Separate When Equal? Racial Inequality and Residential Segregation*

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Abstract

What will happen to residential segregation when racial differences in education and other sociodemographics narrow? In contrast to the conventional wisdom that residential segregation will fall, we identify a powerful mechanism that can lead to persistent and even *increasing* residential segregation. It starts from the observation that middle-class black neighborhoods are in short supply in many U.S. metropolitan areas, forcing highly educated blacks either to live in white neighborhoods with high amenity levels or in more black neighborhoods with lower amenity levels. We present a simple model showing that increases in the proportion of highly educated blacks in a metropolitan area may lead to the *emergence* of new middle-class black neighborhoods, relieving the prior neighborhood supply constraint and causing increases in residential segregation. Cross-MSA evidence from the 2000 Census indicates that this mechanism does in fact operate. We show that, as the proportion of highly educated blacks in an MSA increases, the segregation of educated blacks and blacks more generally goes up. We also investigate and cast doubt on potential alternative explanations for our empirical findings. These findings have important implications for the evolution of residential segregation as racial differences in sociodemographics decline.

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1 Introduction

Racial segregation is a pervasive phenomenon in cities throughout the United States. In the substantial literature that studies its causes and consequences, a number of researchers have attempted to evaluate the contributions of socioeconomic characteristics other than race in explaining racial segregation.[1] These studies typically find that a significant proportion of observed segregation can indeed be explained by differences across race in socioeconomic variables – education and income, for instance.[2] Such findings accord with the intuition that, since socioeconomic characteristics both affect residential choices and vary markedly by race, some residential segregation would be expected to emerge even in the absence of any sorting explicitly on the basis of race.[3] Thus, reductions in racial differences in income and other important sociodemographics should, according to the conventional wisdom, lower the level of residential segregation.

This conventional wisdom is based on partial equilibrium perspective that takes the neighborhood structure in a metropolitan area to be fixed as the sociodemographics of the black population change. In this paper, we conjecture that in a general equilibrium analysis, where neighborhood structure reacts to changes in the distribution of socioeconomic characteristics, the opposite may actually occur: reductions in black-white differences in socioeconomic characteristics may lead to *increases* in the segregation of educated blacks and blacks more generally.

Our conjecture is motivated by three empirical observations about the current state of racial segregation in the United States.[4] First, in almost every metropolitan area, few if any neighborhoods combine high fractions of both black and highly educated individuals. This shortage of middle-class black neighborhoods (as proxied by high average educational attainment) forces highly

[1] Important contributions to this literature include Massey and Denton [23], Cutler and Glaeser [10], and Cutler, Glaeser and Vigdor [11].

[2] See Miller and Quigley [25], for example. Following a similar approach, Bayer, McMillan and Rueben [2] used restricted-access 1990 Census microdata to show that a set of sociodemographic variables that include education, income and language can explain 30 percent of Black segregation and 93 percent of Hispanic segregation in the Bay Area housing market. Sethi and Somanathan [30] propose a different method for decomposing segregation measures into one component that can be attributed to the effect of racial income disparities alone, and another component that combines the effects of neighborhood preferences and discrimination, and reached similar conclusions.

[3] For example, given that demand for housing quality increases with income, and given that whites typically earn more than blacks, neighborhoods with higher quality houses will be occupied primarily by whites; thus income differences per se can help explain segregation.

[4] See Section 2 for details.

educated blacks to choose between predominantly black neighborhoods with low average education and predominantly white neighborhoods with high levels of education. Second, faced with a limited choice set in terms of neighborhood alternatives, highly educated blacks do live in a very diverse set of neighborhoods: while a fraction live in neighborhoods with very few other black and many college-educated neighbors, many live in neighborhoods that have a high fraction of blacks and very few other college-educated residents. Third, most middle-class black neighborhoods are actually located in metropolitan areas with a significant proportion of highly educated blacks. In Table 3, we show that almost 75 percent of Census tracts that are at least 60 percent black and 40 percent college educated are located in Baltimore-Washington DC, Detroit, Los Angeles and Atlanta.

These empirical observations suggest that neither racial composition nor average education of the neighborhood is all-important in determining the location decisions of highly educated blacks.[5] It raises the possibility that highly educated blacks might have preferred to live in highly educated majority-black neighborhoods, *were they available*.[6] In turn, middle-class majority-black neighborhoods, currently found only in a handful of metropolitan areas in the United States, are more likely to emerge when the number of highly educated blacks increases in the metropolitan area. The emergence of middle-class black neighborhoods will then lead to more residential segregation because these neighborhoods are highly attractive to middle-class blacks.

In Section 3, we present a stylized equilibrium model of decentralized residential choice and neighborhood formation that captures the essence of this mechanism.[7] Under some plausible assumptions, we show that when the proportion of highly educated blacks in the metropolitan area increases, highly educated black neighborhoods may emerge in equilibrium as a result of the increased demand for such neighborhoods; moreover, the exposure of highly educated blacks to other highly educated blacks and blacks in general may also increase with the proportion of highly educated blacks in the metropolitan area.

Our empirical analysis takes seriously the neighborhood formation mechanism highlighted in our theoretical model. We examine how changes in the composition of the population within a metropolitan area affect the way that individuals sort on the basis of race and education.[8] In

[5] We present more evidence relating to preferences over neighborhood characteristics in Section 3.

[6] This is entirely consistent with Vigdor's [33] finding that "the nationwide proportion of Black households with *few or no* Black neighbors exceeds the proportion stating a preference for such neighborhoods." (p. 589)

[7] A recent paper by Sethi and Somanathan [31] presents a different model in which they show that racial segregation and income inequality do not exhibit a monotonic relationship. See Section 3 for more discussion of this paper.

[8] In our analysis, we use education as a proxy for socioeconomic characteristics more generally.

particular, we examine whether the relative exposure of highly educated blacks to blacks is an increasing or decreasing function of the education level of blacks in the metropolitan area. Using 2000 Census data from 277 U.S. metropolitan areas (MSA) and summarized at the tract level, the empirical analysis involves a series of regressions that relate the racial-education composition of an individual's tract to an individual's own race-education category, a set of MSA fixed effects, and interactions of individual and MSA race-education compositions.[9] The results show that, relative to others in the MSA, highly educated blacks are increasingly exposed to other blacks as the education level of blacks in the MSA increases. This change is driven primarily by a large relative increase in exposure to other highly educated blacks and is more than completely offset by a decrease in exposure to highly educated whites. These changes are likely to result in a slight decrease in the average level of education in the neighborhoods in which highly educated blacks reside. At the same time, highly educated blacks are also increasingly exposed to less educated blacks and vice versa. This effect is consistent with the comparative statics prediction of our model when the proportion of highly educated blacks in an MSA increases from a low to a moderate level.

A positive correlation at the MSA level between the educational attainment of blacks and the segregation of highly educated blacks (established in Section 4) may be consistent with several plausible alternative mechanisms.[10] In Section 5, we examine in detail three of the most plausible alternative mechanisms: reverse causality, cross-MSA sorting and omitted variables. In examining the reverse causality mechanism – that high levels of segregation *cause* higher levels of educational attainment among blacks – we reconcile an apparent contradiction between our empirical finding with the results in an important paper of Cutler and Glaeser [10, CG hereafter].[11] CG found that blacks aged 20-30 in more segregated areas have significantly lower, not higher, educational attainment (among other outcome measures) than blacks of the same age group in less segregated areas. We show that the correlations between the educational attainment and segregation in MSAs vary systematically by age group. The correlation is negative for blacks aged 20-30, as found by

[9] Note that the inclusion of MSA fixed effects in these regression absorbs out any mechanical increase in same-race and same-education exposure due to changing population composition.

[10] Our empirical analysis exploits cross-MSA variation in the proportion of highly educated blacks; as such, our results are not directly related to time-series segregation analyses conducted by Cutler, Glaeser and Vigdor [11] and Glaeser and Vigdor [16]. However, our finding is consistent with Glaeser and Vigdor's [16] finding that "Segregation declines most sharply in places that ... blacks made up a small portion of the population in 1990. Segregation remains extreme in the largest metropolitan areas."

[11] See Ihlanfeldt and Sjoquist [18] and O'Regan and Quigley [26] for earlier related literature.

CG, but the correlations are positive for older age groups (see Table 10 for details) and are positive overall. It is also worth noting that the main alternative mechanism which motivated CG's IV estimation – that more successful blacks will choose to live in richer and whiter, and thus less segregated, neighborhoods – would have predicted that the OLS estimate overstates the effect of ghettos on outcomes, whereas CG's estimates indicate that their IV estimates for the effect of segregation on black's educational attainment tend to be stronger than their OLS estimates. Our analysis helps explain these OLS/IV differences, drawing attention to an alternative mechanism that emphasizes endogenous neighborhood formation.

A second alternative explanation relates to selection bias, where the primary concern is that highly educated blacks, who select into MSAs with a higher fraction of educated blacks, have a stronger taste for segregation. We address this concern by decomposing the current metropolitan sociodemographic composition associated with each individual into a lagged measure corresponding to the MSA where the individual lived five years ago and the difference between the current and the lagged measure. Including both the lagged and "difference" measures in an analogous set of regressions reveals that the active selection related to migration over the past five years weakens rather than strengthens our main findings, implying that selection across MSAs is not likely to be a significant factor driving our results. This is also consistent with the existing analysis of cross-metropolitan sorting in CG.

The third alternative explanation relates to omitted variables bias, the concern being that historic patterns of black settlement, migration, and segregation in the U.S. might give rise to a spurious correlation between metropolitan sociodemographic composition and segregation. While this explanation cannot be addressed in an entirely satisfactory way due to data limitations, we show that our main findings are completely robust to the inclusion of a full set of interactions with metropolitan size and region.

Our results have several important implications. First, in contrast to the conventional wisdom, they suggest that racial segregation is unlikely to disappear as racial differences in socioeconomic characteristics narrow.[12] The mechanism uncovered in our analysis indicates that an overall increase in the educational attainment of blacks may lead to a decrease in residential segregation *only if* highly educated blacks are dispersed in many, instead of concentrated in few, MSAs. This echoes Glaeser and Vigdor's [16] finding that segregation is lowest among the rapidly growing cities in the

[12] The conventional view has been embraced by many scholars in this literature. See, for example, Durlauf [13], Wilson [35] and Mayer [24].

West, where there is as yet no high concentration of highly educated blacks. Our findings also relate to Wilson [35], who argues that reductions in institutional discrimination in the housing market in the middle of the 20th century led to large-scale reductions in the exposure of less-educated to more-educated blacks, as more-educated blacks left the inner city neighborhoods to which they were formerly restricted. Based on our findings, this trend may not have been so severe in cities in which the black population was more educated initially; and it may partially reverse itself as the black population becomes relatively more educated over time.

The remainder of the paper is organized as follows. Section 2 documents empirically the types of neighborhoods available across different metropolitan areas in the United States; Section 3 presents a simple model of neighborhood formation that highlights the key features of the mechanism underlying our empirical results; Section 4 presents our main empirical finding that the exposure of highly educated blacks and blacks more generally to other blacks increases as the proportion of highly educated blacks in the metropolitan area increases. Section 5 evaluates leading alternative hypotheses, and Section 6 concludes.

2 Neighborhood Choice Sets in US Metropolitan Areas

In this section, we present some empirical facts about the available neighborhood choice sets in U.S. metropolitan areas. Throughout our analysis, we define metropolitan areas as either (i) free-standing Metropolitan Statistical Areas (MSAs) or (ii) Consolidated Metropolitan Statistical Areas (CMSAs) consisting of two or more economically and socially linked metropolitan areas – the so-called Primary Metropolitan Statistical Areas (PMSAs). For expositional convenience, we use the term MSA to refer to this definition throughout the paper. In our analysis, a "neighborhood" corresponds to a Census tract, which typically contains 3,000 to 5,000 individuals. We use the Census Tract Summary Files from the 2000 Census, which provides information on the distribution of education by race for each Census tract. We focus specifically on non-Hispanic black and non-Hispanic white individuals 25 years and older residing in US metropolitan areas; educational attainment is used to proxy the socioeconomic status more generally. We characterize each neighborhood in a metropolitan area using two dimensions: the fraction of black and the fraction of college-educated individuals.

We establish four empirical facts about neighborhood choice sets in the United States:

FACT 1. College-educated blacks constitute a small fraction of the population living in the typical

metropolitan area;

FACT 2. Neighborhoods that combine high fractions of both college-educated and blacks are in extremely short supply in almost every metropolitan area;

FACT 3. College-educated blacks choose to live in a very diverse set of neighborhoods in each metropolitan area;

FACT 4. Middle-class black neighborhoods are concentrated in only a few metropolitan areas that have sizeable numbers of college-educated blacks.

[Table 1 About Here]

Table 1 describes the joint distribution of education and race for blacks and whites. Based on our race definitions, blacks and whites respectively constitute 11.1 and 69.5 percent of the U.S. population 25 years and older residing in metropolitan areas. Among blacks, 15.4 percent have a four-year college degree, while the comparable number for whites is 32.5 percent, and for the U.S. population as a whole is 27.7 percent.

[Table 2 About Here]

Table 2 documents the number of tracts in the U.S. by the percentage of individuals with a college degree and the percentage of individuals that are black and white, respectively. Panel A describes the number of tracts in which more than 0, 20, 40, 60, and 80 percent of individuals 25 years and older are college-educated, respectively. Panel B reports the number of tracts in each of these categories that contain a minimum fraction of blacks equal to 20, 40, 60, and 80 percent, respectively. As the corresponding numbers show, a much smaller fraction of the tracts with a high fraction of blacks also have a high fraction of individuals with a college degree. For example, while 23 percent of all tracts are at least 40 percent college-educated (a number comparable to the fraction of individuals with a college degree in the U.S. population), only 2.5 percent of tracts that are at least 40 percent black are at least 40 percent college-educated, and only 1.1 percent of tracts that are at least 60 percent black are at least 40 percent college-educated. Panel C of Table 2 shows analogous numbers for whites. They show a markedly different pattern of neighborhood choices for whites, with a greater fraction of neighborhoods with at least 40, 60, and 80 percent whites meeting each education criterion.

[Table 3 About Here]

While Table 2 revealed the scarcity of neighborhoods with high fractions of both black and college-educated individuals in the U.S. as a whole, Table 3 further shows that such tracts, to the extent that they exist, are concentrated in only a handful of metropolitan areas, most notably Washington, DC. This implies that the supply of such neighborhoods in most metropolitan areas is even more limited. Table 3 illustrates, for example, that of the 44 tracts (less than 0.1 percent of all tracts) that are at least 60 percent black and 40 percent college-educated, 13 are in the Baltimore-Washington DC, 8 in Detroit, 6 in Los Angeles, and 5 in Atlanta. Almost 75 percent of these tracts can thus be found in only four MSAs. Of the 142 tracts that are at least 40 percent black and 40 percent college-educated, almost two-thirds are in the MSAs listed above along with Chicago and New York.

Tables 2 and 3 taken together show clearly that while neighborhoods that combine high fractions of both college-educated and white individuals are abundant in all metropolitan areas, neighborhoods that combine high fractions of both college-educated and black individuals are in extremely short supply. This suggests that college-educated blacks in most metropolitan areas may face a trade-off between living with other black versus other college-educated neighbors.

[Figure 1 About Here]

To graphically demonstrate this potential trade-off faced by highly educated blacks, Figure 1 shows the scatterplots of available neighborhoods in four metropolitan areas: Boston, Dallas, Philadelphia, and St. Louis. In each scatterplot, a circle represents a Census tract and its coordinates represent the fraction of college-educated individuals (vertical axis) and the fraction of blacks (horizontal axis) in the tract. The diameter of the circle is proportional to the number of college educated blacks in the tract; thus the largest circles correspond to the tracts where highly educated blacks are most likely to live.[13] For these four metropolitan areas, the scatterplots demonstrate the short supply of neighborhoods that combine high fractions of both highly educated and black individuals, neighborhoods that would have appeared in the north-east corner of the plot. They are strongly suggestive of the notion that highly educated blacks face a trade-off when making their residential choices.

Figure 1 also demonstrates that, facing the constrained choice set, highly educated blacks do choose to live in a diverse set of neighborhoods: while a sizeable fraction of college-educated

[13] Note that tracts that do not contain any highly educated blacks do not appear in these scatterplots.

blacks in each of the five MSAs choose neighborhoods with few black and many college-educated neighbors (neighborhoods in the north-western corner of the plots), another sizeable fraction choose neighborhoods with many black and few college-educated neighbors (neighborhoods in the south-eastern corner of the plots).

[Table 4 About Here]

Panel A of Table 4 summarizes the characteristics of neighborhoods chosen by college-educated blacks in metropolitan areas throughout the U.S. We first rank highly educated blacks in each metropolitan area by the fraction of blacks in their Census tract and assign individuals to their corresponding quintile of this distribution. This corresponds to drawing four vertical lines in the scatterplot for each metropolitan area such that an equal number of college-educated blacks fall into each of the resulting five regions. Panel A of Table 4 then summarizes the average fractions of black and college-educated individuals in the tract corresponding to the quintiles of this distribution, averaged over all U.S. metropolitan areas.

The numbers corresponding to different quintiles show a clear trade-off for college-educated blacks between the fraction of their neighbors who are black and the fraction who are highly educated: the average fraction of highly educated neighbors falls from 38.0 percent for those college-educated blacks living with the smallest fraction of black neighbors to 13.8 percent for those living with the largest fraction.

Panel B of Table 4 reports analogous numbers for college-educated whites. Comparison of Panels A and B reveals that college-educated blacks in each metropolitan area who live in the bottom quintile of tracts (in terms of the smallest fraction of other blacks) have roughly the same fraction of college-educated neighbors as college-educated whites do on average; however, college-educated blacks living in the top quintile of tracts (those with the greatest fraction of other blacks) have only about *one-third* of the fraction of highly educated neighbors. That such a high fraction of college-educated blacks in U.S. metropolitan areas choose segregated neighborhoods with relatively low average education attainment suggests that race remains an important factor in the location decisions of a large number college-educated blacks.[14]

Figure 2 depicts the scatterplots of neighborhoods in Atlanta, Chicago, Detroit and Washington DC – metropolitan areas that contain a more sizeable number of college-educated blacks, as shown in Table 3. Figure 2 shows that these metropolitan areas supply a substantially greater number of

[14] In Section 3, we present more evidence regarding race preferences.

neighborhoods combining relatively high fractions of both black and highly educated individuals, and thus the constraint on the neighborhood choice set for highly educated blacks is relaxed there. As the neighborhood supply constraint relaxes for highly educated blacks, highly educated blacks may be increasingly exposed to other blacks.

Figures 1 and 2 together suggest that the constraint on the neighborhood choice sets for highly educated blacks will be systematically relaxed as the number of highly educated blacks in a metropolitan areas increases. In Section 3 below, we formalize this idea with a simple equilibrium model of endogenous neighborhood formation.

3 A Model

In this section, we present a simple model of residential choice and endogenous neighborhood emergence.[15] This simple model formalizes our idea that when the number of highly educated blacks in the metropolitan area increases, a greater supply of neighborhoods that combine high fractions of both black and college-educated neighbors may form. This may in turn lead to an increase in the segregation of highly educated blacks as the average education of the black population in a metropolitan area increases. Importantly, this stylized model serves only to clarify the potential role of endogenous neighborhood formation in the affecting segregation levels; the empirical analysis that follows does not depend on the assumptions of the model in any way.

Sethi and Somanathan [31] presented an alternative model in which they show that low levels of racial inequality are consistent with extreme and even rising levels of segregation in cities where the minority population is large. Their model does not explicitly emphasize the idea of neighborhood emergence since they treat the total number of neighborhoods as being exogenously fixed. In contrast, our model emphasizes the emergence of new middle-class neighborhoods, consistent with the empirical facts documented in Section 2.

Basic Ingredients. Before describing the detailed features of the model, we highlight three key ingredients that drive our results. The first key ingredient is that blacks' preferences are such that, on net, they prefer to live near others of the same race and education level.[16]

[15] See CG [10] for a stylized model of how segregation may impact residents' educational and labor market outcomes.

[16] The idea that individual racial preferences may lead to segregation in the aggregate dates back at least to Schelling [28][29].

There is ample empirical evidence that individuals prefer to live in neighborhoods where their own race is in a majority.[17] For example, in the Multi-City Survey of Urban Inequality (MCSUI), respondents were shown a card representing a neighborhood with fifteen houses (in three parallel rows of five houses each), and then asked to illustrate the racial composition of their "ideal" neighborhoods, where they were presumed to live in the house located at the center of the middle row. Using data from the MCSUI conducted between 1993-1994 in the Atlanta, Detroit, and Los Angeles metropolitan areas, Ihlanfeldt and Scafidi [18] found that, 35-43 percent of blacks designated an all-black neighborhood or mostly black neighborhood (eleven blacks and four whites) as their top choice; and 81-92 percent of the blacks chose all black or mostly black neighborhoods as one of their top two choices.[18]

Our assumption that blacks prefer neighbors with the same level of educational attainment as themselves needs more explanation. One could argue that all individuals might prefer to live with highly educated neighbors due to, say, positive externalities in human capital production (see Benabou [5] and CG [10], for example). Our assumption is sensible only because housing prices – which we abstract from – would have most likely capitalized such positive externalities. Many sorting models generate the prediction that, *ceteris paribus*, less educated individuals are not willing to pay as much as highly educated individuals to live with more educated neighbors. Thus we consider our assumption regarding preferences to live with neighbors of same educational attainment as a convenient reduced-form simplification, which allows us to place the role of housing prices in the background of the analysis.

The second key ingredient of our model is the notion of a critical neighborhood size. In the model below, we capture the notion of critical neighborhood size by assuming that each resident in a neighborhood has to incur a cost that decreases with its total number of residents. Multiple interpretations can be given for this. One interpretation is that the average cost of providing both formal and informal local public goods is decreasing in neighborhood size, at least over some range. Alternatively, it can capture the idea that a larger population can sustain more local options in

[17] Cornell and Hartmann [9], Farley *et al.* [14], O'Flaherty [22] and Lundberg and Startz [21] provide various theoretical arguments as to why individuals might care about the racial composition of their neighborhoods.

[18] See also Vigdor [33] and Charles [6][7] for related evidence. It is important to emphasize that such evidence has to be at best considered as suggestive, as the MCSUI survey questions make no mention of neighborhood amenties, housing prices, or other factors that might influence residential choices. Thus such evidence does not necessarily reveal fundamental racial preferences. King and Mieszkowski [20], Yinger [36] and Galster [15] found evidence of segregation preferences based on housing prices or rents.

retail, television, restaurants, newspaper, and the internet, both in quantity and quality (see, e.g., Berry and Waldfogel [4] and references cited therein).

The third ingredient of our model involves some degree of idiosyncratic location preferences in the individuals' residential choices, unrelated to sorting on the basis of education or race. We capture this heterogeneity by assuming that individuals have employment locations distributed in space and would prefer to commute shorter distances. Such an assumption is standard in the "spatial mismatch" literature (see Kain [19], Ross [27] and Weinberg [34]) and serves the function here of creating idiosyncratic preferences for location.

Model. Consider a metropolitan area located on a straight line with length 2, represented by the interval $[-1, 1]$. The population density in the metropolitan area is given by $N > 0$, so its total population is $2N$. There are two racial groups $r \in \{b, w\}$, a proportion $\lambda_w \in (0, 1)$ being white, with the remaining proportion $\lambda_b = 1 - \lambda_w$ being black. Individuals within each racial group differ in their educational attainment: a fraction $\rho_r \in (0, 1)$ of race-r individuals are highly educated (denoted by type-h) and the remaining fraction $1 - \rho_r$ are less educated (denoted by type-l).[19] Cross-race inequality in socioeconomic characteristics is reflected by the difference $\rho_w - \rho_b$. Clearly for all metropolitan areas in the U.S., the relevant case is $\rho_w > \rho_b$. Thus a narrowing in the racial gap in educational attainment can be represented by an increase in ρ_b while keeping ρ_w fixed.

For simplicity, we assume that whites' residential locations are fixed: at each endpoint of the line, there are two communities, one for highly educated whites (called communities WH and WH') and one for less educated whites (called communities WL and WL').

We focus our analysis on the residential location choices of blacks and the *emergence* of black neighborhoods. Accordingly, we model idiosyncratic locational preferences of blacks by assuming that their job locations are uniformly distributed along the straight line. Commuters experience a cost of $\theta > 0$ per unit distance between their work and place of residence.

There is a cost of maintaining a community, and the average per-resident cost is given by $c(n)$ where n is the number of residents in the community.[20] We assume that c decreases in n.

We now describe blacks' preferences. Consider a black individual with education $e \in (l, h)$, whose job location is at point $z \in [-1, 1]$ on the straight-line. Its utility from living in a community

[19] The heterogeneity could equally be in terms of income.

[20] Technically, this rules out tiny enclaves of individuals claiming to form a neighborhood of their own.

$j \in J$, where J is the set of available communities to be determined in equilibrium, is given by:

$$u(j; z, e) = \alpha \left[p_b(j) + \gamma_1 p_w(j)\right] + \beta \left[p_e(j) + \gamma_2 p_{e'}(j)\right] - \theta D(j, z) - c\left(n(j)\right), \tag{1}$$

where $e' \neq e$ is the other education category; $p_r(j)$ is the proportion of residents in community j of race r; $p_e(j)$ is proportion of residents in j with education attainment e; $D(j, z)$ is the commuting distance between community j and z's job location; $n(j)$ is the number of residents in community j; and $\alpha > 0, \beta > 0, \gamma_1 \in (0, 1)$, and $\gamma_2 \in (0, 1)$ are constants.

In utility function (1), the first term $\alpha[p_b(j)+\gamma_1 p_w(j)]$ captures the utility from interacting with people of different races in the same community, where $\gamma_1 < 1$ measures the same-race preference discussed earlier. The interpretation of the second term $\beta[p_e(j) + \gamma_2 p_{e'}(j)]$ is more subtle. As we explained previously, it is meant to capture, in a reduced-form way, the idea that highly educated individuals will *on net* (taking into account both human capital externality and housing price) prefer to live in more expensive neighborhoods with many other highly educated residents, while less educated individuals will prefer on net to live in cheaper neighborhoods with other less educated residents.

An equilibrium of this simple model is characterized by the set of neighborhoods J^* (including the existing neighborhoods WH, WH', WL, WL') and the residential choices of all blacks such that: (1) given J^*, all black individuals' residential choices are utility-maximizing; and (2) there is a positive measure of residents in all neighborhoods $j \in J^*$.[21]

The equilibrium set of neighborhoods J^* depends on the parameters of the model. We are particularly interested in how the set J^* is affected by an increase in ρ_b – the fraction of highly educated blacks in the metropolitan area. Consider an equilibrium in which a single black community, community B, emerges at point 0. Clearly community B, were it to emerge, would consist of blacks whose job locations are close to point 0. Thus given $J^* = \{$WH, WH', WL, WL', B$\}$, blacks' optimal residential choices can be characterized by a pair $\{x_h^*, x_l^*\}$ such that all highly educated (less educated, respectively) blacks will choose to live in community B if and only if their job location z satisfies $|z| \leq x_h^*$ ($|z| \leq x_l^*$, respectively). The marginal types $\{x_h^*, x_l^*\}$ can be determined from the indifference conditions (see Appendix A for details). Figure 3 depicts this type of equilibrium when ρ_b is small.[22]

[21] Note that we do not need to directly impose a threshold neighborhood size in our model. The existence of the four white neighborhoods, together with the assumption that $c(n)$ is decreasing in n, endogenously ensures that small enclaves of blacks will not form their own neighborhoods.

[22] If such an equilibrium exists with a sufficiently small ρ_b, one can show that ${x_l}^* > {x_h}^*$. The reason is simple:

[Figure 3 About Here]

Imagine that we now increase the fraction of highly educated blacks ρ_b from a low level initially. First, note that as ρ_b increases, the proportion of highly educated blacks in community B, $p_h(\mathrm{B})$, will increase even if the thresholds $\{x_h^*, x_l^*\}$ were hypothetically unchanged. As $p_h(\mathrm{B})$ increases, community B becomes more attractive vis-à-vis community WH and WH' for highly educated blacks. As a result, the marginal type of highly educated black who commutes to community B, x_h^*, will increase. In turn, the probability of a highly educated black living in all-black community B with less educated blacks will increase in ρ_b. Moreover, the increase in exposure of highly educated blacks to other highly educated blacks comes at the expense of exposure to highly educated whites.

The results for less educated blacks are more ambiguous. On the one hand, community B becomes more educated, which makes it less desirable for less educated blacks according to their preference specified in (1); on the other hand, the increase in the total population in community B drives down the per-resident community cost c. Thus, whether or not community B becomes more desirable for less educated blacks is indeterminate. It is thus possible that exposure of highly and less educated blacks to one another may increase. (See Figure 4b for a graphical illustration).

[Figure 4 About Here]

When ρ_b is sufficiently high, however, a point may be reached when it becomes profitable for highly educated blacks in community B to form their own community at point 0, called BH, leaving behind a less educated black community BL (see Figure 4c). The exact point at which the highly educated black neighborhood BH emerges is determined by the balancing of two forces. First, by separating from the less educated blacks living in community BL, highly educated blacks have to incur a higher per-resident community cost c as a result of the smaller population size; second, because community BH consists only of highly educated blacks, the utility component $p_h(\mathrm{BH}) = 1 > p_h(\mathrm{B}) + \gamma_2 p_l(\mathrm{B})$ because $\gamma_2 < 1$.[23] We summarize the above discussion in the following proposition.

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when ρ_b is small, community B is necessarily a predominantly less educated all-black community. Because $\gamma_2 < 1$, the utility for a less educated black from community B is always higher than that for a highly educated black at any job location. Thus less educated blacks are more willing to commute to community B. This is not important for the analysis but explains the ranking of x_l^* and x_h^* in Figure 3.

[23] We abstract from the coordination problem among highly educated blacks in their decision to form their own neighborhood.

Proposition 1 ***(Comparative Statics)***

1. *An increase in ρ_b from small to moderate values will lead to a higher exposure of highly educated blacks to both highly and less educated blacks, and decrease their exposure to highly educated whites.*

2. *When ρ_b is sufficiently high, all-black highly-educated neighborhoods may emerge; and the exposure of highly educated blacks to whites, as well as to less educated blacks, will decrease.*

To summarize, the key insight of our simple model is that the nature of available neighborhoods for highly educated blacks are likely to change as the proportion of highly educated blacks in a metropolitan area increases. The change in the available neighborhoods for highly educated blacks occurs both when ρ_b is moderate and when it is high: when ρ_b is moderate, community B will contain more highly educated blacks even though it is not yet stratified on the basis of education; when the proportion of highly educated blacks ρ_b is sufficiently high, highly educated black community BH emerges and results in a more dramatic change in neighborhood structure.[24] It is worth pointing out that the emergence of community BH is likely to induce an accelerated emigration of highly educated blacks from community WH and WH' to community BH, resulting in greater racial segregation in residential locations.

4 Empirical Evidence

We now present our main empirical analysis. We begin this section by characterizing the pattern of segregation broken out by race and education in U.S. metropolitan areas. We then explore how this pattern varies with the sociodemographic composition of the metropolitan area, focusing especially on the way the segregation of highly educated blacks (and blacks more generally) is affected by the fraction of highly educated blacks in the metropolitan area.

4.1 Segregation Patterns in US Metropolitan Areas

Considering the general pattern of segregation in the United States as a whole, Panel A of Table 5 shows the average tract-level cross-exposure for individuals 25 years and older in four race-

[24] Of course, the emergence of such communities also depends positively on the population density N, and the overall proportion of blacks in the metropolitan area λ_b. It also depends indirectly on the commuting cost θ and the community cost function $c(n)$ via their effects on ${x_h}^*$.

education categories (black/white; college/non-college educated) based on all U.S. metropolitan areas.

Table 5 illustrates a clear pattern of racial segregation in U.S. metropolitan areas for highly educated blacks as well as those with lower levels of educational attainment. The first entry in Panel A, for example, indicates that the average black individual without a college degree lives in a tract where 33.2 percent of the residents are black and without a college degree. This compares to the national average exposure to less educated blacks of 9.4 percent. Panel B reports the average cross-exposure of individuals by race-education categories *relative to the MSA average*.[25] The first row of Panel B states that, relative to an average individual in the same metropolitan area, blacks without a college degree are exposed to 19.6 percentage points more blacks without a college degree and 2.1 percentage points more college educated blacks, etc.

[Table 5 About Here]

Table 6 reports segregation patterns in a manner analogous to Panel B of Table 5, but separately for metropolitan areas with above and below the median fraction of college-educated blacks (1.23 percent). Table 6 provides some initial evidence as to how segregation patterns vary with the sociodemographic composition of the metropolitan area. It shows that the relative exposure of blacks in each education category to both highly and less educated blacks is significantly greater in metropolitan areas with above-median fractions of college educated blacks. For both highly and less educated blacks, the average tract-level exposure to blacks relative to the fraction of blacks in the MSAs above the median is more than double that for MSAs below the median.

[Table 6 About Here]

4.2 Regression Results

To control more formally for the sociodemographic structure of the metropolitan area, Table 7 reports the results of a series of regressions of various tract composition measures on individual and

[25] The exposure rates are constructed as follows (see Bayer, McMillan and Rueben [2]). Let r_j^i be a set of indicator variables that take the value 1 if individual i is of race j and 0 otherwise, and let R_k^i be the fraction of individuals of race k in individual i's neighborhood (the Census tract, for example). The average exposure of individuals of race j to households of race k is $E_{jk} = \sum_i r_j^i R_k^i / \sum_i r_j^i$.

MSA characteristics.[26] The dependent variable is listed in the heading of each column. For example, Column 1 corresponds to a regression whose dependent variable is fraction of college-educated blacks in an individual's Census tract. Each regression includes a complete set of controls for individual race-education categories and MSA fixed effects. The inclusion of the MSA fixed effects ensures that all of the other parameters characterize the effect on average tract composition relative to the MSA average for each set of individuals, i.e., that the regressions account for the mechanical increase in exposure that would follow from a change in the metropolitan composition. In addition, the regressions also include individual characteristics interacted with MSA characteristics.[27] The coefficients on the interaction terms characterize how average race-education composition of an individual's tract relative to the MSA as a whole, for various sets of individuals, varies with MSA characteristics.

[Table 7 About Here]

Due to the various interaction terms in these regressions, the coefficient estimates are difficult to interpret in isolation. In what follows, we use these coefficient estimates to perform two statistical tests. The first test examines how average tract compositions for highly and less educated blacks change as the fraction of college-educated blacks in the MSA is increased, holding constant the fraction of blacks. This corresponds to examining the impact of an increase in the average education level of the black population holding the characteristics of the rest of the population constant. The second test examines how average tract compositions for highly and less educated blacks change as the fraction of college-educated blacks in the MSA is increased at the expense of college-educated whites. This corresponds to examining the impact of an increase in the fraction of the educated population that is black.

[Table 8 About Here]

Table 8 summarizes these effects for a one percentage point change in the fraction of college-educated blacks in the MSA population. Panel A shows that when the fraction of college-educated blacks in a metropolitan area increases by 1 percent at the expense of less educated blacks, the

[26] We include individual level characteristics to the extent that they are available in the Census Tract Summary Files. In practice, this is equivalent to running weighted OLS where the weight is given by the number of individuals in each race/education cell.

[27] If we do not include these interactions, the coefficients on the individual characteristics in these regressions would return the estimates reported in Panel B of Table 5.

relative exposure of college educated blacks to other college educated blacks increase by 1 percentage point and it is statistically significant; the relative exposure of less educated blacks to college educated blacks also increases by 1.1 percentage points. Overall, the relative exposures of blacks with and without a college degree to other blacks increase by 4 and 6.1 percentage points respectively, highlighting the increased segregation of blacks of all education levels following an increase in the average education of the black population. This empirical finding is consistent with our model's prediction when ρ_b lies in an intermediate range (Figure 4b), which we think is the plausible scenario for most U.S. metropolitan areas.

Panel B shows that similar results hold when the fraction of college educated blacks is increased by reducing the fraction of college educated whites (i.e., increasing the fraction of the educated population that is black). For blacks of all education levels, the increased relative exposure to blacks is driven by increased exposure to blacks in both education categories. These relative increases are offset by a decrease in the exposure to (especially highly educated) whites. On net, an increase in the average education of the black population has a slightly negative (although marginally statistically insignificant) effect on the average education level in the neighborhoods in which blacks reside relative to the metropolitan area as a whole.[28]

Table 9 reports results analogous to those reported in Table 8 with the exception that the underlying measure of "highly educated" is changed to include those having at least attended college. With this definition, the fraction of individuals 25 years and older in U.S. metropolitan areas who are highly educated is 54 percent, the fraction who are both highly educated and black is 5 percent, and the fraction of blacks who are highly educated is 45 percent. Our primary objective in examining an alternative is to consider a definition of "highly educated" that includes a larger fraction of individuals and especially black individuals. A comparison of the results reported in Table 9 to those reported in Table 8 reveals a qualitatively similar pattern. With the expanded

[28] To ensure that the results of Table 7 are not driven by the specific form of the dependent variable that we employ, we also conducted a series of regressions analogous to those reported in Table 7, defining the dependent variable as the fraction of individuals in a given category in an individual's tract divided by the fraction in the metropolitan area as a whole. In this way, an increase in tract-level exposure to individuals in a given category from 6 to 12 percent following an increase in the proportion of these individuals in the metropolitan area from 3 to 6 percent would not result in an increase in the dependent variable in this case, while it would have resulted in a 3 percentage point increase in the dependent variable used in the regressions reported in Table 7. The resulting parameter estimates led to a very similar set of conclusions, ensuring that our initial results are not driven by the functional form of the dependent variable. Throughout the remainder of the paper, we present the results of regressions analogous to those reported in Table 7.

definition of highly educated , the relative increase in exposure of both highly and less educated blacks to other blacks is more evenly split between highly and less educated blacks.

[Table 9 About Here]

In sum, both definitions of "highly educated" reveal a pattern of increased relative exposure of both highly and less educated blacks to blacks in each education category when the fraction of highly educated blacks in the metropolitan area increases. This pattern is consistent with the predictions of our model corresponding to an increase in ρ_b from low to moderate levels. With an increase in the average education level of the black population, highly educated blacks move on net into more segregated neighborhoods, increasing the average education level in some of the most segregated neighborhoods. In terms of the scatterplots, this pattern is consistent with the formation of segregated, black neighborhoods with mixed education levels – that is, with a shift of the implicit neighborhood supply constraint that is more upward than outward.

5 Robustness to Alternative Explanations

The main empirical findings presented in Section 4 reveal a clear positive relationship at the MSA level between black educational attainment and the segregation of highly educated blacks. Motivated by the empirical facts presented in Section 2 and the theoretical framework presented in Section 3, we now argue that the mechanism of endogenous formation of middle-class black neighborhoods as the average socioeconomic status of blacks in a metropolitan area improves provides a coherent explanation for this positive correlation. While it is quite clear that the empirical findings presented so far are consistent with this neighborhood formation mechanism, it remains possible that other alternative explanations could also explain these patterns. In this section, we present additional evidence that casts doubt on the leading alternative explanations.

Before turning to specific robustness checks, we should emphasize at the outset that most of the leading alternative explanations for a relationship between black segregation and educational attainment measured at the metropolitan level would imply a negative rather than positive correlation. One explanation that can be ruled out on this ground is statistical discrimination in either the housing or mortgage market: as the fraction of highly educated blacks increases in a metropolitan area, blacks in general would be less likely to be discriminated against, thus leading to less, not more, segregation.[29] To the extent that statistical discrimination exists in reality, the actual

[29] See Arrow [1] and Coate and Loury [8] for statistical discrimination models in a labor market context.

mechanism that we identify in our paper may be stronger than our main estimates would imply.

5.1 Reverse Causality

A first alternative explanation relates to the reverse channel of causality, that the degree of metropolitan segregation may have an impact on black socioeconomic outcomes. Previous research, however, suggests a negative correlation in this case. Most notably, Cutler and Glaeser [10, referred to as CG], using the 1990 Census, found that segregation at the metropolitan level substantially reduces relative educational and labor market outcomes for blacks *aged 20-30*. Thus, in the light of the negative correlation reported in CG for young adults, it is very surprising that we find a clear positive correlation between black educational attainment and segregation at the metropolitan level. In this subsection, we present a detailed analysis that reconciles our finding of an overall positive correlation between blacks' educational attainment and segregation in metropolitan areas with CG's results.

CG, more specifically, ran a series of regressions that relate individual education, fertility, and labor market outcomes to individual and metropolitan characteristics. Their primary focus is on isolating the effect of living in a more segregated metropolitan area on these outcomes for blacks relative to whites. This effect is summarized as the coefficient on the interaction of a measure of metropolitan segregation and a dummy variable that indicates whether the individual is black. Their regressions that directly correspond to our primary findings involve college education as the dependent variable. The coefficient estimates on the interaction term describe the correlation between metropolitan segregation and the relative educational attainment of blacks, holding the attainment of whites constant. They report results both from OLS regressions and IV regressions, where they instrument for segregation with a number of alternative variables designed to isolate the causal effect of residential segregation on outcomes.

[Table 10 About Here]

To reconcile our results with CG's, we begin with their OLS results. Table 10 reports the coefficient on the interaction between their metropolitan dissimilarity measure and whether an individual is black, first replicating their results for age groups 20-24 and 25-30 and then reporting analogous coefficients for individuals between the ages of 31-40, 41-50, 51-60, and 61-70, respectively. The coefficients for older individuals reveal a strikingly different pattern from those for younger individuals. Focusing specifically on college education and earnings, which most closely correspond

to our definition of highly educated (or high SES), the coefficients reverse sign from negative to positive starting for individuals slightly older than those studied by CG. A similar pattern (not shown in the tables) emerges in both the 1980 and 2000 Censuses. From a purely mechanical perspective, this age profile reconciles the results presented in our paper with those in CG, thereby implying that the overall positive correlation that we report in Section 4 is driven primarily by older individuals.

As mentioned above, the primary results presented in CG are not the OLS results replicated here, but a series of IV estimates that instrument for metropolitan segregation with three alternative instruments designed to isolate the causal impact of segregation on outcomes. CG motivate this IV approach by suggesting that their negative coefficient estimates from OLS regressions might be attributable to within-metropolitan sorting, namely, segregation might be higher in metropolitan areas where blacks had poor socioeconomic characteristics relative to whites as a result of sorting along socioeconomic dimensions. Importantly, however, when they instrument for segregation, the point estimate on the interaction between black and segregation in the college degree and log earnings regressions becomes *more* negative in every case (for both age groups and with each alternative instrument, a total of 12 regressions). This suggests that the reverse channel of causality (within metropolitan-area sorting) is actually working against their result, forcing the correlation between black socioeconomic status and metropolitan segregation in a positive rather than a negative direction.[30]

We would like to argue that the full set of results reported in CG (OLS and IV) along with our results in this paper can be fully reconciled as the result of the operation of two complementary mechanisms. First, metropolitan segregation adversely affects the outcomes of *younger* blacks (CG); and second, that an increase in the relative socioeconomic status of *all* blacks leads to more segregation (this paper). The CG mechanism implies a negative correlation between educational outcomes and segregation for younger individuals because, in the CG mechanism, the concurrent measure of segregation is most relevant for younger adults. For older adults, however, the more relevant segregation measure for the operation of the CG mechanism should presumably be the

[30] There are two other superficial differences between Cutler and Glaeser [10] and our work, neither of which is important in explaining the differences between our findings. First, they use the 1990 Census while we use the 2000 Census. Second, we use race/education specific exposure rates as our measure of segregation while they use MSA-level dissimilarity indices. The dissimilarity index, proposed by Duncan and Duncan [12], is an aggregate-level measure capturing the fraction of blacks that would have to switch areas to achieve an even racial distribution citywide (see Cutler, Glaeser and Vigdor [11] for more discussion). See footnote 25 for the construction of exposure rates.

historical measures of segregation. The age profile revealed in Table 10 essentially reveals the weakening relationship between concurrent segregation and educational outcomes associated with the CG mechanism for older adults, plausibly as a result of the relationship between education outcomes and segregation suggested by our endogenous neighborhood formation mechanism.

5.2 Cross-Metropolitan Area Sorting

Another potential explanation for the existence of a correlation between black socioeconomic status and segregation, each measured at the metropolitan level, relates to across-metropolitan area sorting. CG were concerned, for example, about the possibility that college-educated blacks were especially likely to choose less segregated metropolitan areas, which could induce a negative correlation at the metropolitan area level between black educational attainment and segregation. To address this concern, CG showed in their Table VI that sorting for 20-30 year-old age group in the 5 years prior to 1990 Census essentially does not produce any systematic correlation between education and segregation. Specifically they showed that for age group 20-30, the migration pattern of college-educated blacks relative to less-educated blacks is remarkably similar to the migration of college-educated whites relative to less-educated whites.

[Table 11 About Here]

Our concern – that highly educated blacks who select into MSAs with a higher fraction of educated blacks may have a *stronger* taste for segregation – is exactly the opposite of CG's. But we can address this concern in an analogous manner analogous. Note that, given CG's results in their Table VI regarding mobility patterns for age group 20-30, there are only two possibilities based on across-metropolitan area sorting to explain the positive correlation that we observe for older individuals in Table 10. First, in the years just preceding 1990, older individuals may have moved in such a way as to have generated a positive correlation. To examine this possibility, Panel A of Table 11 summarizes the migration patterns of individuals at different ages during the five years preceding the 1990 Census, the same period studied by CG. It describes the number of individuals in each race-age-education category that moved between metropolitan areas between 1985 and 1990 and the fraction that migrated to more versus less segregated metropolitan areas. The results for individuals aged 20-30 replicate those reported in CG, and the results for older individuals again show no evidence that the education profile of movers is different for blacks when compared to whites.

A second possible explanation for the observed positive correlation between the metropolitan-levels black educational attainment and segregation for older individuals in the 1990 Census is that these individuals migrated across metropolitan areas at earlier points in time in such a way as to have induced a positive correlation. To explore this possibility, Panel B of Table 11 summarizes migration patterns by race-age-education categories using the 1980 Census; and again no systematic pattern emerges.

We can also make use of an alternative organization of the 2000 Census – the Public Use Microdata Sample (PUMS) – to address the concern of across-metropolitan area sorting more directly. The PUMS has the advantage over the Tract Summary Files used in the above analysis in that observations are at the individual level; it has the disadvantage that a less detailed level of geographic specificity is provided.[31] From our perspective, the key additional variable contained in the PUMS data is the metropolitan area in which each individual resided five years ago (i.e., in 1995). This variable allows us to explore whether the pattern of active selection across metropolitan areas over this five-year period is in the direction of causing an over- or under-statement in the coefficients estimated in our main specifications.

Before exploring the selection bias issue with these data, we first replicate our main specifications reported in Table 9 for this organization of the Census data. Table 12 shows, as one might expect as a result of the increased geographic aggregation in this data set, a similar pattern of relative exposures to those seen in Table 9 but at rates that are smaller in magnitude.

[Table 12 About Here]

[Table 13 About Here]

Table 13 explores the likely direction of selection bias in our main specification by estimating the following specification: Using the metropolitan area in which each individual resided five years prior to the 2000 Census, we decompose the sociodemographic composition of each individual's current metropolitan area into two components: the first component, the "lagged measure,"is the composition of the metropolitan area in which that person lived five years ago; the second component, called the "differenced measure," is the difference between the composition of the current metropolitan area and the lagged measure. For about 90 percent of the population who did not move, the differenced measure is zero, while for movers, this difference reflects the change in metropolitan area sociodemographics associated with their move. We then include distinct

[31] In the PUMS, individuals are assigned to PUMAs, which contain more than 100,000 people.

interaction terms with both measures in the same specification. The estimated coefficients on the lagged versus differenced measures indicate the direction of the selection bias.

Table 13 shows that the estimated coefficients on the differenced measures are smaller in magnitude than those on the lagged measures for all three categories of exposure. This indicates that the active across-metropolitan selection observed over the past five years leads to an understatement of the main coefficients in our main specification. To the extent that selection in previous periods of time was qualitatively similar to that over the past five years, we would generally expect that our main specification understates the impact of the average education of the black population on the segregation of both highly and less educated blacks. Moreover, the extent to which the coefficients change in this analysis suggesting that, as CG found, across metropolitan sorting simply does not generate much in the way of correlation between the educational attainment of blacks and segregation at the metropolitan level.

5.3 Omitted Variable Bias

The concern with regard to omitted variables is that the fraction of the metropolitan area that is highly educated and black might be correlated with other variables that are associated with different levels of segregation. This is a difficult problem to address satisfactorily, especially since we use cross-MSA variation in the data. Here, we address this problem by adding metropolitan size and region, two prominent factors because of historic patterns of black settlement, migration, and segregation in the U.S., into our regressions. Table 14 reports the results of a set of regressions analogous to those reported in Table 9 with the addition of interactions between each individual's race-education category and a measure of metropolitan size and four dummies for Census region (Northeast, Midwest, South, West).[32]

[Table 14 About Here]

A comparison of the results presented in Table 14 with those in Table 9 reveals a qualitatively similar pattern both in magnitude and in statistical significance. In particular, with the additional controls, the increase in the relative exposure of both highly and less educated blacks to other blacks declines by 15-20 percent in magnitude, but remain highly significant. Changes in relative exposure to highly educated neighbors also decline and remain insignificant in each case. Taken

[32] A total of 16 interaction terms are added to the regression.

together, these results give us confidence that the main conclusions of the paper are not driven by obvious omitted variable biases.

While we added metropolitan size and interactions in the results reported in Table 14, we still assumed that the effects of the fraction of highly educated blacks on segregation do not depend on metropolitan size. The critical mass story implicit in our model implies that not only the fraction but also the number of highly educated blacks in the metropolitan area may be important for the formation of more-educated and segregated black neighborhoods. Given the same fraction of highly educated blacks, highly educated black neighborhoods might more easily form in large (population-wise) rather than small metropolitan areas.

[Table 15 About Here]

Table 15 estimates separate regressions, including the additional 16 control variables added in Table 10, for small (0-200k), medium (200-600k), and large (600k+) metropolitan areas. For brevity, we only report results related to exposure to blacks. A clear pattern emerges in the table: following an increase in average education level of the black population, the increased relative exposure of both highly and less educated blacks to other blacks is much greater in large versus small metropolitan areas. For highly educated blacks, the magnitude of the effect rises from 0.002 in small, to 0.025 in medium-sized, and 0.40 in large metro areas. The results tend to have higher statistical significance in larger metropolitan areas. A similar pattern emerges for less educated blacks. Interestingly, in large metropolitan areas, the increased exposure of highly educated blacks to other blacks is dominated by an increased exposure to other highly educated blacks. Thus, for this subsample, an increase in the average education of the black population might be associated with the formation of predominantly highly-educated, segregated black neighborhoods. This is the prediction of the model corresponding to an increase in the fraction of highly educated blacks from a moderate to a large number.

6 Conclusion

This paper has explored the relationship between metropolitan level sociodemographic composition, particularly racial inequality in education, and residential segregation. We have presented a theoretical argument and empirical evidence that the conventional wisdom, which suggests that residential segregation will fall when racial differences in education and other sociodemographics decline, may not hold.

Our analysis began by showing that middle-class black neighborhoods are in short supply given the current black sociodemographics in many U.S. metropolitan areas, forcing high SES blacks either to live in white neighborhoods with high levels of neighborhood amenities or in more black neighborhoods with lower amenity levels. We presented a model showing that, under certain conditions, increases in black sociodemographics in the metropolitan areas will lead to the emergence of new middle-class black neighborhoods, relieving the prior neighborhood supply constraint and leading to increases in residential segregation. We then presented cross-MSA evidence from the 2000 Census indicating that this mechanism does in fact operate: as the proportion of highly educated blacks in an MSA increases, so the segregation of educated blacks and blacks more generally goes up.

This change is driven primarily by a large relative increase in exposure to other highly educated blacks and is more than completely offset by a decrease in exposure to highly educated whites. At the same time, highly educated blacks are also increasingly exposed to less educated blacks and vice-versa. This effect is consistent with the predictions of our theoretical model when moving from a low to a moderate proportion of highly educated blacks. We have also shown, as far as possible, that our results are robust to concerns related to omitted variable and selection biases.

Our results have a number of important implications. First, they imply that racial segregation is unlikely to disappear with convergence in racial differences in socioeconomic characteristics. The results also have implications concerning the impact of racial sorting in the housing market on the long-run convergence of educational attainment across race. In particular, the results indicate that *given the current sociodemographic structure of U.S. metropolitan areas*, increases in the average education level of blacks may result in a slight decrease in the relative exposure of both highly and less educated blacks to educated neighbors. A third implication relates to the literature following Wilson (1987), which demonstrates that reductions in institutional discrimination in the housing market in the middle of the 20th century led to large-scale reductions in the exposure of less educated to more educated blacks as more educated blacks left the inner city neighborhoods to which they were formerly restricted. The evidence we present here suggests that this trend may not have been severe in cities in which the black population was more educated initially and may partially reverse itself as the black population becomes relatively more educated over time.

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A Appendix

In this appendix, we explain precisely how the black marginal types $\{x_h^*, x_l^*\}$ are determined. We first restrict attention to equilibria in which, if a highly educated (less educated, respectively) black is to choose not to live in community B, she will choose community WH or WH' (community WL or WL' respectively) depending on proximity. Given a pair of thresholds $\{x_l, x_h\}$, the total measure of less- and highly educated blacks in community B are, respectively, $2N\lambda_b(1-\rho_b)x_l$ and $2N\lambda_b\rho_b x_h$. Thus the total population in community B is $2N\lambda_b[\rho_b x_h + (1-\rho_b)x_l]$. Moreover, the relevant proportions for community B are

$$p_b(\mathrm{B}) = 1, p_w(\mathrm{B}) = 0, p_h(\mathrm{B}) = \frac{\rho_b x_h}{\rho_b x_h + (1-\rho_b)x_l}, p_l(\mathrm{B}) = \frac{(1-\rho_b)x_l}{\rho_b x_h + (1-\rho_b)x_l}.$$

The utilities for a highly and less educated black individuals with job location $z \in [0,1]$ from living in community B are then, respectively:

$$\begin{aligned} V_{\mathrm{B}}^h(z; x_h, x_l) &= \alpha + \beta\left[\frac{\rho_b x_h}{\rho_b x_h + (1-\rho_b)x_l} + \gamma_2 \frac{(1-\rho_b)x_l}{\rho_b x_h + (1-\rho_b)x_l}\right] \\ &\quad -\theta z - c\left(2N\lambda_b\left[\rho_b x_h + (1-\rho_b)x_l\right]\right); \\ V_{\mathrm{B}}^l(z; x_h, x_l) &= \alpha + \beta\left(\frac{(1-\rho_b)x_l}{\rho_b x_h + (1-\rho_b)x_l} + \gamma_2 \frac{\rho_b x_h}{\rho_b x_h + (1-\rho_b)x_l}\right) \\ &\quad -\theta z - c\left(2N\lambda_b\left[\rho_b x_h + (1-\rho_b)x_l\right]\right). \end{aligned}$$

We can also calculate the utilities from living in communities WH for a highly educated black with job location $z \in [0,1]$. Given the postulated threshold x_h, the measure of highly educated blacks in community WH is $N\lambda_b\rho_b(1-x_h)$. Taking account of the measure of highly educated whites in community WH, we have the following proportions:

$$p_b(\mathrm{WH}) = \frac{\lambda_b\rho_b(1-x_h)}{\lambda_b\rho_b(1-x_h) + \lambda_w\rho_w}, p_w(\mathrm{WH}) = \frac{\lambda_w\rho_w}{\lambda_b\rho_b(1-x_h) + \lambda_w\rho_w}, p_h(\mathrm{WH}) = 1, p_l(\mathrm{WH}) = 0.$$

Thus the utility for a highly educated black from living in community WH is:

$$\begin{aligned} V_{\mathrm{WH}}^h(z; x_h) &= \alpha\left[\frac{\lambda_b\rho_b(1-x_h)}{\lambda_b\rho_b(1-x_h) + \lambda_w\rho_w} + \gamma_1 \frac{\lambda_w\rho_w}{\lambda_b\rho_b(1-x_h) + \lambda_w\rho_w}\right] + \beta \\ &\quad -\theta(1-z) - c\left(N\left[\lambda_b\rho_b(1-x_h) + \lambda_w\rho_w\right]\right). \end{aligned}$$

Similarly, the utility for a less educated black with job location $z \in [0,1]$ from living in community WL is:

$$\begin{aligned} V_{\mathrm{WL}}^l(z; x_l) &= \alpha\left[\frac{\lambda_b(1-\rho_b)(1-x_l)}{\lambda_b(1-\rho_b)(1-x_l) + \lambda_w(1-\rho_w)} + \gamma_1 \frac{\lambda_w\rho_w}{\lambda_b(1-\rho_b)(1-x_l) + \lambda_w(1-\rho_w)}\right] \\ &\quad +\beta - \theta(1-z) - c\left(N\left[\lambda_b(1-\rho_b)(1-x_l) + \lambda_w(1-\rho_w)\right]\right). \end{aligned}$$

The equilibrium pair of thresholds (x_l^*, x_h^*) must satisfy

$$V_{\mathrm{B}}^h(x_h^*; x_h^*, x_l^*) = V_{\mathrm{WH}}^h(x_h^*; x_h^*), \tag{2}$$

$$V_{\mathrm{B}}^l(x_l^*; x_h^*, x_l^*) = V_{\mathrm{WL}}^l(x_l^*; x_l^*). \tag{3}$$

Equation (2) requires that the marginal type for highly educated blacks, $x_h{}^*$, is indifferent between living in community B (an all-black mixed-education community) and community WH (a highly educated community with a white majority). Equation (3) requires that the marginal type for less educated blacks $x_l{}^*$ is indifferent between living in community B and community WL (a less educated community with white majority). We assume that the parameters of the model are such that equation system (2) and (3) has solutions.

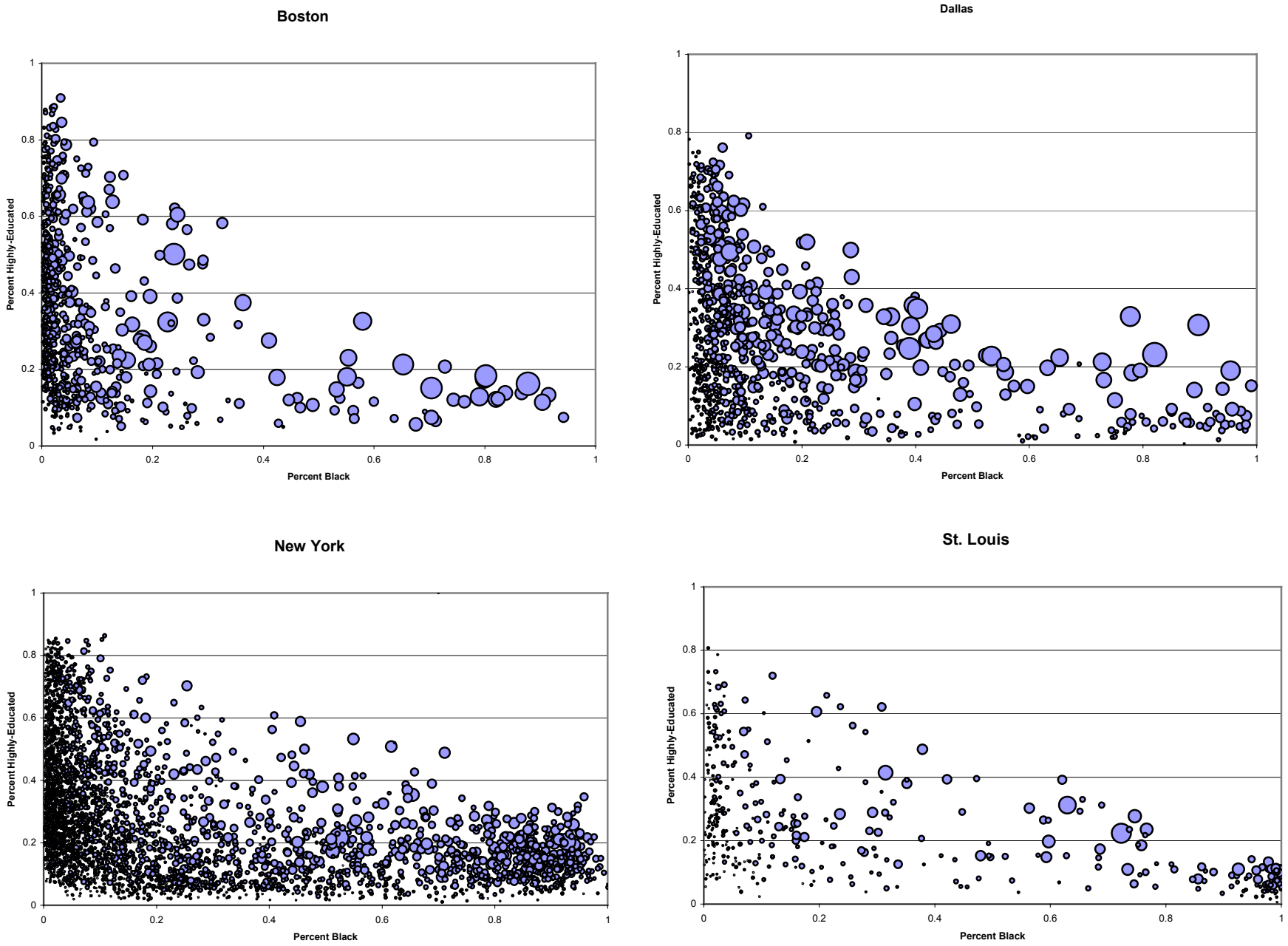


Figure 1: Neighborhood Choice Sets in Boston, Dallas, New York and St. Louis.

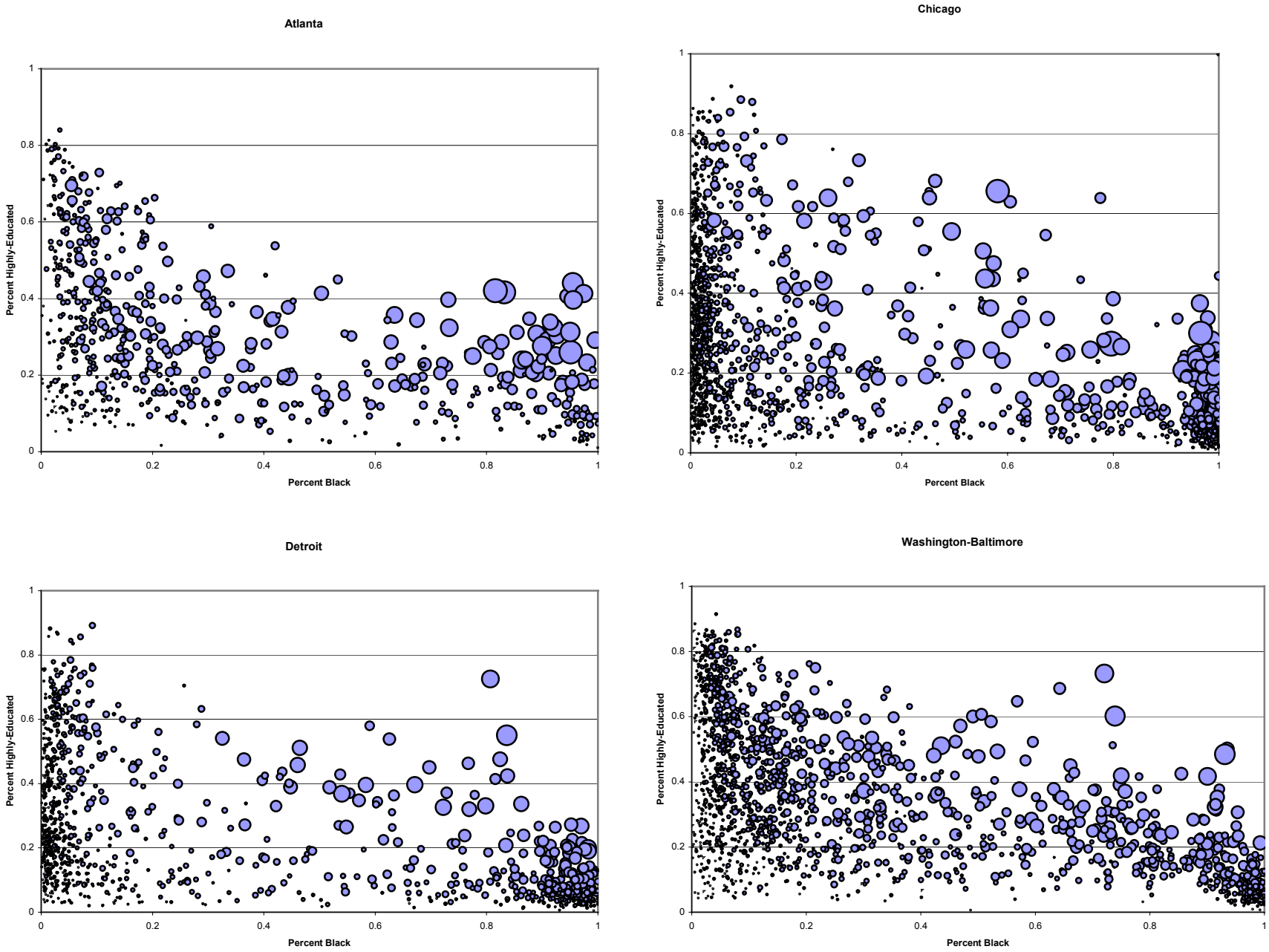


Figure 2: Neighborhood Choice Sets in Atlanta, Chicago, Detroit and Washington DC-Baltimore.

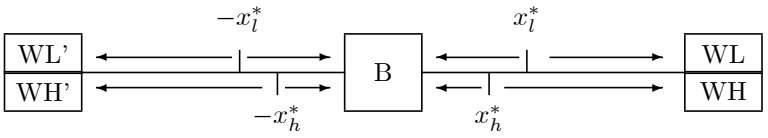
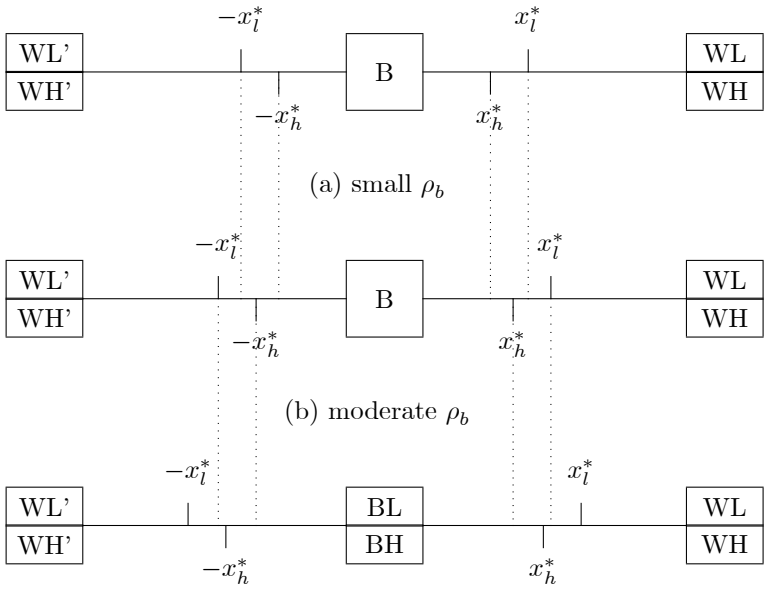


Figure 3: A Graphical Illustration of an Equilibrium.



(c) large ρ_b

Figure 4: Comparative Statics with Respect to ρ_b.

Table 1: Make-Up of Population Living in US Metropolitan Areas

Race	Education	(1) Percentage of Overall Population	(2) Percentage by Race
Black	Less than HS	0.029	0.258
Non-Hispanic	HS	0.032	0.291
	Some College	0.033	0.297
	College Degree	0.011	0.102
	Advanced Degree	0.006	0.052
White	Less than HS	0.091	0.132
Non-Hispanic	HS	0.185	0.266
	Some College	0.192	0.277
	College Degree	0.124	0.178
	Advanced Degree	0.102	0.147

Note: The universe for this table are individuals 25 years and older in US metropolitan areas (approximately 155 million individuals in total). Columns (1) and (2) report the fraction of individuals in each race-education category as a percentage of the total population and the population of the same race, respectively.

Table 2: Number of Tracts in United States in 2000 by Race and Education

	Percent College Degree or More			
	All	*>20%*	*>40%*	*>60%*
Panel A: All Tracts				
All	49,021	26,351	11,094	3,005
	100.0%	53.8%	22.6%	6.1%
Panel B: Tracts by Percent Black				
> 20% Black	9,149	2,567	641	59
	100.0%	28.1%	7.0%	0.6%
> 40% Black	5,657	1,164	142	14
	100.0%	20.6%	2.5%	0.2%
> 60% Black	3,921	623	44	5
	100.0%	15.9%	1.1%	0.1%
> 80% Black	2,559	271	21	1
	100.0%	10.6%	0.8%	0.0%
Panel C: Tracts by Percent White				
> 20% White	43,179	25,178	11,041	2,999
	100.0%	58.3%	25.6%	6.9%
> 40% White	39,602	24,566	10,839	2,967
	100.0%	62.0%	27.4%	7.5%
> 60% White	35,154	22,543	10,214	2,870
	100.0%	64.1%	29.1%	8.2%
> 80% White	26,910	17,539	8,102	2,339
	100.0%	65.2%	30.1%	8.7%

Note: Each cell reports the number, and relative percentage (lower figure in the cell), of tracts meeting both the education criterion described in the column heading and the race criterion in the row heading. Tract compositions are calculated using individuals 25 years and older in US metropolitan areas. Tracts considered in this table have a minimum of 800 such individuals (the average tract in the full sample has over 3,000).

Table 3: Metropolitan Areas with Tracts Combining High Fractions of Black and College-Educated Individuals

	Number of tracts meeting both race and education criteria			Population 25 years and older	Fraction black	Fraction of blacks with college degree
Percentage black	>80%	>60%	>40%	(in millions)		
Percentage with college degree	>40%	>40%	>40%			
Baltimore-Washington	5	14	33	5.06	0.24	0.21
Detroit	5	8	19	3.51	0.19	0.13
Chicago		3	16	6.11	0.16	0.15
New York		4	15	14.88	0.15	0.17
Los Angeles	4	6	10	11.50	0.06	0.18
Atlanta	5	5	8	2.65	0.26	0.22
Cleveland		1	6	1.96	0.15	0.11
Philadelphia		1	5	4.12	0.17	0.13
San Francisco-Oakland			5	4.95	0.06	0.19
Raleigh-Durham		1	3	0.65	0.12	0.22
Indianapolis			3	1.05	0.12	0.14
Jackson, MS	1	1	2	0.44	0.25	0.17
Houston	1	1	2	3.10	0.15	0.18
Columbia, SC			2	0.59	0.17	0.17
New Orleans			2	0.85	0.33	0.13
All U.S. Metropolitan Areas	21	44	142	154.84	0.11	0.15

Notes: Tract compositions are calculated using individuals 25 years and older in US metropolitan areas. Tracts considered in this table have a minimum of 800 such individuals.

Table 4: Neighborhood Patterns for College-Educated Individuals in the United States

Panel A: College-Educated Blacks

College-educated blacks first ranked within each MSA by percent black in Census tract
Average tract composition reported by corresponding quintile averaging across all MSAs

Quintile	1	2	3	4	5	Total
Percent Black	5.7	14.4	28.3	54.6	78.9	32.0
Percent College-Educated	38.0	31.6	26.2	18.4	13.8	27.2
Percent Black and College-Educated	1.3	3.3	6.2	8.0	10.0	5.2

Panel B: College-Educated Whites

College-educated whites first ranked within each MSA by percent white in Census tract
Average tract composition reported by corresponding quintile averaging across all MSAs

Quintile	1	2	3	4	5	Total
Percent White	55.0	77.9	86.6	90.4	94.5	77.4
Percent College-Educated	27.0	36.2	40.7	39.3	39.2	35.3
Percent White and College-Educated	20.1	30.4	36.2	36.1	37.4	30.4

Note: Panels A and B respectively summarize the average distribution of neighborhoods in which college-educated blacks and whites in U.S. metropolitan areas reside. To construct the numbers in Panel A, college-educated blacks in each metropolitan area are ranked by the fraction of blacks in their tract and assigned to one of five quintiles. Average neighborhood sociodemographic characteristics are then reported for each quintile, averaging across all metropolitan areas. Panel B reports analogous figures for college-educated whites, first ranking by their tract-level exposure to whites within each MSA. Tract compositions are calculated using individuals 25 years and older in U.S. metropolitan areas.

Table 5: Average Tract Composition by Race and Education

Panel A: Average Tract Composition

Individual	% Black < College Deg	% Black College Degree	% White < College Deg	% White College Degree	% College Degree	% Black
Black with less than college degree	0.332	0.046	0.315	0.150	0.220	0.378
Black with college degree	0.268	0.052	0.329	0.188	0.272	0.320
White with less than college degree	0.075	0.013	0.564	0.222	0.259	0.088
White with college degree	0.084	0.016	0.469	0.304	0.353	0.100

Panel B: Average Tract Composition Relative to MSA Average Composition

Individual	% Black < College Deg	% Black College Degree	% White < College Deg	% White College Degree	% College Degree	% Black
Black with less than college degree	0.196	0.021	-0.136	-0.077	-0.063	0.217
Black with college degree	0.133	0.026	-0.103	-0.044	-0.021	0.159
White with less than college degree	-0.014	-0.003	0.048	-0.003	-0.009	-0.017
White with college degree	-0.010	-0.001	0.002	0.043	0.044	-0.011

Note: Panel A reports average tract characteristics for individuals in the race-education category shown in row heading. Panel B reports average tract compositions *relative to* average composition of the individual's metropolitan area. Tract and metropolitan compositions are calculated using individuals 25 years and older in U.S. metropolitan areas.

Table 6: Average Tract-Level Exposure by Race and Education

Panel A: Metropolitan Areas Below Median Fraction of College-Educated Blacks (<1.23 percent)

	Average Tract Composition Relative to Average Metropolitan Composition					
Individual	% Black < College Deg	% Black College Degree	% White < College Deg	% White College Degree	% College Degree	% Black
Black with less than college degree	0.111	0.013	-0.107	-0.049	-0.038	0.124
Black with college degree	0.078	0.016	-0.078	-0.014	0.005	0.094
White with less than college degree	-0.006	-0.001	0.030	-0.003	-0.004	-0.007
White with college degree	-0.007	0.000	0.002	0.042	0.045	-0.007

Panel B: Metropolitan Areas Above Median Fraction of College-Educated Blacks (>1.23 percent)

	Average Tract Composition Relative to Average Metropolitan Composition					
Individual	% Black < College Deg	% Black College Degree	% White < College Deg	% White College Degree	% College Degree	% Black
Black with less than college degree	0.220	0.024	-0.144	-0.085	-0.070	0.244
Black with college degree	0.147	0.028	-0.110	-0.052	-0.027	0.175
White with less than college degree	-0.024	-0.005	0.067	-0.004	-0.014	-0.029
White with college degree	-0.012	-0.002	0.002	0.044	0.043	-0.014

Note: This table reports average tract characteristics *relative to* the average characteristics of the metropolitan area. Average compositions are reported for metropolitan areas in which less than and more than 1.23 percent of the population is college educated and black. Tract and metropolitan compositions are calculated using individuals 25 years and older in U.S. metropolitan areas.

Table 7: Tract Composition as a Function of Individual and Metropolitan Characteristics

Dependent Variable:	**Tract Composition**					
	% Black < Col Deg	**% Black Col Deg**	**% White < Col Deg**	**% White Col Deg**	**% College Degree**	**% Black**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
I_BlackHighEd*	3.040	0.968	-2.492	-2.110	-1.261	4.008
M_BlackHighEd	(1.575)	(0.201)	(0.902)	(0.842)	(0.861)	(1.720)
I_BlackHighEd*	0.069	-0.065	0.111	0.200	0.128	0.004
M_BlackLowEd	(0.360)	(0.062)	(0.264)	(0.135)	(0.124)	(0.413)
I_BlackHighEd*	-0.257	-0.058	0.239	0.114	0.070	-0.315
M_WhiteHighEd	(0.091)	(0.018)	(0.063)	(0.043)	(0.042)	(0.104)
I_BlackHighEd*	0.148	0.000	-0.166	0.055	0.066	0.149
M_WhiteLowEd	(0.091)	(0.024)	(0.088)	(0.036)	(0.033)	(0.113)
I_BlackLowEd*	4.911	1.022	-2.663	-3.097	-2.340	5.933
M_BlackHighEd	(1.983)	(0.119)	(0.898)	(1.150)	(1.295)	(2.030)
I_BlackLowEd*	-0.062	-0.086	0.171	0.365	0.319	-0.148
M_BlackLowEd	(0.399)	(0.040)	(0.255)	(0.179)	(0.185)	(0.427)
I_BlackLowEd*	-0.325	-0.039	0.301	0.186	0.191	-0.364
M_WhiteHighEd	(0.094)	(0.014)	(0.077)	(0.053)	(0.045)	(0.105)
I_BlackLowEd*	0.218	0.014	-0.149	0.026	0.079	0.232
M_WhiteLowEd	(0.124)	(0.017)	(0.105)	(0.055)	(0.044)	(0.140)
I_BlackHighEd	0.030	0.023	0.030	-0.019	-0.007	0.053
	(0.060)	(0.015)	(0.046)	(0.022)	(0.024)	(0.073)
I_BlackLowEd	0.049	0.011	-0.025	-0.057	-0.086	0.059
	(0.078)	(0.011)	(0.061)	(0.036)	(0.029)	(0.088)
I_WhiteHighEd	-0.038	-0.004	0.084	0.100	0.094	-0.041
	(0.011)	(0.002)	(0.014)	(0.013)	(0.014)	(0.011)
I_WhiteLowEd	-0.037	-0.005	0.130	0.048	0.035	-0.041
	(0.010)	(0.002)	(0.015)	(0.011)	(0.012)	(0.012)

Note: All regressions include metropolitan area fixed effects. The I_ prefix indicates an individual's own race-education category. The M_ prefix indicates the fraction of individuals in the corrresponding race-education category that reside in the individual's metro area. 'HighEd' refers to individuals with a college degree and 'LowEd' refers to those with less than a college degree. Each regression is estimated on the sample of individuals 25 years and older in U.S. metropolitan area. Tract and metropolitan compositions are calculated using this same sample. Standard errors, adjusted for clustering at the metropolitan area level, are reported in parentheses.

Table 8: Neighborhood Composition as a Function of Fraction of College-Educated Blacks in MSA

	Predicted Change in Tract Composition Relative to MSA Average Composition					
	% Black < Col Deg	**% Black Col Deg**	**% White < Col Deg**	**% White Col Deg**	**% College Degree**	**% Black**
Panel A: One percent increase in fraction of college-educated blacks in MSA (at expense of fraction of less-educated blacks)						
Black with college degree	0.030	0.010	-0.026	-0.023	-0.014	0.040
	0.119	*0.000*	*0.024*	*0.017*	*0.156*	*0.057*
Black with less than college degree	0.050	0.011	-0.028	-0.035	-0.027	0.061
	0.038	*0.000*	*0.002*	*0.009*	*0.126*	*0.012*
Panel B: One percent increase in fraction of college-educated black in MSA (at expense of fraction of college-educated whites)						
Black with college degree	0.033	0.010	-0.027	-0.022	-0.013	0.043
	0.034	*0.000*	*0.012*	*0.009*	*0.071*	*0.012*
Black with less than college degree	0.052	0.011	-0.030	-0.033	-0.025	0.063
	0.009	*0.000*	*0.001*	*0.005*	*0.052*	*0.002*

Note: Using the results presented in Table 7, this table summarizes the predicted change in the average composition of tracts in which blacks with and without a college degree, respectively, reside given a one percent increase in the fraction of college-educated blacks in the metropolitan area. The coefficients report the change in tract composition relative to the metropolitan average, i.e., over and above the mechanical effect of changing the metropolitan composition. Panel A reports the results of increasing the fraction of college-educated blacks while decreasing the fraction of less-educated blacks by 1 percent. Panel B reports the results of increasing the fraction of collge-educated blacks in the metropolitan area while decreasing the fraction of college-educated whites by 1 percent. P-values are reported in italics.

Table 9: Increasing Fraction of Highly-Educated Blacks in MSA - Expanding Definition of 'Highly-Educated'

	Predicted Change in Tract Composition Relative to MSA Average Composition					
	% Black HS Deg or less	**% Black Some College**	**% White HS Deg or less**	**% White Some College**	**% Some College**	**% Black**
Panel A: One percent increase in fraction of highly-educated blacks in MSA (at expense of fraction of less-educated blacks)						
Black with some college or more	0.017	0.027	-0.013	-0.028	-0.003	0.044
	0.159	*0.000*	*0.011*	*0.016*	*0.680*	*0.014*
Black with HS degree or less	0.031	0.027	-0.015	-0.037	-0.013	0.058
	0.017	*0.000*	*0.015*	*0.002*	*0.094*	*0.003*
Panel B: One percent increase in fraction of highly-educated black in MSA (at expense of fraction of highly-educated whites)						
Black with some college or more	0.016	0.020	-0.011	-0.022	-0.003	0.036
	0.040	*0.000*	*0.001*	*0.004*	*0.471*	*0.002*
Black with HS degree or less	0.027	0.020	-0.012	-0.028	-0.011	0.047
	0.002	*0.000*	*0.002*	*0.000*	*0.022*	*0.000*

Note: This table is analogous to the specification reported in Table 8 with the exception that "highly educated" is defined as having at least some college rather than having received a four-year college degree. P-values are reported in italics.

Table 10. Cutler-Glaeser Education and Labor Market Outcome Regressions for Older Individuals

Coefficient on interaction between black and metropolitan segregation (dissimilarity index)

	Education		Income	
Age	College graduate	High school graduate	ln(earnings)	Idle
20-24	-0.094	-0.269	-0.786	0.340
	(0.032)	(0.041)	(0.140)	(0.031)
25-30	-0.064	-0.201	-0.433	0.310
	(0.062)	(0.039)	(0.094)	(0.038)
31-40	0.002	-0.128	-0.026	0.230
	(0.069)	(0.040)	(0.084)	(0.032)
41-50	0.074	-0.092	0.239	0.181
	(0.059)	(0.050)	(0.092)	(0.030)
51-60	0.070	-0.119	0.411	0.118
	(0.046)	(0.068)	(0.131)	(0.041)
61-70	0.034	-0.037	0.081	0.014
	(0.054)	(0.096)	(0.280)	(0.052)

Notes: This table reports the results of a series of regressions based on the specification used in Cutler and Glaeser (1997) to generate Table IV. The specification includes individual characteristics [Black, Asian, Other nonwhite, Hispanic, Female], metropolitan characteristics [Segregation, ln(population), Percent black, ln(median household income), Manufacturing share] and interactions of these metropolitan characteristics with whether the individual is black. The coefficient on Black*Segregation is reported here for four individual outcomes and for six age ranges. Cutler and Glaeser report results for individuals between the ages of 20-24 and 25-30. The coefficients reported for these ages are not identical to those reported in Cutler and Glaeser but are very close. This is most likely attributable to the fact that we use the 5 percent sample of the 1990 Census while the 1 percent sample is used in Cutler and Glaeser. All other measures should be identical as we used the metropolitan characteristics used by Cutler and Glaeser, which Jacob Vigdor has graciously made available on his website.

Table 11. Across Metropolitan Migration Patterns

	Black		White	
	Number In Sample Switching MSAs in Past 5 Years	Fraction Moving to More vs. Less Segregated MSA	Number In Sample Switching MSAs in Past 5 Years	Fraction Moving to More vs. Less Segregated MSA
	Panel A: 1990 Census			
	Age: 20-30			
HS Dropout	1594	0.425	8746	0.490
HS Graduate	3801	0.425	23949	0.504
Some College	5602	0.434	42353	0.476
College Degree	2754	0.497	46981	0.546
	Age: 31-40			
HS Dropout	1081	0.442	4918	0.481
HS Graduate	2126	0.426	16170	0.491
Some College	3554	0.445	28955	0.499
College Degree	2404	0.493	39057	0.512
	Age: 41-50			
HS Dropout	611	0.403	3174	0.467
HS Graduate	835	0.418	9008	0.469
Some College	1302	0.436	14037	0.486
College Degree	908	0.447	16932	0.491
	Age: 51-60			
HS Dropout	494	0.405	2951	0.444
HS Graduate	400	0.368	5960	0.434
Some College	393	0.402	5989	0.445
College Degree	260	0.415	6013	0.472
	Age: 61-70			
HS Dropout	580	0.395	4335	0.377
HS Graduate	246	0.390	6490	0.388
Some College	197	0.310	4763	0.405
College Degree	112	0.446	3930	0.424
	Panel B: 1980 Census			
	Age: 20-30			
HS Dropout	1189	0.485	5744	0.491
HS Graduate	1681	0.448	21561	0.469
Some College	1488	0.445	22802	0.453
College Degree	1368	0.527	29071	0.535
	Age: 31-40			
HS Dropout	624	0.438	3068	0.459
HS Graduate	1214	0.442	11287	0.466
Some College	983	0.419	9939	0.471
College Degree	927	0.478	17597	0.484
	Age: 41-50			
HS Dropout	418	0.464	2205	0.456
HS Graduate	406	0.433	5509	0.430
Some College	266	0.447	3520	0.466
College Degree	222	0.419	4934	0.478

Note: This table summarizes the migration patterns of individuals that moved between metropolitan areas in the five years preceding the 1990 and 1980 Census, respectively. For black and white individuals in each of four education categories in various age ranges, the table describes the number in the sample that moved between metropolitan areas and the fraction of movers that migrates to metropolitan areas that are more (vs. less) segregated than the metropolitan area of residence five years prior.

Table 12: Neighborhood Composition as a Function of Fraction of Highly-Educated Blacks in MSA - PUMA-Level Analysis

	Predicted Change in PUMA Composition Relative to MSA Average Composition					
	% Black HS Deg or less	**% Black Some College**	**% White HS Deg or less**	**% White Some College**	**% Some College**	**% Black**
Panel A: One percent increase in fraction of highly-educated blacks in MSA (at expense of fraction of less-educated blacks)						
Black with some college or more	0.010	0.023	-0.008	-0.022	-0.001	0.033
	0.092	*0.000*	*0.032*	*0.000*	*0.805*	*0.001*
Black with HS degree or less	0.022	0.024	-0.012	-0.028	-0.007	0.046
	0.008	*0.000*	*0.027*	*0.000*	*0.115*	*0.000*
Panel B: One percent increase in fraction of highly-educated black in MSA (at expense of fraction of highly-educated whites)						
Black with some college or more	0.011	0.017	-0.008	-0.016	-0.001	0.028
	0.006	*0.000*	*0.003*	*0.000*	*0.763*	*0.000*
Black with HS degree or less	0.018	0.017	-0.009	-0.017	-0.004	0.035
	0.002	*0.000*	*0.011*	*0.001*	*0.210*	*0.000*

Note: This table is analogous to the specification reported in Table 9 (i.e., "highly-educated" category is defined as some college or more) with the exception that the dependent variables in the underlying regressions are measured at the Census PUMA rather than Census tract level. P-values are reported in italics.

Table 13: PUMA-Level Analysis with Lagged and Differenced Metropolitan Area Sociodemographics

Dependent Variable:	**PUMA Composition % Black - HS Degree or less**			**PUMA Composition % Black - Some College or more**			**PUMA Composition % Black**		
		Single Regression			***Single Regression***			***Single Regression***	
	Actual	***Lagged***	***Differenced***	***Actual***	***Lagged***	***Differenced***	***Actual***	***Lagged***	***Differenced***
Panel A: One percent increase in fraction of highly-educated blacks in MSA (at expense of fraction of less-educated blacks)									
Black with some college or more	0.010	0.011	0.014	0.023	0.024	0.017	0.033	0.035	0.020
	0.092	*0.085*	*0.722*	*0.000*	*0.000*	*0.000*	*0.001*	*0.001*	*0.076*
Black with HS degree or less	0.022	0.023	0.011	0.024	0.024	0.020	0.046	0.047	0.031
	0.008	*0.010*	*0.226*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*	*0.010*
Panel B: One percent increase in fraction of highly-educated black in MSA (at expense of fraction of highly-educated whites)									
Black with some college or more	0.011	0.012	0.014	0.017	0.018	0.013	0.028	0.030	0.019
	0.006	*0.005*	*0.233*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.007*
Black with HS degree or less	0.018	0.018	0.011	0.017	0.017	0.015	0.035	0.036	0.026
	0.002	*0.002*	*0.073*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.002*

Note: This first column of each panel repeats the corresponding results from Table 12 based on Census PUMA level relative exposure rates. The second and third columns report the corresponding coefficients when 2000 MSA population compositions are decomposed into a lagged measure based on where the householded lived in 1995, and the difference between the 2000 and 1995 measures. For these results, a complete set of interactions correpsonding to those shown in Table 7 are included in the underlying regressions for both the lagged and differenced terms. P-values are reported in italics.

Table 14: Adding Interactions with Metropolitan Population Size and Region

	Predicted Change in Tract Composition Relative to MSA Average Composition					
	% Black HS Deg or less	% Black Some College	% White HS Deg or less	% White Some College	% Some College	% Black
Panel A: One percent increase in fraction of highly-educated blacks in MSA (at expense of fraction of less-educated blacks)						
Black with some college or more	0.014	0.023	-0.012	-0.033	-0.002	0.038
	0.176	*0.000*	*0.066*	*0.001*	*0.869*	*0.006*
Black with HS degree or less	0.025	0.021	-0.012	-0.039	-0.011	0.046
	0.035	*0.000*	*0.071*	*0.001*	*0.351*	*0.003*
Panel B: One percent increase in fraction of highly-educated black in MSA (at expense of fraction of highly-educated whites)						
Black with some college or more	0.013	0.018	-0.008	-0.024	-0.004	0.030
	0.045	*0.000*	*0.023*	*0.000*	*0.573*	*0.001*
Black with HS degree or less	0.022	0.016	-0.008	-0.029	-0.011	0.038
	0.003	*0.000*	*0.025*	*0.000*	*0.126*	*0.000*

Note: This table is analogous to the specification reported in Table 9 (i.e., "highly-educated" category is defined as some college or more) with the exception that the underlying regressions also include controls for the interaction of the four individual race-education variables with the total population of the metropolitan area as well as four region dummies corresponding to the Census-defined regions (Northeast, Midwest, South, and West). P-values are reported in italics.

Table 15: Neighborhood Composition as a Function of Fraction of College-Educated Blacks in MSA - By Metropolitan Population Size

	Predicted Change in Tract Composition Relative to MSA Average Composition								
	MSA Population (0-200K)			MSA Population (200-600K)			MSA Population (600K+)		
	% Black HS Deg or less	% Black Some College	% Black	% Black HS Deg or less	% Black Some College	% Black	% Black HS Deg or less	% Black Some College	% Black
Panel A: One percent increase in fraction of highly-educated blacks in MSA (at expense of fraction of less-educated blacks)									
Black with some college or more	0.001	0.001	0.002	0.013	0.012	0.025	0.012	0.027	0.040
	0.892	*0.644*	*0.810*	*0.063*	*0.015*	*0.022*	*0.431*	*0.000*	*0.067*
Black with HS degree or less	0.011	0.003	0.014	0.016	0.012	0.028	0.025	0.024	0.049
	0.104	*0.311*	*0.119*	*0.046*	*0.001*	*0.012*	*0.204*	*0.001*	*0.055*
Panel B: One percent increase in fraction of highly-educated black in MSA (at expense of fraction of highly-educated whites)									
Black with some college or more	0.004	0.002	0.006	0.013	0.009	0.022	0.012	0.020	0.032
	0.269	*0.124*	*0.184*	*0.008*	*0.002*	*0.002*	*0.204*	*0.000*	*0.012*
Black with HS degree or less	0.012	0.003	0.015	0.017	0.009	0.026	0.021	0.018	0.039
	0.005	*0.093*	*0.007*	*0.005*	*0.000*	*0.001*	*0.063*	*0.000*	*0.010*

Note: This table is analogous to the specification reported in Table 14 ("highly educated" category is defined as having some college or more; controls for the interaction of the four individual race-education variables with the total population of the metropolitan area as well as four region dummies) run separately for three categories of metropolitan areas by population size. 147 metropolitan areas have less than 200k individuals; 75 metropolitan areas have between 200-600k individuals; 54 metropolitan areas have more than 600k individuals. P-values are reported in italics.