

# The Dimensions of Racial Inequality: Occupational and Residential Segregation Across Metropolitan Areas in the United States

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Residential and occupational segregation are two structural systems that perpetuate the disadvantaged status of blacks in American society. Despite extensive research on both these topics, there has been little empirical examination as to whether they are independent systems or both part of a larger monolithic system of racial inequality. An analysis of 1990 Census data for 261 metropolitan areas shows that there is a negative zero-order correlation between the two forms of segregation. However, controlling for the size of the population accounts for the negative correlation. Net of this exogenous factor, the correlation between the two forms of segregation is not statistically significant. This suggests that for individuals, the issue of racial inequality is one of tradeoffs between forms of disadvantage as one moves from city to city. For policymakers, these results indicate that urban racial inequality is multidimensional, requiring different strategies for different manifestations.

Despite the many legal and social changes over the past half century, racial inequality remains extensive in American society, and especially so in American cities. Among the numerous forms of inequality that exist, one of the most enduring has been segregation. Even though efforts to end segregation date back to the 1940s, blacks and whites are still much less likely to interact than would be expected in neutrally structured social settings. In urban America, two areas in which segregation remains extensive are the housing and labor markets. Blacks and whites typically do not live in the same neighborhoods in metropolitan areas (Massey and Denton, 1993; Lewis Mumford Center, 2001) and black workers continue to be “crowded” into a limited set of occupations that are, in turn, devalued on the labor market (Jacobsen, 1997; Reid, 1998). The extent of racial segregation of both forms has declined somewhat since the 1960s, but full racial integration remains a distant goal.

Despite the widespread interest in both these forms of segregation, there has been surprisingly little research on whether the two are related. Researchers have emphasized the institutional roots of each of these forms of racial discrimination (Wilson, 1987; Massey and Denton, 1993; Tomaskovic-Devey, 1993b). However, the question of whether both sets of roots derive from a single underlying system or if racial inequality is a multidimensional phenomenon remains unanswered.

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Determining whether these two forms of segregation are associated is not only an issue of understanding whether there is an empirical relationship between them. If effective policies for reducing racial inequality are to be developed, then understanding the structural form of its components is necessary. If occupational and residential segregation are merely different elements of a single system, then reducing inequality in one sphere can be expected to have positive repercussions across other forms of inequality. However, finding that there is no relationship between them suggests that racial inequality is a multidimensional problem. If this is the case, then policymakers must consider each form of racial inequality as a distinct problem to be addressed by distinct actions. It may also be the case that there is a negative relationship between certain forms of racial inequality, which introduces an entirely different set of concerns for individuals and policymakers. Under these conditions, policies that reduce the extent of one form of racial inequality are likely to have the unintended consequence of increasing the severity of other forms of inequality.

#### THEORY AND EVIDENCE ON THE RELATIONSHIP BETWEEN OCCUPATIONAL AND RESIDENTIAL SEGREGATION

Many of the canonical works on urban racial inequality operate under the assumption that the multiple forms of black disadvantage are positively correlated (Moynihan, 1968; Wilson, 1987; Massey and Denton, 1993). Cities with high levels of residential segregation, for example, are generally believed to have high levels of other forms of racial inequality—political representation, occupational segregation, health and mortality, and so forth. However, this assumption is based on what might be called a reverse ecological fallacy. Although individuals who are the victims of discrimination in one realm are likely to be victims of discrimination in other realms (e.g., blacks tend to work in low-paying occupations and are also likely to live in impoverished neighborhoods), this does not inform us about the *systems* of racial inequality at the aggregate level. At this macro level, there is virtually no empirical evidence on the relationships among the various forms of racial inequality. The lack of empirical inquiry is all the more surprising because it is plausible to expect each of the three possible relationships (positive, negative, and no correlation) between levels of occupational and residential segregation across cities.

#### HYPOTHESIS 1: OCCUPATIONAL AND RESIDENTIAL SEGREGATION ARE POSITIVELY CORRELATED

The expectation that metropolitan areas with high degrees of residential segregation also have high degrees of occupational segregation is motivated to some degree by the parsimony of the hypothesis. Both forms of segregation not only represent the differential allocation of residence and occupation on the basis of race, but residential location and occupation are also associated with a number of physical and social rewards, such as economic opportunity, social capital, and reduced exposure to crime. If it is the case that blacks are unable to gain an equal position in the housing market, then it is reasonable to expect that they would be less likely to achieve equality in the labor market and vice versa.

Were the two forms of segregation to be positively correlated, it would suggest that underlying each of these types of inequality is some larger monolithic system of racial inequality that operates in a manner that varies in strength across cities. In some cities, the magnitude of “general racism” may be stronger than in other cities, as the result of structural, historical, cultural, and/or other factors. For individuals, this would mean that the experience of race would also vary systematically across cities. We could identify specific cities in which it is more disadvantageous to be black (and more advantageous to be white) relative to other cities. Taken to its logical conclusion, such a finding may suggest physical relocation as a means to reduce the level of experienced discrimination for blacks.

A second possibility that would lead to a positive correlation between the two forms of segregation would be if there were a causal relationship between them. An example of this theorizing is found in a modification of the “spatial mismatch” hypothesis (Kain, 1968; Kasarda, 1990). In cities where blacks are ghettoized in poor, central neighborhoods, they are often isolated both physically and socially from the larger labor market that is present in the city. As a result, their only options for employment are in the limited number of occupations that are available in the inner city itself. This leads to a disproportionately high level of black employees in the occupations that are present in the inner city and an underrepresentation of blacks in the occupations that are located outside of the central city.

For policymakers and administrators, evidence that there is a single underlying system of racial inequality would support two possible strategies. One option would be to orient actions toward eliminating the larger system of racial inequality rather than focusing on any of its component parts. As opposed to singling out racial gaps in education or employment, a more comprehensive policy of reducing systematic racial bias could be developed to reduce black-white differences across all outcomes. Alternatively, a positive association also suggests that the use of targeted programs that focus on a specific form of racial inequality would be expected to have “echo effects” across other forms. It is also possible, however, that the targeted actions may also be less effective under these conditions, as other forms of racial inequality may serve to buttress the level of inequality in the area at which the policy is targeted.

### Empirical Evidence

Using 1980 data for a sample of 40 metropolitan areas, Galster and Keeney (1988) estimated a simultaneous equations model that sought to describe “the nexus of urban racial phenomena” that they believed operates in cities. They concluded that there was a positive and significant interaction between residential and occupational segregation, albeit one that had a negative quadratic component that resulted in a negative relationship once the measure of residential segregation was greater than 55 (on a scale from 0 to 100). Using an iterative simulation in order to estimate the effects of changes in one urban characteristic on the others, they found that a 10 percent decrease in the level of residential segregation from the sample mean would result in an 18.4 percent decrease in occupational segregation, while a 10 percent decrease in occupational segregation from the sample mean would result in a 1.1 percent decrease in residential segregation.

However, the data used in this study were limited in a number of ways. First, the study used only 40 metropolitan areas, which were selected from a population of cities with a

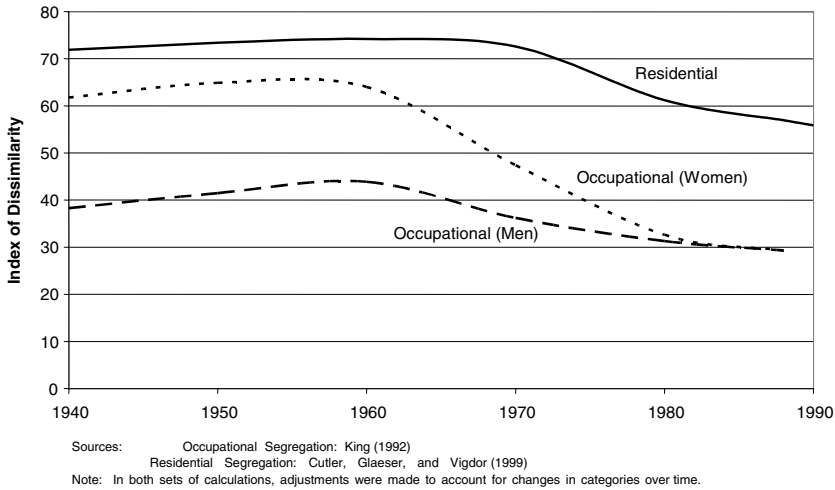


FIG. 1. Black-White Occupational and Residential Segregation, 1940–1990.

minimum black population share of 11 percent in the central city, resulting in a sample that was not representative of cities in the United States. Second, the measure of occupational segregation was an index of dissimilarity based on the six occupational categories identified in the 1980 Census. These broad categories are not measures of an individual's occupation; instead, they are categories of occupations—professional/managerial, manual, service, and so forth. Rather than being a measure of whether whites and blacks work in the same occupation, it is a measure of whether they are proportionally distributed across categories.<sup>1</sup> In contrast, I will use the entire set of metropolitan areas in the United States, the Census-defined set of 501 occupations, and 1990 Census data in this study.

Historical data also suggest that there may be a positive relationship between the two forms of segregation. Correlation over time is at best only suggestive of correlation across place, but the evidence that can be taken from the trends in each form of segregation over the past 50 years indicates that their correlation may be positive. Calculations of the levels of residential segregation are available as far back as the early 20th century, but occupational segregation levels have only been published back to the 1940s. Figure 1 shows that for both residential and occupational segregation, the national average across cities rose slightly from 1940 to 1960, began to decline in the 1960s (albeit more substantially for occupational than residential segregation), and has continued to decline through the 1980s. Recent calculations (Mumford Center, 2001) have shown that the decline in residential segregation continued in the 1990s, but corresponding data on occupational segregation are not yet available.

## HYPOTHESIS 2: OCCUPATIONAL AND RESIDENTIAL SEGREGATION ARE NOT CORRELATED

Technically, the second hypothesis is the null hypothesis for the other two hypotheses, but rather than simply being a “nonresult,” this hypothesis is also theoretically motivated and carries important implications for policymakers and individuals. Although Galster

and Keeney's (1988) research and the historical trends make a case for anticipating residential and occupational segregation to be positively correlated, there are also reasons to expect that there is no relationship between them. Although race is a factor for allocating outcomes in both the housing and labor markets, it may be the case that the causes of racial discrimination are distinct to each type of market. In other words, racial inequality may be a multidimensional phenomenon and the extent of each of the dimensions may vary independently of one another across metropolitan areas.

For individuals, finding that racial inequality is composed of multiple, independent manifestations would make minimizing one's exposure to discrimination more complex than in the case of monolithic disadvantage. As opposed to the pattern of "better" and "worse" cities that would be present with positive correlation, blacks would be faced with different forms of disadvantage across cities. In some cities, blacks may suffer extensive occupational discrimination but limited residential segregation. In other cities, the opposite pattern may hold; in yet others, both forms may be high or low. Cities are complex social structures, and this image of the multidimensional character of racial inequality actually may be more consistent with the lived experience of individuals than the theoretically parsimonious theory of general racism.

For policymakers, multidimensional racial inequality would support the strategy of targeted policies for specific issues. Diffuse initiatives that are aimed at racial inequality in general can be expected to have less effect than specific programs for specific forms of racial inequality. Designing interventions to reduce the racial differences in educational achievement will be more effective than general plans to encourage interracial contact and activities, but the effects of these specific programs on other forms of racial inequality, such as teen employment differences, will be minimal.

### Empirical Evidence

The expectation that there will be no relationship between the two forms of segregation can be derived from the theoretical literature in each field. The explanations offered to account for each form of segregation are significantly dissimilar from one another. Such a lack of theoretical common ground supports the idea that the two forms of racial disadvantage are generated by separate sets of institutional and/or personal processes and that there may be no relationship between them.

The explanations for residential segregation that have been offered in the literature can be grouped into two general categories. First, many researchers have alluded to social psychological reasons for members of racial groups to be clustered in isolated neighborhoods. Second, institutional mechanisms have been identified that have not only facilitated the manifestation of preferences for segregation, but have also potentially encouraged such practices.

"Racism," "self-segregation," and "preferences" have all been commonly used as labels to identify the propensity of individuals, both white and black, to want to live in areas where most of their neighbors are of the same race. In the two waves of the Detroit Area Study, Reynolds Farley and his collaborators (Farley et al., 1978, 1994) found that as white respondents were shown representations of neighborhoods that became increasingly mixed-race, their likelihood of reporting that they would be uncomfortable in the area and probability of moving out of the area increased. Kryson and Farley (2002) concluded that black preferences in racial neighborhood distributions also contribute to ongoing

segregation, as blacks typically express a preference for living in a neighborhood that has a higher black representation than exists in most neighborhoods in the United States. Although blacks in all these studies were less likely than whites to leave a mixed neighborhood, Denton (1996, p. 807) argued that “for some blacks, however, voluntary segregation has become associated with black empowerment, the importance of black culture, [and] black self-help goals.” Therefore, we cover a broad range of behaviors and attitudes when we speak of social psychological causes of residential segregation. At one end of the spectrum, we find the form of overt racism in which members of one group act to harm members of another group solely because of their race. At the other end of the spectrum, we find segregation as a form of potential empowerment to members of the minority community.

The history of residential segregation in the United States also points to institutional practices and public policies that have both facilitated and, to some degree, created the conditions of racial segregation. Prior to the passage of the Fair Housing Act in 1968, a number of institutional barriers existed that fostered residential segregation. The practice of “redlining,” which was established by the Federal Housing Administration the 1930s, identified areas that were black majority or proximate to black-majority areas and reduced the credit ratings of their residents under the assumption that the homes in these areas were already devalued or soon to be so as a result of racial transition. This practice, which was quickly adopted by private banking institutions, was self-fulfilling. As homeowners and buyers in these areas were systematically denied fair market credit, home values declined (Jackson, 1985). Although these practices ended in the 1960s, Massey points out that the subsequent development of lending practices has nevertheless led to further segregation. “Paradoxically, the recent opening up of FHA lending to blacks has only fueled neighborhood racial transition, with FHA loans being used by blacks to buy homes from whites in racially mixed areas, who then flee to all-white neighborhoods using conventional loans that are denied to blacks” (Massey, 1994, p. 479).

Another institutional factor that leads to residential segregation is the well-documented racial preferencing in housing rental and sales markets. Although such practices were overt in the era before the Fair Housing Act, studies by the government and social science researchers in recent years have demonstrated that practices such as racial steering and preferential treatment continue in the housing market today. A national audit survey of real estate agents in 20 markets of at least 100,000 population and 12 percent black population that used matched black and white “consumers” found that 53 percent of the pairs received differential treatment by the sales agents (Yinger, 1991). Most often, these differences took the form of additional units being shown (and recommended) to whites and more favorable credit assistance being offered to whites. Using data from a Department of Housing and Urban Development survey with a similar methodology and results, Galster (1987) showed that the pattern and level of residential segregation in a metropolitan area is positively related to the amount of housing market discrimination.

The most common explanations of why occupations are segregated by race can be broadly summarized in three categories. The earliest explanations posited that differences in human capital across racial groups led to differential occupational distributions. This model was supplemented by a theory that argued that occupational segregation resulted from social closure processes, both on the part of employers and employees themselves. A related, yet distinct, model of occupational segregation has emphasized the devaluation of occupations that have a disproportionately large minority representation as a cause for “white flight” from those occupations.

In the neoclassical economic model, a main cause of occupational segregation is differences across groups in stocks of human capital. Because blacks, on average, have lower levels of education and training, they are disproportionately represented in low-skill occupations. Although this insight has been generally accepted in the literature and has been shown to account for some portion of the occupational segregation found in American society (Polachek, 1976; Albelda, 1986; Kaufman, 1986), it has not sufficed as a comprehensive explanation for occupational segregation. Net of the differences in education and training between whites and blacks, occupational segregation still exists.

Partially in response to the neoclassical explanation of occupational segregation, social processes of closure were hypothesized to be a cause of occupational segregation. Social closure theories have generally taken two complementary forms. The first is when employers are viewed to use social closure processes in order to divide the workforce (Bergmann, 1971; Reich, Gordon, and Edwards, 1973). In this closure mechanism, employers discriminate against minority (and/or female) workers in order to create a secondary labor market of excluded workers. These workers are then forced to accept lower wages than they would receive in a nondiscriminatory labor market. In this way, employers are able to suppress wages to a portion of the labor force, and also privilege workers to whom they have the closest race/gender ties (other white males).

Another process of social closure is internal to the working class. Recognizing the competitive threat that minorities pose to the privileged white (male) segment of the workforce, these advantaged workers create systems that allow them to protect their privilege (Bonacich, 1972; Tomaskovic-Devey, 1993a). Unions are one potential organizational mechanism for this form of closure, but other noninstitutional practices, such as patterns of association, job referrals, and on-the-job assistance, can also be used to enforce social closure among workers.

The third theory of occupational segregation is analogous to social closure, but operates on the aggregate level. The theory of "racial typing" (Kaufman, 1986), "status composition" (Tomaskovic-Devey, 1993b), or "occupational devaluation" (Reid, 1998) proposes that the proportion of minority employees in an occupation lowers the wages paid to all workers in the occupation. Reid (1998, pp. 512–513) explains that "organizational members who play a role in setting wages for occupations may make errors in the evaluation of the worth of an occupation to the organization as a whole due to the normative devaluation of the members associated with that occupation." As occupations are perceived to (or actually do) have a higher percentage of minority workers, the socially accepted wage for the work declines, which in turn leads to flight by the higher wage (white) workers to other occupations for which they are qualified. Thus, a cycle of declining wages and increasing minority representation in the occupation becomes largely self-fulfilling.

Researchers have made considerable progress in identifying the causes of each form of segregation, but there are no common themes that link the two programs. Based on the explanations of black-white segregation on the job and at home, we have little reason to believe that the two forms are related. It is not implausible to develop a theory that would draw on a common cause to explain the two forms of segregation, and if they are found to have a relationship, such an effort would be merited. However, based on the existing explanations for residential and occupational segregation, there does not appear to be compelling evidence that any correlation between the two will be found.

HYPOTHESIS 3: OCCUPATIONAL AND RESIDENTIAL SEGREGATION  
ARE NEGATIVELY CORRELATED

A third possibility is that there is an inverse relationship between residential and occupational segregation. For individuals, this would mean that blacks would be faced with the choice of “picking their poison,” to the extent that they have the option to move to whichever cities they wish. Some cities will offer relatively high levels of occupational integration but at the cost of lower odds of living in an integrated neighborhood. In cities where the level of residential segregation is low, blacks will have a more difficult time finding racially integrated occupations. Because each of these forms of segregation has deleterious effects, racial disadvantage will be generally inevitable.<sup>2</sup>

For policymakers, a negative correlation across forms of racial inequality would be the worst-case scenario. If racial inequality is structured in such a manner that reductions in one area lead to increases in another area, successful interventions in one area will have the unintended consequence of increasing other forms of inequality. Under such conditions, racial disadvantage might be characterized as having resilience. With each step forward made in some area, some other area may be expected to regress. Considering the frustratingly slow progress in combating racial inequality that has been made since the 1960s, this pattern of negative associations among some forms of inequality may not be as implausible as it first appears.

Three theories can be offered as to why we might expect to find that occupational and residential segregation are negatively correlated. First, high levels of residential segregation may lead to the statistical integration of occupations as a result of “parallel economies” developing in areas of high black concentration (Lieberson, 1980; also see Semyonov, 1988, for a similar discussion regarding Arabs and Jews in Israel). It may be the case that in highly segregated neighborhoods, a demand for black professionals and/or other occupations (shopkeepers, entertainers, etc.) arises to serve the segregated minority. A historical example of this process can be seen in Harlem in the first half of the 20th century when a meso-economy developed in a highly segregated part of New York City. This parallel economy consisted of a diverse set of black-owned and -staffed business and services that served the black population of the area. In cities with lower levels of residential segregation, there may be a less concentrated demand for a diverse set of black services, as black residents are more evenly distributed throughout the city and, therefore, have more physical and social access to white professionals and specialists.

A second explanation for a negative correlation may be due to voluntary residential segregation of blacks who have achieved occupational parity with whites. Because the most white-concentrated occupations tend to be relatively highly paid, occupational integration is likely to give rise to a substantial black middle and upper class. However, the rise of a substantial black middle class may not translate into residential integration of suburban and wealthy urban areas, but may instead lead to the development of segregated suburbs, where blacks elect to live in areas that are socioeconomically privileged but nevertheless majority black. A prominent example of this process is Prince George’s County, Maryland, where a substantial proportion of the black middle class of Washington, DC, lives. Although these areas do not have the concentrated disadvantage that ghettos feature, they may be just as residentially segregated as the inner cities.

A third possibility is that there may be an upper limit on the amount of aggregate segregation that can exist in a given area. If there were a level of racial unevenness above which

undesirable results develop, such as race riots or a marked increase in interracial crime, then there would be a *de facto* limit on the amount of discrimination that could be levied against blacks. If this were the case, then those who discriminate would have to choose (most likely in a subconscious manner in response to the “racial atmosphere” perceived at the time of action) when and how they manifest their discriminatory behaviors. In areas that are near the maximum “acceptable” level of total discrimination, an increase in residential (or occupational) segregation would have to coincide with a decrease in occupational (or residential) segregation to prevent deleterious outcomes. If most cities have a total level of segregation that is close to the maximum, the aggregate pattern across cities would be one of negative correlation between residential and occupational segregation.

### Empirical Evidence

The only study that has offered even indirect support to this hypothesis is a recent study by Krysan and Farley (2002). Their data showed that blacks who perceived the job market to be highly discriminatory were more likely to express a preference for living in a racially mixed neighborhood than blacks who felt that the job market was not significantly racially penalizing. The authors did not offer an explanation for this finding, but it suggests that blacks may seek racial integration in residential settings more strongly when they are denied integration in occupational settings. To the degree that they are successful in finding housing that meets their desires, we would expect to find a negative correlation between occupational and residential segregation. This result is most consistent with the second theoretical explanation listed above, but in an inverse manner. As opposed to the voluntary segregation of occupationally successful blacks, this finding suggests that blacks who do not achieve occupational integration seek it in their residential setting.

### METHODS AND DATA

For nearly 50 years, the index of dissimilarity (D) has been the standard measure of segregation. Although there has been a flourishing of alternative measures since the late 1970s (see Massey and Denton, 1988; Massey, White, and Phua, 1996, for reviews), the index of dissimilarity remains the preferred measure when the subject of the analysis is the uneven distribution of members of two groups across a set of categories. The index of dissimilarity is defined as:

$$D = 0.5 \left( \sum_{i=1}^I |b_i/B - w_i/W| \right) * 100$$

where  $b_i$  and  $w_i$  are the number of blacks and whites in category (Census tract or occupation)  $i$ , and  $B$  and  $W$  are the total number of blacks and whites in the population. One of the most appealing properties of D is that it can be easily interpreted as the percentage of the black (or white) population that would have to change from one category to another in order for the distribution by race to be equal in all categories. A D statistic of 50 means that half the members of either group must change to a different category in order to achieve perfectly symmetrical distribution across all categories.

For this study, the indexes of dissimilarity between non-Hispanic blacks and non-Hispanic whites for both residential and occupational distributions have been calculated

directly from the 1990 Census STF3 and EEO files, respectively. The residential segregation data was created using the above formula, using the Census tract as the category, which has been the standard in most residential segregation studies.<sup>3</sup> The occupational segregation data were calculated with a modified formula for the index of dissimilarity that accounts for the expected levels of random variation in occupations with small populations (see Cotter et al., 1997, for a detailed description of the adjustment process).<sup>4</sup> The calculations use the entire 501 occupational categories. Both data sets include 261 metropolitan areas (MAs) as defined by the Census Bureau in June 1993.<sup>5</sup>

It has been thoroughly documented (see Padavic and Reskin, 2002, for a summary) that the occupational distribution of men and women differs substantially and, therefore, separate analyses by sex are warranted. Failure to distinguish male racial occupational segregation from female racial occupational segregation is likely to underestimate the effect of race on the occupational distributions. For example, if black men and white women are both disadvantaged relative to white men by being excluded from a set of occupations, members of each group may end up in similar occupations. This would appear as a method of integration of occupations, when it is actually the presence of two distinct forms of segregation: gender segregation for the white women, and racial segregation for the black men. The goal in this article is to isolate the effect of race on occupational outcomes and, therefore, it is preferable to control for the effects of gender discrimination by measuring the degree of occupational segregation by race for men and women separately. As a result, two analyses will be done in this article—one relating residential segregation to occupational segregation of men, and a second relating residential segregation to occupational segregation of women.

In each analysis, the first stage is the calculation of the correlation of the two levels of segregation across the 261 MAs.<sup>6</sup> The second stage is the identification of the MA characteristics that affect the correlation. To determine whether exogenous factors affect the size of the correlation between occupational and residential segregation across metropolitan areas, identical multivariate regression models of each type of segregation are applied. Variables that have a significant effect on each of the dependent variables with opposite signs are factors that are expected to account for negative correlation between the measures.<sup>7</sup> Variables that have a significant effect on both forms of segregation that act in the same direction can be understood to be positive correlating forces. The calculation of the correlation of the residual values after controlling for the various combinations of positive and negative factors will show the contribution of each factor to the total correlation, and also indicate the strength and direction of the correlation between the types of segregation, net of the explanatory factors. Once the full set of relevant controls has been factored out of the data, the remaining correlation coefficient indicates the relationship between the two forms of segregation.

The latter part of the analysis can be represented with the following equations:

$$\begin{aligned}
 Y_r &= \mathbf{X}\beta_r + \varepsilon_r \\
 Y_o &= \mathbf{X}\beta_o + \varepsilon_o \\
 \hat{\varepsilon}_r &= Y_r - \mathbf{X}\hat{\beta}_r \\
 \hat{\varepsilon}_o &= Y_o - \mathbf{X}\hat{\beta}_o \\
 \text{Corr}(\hat{\varepsilon}_r, \hat{\varepsilon}_o) &= \text{Corr}((Y_r - \mathbf{X}\hat{\beta}_r), (Y_o - \mathbf{X}\hat{\beta}_o))
 \end{aligned}$$

in which  $r$  denotes residential segregation,  $o$  denotes occupational segregation, and  $X$  is a vector of control variables.

#### CONTROL VARIABLES

In previous research on the factors that affect the extent of residential or occupational segregation, few independent variables have been used in both sets of models. Even in Galster and Keeney's (1988) attempt to model the "nexus of urban racial phenomena," there were only three variables that were included in the models of both forms of segregation. Therefore, the list of urban structural characteristics that will be used as controls is relatively brief.

#### Population

Total population is one of the few variables that has been used consistently in both the residential and occupational segregation literature. Findings have been consistent in the residential segregation research that more populous metropolitan areas have higher levels of residential segregation than smaller MAs (Jakubs, 1986; Farley and Frey, 1994; Cutler, Glaeser, and Vigdor, 1999). The occupational segregation literature has not been as consistent in finding the effects of overall MA population. Earlier research (LaGory and Magnani, 1979) found a significant negative effect, but more recent research (Semyonov et al., 2000) did not find that overall population was a significant factor. Therefore, total population may be a factor that accounts for some amount of negative correlation between the two types of segregation. The natural log of the total population of the MA is used in the model to compensate for the skewed distribution of population across cities in the United States.

#### Percent Black

The "minority threat hypothesis" (alternatively, the "visibility-discrimination hypothesis") proposes that as the proportion of a minority group increases in a setting, the level of discrimination against that group also increases (Blalock, 1967). Following this logic, the percentage black of the population has appeared in many models of both types of segregation, but has not always been found to be a significant factor. In the residential segregation research, the findings regarding percent black have been mixed. Cutler, Glaeser, and Vigdor (1999), Galster and Keeney (1988), and Jakubs (1986) found no effect, but Bickford and Massey (1991) found a significant negative effect. Occupational segregation has been consistently associated with percent black (LaGory and Magnani, 1979; Galster and Keeney, 1988; Semyonov et al., 2000), with the larger the percent black, the higher the degree of occupational segregation.

#### Percent Hispanic or Nonblack Minority

Theories of segregation have proposed that the existence of significantly large "buffer groups" may mitigate the effects of discrimination on blacks. Therefore, models of segregation have included percent Hispanic or percent nonblack minority as an indicator of the presence of other minority groups in the region. Cutler, Glaeser, and Vigdor (1999) and

Farley and Frey (1994) both found a significant negative effect of buffer minority size on residential segregation. Semyonov et al. (2000) similarly found a negative effect of percent Hispanic on occupational segregation. Because of the presence of large non-Hispanic minorities in some areas of the nation, the more inclusive variable percent nonblack minority is used in this analysis.

### Region

Researchers in both areas of the research have used either a South/non-South dichotomy or four regional variables in models of segregation. The occupational literature has more often used the binary approach, with higher occupational segregation found in the South (LaGory and Magnani, 1979; Semyonov et al., 2000). The residential literature has used the four-variable approach, showing that highest levels of residential segregation are found in the Northeast and Midwest (Farley and Frey, 1994; Cutler, Glaeser, and Vigdor, 1999). In this study, the four-region system is used, as exploratory calculations of the correlations by region showed that the strength of the correlation varied substantially among the non-South regions.

### Macroeconomic Factors

In examining the pattern of occupational segregation over time, Albelda (1986) found that the annual unemployment level had a positive effect on the degree of occupational segregation. It was theorized that when labor markets are tight, employers are more likely to integrate occupations, while slack labor markets lead to increased segregation. Other researchers of occupational segregation (LaGory and Magnani, 1979; Semyonov et al., 2000) have used percent of the labor force in manufacturing as an indicator of the structure of the labor market, but they have failed to find a significant relationship between this measure and the level of occupational segregation across cities. Farley and Frey (1994) used a more complex set of indicators to assess the “functional specializations” of the MA, and found some power in their set of variables for explaining levels of residential segregation. In this study, percentage of the labor force employed in manufacturing and the gender-specific unemployment rate are used as macroeconomic indicators.

### Black-White Educational Differences

Occupational segregation researchers have used a variety of measures that express the educational achievement gap between blacks and whites. In almost all models, the educational difference has been a significant predictor of occupational segregation (Albelda, 1986; Semyonov et al., 2000). Residential segregation research has not used educational differences in studies, but has found that the income gap between blacks and whites is a consistent predictor of levels of residential segregation (Bickford and Massey, 1991; Farley and Frey, 1994). However, occupational segregation is likely to be a cause of racial income differences. Therefore, a proxy for the racial income difference is preferable. The association between education and income is fairly strong, and the racial educational gap will be used here to capture some of the effects that are usually associated with income differences in models of residential segregation. To measure the extent of educational inequality,

the difference in percent of blacks and whites with a bachelor's degree or higher and the difference in percent with less than a high school degree are used to capture both the high and low ends of the educational distribution.

RESULTS

The top section of Table 1 shows the descriptive statistics for the dependent variables in the study. Residential segregation values range from 22.5 in Jacksonville, NC, to 85.8 in Detroit-Ann Arbor-Flint, MI, with a mean value of 56.9. In other words, even in the least residentially segregated metropolitan areas in the United States in 1990, almost one in four blacks (or whites) would have to move to a different Census tract in order to achieve full racial integration. In the most segregated city, six out of seven members of either race would have to relocate to achieve an even distribution across all census tracts.

The average levels of occupational segregation are somewhat lower in magnitude, as approximately one in three blacks or whites would have to switch occupations in order to fully integrate the employment distribution in the average city in the United States for both men and women. Occupational segregation for men in American metropolitan areas has a low of 23.1 in Springfield, MA, and a high of 55.9 in Duluth-Superior, MN-WI, with a mean of 36.2. Occupational segregation for women is slightly lower on average, with a mean of 33.5, but with a greater variation, ranging from 20.8 (Dayton-Springfield, OH) to 58.0 (Casper, WY). In the most highly integrated cities, slightly more than one in five people would have to change occupations to achieve full integration. In the most highly segregated cities, almost three in five workers would have to change occupations.<sup>8</sup>

The remainder of the table shows the descriptive statistics for the other variables to be used in the analysis. The average MA has a population that is 10.6 percent black and 9 percent nonblack minority, although the range for each of these variables is large.

**TABLE 1.** Descriptive Statistics of Variables Used in the Study

| Variable  | Mean  | SD    | Min    | Max   |
|---|-------|-------|--------|-------|
| Black-white residential segregation                         | 56.95 | 12.27 | 22.52  | 85.84 |
| Black-white male occupational segregation                   | 36.22 | 6.55  | 23.09  | 55.93 |
| Black-white female occupational segregation                 | 33.49 | 7.82  | 20.75  | 58.04 |
| Population (ln)   | 12.71 | 1.08  | 10.95  | 16.78 |
| Percent black   | 10.59 | 10.57 | 0.06   | 45.50 |
| Percent nonblack minority                                   | 9.10  | 13.74 | 0.67   | 85.68 |
| Northeast region  | 0.13  |       | 0      | 1     |
| South region  | 0.46  |       | 0      | 1     |
| North Central region  | 0.25  |       | 0      | 1     |
| West region   | 0.17  |       | 0      | 1     |
| Male percent unemployment                                   | 6.36  | 1.83  | 2.88   | 14.59 |
| Female percent unemployment                                 | 6.41  | 2.09  | 2.28   | 13.99 |
| Percent employed in manufacturing                           | 10.02 | 5.51  | 1.39   | 31.82 |
| Black-white HS graduation rate difference <sup>a</sup>      | 12.11 | 9.75  | -15.95 | 46.88 |
| Black-white college graduation rate difference <sup>a</sup> | 12.41 | 9.61  | -37.32 | 37.24 |

<sup>a</sup>Positive values indicate higher rates of white graduation.

The region variables indicate the distribution of the MAs across the regions, and not the population within them, which means that nearly half the MAs are located in the South. Both male and female unemployment averaged 6.4 percent in 1990, and one in 10 workers was employed in manufacturing of durable goods. For both high school and college, white rates of graduation were 12 percentage points higher than for blacks in the average MA.

## MEN

Only two MAs in the entire study (Fayetteville, NC, and Killeen-Temple, TX) are more than one standard deviation below the mean on both residential segregation and male occupational segregation scores and none are more than one standard deviation above the mean on both scores. Twenty-eight MAs, however, are more than one deviation from the mean in opposite directions on the two measures. Therefore, we may expect that the correlation between the two is not particularly strong or significantly negative.

The latter is the case, as the correlation between the two is  $-0.33$ , indicating that metropolitan areas that are high in one form of segregation are expected to be low on the other measure of segregation. In other words, *metropolitan areas with high residential racial segregation tend to have low male racial occupational segregation and metropolitan areas with high male racial occupational segregation tend to have low residential segregation*. The value of the correlation is significant at  $p < 0.001$ .

Table 2 shows the results of the multivariate regressions run on each of the dependent variables. The natural log of the total population of the MA is a significant predictor of the level of both forms of segregation, and with an opposite sign for each. This suggests that size of the MA may account for some portion of the negative correlation. Similarly, the percent nonblack minority is also significant in opposite directions in the two models. Only one of the region measures is statistically significant (West) and that is only for residential segregation. The percent employed in durable goods manufacturing is significant in both

**TABLE 2.** Regression Results of Models of Occupational and Residential Segregation for Men

|                                   | Occupational Segregation | Residential Segregation |
|-----------------------------------|--------------------------|-------------------------|
| Intercept                         | 36.177***                | 56.921***               |
| Population variables              |                          |                         |
| Population (ln)                   | -3.144***                | 6.080***                |
| Percent black                     | -0.079                   | -0.156*                 |
| Percent nonblack minority         | 0.080*                   | -0.234***               |
| Region (Northeast omitted)        |                          |                         |
| South                             | 0.258                    | -2.121                  |
| North Central                     | 1.119                    | 1.820                   |
| West                              | 0.625                    | -5.622*                 |
| Macroeconomic variables           |                          |                         |
| Male unemployment                 | -0.118                   | 1.510***                |
| Percent employed in manufacturing | -0.299***                | 0.330**                 |
| Education differences             |                          |                         |
| BA rate difference                | -0.096*                  | 0.042                   |
| HS diploma rate difference        | 0.031                    | 0.225***                |
| Model $R^2$                       | 0.46                     | 0.50                    |

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < .05$ .

Note: All independent variables have been centered around their mean.

models and also appears to contribute to the negative correlation. Although each of the education measures affects one of the segregation outcomes, neither one is significant for both.<sup>9</sup>

WOMEN

For women, the basic pattern of association between residential segregation and occupational segregation is similar to that for men. One MA (Glens Falls, NY) is more than one standard deviation above the mean in both residential and occupational segregation, and four (Albuquerque, NM; Anchorage, AK; El Paso, TX; and Killeen-Temple, TX) are more than one standard deviation below the mean in both. Nineteen MAs have levels of segregation that are more than one standard deviation from the mean in opposing directions. The correlation coefficient is  $-0.29$ , which is statistically significant at  $p < 0.001$ . As with male racial occupational segregation, MAs that have high levels of one type of segregation are likely to have low levels of the other type of segregation for women.

Table 3 shows the results of the regression models for residential and female racial occupational segregation. The only difference in the independent variables is the replacement of male unemployment rate with female unemployment rate. The results of the residential segregation model are similar to those found for male occupational segregation, which suggests that spatial patterns of racial occupational segregation do not vary greatly by gender.

Once again, population of the MA is significant in each model and the signs of the coefficients are opposed in the two models, suggesting that population effects explain some portion of the negative correlation. Percent nonblack minority and percent employed in durable goods manufacturing are also significant in both models and are likely to account for part of the negative correlation. The one difference in the results for men and women is that the difference in high school graduation rates is significant in both the residential and

**TABLE 3.** Regression Results of Models of Occupational and Residential Segregation for Women

|                                   | Occupational Segregation | Residential Segregation |
|-----------------------------------|--------------------------|-------------------------|
| Intercept                         | 33.436***                | 56.928**                |
| Population variables              |                          |                         |
| Population (ln)                   | -3.976***                | 5.992***                |
| Percent black                     | -0.055                   | -0.176*                 |
| Percent nonblack minority         | 0.108**                  | -0.177**                |
| Region (Northeast omitted)        |                          |                         |
| South                             | -0.081                   | -3.511                  |
| North Central                     | -1.914                   | 1.265                   |
| West                              | 0.755                    | -7.160**                |
| Macroeconomic variables           |                          |                         |
| Female unemployment               | -0.522*                  | 0.674                   |
| Percent employed in manufacturing | -0.175*                  | 0.316**                 |
| Education differences             |                          |                         |
| BA rate difference                | -0.172***                | 0.025                   |
| HS diploma rate difference        | 0.160***                 | 0.230***                |
| Model $R^2$                       | 0.43                     | 0.47                    |

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ .

Note: All independent variables have been centered around their mean.

occupational models for women, and the effects are positive on each outcome. Unlike the other explanatory variables that have been found to be significant, high school graduation rate differences appear to have a positive effect on the direction and magnitude of the correlation (i.e., controlling for educational differences is expected to make the correlation more strongly negative).

#### THE EFFECT OF THE CONTROL VARIABLES ON THE CORRELATIONS

The zero-order correlations of residential segregation and occupational segregation were  $-0.33$  and  $-0.29$ , for men and women, respectively. Both correlations are statistically significant at  $p < 0.001$ . Although this appears to support the hypothesis that there is a trade-off pattern between the two forms of segregation (Hypothesis 3), it may be the case that the control variables that affect both forms of segregation account for the negative correlation. Net of these factors, the correlation may still be negative, but it may also be nonsignificant or even positive.

Table 4 shows the resulting correlations of the residual values of the levels of residential and occupational segregation, once specific independent variables are controlled. The second line of the table shows the correlations after the full models presented in Tables 2 and 3 are applied to the dependent variables. For both men and women, the application of the full set of controls reduces the correlation between occupational and residential segregation to a value that is not significantly different from zero. In other words, once the exogenous factors in the model are controlled, the two forms of segregation are not correlated. Therefore, the answer to the question posed at the beginning of the article is that *net of the exogenous factors controlled in the model, there is no association between occupational and residential segregation of blacks and whites for either men or women*. The two forms of segregation appear to be distinct forms of racial disadvantage and not related parts of some greater structural system (supporting Hypothesis 2).

The question still remains whether some of the factors controlled for in the models contribute to the pattern of negative association more than others. The remainder of Table 4 shows the resulting correlation values after each of the variables that were significant in both models for either men or women are controlled individually.

Controlling for population of the MA was expected to reduce the size of the negative correlation, as it has a positive effect on levels of residential segregation and a negative effect on occupational segregation. The effect of controlling for city size on the correlation coefficient for both men and women is substantial. In both cases, the correlation of the

**TABLE 4.** Correlation Coefficients of Model Residuals

| Model                             | Correlation Coefficient of Residuals |               |
|-----------------------------------|--------------------------------------|---------------|
|                                   | Men                                  | Women         |
| Zero-order correlation            | $-0.33^{***}$                        | $-0.29^{***}$ |
| Full model                        | 0.09                                 | 0.09          |
| Population (ln)                   | $-0.07$                              | $-0.01$       |
| Percent nonblack minority         | $-0.31^{***}$                        | $-0.28^{***}$ |
| Percent employed in manufacturing | $-0.26^{***}$                        | $-0.23^{***}$ |
| HS diploma rate difference        |                                      | $-0.30^{***}$ |

$***p < 0.001$ ;  $**p < 0.01$ ;  $*p < 0.05$ .

levels of segregation, net of the population effect, is nonsignificant. Even with the other negatively correlating factors (percent nonblack minority and percent employed in manufacturing) not controlled in the model, the negative correlation between the two forms of segregation is eliminated.

Percent nonblack minority and percent employed in durable goods manufacturing are also expected to reduce the negative correlation, but after seeing the effect of controlling for population, it is to be expected that the effect of controlling for these factors will be much less substantial. This is the case for both variables and for both men and women, as the reduction of the size of the coefficient is much smaller than after controlling for total population. For both variables, controlling for their effects does not reduce the correlation coefficient for occupational and residential segregation to a level of nonsignificance.

For women, the correlation between residential and occupational segregation is expected to become more negative when the effects of high school graduation rate differences are factored out. Although this is the case (increasing to  $-0.30$ ), the size of the increase is relatively minimal. Educational differences increase the positive association between residential segregation and women's racial occupational segregation, but not substantially.

#### SUMMARY AND DISCUSSION

It is readily apparent to most observers that blacks are subject to multiple forms of structural disadvantage in American metropolitan areas; however, the question of whether these multiple forms are associated with one another in a larger structural system generally has not been explored. This study has shown that the zero-order association between two forms of segregation, occupational and residential, is negative and significant. In cities with relatively extensive segregation of one form, the other form of segregation tends to be relatively low. There is a tradeoff between occupational and residential segregation as one moves from city to city.

To understand why this pattern exists, multivariate models were developed to determine common factors among the determinants of segregation of both forms. The dominant factor was overall population. Large cities tend to have high levels of residential segregation and low levels of occupational segregation; smaller cities tend to have the opposite pattern. Although there are other factors that influence the association of the two forms of segregation, the negative correlation of the levels of segregation is predominantly the result of city size. Net of this exogenous factor, there is no association between the two forms of segregation.

Despite the findings in other research that race and gender interact in occupational segregation, the pattern of correlation and the effect of the control variables were similar for both men and women. This suggests that the greater system of racial inequality may not have a distinct gender dimension. The institutional factors that create inequality between black and white men may function in similar ways to create disadvantage for black women relative to white women, as well.

Returning to Figure 1, we can now understand the parallel declines of residential and occupational segregation in a different manner than was initially suggested. The recognition that residential and occupational segregation are separate dimensions of racial inequality suggests that different factors affect the extent to which they are present. The reversal in the trend in residential segregation around 1970 suggests that the passage of the Fair

Housing Act in 1968 and other legal and institutional changes in the wake of the civil rights movement were at least partially effective in fulfilling their goals. However, we should not expect that these changes in the housing market are also responsible for the decline in the level of occupational segregation that began around the same time. It is more likely that these changes are due primarily to the legal and institutional changes in labor markets that took place independently of the changes in the residential institutions in the 1950s and 1960s, such as Title VII of the Civil Rights Act (1964).

Both sets of institutional changes were products of the civil rights movement, but the coincidental timing creates the illusion of positive correlation. Had the Fair Housing Act been passed 20 years earlier than Title VII, we may have seen the decline in the level of residential segregation predate the decline in occupational segregation by approximately 20 years. Along the same lines, we might also conclude that had the reforms in the employment realm been approved but the program of residential reforms been defeated, we would currently be considering the question of why occupational segregation has declined but residential segregation remains as high as ever (in which case, it would also be apparent that the two are distinct dimensions of racial inequality).

Returning to the applied questions of what this research means for individuals and for policymakers, we need to distinguish between the zero-order results and the results after controlling for other factors. For individuals, the zero-order correlation is the relevant measure. People live in cities as they are, including the factors that are controlled for in statistical models. Specifically, American cities vary in size and the size of the city is associated with both residential and occupational segregation in opposite ways. Therefore, as individuals choose to live in cities of different sizes, they are also (usually unintentionally) selecting whether they will be subjected to higher levels of occupational segregation or higher levels of residential segregation. When a black resident of Detroit chooses to leave the high residential segregation of Detroit for the relatively integrated city of Santa Fe, the cost of that choice is a decline in the odds of working in a racially integrated occupation.

In contrast, policymakers should be concerned with the correlation, net of the explanatory variables. For them, the question is whether these forms of segregation are directly related, and not whether some third variable is mutually causal.<sup>10</sup> The relevant conclusion is that there is no correlation between the forms of segregation, net of population, which suggests that racial inequality in cities is multidimensional.

Whether this is ultimately good news or bad news for those who seek to reduce and ultimately eliminate racial inequality is not clear. To the extent that research-informed policy seeks to find “magic bullets” that can simultaneously reduce multiple forms of racial inequality, this lack of association is a discouraging result. Were the correlation between occupational and residential segregation positive, then progress in reducing one form of inequality would be expected to have the additional benefit of reducing inequality in other areas. Instead, it appears that our best policy approach is to recognize that for different forms of racial inequality, different interventions are needed.

However, there is also good news in the result that the forms of racial inequality are not correlated, net of city size. Even though levels of occupational and residential segregation have declined over the past three decades, it is possible that either of these trends may reverse in the future. The lack of a positive association between them means that we would not expect an increase in one form of segregation to lead to an increase in the other form. Should cities begin to residentially resegregate in the future, it does not mean that occupational segregation is also likely to increase. This, perhaps, is the silver lining of the

multidimensional cloud of racial inequality—multiple interventions are needed to reduce it, but setbacks in one area will not necessarily lead to a cascade across others.

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### Notes

<sup>1</sup> For example, consider a hypothetical case where there are two occupations in the managerial category and two occupations in the service category, which are exhaustive of the occupational distribution. In this economy, all the white workers are in one occupation of the managerial category and one occupation of the service category, while the other two occupations are exclusively black. As long as the ratio of black to white workers in each category is equal, the categorical measure will indicate no segregation, while the occupational measure will indicate complete segregation.

<sup>2</sup> It should be noted that as long as all cities in the United States currently have some degree of segregation in all areas, this statement is true regardless of the relationships among them.

<sup>3</sup> The primary alternative is the block group, which results in higher values of D due to a larger number of categories. Across metropolitan areas, however, tract level and block group level measures are highly correlated ( $r = 0.88$  in these data).

<sup>4</sup> This adjustment is not necessary for residential data because of the relatively large size of all Census tracts (approximately 4,000 people; Bureau of the Census, 1994).

<sup>5</sup> The MAs are the MSAs by the Census Bureau with three exceptions: (1) NECMAs are used in New England, (2) CMSAs are used as opposed to their component PMSAs, and (3) in six cases (Kokomo-Indianapolis, Iowa City/-Dubuque, Lawrence-Kansas City, Lewiston/Auburn-Bangor, Bismark-Grand Forks, and Sheboygan-Green Bay), small MSAs were combined with other cities in the same state. Laredo, TX, was excluded because of its extremely low number of black residents.

<sup>6</sup> To explore whether the results were affected by the presence of cities with small black populations, models were also run using the 187 MAs that had at least 20,000 black residents or a 3 percent black population share (following Farley and Frey, 1994). The results using this reduced data set were similar to those reported here.

<sup>7</sup> Because the data set is a population and not a sample, the measures of statistical significance should not be interpreted as indications of the risk of erroneously rejecting the null hypothesis, as they are in a standard analysis. Instead, the measures of significance ought to be considered as indications of the consistency of effect across the units. A small standard error (and therefore, a lower  $p$  value) indicates a relationship that is consistent across cities (Grodsky and Pager, 2001).

<sup>8</sup> These occupational segregation values are higher than in other published data (King, 1992; Jacobsen, 1997; Semyonov et al., 2000) because they are generated from the full 501 occupational categories defined in the EEO data. The index of dissimilarity is sensitive to the number of categories in the data, and the value of D will increase with the division of categories into smaller categories.

<sup>9</sup> Curiously, the effect of college graduation rate differences on occupational segregation is negative, which means that larger college graduation differences are associated with lower levels of occupational segregation.

<sup>10</sup> The exception is policies that are aimed at changing the population of the metropolitan area. These programs should be undertaken with the knowledge of the effect of population on both forms of segregation. In other words, growth programs should be seen as reducing occupational segregation, but increasing residential segregation.

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