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I INTRODUCTION

This paper is part of a larger research effort to identify the causes of differentials in early labor market success among youth. Here, we are primarily interested in (a) the effect of education, independent of ability, on early labor market success, and (b) white-black differentials in the determinants of early labor market success, where our measure of "success" is hourly earnings. For the most part, the extensive literature on women's wages consists of descriptions of male-female pay differences and attempts to answer questions concerning discrimination (1, 3, 6, 10, 11, 12, 14).¹ Our results are both relevant to those issues -- indeed, such issues are central to our larger project -- and of interest in their own right. Furthermore, we believe that the youth dimension in our study is of special import, for just as it has been shown that early encounters with unemployment have consequences for subsequent labor force experience (8), we contend that the wage rates received early in one's work history have an impact upon later experience.

II CONCEPTUAL FRAMEWORK

Our examination of differentials in early labor market success is by means of a two-equation, recursive model, with educational attainment as the dependent variable in the first equation and labor market success as the dependent variable in the second. Our explanatory variables are race, family background, ability, health, quality of education, and (for the second equation) quantity of education. Being black is expected to have a negative effect upon both educational attainment and labor market success, in that it is expected to reflect any existent racial discrimination (current or past) and any resultant intercolor variations in norms and attitudes. For reasons discussed below, each equation is run separately for whites and for blacks, rather than entering race as a dummy explanatory variable. Family background is expected to be positively related to both dependent variables, as a result of heredity and financial and environmental support. Ability is also presumed to bear a direct relationship to both education and labor market success. While we would anticipate good health to be associated positively with labor market success, it is not clear what sign to expect in its association with years of education completed. On the one hand, youngsters with severe health problems are often unable to continue in school. On the other hand, the foregone earnings cost of continuing school is probably considerably lower for them than for youth without disabilities.² Quality of schooling is hypothesized to be positively related to both dependent variables. Products of "better" schools should be more likely to be both motivated to seek and able to attain additional education, and should be better equipped for success in the labor market. Similarly, because we anticipate positive returns from investment in education, we expect the coefficient of education to be positive in the labor market success equation.

III THE DATA BASE

The universe under consideration here is a subset of a larger, national sample of women who were 14 to 24 years of age when interviewed in January/February 1968. The sample is a multi-stage probability sample selected from the civilian noninstitutionalized population of women within the prescribed age limits, and is a part of the National Longitudinal Surveys of labor market and educational experiences.³ Data for all variables other than ability and quality of schooling were obtained through personal interviews conducted by the Bureau of the Census. Data on ability and quality of schooling were obtained through a mailed survey of the high schools attended by all 14- to 24-year-old male and female respondents in the National Longitudinal Surveys panels.

The characteristics of the available data base are such that we are both permitted and constrained to focus on a rather narrow universe of young women. This universe is specified as follows: females 18 to 24 years of age in 1968 who were employed as wage and salary workers and who were not enrolled in school at the time of the survey. The universe is further confined to those who had attended at least the first year of high school (the 9th grade) because the sources of our measure of mental ability were the records of secondary schools. The minimum age and enrollment status criteria were chosen so as to permit a reasonable range of occupations to be represented and to exclude those teenagers whose principal labor force activity is the rather casual occupation of babysitting. The employment status restriction was imposed after some experimentation with the data. We concluded that the value of a larger sample size would be outweighed by the costs of having to adjust the wage rates of the nonemployed for the effects of inflation. That is, for those unemployed or out of the labor force, strict comparability of measurement would have required dating their most recent job and adjusting the wage rate on that job for price level changes between that date and January/February 1968. In some cases the most recent job might have been held as much as five years prior to the survey.

IV METHODOLOGY

Specification and Estimation of the Model

As a first approximation to the complex nexus of variables which causes "early labor market success" among young women we employ a two-equation, recursive model. It can be stated as follows:

- (1) EDU = F (RACE, SEL, SIBS, IQ, HLTH, QUAL)
- (2) LMS = G (RACE, SEL, SIBS, IQ, HLTH, QUAL, EDU)

where each functional relationship indicates a linear structural equation. The acronyms are defined below in the discussion of the measurement of the concepts. This format was prompted by several factors. First, there seems to be a growing recognition among economists that

single-equation models are inadequate to describe and explain the effects of schooling upon earnings (5, 9). Second, sociologists interested in similar hypothetical causal structures have found at least a modicum of success with the recursive structure, especially when interested in examining direct and indirect effects (2). Third, because of the recursive-structure hypothesis, the parameters of the structural equations can be estimated using ordinary least-squares regression analysis (7), which is a low-cost, convenient starting point. Finally, the multiple-equation format permits us to examine both direct and indirect effects of some variables.⁴ It should be recalled that the parameters of the model are estimated and shown separately for whites and blacks.5 This estimation procedure reflects our belief that race interacts with the other determinants of success.6

Measurement of the Concepts 7

Labor market success (LMS) The measure of success used here is hourly rate of pay on current job. It differs from a "contract wage" because the time unit in which a respondent reported her earnings was at her discretion. If she reported it in other than hourly terms, the figure was converted to weekly units and divided by the usual number of hours she worked per week. Although the measure ignores psychological dimensions of success, it seems to us to be the most appropriate measure of economic success. Annual earnings is a more commonly used measure, but seems inferior to us because it is "contaminated" by the effects of annual hours of work which may or may not be positively related to success. The young woman who seeks and obtains part-year or part-time employment may be considered as "successful" as her counterpart who is employed full time all year. The social stigma which is applied to out-of-school males who are out of the labor force a significant part of the year does not seem to be applied to comparable females, even if they are unmarried.

<u>Amount of schooling (EDU)</u> The amount of schooling completed is measured as a continuous variable in units of single years. Although nonlinearities in the effects of schooling (e.g., "sheepskin" effects) may exist, we do not test for them here.

Quality of schooling (QUAL) We operationalize this concept in an index based on the following characteristics of the last secondary school attended by the respondent: per-pupil availability of library facilities, guidance counselors/100 pupils, pupils/fulltime teachers, and starting salary of an inexperienced teacher with a bachelor's degree. The last variable is not school-specific. Rather, it refers to district-wide schedules for the 1967-1968 academic year and was adjusted for inter-area differences in price levels in 1967. The quality index is conceived purely in ordinal terms and was constructed to correspond to the assumption that schools from which the data were obtained are normally distributed with respect to quality. The final scaling of the index assigned a range of values of 1-11 where: 1 = lowest 1 percent of the quality distribution, 2 = next higher 4 percent, 3 = next higher 7 percent, 4 = next higher 12 percent, 5 = next higher 16 percent, 6 = middle 20 percent, etc.

Family background (SEL and SIBS) Family background is operationalized in two variables, i.e., an index of the socioeconomic level of the parent family (SEL) and number of siblings of the respondent (SIBS). The index is a simple average (mean = 10.0, s.d. = 3.0) of the linearly transformed values of the following measures: father's education, mother's education, education of oldest older sibling, father's occupation, and availability of reading material in the home of orientation. In order to preserve data cases, we permit the index to be computed for any respondent who provided information on at least three of the five components. For the sake of computational convenience, the number of siblings is excluded from the index but included separately in the estimating equation.

<u>Mental ability (IQ)</u> Our measure of mental ability is a standardized measure derived from the score on one of many tests of mental capacity reported by the secondary schools. For the entire sample of young people (male and female) for whom the data were collected, the variable was scaled to a metric which is conventional in educational testing--i.e., mean = 100, s.d. = 16. A lengthy analysis of pooling scores from different tests has been performed which establishes the legitimacy of the technique for this type of empirical research (9).

<u>Health (HLTH)</u> The measure of health condition used here is a dummy variable (1 = "unhealthy") based on self-reported physical limitations on current work activity. The measure is less than ideal as a proxy for health conditions which might have affected school attendance, and in future work we intend to attempt a refinement of it based on the duration of the professed limitation.

V DISCUSSION OF FINDINGS

In the educational attainment equation for whites. all of the variables except HLTH are significant and all have the hypothesized signs (Table 1). In sum, the equation explains 24 percent of the variance in educational attainment. The nonsignificance of the health variable should be interpreted with caution. First, there are the measurement problems mentioned above. We are unable to relate the timing of the reported health limitation to the respondent's period of school enrollment. Furthermore, we have no knowledge of the nature of the reported health impairment. Second, nonsignificance may result from two offsetting impacts of poor health: some of the unhealthy young women may not be physically or mentally capable of continuing in school, while others may be induced by the relatively lower opportunity costs to stay in school.

For blacks, the explanatory power of the equation is substantially less than for whites, i.e., it accounts for only 10 percent of the variance in educational attainment. There are also other major intercolor differences in the equation. For blacks, the only variable which is significant at conventionally accepted levels is IQ. Examination of (a) the zero-order correlation among the regressors and (b) several different sequences of entrance of the variables into the equation indicates that the nonsignificance of family background ⁸ and school quality⁹ is "real" rather than a product of collinearity.

In the wage equation for whites the \overline{R}^2 is .167 and only the coefficients for EDU and SIBS are significant. The direction of effect is as hypothesized in both instances. For the blacks, EDU, IQ and QUAL all have significant coefficients, again in the hypothesized

Table 1 Regression Results for Model F-1: Out-of-School Females 18 to 24 Years of Age in 1968 Employed as Wage and Salary Workers

(t-ratios)

Dependent	EDU (years)	LMS = WAGE (cents/hour)			
variable ^a Explanatory variable ^b	WHITES	BLACKS	WHITES	BLACKS		
EDU	c	с	+16.6 (9.41)	+19.1 (5.00)		
IQ	+.04 (7.94)	+ .03 (3.12)	+ .1 (0.30)	+ 1.1 (2.50)		
SIBS	07 (2.65)	05 (1.04)	- 2.1 (1.78)	+ .1 (0.50)		
HLTH	+.01 (0.02)	47 (0.92)	+ 2.9 (0.25)	+15.9 (0.71)		
QUAL	+.07 (2.56)	09 (1.57)	+ .4 (0.31)	+ 5.9 (2.26)		
SEL	+.25 (7.29)	+.08 (1.33)	9 (0.58)	8 (0.31)		
CONSTANT	+6.12	9.68	4	-175.1		
_ 2	.237	.099	.167	.219		
F-ratio/S.E.E.	38.4/1.39	4.06/1.38	21.0/59.9	7.56/61.4		
Ν	602	141	602	141		

a See text for definition of dependent variables.

b See text for definition of explanatory variables.

c Variable did not enter equation as explanatory factor.

directions. Here, the $\overline{R^2}$ is somewhat higher, .219. Of particular interest is the intercolor differential in the effect of ability on earnings. It is substantially more important for young black women; evidence, perhaps, of an element of racial discrimination in the labor market. For example, the fact that a white job applicant has received a high school diploma might alone be sufficient to secure employment for her, whereas only the most able of the black graduates might be accepted for that same job.¹⁰

It should be noted at this point that the explanatory powers of the above equations differ as between whites and blacks. In the education equation we are able to explain more of the variance among whites than among blacks, whereas in the wage equation the reverse is true. Additionally, the intercolor difference is far more striking in the education than in the wage equation.

The notable intercolor difference in the behavior of the measure of mental ability prompts us to examine it in somewhat greater detail. Given the causal ordering embodied in our model, the "total" effect of IQ on WAGE net of all prior factors can be decomposed into a direct effect (i.e., the regression coefficient shown in Table 1) and an indirect effect.¹¹ The latter is obtained by computing the effect of ability on hourly earnings through education. If we categorize the variables in our model into I(IQ), E(EDU), W(WAGE) and O(OTHER), the total effect of I on W can be seen as $b_{WI.0}$. The decomposition of this total effect implied by our model is as follows:

 $b_{WI.0} = b_{WI.E0} + (b_{WE.I0}) (b_{EI.0}).$

The first term on the right-hand side of the equation is the net, direct effect and the second term is the indirect effect.

Using the estimated regression coefficients to compute the total effect of IQ on WAGE for whites and blacks yields values for ${}^{\rm b}_{\rm WI.0}$ of .6¢ and 1.6¢,

respectively. This suggests that ability is about three times as important in the determination of the wages of young black women as in the determination of the wages of young white women. While this difference is by no means trivial, it is certainly more reasonable than the relative difference of 24:1 (if $b_{WI,EO}$ for whites is

assumed \neq 0) or of ∞ (if $b_{WI,E0}$ is assumed = 0).

Furthermore, it indicates that the size of the indirect effect of mental ability, through schooling, is about the same for white and black women. Finally, because in general women's wages are affected by their concentration in lower paying occupations, we have begun to explore the effect of occupational assignment upon our estimates. To examine this effect, we first employed a dummy variable representing "atypicality of occupation, n12 because there is some evidence that women in occupations where the proportion of female employment is low are likely to receive higher wages than those in occupations where women make up a large proportion of the work force (3, 4, 11, 12, 14). When this atypicality variable was added to the wage equation we found that, among whites, 13 those employed in atypical occupations earn approximately 13 cents per hour more than do their counterparts holding more traditional female jobs.

We then expanded our exploration to include a full set of interaction terms between atypicality of occupation and the other determinants of hourly rate of pay. Previous work (13) had suggested that the background characteristics of young women in atypical occupations were sufficiently different from those of the respondents in typical jobs to warrant testing for the existence of these interactions. The final equation containing only significant interaction terms is shown below (values in parentheses are t-ratios).

WAGE = .7 + 17.5 EDU - .2 IQ - 2.1 SIBS + 1.3(IQ)(ATYP) (10.2) (0.69) (1.84) (2.62) - 10.0 (EDU)(ATYP) (2.38)

This equation shows that, in terms of labor market success, education is less important for the atypicals than for the typicals, while ability is more important. More so than in traditional "women's work," the labor market success of a young woman who enters an atypical occupation is a function of her ability rather than merely the amount of schooling she completes.

VI SUMMARY

We have hypothesized and tested a two-equation, recursive model to identify the determinants of early labor market success among young women, where success is operationalized as hourly earnings. For the most part, the explanatory variables included in the model performed in accordance with our expectations. The principal exception was the consistent nonsignificance of the measure of health condition, although for reasons discussed earlier we caution against strict interpretation of our results for this variable. Another unexpected finding was that family background does not play a significant role in determining the educational attainment of young black women. It should be recalled that this applies only to those young women who at least enter high school, and that nearly one of every eight black women in the age range of our study did not go beyond the eighth grade (15). Each of our measures of mental ability, amount of schooling and quality of schooling exhibit significant direct effects on hourly earnings for one or both of the color groups.

The several black/white differences revealed by the regression analysis provide <u>prima facie</u>, if not statistically rigorous, support for our belief that race interacts with other determinants of labor market success. One of the intercolor differences is in the explanatory power of the model, i.e., we are able to explain more of the variance in success among blacks than among whites, but just the reverse is true for the educational attainment equation. Our results indicate. also that mental ability has both direct and indirect effects on the early success of young black women, but only an indirect impact for their white counterparts. We have suggested that finding a significant direct effect of ability for blacks but not for whites may be evidence of racial discrimination in the labor market--i.e., the "creaming" of only the most able blacks.

Our brief exploration of the role of occupational assignment in the determination of hourly earnings indicates that young white women in atypical occupations receive higher wages and that their labor market success is more likely to be dependent upon ability than is the success of their counterparts in traditional women's occupations. Finally, the net effect of years of schooling is significantly lower for young women in atypical occupations than for those holding more conventional occupational assignments.

FOOTNOTES

"This paper is based on data from the National Longitudinal Surveys, a project sponsored by the Manpower Administration, U.S. Department of Labor, under the authority of the Manpower Development and Training Act. Researchers undertaking such projects are encouraged to express their own judgment, thus interpretations or viewpoints stated in this document do not necessarily represent the official position or policy of the Department of Labor.

¹All item numbers in text and footnotes refer to numbered reference items.

²The sign of the estimated coefficient can be used to test the relative power of these competing hypotheses. Of course, a nonsignificant coefficient does not resolve the ambiguity.

⁵For a detailed description of the sampling design and the complete interview schedule see (15).

⁴Among the alternative specifications of the model which will be examined in the larger study of which this is a part are multiplicative equations and the hypothesis that the system is more appropriately viewed as simultaneous.

⁵The term "blacks" refers here exclusively to Negroes. The nonwhite nonblacks in the sample were purposely excluded in order to focus on Negro-white differences.

^bUnfortunately, we are unable to subject this belief to rigorous statistical testing because the computer technology available to us at the present time does not permit precise consideration of the fact that blacks were oversampled relative to whites in the ratio of 3:1. We expect, however, that this technological bottleneck will be eliminated in the near future.

⁷For means, standard deviations, and zero-order correlations for the variables described below, see Appendix Table 1. ⁸Previous tabular analysis of the relationship between family background and educational attainment, using slightly different measures of the former, produced similar results (15, pp. 30-32).

⁹In an earlier version of this paper we had suggested that a black-white differential in graduation from vocational high schools might be responsible for the unexpected sign of QUAL in the education equation for blacks. However, re-estimation of the equations including variables representing vocational school enrollment did not confirm this speculation.

¹⁰Because we believed that both statistical and "real" interrelationships among the regressors could be leading our interpretations astray, we re-ran both equations, entering only the variables which were significant in the model specified above. For both the wage and education equations, the results produced by the re-estimation were virtually identical to those from the original run.

11 This decomposition is analogous to those performed using beta weights or path coefficients and can also be derived by applying the conventional "omitted-variable" formula (5).

¹²The categorization of occupations as "atypical" or "typical" for women was based on the occupational distribution of women in the labor market as of the 1960 Census. At that time women comprised 32.8 percent of the U.S. labor force; thus those occupations for which the proportion of female incumbents was less than that percent were classified as "atypical" for women. For a complete description of the variable and examples of atypical occupations see (14, pp. 3-4).

¹³We did this only for whites because the number of sample cases of blacks in atypical occupations was too small for confident analysis.

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Appendix Table 1 Means, Standard Deviations and Zero-Order Correlation Coefficients^a for Variables^b in Labor Market Success Model, by Color: Employed Nonstudent Females 18 to 24 Years of Age in 1968 Who Had Completed at Least 8 Years of Schooling

	Whites									Bla	cks
	Mean	S.D.	EDU	IQ	SEL	SIBS	HLTH	QUAL	WAGE	Mean	S.D.
EDU (ye ars)	12.6	1.6		30	16	-17	-06	-13	44	12.3	1.4
IQ (index)	104.6	12.3	3 8		17	-20	09	-07	30	91.4	12.5
SEL (index)	9.0	1.8	3 8	25		-22	-03	14	10	8.3	2.1
SIBS (persons)	2.7	2.1	-19	-11	-20		05	01	-10	4.1	2.8
HLTH (percent)	4.7	21.2	-04	-08	-06	01		-02	-06	5.7	23.2
QUAL (index)	5.9	2.0	10	01	03	-01	02		11	6.0	2.0
WAGE (cents/hour)	200.6	65.6	41	16	15	-14	-01	05		190.3	69.5

a Correlation coefficients for whites are below the main diagonal and those for blacks are above the main diagonal. Decimal points are omitted from the coefficients.

b For definition of the index units of measurement see text.