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INDUSTRIAL PATTERNS OF
MALE NEGRO EMPLOYMENT*

Measurement and interpretation of the percent male Negro employment in an industry and occupation for public policy purposes faces two problems. First, detailed industry-occupation employment data by race are scarce. Second, it is frequently difficult to determine if a low Negro employment

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share is due to discrimination,¹ or to other nondiscriminatory factors such as regional location and unavailability of industry-demanded skills. The purpose of this note is to develop alternative indices of job discrimination which account for these factors and to report the results of applications of these indices to relatively disaggregated industry data.²

I. THREE INDICES OF JOB DISCRIMINATION

The most common measure of employment discrimination is the ratio of actual to "expected" percent Negro employment per industry and occupation. Let there be k industries and m occupations, and let E_n and E_w denote numbers of employed male Negroes and whites; then we may write observed to "expected" percent Negro employment as:

$$P_{io} = \frac{E_{n_{io}}}{E_{n_{io}} + E_{w_{io}}} / \frac{\sum_{i=1}^k E_{n_{io}}}{\sum_{i=1}^k (E_{n_{io}} + E_{w_{io}})}$$

The expectation is merely that the Negro employment share within the o th occupation in the i th industry is the overall percent Negro employment for the occupation in question. The comparison between observed and "expected" provides some normative information: Industries having less than the occupational average might be thought to discriminate, while those above the average might be thought to prefer Negro employees.

1 This paper assumes at the outset that *wage* discrimination, the paying of lower hourly wage rates to Negroes than to whites for identical work performed for the same employer, ceased after World War II. See reports of various Federal Fair Employment Agencies: Fair Employment Practices Committee, *First Report: July 1943-1944* (Washington: U.S. Government Printing Office, 1944); U.S. Civil Rights Commission, *Annual Reports (1959-68)*, especially the *1961 Report, Part III*; and U.S. Equal Employment Opportunity Commission, *1965 Report* (Washington: U.S. Government Printing Office, 1965). This evidence raises the correlative issue of Negro-white *income* differentials which are widely documented. Lower Negro incomes per skill group would then seem to be due to an adverse occupational structure, higher unemployment rates, slower promotion policies, and last hired-first fired employment practices. Pre-labor market discrimination, such as unequal provision of public education, certainly contributes to these income differentials as well. Exclusion of Negroes from jobs they are qualified for, however, is posited here as the central, policy-controllable mechanism which creates these well known income differentials.

2 The tables supporting the statements in Sections II and III and a more complete discussion of the data base and techniques used to calculate the three indices are available from the author upon request.

In contrast to P_{io} , two alternative indices, I_{ij} and D_{ij} , compare actual relative with "expected" relative employment. They meet obvious criticisms of P_{io} by using an occupational classification scheme that allows for skill-substitutions, by accounting for relative numbers of qualified workers by race and by accounting for job search patterns. We introduce these first two considerations by defining occupations in terms of ordinal skill requirements and by assuming that to qualify for a particular occupation, one must have at least the skill required. I_{ij} and D_{ij} are generally defined as:

$$I_{ij}, D_{ij} = \frac{E_{n_{ij}}}{Q_{n_j}} / \frac{E_{w_{ij}}}{Q_{w_j}}$$

where i is the industry; j is the skill-specific occupation; Q_{n_j} is the number of male Negroes with skill level j ; Q_{w_j} is the number of male whites with skill level j ; $Q_{n_j} > \sum_{i=1}^k E_{n_{ij}}$; and $Q_{w_j} > \sum_{i=1}^k E_{w_{ij}}$. Qualified Negroes are thus expected to be employed by an industry to the same extent as are qualified whites. Job discrimination occurs when $I_{ij}, D_{ij} < 1.0$. We introduce the third consideration by ordering all ij jobs by weekly income and by assuming that qualified workers queue for these jobs in that order. Qualified workers who do not get the most attractive jobs apply for the next most attractive ones. Operationally, this means the Q_{n_j} and Q_{w_j} are not constant within an occupation. I_{ij} and D_{ij} differ in how the Q 's change.

The index I_{ij} is based on the assumption that workers of skill level j look for work within occupation j among industries. D_{ij} assumes that workers search for the highest paying job for which they are qualified.³ Letting the industry subscript also denote the rank of the i th weekly income, we may write I_{ij} for the highest paying and highest skilled occupation ($j = 1$) as:

$$I_{11} = \frac{E_{n_{11}}}{Q_{n_1}} / \frac{E_{w_{11}}}{Q_{w_1}}$$

Then I_{21} , the second highest paying job in the highest skilled occupation, is:

$$I_{21} = \frac{E_{n_{21}}}{Q_{n_1} - E_{n_{11}}} / \frac{E_{w_{21}}}{Q_{w_1} - E_{w_{11}}}$$

Remaining Q_{n_1} and Q_{w_1} , who are not employed in the $k - 2$ other industries within occupation 1, queue with Q_{n_2} and Q_{w_2} for the highest paying jobs in the second most skilled occupation. Thus I_{21} becomes:

3 Thus D_{ij} accounts for the fact that lower skilled jobs may pay higher wages to compensate for risk, unpleasant conditions, etc. Both indices assume no racial differences in work-leisure choice and abstract from search costs.

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$$I_{12} = \frac{E_{n_{12}}}{Q_{n_2} + (Q_{n_1} - \sum_{i=1}^k E_{n_{i1}})} / \frac{E_{w_{12}}}{Q_{w_2} + (Q_{w_1} - \sum_{i=1}^k E_{w_{i1}})}$$

The procedure continues through the remaining industries and occupations. To create D_{ij} , we rank all n ($n = i \times j$) jobs by weekly income, associate the appropriate Q_{n_j} and Q_{w_j} with the n th ranked jobs, subtract the number of employed from the number available, and then relate these values of D_n back to the original industry-occupation titles.

II. DATA AND MEASUREMENT RESULTS

To calculate the three indices of employment representation, P_{io} , I_{ij} , and D_{ij} , 1960 Census data have been employed.⁴ The P_{io} measure was calculated from a special 5 percent 1960 Census sample for three-digit Census of Population industries and nine major Census of Population occupational categories.⁵ Because I_{ij} and D_{ij} necessitate an occupational classification which is ordinal with respect to skill requirements, usual Census of Population occupations cannot be used. Scoville,⁶ however, provides three-digit Census occupations by General Educational Development (GED), measured in school year equivalents which, at a high level of aggregation, may be construed to have the desired ordinal properties. Thus, the three-digit occupations were ranked by GED score and grouped into 11 "skill occupations" so that educational attainment, as reported on the 1960 1/1000 Census sample, could predict an individual's skill occupation. An individual with 17+ years of education is expected to be in skill-occupation 1; 16 years of schooling predicts he will be in skill-occupation 2, and so forth. Regional I_{ij} 's

4 All calculations were performed on a Control Data Corporation 3600 computer using double precision arithmetic. I wish to thank Mrs. Carol Matheson of the Social Systems Research Institute Programming Division for her competent programming which created I_{ij} and D_{ij} .

5 I wish to thank the Institute for Research on Poverty, in particular Karl and Alma Taeuber, for making this table available to me. The table corresponds to a percent Negro employment table analogous to Table 2, "Detailed Occupation of Employed Persons, by Detailed Industry and Sex," in U.S. Bureau of the Census, *U.S. Census of Population: 1960 Subject Reports, Occupation by Industry, Final Report*, PC(2)-7C. The occupations used differ slightly from typical major Census groupings in the following ways: "Farm laborers and foremen" and "laborers except farm and mine" have been combined to form "laborers"; "private household workers" and "service workers except private household workers" have been combined to form "service workers."

6 James G. Scoville, "Education and Training Requirements for Occupations," *Review of Economics and Statistics* 48 (May 1968).

that Negro employment is concentrated in low paying industries within a particular occupation. This finding obtains when employment is measured by I_{ij} and D_{ij} , of course, and when the measure of income is standardized for weeks worked. It may well be that not accounting for weeks worked explains why this notion has persisted.

Having noted some of the characteristics of the industry-occupation distribution of male Negro employment, we turn now to examine overall industry profiles in 1960. Aggregate industry indices may be calculated by summing across occupations and industries for P_i and across regions and skill-occupations for I_i and D_i :⁹

$$P_i = \frac{\sum_{o=1}^m E_{n_{io}}}{\sum_{o=1}^m (E_{n_{io}} + E_{w_{io}})} \bigg/ \frac{\sum_{i=1}^k \sum_{o=1}^m E_{n_{io}}}{\sum_{i=1}^k \sum_{o=1}^m (E_{n_{io}} + E_{w_{io}})}$$

$$I_i, D_i = \frac{\sum_{r=1}^4 \sum_{j=1}^{11} E_{n_{rj}}}{\sum_{r=1}^4 \sum_{j=1}^{11} E_{n_{rj}}} \bigg/ \frac{\sum_{r=1}^4 \sum_{j=1}^{11} E_{w_{rj}}}{\sum_{r=1}^4 \sum_{j=1}^{11} Q_{w_{rj}}}$$

While it is impossible to discuss the indices for each three-digit industry at this level of aggregation, several deserve mention (see Table 1). Public sector employment behavior shows a sharp federal-nonfederal distinction. Male Negroes tend to be overrepresented in the federal public administration and postal service industries and underrepresented in state and local public administration. Industries from which male Negroes are most excluded (large industries that have small values of P_i , I_i , and D_i) include electric machinery, aircraft and parts, electric light and power, and trucking service. Sizable overrepresentation occurs in agriculture, hospitals, sanitary services, and laundering and cleaning. Surprisingly, construction has a slight overrepresentation of male Negroes.

The striking result of a comparison of these indices per industry is that P_i , when compared to I_i and D_i , is not altogether different. We expect it to be smaller than I_i and D_i because P_i does not hold constant relative quantities of labor skills which I_i and D_i do. P_i would tend, then, to overstate the amount of job discrimination that occurred. Regression analysis on the three indices indicates that the degree of overstatement increases as P_i goes beyond

9 The interested reader will find the complete distributions of P_{io} , I_{ij} , and D_{ij} in Strauss, "Discrimination Against Negroes in the Labor Market: The Impact of Market Structure on Negro Employment" (Ph.D. diss., University of Wisconsin, 1970).

Intraregional analysis of these two indices of job discrimination suggests that male Negroes are equally excluded, among regions, from the highest occupations and are equally overrepresented, among regions, in the most menial occupations. In the middle, essentially supervisory, range of occupations, Negro males were more excluded in the South than in other regions.

This study has several implications in terms of public policy. First, a simple percent Negro employment calculation should indicate whether or not exclusion or job discrimination has occurred. Second, since discrimination was still found after standardization for educational attainment,¹⁰ the provision of more and better education for Negroes will not necessarily improve the job opportunities of male Negroes. The apparent deficiency lies not in too few qualified Negroes being available, but rather in the refusal by whites to hire and promote on the basis of productivity rather than race. These conclusions must be tempered by the fact that they rest on an analysis of 1960 data and more than 10 years have now passed. It is, however, the author's view that the 1970 Census will not alter these conclusions dramatically.

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¹⁰ The reader may object to this last conclusion because differential quality of education has not been accounted for. However, recalculation of D_i , using Coleman's adjustments, did not significantly affect the results.