for the 64 cities that have remained independent MSAs. For MSAs in which multiple city centers are each in a separate county, I assign to each city the characteristics for the county that holds that city's original urban center. Doing so allows me to differentiate between the effect of an original center on its county level outcomes and the combined effect of several centers on MSA-level outcomes (e.g. outcomes for the New York-Northern New Jersey-Long Island Consolidated MSA). Fifty-three cities are in unique counties but share an MSA with at least one other city. Finally, for the 17 cities that share a single county with another city, I assign the characteristics of the politically-defined city itself to the observation. I use Census data collected at these MSA, county, or municipal levels to derive city outcomes including education, labor force characteristics, poverty, and distribution of income.

Results

First stage

Table 1 shows that, controlling for track per square kilometer in the historical city center, the neighborhood RDI generated by the configuration of track strongly predicts the metropolitan dissimilarity index in the period 1980 to 2000. Adding a control for pre-period manufacturing composition does not significantly affect the relationship between railroad division and current segregation.[10] Nor does adding per-capita war contracts as a proxy for exogenous black inflows. The regression in column 4 includes Census region

[10] Regressions that instead use later measures of manufacturing share (1970 and 1998) produce similar results. These regressions should, if anything, bias the effect of manufacturing on outcomes toward greater significance (Acemoglu, Johnson, and Robinson 2001).

dummies; the coefficient on the RDI remains positive and significant. As seen in Table 2, the RDI similarly positively predicts other aspects of segregation, including isolation, clustering, concentration, and centralization. The effects of the RDI on three of these four facets of segregation are highly significant.

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Main results: The impact of segregation on city outcomes

Table 3 shows ordinary least squares and two-stage least squares estimates of the effects of racial segregation on a variety of urban characteristics. Black outcomes and white outcomes are shown separately. Table 3 also includes overall city outcomes, but these are strongly driven by white outcomes, since white populations numerically dominate black populations.

The top panel of Table 3 demonstrates that segregation causes a city's low-skilled whites to have better characteristics. White unemployment and poverty are lower, and whites are less likely to be high-school dropouts; the former two effects are significant. In contrast, segregation causes a city's black population to have worse characteristics; in particular, they have much higher poverty rates. The effects of segregation on black unemployment and proportion of adults who are high-school dropouts, however, are not significant.

The bottom panel of Table 3 shows that segregation has negative effects on the characteristics at the upper end of the skill distribution. Segregation significantly lowers the fractions of a city's blacks and whites who are college graduates, as well as the fractions of white and black households with more than $150,000 in income. The negative effects on these characteristics for whites are as large as or larger than for blacks.

Specification checks

Table 4 displays the results of regressions predicting city characteristics before they experienced significant African-American inflows using railroad division. Unfortunately measures of city characteristics prior to the 1920 Census (just after the beginning of the Great Migration) are too noisy to be of use, but using data from 1920, after the start of the Migration, should bias specification tests toward failure. As shown in Table 4, the RDI predicts neither 1920 labor force participation, average income, population, physical city size, nor percent black. The RDI has a marginally significant relationship with literacy rate in an unexpected direction—more railroad subdivision corresponds to higher literacy.

II. The effects of segregation on individual outcomes

To what extent are these differences in present-day city characteristics driven by sorting of individuals across cities in response to segregation? To what extent are they driven by the direct effect of segregation on the production of health, human capital, and productivity? To distinguish between the effects of segregation on individuals and equilibrium sorting of individuals by race and skill, it is helpful to briefly examine the theoretical relationships between tastes, skills, production, and residential choice.

Theory

Assume two small open-economy cities that exist for two generations. City I has railroad technology such that it will have two perfectly racially integrated tracts, while city S has railroad technology such that it will have two perfectly racially segregated tracts (See Figure 4a for an illustration). In all other ways, these two cities are identical.

At time zero, corresponding to the Great Migration, each city is randomly assigned the same population of measure one, β of which is black and $1-\beta$ white. There are two types of residents, high and low, such that the high types receive wage H, relative to a low-type wage that is normalized to 1. Even assuming some wage discrimination, it is appropriate to infer from the data that at time of the Great Migration the proportion of blacks who are high types, p_{hb}, is lower than the proportion of whites who are high types, p_{hw}.

Production of types in the next generation depends on the type mix of current neighborhood residents. This implies that type is a neighborhood-level public good. It could represent education, health, connectedness to a job network, political influence—anything that varies at the individual level but might depend on the mix of characteristics of a neighborhood's elder generation. In particular, consider the following public-good production function:

$$p_{H2} = \lambda p_{H1}^{\alpha}$$

where $\alpha \geq 0$, λ is a scaling parameter, and p_{H1} and p_{H2} are a neighborhood's proportion high-type in the first and second generations, respectively.

The parameter α reflects the complementarity or substitutability of types in the production of next-generation type. If $\alpha < 1$, the production of high-type offspring is concave in the percent high type in the current generation, meaning that types are substitutes. If $\alpha > 1$, the production of high-type offspring is convex in the percent high type in the current generation, meaning that types are complements. (See Figure 4b for an illustration.) The complementarity or substitutability of types has important implications for the economic efficiency of segregation.

If residents cannot move between cities—i.e., moving costs are greater than high-skilled income—we need go no further. Tastes or distastes for integration will be irrelevant, the high-skilled will not be able to migrate differently from the low-skilled, and housing demand will not differ by city. Observed differences in proportion high-skilled in the second generation can be interpreted as resulting from the relative productivity of segregation. As long as $\alpha > 0$, whites in S will have higher p_{H2} than whites and blacks in I, who in turn will have higher p_{H2} than blacks in S. If $\alpha > 1$, so that types are complements, then the weighted average p_{H2} in S will be greater than the weighted average p_{H2} in I—implying that segregation is more efficient than integration. If $\alpha < 1$, so that types are substitutes, then the weighted average p_{H2} in S will be smaller than the weighted average p_{H2} in I—implying that integration is more efficient than segregation.

However, if moving cost C is low enough that migration between cities occurs, then the picture becomes more complicated. Race, income, tastes or distastes for integration, intergenerational altruism, and the elasticity of housing supply will affect individuals' choice of city. To explore these complications, allow a parameter *a* to represent taste (if positive) or distaste (if negative) for integration, and assume that individual utility is:

$$U = \ln(wage) + (a \mid residence in I)$$

Consistent with survey evidence, *a* varies continuously, takes on both positive and negative values, and is distributed differently by race. A simple parameterization that captures these attributes is to define *a* as distributed uniformly on the interval $[\underline{a}_{w}, \bar{a}_{w}]$ for whites and $[\underline{a}_{b}, \bar{a}_{b}]$ for blacks.

In the absence of housing discrimination and with a flexible neighborhood delineation, we can assume that the housing market clears on the city level. Initially, with equal population of measure 1 in each city, the price of housing in city I relative to city S can be normalized to 0. To avoid an unrealistic corner solution in which everyone resides in one city or the other, it is desirable that the relative price of housing in city I approach infinity as city population approaches 2 and approach negative infinity as city population approaches 0. A simple parameterization that captures these three characteristics of the housing market is:

$$R = \eta\left(\frac{\frac{1}{2} - T}{T(T-1)}\right)$$

where R is the rent that must be paid (or subsidy received) each generation, η is a scaling parameter, and T is the total population of city I (see Figure 4c for an illustration).

To capture individuals' interests in the difference in public goods production by segregation and race, assume that each individual is altruistic towards an offspring in the second generation who shares taste parameter *a*. The individual's problem, then, is to maximize, by choosing I or S, the value of his own utility plus the expected value of his offspring's utility, which is discounted at rate δ.

In equilibrium, the proportion of each of the four groups of individuals (high- and low-type blacks and whites) choosing I should be in the interval (0,1), since we never in fact observe cities entirely missing one of these demographics. Within race and type, individuals will sort by preferences, so that the individual with preference a^* is indifferent between the two cities, while those with $a > a^*$ choose city I and those with $a < a^*$ choose city S.

For example, an individual who is black and of high type will be indifferent between cities I and S if he has taste for integration $a_{hb}*$ such that:

$$\ln w_{I,1} + \frac{E\ln[w_{I,2}]}{1+\partial} + \frac{2+\partial}{1+\partial} a_{hb}* = \ln w_{S,1} + \frac{E\ln[w_{S,2}]}{1+\partial} \quad (1)$$

where $w_{city,1}$ is the net wage in period 1 after paying rent and moving costs, if any:

$$w_{I,1} = H - R[T] - (C \mid residence_0 = S) \quad (2)$$

$$w_{S,1} = H - (C \mid residence_0 = I) \quad (3)$$

and $E\ln[w_{city,2}]$ is the expected utility of the net wage in generation 2:

$$E\ln[w_{I,2}] = \left(\frac{\beta p_{bh} b_H + (1-\beta) p_{wh} w_H}{T}\right)^{\alpha} \ln(H - R[T]) + \left(1 - \left(\frac{\beta p_{bh} b_H + (1-\beta) p_{wh} w_H}{T}\right)^{\alpha}\right) \ln(1 - R[T]) \quad (4)$$

$$E\ln[w_{S,2}] = \left(\frac{(1-b_H) p_{bh}}{(1-b_H) p_{bh} + (1-b_L)(1-p_{bh})}\right)^{\alpha} \ln(H) + \left(1 - \left(\frac{(1-b_H) p_{bh}}{(1-b_H) p_{bh} + (1-b_L)(1-p_{bh})}\right)^{\alpha}\right) \ln(1) \quad (5)$$

Since half of each group is initially assigned to each city, the equilibrium condition for high-type blacks can be rewritten as:

$$\frac{2+\partial}{1+\partial} a_{hb}* = \tfrac{1}{2}\ln(H - C) + \tfrac{1}{2}\ln(H) + \frac{E\ln[w_{S,2}]}{1+\partial} - \tfrac{1}{2}\ln(H - R[T] - C) - \tfrac{1}{2}\ln(H - R[T]) - \frac{E\ln[w_{I,2}]}{1+\partial} \quad (6)$$

Because taste for integration is distributed uniformly, the fraction b_H of high-type blacks choosing to live in I satisfies:

$$1-b_H = \frac{a_{bh}^* - \underline{a_b}}{\overline{a_b} - \underline{a_b}}, \text{ or } a_{hb}^* = \left(1-b_H\right)\left(\overline{a_b} - \underline{a_b}\right) - \underline{a_b} \tag{7}$$

Therefore equation (6) can be rewritten:

$$\frac{2+\partial}{1+\partial}\left(\left(1-b_H\right)\left(\overline{a_b}-\underline{a_b}\right)-\underline{a_b}\right)=\tfrac{1}{2}\ln\left(H-C\right)+\tfrac{1}{2}\ln\left(H\right)+\frac{E\ln\left[w_{S,2}\right]}{1+\partial}-\tfrac{1}{2}\ln\left(H-R[T]-C\right)-\tfrac{1}{2}\ln\left(H-R[T]\right)-\frac{E\ln\left[w_{I,2}\right]}{1+\partial} \tag{8}$$

Solving for b_H:

$$b_H=\frac{\overline{a_b}-\frac{1+\partial}{2+\partial}\left(\tfrac{1}{2}\ln\left(H-C\right)+\tfrac{1}{2}\ln\left(H\right)+\frac{E\ln\left[w_{S,2}\right]}{1+\partial}-\tfrac{1}{2}\ln\left(H-R[T]-C\right)-\tfrac{1}{2}\ln\left(H-R[T]\right)-\frac{E\ln\left[w_{I,2}\right]}{1+\partial}\right)}{\overline{a_b}-\underline{a_b}} \tag{9}$$

The term in parentheses can be interpreted as the net present value of the difference in utility from income in city S relative to city I for high-type blacks. The fraction of high-type blacks choosing city I will decrease as the net present value of this difference increases relative to the range of preferences for integration. An equation parallel to equation (9) can be written for each group.

Thus we have four indifference equations and four unknowns—the proportions (b_H, w_H, b_L, and w_L) of each group that choose the integrated city—so we can solve for the equilibrium populations, generation 2 proportion high-type, and rent differential. Because these equations are of the form $x\ln(x)$, they do not have closed-form solutions. Instead, they can be solved numerically for given parameter values.

Without making parametric assumptions necessary to solve the model, several implications are clear. If, in equilibrium, rents are lower in cities with more exogenous segregation, then either segregation is unproductive or people on average have strong tastes for integration. If, in addition, it is observed that in equilibrium a racial group has more positive outcomes in more segregated cities and faces lower rent in these cities, it is evident that segregation is productive for that group, but that the group has average tastes in favor of integration. On the other hand, if a group has worse outcomes in more segregated cities and pays lower rents, it is unclear whether those with lower unobservable type are sorting into more segregated cities because of the lower costs or whether the cities actually produce worse outcomes. Finally, the model has a specific prediction in terms of the relative production effects by race: since blacks start out with a lower type distribution, segregation must produce relatively worse outcomes for blacks than for whites. Any effect on white characteristics that is more negative than the corresponding effect on blacks must be due to sorting.

Extrapolating to a multigenerational context, sorting recurs every generation, since type is not perfectly inherited. That is, migration persists even in equilibrium, as offspring who find themselves with different type than their parents re-sort so that the housing market clears. The signed equilibrium conditions can be used to make inferences from the patterns that emerge in the empirical results.

Empirical Strategy

To apply the equilibrium conditions concerning prices and housing demand to the data, segregation is again treated as an endogenous regressor affecting city-level outcome Y, as in equations (1) and (2). Here, however, these outcomes are city average housing prices and net population flows by demographic group. I test whether the population flows of each race or race and skill group are positive or negative, and also whether the group faces relatively high or low rent and mortgage costs.

Differences in housing costs would not be a valid measure of city demand if they are driven by variation in the cost of living or by the amount of housing consumed in more versus less segregated cities. To test for this possibility, I examine costs as a percent of income and I examine household crowdedness. Combining these results with the findings on group outcomes allows the testing of the equilibrium conditions derived above.

Differences between the overall change in a city's skill distribution and that explained by migration represent the city's production of skill. For example, the percent change in a city's population of young high school dropouts, conditional on net migration of young high school dropouts, can provide an upper bound for the effect of city production on the size of the low-skill population. A similar argument holds for college graduates. By breaking down these differences by race, the race-specific production effects of segregation can be measured.

Data

I again use published Census Bureau (2000) reports of urban characteristics by race. These include median rent and mortgage costs, costs as a percent of income, percent of households with more than one person per room, and proportion of residents who are new to the area. Unfortunately, aggregate Census data do not allow me to distinguish racial migration patterns by education level. They also do not report out-migration, which is required to identify net migration (since population change data combine in- and out-migration with births and deaths). To identify out-migration and characteristics by race-skill group, I use Census microdata (Ruggles et al. 2004) that I aggregate to the urban level. However, Census microdata only identify a subset of urban locations, and represent a 5% sample of the population. Both of these limitations reduce the precision of my estimates.

Results

Table 5 shows migration and housing market characteristics by race from 2000 Census statistics reported at the urban level. More segregated cities have significantly fewer new residents, both black and white. The effect on black in-migration is larger than the effect for whites.

Unfortunately, because the Census does not supply data on out-migration, I cannot distinguish between low demand and low supply as explanations for this result. It may be that there are fewer new residents because out-migration is lower, leading to few vacancies. However, the evidence on housing values in Table 5 suggests that segregated cities are in fact in less demand. First, more segregated places have significantly lower rents, lower mortgage costs, and lower home values. These effects do not appear to be driven by lower cost of living in more segregated cities, since rents are as low or lower as a fraction of income (significantly lower for whites). Lower expenditures on housing also do not seem to reflect lower consumption of housing in more segregated cities; blacks and whites in more segregated cities are significantly less likely to live in crowded homes.

Table 6 shows migration data by race and education for young adults (age 22 to 30), created from IPUMS (Ruggles et al. 2004) individual Census microdata. Consistent with the aggregate data in Table 5, individual-level data also show lower rents in more segregated cities. Unfortunately, the microdata cannot give precise enough estimates to distinguish total population change from that change induced by net migration. Therefore, these data cannot separately identify production effects and the effects of general equilibrium sorting by race and education. I hope to further explore these separate effects using restricted-use Census microdata in future research.

Discussion

Low-skilled whites are better off in more segregated cities: they are less likely to be poor or unemployed, and they pay lower rent for better housing. Nonetheless, they do not appear to be migrating towards segregated cities—the causal estimates of segregation on migration of white high-school graduates and dropouts are negative and insignificant. This suggests that more segregated cities produce better outcomes for low-skilled whites. The mechanism or mechanisms through which this production occurs remains an open question.

More segregated cities have a higher percentage of blacks who are poor. Their white and black populations have fewer college graduates and fewer households with very high income. The data cannot distinguish with certainty between sorting and production explanations for these groups. However, the fact that the causal estimates for high-skilled white education and income are as large as or larger in magnitude than those for high-skilled blacks suggest, according to the model, that at least some of the white effect is due to migration.

OLS estimates overstate the negative effects of segregation on low-skilled whites and blacks and overstate the positive effects on high-skilled whites. This suggests that other city characteristics that result in greater inequality also imply more endogenous segregation. Such a correlation could arise, for example, if cities that have lower tastes for redistribution also have lower tastes for neighborhood mixing. It does, however, appear that on average Americans have tastes for more integrated cities—such cities are more crowded, demand higher rents, and attract more new residents.

To what extent does racial segregation cause worse city level outcomes? This question has been difficult to answer because of the confounding effects of endogenous segregation and endogenous migration. This paper addresses the first of these two obstacles: it separates endogenous relationships between segregation and city characteristics (such as their correlations with more manufacturing and larger black population) from causal relationships, and demonstrates that segregation causes cities to have low-skilled whites with better characteristics and other populations with worse characteristics. It also sheds light on the second concern: it identifies causal effects on low-skilled whites as the result of differential production rather than migration; it suggests that at least some of the effects on high-skilled white characteristics occur through migration.

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Figure 1.

Binghamton, NY York, PA

19th century railroads, shown in red within the 4-kilometer radius historical city center, divide York, PA into a larger number of smaller neighborhoods than do the railroads in Binghamton, NY. Thus, even though the two cities had similar total lengths of track, similar World War II labor shortages, and similar manufacturing bases (in fact, Binghamton was somewhat more industrial than York), York became more segregated, as can be seen from the smaller, more concentrated area of African-Americans near the railroad-defined neighborhoods at the city's center. Rivers are shown in blue.

Figure 2. Measuring the railroads of Anaheim, CA

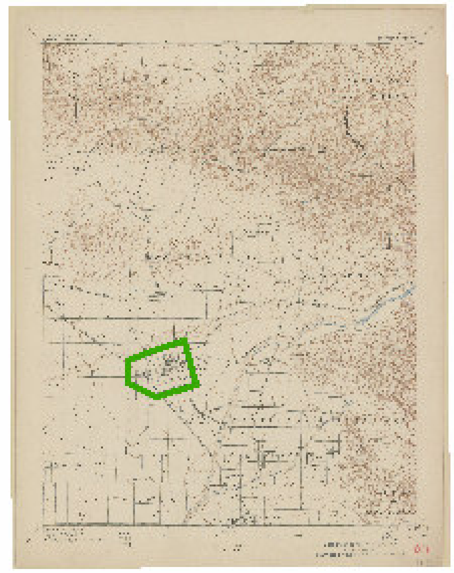


Figure 2a. 1894 15’ map showing Anaheim, CA, which is marked in green.

Figure 2b. The outline of the densely occupied area of Anaheim, defined as dense housing (each house is represented by a dot) and regular streets. The centroid of the occupied area is marked in blue.

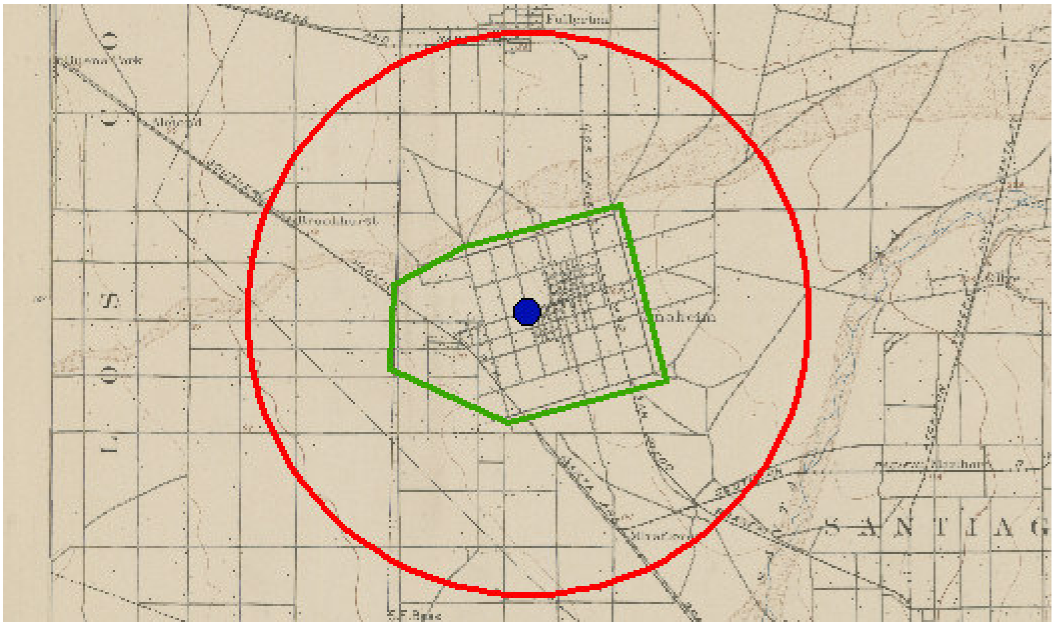


Figure 2c. The historical city center is defined as the 4 kilometer-radius circle around the centroid of the historical city, and is shown here in red.

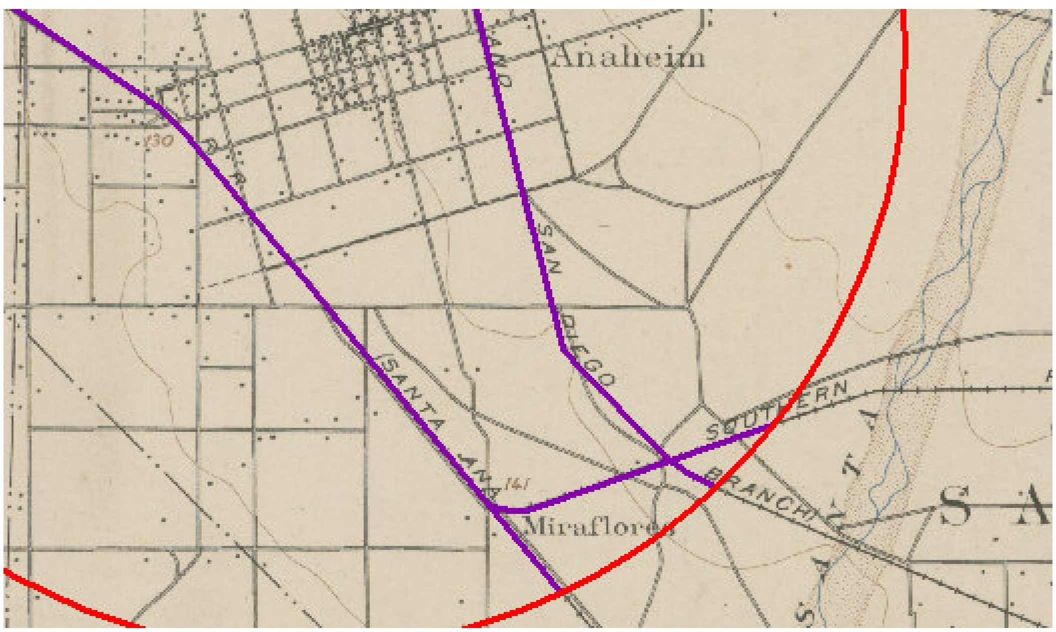


Figure 2d. Every railroad within the 4-kilometer circle is marked and measured—detail is shown here in violet.

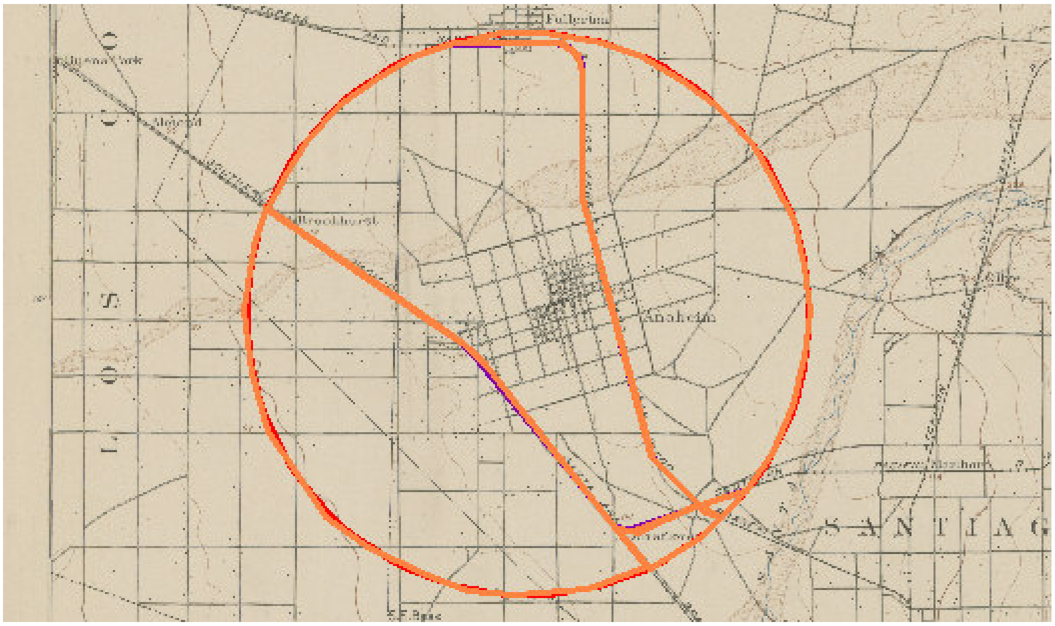


Figure 2e. Neighborhoods are defined as polygons created by the intersection of railroads with each other and with the perimeter. Anaheim contains five neighborhoods, shown here in orange. The area of each neighborhood is calculated and used to calculate a RDI measuring the subdivision of the historical city center.

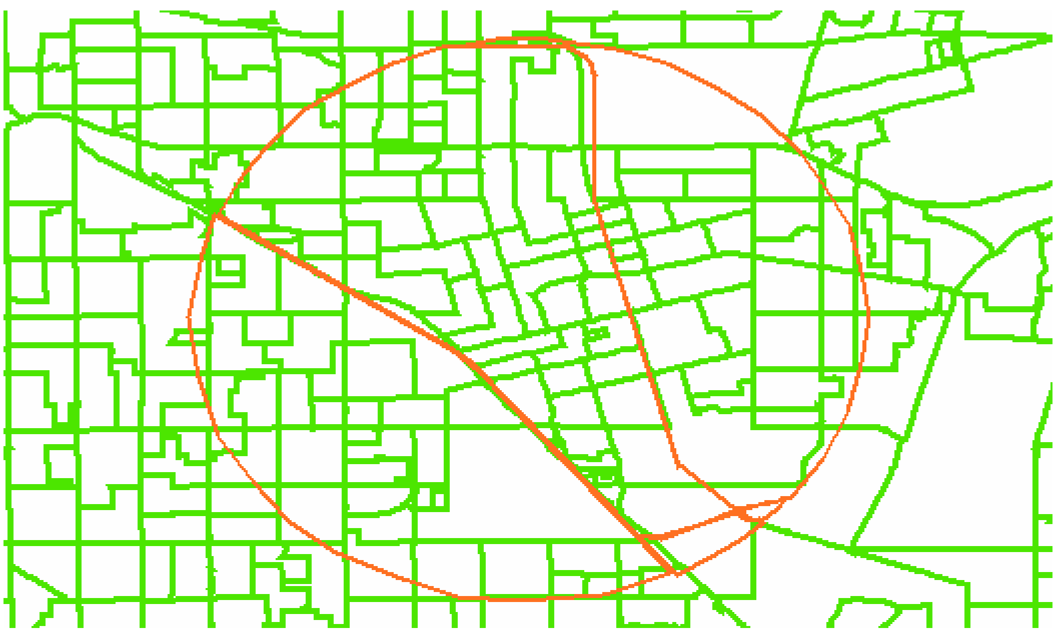


Figure 2f. Year 2000 census tracts are shown in green. Note that current neighborhood borders, as defined by the US Census Bureau in 2000, closely follow historical railroad tracks.

Figure 4. Illustrations for model

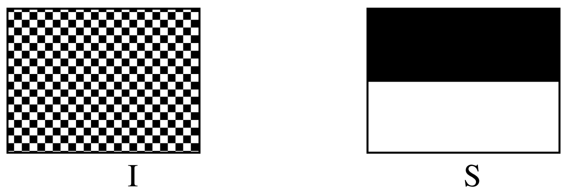
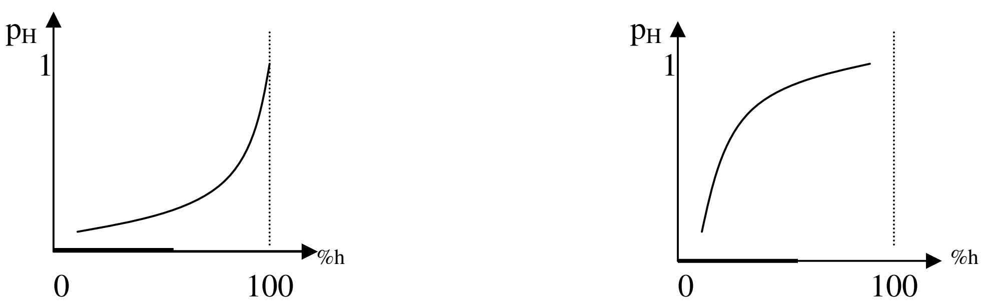


Figure 4a. City I is perfectly integrated (blacks and whites have the same outcomes, determined by the overall city characteristics). City S is perfectly segregated (blacks and whites have different outcomes, determined only by the characteristics of those of their race living in the city.)



n>1: segregation dominates **n<1: integration dominates**

Figure 4b. The convexity of the skill production function with regard to proportion high-skilled in the current generation will determine whether the separating (segregation) or pooling (integration) outcome is more efficient in producing second generation skill. Note, however, that the proportion of high-skill in the next generation is always increasing with the current proportion of skill, so that it is always desirable for an individual to be in a higher-skilled neighborhood. In the absence of perfect markets, then, low-skilled people may be unable to fully compensate high-skilled people to live with them even if pooling is more efficient.

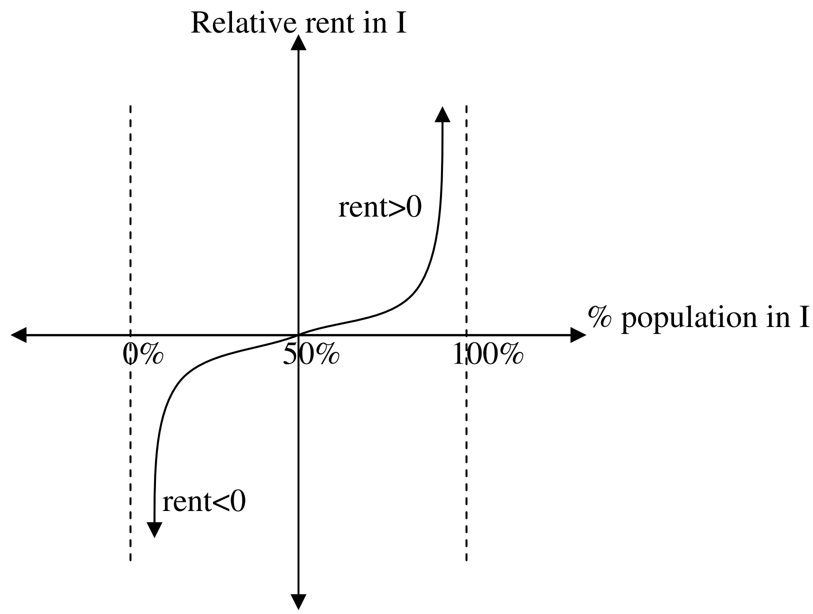


Figure 4c. A basic rent function. Note that the parameter η will determine for what range of populations rent will rise less than population (housing supply is elastic) and at what threshold level rent will begin rising faster (housing supply is inelastic). A smaller η implies elastic housing over a broader range of populations.

Table 1. First stage: Railroad division index as a predictor of current segregation (dissimilarity index)

	(1)	(2)	(3)	(4)
Railroad division index	0.3915**	0.3407**	0.3458**	0.2332**
	(0.081)	(0.083)	(0.073)	(0.076)
track length (km/km^2)	18.7881*	19.5858*	13.7753+	13.7068+
	(9.235)	(9.078)	(8.300)	(8.068)
Per-capita WWII war contracts		0.0101*		
		(0.004)		
% of employment in manufacturing 1920			0.2752**	
			(0.047)	
Region dummies				X
R-squared	0.21	0.28	0.37	0.42

Standard errors in parentheses. N=134.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 2. First stage with Alternative Segregation Measures: Railroad subdivision index as a predictor of current segregation

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Dissimilarity	Isolation	Clustering	Concentration	Centralization
Railroad division index	0.3407**	0.3596**	0.4299**	0.3875*	0.2335
	(0.0825)	(0.1046)	(0.1345)	(0.1529)	(0.1414)
Observations	134	134	121	121	121
R-squared	0.24	0.29	0.28	0.16	0.05

All regressions control for total track length per square kilometer and per-capita WWII war contracts.
Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%

Table 3. The Effect of Segregation on Current City Characteristics

	Overall		Blacks		Whites	
Dependent variable	OLS	2SLS	OLS	2SLS	OLS	2SLS
Lower-tail characteristics						
Poverty rate	-0.0165	-0.1711+	0.2291**	0.3573*	-0.0497*	-0.1721*
	(0.0287)	(0.0930)	(0.0511)	(0.1536)	(0.0217)	(0.0711)
Unemployment rate	0.0028	-0.0794+	0.1119**	0.0222	-0.0105	-0.0657+
	(0.0142)	(0.0467)	(0.0270)	(0.0824)	(0.0105)	(0.0338)
Fraction of adults who are high school dropouts	0.0480	-0.1751	0.3436**	0.0971	0.0602	-0.0701
	(0.0475)	(0.1509)	(0.0546)	(0.1724)	(0.0404)	(0.1232)
Upper-tail characteristics						
Fraction of adults who are college graduates	-0.1956**	-0.3303+	-0.3352**	-0.4035**	-0.1695*	-0.4614*
	(0.0557)	(0.1670)	(0.0440)	(0.1302)	(0.0619)	(0.1967)
Fraction of households with more than $150,000 in income	-0.0341*	-0.0960+	-0.0311**	-0.0496+	-0.0277	-0.1347*
	(0.0169)	(0.0521)	(0.0085)	(0.0255)	(0.0210)	(0.0675)

All regressions control for total track length per square kilometer and per-capita WWII war contracts. Standard errors in parentheses. N=134. + significant at 10%; * significant at 5%; ** significant at 1%

Table 4. Falsification Tests: 1920 Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	Labor Force Participation Rate	Average Income Category	Literacy Rate	Population	Area (mi^2)	Percent Black
Railroad division index	0.0403	-0.0887	0.0429+	312,242	1,036	-0.0029
	(0.0279)	(0.1329)	(0.0241)	(305,958)	(27,741)	(0.032)
Observations	134	134	134	78	72	49
R-squared	0.03	0.01	0.05	0.03	0.00	0.49

All regressions control for total track length per square kilometer and per-capita WWII war contracts. Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%

Table 5. Effect of segregation on migration and housing by race, from aggregate Census data

	Blacks		Whites	
Outcome variable	OLS	2SLS	OLS	2SLS
Proportion of residents who are new to the city since 1995	-0.3783**	-0.5804**	-0.1705**	-0.2175**
	(0.0683)	(0.2070)	(0.0260)	(0.0774)
Median monthly rent	-412.6272**	-770.3659**	-348.2157**	-847.8479**
	(73.42)	(234.33)	(89.18)	(291.62)
Median home value	-198,549**	-404,682**	-137,381**	-463,138**
	(34,273)	(113,725)	(46,467)	(160,093)
Median home expenses w/mortgage	-1,007**	-2,243**	-490*	-1,972**
	(198)	(662)	(222)	(755)
Median percent of income that goes to rent	-3.3789	-3.1139	-7.8383**	-17.0297**
	(2.41)	(7.07)	(1.25)	(4.38)
Proportion of HHs w/more than 1 person per room	-0.0771**	-0.1577*	-0.0510**	-0.1166*
	(0.02)	(0.07)	(0.01)	(0.05)

All regressions control for total track length per square kilometer and per-capita WWII war contracts. Standard errors in parentheses. N=134. + significant at 10%; * significant at 5%; ** significant at 1%

Table 6: City Demand by Race and Education Among Young Workers (Aged 22-30), from 5% Census Microdata

	College Graduates				High-School Graduates				High School Dropouts			
	Black		White		Black		White		Black		White	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Average Rent	-220	-982*	-396**	-1,266**	-472**	-630*	-451**	-916**	-549**	-1,326**	-253*	-705*
	(151)	(453)	(134)	(472)	(89)	(262)	(109)	(347)	(175)	(475)	(97)	(313)
N	91		96		96		96		87		96	
% Pop Change '95-'00	0.9873	1.6145	0.0708	0.125	0.2112	-1.8971	0.1113	-0.4125	0.2603	-6.8406	0.1503	-0.7176
	(0.6121)	(1.4259)	(0.2914)	(0.8063)	(0.3661)	(1.1972)	(0.1368)	(0.4098)	(2.7668)	(7.6651)	(0.2466)	(0.7303)
N	78		89		88		89		81		89	
% Net Migration '95-'00	0.768	1.3315	-0.0385	0.3849	-0.1266	-0.5786	-0.2576*	-0.0418	-0.1296	-3.1076	0.0867	-0.1687
	(0.5595)	(1.3030)	(0.2363)	(0.6662)	(0.2631)	(0.7412)	(0.1025)	(0.2908)	(1.2898)	(3.5463)	(0.1763)	(0.4938)
N	78		89		88		89		81		89	

All regressions control for total track length per square kilometer and per-capita WWII war contracts. Standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%