Black Concentration Effects on Black-White and Gender Inequality: Multilevel Analysis for U.S. Metropolitan Areas*

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Abstract

This investigation into effects of metropolitan-area black population proportions on earnings inequality differs from previous studies in two principal ways: It examines black population effects on gender as well as black-white inequality; and it employs a hierarchical linear model for individual and metropolitan area data from the 1990 Census. Principal findings are that greater relative black population size is associated with (1) higher white earnings and lower black earnings for men and women, and (2) reduced gender inequality among black workers. Thus, black-white inequality is higher relative to gender inequality in labor markets with greater black representation, which has important implications for the study of interaction in stratification systems.

Several generations of researchers have found a positive relationship between black population proportions and black-white inequality (e.g., Beggs, Villemez & Arnold 1997; Blalock 1956, 1967; Burr, Galle & Fossett 1991; Fossett 1988; Frisbie & Neidert 1977; Semyonov, Hoyt & Scott 1984; Tienda & Lii 1987; Tomaskovic-Devey & Roscigno 1996; Wilcox & Roof 1978). This investigation expands upon the tradition in two principal ways. First, it examines effects on gender inequality as

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well as black-white inequality. The interactions of racial-ethnicity and gender have thus far not been a significant part of minority concentration studies. Second, it employs a hierarchical linear model (HLM) that combines individual and metropolitan area (MA) data from the 1990 Census.[1] Multilevel models are necessary for studies of labor market effects on earnings inequality (e.g., Cotter et al. 1997), and this technique provides greater accuracy and more flexibility than standard contextual models or purely aggregate-level studies (Bryk & Raudenbush 1992).

Black-White Earnings Inequality

Structural perspectives consider economic, political, and social characteristics of labor markets as determinants of black-white labor market inequality (Tomaskovic-Devey & Roscigno 1996). If individual characteristics such as education or other human capital variables contribute as well, these are often understood as functions of social inequality (Fossett 1988; Roscigno 1995). Much of this research has therefore focused on local labor markets, using a range of data and methods, and most studies find that labor market proportion black (PB) is positively associated with black-white inequality.

The most common explanation for this phenomenon is that higher PB increases a perception of threat on the part of whites and provokes a greater level of discrimination, leading to a greater gap between black and white labor market outcomes. This has been called the "visibility-discrimination" or "competition" hypothesis (Beggs, Villemez & Arnold 1997; Burr, Galle & Fossett 1991). The hypothesis receives support from research showing the association between increased black-white contact and racial discrimination or inter-group tensions. PB is associated with anti-black attitudes across regions and time (Quillian 1996), with increased whites' perceptions of threat from blacks, and with decreased support for integration (Fossett & Kiecolt 1989). Increased black-white contact has been shown to provoke opposition to busing (Olzak, Shanahan, & West 1994) and race riots (Olzak, Shanahan & McEneaney 1996). And studies of lynching have consistently found that white racist mobilization was greater in higher PB counties (e.g., Tolnay & Beck 1995; Tolnay & Deane 1996).

However, existing studies of PB-effects on labor market outcomes do not have adequate data to explain the mechanisms at work. Identifying discrimination at the employer level, for example, requires data on skills, training, and tenure as well as more commonly available variables (Cancio, Evans & Maume 1996). Similarly, showing racial mobilization in the wider community requires evidence of collective action that cannot be assumed from cross-sectional earnings data, and studies of white racial attitudes (e.g., Fossett & Kiecolt 1989; Quillian 1996) are generally not linked to labor market outcomes. Beggs, Villemez and Arnold

(1997) do find that local support for equality of opportunity reduces black-white occupational inequality, but adding this variable does not substantially reduce the effect of black population concentration, which it would be expected to do if local attitudes were the mechanism by which PB operates on inequality. So causal claims should be considered cautiously. Findings of an association between black concentration and increased inequality do not necessarily support the visibility-discrimination hypothesis.

A crowding-effect hypothesis complements the visibility-discrimination theory, positing that because of occupational segregation, the greater supply of workers considered suitable for minority-dominated occupations will result in lower wages in those occupations. If local attitudes contribute to occupational segregation, and both influence earnings inequality (Tomaskovic-Devey 1993), it is likely that crowding and competition work together.

Although the phenomenon under study has persisted over time (Burr, Galle & Fossett 1991; Fossett & Seibert 1997), recent patterns of investment and development, combined with residential segregation, may also play a role in contemporary PB effects. Industrial restructuring has disproportionately hurt black communities (Logan & Molotch 1987; Squires 1992; Wilson 1987). Corporate and local businesses have made relocation decisions in ways that disadvantage blacks (Squires 1984; Squires, Velez & Taeuber 1991), and the shrinking of local tax bases in traditionally black areas has hurt school districts that serve predominantly black populations (Roscigno 1995). Continued high levels of residential segregation (Farley & Frey 1994), the geographic concentration of poor blacks within metropolitan areas (Massey, Gross & Shibuya 1994), the suburbanization of capital (Kasarda 1995; Squires, Velez & Taeuber 1991) and its flight from metropolitan areas with more blacks (Squires 1992), all contribute to difficulties in finding and keeping good jobs – a problem worsened by discrimination against job applicants known to live in poor black neighborhoods within metropolitan areas (Wilson 1996). Larger black populations could thus increase the distance to, and difficulty in finding and keeping, good jobs for black workers, putting downward pressure on their wages.

GENDER INTERACTIONS AND THEORETICAL EXPECTATIONS

Tienda and Lii (1987) believe it is important to examine within-group differentiation, and thus include education differences within racial-ethnic groups. Tomaskovic-Devey and Roscigno (1996:583) concur, arguing that "dominant ethnic or racial groups are often internally divided along class and regional lines," so that "who benefits from racial inequality cannot be answered from within a simple group competition model." However, although these authors are sensitive to the interactions of race and class, they are silent on the question of gender differentiation. Indeed, most studies include only men in their analyses (Burr, Galle

& Fossett 1991; Fossett 1988; Tienda & Lii 1987; Semyonov, Hoyt & Scott 1984; Tigges & Tootle 1993; McCreary, England, & Farkas 1989).

This is problematic for several reasons. First, there is no basis offered from which to generalize from men to women; we cannot assume women's labor market experience parallels men's along racial-ethnic lines. Second, labor markets include a substantial if less than equal proportion of women, so any analysis of labor market dynamics that excludes women runs the risk of missing substantive effects and interactions that compromise the value of their conclusions. For example, Tienda and Lii (1987) discuss the implications of their results for an "overflow" (or queuing) hypothesis wherein PB might help more educated members of minority groups (and whites) to improve their earnings by moving into better jobs when the racially-typed jobs below them are filled (Lieberson 1980; Olzak 1992). But with women excluded from the analysis, the possibility of white women competing for these "overflow" jobs cannot be examined. Semyonov, Hoyt and Scott (1984), who broadly examine this hypothesis, do so without considering women in labor markets.

A few studies have measured PB effects on black-white inequality for women as well as men (Cassirer 1996; Grant & Parcel 1990; Beggs, Villemez & Arnold 1997). Beggs, Villemez and Arnold (1997) find that the effect of PB in adjacent labor markets on inequality is greater for women than for men, supporting the idea black women might be especially hampered by difficulties traveling to jobs. Grant and Parcel (1990) find that PB has greater effects on black-white inequality for women than men.[2] However, these studies do not examine the effects of PB on gender inequality, but rather its effects on black-white inequality separately for men and women.

White women might gain more or less from PB effects on labor markets than white men. At the same time, black women might lose more or less than black men. This range of possible outcomes would have different implications for black-white as well as gender inequality. Methods that model men and women separately cannot adequately distinguish these effects. If PB-related inequality is reflective of more ascriptive hierarchical structures, for example, white women might also suffer greater discrimination in higher-PB markets. If PB has specifically racial-ethnic effects, it might affect men and women equally, although differential effects by education or occupational level might help or hurt black or white women in particular.

The lack of previous research on gender interactions warns against over-ambitious theorizing, but there are several ways white women in particular might be expected to benefit from black-white inequality resulting from PB, to a greater or lesser extent than white men do. The first is a gender variation of the "overflow" thesis. If women largely work in occupations that are typed as "reproductive" and sex segregated but hierarchically distributed by racial-ethnicity, then we might expect greater PB to allow white women to move up to higher positions in the

"racial division of paid reproductive labor" (Glenn 1992). Glenn concludes: "That the higher standard of living of one woman is made possible by, and also helps perpetuate, the other's lower standard of living is clearly evident" (1992:32). And this is largely the result of occupational distributions consistent with an "overflow" hypothesis. "White women are preferred in positions requiring physical and social contact with the public ... while racial-ethnic women are preferred in dirty back-room jobs" (1992:20).[3] White women might "overflow" into higher-visibility and higher-paying positions when there are black women to fill those below.[4] Further, if higher PB is indeed associated with a greater level of anti-black discrimination, that might increase the motivation of employers to fill better-paying jobs of higher visibility with white women. And if black women are crowded into the lower levels of sex segregated occupations, they may suffer lower wages in accord with the crowding hypothesis.

A different way PB might increase white women's earnings is by making it more economical to purchase the services required for women to make career commitments. A growing body of research documents the importance of the service-economy to married women's labor force success (e.g., Bergen 1991; Cohen 1998; Hanson & Ooms 1991; Oropesa 1993; Presser 1988). A greater presence of lower-paid black (or other non-white) women and men to perform such services — from filling fast food orders to dry cleaning and housekeeping — might be expected to lead to increased rewards for professional women as they devote more time to their careers. This might be of greater benefit to white women because they have higher education on average.

Finally, if the geographic dispersion of jobs in higher-PB metropolitan areas negatively affects blacks more than whites, this too might have differential effects by gender. Spain and Bianchi (1996:176) cite evidence that women face a greater imperative to work close to home than do men, which might increase the incentive for black women to settle for lower-paid jobs. The spatial segregation of men's and women's jobs within metropolitan areas (Hanson & Pratt 1991) raises further complications for analyzing PB effects that cannot be revealed in the present analysis, although Beggs, Villemez and Arnold (1997) offer some support for this hypothesis.

MEASUREMENT ISSUES

PB effects on earnings inequality have been the subject of studies at the *aggregate* level and the *individual* level. Among recent aggregate-level studies, Beggs, Villemez and Arnold (1997) use a sample of 1990 labor-market areas to model black-white occupational and wage inequality; Tomaskovic-Devey and Roscigno (1996) use North Carolina counties, finding that PB is associated with decreased white poverty rates and increased black poverty rates in 1980. Semyonov, Hoyt and Scott (1984) use major MAs in 1970; Frisbie and Neidert (1977) use Southwestern MAs in

1970; and Burr, Galle and Fossett (1991) use Southern MAs from 1940 through 1980. These and other aggregate-level studies do not have individual-level controls for determinants such as age, marital status, or education, even when they control for between-group differences in individual characteristics (e.g., Beggs, Villemez & Arnold 1997).

Controlling for between-group education differences does not always diminish or eliminate the black population-size effect (Beggs, Villemez & Arnold 1997; Frisbie & Neidert 1977; Grant & Parcel 1990; Semyonov, Hoyt & Scott 1984), yet some MA-level analyses have concluded that variations in black-white inequality are a function of between-group differences in educational attainment (e.g., Becker [1957] 1971). However, Roscigno (1995) and Fossett (1988) argue that PB is likely to increase inequalities in both educational attainment and the quality of education, which would suggest that controlling for group education level underestimates PB effects.

Studies that use individual-level data with appended contextual variables have produced similar results. Using appended MA-level data, Tienda and Lii (1987) found that PB is associated with lower black earnings and higher white earnings in 1980. Fossett (1988) used mean earnings for male MA-race-age-education groups, and found similar effects in 1970. In central cities, McCreary, England and Farkas (1989) found that greater PB (up to 0.5) increases the likelihood of unemployment for black male youths and decreased unemployment for white male youths in 1980.[5]

Design problems limit the effectiveness of these studies. Aggregate-level studies cannot measure effects net of individual variations, and purely individual-level studies do not correctly estimate environmental influences. For the study of variations in black-white inequality, "an appropriate analysis must draw on *both* individual-level and aggregate data" (Fossett 1988:469). The most common method, appending contextual level variables to individual records, results in downward bias in the standard errors due to the restricted variance of the contextual variables (Hirsch & Schumacher 1992:609). While there may be many thousands of degrees of freedom at the individual level, most studies use less than three hundred contextual-level units.

In large, complicated models (e.g., Cassirer 1996), this problem is especially pronounced and its effects difficult to discern. Cassirer (1996) includes a much broader array of variables than previous studies, and runs separate models for men and women in a study using 1980 Census data. In particular, she uses more MA control variables than others, including regional interactions. Her design differs from the present work in several important ways, but most seriously, Cassirer's results are undermined by the problem of underestimated standard errors. With the 1% PUMS sample from 267 MAs and 18 metropolitan-area variables (including 12 interaction terms) attached to individual records, her model assumes many thousands more degrees of freedom than it actually has at the MA level.

Analytic Strategy and Measurement

I use a hierarchical linear model (Bryk & Raudenbush 1992) that combines data from individuals and metropolitan areas. Individual data are from the 5% Public-Use Microdata Sample (PUMS), limited to non-Hispanic white and black men and women, ages 25-54, who worked as civilians in metropolitan areas, full-time, year-round in 1989. Limiting the sample to white and black workers simplifies the analysis by, on the one hand, reducing the complexity of controls at the individual level.[6] On the other hand, the limitation permits a more specific analysis of macro-level results and restricts the temptation to generalize on limited evidence across groups.

The dependent variable is the *natural log of 1989 annual earnings.* The macro unit of analysis is the MA as defined by the Bureau of the Census in 1993, based on 1990 population totals and commuting patterns.[7] These metropolitan areas, designed to delineate local labor markets, "provide a social context within which the complex sets of interactions between the population and the local economic environment are carried out" (Burr et al. 1992:386). Of 267 potential MAs in the analysis, 182 of the largest are included.[8]

The primary MA-level independent variable is *proportion black.* The use of PB is consistent with including only blacks and whites in the models. Although percent minority is a better predictor of overall white gains from discrimination, PB is the best predictor of black losses (Tienda & Lii 1987). Therefore, I also include *proportion Hispanic* and *proportion Asian* as controls at the macro-level.[9]

HLM improves the confidence of predictions, and it allows for simultaneous estimation of a full macro-level model to predict the *slopes* of individual-level independent variables. The individual-level coefficients of primary interest are dummy variables for *white women, black men,* and *black women* (white men are the excluded category). These coefficients, measuring the effects of race and gender net of individual controls, are the dependent variables in the MA-level equation.

The individual-level equation thus takes the form:

$$Y_{ij} = \beta_0 + \beta_{1j}(WW_{ij}) + \beta_{2j}(BM_{ij}) + \beta_{3j}(BW_{ij}) + S\beta_{jk}X_{ijk} + R_{ij}$$

where: Y_{ij} = *ln* EARNINGS for individual i in MAj
β_{0j} = the intercept (white men)
β_{1j} = the difference between white women and white men
β_{2j} = the difference between black men and white men
β_{3j} = the difference between black women and white men
$\beta_{jk}X$ = the slopes for k control variables X
and R_{ij} = an error term

And the complete metropolitan-area equation takes the form:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(PB_j) + S\gamma_{k0}Z_j + U_{0j}$$
$$\beta_{1j} = \gamma_{10} + \gamma_{11}(PB_j) + S\gamma_{k1}Z_j + U_{1j}$$
$$\beta_{2j} = \gamma_{20} + \gamma_{21}(PB_j) + S\gamma_{k2}Z_j + U_{2j}$$
$$\beta_{3j} = \gamma_{30} + \gamma_{31}(PB_j) + S\gamma_{k3}Z_j + U_{3j}$$
$$\beta_{jk} = \gamma_k$$

where: γ_{00} = intercept for the MA-level model of average WM log earnings (β_{0j})
γ_{01} = the effect of PB on β_{0j}
γ_{10} = intercept for the MA-level model of WW-WM difference in log earnings (β_{1j})
γ_{11} = the effect of PB on β_{1j}
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$\gamma_{k(0\text{-}3)}Z$ = MA-level coefficients k for control variables Z
γ_{κ} = constant coefficients b_k across all MAs
and $U_{(0\text{-}5j)}$ = the error terms for MA-level random effects

After WW, BM, and BW, the individual-level model includes *education* measured in years of schooling. Black education is set to zero for whites, and vice versa, as race-education interactions — therefore measuring the returns to education separately for each group. These variables are then centered at the grand mean (13.9 years), so that the race-gender dummy variables reflect earnings differences at the mean of education. Further controls include *potential experience* (age-schooling-6), *potential experience squared*, *hours usually worked per week* (*ln*), and a dummy variable for *disabled* (1 = work-limiting disability). There are three pairs of family context measures — *married*, *formerly married*, and *number of related children in the household* — each comprising gender interaction terms (i.e., married man, married woman). Formerly married is coded to include separated, divorced, and widowed people, and never married is the excluded category. These individual-level controls are consistent with Tienda and Lii (1987), except for the addition of race and gender interactions and the exclusion of language and foreign-born variables.

All the individual-level interaction terms are centered at their grand means. The other individual-level control variables (except disabled) are also centered at their means. As a result, the intercept term at the individual level (b_0) represents predicted earnings for a non-disabled, white man with just under two years of college

education and average potential experience, hours worked, number of children, and marital status.

This is a not a complete discrimination model, which would include skills, training, and work experience. So the slopes for WW, BM, and BW cannot be interpreted to measure discrimination *per se*, but they are the closest approximation possible with Census data. I also do not include occupation, industry, union representation, or other "correlates of wages that are endogamous to the discrimination process," as these should not be included in earnings models in order to let the race variables reflect some of their influence (Cancio, Evans & Maume 1996:544). Because controlling for education, which is also an outcome of labor-market inequality (Fossett 1988; Roscigno 1995), introduces a conservative bias in the measure of black-white inequality, I present results with and without this control.

METROPOLITAN AREA VARIABLES

There is considerable diversity in the MA-level predictors and controls used in studies of black-white inequality variations. As noted, I include *proportion Hispanic* and *proportion Asian* as MA-level controls. Because of the historical and contemporary differences in black-white relations between regions, I add controls for *region*, coded as dummy variables for South, North Central, and West (Northeast is the excluded category).[10]

Tienda and Lii (1987) and Cassirer (1996) use average earnings as an MA-level control for variations in costs of living. However, cost of living variation between MAs is presumably similar for blacks and whites. I do use *population size* (*ln*), which may be used to evaluate the argument by Martin and Poston (1976), that city size is associated with less discrimination because it implies more urbanization and economic rationality. (It also may serve as a proxy for cost of living.) Burr, Galle, and Fossett (1991) found that growing populations and high levels of white male employment were associated with higher levels of occupational inequality, as local economic well-being apparently brought greater benefits to white men than black men. This contradicted the hypothesis that a healthy local economy meant more to go around, and a subsequent narrowing of the black-white gap. I include a measure of *net in-migration*, (in-migrants minus out-migrants over the five years before 1990 as proportion of the population) instead of population growth, to proxy for long-term economic growth. For short-term economic conditions, I include the *unemployment rate* in 1989. Following previous research (e.g., Blalock 1956; Burr, Galle & Fossett 1991; Cassirer 1996; Fossett 1988), I include a control for *percent manufacturing* in the labor force to capture some of the industrial structure. Table 1 shows means of the individual- and MA-level variables for each demographic group.

TABLE 1: Means of Variables in the Analysis

	White Men	White Women	Black Men	Black Women
Metro-Area Variables				
Proportion Black	.13	.13	.18	.18
Proportion Hispanic	.08	.08	.08	.08
Proportion Asian	.03	.03	.03	.03
Unemployment	.06	.06	.06	.06
Net in-migration	.001	.002	.0007	-.0002
South region	.33	.35	.50	.49
Northeast region	.24	.24	.21	.23
North Central region	.24	.23	.18	.19
West region	.18	.18	.11	.10
Proportion manufacturing	.17	.17	.16	.16
Population (*ln*)	14.67	14.64	14.82	14.89
Individual Variables				
Earnings (*ln*)	10.40	9.97	10.04	9.84
Earnings	40,082	24,730	26,729	21,284
Potential experience	18.10	18.01	18.73	18.35
Years of education	14.13	13.89	13.08	13.39
Hours worked (*ln*)	3.81	3.73	3.76	3.71
Married	.75	.61	.61	.43
Formerly married	.10	.22	.16	.30
Children in household	.98	.67	1.08	1.11
Disabled	.03	.02	.03	.02
Percent of total	56.2	33.3	5.2	5.3

Note. Individual $N = 1{,}832{,}698$; Metropolitan-area $N = 182$.

Results

Table 2 shows the individual-level model, with only the four race-gender dummy coefficients allowed to vary across MAs. Among the interaction control variables, white education is shown to bring approximately 10 percent greater returns than black education per year. Married and formerly married both have positive effects for men and negative effects for women (compared with never married). The number of children in the household has a small positive effect on men's earnings, one-third the size of the negative effect it has on women's earnings. Because of the large sample size, all the variables are highly significant.

Table 3 shows the HLM results for the intercept, WW, BM, and BW coefficients. The first model is the baseline model from Table 2, in which there are no MA-level predictors, and only the slopes for the intercept and race-gender dummy variables are allowed to vary across MAs. This model establishes the amount of

TABLE 2: Hierarchical Linear Regression for Annual Earnings (*ln*) on Individual Characteristics

Variable	Parameter Estimate	Standard Error
Intercept (white man)	10.231	.0074
White woman (Difference from white men)	-.369	.0040
Black man (Difference from white men)	-.200	.0058
Black woman (Difference from white men)	-.462	.0067
Potential experience	.027	.0002
Potential experience^2	-.0004	.0000
Years of education, black	.084	.0004
Years of education, white	.095	.0002
Hours worked (ln)	.462	.0023
Married, woman	-.026	.0016
Married, man	.245	.0014
Formerly married, woman	-.039	.0018
Formerly married, man	.121	.0018
Children in household, woman	-.026	.0006
Children in household, man	.015	.0005
Disabled	-.142	.0022

Note. All coefficients are significant at $p < .001$. Except WW, BM, BW dummies and disabled, variables are centered at their means; interaction terms are centered at their grand means.

variance across MAs in these coefficients, shown at the bottom of the table — and shows that there is substantially greater race-ethnic variation than gender variation at the baseline. The individual-level intercept (β_0) of 10.231 ($27,750) is the average annual earnings (*ln*) of white men with average characteristics and no disability. This model shows the baseline disadvantage for white women (β_1= -.369, for 31 percent or $8,563 less), black men ($\beta_2$ = -.200, 18 percent or $5,030 less), and black women (β_3 = -.462, 37% or $10,267 less) at the mean of the individual controls.

Models 2 and 3 introduce MA-level predictors of the race-gender coefficients. In model 2, PB has a negative effect on each group's coefficient. The introduction of PB alone reduces the variance of the BW coefficient across MAs by more than one-third, and by one-quarter for BM, substantially more than the reductions in the MA variances of the white coefficients. The substantial decrease in the variances of the BM and BW coefficients from model 1 to model 2 indicates that PB explains a larger portion of their variance across MAs.

In model 2, the effect of PB is negative and significant for all groups except white women. The negative coefficient for the intercept means that white men earn

TABLE 3: Hierarchical Linear Regression for Annual Earnings (*ln*) on Individual and Metro-Area Characteristics

Variables	Model 1	Model 2	Model 3	Model 4
Intercept (White Men)				
Intercept	10.231***	10.253***	10.210***	10.210***
Proportion black	–	-.153*	.151	.143*
South region	–	–	-.153***	-.084***
North Central region	–	–	-.052*	-.021
West region	–	–	-.036	-.038
Percent manufacturing	–	–	–	.157*
Population (*ln*)	–	–	–	.052***
Proportion Hispanic	–	–	–	.124*
Proportion Asian	–	–	–	.042
Unemployment	–	–	–	-.643+
Net in-migration	–	–	–	-.135
White Women (Difference from White Men)				
Intercept	-.369***	-.369***	-.370***	-.378***
Proportion black	–	-.005	-.003	.061
South region	–	–	-.000	-.011
North Central region	–	–	-.027+	-.017
West region	–	–	.032+	-.005
Percent manufacturing	–	–	–	-.298***
Population (*ln*)	–	–	–	-.004
Proportion Hispanic	–	–	–	.074+
Proportion Asian	–	–	–	.146+
Unemployment	–	–	–	-.820***
Net in-migration	–	–	–	.181*
Black Men (Difference from White men)				
Intercept	-.200***	-.155***	-.167***	-.148***
Proportion black	–	-.303***	-.217***	-.340***
South region	–	–	-.065***	-.057***
North Central region	–	–	.006	.003
West region	–	–	-.086***	-.048*
Percent manufacturing	–	–	–	.136*
Population (ln)	–	–	–	-.010*
Proportion Hispanic	–	–	–	-.290***
Proportion Asian	–	–	–	-.000
Unemployment	–	–	–	1.175***
Net in-migration	–	–	–	-.050

TABLE 3: Hierarchical Linear Regression for Annual Earnings (*ln*) on Individual and Metro-Area Characteristics

Variables	Model 1	Model 2	Model 3	Model 4
Black Women				
(Difference from White Men)				
Intercept	-.462***	-.397***	-.422***	-.427***
Proportion black	–	-.418***	-.242***	-.218***
South region	–	–	-.075***	-.081***
North Central region	–	–	-.003	.001
West region	–	–	-.187	-.017
Percent manufacturing	–	–	–	-.130
Population (*ln*)	–	–	–	.006
Proportion Hispanic	–	–	–	-.041
Proportion Asian	–	–	–	-.237
Unemployment	–	–	–	-.229
Net in-migration	–	–	–	.357**
Variances Components of Coefficients				
(Percent of between-MA variation explained)				
Intercept				
White men	.0100	.0098	.0073	.0041
Percent		2	27	59
White women	.0026	.0026	.0023	.0015
Percent		0	12	42
Black men	.0046	.0035	.0026	.0017
Percent		24	43	63
Black women	.0066	.0041	.0037	.0037
Percent		38	44	44

$^{+}p < 0.1$ $^{*}p < 0.05$ $^{**}p < 0.01$ $^{***}p < .001$ (two-tailed tests)

less in high-PB metropolitan areas. The nonsignificant coefficient for white women means that they earn equal amounts less in higher-PB areas. The significant negative coefficients for black men and women mean they fall farther behind whites in high-PB labor markets. However, with the introduction of regional controls in model 3, the negative coefficient for white men is replaced by a positive effect. Because of the correlation between PB and lower earnings in the South, it appears that the negative effect of PB for whites in model 2 was spurious. The PB coefficient is still negative for black men and women, meaning PB predicts increased inequality net of regional controls, and the smaller size of coefficients reflect the correlation between PB and South that was concealed in model 2. The regional effects show that white men's earnings are highest in the Northeast, white women are closest to

TABLE 4: Proportion Black Effects on Annual Earnings (*ln*), With and Without Individual Controls

Variables	No Individual Controls (A)	Full Individual Model (B)
Intercept (White Men)	10.237***	10.210***
Proportion Black	.227***	.143*
White Women	-.445***	-.378***
Proportion Black	.019	.061
Black Men	-.238***	-.148***
Proportion Black	-.555***	-.340***
Black Women	-.533***	-.427***
Proportion Black	-.325***	-.218**
Between-MA Variances		
Intercept (White Men)	.0046	.0041
White Women	.0015	.0015
Black Men	.0033	.0017
Black Women	.0041	.0037

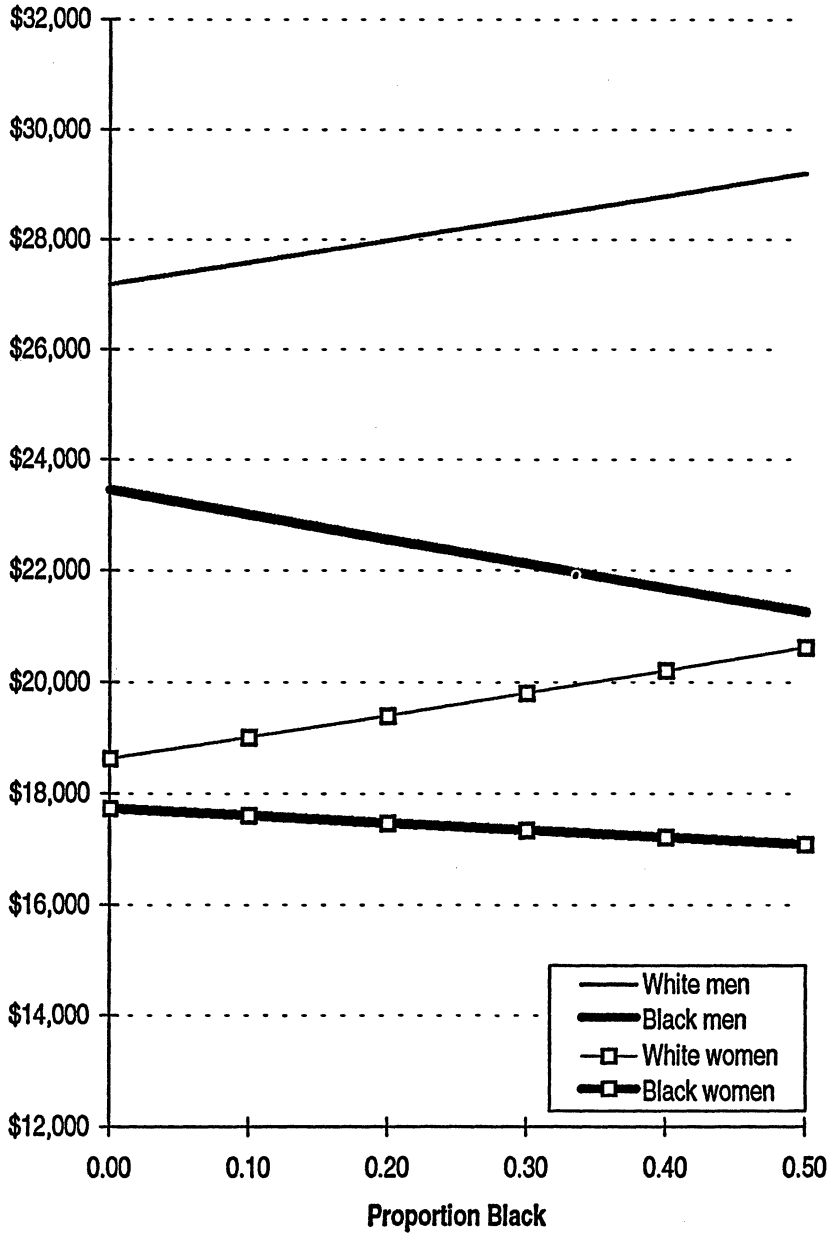
Note. Proportion black effects are estimated with metropolitan-area-level controls (from model 4 of Table 3).

white men in the West, black men are farthest behind in the West, and black women are farthest behind in the South.

Finally, model 4 shows the complete MA-level model of the four coefficients. The additional MA controls lower the PB effect somewhat for black women and raise it somewhat for black men. The results are illustrated in Figure 1. The figure shows predicted earnings for average WM, WW, BM, and BW individuals (just under two years of college, average hours worked, potential experience, marital status, and number of children, no disability) as PB increases from zero to 0.5, the approximate range of PB. *Controlling for region, percent in manufacturing, population size, Hispanic and Asian representation, unemployment level, and net in-migration on the MA level — and the vector of individual characteristics — proportion black is associated with greater black-white earnings inequality for women and men.* Net of individual and metropolitan area controls, black men are predicted to earn 86 percent of what white men earn at zero PB and 73 percent of what white men earn at 0.5 PB. Black women are predicted to earn 95% of white women's earnings at zero PB and 83% of white women's earnings at 0.5 PB.

The gender gap among white workers is unaffected, but among black workers, the gender gap narrows as black men suffer substantially greater losses than Black women.[12] Figure 1 is instructive in terms of gender interactions. At zero PB the four groups are separated more by gender than race, but black-white differences increase in

FIGURE 1: Predicted Annual Earnings, by Race, Sex, and Proportion Black in Metropolitan Area



Note. Controlling for individual and metro-area characteristcs

importance with rising PB. This is reflected in the gender gaps: the white gender gap narrows slightly (from 68.5% at zero PB to 70.6% at 0.5 PB), while the black gender gap closes 4.8% (from 75.6% to 80.4%).

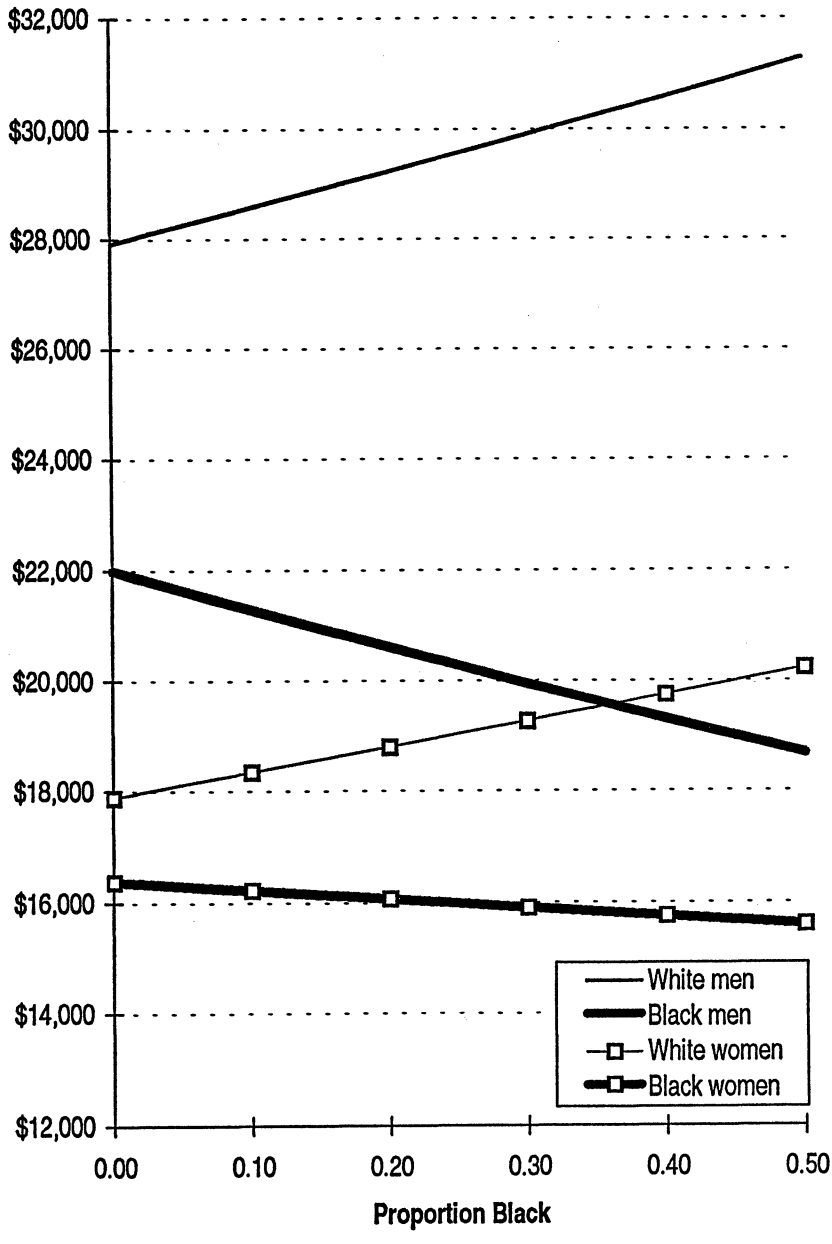
In terms of other minority groups, proportion Hispanic is associated with greater black-white inequality for men, through increases in white men's earnings and decreases in black men's earnings.[13] Hispanic representation is also associated with a further narrowing of the both gender gaps, though in different ways, as indicated by the positive coefficient for white women and the negative coefficient for black men. Asian population size also benefits white women relative to white men. Several other MA-level variables have notable effects. Net in-migration, the proxy for longer-term MA economic growth, is associated with narrowing gender gaps among black and white earners. Proportion of the labor force in manufacturing is associated with greater inequality between white men and women, but less inequality between black and white men. Regional effects on black-white inequality remain strong, with white workers earning less in the South, where black men and women are even further behind: Black men lose about an *additional* 5% and black women about 8% more than whites lose in the South.

The individual-level equation underlying the models in Table 3 approximates an earnings discrimination model, and the PB coefficients in the table reflect the MA-level effect of black population concentration net of individual variables. However, given previous research showing PB effects on overall poverty rates (Tomaskovic-Devey & Roscigno 1996) and underemployment (Tigges & Tootle 1993), it is worth investigating to what extent PB affects *overall* earnings inequality for year-round, full-time workers, without individual controls. Table 4 shows the PB coefficients from model 4 in Table 3 (B) with coefficients from a new model that includes the same MA variables but no individual-level controls (A).

The coefficients in model A of Table 4 show the total effect of PB on average annual earnings of year-round, full-time workers. The reduction in the size of the PB coefficients from model A to model B — e.g., a drop from .227 to .143 for white men — indicates that approximately one-third of the total PB effect is mediated through the characteristics of the individual-level model. PB therefore has predicted effects not only on the process of earnings discrimination, but also on the determination of individual characteristics that contribute to labor market inequality.

Figure 2 illustrates model A of Table 4 on the same scale as Figure 1. Not surprisingly, white men have a greater advantage over the other three groups in the model that does not control for individual characteristics. However, the figure also shows steeper slopes; the effects first seen in Figure 1 are more pronounced here. The black gender gap drops dramatically as black men suffer predicted losses of more than $3,000 from zero to 0.5 PB. The black gender gap in this model narrows 9.1%, from 74.5 to 83.5%. White women are also predicted to earn substantially more than black women do as PB increases. Above 0.4 PB, white women are

FIGURE 2: Predicted Annual Earnings, by Race, Sex, and Proportion Black in Metropolitan Area



Note. Controlling for metro-area characteristcs

predicted to earn more on average than black men, and at 0.5 PB white women's predicted advantage over black women's earnings has increased from less than $1,000 to more than $2,000. The gender separation of the four groups at zero PB is thus eclipsed by black-white inequality at the upper end of the PB distribution. Compared to white men, black men's predicted earnings drop from 79% to 60%, and black women's drop to just 50%.

Discussion

This study of metropolitan area proportion-black effects on earnings for full-time, year-round workers shows that proportion black has a significant association with higher white earnings and lower black earnings for both women and men, substantially increasing black-white inequality in areas where blacks are a larger portion of the population. I also find substantial gender interactions: black men are hurt substantially more than black women by living in a metropolitan area with a large black population, resulting in a narrowing of the black gender gap in earnings. Thus, where the black population share is larger, black-white earnings differences are of greater importance relative to gender differences.

These results are consistent with both the visibility-discrimination hypothesis — whereby increased minority size provokes a more hostile collective reaction from whites — as well as the crowding hypothesis, which posits that larger minority workforces under conditions of occupational segregation lead to lower wages in jobs held by minority-group workers. I have also shown that, whether by the same or different mechanisms, employed white women apparently benefit from increased black population size about as much as white men. White women's gender disadvantage thus does not block their share of gains from increased black-white inequality. This also implies that PB-related inequality may not be reflective of more ascriptive hierarchical structures in general, because there is no associated increase in gender inequality.

The gender interactions revealed here raise significant questions for future research. The increase in the black-white gap among women, while not as great as the effect among men, provides some support for the hypothesis that white women are more likely to fill higher paying and higher visibility jobs in the "racial division of paid reproductive labor" (Glenn 1992) when black women are available to fill lower jobs. This hypothesis gains further support from the positive effect of Hispanic and Asian representation on white women's earnings, and the (insignificant) negative effect of these groups on black women. These three racial-ethnic variables together indicate that white gender gaps are reduced by greater non-white representation in labor markets. However, with these data — and without analyzing occupational distributions — it is not possible to demonstrate the mechanism for the observed increase in inequality. Similarly, effects of minority population size

reported here offer some support for the service economy hypothesis, by which the presence of lower-paid non-white workers eases white women's career burden. Both of these hypotheses should be investigated further.

These results also show that the more observable total effects of labor market proportion black are greater than effects seen in models that control for individual differences. Although researchers interested in employment discrimination need to consider models with individual-level controls, the question of PB-related inequality should not be limited to this mechanism. If black-white inequality is more salient relative to gender inequality where black representation is greater, this may indeed reflect greater anti-black employment discrimination, as the visibility-discrimination hypothesis predicts. But black-white inequality itself, in addition to black representation, may also contribute to community perceptions and collective action, affecting outcomes at all levels.

Black-white inequality has complicated effects that reach across other axes of stratification. Future research into minority composition issues should further investigate racial-ethnic and gender interactions in labor market inequality. The restriction here to full-time, year round workers precludes investigation of other important labor-market outcomes, especially joblessness and underemployment. Future research should extend hierarchical models to these areas as well as to occupational distributions and outcomes for the wider mix of racial-ethnic groups. These methods offer new possibilities for testing hypotheses at different levels that will increase our knowledge of the relations between different forms of stratification.

Notes

1. Census data show that from 1979 to 1989, year-round, full-time working black men lost some ground compared to white men (70% to 68%), as did black women compared to white women (95% to 91%) (Wetzel 1995:Table 2A.2).

2. Hirsch and Schumacher (1992) include women in their analysis, but do not theorize their position in the PB-related inequality. Also, their definition of labor markets (industry-occupation-region cells) is not comparable with the MA-level analysis used here.

3. An examination of occupational data from the 1990 Census supports this view (Bureau of the Census 1992). Of the top 20 occupations for which white women are most heavily favored (those in which they are most disproportionately represented) 17 involve extensive direct contact with the public. These include lower-level service jobs — such as secretaries (of which white women are 84%), receptionists (77%), and bank tellers (73%) — as well as professional occupations such as speech therapists (84%), teachers in pre-kindergarten and kindergarten (77%), and librarians (70%).

4. Note that at high levels of PB this might benefit black women as well, as the jobs to which they are constrained fill up and some "overflow" into better jobs.

5. After PB reached 0.5, however, it predicted decreased Black youth unemployment. This lent support to the "minority power" hypothesis, which predicts that high concentrations of minority groups may yield positive outcomes for hiring and promotions as supportive niches form in the economy. However, this theory has not received support at the MA level. At the organizational level, Shenhav and Haberfeld (1992) found no evidence that the presence of black managers increased pay levels for black employees.

6. Immigrant status and language ability are typically left out of a black-white model, for example.

7. The analysis uses consolidated metropolitan areas where applicable (e.g., Washington-Baltimore). In the six New England states, New England County Metropolitan Areas are used instead of town- or city-based MAs, which makes them more comparable with MAs elsewhere. The MAs and MA-level data are as used by Cotter et al. (1997), who made their data available for this study. Individuals are assigned to the MAs where they work, which in some cases is not the same as where they live.

8. Although HLM can reliably estimate models that include macro-level groups with very few individuals (Bryk & Raudenbush 1992), I have restricted the sample to include only those MAs for which individual models may be independently estimated. The list of included MAs with their OLS regression results is available upon request. Some researchers (Beggs, Villemez & Arnold 1997; Tigges & Tootle 1993) use labor market areas (LMAs), which has the potential advantage of representing nonmetropolitan labor markets as well. Neither of these studies, however, is able to include all LMAs due to small sample and black population sizes in many areas. Up to this point, results from LMA studies do not demonstrably differ from the large body of research using metropolitan areas; in the absence of such differences, and because both geographic units are defined by commuting patterns, these methods may be considered comparable.

9. Most studies have not considered Hispanics, and have not separated them from white and black racial groups (e.g., Beggs, Villemez & Arnold 1997; Cassirer 1996; McCreary, England & Parkas 1989; Tigges & Tootle 1993). However, results from Frisbie and Neidert (1977), Tienda and Lii (1987), and Grant and Parcel (1990) all demonstrate the importance of considering Hispanics separately. Tienda and Lii (1987) found that black, Hispanic, and Asian workers all suffered earnings losses from increases in PB, which means including Hispanics among whites confounds opposing effects. On the other hand, Grant and Parcel (1990) found that Hispanic population size reduced black-white median income gaps for men (but not for women).

10. Following from Cassirer (1996), in results not shown I included a PB-South interaction to capture regional variation in the effects of PB. When regional effects of PB were not substantially different, however, I dropped this interaction from the analysis.

11. For ease of interpretation, the MA variables (except PB) are centered at their means in the macro-level equation, so the MA-level intercept (γ_{0k}) represents an MA with average characteristics on these measures, and zero PB.

12. The nonsignificant coefficient for white women means their earnings benefit from PB as much as do white men's. Both black men and black women have significant negative coefficients for PB, and the loss for black men is substantially larger.

13. This finding is contrary to the results obtained by Grant and Parcel (1990).

References

Becker, Gary. S. [1957] 1971. *The Economics of Discrimination.* University of Chicago Press.

Beggs, John J., Wayne J. Villemez, and Ruth Arnold. 1997. "Black Population Concentration and Black-White Inequality: Expanding the Consideration of Place and Space Effects." *Social Forces* 76:65-91.

Bergen, Elizabeth. 1991. "The Economic Context of Labor Allocation: Implications for Gender Stratification." *Journal of Family Issues* 12:140-57.

Blalock, Hubert M., Jr. 1956. "Economic Discrimination and Negro Increase." *American Sociological Review* 21:584-88.

———. 1967. *Toward a Theory of Minority-Group Relations.* Wiley.

Bryk, Anthony S. and Stephen W. Raudenbush. 1992. *Hierarchical Models: Applications and Data Analysis Methods.* Sage.

Bureau of the Census. 1992. "Detailed Occupation and Other Characteristics From the EEO File for the United States," 1990 Census of the Population Supplementary Reports.

Burr, Jeffrey A., Lloyd B. Potter, Omer R. Galle, and Mark A. Fossett. 1992. "Migration and Metropolitan Opportunity Structures: A Demographic Response to Racial Inequality." *Social Science Research* 21:380-405.

Burr, Jeffrey A., Omer R. Galle, and Mark A. Fossett. 1991. "Racial Occupational Inequality in Southern Metropolitan Areas, 1940-1980: Revisiting the Visibility-Discrimination Hypothesis." *Social Forces* 69:831-50.

Cancio, A. Silvia, T. David Evans, and David J. Maume Jr. 1996. "Reconsidering the Declining Significance of Race: Racial Differences in Early Career Wages." *American Sociological Review* 61:541-56.

Cassirer, Naomi. 1996. "Race Composition and Earnings: Effects by Race, Region, and Gender." *Social Science Research* 25:375-99.

Cohen, Philip N. 1998. "Replacing Housework in the Service Economy: Gender, Class, and Race-Ethnicity in Service Spending." *Gender and Society* 12:219-231.

Cotter, David A., JoAnn DeFiore, Joan M. Hermsen, Brenda Marsteller Kowalewski, and Reeve Vanneman. 1997. "All Women Benefit: The Macro-Level Effect of Occupational Integration on Gender Earnings Equality." *American Sociological Review* 62:714-734.

Farley, Reynolds and William H. Frey. 1994. "Changes in the Segregation of Whites from Blacks During the 1980s: Small Steps Toward a More Integrated Society." *American Sociological Review* 59:23-45.

Fossett, Mark A. 1988. "Community-Level Analyses of Racial Socioeconomic Inequality: A Cautionary Note." *Sociological Methods and Research* 16:454-491.

Fossett, Mark A., and K. Jill Kiecolt. 1989. "The Relative Size of Minority Populations and White Racial Attitudes." *Social Science Quarterly* 70:820-835.

Fossett, Mark A., and M. Therese Seibert. 1997. *Long Time Coming: Racial Inequality in the Nonmetropolitan South, 1940-1990.* Westview Press.

Frisbie, W. Parker, and Lisa Niedert. 1977. "Inequality and the Relative Size of Minority Populations: A Comparative Analysis." *American Journal of Sociology* 82:1007-30.

Glenn, Evelyn Nakano. 1992. "From Servitude to Service Work: Historical Continuities in the Racial Division of Paid Reproductive Labor." *Signs: Journal of Women in Culture and Society* 18:1-43.

Grant, Don Sherman, II, and Toby L. Parcel. 1990. "Revisiting Metropolitan Racial Inequality: The Case for a Resource Approach." *Social Forces* 68:1121-1142.

Hanson, Sandra L., and Theodora Ooms. 1991. "The Economic Costs and Rewards of Two-Earner, Two-Parent Families." *Journal of Marriage and the Family* 53:622-34.

Hanson, Susan, and Geraldine Pratt. 1991. "Job Search and the Occupational Segregation of Women." *Annals of the Association of American Geographers* 81:229-53.

Hirsch, Barry T., and Edward J. Schumacher. 1992. "Labor Earnings, Discrimination, and the Racial Composition of Jobs." *The Journal of Human Resources* 27:602-28.

Kasarda, John D. 1995. "Industrial Restructuring and the Changing Location of Jobs." Pp. 215-67 in *State of the Union: America in the 1990s.* Vol. 1, edited by Reynolds Farley. Russell Sage Foundation.

Lichter, Daniel T. 1989. "Race, Employment Hardship, and Inequality in the American Nonmetropolitan South." *American Sociological Review* 54:436-446.

Lieberson, Stanley. 1980. *A Piece of the Pie: Blacks and White Immigrants Since 1880.* University of California Press.

Logan, John R., and Harvey L. Molotch. 1987. *Urban Fortunes: The Political Economy of Place.* University of California Press.

Martin, Walter I., and Dudley L. Poston Jr. 1976. "Industrialization and Occupational Differentiation: An Ecological Analysis." *Pacific Sociological Review* 19:82-97.

Massey, Douglas S. and Nancy A. Denton. 1993. *American Apartheid: Segregation and the Making of the Underclass.* Harvard University Press.

Massey, Douglas S., Andrew B. Gross and Kumiko Shibuya. 1994. "Migration, Segregation, and the Geographic Concentration of Poverty." *American Sociological Review* 59:425-445.

McCreary, Lori, Paula England, and George Farkas. 1989. "Employment of Central City Male Youth: Nonlinear Effects of Racial Composition." *Social Forces* 68:55-75.

Olzak, Susan. 1992. *The Dynamics of Ethnic Competition and Conflict.* Stanford University Press.

Olzak, Susan, Suzanne Shanahan, and Elizabeth H. McEneaney. 1996. "Poverty, Segregation, and Race Riots: 1960-1993." *American Sociological Review* 61:590-613.

Olzak, Susan, Suzanne Shanahan, and Elizabeth West. 1994. "School Desegregation, Interracial Exposure, and Antibusing Activity in Contemporary Urban America." *American Journal of Sociology* 100:196-241.

Oropesa, R.S. 1993. "Using the Service Economy to Relieve the Double Burden: Female Labor Force Participation and Service Purchases." *Journal of Family Issues* 14:438-73.

Presser, Harriet B. 1988. "Shift Work and Child Care Among Young Dual-Earner American Parents." *Journal of Marriage and the Family* 50:133-48.

Quillian, Lincoln. 1996. "Group Threat and Regional Change in Attitudes toward African Americans." *American Journal of Sociology* 102:816-860.

Roscigno, Vincent J. 1995. "The Social Embeddedness of Racial Education Inequality: The Black White Gap and the Impact of Racial and Local Political-Economic Contexts." *Research in Social Stratification and Mobility* 14:135-165.

Semyonov, Moshe, Danny R. Hoyt and Richard I. Scott. 1984. "Place, Race and Differential Occupational Opportunities." *Demography* 21:259-270.

Shenhav, Yehouda and Yitchak Haberfeld. 1992. "Organizational Demography and Inequality." *Social Forces* 71:123-43.

Spain, Daphne and Suzanne M. Bianchi. 1996. *Balancing Act: Motherhood, Marriage, and Employment Among American Women.* Russell Sage Foundation.

Squires, Gregory D. 1992. *From Redlining to Reinvestment: Community Responses to Urban Disinvestment.* Temple University Press.

———. 1984. "Capital Mobility Versus Upward Mobility: The Racially Discriminatory Consequences of Plant Closings and Corporate Relocations." In *Sunbelt / Snowbelt: Urban Development and Regional Restructuring*, edited by Larry Sawers and William K Tabb. Oxford University Press.

Squires, Gregory D., William Velez and Karl E. Taeuber. 1991. "Insurance Redlining, Agency Location, and the Process of Urban Disinvestment."

Tienda, Marta and Ding-Tzann Lii. 1987. "Minority Concentration and Earnings Inequality: Blacks, Hispanics, and Asians Compared." *American Journal of Sociology* 93:141-65.

Tigges, Leann M. and Deborah M. Tootle. 1993. "Underemployment and Racial Competition in Local Labor Markets." *The Sociological Quarterly* 34:279-298.

Tolnay, Stewart E. and E. M. Beck. 1995. *A Festival of Violence: An Analysis of Southern Lynchings, 1882-1930.* University of Illinois Press.

Tolnay, Stewart E. and Glenn Deane. 1996. "Vicarious Violence: Spatial Effects on Southern Lynchings, 189-1919." *American Journal of Sociology* 102:788-815.

Tomaskovic-Devey, Donald, and Vincent J. Roscigno. 1996. "Racial Economic Subordination and White Gain in the U.S. South." *American Sociological Review* 61:565-89.

Tomaskovic-Devey, Donald. 1993. "The Gender and Race Composition of Jobs and the Male/Female, White/Black Pay Gaps." *Social Forces* 72:45-76.

Wetzel, James R. 1995. "Labor Force, Unemployment, and Earnings," Pp. 59-106 in *State of the Union: America in the 1990s.* Vol. 1, edited by Reynolds Farley. Russell Sage Foundation.

Wilcox, J. and Wade Clark Roof. 1978. "Percent Black and Black-White Status Inequality: Southern Versus Nonsouthern Patterns." *Social Science Quarterly* 59:421-34.

Wilson, William Julius. 1987. *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy.* University of Chicago Press.

———. 1996. *When Work Disappears: The World of the New Urban Poor.* Vintage Books.