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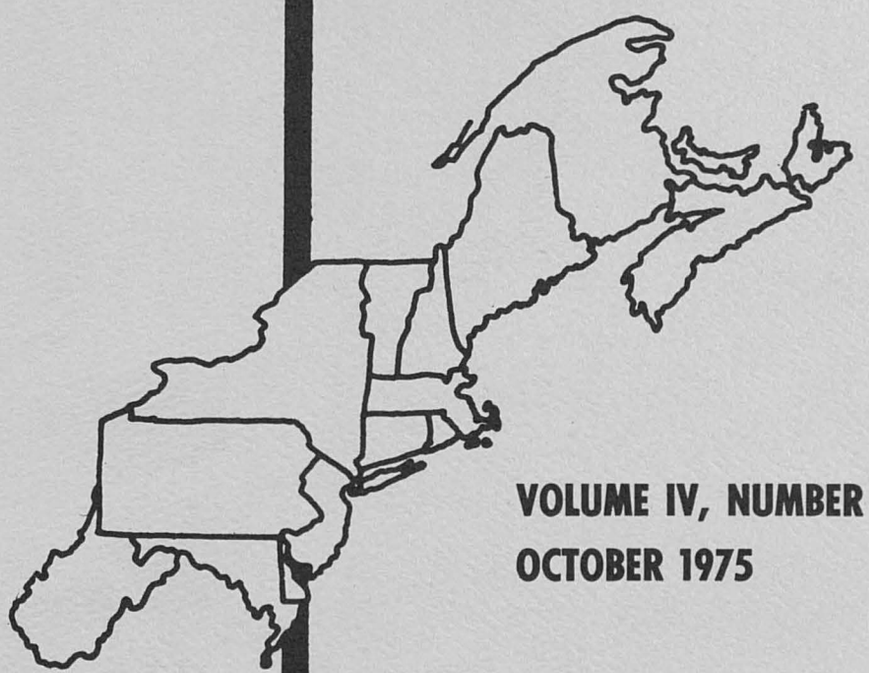

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FACTORS ASSOCIATED WITH THE VARIATION IN HOURLY WAGE RATES AMONG A SAMPLE OF LOW WAGE WORKERS IN RURAL DELAWARE

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Many persons in rural areas in the U.S. are dependent largely on labor earnings for their economic well-being. Seventy-five percent of the 14.8 million rural nonfarm persons and fifty-two percent of the rural farm persons 16 years old and over who were employed in 1969 were employed as wage and salary workers. Of the 1.6 million rural nonfarm families with incomes less than the poverty level in 1969, 51 percent had male heads less than 65 years of age, and 71 percent of these male heads were in the labor force in 1969. Sixty-seven percent of the 442,000 rural farm families with incomes less than the poverty level had a male head less than 65 years old and 81 percent of these male heads were in the labor force in 1969 [8].

These data generally establish the importance of the labor factor market as a source of income to individuals and families in rural areas and to the failure of many family units to escape poverty status because of their failure to earn sufficient income in the labor factor market.

However, as Bawden [1] notes, agricultural economists have directed most of their attention to farmers and to a lesser extent farm laborers, and the work behavior of rural wage workers has in general been overlooked. Yet, formulation and implementation of sound policies to facilitate the reduction in the incidence of poverty in rural areas through the labor factor market necessitate an understanding of the manner in which such labor markets operate.

Low labor earnings can be attributed to (a) low wage rates and/or (b) low labor force participation rates. This paper focuses on the wage rate problem and does not consider the problem of low labor force participation rates. Specifically, the purpose of the paper is to attempt to identify some of the factors associated with the variation in hourly wage rates among a sample of low wage workers in a local rural labor market in Delaware.

The Model

It is posited that an individual's wage rate depends upon his demographic characteristics, his stock of human capital, and the type

of firm in which he is employed. Specifically, the following wage function is proposed:

$$HWR = f(DC, HC, FC)$$

where HWR is the gross hourly wage rate, DC is a vector of demographic characteristics, HC is a vector of human capital variables, and FC is a vector of characteristics of the firm which employs the individual.[1/] The independent variables are specified below.

Sex. The operation of a variety of cultural and institutional factors results in bias against female workers in the labor market. The net result is that female workers have lower wage rates than male workers, other things being equal. Sex enters the equation as a dummy variable (1 = male, 0 = female).

Marital Status. In contrast to being divorced or separated, being married may be indicative of certain personality traits such as maturity, responsibility, and initiative. All of these traits are positively associated with productivity. Therefore, married individuals have higher productivity levels and wage rates than individuals who are divorced or separated. There is not a priori basis for ranking individuals who are widowed or who never married with respect to these personality traits. Marital status enters the equation as a set of dummy variables:

M_1 = 1 if married, 0 otherwise (suppressed to avoid singularity);

M_2 = 1 if widowed, 0 otherwise;

M_3 = 1 if divorced or separated, 0 otherwise; and

M_4 = 1 if never married, 0 otherwise.

Race. To the extent that blacks suffer discrimination in the labor market, they will have lower hourly wage rates than whites, other things being equal. Race enters the equation as a dummy variable (1 = white, 0 = black).

Health. Disease and impairment tend to reduce an individual's productivity and wage rate, other things being equal. The health variable used in the model enters the equation as a dummy variable (1 if the individual's health or physical condition limits the kind or amount of work he can do, 0 otherwise).

Age. Age serves as a proxy for potential labor force experience or exposure. The returns to additional labor force experience are high

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1/For the rationale of this approach see [4].

during the beginning years in the labor force, because during these years workers are learning how to perform in an industrial setting and are acquiring on-the-job skills. Earnings potential reaches a maximum during the prime age years, after which returns to additional years of experience fall because workers do not learn new skills and additional tenure does not provide new employment opportunities [6]. Because of the high earnings potential of workers in the prime age group, age is specified as both age and age squared.

Formal Education. The generally high rate of return to investment in formal education is well documented [2, 3, 5]. Education is positively associated with wage rates, and enters the equation as the number of years of school completed.

Tenure. An individual's wage rate is positively associated with his experience with his current employer because of the returns associated with increased productivity resulting from on-the-job training. This variable enters the equation as the number of years of employment with the current employer.

Vocational Training. Another form of investment in human capital that is expected to affect the wage rate is vocational training. Although the effectiveness of vocational training in increasing the productivity and wage rate of workers is still a subject of some controversy, such vocational training has been considered by public policy-makers to be an important instrument for reducing the incidence of poverty through increased worker productivity.

In contrast to formal education, vocational training can be acquired in a variety of ways. In addition, it tends to be very specific and is usually applicable to only a narrow range of jobs. For these reasons, it is difficult to obtain a standardized measure of the stock of human capital obtained through vocational training.[2/] In this analysis, two vocational training variables are included. The first is a dummy variable used to denote completion of a vocational training program within the last five years (1 if the individual completed a vocational training program in the last five years, 0 otherwise). The

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[2/] The types of vocational training taken by the sample workers include (1) vocational training in the armed forces, (2) apprenticeship training (usually conducted by unions), (3) a vocational or technical program from a correspondence school, (4) a full-time program lasting six weeks or more at a company training school, and (5) government training programs. While it is recognized that these different approaches to vocational training could have significantly different outcomes, the small number of individuals who complete any one type of program made it difficult to construct a separate variable for each program.

second is a dummy variable used to denote actual use of the acquired vocational training on the current job (1 if the training is used on the present job, 0 otherwise).

Firm Characteristics. According to neoclassical theory of the firm, the marginal productivity of identical labor inputs can differ between firms because of disequilibrium in the labor factor market and differences in capital-labor ratios between firms. In addition, because of varying degrees of competition in the factor and product markets, wage rates may deviate from marginal productivity in varying degrees between firms. Because of the difficulty of obtaining direct measures of capital stocks and conditions in the factor and product markets for individual firms, proxies in the form of dummy variables are included in the model:

I_1 = 1 if the individual is employed by an agricultural firm (SIC Codes 01-09), 0 otherwise (suppressed to avoid singularity);

I_2 = 1 if the individual is employed by a food manufacturing firm (SIC Code 20), 0 otherwise;

I_3 = 1 if the individual is employed in an apparel or textile manufacturing firm (SIC Codes 22-23), 0 otherwise;

I_4 = 1 if the individual is employed in a durable manufacturing firm (SIC Codes 35, 36, 37, 39), 0 otherwise;

I_5 = 1 if the individual is employed by a retail trade firm (SIC Codes 52-59), - otherwise; and

I_6 = 1 if the individual is employed by a service firm (SIC Codes 70-89), 0 otherwise.

The Data and Findings

The data used in this analysis were obtained from a survey of 320 low wage workers employed by 66 firms in Kent and Sussex Counties, Delaware, during the months of June and July 1973. The sampling procedure involved stratifying all employers in the two county area by the Standard Industrial Classification Code and selecting a sample of firms within each strata. During the survey period each sampled firm was contacted and a sample of low wage workers interviewed.[3/] For purposes of the sample, a low wage worker was defined as anyone whose gross earnings, at the time of interview, were $2.50 or less per hour. The

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[3/] The strata correspond to the industry categories presented in the model specification section of the paper.

distribution of the Kent and Sussex Counties labor force by industry for 1970 is shown in Table 1. Table 2 contains basic information of the sample of 320 low wage workers.

Table 1
Distribution of Employment by Industry in Kent and Susses Counties, Delaware, 1970

Industry	No. of Employees	Proportion of All Employees
Agriculture	4,128	.0838
Manufacturing	16,535	.3356
Food and Kindred Products	5,086	.1032
Transportation and Other Public Utilities	3,404	.0691
Wholesale Trade	1,866	.0379
Retail Trade	9,363	.1900
Finance, Insurance and Real Extate	1,644	.0334
Services	6,383	.1296
Total	49,272	1.0000

Source: U.S. Bureau of the Census, Census of the Population 1970, General Social and Economic Characteristics, Final Report PC(1) - C9, Delaware.

The results of a fitted regression equation are shown in Table 3.[4/] Variables M_1 and I_1 were deleted to avoid singularity. The findings indicate that 11 of the 17 variables are statistically significant at least at the .05 level. Together the variables explain about 29 percent of the variation in hourly wage rates.

Demographic Variables. Together, the demographic variables explain 12 percent of the variation in hourly wages; this amounts to about 42 percent of the explained variation. The variable set for marital

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[4/] In addition to the functional form of the model presented, other functional forms were tried, including the semilog form. On the basis of the R^2 and t statistics, the functional form as presented in Table 1 represents the best fit.

Table 2
Basic Information for 320 Low Wage Workers in Kent and Sussex Counties, Delaware

Variable[a/]	Mean or Proportion	Standard Deviation
Sex		
Percent Male	.33	
Percent Female	.67	
Marital Status		
Proportion M_1	.40	
Proportion M_2	.10	
Proportion M_3	.15	
Proportion M_4	.35	
Race		
Proportion Black	.47	
Proportion White	.53	
Health		
Proportion with limitation	.03	
Proportion without limitation	.97	
Age	33.16	14.38
Education	9.99	2.96
Tenure	4.09	6.87
Percent Finishing Voc. T.	.18	
Percent Using Voc. T.	.08	
Industry of Employment		
Proportion Employed in I_1	.20	
Proportion Employed in I_2	.25	
Proportion Employed in I_3	.12	
Proportion Employed in I_4	.05	
Proportion Employed in I_5	.18	
Proportion Employed in I_6	.20	
Gross Hourly Wage Rate	1.99	1.26

[a/] The variables are defined fully in the text.

status is statistically significant at the .10 level, although not all elements of the set are significant. Other things being equal, individuals who are divorced or separated, on the average, earn 67 cents less in hourly wages than married individuals. However, individuals who never married or who are widowed do not have significantly different wage rates than individuals who are married. Male workers, on the average, earn 59 cents more per hour than females, other things being equal.

Table 3
Fitted Regression Equation for Hourly Wages for 320 Low Wage Workers in a Rural Delaware Labor Market

Variable[a]	Regression Coefficient	t Value	F Ratio[c]
Sex	.5851***	3.96	
M_2	.1386	.67	
M_3	-.6708***	4.49	
M_4	.1333	.71	1.63*
Race	.0262	.18	
Health	-.8415***	2.95	
Age	.0813***	3.44	
Age^2	-.0010***	3.33	
Education	.0679***	2.63	
Tenure[b]	.3487***	4.41	
Voc. T. Finish	-.0093	.05	
Voc. T. Use	.6826***	2.52	
I_2	.5139**	2.02	
I_3	.4256**	2.03	
I_4	.7963**	2.38	
I_5	.1236	.54	
I_6	.1141	.51	1.68**
R^2 = .2896	F = 7.1680***	d.f = 302	

***Significant at the .01 level.
**Significant at the .05 level.
*Significant at the .10 level.
[a]The variables are defined fully in the text.
[b]Variable is transformed into natural logarithm plus 1.
[c]F is computed for sets of dummy variables.

The coefficient of the race variable is not statistically significant, indicating that there is no wage differential between black and white workers after controlling for other demographic and human capital variables and industry of employment. These findings are consistent with and seem plausible from more global research. Thurow [6], for example, found that the income gap between whites and blacks is minimal at low educational levels. The gap between black and white earnings grows at an increasing rate as education rises.

Both age and age^2 are statistically significant in explaining the variation in wage rates. At age 25, the value of an additional year of age in terms of hourly wage rates is 3 cents, and at age 35, the value of an additional year is one cent. At age 50, an additional year in age is associated with a decrement of 2 cents in hourly wages, other things being equal. The peak earnings age is 40.65 years.

Since labor force participation by male workers tends to be continuous after initially entering the labor force while participation by females tends to be more sporadic or discontinuous, it might be argued that the age variables do not measure the same thing for male and female workers. To determine whether the relationship between the age variables and hourly wages differ significantly by sex, interaction terms (age x sex, age^2 x sex) were entered into the equation. However, neither of the terms were statistically significant.

While the health variable used in the model is only crudely specified, it is statistically significant and has a very large coefficient. A person whose health or physical condition limits the amount or kind of work he can do earns, on the average, 84 cents less in hourly wages than an individual without such a condition.

Human Capital Variables. In total the human capital variables explain 12 percent of the variation in hourly wages; this amounts to about 42 percent of the explained variation. All of the human capital variables, except the dummy variable used to denote completion of a vocational training program, are statistically significant at least at the .05 level. The value of an additional year of education, in terms of hourly wages, is 7 cents.

Completion of a vocational training program within the last five years is not related to hourly wages. However, use of the vocational training acquired is related to hourly wages. On the average, an individual who completed a vocational training program within five years of the survey period and who uses this training on his present job earns an average of 68 cents more per hour than an individual who did not complete such a program. This suggests that vocational training does not have any value unless actually used in employment.

While tenure or experience with current employer is not significant in the linear form, it is highly significant in the semilog form, indicating that the return to additional years of tenure increases at a decreasing rate. The value of one year of tenure in terms of hourly wages is 48 cents, the value of five years is 60 cents, and the value of ten years is 83 cents. The success of the logarithmic form of the variable is consistent with interpreting the tenure variable as a measure of experience on the job or of training specific to the employer. The alternative explanation is that wage increases based on seniority are institutionally determined for such purposes as maintaining morale and have no relation to productivity. The success of the logarithmic form is not necessarily inconsistent with this interpretation.

Industry Variables. As a set, the industry variables are statistically significant and explain about 5 percent of the variation in hourly wages, or about 16 percent of the explained variation. However, only three elements within the industry set are statistically significant.[5/] Other things being equal, individuals employed by textile and apparel firms, on the average, earn 42 cents more per hour than individuals employed by agricultural firms, while individuals employed by food manufacturing firms earn, on the average, 51 cents more per hour than individuals employed by agricultural firms. Individuals employed by durable manufacturing firms, on the average, earn 80 cents more per hour than individuals employed by agricultural firms, other things being equal. However, individuals employed by service firms or retail trade firms do not earn significantly more than individuals employed by agricultural firms.

Summary

The purpose of this paper was to identify some of the factors associated with the variation in the hourly wage rates among a sample of low wage workers in a rural labor market in Delaware. The model employed explains about 29 percent of the total variation in wage rates. The findings indicate that there is no single overriding factor associated with the variation in hourly wage rates. Rather, demographic

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5/ The possibility that the type of industry in which an individual is employed is correlated with his personal characteristics was considered. However, serious multicollineary did not appear to be a problem. The highest partial correlation coefficient between industry variables and personal characteristic variables was -.3036. Likewise, when the industry variables were deleted from the equation, the coefficients and standard errors of the remaining variables were not changed appreciably.

and human capital variables each explain about 12 percent of the variation and industry of employment explains about 5 percent.

The study is derived from a narrow data base and deals only with low wage workers. Nevertheless, the findings lend support to the notion that there are several potential causes of wage poverty and that these factors are independent. Some individuals earn low wages primarily because of low levels of human capital, others primarily because of disadvantaging demographic characteristics and still others primarily because of the industry in which they are employed. The relative degree of wage poverty that an individual experiences depends upon the number and combination of disadvantaging characteristics he possesses.

The diversity of factors which account for the variation in wage rates suggest the need for a broad manpower policy which includes both improving employment opportunities and improving the skills and productivity of marginal workers. However, the findings further suggest that the possibility for a labor market solution to the low wage rate problem is severly restricted by the relatively large proportion of explained variation in wage rates that is accounted for by variables which are not policy instrumental.

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