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A longitudinal examination of racial differences in occupational distributions among prime-aged males in the United States

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Abstract

This study uses longitudinal data to investigate racial differences in the occupational structures of prime-aged males in the U. S. labor market. Our primary empirical objective is to determine if the level of occupational segregation against African American males has declined over time. Our analysis indicates that while overall occupational differences between black and white men are essentially unchanged over the last two decades, empirical estimates of racial occupational segregation (i.e., unequal treatment) have fallen significantly. Thus, vintage effects of early labor market discrimination do not appear present.

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1. Introduction

Economists and other social scientists have long been interested in the labor market consequences of segregation. Occupational segregation occurs when workers are excluded from certain jobs for reasons such as race, gender or ethnicity. Workers who encounter persistent occupational segregation may also suffer such adverse effects as lower self-esteem (Preston 1999), increased income inequality (Blau and Beller 1988), and diminished expectations of occupational mobility (Gill 1994). Recent cross-sectional analyses of employment patterns indicate slight declines in occupational segregation against blacks and women and mixed results for Hispanics and Asians (Alonso-Villar *et al.* 2012; Queneau 2009). This paper offers an alternative approach that may also shed light on occupational employment trends by focusing on a cohort of workers as they progress through their labor market careers. More specifically, this paper examines a twenty-year trend in occupational segregation against African American males in the United States labor market.

Table 1 presents recent data from the U.S. Department of Labor. Not surprisingly, managerial, professional and technical, and construction occupations appear to have a greater representation of white males whereas black males seem to be overrepresented in clerical and service jobs. Table 1 also presents a well-known measure of the racial disparity in occupational distributions: the index of dissimilarity (*ID*). This index, based on the absolute deviation in the percentages of white and black men across occupations, is defined as:

$$ID = \frac{1}{2} \times \sum_{j=1}^{J} \left| P_j^W - P_j^B \right| \quad (1)$$

where $P_j^{W,B}$ measures the percentage of white (W) or black (B) males in occupational category j. The data in Table 1 indicate that in 2012, 19.2 percent of black or white men (or a combination of percentages that sum to 19.2) need to shift occupations for there to be complete racial equality in occupational distributions. Although the occupational differences reported in Table 1 are commonly understood, researchers continue to investigate whether these employment disparities result from racial differences in occupational choice, differences in human capital characteristics, or from labor market distortions such as occupational segregation.

2. Empirical Model

A worker's occupational attainment is based on demand- and supply-side processes that ultimately determine a worker's occupation. The demand side is influenced by employer-determined training, education, and experience requirements of jobs, and by other market factors such as product demand. On the supply side, a worker's tastes, skills, ability, and aptitude will influence occupational choice and placement. Empirical models of occupational attainment are therefore reduced-form specifications that attempt to incorporate both supply- and demand-side factors.

Table 1
Employed Men by Occupation and Race, 2012
U.S. Civilian Labor Force: Ages 16 Years and over

	White		Black	
Occupation	Number (in thousands)	Percentage Employed in each Occupation	Number (in thousands)	Percentage Employed in each Occupation
Managerial	11,034	17.8%	745	10.2%
Professional & Related	10,786	17.4%	993	13.6%
Sales	6,633	10.7%	672	9.2%
Administrative Support	3,657	5.7%	694	9.5%
Service	8,431	13.6%	1,643	22.5%
Production	4,959	8.0%	621	8.5%
Transportation & Related	5,641	9.1%	1,110	15.2%
Construction & Extractive	6,819	11.0%	453	6.2%
Installation, Maintenance, & Repair	4,029	6.5%	380	5.2%
Total	**61,990**		**7,302**	
Index of Dissimilarity:				
White and Black Men	**19.2**			

Source: U.S. Department of Labor

In this paper, we adopt a well-established occupational attainment model to estimate the link between a worker's characteristics and the likelihood he is employed in a given occupation. Thus, the probability a worker is employed in the jth occupation (j = 1,…, J) can be expressed as a logistic conditional probability function:

$$P_{ij} \mid X_i = \frac{e^{\delta_j X_i}}{\sum_j e^{\delta_j X_i}} \tag{2}$$

where P_{ij} is the expected probability that the ith individual (i = 1, …, N) is employed in the jth occupation, X_i = a vector of individual characteristics, and δ_j = a vector of coefficients to be estimated. The logistic model in (2) can be expressed in linear terms as a log odds ratio:

$$\ln = (P_{ij}/P_J) = \hat{\delta}_j X_i \tag{3}$$

Estimating the parameters in $\hat{\delta}_j$ yields an occupational structure where the net influence on a worker's occupation is expressed as a function of personal characteristics that are statistically linked to occupational attainment (Schmidt and Strauss, 1975).

Expression (3) can be adapted to investigate if black males face differing prospects for occupational attainment than their white counterparts. The initial step is to estimate the parameter coefficients of (3) for white men, then apply these estimated coefficients to worker

characteristics from the black sample.[1] This yields an estimated probability that a black male is employed in an occupation, given that his personal traits are evaluated according to the estimated occupational structure for white men:

$$\hat{P}_{ij}^{B} = \frac{e^{\hat{\delta}_j^{W} X_i^{B}}}{\sum_j \hat{\delta}_j^{W} X_i^{B}} \quad (4)$$

Expression (4), the expected percentage of black males in occupation j, assumes that blacks are assigned to occupations, based on their characteristics, in a similar fashion to white men.[2]

To compare the actual occupational distribution of white men with the actual and expected occupational distributions of black men, we calculate two indexes of dissimilarity: ID_1 and ID_2. ID_1compares the **actual** occupational distributions of blacks and whites, while ID_2 compares the **actual** white male distribution and the **expected** black male distribution from expression (4). A decline from $ID_1$to ID_2 indicates that racial disparities in occupational distributions diminish if black men face the estimated occupational structure of white men. Thus, a large gap between ID_1 and ID_2 is equivalent to saying that disparities in the occupational distributions of black and white men (ID_1) result largely from 'unexplained' factors such as unequal labor market treatment by race. This supports the notion of discrimination-based occupational segregation against blacks, assuming that white and black men have similar tastes in occupational choice. The assumption of similar tastes and preferences for occupations is generally considered less problematic when assessing occupational outcomes for workers of the same gender (see Bergmann (1974)). Thus, the empirical model in this paper assumes that any remaining disparity in occupational outcomes by race, as reflected in ID_2, are due primarily to differences in skills, qualifications, and socioeconomic traits between white and black men.[3]

3. Data and Empirical Results

Longitudinal data allows us to investigate a particularly interesting aspect of labor market discrimination: the possibility of vintage effects. According to the vintage effect argument, workers who encounter discrimination early in their career tend to experience much lower levels of wage and occupational mobility (Lazear (1979)). Thus, if vintage effects are present, occupational segregation against younger workers may lead to greater divergence in occupational attainment as workers age. For the empirical analysis below, we construct biannual samples of workers over the twenty year period 1990 to 2010 using the 1979 cohort of the National Longitudinal Survey of Youth (NLSY79). In 1990 the NLSY79 was comprised of workers between the ages of 25 and 33, i.e. workers at the beginning of their full-time careers. By 2010, these workers were between the ages of 45-53, i.e., 'prime-aged' workers.[4] Table 2 lists the 2-digit census occupational categories, and Table 3 describes the independent variables for the logit model of occupational attainment (X_i). The variables in X_i include standard traits such as union status, residence and mother's education, as well as measures of labor market skills and ability (Education, Experience, and Armed Forces Qualification Test score (AFQT)). Although the AFQT is considered an aptitude test, it often serves as a proxy for ability, and is generally correlated with labor market success in terms of earnings (Mayer and Peterson, 1999).

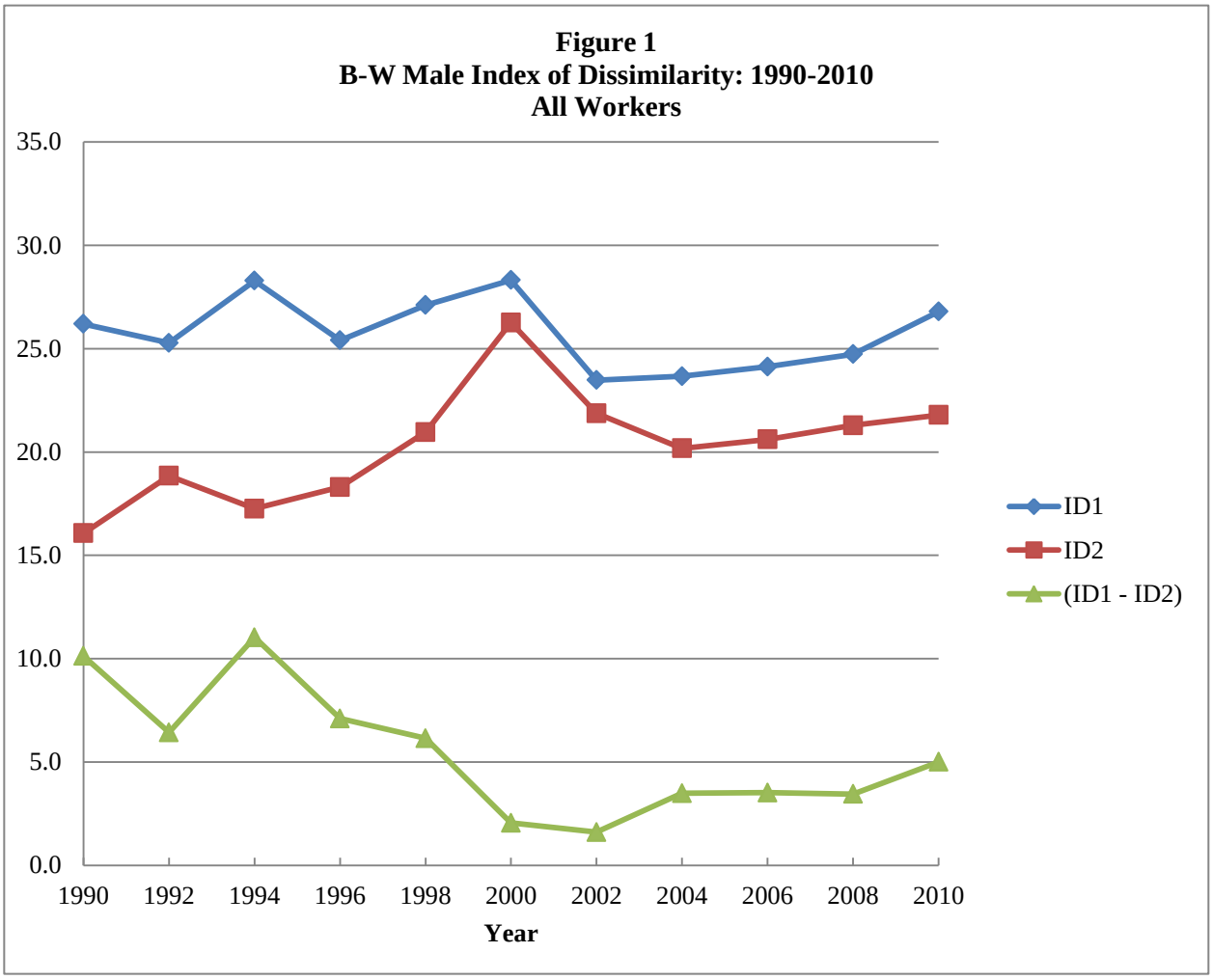
Table 2
2-Digit Census Occupational Categories

Occupational Category	Occupations Included:
1. Service	**Service Occupations, including Private Household**
2. Laborers	**Handlers, Equipment Cleaners, Helpers, and Laborers**
3. Clerical	**Administrative Support Occupations**
4. Operatives	**Machine Operators, Assemblers, Inspectors, Material Moving Occupations**
5. Craft	**Production, Craft, and Repair Occupations**
6. Sales	**Sales and Related Occupations**
7. Technical	**Technicians and Related Support Occupations**
8. Professional	**Professional Specialty Occupations**
9. Managerial	**Executive, Administrative, and Managerial Occupations**

Table 3
Independent Variables (X_i) for the
Multiple Logit Occupational Attainment Model

HIGRADE:	Highest grade of schooling completed by respondent in survey year
YRFTEXP:	Total years of year-round full-time equivalent labor market experience since 1979 -- calculated as (total annual hours of labor market activity)/1750
AFQT:	Percentile score on the Armed Forces Qualifications Test, administered in 1980
MHGRADE:	Highest grade of schooling completed by respondent's mother
UNION:	Equal to 1 if an individual reports that he is a member of a union or that his workplace is covered by a collective bargaining agreement, 0 otherwise
URBAN:	Equal to 1 if an individual resides within an urban area, 0 otherwise

Figure 1 illustrates that overall racial differences in occupational distributions (as measured by ID_1), have remained relatively stable over the past two decades. This result is similar to findings from cross-sectional studies (Blau, Ferber and Winkler, 2002; Queneau 2009). Figure 1 also shows the twenty-year trend in ID_2, which compares the actual occupational distribution of white men with the ***expected*** occupational distribution of black men (derived from expression (4)). As Figure 1 illustrates, the gap between ID_1 and ID_2 has declined steadily over the last 20 years (from 10 points in 1990, to less than 5 points in 2010).This result suggests that estimates of occupational segregation against black males have declined markedly from 1990 to 2010. Thus, any potential vintage effects of early occupational discrimination appear to diminish as these workers progress through their careers.

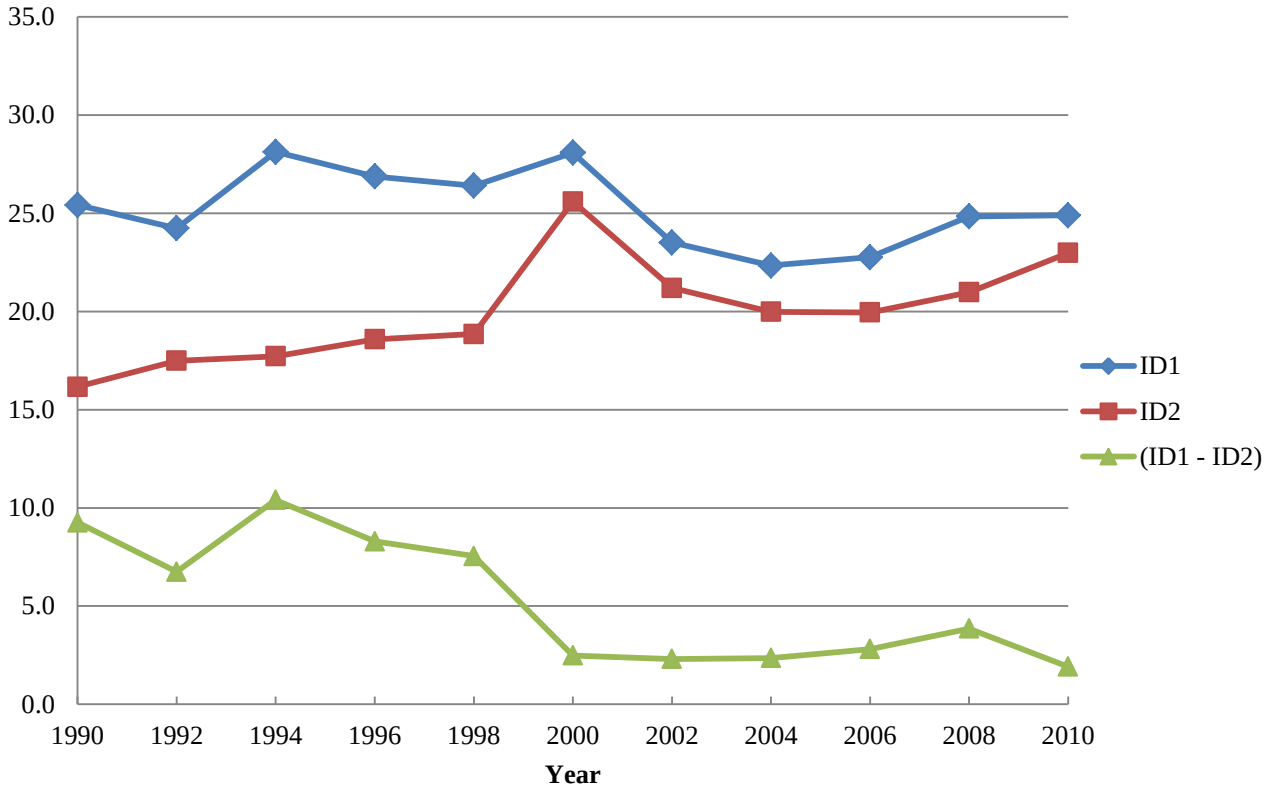


As Figure 2 illustrates, the twenty-year convergence between the actual and expected occupational distributions of black and white men, indicated by a reduction in the gap between ID_1 and ID_2, is even more pronounced for year-round, full time workers. Thus, for workers who demonstrate a strong attachment to the labor force, vintage effects of early occupational segregation are virtually erased as they approach their prime working ages.

The decline in the gap between ID_1 and ID_2, reported in Figures 1 and 2, suggest a general reduction in occupational segregation by race, which can be viewed as a favorable

development in terms of labor market equity. However, a more troubling observation is the slight increase in ID_2 over the period. An increase in ID_2 indicates a persistence of racial skill differentials that affect occupational attainment. Hence, black males may have experienced slower growth in the attributes associated with occupational mobility, relative to white males.

Figure 2
B-W Male Index of Dissimilarity: 1990-2010
Year-round Full-time Workers



4. Conclusion

This paper examines recent trends in the relative occupational attainment of black and white males in the U.S. labor market. Our empirical analysis investigated whether black men encounter unequal employment prospects across occupations, after adjusting for racial differences in personal characteristics. Using the white male occupational distribution as a benchmark, we find that over the past two decades overall occupational differences between black and white men have remained relatively stable. However, empirical estimates for the extent of racial occupational segregation have fallen significantly, especially among year-round full-time workers. Hence, we find no evidence that vintage effects have reduced the occupational mobility of black men over time. Although racial disparities in occupational attainment persist, they apparently result more from differences in human capital than from differential treatment in the labor market.

Notes

[1] The multinomial logit estimates used to derive the expected occupational distributions are available from the authors upon request.

[2] Expression (4) assumes that white men encounter the "discrimination free" occupational structure. This standard approach also assumes implicitly that any remaining disparity in occupational distributions results from racial differences in human capital (Schmidt and Strauss, 1975).

[3] This interpretation of the gap between ID_1 and ID_2 is analogous to the 'unexplained residual' or 'discriminatory' portion of the average wage differential in the well-known wage decomposition approach for analyzing earnings disparities by race or gender (see Schmidt and Strauss, 1975).

[4] The 2010 age distribution of the NLSY79 sample (45-53) falls within the standard classification of "prime aged". Although not entirely representative of the entire labor force, this age group represents a significant portion of the labor market, accounting for approximately 27.5% of the U.S civilian labor force in 2010.

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