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## INTRODUCTION

The existence of lower wages in the South than in the rest of the United States has been a subject of continuing practical and scientific interest. For businessmen, union leaders, and public officials, the regional wage differential has significant implications for policy purposes. Some economists have concentrated their research on explaining the differential.<sup>1</sup> Others have found it to be of considerable value in testing economic theories and in deriving quantitative estimates of important economic relationships.

Thus, the fact that the price of labor relative to the price of capital differs between regions permits the estimation of production functions for individual industries and the calculation of elasticities of substitution between labor and capital.<sup>2</sup> Similarly, if it is true that the regional wage differential is significantly greater for unskilled than for skilled labor, it should be possible to use this information to gain insights concerning the elasticity of substitution of human capital for raw labor. Such insights would contribute to an understanding of interindustry differences in rates of change of output per man over time.<sup>3</sup> In addition to its role in the estimation of production functions, the wage differential is important in the analysis of income distribution,<sup>4</sup> population migration,<sup>5</sup> and changes in the location of manufacturing.<sup>6</sup>

<sup>1</sup>See, for example, Lowell E. Galloway, "The North-South Wage Differential," *Review of Economics and Statistics*, August 1963, pp. 265-272.

<sup>2</sup>See, for example, C. E. Ferguson, "Cross-section Production Functions and the Elasticity of Substitution in American Manufacturing Industry," *Review of Economics and Statistics*, August 1963, pp. 305-313; Jora R. Minasian, "Elasticities of Substitution and Constant Output Demand Curves for Labor," *Journal of Political Economy*, June 1961, pp. 261-270; Robert M. Solow, "Capital, Labor, and Income in Manufacturing," in *The Behavior of Income Shares*, Princeton University Press for National Bureau of Economic Research, 1964, pp. 101-128. There are many similar studies.

<sup>3</sup>Victor R. Fuchs, *Productivity Trends in the Goods and Service Sectors, 1929-61: A Preliminary Survey*, New York, National Bureau of Economic Research, 1964, p. 30.

<sup>4</sup>Frank A. Hanna, "State Per Capita Income Components, 1919-1951," *Review of Economics and Statistics*, November 1956, pp. 449-464.

<sup>5</sup>Richard A. Easterlin, "Regional Growth of Income: Long-Term Tendencies," in Simon Kuznets *et al.*, *Population Redistribution and Economic Growth, United States, 1870-1950*, Philadelphia, 1960, Vol. II, pp. 141-203.

<sup>6</sup>Victor R. Fuchs, *Changes in the Location of Manufacturing in the United States Since 1929*, New Haven, 1962.

Most previous studies of regional wage differentials have been based on gross comparisons of state income levels, or have examined wages for a few specific industries and occupations. Where wages have been calculated from actual earnings, they have frequently been based on annual earnings or annual income, or else have been limited to particular types of workers because of the absence of comprehensive data on hourly earnings. For this reason, earnings of self-employed persons and salaried employees have often been excluded from the wage comparisons. The interpretation of regional comparisons for occupations or industries has also been complicated by the difficulty of introducing such variables as age, education, color, and sex into the analysis.

Standardization for geographical differences in industry or occupation mix is one way of getting at the question of geographical differences in labor quality, but it is deficient to the extent that there are labor quality differences within the same industry or occupation.<sup>7</sup> An alternative approach to the problem is to look at such labor quality proxies as color, age, sex, and education, since it is well known that there are significant wage differentials at the national level associated with each of these variables. Table 1 summarizes these differentials in gross form; detailed tables are presented in Appendix A. It is readily apparent that differences in the composition of the labor force with respect to these variables could be an important source of geographical differentials in hourly earnings.

The purpose of this paper is to present new estimates of geographical wage differentials based on average hourly earnings of all non-agricultural persons as calculated from the *1960 Census of Population*. The availability of a 1/1,000 sample of the Census on punched cards makes it possible to standardize simultaneously for color, age, sex, and education and to investigate the relation between city size and wages along with the analysis of regional differentials.

The balance of this section describes the data and the methodology of the paper. Section 2 is concerned with regional differences in hourly earnings, in labor force composition, and in hourly earnings standardized for color, age, sex, and education. Section 3 examines the same questions for city size. In Section 4 the regional differentials

<sup>7</sup> Moreover, the statement that wages are high (or low) in a particular location because of the presence of "high paying" (or "low paying") industries does not really go to the heart of the matter. In a study of interindustry wage differentials now under way at the National Bureau, we find that the terms "high paying" and "low paying" can profitably be replaced by specifically identifying those characteristics such as color, age, sex, and education of the labor force, location, extent of unionization, and size of employer that explain nearly all of the interindustry differences in earnings. Cf. Section 6.

are adjusted for city size and the city size differential is studied holding region constant. Section 5 presents the geographical differentials by educational level, color, and sex. In Section 6 the findings are tested by multiple regression analysis across industries; this approach permits the introduction of two additional explanatory variables, extent of unionization, and size of employer. The principal conclusions are summarized in Section 7, and some suggestions are offered for further research.

TABLE 1

*Average Hourly Earnings of Nonagricultural Employed Persons,  
United States, by Demographic Characteristics, 1959*

	Dollars per Hour		Dollars per Hour
Sex		Age	
Males	2.79	14-19	1.38
Females	1.70	20-24	1.73
		25-34	2.38
Color		35-44	2.72
Whites	2.58	45-54	2.71
Nonwhites	1.61	55-64	2.62
		65 and over	2.50
Years of Schooling			
0-4	1.66	All	2.50
5-8	2.09		
9-11	2.26		
12	2.40		
13-15	2.92		
16 and over	3.96		

Source: *U.S. Censuses of Population and Housing: 1960, 1/1,000 Sample.*

A detailed description of the 1/1,000 sample and of the statistical procedures followed in preparing the wage estimates is given in Appendix A. The principal points to be made here are:

1. The population studied includes all persons who were employed

in nonagricultural industries during the Census "reference" week (varying weeks in April) in 1960, and who had some earnings in 1959. The total number of persons covered in the sample was 56,247. Persons employed in agriculture were excluded because average hourly earnings for such persons present special problems of reliability and interpretation.<sup>8</sup>

2. All such persons were grouped into 168 cells by color (two classes), sex (two classes), age (seven classes), and years of school completed (six classes). They were also grouped by region (Northeast, North Central, South, and West)<sup>9</sup> and city size (seven sizes ranging from "rural" to Standard Metropolitan Statistical Areas of 1,000,000 and over).

3. Estimates of annual hours worked were obtained for each worker by multiplying the number of weeks worked in 1959 by the number of hours worked in the Census reference week in April 1960. It is important that the multiplication of weeks by hours is done at the individual-worker level because there is a positive correlation between number of weeks worked in a year and number of hours worked in a week. Although the use of hours for a single week in a different year and inaccuracy in reporting of hours may produce considerable error for any single worker, we do not believe that any large or systematic error is present in comparisons of groups.<sup>10</sup> Because sampling errors are larger when there are few observations, measures that are based on fewer than fifty observations are so identified.

4. Annual hours and annual earnings were each aggregated across workers in each group. Average hourly earnings for the group in 1959 were estimated by dividing aggregate earnings by man-hours. These estimates are referred to as "actual" hourly earnings to distinguish them from "expected" hourly earnings, which are explained in the following paragraph. The national average hourly earnings for each of the 168 color, sex, age, and education cells are shown in Appendix Table A-1. Table A-2 shows the number of observations in each cell.

5. "Expected" earnings for each region or city size were obtained

<sup>8</sup>Hours worked and earnings are both less likely to be reliably reported by agricultural workers. Moreover, some labor income may be earned in kind (unreported), and in other cases reported earnings may include substantial returns to land and capital as well as labor income.

<sup>9</sup>Northeast: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania.

North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

South: Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, Texas.

West: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California.

<sup>10</sup>The reliability of the hours data is examined in Appendix B.

by multiplying, for each worker, the estimated number of hours worked in 1959 by the national hourly earnings rate for his particular color, age, sex, and education cell. These earnings were then aggregated and divided by the aggregate man-hours to get "expected" hourly earnings. To the extent that labor quality is associated with color, age, sex, and education, differences in average "expected" earnings across regions and city size groups measure differences in labor quality;<sup>11</sup> differences in the ratio of estimated actual earnings to "expected" earnings measure differences in wages, holding labor quality constant. The notation and definitions follow:

Let  $A$  = actual annual earnings in 1959

$K$  = number of weeks worked in 1959

$L$  = number of hours worked in Census week in April 1960

$H = K \cdot L$  = estimated hours worked in 1959

$W = A \div H$  = estimated actual average hourly earnings

$c$  = color-age-sex-education cell  $c$

$r$  = region  $r$

$u$  = U.S.

$s$  = city size  $s$

$$E_r = \frac{\sum_c H_{cr} W_{cu}}{H_r} = \text{"expected" average hourly earnings in region } r$$

$$R_r = \frac{W_r}{E_r} = \text{ratio of actual to "expected" earnings in region } r.$$

It should be noted that the differentials studied in this paper are *relative* differentials; they are obtained by dividing "actual" by "expected" earnings. It is also possible to study *absolute* differentials by subtracting expected from actual earnings. Because our primary interest is how demand for labor responds to changing wage rates, the relative differentials appear to be more relevant. If one were primarily interested in questions concerning the supply of labor, absolute differentials would be more relevant.

<sup>11</sup>Systematic differences in national hourly earnings rates by color, age, sex, and education suggest that these variables do, to some extent at least, measure labor quality. The white-nonwhite differences are probably due in part to market discrimination, but color is relevant to quality because of the likelihood that, at given levels of education, nonwhites have received poorer-quality schooling and less on-the-job training than have whites.