Racial Wage Inequality: Job Segregation and Devaluation across U.S. Labor Markets[1]

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Despite decades of research showing greater black-white inequality in local areas where the black population is relatively large, little is known about the mechanisms for this effect. Using a unique data set of individuals nested within jobs across labor markets, this article tests two possible mechanisms for the black concentration effect on wage inequality: job segregation and devaluation. Results show that black population size is associated with greater segregation of black workers into black-dominated jobs. On the other hand, no evidence is found that the penalty for working in a black-dominated job (the devaluation effect) increases as a function of black population size. The article concludes that discrimination against workers—especially exclusion from better-paying jobs—is an important mechanism for the effect of black population size on the racial wage gap.

INTRODUCTION

Sociological research conducted over half a century has shown that the proportion of black people in local populations is positively associated with black-white inequality on a wide variety of measures (e.g., Beggs, Villemez, and Arnold 1997; Blalock 1956; Burr, Galle, and Fossett 1991; Cohen 2001; Tomaskovic-Devey and Roscigno 1996). Typically, this work draws on Blalock's (1967) theory of group threat or competition—the "visibility-discrimination" hypothesis—to explain why there is more racial inequality where the black population is larger. This hypothesis receives

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support from studies showing that white racial animus is more intense in such areas (e.g., Fossett and Kiecolt 1989; Quillian 1996; Taylor 1998). However, as Reskin (2003, p. 3) points out, "None of these researchers addressed the mechanisms through which whites' hypothesized fears lower blacks' relative earnings." Therefore, although the pattern of greater inequality in the presence of larger black populations is well established, we do not know *how* this occurs. How does greater racism increase racial inequality?

We address this deficit by testing two possible mechanisms for the effect of black population size on labor market outcomes. On the one hand, the effect may reflect a greater concentration of black workers in black-dominated jobs. In other words, *segregation* might increase as a function of black population size. On the other hand, the black population size effect may result from a stronger tendency to underreward black-dominated jobs. That is, there may be more *devaluation* of black jobs (Baron and Newman 1990; Kmec 2003) where the relative number of blacks poses a threat to the white majority. Although these mechanisms are conceptually distinct, they are not mutually exclusive—and each has its own implications for how racial wage inequality is structured and maintained.

To date, existing studies of the racial segregation of work and the underrewarding of black-dominated jobs focus on only one level of analysis—such as labor markets (e.g., Burr et al. 1991), occupations (e.g., Grodsky and Pager 2001) or establishment-specific jobs (e.g., Tomaskovic-Devey 1993*b*)—to the exclusion of other levels. In contrast, we take an integrative approach by uniting research on the racial composition of labor markets with studies on the racial composition of jobs. Using a unique data set that includes individuals, jobs, and labor markets, we extend prior work in several important ways. Methodologically, our analysis is the only one in this area to date that uses a multilevel research design with controls for variables at all three levels of analysis. However, this is not merely a methodological advance. Because we model *variation* in the processes of racial job segregation and devaluation, we can identify potential mechanisms for the effect of population proportion black on wage inequality.

RACIAL COMPOSITION AND INEQUALITY: THEORY AND RESEARCH

Black Population Concentration

At the metropolitan-area level, a high proportion of blacks has been linked to inequality in black-white earnings or income (Beggs 1995; Beggs et al.

1997; Blalock 1956; Cohen 1998, 2001; Tienda and Lii 1987; Cassirer 1996; Rankin and Falk 1991; Fossett and Seibert 1997; McCall 2001), as well as to occupational attainment (Burr et al. 1991; Semyonov, Hoyt, and Scott 1984; Perna 2001), levels of employment (Tigges and Tootle 1993), and poverty rates (Tomaskovic-Devey and Roscigno 1996). This research consistently finds that higher black representation in the population exacerbates black-white inequality.

Most scholars believe that the positive association between metropolitan area racial concentration and levels of inequality reflects a white response to the numerical threat posed by larger minority group size (Lieberson 1980; Olzak 1992; Quillian 1996; Szymanski 1976). This idea was formalized in Blalock's (1967) "competition" or "visibility-discrimination" hypothesis, which predicts a positive relationship between representation of a subordinate group and discrimination because of the heightened competition over scarce resources.[2] Research on white attitudes and behaviors consistently supports Blalock's proposition. Studies of white racial *attitudes* show that those living in areas with larger black populations are more likely to perceive blacks as a threat and to oppose integration (Fossett and Kiecolt 1989), to demonstrate more traditional prejudice and greater opposition to government policies that alleviate racial inequality (Quillian 1996)—including busing (Olzak, Shanahan, and West 1994)—and to blame individual failings for black disadvantage (Taylor 1998).

These studies complement a raft of historical research showing that antiblack *behavior* by whites also is more prevalent in areas with larger black populations. The relationship has been shown in, for example, race riots (Olzak, Shanahan, and McEneaney 1996), lynching (Reed 1972; Tolnay and Beck 1995; Tolnay, Deane, and Beck 1996), voting for segregationist candidates (Heer 1959), and school segregation (Pettigrew 1957). Burr et al. (1991, p. 844) conclude that available evidence "strongly suggests that the majority white population responds in a conservative fashion to the greater potential threat that integration poses to white social, economic, and political privileges when blacks are present in large numbers."[3]

[2] Additionally, Glenn's (1963) "white gains" perspective also predicts a negative relationship between population proportion black and blacks' status relative to whites; however, rather than relying on perceptions of threat and competition, it emphasizes the gains whites enjoy through discrimination against blacks. Because whites directly profit from discrimination against blacks, it follows that the intensity of race-based discrimination will be strongest where black concentration is high (McCreary et al. 1989).

[3] Because local proportion black is relatively stable, such a white response also may have cumulative historical effects. Cohen (1998, p. 222), e.g., finds that about one-third of the proportion-black effect on wage inequality is mediated through premarket individual characteristics.

Explaining Compositional Effects

What mechanism might best explain the well-established macrolevel effect of proportion black in a labor market on black-white inequality? We focus on two competing—but not mutually exclusive—mechanisms.

First, increasing proportion black in the local area may strengthen the tendency for black workers to be channeled into predominantly black jobs. Because white racism is worse in black labor markets, it follows that behavior contributing to racial segregation would be especially strong in areas with larger local black populations. "Allocative discrimination" (Petersen and Morgan 1995) by employers plays a central role in this process (Maloney and Whatley 1995). This includes the practice of statistical discrimination as employers reserve some jobs for whites and others for blacks based on a perception of average racial differences in productivity or other job-related attributes (Aigner and Cain 1977; Bielby and Baron 1986). Employers also may respond to real or perceived pressure from white consumers, placing black and white workers in different jobs, according to local expectations—especially in the service industries (Holzer 1997; Holzer and Ihlanfeldt 1998). Finally, racial job segregation could reflect the racially motivated efforts of white workers and the unions they dominate (Beck 1980; Bonacich 1976; Stearns and Coleman 1990).

Although previous research on black population effects has not examined job segregation itself as an outcome, studies have shown that the inequality in occupational attainment between black and white workers is greater in local areas with more blacks in the population (Semyonov et al. 1984; Burr et al. 1991; Kulis and Shaw 1996). If these practices reflect underlying racial motivations, and if those motivations are stronger in local areas with larger black populations (Taylor 1998), then racial segregation and proportion black in the population would be positively related. Job segregation need not reflect racial motivations, however. For example, the "spatial mismatch" hypothesis (e.g., Kasarda 1989) predicts that black employment suffers as a result of the suburbanization of jobs. Results from these analyses are mixed, with some recent studies finding supporting evidence for the hypothesis (Mouw 2000; Stoll and Raphael 2000; Stoll, Holzer, and Ihlanfeldt 2000) but others not finding any (Cohn and Fossett 1996; Boardman and Field 2002). Although most of these studies examine employment rates, the spatial mismatch clearly could also result in greater job segregation among the employed.[4]

[4] Because of the nature of our "job" measure, however (see below), some of this segregation would appear in our data as occurring within jobs, because we include, e.g., all custodians in the retail industry in each labor market as working in one "job." Segregation within such "jobs" needs to be analyzed as interfirm segregation (Carrington and Troske 1998; Mouw 2002).

In contrast, queuing models predict a negative relationship between racial segregation and proportion black in a local area (Fossett and Seibert 1997; Lieberson 1980). If there are more blacks in a particular area than there are racially typed jobs for them to fill, some of them will "overflow" and be pushed upward into the more desirable, racially mixed jobs. Although Tienda and Lii (1987) present some empirical evidence supporting queuing models, numerous studies showing greater black-white inequality in high proportion black labor markets are inconsistent with a queuing perspective. It may be the case that queuing does in fact operate, but its effect on reducing black-white inequality is eclipsed by the stronger influence of competition-discrimination.[5]

A second way the higher representation of blacks in a local labor market may increase inequality is by magnifying the tendency for jobs held by blacks to be paid lower wages than jobs held by whites, net of skill requirements and other factors related to wages. Tomaskovic-Devey (1993*b*) argues that, through the process of status composition, the race or gender makeup of a job influences "the organizational evaluation of the worth of the work" (p. 6). This form of discrimination, based on the biased evaluation of positions (Petersen and Morgan 1995), suggests that labor markets are tainted with systematic bias that results in the underrewarding of work performed by subordinate groups (Barnett, Baron, and Stuart 2000; Cohen and Huffman 2003*a*).

Consistent with the general position that black jobs are underrewarded relative to comparable white and integrated jobs, some researchers (e.g., Baron and Newman 1990; Browne et al. 2001; Elliot 1999; Hirsch and Schumacher 1992) have shown that positions dominated by racial/ethnic minorities receive lower pay than other jobs, even after differences in skills, working conditions, and other earnings-related factors are accounted for. Findings on these wage effects are inconsistent, however (Catanzarite 2002), and the units of analysis employed vary widely, including establishments (Carrington and Troske 1998), national occupations (England 1992; Grodsky and Pager 2001; Reid 1998), civil service jobs (Baron and Newman 1990), jobs in one state (Tomaskovic-Devey 1993*b*), occupations in one labor market (Catanzarite 1998, 2002), or occupation-industry-region cells (Hirsch and Schumacher 1992).

This hypothesis of race-based ascription in job worth parallels the large body of gender-based research showing marked penalties—that are not

[5] The competition-discrimination process and the queuing process collide in higher-status positions in particular. In areas with more black (and, thus, fewer white) workers, there is pressure to bring black workers into higher-status jobs. On the other hand, as the number of black workers in higher-status jobs increases—as predicted by queuing—discriminatory behavior against those black pioneers increases as well. On balance, previous research suggests it is the latter process that prevails.

explained by conventional market-based or supply-side accounts—accruing to female-dominated jobs (e.g., Baron and Newman 1989; Bridges and Nelson 1989; Cohen and Huffman 2003*b*; England 1992; Huffman and Velasco 1997).[6] And, although some studies do find a significant net effect of the racial composition of jobs on wages, those studies do not answer the question of whether the tendency to devalue jobs held by black workers is especially strong in high proportion black labor markets.[7] The competition-discrimination hypothesis clearly implies that this would be the case.

Research Agenda

Although a substantial body of empirical research shows that both black-white inequality and white racism are more severe in labor markets where black representation is high, the mechanisms for this have eluded prior research. Our analysis comprises two steps: First, we model racial job segregation as a function of labor market proportion black. Then, we test whether the job composition penalty is more severe in local labor markets with relatively larger black populations. The macrolevel effect of proportion black could reflect either—or both—of these processes: segregation and devaluation.

We note that there could be greater black-white wage inequality in labor markets with more black workers even if job composition penalties were constant across labor markets. This would be the case if black workers in labor markets with larger black populations were more concentrated in black-dominated jobs. For example, our data show that in Albany, Georgia, which is 46% black, the average black worker is in a job that is 63% black. So even if the penalty for working in a black-dominated job were not worse in Albany, black-white inequality would be greater than in other, less segregated labor markets because more black workers in Albany are subject to that penalty. In this case, the effect of labor market racial composition works through increased segregation rather than steeper devaluation. On the other hand, if the penalty for working in a black-dominated job were steeper in markets with a larger

[6] However, some caution against assuming a parallel between race and gender job-composition effects (Catanzarite 2003; Kilbourne, England, and Beron 1994; Reid 1998).

[7] In one recent study based only on data from Atlanta, Boston, and Los Angeles, Kmec (2003) includes a city × workplace minority concentration interaction term in her wage models to test whether the job minority concentration-wage association varies according to the minority composition of cities. Her findings suggest that the relationship is the same across these cities despite their different local minority concentrations.

share of black workers, black-white inequality would be greater even if these markets were not more segregated by race. The relative role of these two processes is an empirical question.

To summarize, our analysis targets two main questions. First, does racial concentration exacerbate job segregation? Previous research has examined proportion black effects on occupational inequality (e.g., Burr et al. 1991; Semyonov et al. 1984). However, we do not yet know whether black workers are more likely to find themselves in black-dominated jobs in more heavily black labor markets, net of individual and other labor market characteristics. If racial job segregation is important to the black-white wage gap (Kmec 2003), then its spatial variation can help explain how such inequality is reproduced.

Second, is the tendency for black jobs to be devalued especially strong in labor markets that have a high percentage of blacks? In the process of answering this question, we must first establish whether there is a black job composition penalty. This question is less pedestrian than it might appear, given the inconsistent findings and methods applied in previous research on job-level racial composition effects. Our multilevel research design allows us to estimate job-level effects while controlling for the race of individuals. That is, we test whether black-dominated jobs pay less after adjusting for the lower overall average pay of black workers and other individual characteristics.

Blalock (1967, pp. 28–30) argues that, when racial practices and attitudes at the microlevel are unmeasured—as is usually the case—careful examination of the patterns of macrolevel inequality can help explain the underlying processes at work. Taken together, answers to the questions we pose help unearth the mechanisms for the well-established racial concentration effect. This, in turn, suggests how racism might reproduce inequality in the labor market.

DATA, MEASURES, AND STATISTICAL MODELS

Data

We use several data sources to measure characteristics of individuals, jobs, and labor markets. The first is the 1990 census (5% Public Use Microdata sample [PUMS]). At the individual level, we use all workers in the PUMS who were in the age bracket 25–59, who earned between $1 and $250 per hour in 1989, who were not self-employed, and who lived in metropolitan areas (including part-time and -year as well as full-time and -year workers). These individuals make up the first level of our three-level data set.

Our second level of data comprises jobs. Some previous research (e.g., Budig 2002; England, Reid, and Kilbourne 1996) defines jobs as national occupation-industry cells, which does not include a geographic component. As Tomaskovic-Devey and Skaggs (2002) note, however, the effects of demographic composition on wages are the result of processes that play out in local contexts, at the job level. As such, patterns observed at more highly aggregated levels of analysis largely reflect the accumulation of more localized effects. Hirsch and Schumacher (1992) use broad occupation and industry categories to create occupation-industry cells for each of the four major census regions. However, their approach offers limited occupation-industry and geographic detail (in fact, they consider their cells to represent labor markets rather than jobs).

Our construction of jobs borrows from both of these approaches (Cohen and Huffman 2003*a*). We include the most detailed occupation and industry categories available, in combination with local labor markets, to yield a better approximation of local jobs. To construct local jobs, each respondent is assigned to an occupation-industry-metropolitan area cell, using the census's three-digit occupation and industry codes, and 261 metropolitan areas (MAs) from the file constructed by Cotter et al. (1997).[8]

Admittedly, this is not a perfect substitute for a true job-level measure (in the sense of establishment-specific jobs). However, data sets that include a job-level measure of racial composition are extremely rare—and the ones that do exist are based on samples of public sector jobs (Baron and Newman 1990) or establishments in a single labor market (Hewitt 2000; Tomaskovic-Devey 1993*b*). On the other hand, data sets based on random samples of establishments that span labor markets lack the necessary job-level measure of racial composition and multiple respondents per job (the National Organizations Survey) or only include respondents at the low end of the skill and educational distributions (the Multicity Study of Urban Inequality). Thus, although imperfect, our construction of jobs offers a marked improvement over those used in previous work: it combines the specificity of detailed occupation-industry combinations with a spatial component that spans U.S. labor markets.

In creating our job-level data file, we use the individual-level data prior to imposing the age restriction, so workers outside the 25–59 age range contribute to the job-level characteristics we need (such as racial composition). To avoid making estimates from samples that are too small, we

[8] Cotter et al. (1997, pp. 716-17) constructed a file from the 1993 U.S. Census definitions of metropolitan areas, which uses MAs for most of the country, New England county MAs, as well as consolidated MAs (e.g., Washington-Baltimore) in the case of large integrated labor markets. Six small MAs were combined with nearby MAs, and one (Jacksonville, N.C.) was excluded because it was dominated by a military installation. The resulting file includes 261 labor markets, incorporating about four-fifths of the total U.S. population.

exclude those jobs with fewer than 10 incumbents prior to the age restriction. The resulting sample includes 2,010,737 individuals nested within 62,326 jobs, which in turn are nested within 261 labor markets.

The geographic dimension of our job measure warrants additional discussion. Findings regarding racial composition are sensitive to the level of aggregation used. In studies examining the racial concentration of national units, for example, the negative effect of proportion black on wages is difficult to detect (England 1992; Jacobs and Blair-Loy 1996). The black population distribution makes it difficult to speak of the racial composition of national occupations (Grodsky and Pager 2001) or occupation-industry cells.[9] As Jacobs and Blair-Loy (1996) note, the presence of a clear majority, which leads to a "typical incumbent," is a necessary condition for the devaluation of work performed by a particular group (Tomaskovic-Devey 1993*a*). For example, although nurses' aides who work in hospitals are disproportionately black nationally (33% in our sample), that position cannot universally be associated with blacks because its racial composition is conditional on the local population. In Minneapolis–St. Paul, for example, only 5% of these workers are black. Clearly, then, the racial composition of local jobs (occupation-industry cells) varies across local areas.

This variation, however, does not simply mirror the local population distribution, because jobs exhibit markedly differing patterns of segregation across space. To illustrate this point, figure 1 shows the %black in three occupation-industry cells in relation to labor market %black. For elementary teachers in elementary and secondary schools, %black in the occupation-industry cell closely tracks the local %black in the population. But in most cases black workers are systematically over- or underrepresented. Thus, nurses' aides and orderlies in hospitals are black far out of proportion to the local population. On the other hand, lawyers in the legal services industry are black far less frequently than would be expected from the local population. Even in these segregated cases, furthermore, the pattern is not uniform. For example, in the Chicago consolidated metropolitan area, which is 19% black, just 3% of the 600 lawyers in legal services captured by the PUMS are black. But in the Detroit metropolitan area, which is similar to Chicago in racial composition (20% black), black lawyers in legal services are much more common (6%). Because some of the variation in jobs' racial composition is systematically related to local conditions, models using national occupation-industry cells may be underspecified with respect to local-level sources of variation (Baron 1984, p. 49).

[9] This is not the case for gender, because occupations that are predominately female tend to be female-dominated across all locations (Huffman and Cohen 2004).

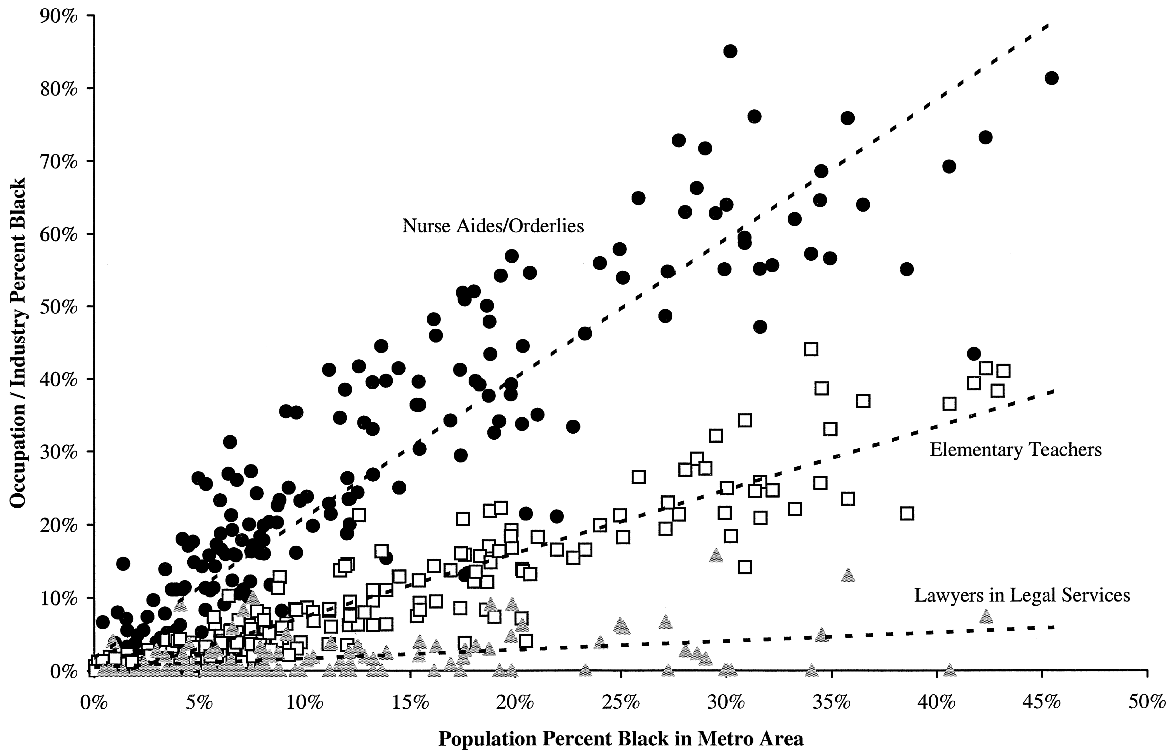

FIG. 1.—Race composition of selected occupation-industry cells, by labor market population %black

Measures

As noted, our analysis includes two main parts. First, we model proportion black in each worker's job as a function of person and labor market characteristics. This analysis will tell us whether black workers experience higher levels of job *segregation* in labor markets with larger black populations, net of their personal characteristics. In the second part, we model wages as a function of person, job, and labor market characteristics. These models will test whether the penalty for working in a black-dominated job is worse where blacks make up a larger portion of the population—that is, whether the level of racial *devaluation* varies as a function of racial concentration. Here we describe all of our measures; in the following section we specify their use in the different models.

The dependent variable in the first analysis is the proportion black in each worker's job. This is calculated from the job-level file and appended to the individuals' records. In the second analysis, our dependent variable is the natural logarithm of respondents' hourly wage in 1989, constructed by dividing annual earnings by the product of weeks worked and hours usually worked per week.

At the individual level, we control for race/ethnicity and gender differently in the two sets of models. Because we limit our wage investigation to racial job penalties, rather than race/gender job penalties (e.g., the penalty for working in a job with many black women), we also model job segregation as a race rather than race/gender outcome. Thus, in the segregation models our individual level dummy variables are black, Latino, Asian, other race, and female. In the devaluation models, where the question is the effect of racial composition on average wages in the job, we ascertain average wages net of race and gender with a series of dummy variables identifying black, Latino, Asian, and other race men, and white, black, Latina, Asian, and other race women (in all cases white, black, Asian and other race are non-Latino).[10]

In both sets of models, control variables include marital status, foreign-born, and disabled dummy variables. Continuous control variables include years of education, potential labor market experience (age − education − 6) and its square, hours usually worked per week in 1989, and the number of householder's own children present. With the exception

[10] Thus, we produce estimates of job segregation for black and white workers that are not disaggregated by gender; on the other hand, we produce estimates of average job wages that control for race/gender interaction dummies. This is logical in light of research showing gender effects on wages that differ by race/ethnicity (e.g., Cohen 1998; King and Easton 2000). In separate models (not shown; available from the authors), we find that both black and white women are predicted to be somewhat more concentrated in black jobs than their male counterparts are. However, the patterns of segregation across MAs are substantially the same.

of the disability indicator, these variables are common to wage analyses that use decennial census data (Grodsky and Pager 2001; McCall 2001).

In the first set of models, there are no job-level control variables (see below). In the second set of models, the primary independent variable of interest at the job level is proportion black, although we also control for the proportion female, Latino, Asian, and other race in each job, as well as the proportion foreign-born. As in previous research on job and occupation compositional effects (e.g., England 1992; England et al. 1994; Huffman and Velasco 1997; Tam 1997) we use several variables from the *Dictionary of Occupational Titles* (*DOT*) data set to control for skill differences across jobs. Specifically, we use standard vocational preparation (SVP), general educational development (GED), and physical demands (PHYSDMD).[11]

SVP taps the typical amount of training needed to learn the necessary techniques and information for average performance. It includes training attained in a work, school, vocational, institutional, or military setting but excludes schooling lacking specific vocational content (England and Kilbourne 1988). Therefore, it can be thought of as a measure of occupation-specific human capital—that is, investments made by workers in those skills that are valued by particular employers, not easily transferred between work settings (Becker 1975; Tam 1997; Tomaskovic-Devey and Skaggs 2002). SVP is measured along a nine-point scale, each corresponding to a period of training time.

In contrast, GED measures *general* human capital, tapping an occupation's educational requirements that are not vocationally specific (England, Hermsen, and Cotter 2000, p. 1742). GED measures workers' productive capacities that would be valued by many employers, such as general educational skills and work habits (Tomaskovic-Devey and Skaggs 2002). GED includes aspects of both informal and formal education that add to workers' reasoning, language, and mathematical skills (England and Kilbourne 1988). It is measured on a six-point scale, with "6" indicating the highest level of educational development. The value of PHYSDMD is an average computed across five physical demand factors: climbing, reaching, stooping, talking, and seeing. Because high values of

[11] Variables from the *DOT* are based on 1980 census occupational codes, while the occupation variable in the census data is based on the 1990 codes. However, the two sets of codes correspond closely to one another, allowing most codes to be easily matched. There were two 1980 codes that were split into three 1990 categories; in these cases, we were simply use the 1980 code for all three 1990 categories. Additionally, six pairs of 1980 codes were combined into a single 1990 code; in these cases, we assigned the mean value of the *DOT* variables computed across each pair of 1980 codes to the 1990 code. We exclude a new occupation—physicians' assistants—because the *DOT* variables are missing for this occupation.

SVP and GED indicate higher levels of human capital, we expect these variables to be positively related to wages. High PHYSDMD values represent a greater demand for physical work; as such, we expect this variable to be negatively associated with wages.[12] Last, we control for systematic differences in pay across industries by using dummy variables to represent the 13 broad industrial categories (England et al. 1996).

At the MA level, the key variable is the proportion black in the population. Where it improves the fit of the models, we also include proportion black squared. We also control for the proportion Latino and the proportion Asian in the population. A set of MA-level control variables reflects economic structure, historical conditions, and labor market policy. Differences in historical development are represented by the proportion of the local labor force employed in durable-goods manufacturing, and dummy variables representing the four census regions (South is the excluded category). For local economic conditions we use the net proportion change in the population resulting from 1985–90 internal migration (a proxy for long-term regional economic vitality) and the unemployment rate (to tap short-term vitality). We control for the size of the population (logged) to capture other aspects of the local demographic structure and the cost of living. Finally, if black workers are concentrated at the low end of the labor market, then the wage floor fixed by state policy may reduce the penalty for working in a black-dominated job. Therefore, we include the state's minimum wage in 1989.[13] Descriptive statistics for the three levels of data are presented in table 1.

Statistical Models and Analyses

Tests of our research questions necessitate not only controls at multiple levels, but also interactions between variables measured at different levels.

[12] Consistent with previous research using the *DOT* and the notion of compensating differentials (e.g., Filer 1985), our preliminary models were estimated including the *DOT* variable HAZARDS, which measures the proportion of workers in an occupation facing physically hazardous work. Like Reid (1998, see tables 2 and 3), we found the effect of this variable insignificant in all models. Furthermore, its inclusion did not affect any other coefficients. Therefore, it is not included in the models presented here.

[13] Inclusion of this variable was suggested to us by an anonymous reviewer. Twelve states and the District of Columbia had minimum wages higher than the federal minimum for the calendar year 1989. They were Alaska, California, Connecticut, the District of Columbia, Hawaii, Maine, Massachusetts, Minnesota, New Hampshire, Pennsylvania (raised February 1, 1989), Rhode Island, Vermont (raised July 2, 1989), and Washington. State minimum wages are drawn from Nelson (1989), except Alaska, which was provided by the Alaska Department of Labor and Workforce Development. For MAs that span states with different minimum wages—and states that raised their minimum wage part way through 1989—weighted averages are used to produce annual minimum wages for the total population.

TABLE 1
DESCRIPTIVE STATISTICS FOR INDIVIDUAL, JOB, AND METROPOLITAN AREA CHARACTERISTICS

Variable	Mean: White	Mean: Black	Mean: Other	Min	Max
Individual variables:					
Wage	14.87	12.00	11.87	1	249.80
Wage (ln)	2.489	2.278	2.240	0	5.521
N own children	.81	1.03	1.25	0	18
Hours	40.89	39.84	40.69	1	99
Foreign-born	.051	.091	.654	0	1
Disabled	.033	.036	.023	0	1
Education	14.06	13.16	12.16	0	20
Potential experience	20.27	20.78	20.25	−1	58
Potential experience^2	527.03	550.58	531.35	0	3,364
Married	.693	.493	.670	0	1
Job variables:					
Proportion black	.081	.243	.086	0	.971
Proportion Latino	.060	.081	.270	0	.994
Proportion Asian	.029	.029	.087	0	.952
Proportion other race	.004	.004	.007	0	.487
Proportion female	.480	.539	.453	0	1
Proportion foreign-born	.098	.126	.307	0	1
General educational development	4.01	3.66	3.61	1.56	6
Physical demands	1.50	1.71	1.80	0	3.93
Standard vocational preparation	5.67	5.05	5.10	1.71	8.51
Metropolitan area variables:					
Proportion black	.128	.182	.110	.000	.455
Proportion unemployed	.061	.061	.065	.028	.143
Proportion Asian	.034	.032	.069	.001	.600
Proportion Latino	.093	.093	.211	.002	.939
Proportion durable goods	.106	.093	.100	.014	.318
Northeast	.290	.236	.196	0	1
Midwest	.220	.169	.070	0	1
West	.209	.117	.506	0	1
Net migration	−.001	−.001	−.007	−.154	.261
Minimum wage	3.51	3.46	3.68	3.35	4.25
Proportion black^2	.022	.040	.016	.000	.207
Population (ln)	14.879	15.070	15.464	10.946	16.784
N	1,547,208	200,648	262,881		
% of sample	76.9	10.0	13.1		

Because this obliges us to use multilevel data (individuals within jobs within MAs), we use hierarchical linear models (Bryk and Raudenbush 1992; Snijders and Bosker 1999), which permit tests of variability in individual regression coefficients across levels of analysis (Kanaiaupuni and Donato 1999). For example, we will be able to address questions such as whether the job-level effect of proportion black on wages is conditional on MA-level racial concentration.

Additionally, hierarchical models avoid problems arising from correlated error terms associated with nested data structures. In our data set, for example, jobs in the same MA share all MA-level characteristics. Ignoring this nested structure (e.g., by simply merging macrolevel variables with individual-level records) may result in overstating the significance of macrolevel effects. Hierarchical models provide accurate standard errors and significance tests when data are multileveled (Bryk and Raudenbush 1992; Guo and Zhao 2000).

In the first set of models, we examine the racial composition of jobs as a function of individual and labor market characteristics, testing the association between labor market proportion black and the racial *segregation* of jobs. This part of the analysis comprises a series of two-level hierarchical linear models, with individuals nested within metropolitan areas.

At the individual level (level 1), our segregation model is

$$Y_{ik} = \beta_{0k} + \beta_{1k}(\text{black}_{ik}) + \beta_{2k}X_{1ik} + \ldots + \beta_{mk}X_{mik} + r_{ik},$$

where Y_{ik} is the proportion black ("PB" below) in the job of person i employed in labor market k; and β_{0k} is the intercept for job labor market k. With all variables centered at their grand means except the race/ethnicity dummies, this is the average job proportion black for whites in labor market k (see Bryk and Raudenbush 1992, pp. 25–31). Next, β_{1k} is the individual race effect on job proportion black for person i in labor market k, or the average difference in the racial composition of jobs experienced by blacks versus whites. If β_1 is positive and significant, black workers are more concentrated in black jobs than are white workers. Finally, X_{mik} denotes the M individual-level control variables, and β_{2k} through β_{mk} are the associated individual-level regression coefficients. Last, r_{ik} is the person-level random effect.

At the MA level of the segregation analysis, we estimate the following model,

$$\begin{aligned}\beta_{0k} &= \gamma_{00} + \gamma_{01}(\text{MA PB}_k) + \gamma_{02}(\text{MA PB}_k^2) + \gamma_{03}W_{1k} + \ldots \\ &\quad + \gamma_{0S}W_{sk} + u_{0k}, \\ \beta_{1k} &= \gamma_{10} + \gamma_{11}(\text{MA PB}_k) + \gamma_{12}(\text{MA PB}_k^2) + \gamma_{13}W_{1k} + \ldots \\ &\quad + \gamma_{1S}W_{sk} + u_{1k}, \\ \beta_{mk} &= \gamma_k,\end{aligned}$$

where γ_{00} is the intercept for the MA-level model of the job proportion black for individuals, γ_{01} is the effect of labor market proportion black on β_{0k}, and γ_{02} is the effect of its square. The MA-level intercept for the effect of being black on job proportion black is denoted by γ_{10}. The effect of labor market proportion black on β_{1k} is shown as γ_{11}, and γ_{12} is the effect of its square. *If the net effect of these two coefficients is positive, then black workers are more segregated in labor markets with larger black populations.* $W_{1k} \ldots W_{sk}$ is a set of S MA-level control variables (each centered at its grand mean), shown with corresponding regression coefficients in each level-2 model. The effects of the level-1 control variables do not vary across MAs; thus, γ_k represents the fixed effects β_k across all MAs. Finally, u_{0k} and u_{1k} are level-2 random effects, assumed to be uncorrelated and with means of zero.

In the second part of our analysis, we model wage variation as a function of individual, job, and labor market characteristics. Here, we target the wage effect of the racial composition of jobs and the relationship between labor market proportion black and the *devaluation* of black jobs.

One important advantage of our data structure is that all job-level effects are net of the composition of the job. That is, black-dominated jobs may pay less, but we can test whether that effect persists after we account for the lower overall average pay of black workers and other individual characteristics. Studies that examine the association between the racial or gender composition of jobs and the average pay in those jobs without controlling for race or gender at the individual level (e.g., Huffman and Velasco 1997) cannot differentiate between those two sources of inequality and therefore confound inequality *between* jobs with that which exists *within* jobs.

At the individual level (level 1), our model is simply

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}a_{1ijk} + \ldots + \pi_{pjk}a_{pijk} + e_{ijk},$$

where Y_{ijk} is the log wage of person i employed in job j in labor market k, and π_{0jk} is the intercept for job j in labor market k. Because all the level-1 independent variables are centered at their grand means, the model intercept equals the average job wage, at the mean of all variables in the model. Next, a_{pijk} denotes the P individual-level control variables, and π_{1jk} through π_{pjk} are the associated individual-level regression coefficients. Finally, e_{ijk} is the level-1 random effect.

All the level-1 coefficients are constrained to have the same effect across jobs, except the intercept. We model the level-1 intercept across jobs as follows:

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}(\text{job PB}_{jk}) + \beta_{02k}X_{1jk} + \ldots + \beta_{0qk}X_{qjk} + r_{0jk},$$

where β_{00k} is the intercept for the job-level model in the kth labor market. In turn, β_{01k} is the effect of job proportion black on average wages in the job (π_{0jk}). Thus, β_{01k} represents the point estimate of the job composition effect.[14] *If this coefficient is negative, then average wages in a job are lower when the proportion of black workers is higher*. Last, r_{0jk} is the job-level random effect.

Each level-2 coefficient relating job characteristics to level-1 effects on wages also can be modeled as either a random or fixed effect across labor markets. In our models, only the level-2 intercept and the job proportion black coefficient are permitted to vary across labor markets. Thus, our level-3 model is

$$\beta_{00k} = \gamma_{000} + \gamma_{001}(\text{MA PB}_k) + \gamma_{002}(\text{MA PB}_k^2) + \gamma_{003}W_{1k} + \ldots + \gamma_{00s}W_{sk} + u_{00k}$$

and

$$\beta_{01k} = \gamma_{010} + \gamma_{011}(\text{MA PB}_k) + \gamma_{012}(\text{MA PB}_k^2) + \gamma_{013}W_{1k} + \ldots + \gamma_{01s}W_{sk} + u_{01k},$$

where γ_{000} and γ_{010} are the level-3 intercepts in models of the level-2 coefficients; γ_{001} and γ_{011} are the effects of MA proportion black on the level-2 intercept and the job proportion black coefficient, and γ_{002} and γ_{012} are the effects of their squared terms. *If the net effect of* γ_{011} *and* γ_{012} *is negative, then the job composition penalty is more severe in labor markets with larger black populations*. Coefficients for the S level-3 control variables (W) are denoted by γ, and are also grand-mean centered. The level-3 error terms are given by u for each labor market, k.

As a result of variable centering, the model intercept in the final model can be interpreted as the wages of a worker with average characteristics (including race and gender), in a 0% black job with otherwise average characteristics, in a 0% black labor market with otherwise average characteristics. Effects of job and labor market composition, then, are interpreted as effects on this average outcome.

RESULTS

Racial Job Segregation

Descriptive statistics from table 1 offer the most straightforward indicator of job segregation for the workers in our sample. The average white

[14] The distribution of the proportion black variable at the job level is highly skewed, with small proportions of black workers in the great majority of cells. However, examination of residuals in the multivariate analysis showed that all residuals are normally distributed, and job proportion black is not correlated with any of the residuals at the job level.

worker lives in a labor market that is 12.8% black and works in a job that is 8.1% black. On the other hand, the average black worker lives in a labor market that is 18.2% black, but works in a job that is 24.3% black. In the multivariate analysis, we test whether this segregation is more pronounced in labor markets with larger black populations, in the presence of controls at the individual and labor market levels. This analysis is presented in table 2.

Table 2 shows results from four models with increasingly stringent controls. The two baseline coefficients in the first model represent the gross segregation, controlling only for unobserved variation across labor markets: whites are predicted to work in jobs that are 7% black, and blacks are predicted to work in jobs that are 17.5% black (.07 + .105). In models 2–4, the baseline coefficients represent predicted values for white and black workers in an all-white labor market, and the coefficients for MA proportion black and its square show how these individual-level coefficients are affected by labor market composition. In the final model, the coefficients are estimated at the mean of all individual and labor market control variables.

Unsurprisingly, models 2–4 show that whites in labor markets with more black workers are more likely to share jobs with black workers (the nonlinear effect for whites is not significant; $P > .10$). However, the models also show increasing segregation as black population proportion increases, as the black coefficient is positively affected by population proportion black. In other words, the gap in racial composition between white and black workers is larger in labor markets with more blacks in the population. The significant nonlinear effect for blacks indicates that the rate of increase in segregation declines at even higher levels of population proportion black, but the inflection point is beyond the range of the data.[15]

The predicted racial composition for black and white workers from model 4 is depicted in figure 2. The %black in the job for white workers rises more slowly than the population %black, while the opposite is true for black workers. Thus, even after controlling for individual and labor market characteristics, we may conclude that *black workers are more segregated into black jobs where black populations are relatively larger*. If average wages are lower in local jobs with more black workers, then greater segregation in areas with larger black populations is one mechanism for increasing black-white wage inequality as a function of black concentration.

[15] Individual control variables (not shown) are generally similar to those found for wage determination models. For example, female gender, number of children, and disability increase the average proportion black while education and hours worked are associated with a smaller proportion black in the individual's job.

TABLE 2
Hierarchical Linear Models for Proportion Black in Job

Variable	Model 1	Model 2	Model 3	Model 4
Intercept (white)	.070****	−.002	−.005****	−.002
MA proportion black	. . .	.683****	.704****	.668****
MA proportion black^2	. . .	.029	−.0003	.049
MA population (ln)	. . .	. . .	. . .	−.001
MA proportion unemployed	. . .	. . .	. . .	−.215**
MA proportion Asian	. . .	. . .	. . .	−.023**
MA proportion Latino	. . .	. . .	. . .	.002
MA proportion durable goods	. . .	. . .	. . .	.015
Northeast	. . .	. . .	. . .	−.012****
Midwest	. . .	. . .	. . .	−.012****
West	. . .	. . .	. . .	−.004*
Net migration	. . .	. . .	. . .	.028
Minimum wage	. . .	. . .	. . .	.002
Black	.105****	.035****	.037****	.033****
MA proportion black	. . .	.791****	.706****	.831****
MA proportion black^2	. . .	−.663***	−.519**	−.864***
MA population (ln)	. . .	. . .	. . .	−.014****
MA proportion unemployed	. . .	. . .	. . .	−.362**
MA proportion Asian	. . .	. . .	. . .	.086***
MA proportion Latino	. . .	. . .	. . .	.060**
MA proportion durable goods	. . .	. . .	. . .	−.041
Northeast	. . .	. . .	. . .	−.013**
Midwest	. . .	. . .	. . .	−.022****
West	. . .	. . .	. . .	−.002
Net migration	. . .	. . .	. . .	.014
Minimum wage	. . .	. . .	. . .	.005
Variance components:				
Intercept	.0056	.0003	.0003	.0002
Black	.0047	.0013	.0013	.0009
Individual control variables	No	No	Yes	Yes

Note.—Coefficients estimated at the grand mean of the control variables. Individual variables not shown. MA = metropolitan area.
* $P < .10$, two-tailed tests.
** $P < .05$.
*** $P < .01$.
**** $P < .001$.

Racial Job Composition Penalties

To examine the other proposed mechanism for the population concentration effect—increased devaluation—we test whether the wage penalty for jobs with more black workers is more severe in those markets with larger black populations. These results are presented in tables 3 and 4. Table 3 shows five models with increasingly stringent controls. Table 4 presents

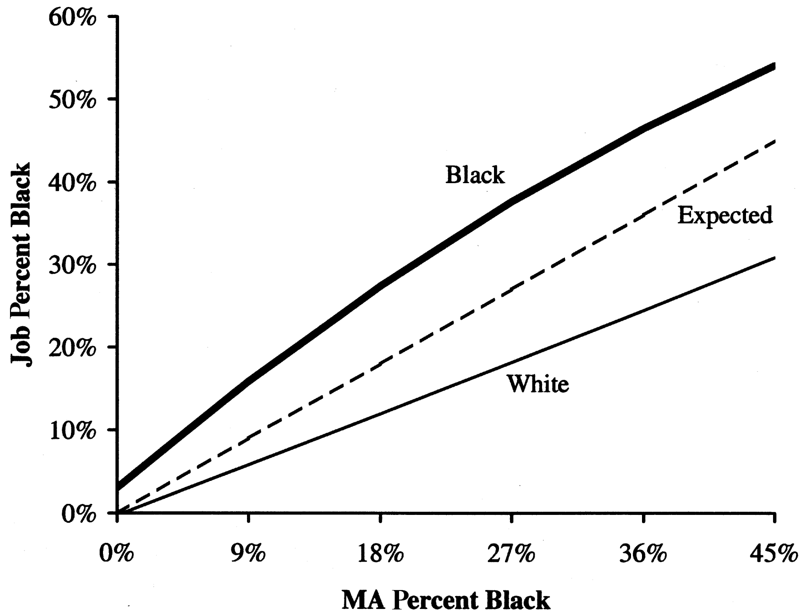

FIG. 2.—Predicted job %black for black and white workers, by labor market population %black.

the final model, with control variables measured at all three levels: individual, job, and labor market. The coefficients for the intercept represent the predicted average wage at the mean of all control variables—in a job with no black workers and a labor market with zero black population. The first proportion black and proportion black squared coefficients show the effects of population composition on this average wage. The job proportion black coefficient shows the predicted difference in average wage between a job with no black workers and one with all black workers—this is the proposed devaluation effect, the net penalty for working in a black-dominated job. Finally, the MA proportion black coefficient on the job effect shows how this penalty is affected by local population composition.

The first model in table 3 includes only MA and job proportion black and no controls. The significant effects of MA proportion black on the model intercept show that, on average, wages are higher in MAs with higher proportion black populations (reflecting the larger urban areas where blacks are concentrated), up to 26% black, after which they begin to decline (the highest local black population is 46%, in Albany, Ga.). The effect of job proportion black is the wage penalty associated with black-dominated jobs. The large negative coefficient indicates a substantial wage

TABLE 3

HIERARCHICAL LINEAR MODELS FOR LOG WAGES

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	2.174****	2.172****	2.191****	2.239****	2.246****
MA proportion black	1.778****	1.511****	1.474****	.732***	.471***
MA proportion black^2	−3.359****	−2.988****	−2.989****	−1.721***	−1.519***
Job proportion black	−1.099****	−.867****	−.771****	−.648****	−.160****
MA proportion black	.699***	.522**	.537***	.553***	.028
Variance components:					
Individual intercept	.1145	.0901	.0678	.0407	.0296
Job-level intercept	.0143	.0137	.0117	.0175	.0105
Job proportion black	.0381	.0366	.0255	.0163	.0167
Control variables	None	Individual race and gender	All individual	Individual and job (except skills)	Individual and all job

NOTE—Coefficients are calculated at the grand mean of all control variables. MA = metropolitan area.
* $P < .10$, two-tailed tests.
** $P < .05$.
*** $P < .01$.
**** $P < .001$.

TABLE 4

HIERARCHICAL LINEAR MODEL FOR LOG WAGES (WITH ALL CONTROL VARIABLES)

Variable	Coefficient	Variable	Coefficient	Variable	Coefficient
Intercept:	2.217****	MA proportion durable goods	.614	Other race man	−.112****
MA proportion black	.638****	Northeast	.188***	White woman	−.289****
MA population (ln)	.040****	Midwest	.116**	Black woman	−.254****
MA proportion unemployed	−.529*	West	−.054	Latina woman	−.290****
MA proportion Asian	.292***	Net migration	.262	Asian woman	−.281****
MA proportion Latino	.282****	Minimum wage	−.125	Other race woman	−.327****
MA proportion durable goods	−.068	Job controls:		N own children	.000
Northeast	.056***	Proportion female	−.200****	Hours	−.007****
Midwest	.053****	Proportion Latino	−.210****	Foreign-born	−.033***
West	.052**	Proportion Asian	−.038	Disabled	−.102****
Net migration	.269*	Proportion other race	−.309****	Education	.051****
Minimum wage	.140****	Proportion foreign-born	−.120****	Potential experience	.023****
MA proportion black^2	−1.180***	General educational development	.093****	Potential experience^2	.000****
Job proportion black:	−.140****	Physical demands	−.034****	Married	.058****
MA proportion black	.121	Standard vocational preparation	.034****	Variance components:	
MA population (ln)	−.050****	Individual controls:		Individual intercept	.0296
MA proportion unemployed	−.417	Black man	−.132****	Job-level intercept	.0031
MA proportion Asian	−.687**	Latino man	−.112****	Job proportion black	.0093
MA proportion Latino	.201	Asian man	−.143****		

NOTE.—Industry control variables not shown; calculated at the grand mean of all variables. MA = metropolitan area.
* $P < .10$, two-tailed tests.
** $P < .05$.
*** $P < .01$.
**** $P < .001$.

gap between jobs with no black workers and all-black jobs. The model predicts that an all-black job would have average log wages 1.099 less than an all-white job. As MA proportion black increases from 0 to 1, however, that penalty is reduced by .699. Thus, with no controls, there is a strong black-job penalty in MAs with few black workers, but that penalty diminishes as local proportion black increases.

Model 1 estimates the difference in pay across jobs and labor markets. However, because this model includes no controls, the job penalty could reflect differences in those variables. Moreover, since race measured at the individual level is not controlled in model 1, some of the gross effect of job racial composition presumably reflects the lower pay of black workers rather than a job composition penalty per se.

Model 2 includes controls for race and gender at the individual-level with dummy variables for nine race-gender groups, all centered around their grand means. In this model, the coefficient on job proportion black (−.867) now reflects an adjusted job composition penalty—adjusted for the fact that women and blacks are paid less than men and whites across the board. Thus, comparing the compositional penalty across the first two models suggests that about 21% of the gross job composition penalty in model 1 is attributable to the lower pay of the groups of workers who hold those jobs. Although this adjusted gap is smaller, the job composition penalty remains large and statistically significant. Model 2 also shows that the MA proportion black effect on the job compositional penalty is still positive and significant (.522; $P < .05$).

In sum, the first two models suggest a strong penalty accruing to black-dominated jobs, but that penalty is *weaker* in labor markets with larger black populations. Although the size of the coefficients varies, these basic results hold as we add individual- and job-level control variables in the next three models.

We include model 4 and model 5 to show the effect of adding the job skill measures from the *DOT*, which figure significantly in previous research on devaluation effects (England et al. 1994; Reid 1998; Tam 1997). Comparing models 4 and 5 shows that variation in the skill measures accounts for 75% of the job proportion-black penalty: it drops from −.648 to −.160. Similar to Tomaskovic-Devey's (1993*b*) findings, then, our results show that most of the racial-composition effect on wages at the job level reflects skill requirements for black-dominated jobs. In other words, black-dominated jobs pay less in large part because black workers are excluded from jobs with higher skill requirements. However, the remaining black composition effect is still significant, even with controls for all job characteristics. The tendency for the job-composition penalty to decrease in MAs with more black workers is not significant in model 5 (.028; $P > .10$). That is, once individual and job characteristics are controlled, we can no longer conclude that race devaluation is less severe in markets with larger black populations.

We have explained much of the variance across labor markets in the job composition penalty, as the variance component for this coefficient drops from .0381 in model 1 to .0167 in model 5. However, the variance remains significant ($P < .001$). In the final model we add MA-level control variables. These results are presented in table 4.

The job composition effect in table 4 remains significant in the presence of the full array of individual-, job-, and MA-level controls ($-.140$; $P <$ .001). To illustrate the results for the job composition effect across MAs, figure 3 shows predicted average wages for jobs with no black workers and all-black jobs as population %black rises from zero to 45—at the mean of all control variables in the final model. The average job with no black workers is predicted to pay between \$9.18 and \$10.01, while the average all-black job earns between \$7.98 and \$9.00. Thus, we are confident that *black-dominated jobs have lower average wages, net of other relevant factors*.

This is the most stringent test to date of the local black job composition penalty based on a large, national sample. Since our identification of "jobs" is unique, however, a comparison with other studies is warranted. The size of the job composition effect reported in table 4 is comparable to the largest reported by Reid (1998, p. 524), who used national occupation-industry cells as a proxy for jobs, although her effects are only significant for white women's wages. On the other hand, black composition effects found by Baron and Newman for specific California civil service jobs are more than twice as large in dollar terms as those reported here (1990, p. 162).[16]

However, the central question for this analysis is whether the job composition penalty varies systematically with local black population size. Figure 3 shows the black-job penalty narrowing from \$1.20 to \$.79, but this is based on a nonsignificant effect of MA proportion black in the model (.121; $P > .10$). Since the effect of local black population size on the job composition effect is not significant, we cannot conclude that the job composition penalty is affected by black population size. Nevertheless, we are confident that *the job composition effect is not stronger in labor markets with larger black populations*. So increased black job devaluation

[16] One reason Baron and Newman (1990) find a larger job composition effect could be that instead of controlling for occupational skills, they analyze composition effects within 99 specific work-activity categories.

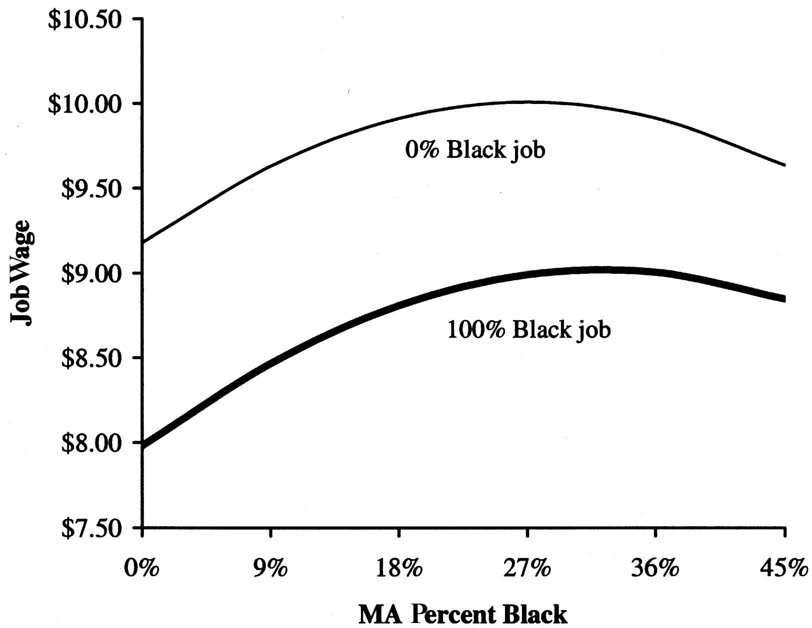

FIG. 3.—Predicted average job wage, by labor market population %black

is *not* a mechanism for the black population composition effect on black-white wage inequality.[17]

DISCUSSION

What do we make of these two complementary sets of results? On the one hand, we show that segregation is more pronounced where black populations are more visible. This is consistent with the hypothesis that white racism and its attendant practices are more severe in places where the black population is more threatening numerically. On the other hand, this population concentration apparently does not increase the tendency to devalue work done in jobs dominated by black workers.

As we noted at the outset, either or both of these mechanisms could

[17] Regional effects in table 4 capture historical development related in part to population proportion black (Cohen 2001, p. 154). Thus, we should not make the mistake (McCall 2001) of considering them wholly apart from racial composition effects. The full model shows that black job devaluation is less pronounced in the Midwest and Northeast than it is in the South (the excluded category). In a separate model without regional controls, however, proportion black did not significantly affect the job composition penalty (not shown).

account for the black population effect on black-white wage inequality. To put these results in perspective, we present figure 4. Using the predicted %black in the job for black and white workers (from the final model of table 2)—and the average pay in jobs with no black workers and jobs with all black workers (from the model in table 4)—we calculate the predicted average job wage for black and white workers. This is simply what black and white workers would be paid if they all received the average wages in the jobs they are predicted to occupy, at the mean of all controls in the models.

Figure 4 shows that the racial wage gap increases until about 36% black, and then declines slightly (note that less than 1% of our sample lives in an MA that is more than 36% black). Thus, the tendency for greater segregation in areas with larger black populations outweighs the (nonsignificantly) smaller black-job wage penalties in these areas. Clearly, segregation is a more important mechanism than devaluation for explaining the black population effect on inequality.

Supplementary Analysis

The inequality shown in figure 4 is relatively small compared to the black population size effects found in previous research based on the 1990 census, however (e.g., Cohen 1998). We have up to this point assumed that all workers in a given job earn the average wage for that job. Average wages are an important indicator, of course, but there is also significant inequality *within* jobs (Cohen and Huffman 2003*a*), especially given our definition of jobs, which includes workers at different establishments. This form of inequality has not been represented in our models thus far.[18]

In a supplemental model, we estimate the labor market black population effect on within-job inequality. Here, we let the effect on wages of three dummy variables (black man, white woman, black woman) and the intercept vary across jobs and labor markets. And we control for job characteristics, including proportion black. Because the intercept is permitted to vary across jobs, the effects of the dummy variables now reflect *within-job* differences—that is, wage gaps between black men, white women, and black women and the white men with whom they share jobs—net of all job and MA characteristics controlled in the model. The MA proportion black effects on these differences indicate whether they are greater in areas with larger black populations.

The basic results from this model are shown in table 5 (complete results

[18] This might explain why, unlike in the analysis by Cohen (1998), the inclusion of individual-level control variables does not greatly reduce the effects of labor market proportion black on wages (see table 4).

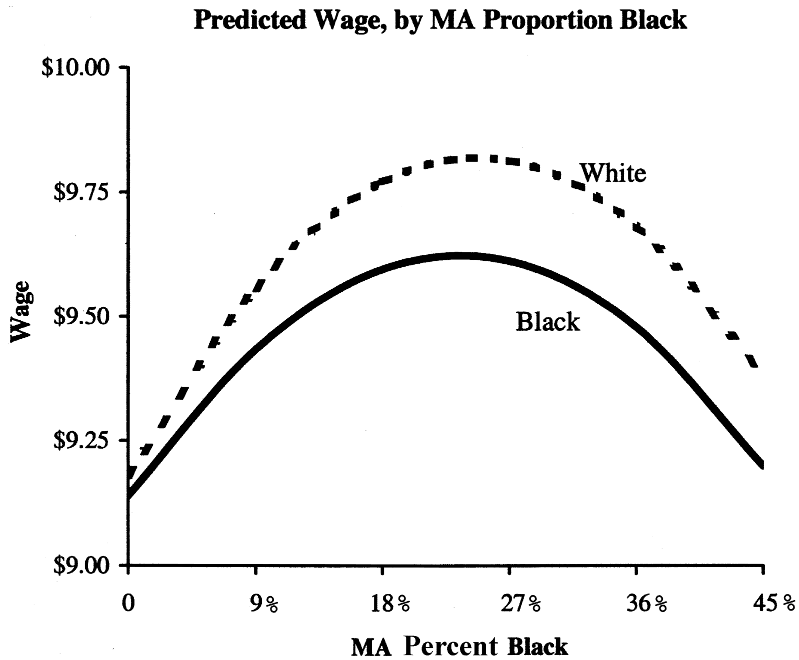

FIG. 4.—Predicted wage for black and white workers by labor market population %black

are available from the authors). The coefficients show that black-white inequality *within* jobs increases as a function of population proportion black. At 0% black in the population, black women are predicted to earn about 6% more than white women, but by 45% black in the population, white women earn 3% more. Among men, the black disadvantage increases from 9% at 0% black in the population to 15% in areas that are 45% black. This within-job inequality could represent black workers being paid less at the same establishments. However, given our job measure, it could also represent interfirm segregation among workers in the same local occupation/industry cells. If the latter applies, these supplementary results would only serve to reinforce the conclusion that the segregation of black and white workers is greater in labor markets with larger black populations.

CONCLUSIONS

We draw several substantive conclusions from our results. First, blacks are systematically segregated into jobs with disproportionate black rep-

TABLE 5
HIERARCHICAL LINEAR MODEL FOR LOG WAGES ON INDIVIDUAL RACE/GENDER AND MA-LEVEL PROPORTION BLACK

Variable	Coefficient
Intercept (white man)	2.369****
MA proportion black	.639****
MA proportion black^2 ...	−1.090***
Black man	−.091****
MA proportion black	−.159***
White woman	−.289****
MA proportion black	.033
Black woman	−.234****
MA proportion black	−.155***

NOTE.—Coefficients are calculated at the mean of all control variables at individual, job, and MA levels. MA = metropolitan area.
* $P < .10$, two-tailed tests.
** $P < .05$.
*** $P < .01$.
**** $P < .001$.

resentation, and this segregation is more severe in labor markets with larger relative black populations, even controlling for individual and local area characteristics. The evidence for wage penalties suggests that this segregation is the result of skill-based status closure processes (England 1992; England et al. 1994; Tilly 1998; Tomaskovic-Devey 1993*b*) whereby black workers' access to well-paying, high-skilled jobs is blocked. Consistent with our hypothesis, this process appears to be exacerbated by larger local black population size.

Second, jobs with more black workers do tend to pay less than other jobs, even with stringent controls at the individual, job, and labor market levels. Thus, our results are at odds with the position that the racial composition of jobs is largely unimportant in determining wages (see Reid 1998) and instead support studies finding substantial net effects of racial composition on wages (see Baron and Newman 1990; Catanzarite 2003). However, we do not find evidence that the racial composition penalty is affected by local racial concentration, once controls are introduced at the job and labor market levels.

If the racial composition penalty we find at the job level reflects racial devaluation—assigning less worth to work done by black workers—as has been suggested in previous literature (Baron and Newman 1990; Reid 1998), why is it not more severe in areas with larger black populations? We conclude that the process behind the negative effect of black job composition on wages is more complicated than a simple cultural devaluation of work associated with blacks. What then is the source of the compositional penalty? Although rigorous tests of competing explanations would require data beyond those analyzed here, we briefly consider possible alternative explanations to supplement the devaluation hypothesis.

First, as Catanzarite (2003, p. 4) has noted, the cross-sectional association between demographic composition and wages could reflect historical patterns of blocked access, where subordinate groups are sorted into jobs with poor pay relative to required skills. Thus, the causal ordering may be reversed, with low pay causing a job's racial composition. If in fact discrimination against black workers operates in this way—at the point of hire or promotion—then this process also should be stronger where the black population is larger and there is more racial discrimination (Burr et al. 1991). That is exactly what we do find with regard to job segregation (although not devaluation).

On the other hand, the practice of excluding blacks from jobs with high skill requirements may be undermined by a queuing process (Lieberson 1980; Reskin and Roos 1990; Thurow 1975;), wherein black workers gain access to higher-skill jobs in labor markets with more black workers, because in those markets there are not enough whites to fill all the better jobs (Semyonov et al. 1984). The benefits of a hiring queue may thus partially offset the higher levels of discrimination in markets with larger black populations—a scenario considered by Cassirer (1996, pp. 378–79) and McCreary, England and Farkas (1989, p. 59). We are skeptical of this interpretation given that we do find more black-white inequality in high proportion black labor markets. However, our findings suggest that at very high levels of black concentration (above 36%) the racial wage gap narrows, which could reflect a queuing process in these extreme cases.

A second possibility, also congruent with our findings, follows from the poor market position of black workers and/or the establishments that employ them.[19] On the one hand, job composition effects on wages may reflect in part the lesser clout minority workers have in negotiating with employers. If that is the case, black workers in predominantly white labor markets may have even less such bargaining power because of their smaller numbers (even if there is also less racism in those markets). On the other hand, the job composition effect may reflect the weaker position

[19] This alternative probably does not help explain at least one prominent study that treats unexplained job composition effects as evidence of devaluation (Baron and Newman 1990), because their data are limited to civil service workers in one state. In that case, the market position alternative seems less applicable. Our findings address the devaluation hypothesis as an explanation for racial composition effects generally, but we do not rule out the possibility that devaluation occurs in specific organizational settings (Nelson and Bridges 1999; Tomaskovic-Devey and Skaggs 2002).

of establishments that hire black workers, perhaps because of their secondary sector market location (Sakamoto and Chen 1991).[20] If our racial composition measure partly reflects sector location, the penalty for being in a high proportion-black job might be worse in white-dominated labor markets because markets with larger black populations can better support black-dominated establishments (Boyd 1991; Lieberson 1980; Villemez and Beggs 1984), an idea borrowed from the ethnic enclave literature (Model 1985; Waters and Eschbach 1995).

There are several limitations to our analysis, including compromises made because of available data. First, our job measures do not reflect true establishment-level jobs, so these findings cannot account for racial concentration at the establishment level or the level of specific jobs within establishments. Tomaskovic-Devey (1995) and Huffman, Velasco, and Bielby (1996) have documented the measurement error that results from using occupational-level data in lieu of true job-level measures. Although our job measure comes much closer to actual jobs than either national occupations or national occupation-industry cells—which have been used in the most recent prior research—measurement error associated with segregation patterns *within* local occupation-industry cells may still exist. Similarly, our measures of job skill requirements are drawn from national occupations. It is therefore possible that some of the job proportion black effect that remains after controlling for skills reflects measurement error in skill requirements. Second, our primary labor market measure, population proportion black—while shown to be a reliable predictor of racial attitudes and practices by a large body of literature (see above)—is not a direct measure of these traits. On both of these counts, however, we do not see feasible alternatives among existing data sets. The quality of the decennial census data, and the sample size it affords, outweigh these weaknesses.

Our findings have important implications. The results suggest that discrimination occurs against black *workers* rather than against black jobs per se. Blacks face exclusion from desirable jobs with more white workers—jobs characterized by longer training times and other skill demands that translate into high wages. Congruent with qualitative research on employers' racial biases, black workers are paid less than comparable white workers, even when employed in similar jobs (Moss and Tilly 2001; Wilson 1996). Consistent with the competition-discrimination hypothesis, moreover, both exclusion from better jobs and within-job pay inequality

[20] Our controls for skill requirements and industry should pick up some of the aspects of secondary sector location. However, job racial composition coefficients in our models also may reflect the effects of firm size and unionization, e.g., which are related to secondary sector employment.

are more severe where black numbers are proportionately larger. We have proposed several possible mechanisms for this finding; however, adjudicating among them will require additional theorizing and empirical research.

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