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**THE ECONOMIC EFFECTS
OF FAIR EMPLOYMENT LAWS
ON OCCUPATIONS**

**The Application of Information Theory
to Evaluate Progress of
Black Americans, 1954-1972**

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The function of law in relation to equal employment opportunity for ethnic minorities is not well implemented or enforced in either the public or the private sector. In many cases, at employment offices we see these words: "We believe in equal opportunity for all." However, what people believe and what people do can often be a different matter altogether. Karl Marx once said that "theory without practice is not theory"; similarly, a law without enforcement is no law at all. A case at point is the Fair Employment Practices laws (FEP; Public Law 88-352) that compel employers to give Black workers, or workers from any other ethnic minority, equal wages for equal work, the same employment opportunities as those of the dominant group and free entry into labor unions. Although it is commonly assumed that FEP laws have been effective in increasing the participation of Black workers in every occupational category, hitherto there has been little evidence to support or reject this belief. Some have even questioned if these FEP laws have been the cause or the result of an observable increase in every occupation classification.

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Furthermore, others remain dubious of the extent that FEP laws have been implemented (Ashenfelter, 1971).¹ In the final analysis, the crucial question remains: "What has been the effect, if any, of FEP laws on the economic status of Black Americans, as measured by income, unemployment rates, and occupational distribution?"

The purpose of this paper is to deal with this question. The paper seeks to evaluate the occupational mobility between occupations and the impact of FEP laws on Black Americans between 1954 and 1972 by a chronological, empirical analysis applying information theory concepts. It must be emphasized that this paper concerns itself only with occupational distribution.

The paper will proceed as follows: the second section provides a brief description of the provisions of the Fair Employment Practices laws and their relation to market demand for labor force. The third section provides a model of the information theory concepts as an alternative technique to study the occupation distribution. The fourth section presents an empirical analysis and regression results. A statement of my findings and some policy recommendations are offered in the concluding section.

A BRIEF HISTORICAL DEVELOPMENT OF THE FEP LAWS

The struggle of Black Americans to achieve full equality in political and economic representation has been a major social issue since the Civil War. The question of discrimination in employment is dealt with by Section VII of the Civil Rights Act commonly referred to as the Fair Employment Practices laws. The first of these laws was enacted during the Franklin D. Roosevelt Administration and resulted from pressure by Black protest movements during this period. Presidential

Executive Order #8802 (1941) prohibited discriminatory practices in companies and unions which had federal contracts or were otherwise engaged in government work. At the same time, a temporary Fair Employment Practices Commission was established.

In order to strengthen Executive Order #8802, President Truman issued Executive Order #9981 calling for a progressive breakdown of segregation barriers in the military to be completed by June 30, 1954. In addition, the Truman Administration established a permanent FEP Commission. The Taft-Hartley Bill (1949) was another important piece of legislation. The bill called for “making it unfair labor practice for union or employer to discriminate because of race, creed, or color.”

President Eisenhower continued to press for civil rights. On February 2, 1953, he stated that many of the answers to civil rights problems lay “in the power of fact, fully published, or persuasion, honestly pressed, and conscience, justly aroused.” He issued Executive Order #10479 which created a government contract committee to promote compliance with the antidiscriminatory clause in government contracts.

The Kennedy and Johnson Administrations made a substantial contribution to the progress of the Civil Rights struggle. President Kennedy issued Executive Order #10925 (1961) which established the President’s Committee on Equal Employment Opportunity. The Committee had power to deal with discrimination in employment, and made some “affirmative” actions in dealing with discrimination. The Civil Rights Act of 1964 is the most comprehensive act in the history of Civil Rights. The Act has eleven titles. Three of these titles, and specifically Title IV, concern the desegregation of public education; Title VI bans discrimination under any program or activity receiving federal assistance; and Title VII outlaws discriminatory practices in employment.

Title VII is known as the Equal Employment Opportunity law, or more commonly, as the Fair Employment Practices law (FEP), under the Civil Rights Act of 1964. The FEP laws

have a basic clause prohibiting employment discrimination by employers, labor unions, or employment agencies. According to FEP laws, these various groups are assumed to display a taste for discrimination which is prohibited by law. The employers, labor unions, and employment agencies have a monopoly power in the labor market and hence can exercise the taste for discrimination. What is the impact of FEP laws on breaking down monopolistic labor market practices by labor unions, employers, and employment agencies?

IMPACT OF FEP LAWS AND EMPLOYMENT LEVELS

The main clause of the FEP laws calls for equal wage and equal employment opportunities for all workers. The enactment of the FEP laws establishes facts that in the labor market there exist two different market demands for Black workers and non-Black workers. That is to say, in each occupation category there exists different market demands for each race worker. In order to create equity in demand for the worker, FEP laws call for equal wage and equal employment for all workers.² Theoretically, the FEP laws are aimed at affecting the "taste for discrimination" which perpetuates these conditions of two market demands.³

It should be noted that the FEP laws might have both a positive effect on some occupations and a negative effect on others. That is, the index of racial entropy of occupational distribution would increase in some occupations which had few Black workers and decrease in those occupations that had many Black workers. If we assume FEP laws were effective, then, the following might take place. *First*, the aggregate demand for a Black labor force would increase relative to that of the non-Black labor force. This is possible because of the change in demand for Black workers as a consequence of favorable change in the taste for discrimination on the part of employers in hiring, on the non-Black employers in letting Blacks join the labor unions. Many Black

workers would come forward to participate in the new labor market. If, and only if, the Black labor supply is so large to affect the aggregate total labor supply, the overall price of labor might be expected to decrease due to a surplus labor supply. *Second*, the income of Blacks should increase relative to the non-Blacks' income due to the equalization of wage and the employment of Blacks on higher education levels. *Third*, occupation distribution should improve, that is, many Blacks would be employed in each occupational level that previously employed no (or few) Blacks and fair representation in many occupations might occur.⁴

The occupational distribution according to race is usually measured in terms of percentage. In this paper, a *new* concept in economic thought, namely, Information Theory, will be applied to evaluate the measure of inequality between Black and non-Black workers.

THEORETICAL ANALYSIS

INFORMATION THEORY CONCEPTS AND OCCUPATIONAL DISTRIBUTION

When people are looking for employment, this event, *E*, has two chances; namely, one will be successful in being hired and second, one will be unsuccessful in being hired. To explain the chances of their expectations of successes and failures, the information theory concept is an appropriate tool for analysis.⁵ The information theory originated in statistical thermodynamics and is mainly used in communication engineering. Social sciences—namely, statistics, psychology, and economics—have applied some information concepts to various problems. Theil noted, “the reason information theory is nevertheless important in economics is that it is more than a theory dealing with information concepts. It is actually a general partitioning theory in the same sense that it presents measures for theory in which some set is divided into subsets”

(Theil, 1967: 19). The information concept is applied here to determine the distributional intake in each occupational category between Black and non-Black workers.

The workers in the labor force have different job faculties; some are medical doctors, lawyers, craftsmen, and so on. Each worker in his lifetime has gone out to look for a job. Some workers have been lucky enough to get a job as soon as they applied for one, whereas others have had to move from one prospective employer to another until hired. In the United States, there are customarily some jobs meant for Black workers and female workers and some for non-Black workers. This traditional definition of job by race has been credited to the institution of slavery which has caused the employers to possess a taste for discrimination. As a result of this, employers exercise unfair employment practices which favor non-Black workers over Black workers. To correct this injustice, the federal government enacted the FEP laws which aim at opening more occupation opportunities to Black workers and effecting desegregation of occupations and wages. In other words, the probability of the Black worker to be employed would be expected to increase as the result of FEP laws.

Suppose that in every occupational category there is representation of the two groups, Blacks and non-Blacks. If we are to assume that the two populations are perfect substitutes hired at random and fired at random, one will expect a fair proportional distribution of each race in every occupation. Further, it is assumed that the employer would hire workers at random on a first come, first "get a job" basis. Also, it is assumed that job information is free and available to all people and there exists free entry to the job market. In addition, the employers have perfect information about employees.

In the event, B, of looking for employment, there are two possible outcomes: one is either hired or not hired. So when

the Black workers are hired in any particular occupation, event B has occurred. Let P represent the probability of the event B has taken place. Therefore, the probability of the event B not occurring would be $(1-P)$. If P is so close to 1 ($P = 0.99$, say), the information gained is pretty small since event B would take place before the message was received. A good example of this case is those occupations with high concentrations of Black workers. According to Theil's definition, the information content is given by decreasing function thus (Theil, 1967: 24):⁶

$$h(P_i) = \log \frac{1}{P_i}$$

The information content could be any number $h(P_1), \dots, h(P_N)$. It was noted that B_i has probability P_i , that is B_i was hired or the message took place receives the same probability. Therefore, the information content would be $h(P_i)$, with probability P_i . The expected information content, which is also known as the entropy, is:

$$H(P) = \sum_{i=1}^N P_i h(P_i) = \sum_{i=1}^N P_i \log \frac{1}{P_i} = - \sum_{i=1}^N P_i \log P_i,$$

if all alternatives are represented in one measure. Thus, where the B on the left stands for the array of the N events with probabilities P_1, \dots, P_N , and P s sum up to one. In terms of the employment of Black and non-Black workers in a particular occupation, for instance, professional, technical, and kindred workers, there is a number of Black workers expected to be found in this occupation. The expected information from this distribution of Black workers is called the entropy of that distribution, that is, racial entropy of occupational distribution.

APPLICATION OF THE MODEL

The question of how many Black workers should be employed or be working in any particular occupational category has been a major concern to the American people. In some instances, some people have argued that the Black workers in any particular occupation ought to reflect the same relative frequency of that Black population in the total population of the country. This line of thought assumes that the labor market is homogeneous, perfect competition exists, and no discrimination exists in hiring and firing. In addition, it is further assumed that black workers have the same ability and are perfect substitutes to that of non-Black workers.

The relative frequency distribution of the Black people is about 10% of the total population and that of non-Black people is about 90%. Let this relative frequency distribution of non-Black workers be noted by P . Therefore the Black workers become $(1-P)$. This representation will be referred to as an ideal distribution. The ideal racial entropy of occupation distribution, REO_D , by information concept is expected to be:

$$REO_D = Ph(P) + (1-P)h(1-P)$$

$$\text{By substitution } h(P) = \log \left(\frac{1}{P} \right)$$

$$REO_D = P \log \frac{1}{P} + (1-P) \log \frac{(1)}{(1-P)} \dots, \quad [1]$$

where $(P = 0.9)$ is the fraction of non-Blacks working in a particular occupation and $((1-P) = 0.1)$ is the fraction of the Black workers in that particular occupation. The value of REO_D in natural logarithms is approximately 0.3251.

The actual number of the Black workers employed in any particular occupation is different from that of ideal. The expected information of the actual racial entropy of occupation distribution (REO_A) becomes:

$$REO_A = W \log \frac{1}{W} + (1-W) \log \left(\frac{1}{1-W} \right) \dots, \quad [2]$$

where W is the actual fraction of non-Black workers in specific occupation, and $(1-W)$ is the fraction of the Black workers actually employed.

The index of the racial entropy of occupation distribution, REO_I ,⁷ can be expressed as

$$REO_I = \frac{REO_A}{REO_D} + \frac{W \log \left(\frac{1}{W} \right) + (1-W) \log \left(\frac{1}{1-W} \right)}{P \log \left(\frac{1}{P} \right) + (1-P) \log \left(\frac{1}{1-P} \right)} \dots [3]$$

From the REO_I , we can postulate the following conditions: *one*, if the value of REO_I happens to be *zero*, this means that the minimum actual racial entropy of occupation distribution is zero. The relative frequency distribution of one race in that particular occupation is equal to 1. This occupation is termed to be completely segregated. *Two*, if the occupation has 50-50, distribution that is, 50% X workers and 50% Y workers.

This occupational category is considered as a maximum integration. The value of REO_A is 0.6931, and REO_D equals to 0.3251, and REO_I becomes approximately 2.0.⁸ *Three*, if the value of actual racial entropy occupation distribution is equal to the ideal racial entropy occupation distribution, it is obvious, the index assumes the value of 1.0. The occupation could be classified as *standard integration*.

To sum up, from the index of the racial entropy of occupation distribution, we are now able to evaluate the degree of integration and segregation of each occupation. The rest of the paper will deal with empirical analysis of the entropies and regression analysis.

EMPIRICAL ANALYSIS

RESULTS OF RACIAL ENTROPY OF OCCUPATIONAL DISTRIBUTION

Table 1 shows the actual racial entropy indices of the eleven occupations is computed by using equation 2.⁹ During the years between 1954 and 1972, there are two major behaviors of the occupational entropy indices. In some of the occupational categories, the entropic index increased, and in some, it decreased. The increase is found in the skilled occupation and the decreases in the unskilled.

Occupational progress is defined as increase of Black workers in skilled jobs and decrease in unskilled occupations. The occupations are grouped into three classes, skilled, semi-skilled, and unskilled. Table 1 illustrates this progress. The index for professional, technical, and kindred workers ranges from 0.1616 in 1957 to 0.2506 in 1970, giving an upward trend over that period of time. Indices for clerical workers, craftsmen, foremen, and operative workers show a rapid increase. Between the years 1954 and 1962, the increase is smaller than that between 1963 and 1972. In the managerial, official, and proprietor classifications, which are usually lightly structured, competitive, has high pay, long hours, and is relatively secure, the index has slightly increased, indicating that movement toward these occupations has been slower than in the other occupation. In craftsmen, foremen, and kindred workers, the entropic index rose by less than 1% from year to year. On the other hand, in the next group of occupations, unskilled or service jobs, the racial entropy index declined. In 1967, about 41% of Blacks were engaged in these occupations, whereas the figure for non-Blacks was only 15%. The entropy index declined by more than 1% every year. The decline is more noticeable between 1954 and 1963 for farm workers, and shows a slight change or no change from 1964 on. The racial entropy index remains constant in private household occupations, which could be interpreted to mean that Black females are still employed in large numbers by private households, a major source of employment.

TABLE 1
The Actual Racial Entropy Index of Each Occupation, 1954-1972

YEAR	OCCUPATION ¹											
	1	2	3	4	5	6	7	8	9	10	11	12
1951	.1670	10.38	167.8	.1076	.1625	3385	6930	.5036	.3242	.6047	6061	.3341
1955	.1659	.1087	161.6	.0995	.1691	3369	662.9	4.271	.2905	.891	.5891	.3299
1956	.1583	-.1072	.1579	.0941	.1777	3398	.6993	.5264	.790	.5915	.5883	.3350
1957	.1616	.1003	177.9	.0935	1798	3324	687.1	5.206	.748	.6179	.5900	.3361
1958	.1643	.1126	192.7	104.5	.1874	3322	687.1	5.206	.748	.5911	.5946	.3399
1959	.1746	111.6	181.8	105.6	137.2	3356	6850	4.985	.675	.5690	.5840	.3327
1960	.1811	116.6	203.9	119.4	194.0	3630	6890	4.185	1.749	.5629	.5784	.3372
1961	.1726	.1143	-.1106	116.9	.1957	3640	6845	5.014	2.642	.5602	.5703	.3334
1962	.1878	.1183	-.2004	122.2	.1962	3614	6869	4.991	.2667	.5715	.5836	.3351
1963	.2062	.1217	201.2	135.8	.2069	3628	6879	4.993	.5339	.5529	.5756	3362
1964	.2224	.1197	209.0	136.5	222.6	3621	6850	5.026	.2338	.5490	.5820	3387
1965	.2245	.1170	217.8	138.1	.2169	3735	6849	5.289	.2182	.6416	.5683	.3693
1966	.2185	1141	236.2	126.8	.2364	3836	6776	5.130	.2086	.5277	.5600	3414
1967	.2236	.1206	265.2	141.8	.2354	3956	6919	5.029	.7072	.6504	.5610	.3417
1968	.2316	144.8	263.8	160.4	.2442	4062	6881	5.052	.2887	.6488	.5751	3415
1969	.2378	1481	282.4	157.9	2601	4032	6872	4.863	1.869	.6529	.5541	.3417
1970	.2506	.1539	.2815	155.9	.2486	4115	6790	4.859	.1911	.4700	.5419	.3411
1971	.2490	.1670	.2921	161.7	.2406	4055	6801	4.795	.1518	.4423	.5191	3385
1972	.2357	.1665	293.9	152.8	.2519	3974	6734	4.802	.1393	.4235	.5040	.3372

SOURCE: Department of Commerce, Bureau of the Census, Current Population Report Series P-50, P-57 Department of Labor Statistic, Employment and Earnings and Monthly Report on Labor Force.

- 1 (1) Professional, technical, and kindred workers
- (2) Managers, officials, and proprietors (excluding farm)
- (3) Clerical and kindred workers
- (4) Sale workers
- (5) Craftsmen, foremen, and kindred workers
- (6) Operative and kindred workers
- (7) Private household workers
- (8) Service workers (excluding private households)
- (9) Farmers and farm managers
- (10) Farm laborers and foremen
- (11) Laborers (excluding farm and mine)
- (12) Regression of all occupations

MEASUREMENT OF INTEGRATION

The indices in Table 2 were computed by weighting actual racial entropy of occupation distribution by the ideal racial entropy of occupation distribution. They provide us with a new measure of comparison between the occupations instead of common percentage measure. In an early part of this paper, it was postulated that if a job has index of zero in any particular time, this could be considered to be perfect segregation. Table 2 shows that no occupation could qualify as segregated. The operative and kindred workers have an index of near to *one*. The Black workers in this occupation category constitute a nearly equal relative frequency distribution as to that of the Black labor force. Among the skilled occupations, the professional and technical and kindred workers, the index was lowest in 1956 at 0.4869 and highest in 1970 at value of 0.7708. The rate of increase of this index is high and is approaching the desired index of *one*.

On the other hand, the index value of the managers, officials, and proprietors category has been below 0.4 between 1954 and 1968. The highest index value of 0.5137 was experienced in 1971. This group of occupations is highly structured and competitive. Furthermore, it should be noted that no migration from the labor market for unskilled to these highly skilled occupations could be possible. The index for sales' occupation is far from the standard integration, and through the entire period is below 0.50. The private household workers have the highest concentration of the Black workers. The index has been above 2.0 for the entire period. In total, Black workers are still segregated in semiskilled occupations which face a high rate of unemployment.

OCCUPATIONAL ANALYSIS OF REGRESSION RESULTS

A linear regression model:

$$O_i = B_0 + BX + FD + E,$$

TABLE 2
The Indices of Racial Entropy of Each Occupation, 1954-1972

YEAR	1	2	3	4	5	6	7	8	9	10	11	12
1954	.4983	.3193	.5069	.3310	.4998	1.0412	2.1317	1.5484	.9972	1.8600	1.8643	1.0277
1955	.5103	.3344	.4971	.3061	.5201	1.0363	2.1313	1.3137	.8936	1.8121	1.8121	1.0148
1956	.4869	.3297	.4857	.2894	.5466	1.0791	2.1233	1.6192	.8582	1.8194	1.8096	1.0305
1957	.4971	.3085	.5472	.2876	.5531	1.0855	2.1150	1.5955	.8696	1.9006	1.8148	1.0338
1958	.5054	.3464	.5927	.3214	.7644	1.1449	2.1135	1.6014	.8453	1.8182	1.8290	1.0455
1959	.5371	.3433	.5392	.3248	.7753	1.0938	2.1070	1.5272	.8278	1.7502	1.7964	1.0234
1960	.5577	.3587	.6272	.3073	.5967	1.1166	2.1193	1.2873	.8156	1.7315	1.7791	1.0372
1961	.5303	.3516	.6478	.3396	.6020	1.1197	2.1055	1.5623	.8127	1.7232	1.7542	1.0255
1962	.5777	.3639	.6164	.3759	.6035	1.1117	2.1129	1.5352	.8204	1.7579	1.7951	1.0308
1963	.6343	.3743	.6189	.4177	.6364	1.1160	2.1160	1.5358	.7810	1.7007	1.7705	1.0341
1964	.6841	.3682	.6429	.4199	.6847	1.1138	2.1070	1.5460	.7192	1.6887	1.7902	1.0418
1965	.6906	.3906	.6699	.4248	.6672	1.1489	2.1067	1.6269	.6712	1.9735	1.7481	1.1360
1966	.6721	.3820	.7204	.3900	.7272	1.1799	2.0843	1.5780	.6416	1.6232	1.7225	1.0501
1967	.6939	.3710	.8157	.4362	.7241	1.2169	2.1283	1.5469	.6373	2.0006	1.7256	1.0511
1968	.7124	.4454	.8114	.4934	.7512	1.2495	2.1166	1.5540	.8880	1.9957	1.7690	1.0504
1969	.7315	.4556	.8687	.4857	.8001	1.2402	2.1138	1.4958	.5749	2.0083	1.7044	1.0504
1970	.7708	.4734	.8659	.4795	.7647	1.2658	2.0886	1.4946	.5878	1.4457	1.6669	1.0492
1971	.7659	.5137	.8985	.4974	.7401	1.2473	2.0920	1.4749	.4669	1.3605	1.5967	1.0412
1972	.7250	.5121	.9102	.4700	.7748	1.2224	2.0714	1.4771	.4285	1.3027	1.5503	1.0372

SOURCE: Department of Commerce, Bureau of the Census, Current Population Report Series P-50, P-57, Department of Labor Bureau of Labor Statistics, Employment and Earnings and Monthly Report on Labor Force

1 (1) Professional, technical, and kindred workers

(2) Managers, officials, and proprietors (excluding farm)

(3) Clerical and kindred workers

(4) Sale workers

(5) Craftsmen, foremen, and kindred workers

(6) Operative and kindred workers

(7) Private household workers

(8) Service workers (excluding private households)

(9) Farmers and farm managers

(10) Farm laborers and foremen

(11) Laborers (excluding farm and mine)

(12) Regression of all occupations

TABLE 3
Regressions of the Index of Racial
Entropy of Each Occupation, 1954-1972

	B_0	B	F	Correlation Coefficient r^2
1. Professional, technical and kindred workers	0.4690	0.0119 (0.0020)	0.0704 (0.0215)	0.9534
2. Managers, officials and proprietors (excluding farm)	0.2781	0.0119 (0.0022)	-0.0211 (0.0243)	0.8631
3. Clerical and kindred workers	0.4343	0.0248 (0.0032)	-0.0048 (0.0351)	0.9359
4. Sales Workers	0.2775	0.0111 (0.0021)	0.0119 (0.0228)	0.8936
5. Craftsman, foremen and kindred workers	0.5007	0.0129 (0.0016)	0.0434 (0.0179)	0.9622
6. Operative and kindred workers	1.0323	0.0116 (0.0024)	0.0051 (0.0262)	0.8629
7. Private Household workers	2.1346	-0.0026 (0.0010)	0.0080 (0.0112)	0.4869
8. Service Workers (excluding private households)	1.5482	-0.0065 (0.0077)	0.0837 (0.0845)	0.0579
9. Farmers and Farm Managers	0.9847	-0.0234 (0.0067)	-0.0083 (0.0733)	0.7646
10. Farm Laborers and Foremen	1.9893	-0.0363 (0.0154)	-0.363 (0.1692)	0.2843
11. Laborers (excluding farm and mine)	1.8913	-0.0137 (0.0033)	0.0437 (0.0358)	0.7838
12. Regression of all occupations	1.0419	-0.0017 (0.0018)	0.0420 (0.0200)	0.3236

NOTE: The number in parentheses is the standard error.

SOURCE: See Table 2

where O_i is the dependent variable, that is, the index of racial entropy of occupational distribution. The B_0 is the intercept of the occupation O_i ; and B is a parameter to be estimated in order to determine the value of O_i change with each unit change in time and $i = 1, \dots, 12$. The X is the time variable and F is a parameter to be estimated. The D is the dummy variable (or switching variable) which assumes the value of 0 and 1 for non-FEP laws period 1954-1963 and for FEP laws period 1964-1972, respectively; and of course E is the disturbance term. Each occupational index was treated as the dependent variable and regressed against time and the switching variable. Tables 3 and 4 show estimated parameters,

TABLE 4
Regressions of Actual Racial Entropy Index
of Each Occupation, 1954-1972

	B_0	B	t'	Correlation Coefficient r^2
1. Professional, Technical and Kindred Workers	0.1523	0.0039 (0.0006)	0.0228 (0.0070)	0.9534
2. Managers, Officials and Proprietors (excluding farm)	0.0903	0.0039 (0.0007)	-0.0067 (0.0079)	0.8431
3. Clerical and Kindred workers	0.1410	0.0081 (0.0010)	-0.0016 (0.0114)	0.9359
4. Staff workers	0.0901	0.0036 (0.0007)	0.0039 (0.0074)	0.8936
5. Craftsmen, Foremen and Kindred Workers	0.1626	0.0042 (0.0005)	0.0141 (0.0058)	0.9622
6. Operative and Kindred Workers	0.3351	0.0038 (0.0008)	0.0017 (0.0085)	0.8629
7. Private Household Workers	0.6931	-0.0008 (0.0003)	0.0026 (0.0037)	0.4869
8. Service Worker (excluding private households)	0.5027	-0.0021 (0.0025)	0.0272 (0.0271)	0.0579
9. Farmer and Farm Managers	0.3200	-0.0076 (0.0022)	-0.0027 (0.0238)	0.766
10. Farm Laborers and Foremen	0.6459	-0.0118 (0.0050)	0.0871 (0.0549)	0.2863
11. Laborers (excluding Farm and mine)	0.6141	-0.0051 (0.0011)	0.0142 (0.0116)	0.7838
12. Regression of all occupations	0.3380	0.0005 (0.0006)	0.0136 (0.0065)	0.3236

NOTE: The number in parentheses is the standard error.

SOURCE Table 1

constants, correlation coefficients, and respective standard errors.¹⁰ The intercepts vary from one occupation to another indicating different minimum levels of employment.¹¹

The parameters are very sensitive to the dummy variable and the majority of them are statistically significant at the 5% level. The skilled occupations have positive slope which could be viewed as positive mobility of the Black workers into these occupations. On the other hand, unskilled occupations have a negative slope which correspond to a decrease in the racial entropy indices. It is also quite interesting to note that these unskilled occupations have a high concentration of Black workers.

The dummy variable is statistically significant for professional, technical, and kindred workers and also carries a positive sign. The dummy variable for managers, officials, and proprietor workers; and clerical and kindred workers have a negative sign. This could be inferred that FEP laws might have an opposite effect on these occupations. The dummy variable for the farmers and farm managers, and farm laborers and foremen workers also have a negative sign.

In the professional, technical, and clerical kindred workers level, more Black workers were employed in those occupations at a higher rate than in any other occupations. In terms of numbers, between 1959 and 1964, Blacks gained 198,000 jobs in the professional and technical category and 158,000 jobs in the clerical group; this is an increase of the racial entropy index from 0.1746 to 0.224, and 0.1818 to 0.2090, respectively. There was a real increase in skilled craftsmen of more than 134,000, in semiskilled operatives, 193,000, and the service workers 262,000; there was a decrease of 188,000 unskilled laborers for a net gain of 401,000 manual jobs.

The Department of Labor forecast that between 1965 and 1975, employment growth is hoped to be "more than average" in professional and technical service and clerical fields, "average" in sales, managerial, and skilled labor categories, and "less than average" in semiskilled occupations; it also predicted that the number of unskilled labor would decline. The racial entropy Table 1 strongly reveals this trend, save the managers, officials, and proprietors; sales workers show slow progress in integration. The number of salaried managers rose from 47,000 in 1959 to 72,000 in 1963, but the fact remains that Blacks are underrepresented in this occupation, creating a deficit of about 400,000.

Examining the period between 1964 and 1972, Table 3 indicates that all skilled occupations increased at a decreasing rate as in the period before 1964. The unskilled occupations declined at an increasing rate, which indicated that the movement to well-paying jobs was of the same magnitude as

before the FEP laws. Professional and technical employment increased by 17%, reducing the deficit by 44,000. Remarkable progress was observed in clerical jobs, but sales workers still dragged behind, showing hardly any change. Black workers gained drastically in entry into crafts: note that the entropy index for 1964 jumped from 0.2069 in 1963 to 0.2226 in 1964, a cut of the deficit of 58,000 jobs in that particular year. Among the skilled occupations, the managers, officials, and proprietors, Black workers have made relatively slow gains in employment in these occupations. The increase is slower between 1954 and 1962 compared to that of the previous years; the entropy index rose from 0.1039 to 0.1143. From there on, the progress is very encouraging. Between 1962 and 1967, many Blacks achieved managerial employment in large companies and with the government. The increase in the occupational entropy was from 0.1183 in 1962 to 0.1206 in 1967 representing an increase from 77,000 to 115,000 Black salaried managers. Between 1967 and 1969, there was a net gain of 44,000 Black managers.

The majority of Black workers are found in unskilled jobs which have high rates of unemployment. As was noted before, the racial entropy is declining. Although the entropy index is decreasing, the number of Black service workers rose by nearly 250,000 in the 1962-1967 period to a total of 1.5 million, a change in percentage from 32.8 in 1962 to 29.4 in 1967. The majority of Black women are employed in domestic service jobs. Between 1962 and 1967, the number fell by 200,000. The entropy index remains unchanged, indicating that the proportion of Black workers to the total in the occupation remained unchanged.

Black farm workers have been laboring on farms for the last 400 years. They have remained on the farms because of the limited opportunities which are open to them. It has been seen that, gradually, "push" factors toward the farms have been overpowered by "pull" factors of the urban cities and metropolitan areas. Between 1962 and 1967, over 350,000

Blacks left the farm for better jobs elsewhere. The rate of out-migration of Blacks from farms is twice that of the rate for non-Blacks; one of the reasons is that Blacks do not own the farms, so they choose to migrate to urban settings for higher paying jobs.

CONCLUSION

The index of racial entropy of occupation distribution provides a simple measuring index of the rate of the concentration of Black workers between different occupations. In applying the index, one could discuss the degree of segregation with a reference to a specific unit of index. The index could be used across the industries once the relative frequency of one race is known in an area of the job market. The policy makers could use the index value as a unit of measure to enforce the affirmative action program. In total, it is easy to use and understand in evaluating inequality which prevails in the occupational level of employment distribution.

The empirical analysis shows that there are some increases in employment in all skilled occupations and a decline in the unskilled occupations. In both the period before the FEP laws and after, the change in the racial entropy index increases at decreasing rates. The change in index could also be caused by such factors as the war in Vietnam and other affirmative action programs. The increasing number of Blacks employed reveals that the occupational category of managers, officials, and proprietors retains a high degree of discrimination in hiring Black workers. In the light of this study, the FEP laws have a long way to go before they can effectively deal with racist employment practices. American society will have to be prepared to overcome social forces that perpetuate racial discrimination, or the economic status of ethnic minorities will have to remain inferior to that of non-Black people for many years to come.

NOTES

1. Herbert Hill commented on Ashenfelter's article discussing many court cases involving racial discrimination in employment and refuting Ashenfelter's thesis of less discrimination among trade unions. The entire book contains outstanding papers of well-known names in the field; e.g., Kenneth Arrow writes on "The Theory of Discrimination," and Barbara R. Bergmann commented on "Sex Discrimination in Wages."

2. Note that the "equity" could be defined to reflect about relative proportion of the Black labor force to that of the non-Black, say about, 10% of the total Black population in the nation.

3. Gary S. Becker (1957) has developed a theory to measure these attitudes.

4. In case these assertions do not occur, it means that the FEP Laws have proved to be ineffective in improving the economic stature of the Black American.

5. This theory has been discussed in great depth in Henri Theil's book *Economics and Information Theory* (1967). Social sciences such as psychology and statistics have applied the information concepts (see S. Kullback (1959) *Information Theory and Statistics*; F. Attneave (1959) *Application of Information Theory to Psychology*).

6. Note that a logarithmic function is needed due to its additivity property in the case of the independent events. It decreases monotonically with increases in P.

7. I would like to credit Michael Koehn of the University of Southern California for suggesting this point.

8. The condition does not apply in cases of Black workers and non-Black workers because Black workers constitute only 10% of the labor force.

9. The racial entropy index is computed as logarithms, to the base e; normally are referred in nits (logarithms to base 2).

10. Table 4 gives regression results computed from Table 1. These results are provided here for comparison purposes with those in Table 3. The core of analysis will be made with reference to Table 3.

11. See Richard B. Freeman (1973), especially Table 4 appearing on pages 88-89. Freeman's results are similar to mine indicating upward mobility in skilled occupation and decrease in unskilled jobs.

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