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Human Capital and Labor Market Employment

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I.

Individuals obtain returns to human capital investment by achieving both higher prices for the rental of their human capital services, i.e., increased wage rates, and greater opportunities to rent these services, i.e., increased employment in the labor market. Virtually all the empirical research to date on returns to human capital investment has examined the relationship between human capital indicators such as education and job experience on the one hand and either wage rates or labor market earnings on the other hand, thus concentrating, respectively, on either rental prices of human capital or total factor payments to human capital services. The relationship between human capital investment and the opportunity to rent human capital services has been considered only indirectly and implicitly in studies of labor market earnings. In this paper, we examine this rather neglected category of returns to human capital investment by investigating the relationship between labor market employment and various indicators of human capital.

Our data source and theoretical foundations for the subsequent empirical work are discussed in Section II. In Section III we report equations estimated using individual observations in which the dependent variable indicates the probability that an individual is employed and thus realizing the opportunity to rent his or her human capital services. Equations are fitted separately for white males, black males, white females, and black females and are used

in Section IV to estimate how much of the differential in employment rates by race-sex categories can be explained by differing levels of human capital investment across race-sex groups. The analysis in this section follows that of Oaxaca (1972) for wage rates.

II.

The data used in this paper are obtained from the May 1973 Current Population Survey tape. The observations incorporated into the equations refer to individuals who are residents of the United States, either white or black, sixteen years of age or older, and labor force participants.

The equations are estimated by probit analysis so that the dependent variable indicates the probability that an individual is employed at the time of the survey. The coefficients of each independent variable indicate the increased probability of being employed accompanying a unit increase in that independent variable divided by the standard normal probability density function evaluated at appropriate values of the independent variables.[1/]

The theoretical justification for a relationship between human capital and employment is straightforward. On the supply side, individuals with greater levels of human capital may be more skilled in searching for jobs and consequently may have shorter spells of unemployment. This negative effect on unemployment incidence may be mitigated, however, by these individuals'

[1/] Since the dependent variable $Y = F(X'\beta)$ where X is the vector of independent variables, β the vector of associated coefficients, and F the cumulative distribution of the standard normal random variable, it follows that $\partial Y/\partial X_i = f(X'\beta) \cdot \beta_i$ where f is the probability density function of the standard normal random variable.

possible relatively higher reservation wage rates and greater propensities to quit jobs. Quit rates, however, should be negatively associated with the level of accumulated specific on-the-job training for the simple reason that one can receive returns to specific human capital investment only while employed at the firm in which the specific training took place. For the same reason, on the demand side, layoffs and therefore unemployment should be inversely related to the level of accumulated on-the-job training.

The human capital variables used in the regressions estimated below include years of formal education and labor market experience defined as age minus years of schooling minus six. As pointed out by Smith (1976), this definition of experience is reasonable only for those individuals who have worked continuously since completing their formal schooling and should be interpreted as a potential experience variable. Marital status is likely to affect labor force attachment and therefore the extent of post-school job experience for both males and females.[2/] Consequently, variables indicating marital status and the product of marital status and potential job market experience are used to provide indicators of actual job market experience.

[2/] Mincer and Polachek (1974) have noted that single, never married women have the strongest attachment to the labor force, married mothers with spouse present the weakest attachment, and married women without children and mothers with spouse absent an intermediate attachment. Bowen and Finegan (1969) found marital status to be the "single most powerful predictor of labor force participation for prime age males" (p. 40).

Education and potential experience variables both enter the equations as linear and quadratic terms. Dummy variables are included indicating whether an individual is married with spouse present and whether an individual is married with spouse absent (this includes widowed, divorced, and separated individuals), the reference group being individuals never married. Also included are interaction terms between potential experience and education, potential experience and the marital status variables, and potential experience squared and the marital status variables.

In the equations for males, a dummy variable indicating veteran status is entered. Job search may be reduced for veterans in cases where veterans are given job preference over non-veterans of equal qualifications, as in the Civil Service, or when veteran status is regarded as an indicator of employee maturity and responsibility. On the other hand, veteran status may be an undesirable employee characteristic, as seems to be the case for Vietnam veterans[3/], and also indicates foregone civilian labor market experience. A variable indicating Spanish origin is included in each equation and is expected to capture both language difficulties and labor market discrimination that exists other than on the basis of race and sex.

Finally, a number of variables describing labor market characteristics are included in these equations. These variables indicate region of residence in the United States, size of

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[3/] See Gildea (1974).

resident standard metropolitan statistical area, occupation, and whether the individual is a private or public sector employee, regular or part-time worker, or union member. We expect that, ceteris paribus, unemployment rates will be lower for union members and government workers, since these classes of workers have recourse to grievance procedures that raise the costs of firing employees. For unemployed individuals, the labor market characteristics refer to their last job held.

III.

The equations described in the preceding section were estimated by probit analysis and are reported in Table 1. In interpreting these equations, two cautionary remarks are in order. First, the results obtained here when the (seasonally adjusted) unemployment rate is 6.1% may not be general results that obtain over the entire business cycle: returns to education or labor market experience either absolutely or relatively across race-sex groups may be quite different in booms than in recessions.[4/] Second, by observing the economy at a given point in time, we are more likely to observe unemployed people with relatively lengthy spells of unemployment: selection of the unemployed in the Current Population Survey is a classical case of length-biased sampling.

[4/] See Reder (1955) for a discussion of labor demand for skilled and unskilled labor over the business cycle.

Table 1

Employment Equations

	White Males	Black Males	White Females	Black Females
Constant	-0.054	-1.21	-0.68	-0.58
	(-0.25)	(-2.00)	(-2.50)	(-0.80)
Human Capital				
Education	0.094	0.17	0.23	0.048
	(3.12)	(1.92)	(5.83)	(0.43)
Education**2	-0.00048	-0.0038	-0.0050	0.0050
	(-0.41)	(-1.08)	(-3.29)	(1.11)
Experience	0.043	0.11	0.082	0.062
	(4.02)	(4.00)	(6.67)	(2.13)
Experience**2	-0.00016	-0.0014	-0.0072	-0.00028
	(-0.66)	(-2.95)	(-3.04)	(-0.48)
Experience*Education	-0.0014	-0.0024	-0.0024	-0.0020
	(-3.79)	(-1.98)	(-4.94)	(-1.30)
Marital Status				
Spouse Present	0.47	0.88	-0.084	-0.090
	(6.95)	(4.65)	(-1.32)	(-0.52)
Spouse Absent	0.15	0.35	0.033	-0.45
	(1.01)	(0.98)	(0.27)	(-1.99)
Single, Never Married	-----	-----	-----	-----
Experience*Spouse Present	0.0092	-0.046	-0.0047	0.021
	(0.96)	(-2.00)	(-0.41)	(0.83)
Experience*Spouse Absent	-0.015	-0.045	-0.036	0.030
	(-1.10)	(-1.34)	(-2.56)	(1.09)
Experience**2*Spouse Present	-0.00048	0.00091	0.0000023	-0.00031
	(-1.99)	(1.82)	(0.0087)	(-0.48)
Experience**2*Spouse Absent	0.000044	0.0011	0.00060	-0.00041
	(0.15)	(1.66)	(2.09)	(-0.64)
Veteran Status	-0.061	-0.20	-----	-----
	(-1.73)	(-2.11)		
Spanish Origin	-0.15	-0.018	-0.14	-0.64
	(-2.32)	(-0.048)	(-1.94)	(-1.50)
Region				
Northeast	-0.35	-0.19	-0.19	0.052
	(-7.87)	(-1.41)	(-4.03)	(0.36)
North Central	-0.16	-0.035	-0.068	-0.030
	(-3.64)	(-0.30)	(-1.47)	(-2.67)

Table 1 (Continued)

	White Males	Black Males	White Females	Black Females
West	-0.39 (-8.40)	-0.53 (-3.57)	-0.35 (-7.03)	-0.46 (-3.02)
South	-----	-----	-----	-----
SMSA Size				
Not in SMSA	-----	-----	-----	-----
Less than 250,000	0.068 (1.16)	-0.17 (-1.02)	-0.075 (-1.29)	-0.11 (-0.71)
250,000-499,999	0.025 (0.46)	-0.16 (-0.99)	-0.030 (-0.52)	-0.22 (-1.47)
500,000-999,999	0.039 (0.72)	-0.082 (-0.55)	0.022 (0.38)	0.11 (0.72)
1,000,000-2,999,999	0.013 (0.31)	-0.19 (-1.54)	0.10 (2.13)	0.016 (0.13)
Over 3 million	-0.023 (-0.52)	-0.12 (-0.82)	0.14 (2.69)	0.077 (0.49)
Occupational				
Professional	0.56 (7.66)	0.46 (2.07)	0.19 (2.61)	0.083 (0.46)
Manager	0.70 (9.78)	1.22 (3.02)	0.24 (2.59)	0.10 (0.33)
Sales	0.54 (7.00)	0.78 (2.41)	0.19 (2.88)	0.17 (0.63)
Clerk	-----	-----	-----	-----
Craft	0.43 (8.00)	0.64 (4.03)	0.074 (0.58)	-0.029 (-0.085)
Operative	0.51 (9.43)	0.37 (2.84)	-0.034 (-0.65)	0.050 (0.40)
Laborer	0.34 (5.75)	0.39 (2.71)	0.030 (0.20)	0.22 (1.44)
Service	0.48 (7.43)	0.52 (3.62)	0.11 (2.23)	0.16 (1.44)
Farm	0.89 (9.16)	1.07 (3.15)	0.40 (2.55)	0.37 (1.14)
Private Household	-----	-----	0.73 (5.69)	0.19 (1.10)
(Regular) Part-Time Worker	0.14 (2.89)	0.19 (1.39)	-0.014 (-0.36)	0.12 (1.13)
Union	-0.016 (-0.44)	0.13 (1.37)	0.056 (1.02)	0.32 (2.61)

Table 1 (Continued)

	White Males	Black Males	White Females	Black Females
Class of Worker				
Federal	0.46	0.32	0.10	-0.045
	(4.11)	(1.68)	(0.89)	(0.26)
State	0.24	0.64	0.27	0.40
	(2.19)	(2.10)	(2.51)	(1.84)
Local	0.33	0.46	0.38	0.42
	(4.04)	(2.94)	(5.00)	(2.83)
Private	-----	-----	-----	-----
Proportion of individuals employed	.9653	.9168	.9532	.9014
Standard normal probability density function evaluated at proportion individuals employed	.157	.172	.160	.177
Number of Observations	31,575	2,812	19,792	2,425

Equations are estimated by probit analysis. Entries in parentheses are ratios of the estimated coefficients to their estimated standard errors, i.e., approximate "t-statistics".

With these remarks in mind, we note generally a positive association between the probability of being employed and our basic human capital indicators, years of formal education and years of potential labor market experience. Because of the non-linearity of these two variables in the equations, the change in the probability of employment accompanying a years increase in formal education or potential labor market experience varies with the original level of these two independent variables. In Table 2, changes in the probabilities of employment accompanying one year increases in education and potential labor market experience are given for single, never married individuals in each of the four race-sex categories, assuming an initial level of 11 years of education and 20 years of potential labor market experience, values that are quite close to the means for all four groups.[5/] The return to an additional year of formal education is greatest for white females and least for black females and the return to an additional year of potential labor

Table 2

Change in probability of employment accompanying one year increase in[a/]

	Formal education	Potential labor market experience
White males	.00879	.00424
Black males	.01961	.01393
White females	.02752	.00864
Black females	.00319	.00690

[a/] Coefficients are derived from Table 1 and then multiplied by the standard normal density function evaluated at the proportion of individuals employed in each group. See footnote 1.

[5/] More precisely, the mean formal education and potential experience levels for each race-sex group are 11.92 and 21.01 for white males, 10.23 and 21.44 for black males, 11.96 and 19.79 for white females, and 11.03 and 19.88 for black females.

market experience is greatest for black males and least for white males. Unfortunately, the large number of observations and limitations of the available software precluded calculation of the covariance between any two regression coefficients and, consequently, the estimated standard errors of the entries in Table 2.

The sign predictions of Section II with respect to the remaining variables are generally supported as well. The coefficients on Spanish origin are always negative, but significantly so at the 5% level only for whites. The veteran coefficients are significantly less than zero at the 5% level for both blacks and whites. The union coefficient is positive in three of four cases but significantly greater than zero at the 5% level only for black males. The state and local government coefficients are significantly positive at the 5% level for all four subgroups and the federal government coefficients significantly positive at the 5% level only for males, probably reflecting the impact of no-layoff policies increasingly prevalent in government employment. In addition, the probability of being employed is positively associated with individuals having a regular part-time job for three of the four subgroups, but significantly greater than zero at the 5% level only for white males. These positive coefficients may reflect a greater flexibility of hours in part-time jobs and consequent effective demand reduction taken in hours rather than layoffs.

Despite the similarity of signs of coefficients across race-sex categories, hypotheses of equality of coefficients across race for each sex and across sex for each race are rejected at the

½ of 1% level using the standard likelihood ratio test.

IV.

The equations reported in Table 1 also were used to investigate how much of the employment differentials among the race-sex groups could be explained by differences in the group means of the independent variables. The analysis follows that of Oaxaca (1973) and Malkiel and Malkiel (1973) and yields a differential explained by variation in characteristics and an unexplained residual due to differences in estimated coefficients. The unexplained residual reflects the influence of factors not incorporated explicitly into the equations and is assumed to be due at least in part to race (sex) discrimination.

The method of decomposition may be illustrated by considering in some detail the comparison between the employment equations for white males and black males. Let $\tilde{E}_w$ be the estimated mean employment level for white males using the coefficients estimated for black males and the mean values of the independent variables observed for white males. Then the amount of the racial employment differential due to differences in characteristics between white and black males is measured by $\tilde{E}_w - \bar{E}_b$, where $\bar{E}_b$ is the estimated mean employment level for black males using both the estimated coefficients and the mean values of the independent variables observed for black males, and the unexplained residual is measured by $\tilde{E}_w - \bar{E}_w$, where $\bar{E}_w$ is the estimated mean employment level for white males using both the estimated coefficients and

the mean values of the independent variables observed for white males. This decomposition is subject to the familiar index number problem since the same differential can be decomposed under the alternative assumption that the estimated white structure applied to both groups of males. The true structure that exists for both groups is unknown. Nevertheless, it is assumed that the range of estimates obtained under these alternative assumptions includes the values based on this unknown true employment relationship.

The analysis of the employment differentials using this technique is presented in Table 3. It indicates that the overall employment differentials between the races within each sex are roughly twice as large as the same differentials between the sexes within each race. More than 60 percent of the difference in employment rates for males cannot be explained by differences in characteristics between the races and presumably is largely attributable to racial discrimination, although the unexplained residual may also reflect differences in the educational quality received by members of each race: years of schooling measures only one dimension of formal education received. On the other hand, for females, it appears that if the same employment structure applied to both races, the proportion of blacks employed would exceed that of whites. Thus, although the overall employment differentials are very similar in size for both sexes, it appears that racial discrimination has a more

Table 3

Employment Differentials

Differences by Race

	Males		Females	
	$\bar{E}_w = 0.9768$ $\bar{E}_b = 0.9435$		$\bar{E}_w = 0.9610$ $\bar{E}_b = 0.9265$	
$\bar{E}_w - \bar{E}_b$	0.0333		0.0345	
	White Weights $\bar{E}_w - \tilde{E}_b$	Black Weights $\tilde{E}_w - \bar{E}_b$	White Weights $\bar{E}_w - \tilde{E}_b$	Black Weights $\tilde{E}_w - \bar{E}_b$
	0.0053	0.0118	-0.0064	-0.0042
% of differential due to variation in independent variables	15.92	35.44	-18.55	-12.17
	$\tilde{E}_b - \bar{E}_b$	$\bar{E}_w - \tilde{E}_w$	$\tilde{E}_b - \bar{E}_b$	$\bar{E}_w - \tilde{E}_w$
	0.028	0.0215	0.0409	0.0387
% of differential unexplained by independent variables	84.08	64.56	118.55	112.17

Differences by Sex

	Whites		Blacks	
	$\bar{E}_m = 0.9768$ $\bar{E}_f = 0.9610$		$\bar{E}_m = 0.9435$ $\bar{E}_f = 0.9265$	
$\bar{E}_m - \bar{E}_f$	0.0158		0.017	
	Male Weights $\bar{E}_m - \tilde{E}_f$	Female Weights $\tilde{E}_m - \bar{E}_f$	Male Weights $\bar{E}_m - \tilde{E}_f$	Female Weights $\tilde{E}_m - \bar{E}_f$
	0.0122	0.004	0.0138	0.0055
% of differential due to variation in independent variables	77.22	25.32	81.18	32.35
	$\tilde{E}_f - \bar{E}_f$	$\bar{E}_m - \tilde{E}_m$	$\tilde{E}_f - \bar{E}_f$	$\bar{E}_m - \tilde{E}_m$
	0.0036	0.0118	0.0032	0.0115
% of differential unexplained by independent variables	22.78	74.68	18.82	67.65

damaging effect on the employment opportunities of females than of males.

The analysis of the employment differentials between the sexes within each race is more sensitive to the weights used to decompose the differentials. It appears that a larger proportion of the overall employment differential is explained by variation in characteristics (including the human capital variables) and, therefore, presumably a smaller proportion is attributable to discrimination than was the case in the analysis of the race differentials within each sex. This would imply that the effects of sex discrimination on employment opportunities are less damaging than the effects of racial discrimination and is consistent with the earlier observation that the overall employment differential between the races is approximately twice that between the sexes. Alternatively, these results may be interpreted to imply that there is greater variation in levels of and returns to human capital between the races (within each sex) than between the sexes (within each race) so that larger differences in employment levels would be anticipated between the races. This seems to be consistent with the evidence cited in Table 2 and footnote 5 above.

Our analysis of male/female employment differentials can be contrasted with Oaxaca's analysis of male/female wage differentials.[6/] An examination of the proportions unexplainable

[6/] Since the analysis of each of these differentials includes a range of values for each component (depending upon whether male or female regression weights are used to evaluate the decomposition) and because Oaxaca controls for variation in industrial composition as well as the variables we consider, comparison is not made of specific proportions of each differential attributable to the effects of discrimination. Instead, a contrast is made between the range of proportions attributable to discrimination in employment and wage rate differentials.

by the independent variables for each type of differential suggests that sex discrimination has a more damaging impact on wages than on employment opportunities. This would imply that the impact of sex discrimination is more likely to be manifested in unequal pay for comparable workers than in restrictive hiring practices. Such behavior may be explained by the fact that discriminatory hiring and firing practices are more easily observable than discriminatory pay policies and, consequently, are more readily correctable by affirmative action policies.

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