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UNION EFFECTS ON THE SIZE
DISTRIBUTION OF EARNINGS

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UNION EFFECTS ON THE SIZE DISTRIBUTION OF EARNINGS

By

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ABSTRACT

UNION EFFECTS ON THE SIZE
DISTRIBUTIONS OF EARNINGS

By

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There has been much work on unions' effects on relative wages, but little is said on their effects on the functional distribution and practically nothing on their effects on the size distribution.

This study is an attempt to fill this void, for several sets of microdata, to estimate the incidence of unionism and its relative wage effect by earnings class, make assumptions about the unions' effect on the incidence of periods of unemployment and about what they do to relative factor shares, then proceeds to estimate what they do to the size distribution.

The functional equation to be estimated by ordinary least squares is of the form

$$\text{Ln } E_{ij} = f\ (\text{UNION}_{ij},\ X_{ij},\ Z_{ij})$$

where: E_{ij} is the hourly earnings

$UNION_{ij}$ is the membership status

X_{ij} is the vector of demographic, industry and occupation characteristics

Z_{ij} is the vector of indicators of human capital for the ith worker in the jth earnings class

Since the observed E_j is a weighted average of union and nonunion earnings, the latter value can be determined as

$$E_j^n = E_j/(1 + UNION_j \cdot \hat{m})$$

where: $\hat{m}$ is the estimated differential due to unionism.

The mean union earnings is easily derived. For each earnings class the frequency distribution of both types of earnings can be determined and a Lorenz curve generated by a Pareto distribution of the form

$$Y = \{1 - (1-x)^{\alpha}\}^{1/\beta} \qquad 0 < \alpha, \beta \leq 1$$

is fitted over the whole range. From the estimated Lorenz curve the Gini index, as a measure of inequality, is derived for both union and nonunion earnings.

The data used are the Survey of Working Conditions, and the National Longitudinal Survey--Mature Men. The evidence suggests that the distribution of union earnings is relatively more equal than that of nonunion over a number of years.

To My Parents

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CHAPTER I

INTRODUCTION

Is a union a latter-day version of Robin-Hood's merry men striking out from local headquarters to rescue financially deprived workers? In other words, can trade unions increase the workers' share in the distribution of income at the expense of the receivers of rent, interest, and profits and then redistribute this share equitably to people at different earnings levels?

One of the basic objectives of unions is to raise relative earnings of their members. In doing so they may have gained at the expense of nonunion workers, whose money wages are depressed as labor is reallocated, rather than capital,[1] and they may have gained at the expense of weak unions. The size of this gain is difficult to ascertain, as Albert Rees states succinctly

> We tend to overemphasize the role of unions, both in . . . their own industries and . . . the economy as a whole. . . . The other two thirds may have their wages and salaries influenced by what the unions do, but I feel there are very strong independent forces on the demand side that govern their rates of pay. . . . Even in the . . . unionized [one third] there are some very weak . . . unions that have had very little to do with the wages of their members. . . .
>
> In a series of rough guesses, I would say perhaps a third of the trade unions have raised the wages of their members by 15 percent to 20 percent above what they might be in a nonunion situation; another third by perhaps 5 percent to 10 percent, and the remaining third not at all. . . . The high figures tend to be found, not in periods of inflation, but

> in periods of prosperity combined with stable prices. . . . In [an inflationary] period like 1946-1948, for example, the union people may even lag behind simply because of the rigidities involved in the collective bargaining process.[2]

Why is it that the magnitude of the effects of a successful union seems to be in the neighborhood of 10 to 20 percent rather than say, 1 or 2 percent or even 100 or 200 percent? Since the basic goal of unions is to raise wage rates, what kinds of forces limit the success of unions that temporarily achieve very large gains and drive them back toward a more usual impact on relative wages?

There are economic restraints which mitigate the impact of unionism on relative wages. The magnitude of the union effect is based on the elasticity of the demand for union labor, more specifically on the elasticity of a Marshallian derived demand. The demand is more inelastic the more essential is union labor to the production of the final product, the more inelastic the demand for the final product, the smaller the ratio of the cost of union labor to the total cost of the product, and the more inelastic the supply of the other factors of production.

In a smaller framework, the impact of the union on relative wages is the extent to which a union raises the wages of its members and the other workers for whom it bargains above the wages of comparable but unorganized workers. However, there are problems in comparing union and nonunion wages. If we compare wages in union and nonunion plants in the same industry and labor market, we may observe only small differences even where the union is effective, for nonunion employers will often be forced to raise wages if they

want to prevent the unionization of their workers. Moreover, a union wage increase will not necessarily affect the wages of nonunion workers in other industries; the effect can be in either direction. In one case the higher union wages in one industry may stimulate an increase in union wages in other industries which in turn spill over onto nonunion wages in those industries. In other cases, the effect operates through the labor market. The higher wages in the union sector will tend to check the growth of employment in that sector. This will increase the supply of labor to the nonunion sector and tend to check increases in nonunion wages.[3]

On the supply side, there are empirical limits which prevent the clear distinction between the effect of the union from the effect of other forces that contribute to wage differentials in the absence of unions.[4] For one thing, the wages of two comparable but unorganized workers having the same occupations will not usually be the same if both live in two different cities. There will almost always be some differential whose size is determined by such factors as the age and skill of the workers, working conditions, the size of the cities, the local market conditions and the area in which the cities are located.

In view of the above problems, estimates of union impact on wages cannot be regarded as exact but should give us some rough order of magnitude of the union effect. Some studies have investigated a large number of industries simultaneously, classifying them according to the degree of unionization and industrial concentration.[5] Other studies have examined intensively the effects of unions

on earnings in a single industry.[6] More recently, with the availability of microeconomic data, some studies have incorporated union status as a personal characteristic into the wage equation.[7] Furthermore, there are specialized studies on the impact of public unions on the wages of firefighters[8] and public school teachers.[9]

In summary, all the studies mentioned concentrate on improving the estimates of union-nonunion relative wages differential for various sectors of the economy without examining the effects of unionization on labor's share. Johnson and Mieszkowski[10] and Diewert[11] have attempted to analyze the impact of unions on the distribution of income and have shown, via a general equilibrium approach, "that most, if not all, of the gains of union labor are made at the expense of nonunionized workers, and not at the expense of earnings on capital."[12] What is then the union effect on the size distribution?

Freeman,[13] in an unpublished paper, measures inequality in the general distribution of wages by using both the standard deviation in the logarithms and the coefficients of variation. This technique is applied to the wages of unionized and nonunionized workers in both the manufacturing and nonmanufacturing sectors, while at the same time controlling for individual characteristics. The crux of Freeman's paper is a test of the standardization hypothesis whereby collective bargaining tends to equalize wage rates across establishments, replace personal rates with formal job rates within plants and reduce white collar-blue collar differentials in

enterprises. Results show that unionism reduces dispersion of wages within the organized sector; and by more than offsetting the increase in dispersion of earnings across industries, unionism reduces inequality on net.

The present study is an attempt to put forth another method of measuring relative inquality due to unionism and, for two sets of microdata, to estimate the incidence of unionism by wage levels and its relative effect, to make assumptions about the unions' effect on the incidence of periods of unemployment and about what they do to relative earnings shares, then proceed to estimate what they do to the size distribution.

The functional equation to be estimated by ordinary least squares is of the form

$$LnE_i = f\ (Union_i,\ X_i,\ Z_i) \qquad (1)$$

where: E_i is the average hourly earnings
$Union_i$ is membership status
X_i is the vector of demographic, industry, and occupation characteristics
Z_i is the vector of indicators of human capital for the ith worker.

Since the observed average hourly earnings E_i is a weighted average of union and nonunion earnings, the latter value can be determined as follows:

$$E_i = \text{Union}_i \cdot E_i^u + (1 - \text{Union}_i)\, E_i^n \qquad (2)$$

then $$E_i^N = E_i/(1 + \text{Union}_i \cdot \hat{m}) \qquad (3)$$

where: $\hat{m}$ is the estimated percentage diffential due to unionism

The average union earnings is easily derived from equation (2). For each earnings class the frequency distribution of both types of earnings can be determined on a Lorenz curve generated by a Pareto distribution of the form

$$Y = [1 - (1 - x)^{\alpha}]^{1/\beta} \qquad 0 < \alpha, \beta \leq 1 \qquad (4)$$

fitted over the whole range. From the estimated Lorenz curve, the Gini coefficient, as a measure of inequality, is derived for both union and nonunion earnings.

The plan of this dissertation is as follows: Chapter II discusses the theoretical approach to the determination of union and nonunion earnings by earnings brackets and hence the union effect on size distribution. Chapter III provides an investigation into the 1969-1970 National Survey of Working Conditions. The nature of the data allows not only control of personal characteristics, but also of nonpecuniary aspects of the place of work on the determination of hourly earnings. Chapter IV analyzes the National Longitudinal Survey of Men 45 to 59 years of age and takes into consideration problems which are specific to this group of respondents. In Chapter V the sample of mature men is disaggregated into manufacturing and nonmanufacturing sectors and further subdivided into

blue collar and white collar occupations. A reconciliation of results obtained from the Survey of Working Conditions and the National Longitudinal Survey is presented in Chapter VI along with a synthesis of this study.

FOOTNOTES: CHAPTER I

[1]In the long run the employer will tend to substitute capital for labor.

[2]Albert E. Rees, Wage Inflation (New York: National Industrial Conference Board, 1957).

[3]Albert E. Rees, The Economics of Work and Pay (New York: Harper and Row, 1973), p. 74.

[4]Ibid.

[5]See Arthur M. Ross, "The Influence of Unionism upon Earnings," Quarterly Journal of Economics 62 (February 1948): 263-286; Harold M. Levinson, Unionism, Wage Trends, and Income Distribution (Ann Arbor: University of Michigan Press, 1951); and H. Gregg Lewis, Unionism and Relative Wages in the United States (Chicago: University of Chicago Press, 1963). Lewis' estimate that unions had raised the average wage rate of union workers by 10 to 15 percent above that of nonunion workers in the period 1957-58 has served as a benchmark for further study. More recent studies are by the following: Adrian W. Throop, "The Union-Nonunion Wage Differential and Cost Push Inflation," American Economic Review 58 (March 1968): 79-99; Sherwin Rosen, "Trade Union, Power, Threat Effects and the Extent of Organization," Review of Economic Studies 36 (April 1969): 185-196; Sherwin Rosen, "Unionism and the Occupational Wage Structure in the United States," International Economic Review 11 (June 1970): 269-286; and Orley Ashenfelter and George E. Johnson, "Unionism, Relative Wages, and Labor Quality in U. S. Manufacturing Industries," International Economic Review 13 (October 1972): 488-508.

[6]See Stephen P. Sobotka, "Union Influence on Wages: The Construction Industry," Journal of Political Economy 61 (April 1953): 127-143; Joseph Scherer, "The Union Impact on Wages: The Case of the Year-Round Hotel Industry," Industrial and Labor Relations Review 9 (January 1956): 213-244; Melvin Lurie, "The Effect of Unionization on Wages in the Transit Industry," Journal of Political Economy 69 (December 1961): 558-572; and Victor R. Fuchs, The Service Economy (New York: National Bureau of Economic Research, 1968).

[7]See Leonard Weiss, "Concentration and Labor Earnings," American Economic Review 56 (March 1966): 96-117; Frank Stafford, "Concentration and Labor Earnings: Comment," American Economic Review 58 (March 1968): 174-180; Michael J. Boskin, "Unions and Relative Real Wages," American Economic Review 62 (June 1972): 466-472; Peter Schmidt and Robert P. Strauss, "The Effect of Unions on Earnings and Earnings on Unions: A Mixed Logit Approach," International Economic Review 17 (February 1976): 204-212; Lawrence M. Kahn, "Union Impact: A Reduced Form Approach," Review of Economics and Statistics 54 (November 1977): 503-507.

[8]See Orley Ashenfelter, "The Effect of Unionization on Wages in the Public Sector: The Case of Fire Fighters," Industrial and Labor Relations Review 24 (January 1971): 191-202; and Ronald G. Ehrenberg, "Municipal Government Structure, Unionization, and the Wages of Fire Fighters," Industrial and Labor Relations Review 27 (October 1973): 36-48.

[9]See Hirschel Kasper, "The Effects of Collective Bargaining on Public School Teachers' Salaries," Industrial and Labor Relations Review 25 (October 1970): 57-72; and David B. Lipsky and John E. Drotning, "The Influence of Collective Bargaining on Teachers' Salaries in New York State," Industrial and Labor Relations Review 27 (October 1973): 18-35; also Daniel S. Hamermesh, "The Effect of Government Ownership in Union Wages," in Labor in the Public and Nonprofit Sectors, ed: Daniel Hamermesh (Princeton: Princeton University Press, 1975).

[10]Harry G. Johnson and Peter Mieszkowski, "The Effects of Unionization on the Distribution of Income: A General Equilibrium Approach," Quarterly Journal of Economics 84 (November 1970): 539-561.

[11]W. E. Diewert, "The Effects of Unionization on Wages and Employment: A General Equilibrium Analysis," Economic Inquiry 12 (September 1974): 319-339.

[12]Gary S. Becker and Barry R. Chiswick, "Education and the Distribution of Earnings," American Economic Review 56 (May 1966): 358-369.

[13]Richard B. Freeman, "Unionism and the Distribution of Labor Incomes," Working paper, Harvard University and National Bureau of Economic Research (September 1977).

CHAPTER II

THEORETICAL FRAMEWORK

2.1 Introduction

Myriad studies have been carried out pertaining to the effects of labor organization on the relative union-nonunion earnings differential, but only one has tackled the problem of size distribution. What this study proposes is to look at each decile level of the earnings spectrum and use the overall estimated union relative effect to determine both the union and nonunion earnings while incorporating the incidence of unionism at each decile. The resulting union shares provide a basis for comparison of the size distributions.

2.2 Unionism and Relative Wages

It has been shown that union wage is higher than nonunion wage. H. G. Lewis[1] estimated this relative difference in the order of 10 to 15 percent while subsequent studies demonstrated an effect of anywhere from 5 to 30 percent for various industries and occupations. Assume that the proportionate wage advantage of the union over the nonunion worker is constant and is defined as

$$m = \frac{W_u - W_N}{W_N} = \frac{W_u}{W_N} - 1 \qquad (5)$$

where: W_u and W_N are the union and nonunion wage rates.

It follows that

$$\ln W_u = \ln W_N + \ln (1 + m) \tag{6}$$

Rosen[2] pointed out that most studies fail to take into account the union threat effect, hence published results may be misleading if there were significant externalities. There are two types of externality: the threat of unionism may induce nonunion employers to raise wages above the level of competitive wage in an effort to avoid unionism. On the other hand, nonunion wage may be bid below what they otherwise would have been by workers displaced from the union sector.[3] Letting W_c be the competitive wage rate, then the changes induced in the nonunion wage may be represented by[4]

$$D = \frac{W_N - W_c}{W_c} = \frac{W_N}{W_c} - 1 \tag{7}$$

It follows that:

$$\ln W_N = \ln W_c + \ln (1 + D) \tag{8}$$

The mean wage received by workers in a given industry is a weighted geometric average of union and nonunion wage rates. Its logarithmic form is

$$\ln W = U \ln W_u + (1-U) \ln W_N \tag{9}$$

where: U is the fraction of workers who are union members.

Substituting equation (8) into (6) then into (9), we obtain

$$\ln W = U \ln (1 + m) + \ln W_c + \ln (1 + D) \qquad (10)$$

Thus the observed wage rate is some competitive wage level affected by unionism and influenced by labor market conditions.

2.3 Determinants of Competitive Wages

In practice, labor is not homogeneous, so the equilibrium wage rate will depend on the quality of the workers in the industry. In the human-capital theory of income distribution developed by Becker,[5] Mincer,[6] and Becker and Chiswick[7] the observed differentials in earnings across individuals are hypothesized to result from differentials in investments in productivity-augmenting capital. Investments in human capital may take many forms, including formal schooling, on-the-job training, health, migration and search. However, the major determinant of quality differences is the average extent of investment in schooling and on-the-job training. Since investments and rate of depreciation do not follow a linear pattern over the worker's life time,[8] the net earnings function is parabolic. Such a function is specified by Mincer[9] via a Taylor expansion of a quadratic approximation. The general functional form is:

$$\ln W_{Ci} = f(\text{Schooling}_i, Z_i) \qquad (5)$$

where: Z_i is the vector of worker characteristics such as experience and on-the-job training.

Equation (5) can be rewritten in the estimating form as:

$$\ln W_{Ci} = b_0 + b_1 \text{Schooling}_i + b_2 Z_i + v_i \qquad (6)$$

where: v_i is a random disturbance term.

Positing X_i as a variable which encompasses such factors as non-pecuniary aspects of work, location, and other industrial characteristics, the specification of which will be taken up in subsequent chapters, and substituting (6) into (4), we obtain the following estimating equation:

$$\ln W_i = b_0 + \alpha_1 U_i + b_1 \text{Schooling}_i + b_2 Z_i + b_3 X_i = \varepsilon_i \qquad (7)$$

where: $\varepsilon_i = v_i + \ln(1 + D_i)$ and $\alpha_1 = \ln(1 + m)$.

The goal is to estimate the b_j and α_1 by ordinary least squares regression with the assumption that $\text{Cov}(U_i, \varepsilon_i) = \text{Cov}(\text{Schooling}_i, \varepsilon_i) = \text{Cov}(Z_i, \varepsilon_i) = 0$.[10]

2.4 Earnings Shares

Consider a spectrum of income levels classified by deciles. Let $p = 1, 2, \ldots, s$ by the different decile levels. Then for the pth decile, the level of earnings can be determined as:

$$E_p = \sum_{i=1}^{N - N/10} E_i, \quad p = 1, 2, \ldots, s \qquad (14)$$

where: E_i is the individual average hourly earnings in the first decile.

The total earnings in the first decile may be written as:

$$E_1 = \sum_{i=1}^{N - N/10} E_{Ni} + \sum_{i=1}^{N - N/10} E_{ui} \qquad (15)$$

where: E_{Ni} and $E_{u1} + (1 - U_1)\overline{E}_{N1}$ are the nonunion and union earnings.

However, the observed average earnings for the first decile is a geometric weight average of the form.

$$\overline{E}_1 = U_1 \overline{E}_{u1} + (1 - U_1)\overline{E}_{N1} \qquad (16)$$

where U_1 is the proportion of persons in the first decile who are union members.

Since earnings of unionized workers are higher by a proportion m than those of unorganized workers, the average earnings become[11]

$$\overline{E}_1 = \overline{E}_{N1} (1 + U_1 m) \qquad (17)$$

or $$\overline{E}_{N1} = \overline{E}_1/(1 + U_1 m) \qquad (18)$$

and from (16), one can obtain

$$\overline{E}_{u1} = (\overline{E}_1 - \overline{E}_{N1}/U_1) + E_{N1} \qquad (19)$$

It is then possible to analyze the two distributions generated by unionization and by the absence of unionization from knowing the incidence of unionism and the incidence of

unionism for each decile and the union-nonunion earnings differential derived from the overall sample.[12]

2.5 Measures of Inequality and Functional Forms for the Lorenz Curve

Inequality comparisons between two frequency distributions generated by the cumulative shares of union and nonunion earnings may be carried out by graphing their respective Lorenz curves. The measures of inequality that have been proposed in the economic literature have concentrated on some objective statistical measures of relative variation of earnings such as the variance, the coefficient of variation, the Gini coefficient of the Lorenz curve, with no very explicit reason being given for preferring one measure rather than another.[13] Dalton[14] and Atkinson[15] argued that one should approach the question by considering directly the form of the social welfare function to be employed, i.e., a normative notion of social welfare so that a higher degree of inequality corresponds to a lower level of social welfare for a given total income. However, Sen[16] points out that it is possible to argue that there are some advantages in taking the objective approach so that "one can distinguish between (a) seeing more or less inequality, and (b) valuing it more or less in ethical terms." Furthermore, Sen cautions that "comparing alternative income distributions among a large number of people, it becomes very difficult to speak of inequality in a purely objective way, and the measurement of the inequality level could be intractable without bringing in some ethical concepts."[17]

One strategy is to use all measures of inequality. The coefficient of variation, which is simply the square root of the variance divided by the mean earning level, captures the property of being sensitive to earnings transfers for all earnings levels. However, this measure suffers from a methodological drawback, since the difference of each earnings level is measured from the overall mean only, which might not be the average earnings of each individual. The second measure, the standard deviation of logarithms, tends to soften the blow in reflecting inequality, since it lessens the deviation from the mean through a logarithmic transformation. On the other hand, it attaches greater importance to earnings transfers at the lower end than at the upper end. Another way of measuring relative inequalities in the distribution of income is through the computation of the Gini coefficient. In a Lorenz diagram the Gini coefficient is the ratio of the area between the line of perfect equality (diagonal) and the Lorenz curve to the total area under the diagonal. Equivalently the Gini coefficient can be determined as one minus twice the area under the Lorenz curve. The smaller the value of the Gini coefficient, the more equal is the size distribution and the closer the Lorenz curve is to the line of perfect equality. This study will attempt to use the Gini coefficient as a measure of inequality and to estimate a new coordinate system for the Lorenz curve that would fit actual data reasonably well.

The Gini coefficient is not without drawbacks. One problem stems from the curvature of the Lorenz curve. Approximation by

straight lines suffers from lack of accuracy due to the technical limitation in providing enough discrete segments. More importantly, two Lorenz curves may intersect, making comparison of the resulting Gini coefficients difficult at best. First, there may not be much difference in magnitude between the two sets of coefficients. Second, given the magnitude, there may be difficulty in telling which coefficient is more significant than the other, or whether either is significant. In other words, it is not possible to state with any measure of certainty that one ratio is smaller than the other one, since the cumulative distributions do not lie everywhere above another. In this case, the sets of Lorenz curves are not definitely distinguishable in a mathematical sense. If two Lorenz curves cross we can always find two functions that will rank them differently, i.e., the ranking is not complete.[18] This study provides an estimating equation for the Lorenz curve with the help of which an accurate estimation of the Gini coefficient is possible.

The Lorenz curve is defined as the relationship between the cumulative proportion of earnings and the cumulative proportion of earners. Restrictions on this relationship postulate that the curve falls below the equality line, the slope of the curve increases monotonically, and is zero at the point (0,0) and tends to infinity at the point (1,1). Taking these restrictions into consideration, Rasche, et al.[19] propose a new functional form of the Lorenz curve which appears to fit their data well.

Let p_j be the cumulative percentage earned by all individuals having wages below the upper limit of the decile j and let q_j be the cumulative percentage of earnings received by the same individuals. The Lorenz curve is then the graphical representation of the parametric relationship between q and p. Rasche, et al.[20] propose the following functional form:

$$q_j = [1 - (1 - p_j)^{\alpha}]^{1/\beta} \tag{20}$$

where: α and β are the parameters to be estimated, and $0 < \alpha, \beta \leq 1$.

The first characteristic of this functional form is that it includes the Lorenz curve specification corresponding to the Pareto distribution of income as the special case of $\beta = 1$, $\alpha < 1$.[21] Second, the equality line $q = p$ is generated by the case $\alpha = \beta = 1$. Furthermore, the function is continuous and is twice differentiable and possesses the proper corvexity and slope constraints proposed by Kakwani and Podder.[22]

The Gini coefficient is derived as follows:

$$G = 1 - 2 \int_0^1 [1 - (1 - p)^{\alpha}]^{1/\beta} \, dp \tag{21}$$

Using the transformation of variables, $\mu = (1 - p)^{\alpha}$

$$G = 1 - \frac{2}{\alpha} \int_0^1 (1 - u)^{1/\beta} \, \mu^{1/\alpha - 1} \, du \tag{22}$$

or $$G = 1 - \frac{2}{\alpha} B\left(\frac{1}{\alpha}, \frac{1}{\beta} + 1\right) \tag{23}$$

where: $B\left(\frac{1}{\alpha}, \frac{1}{\beta} + 1\right)$ is the Beta distribution.

Given estimates of α and β the Gini coefficient can be easily obtained from either standard tables or generally available computer subroutines.

Let $\hat{\alpha}$ and $\hat{\beta}$ be the consistent estimates of α and β respectively, then the asymptotic variance of an estimate of Gini coefficient based on equation (23) will be

$$\text{Var}(G) = \left(\frac{\partial G}{\partial \alpha}\right)^2 \text{Var}(\hat{\alpha}) + \left(\frac{\partial G}{\partial \beta}\right)^2 \text{Var}(\hat{\beta}) + 2\left(\frac{\partial G}{\partial \alpha}\right)\left(\frac{\partial G}{\partial \beta}\right) \text{cov}(\hat{\alpha}, \hat{\beta}) \tag{24}$$

where: $$\frac{\partial G}{\partial \alpha} = \frac{2}{\alpha^3}\left[\alpha + \Psi\left(\frac{1}{\alpha}\right) - \Psi\left(1 + \frac{1}{\alpha} + \frac{1}{\beta}\right)\right] B\left(\frac{1}{\alpha}, \frac{1}{\beta} + 1\right) \tag{25}$$

$$\frac{\partial G}{\partial \beta} = \frac{2}{\alpha\beta^2}\left[\Psi\left(\frac{1}{\beta} + 1\right) - \Psi\left(1 + \frac{1}{\alpha} + \frac{1}{\beta}\right)\right] B\left(\frac{1}{\alpha}, \frac{1}{\beta} + 1\right)$$

where: $\Psi\left(\frac{1}{\alpha}\right)$ is the Euler's psi function which can be numerically computed by making use of the following relationship:

$$\Psi\left(\frac{1}{\alpha}\right) - \Psi\left(1 + \frac{1}{\alpha} + \frac{1}{\beta}\right) = \sum_{k=0}^{\infty} \left(\frac{1}{1 + \frac{1}{\alpha} + \frac{1}{\beta}} - \frac{1}{\frac{1}{\alpha} + k}\right) \tag{26}$$

Thus, if the variances and co-variances of estimates of α and β are known, the standard error of the Gini coefficient based on equation (23) can be computed. The existence of the asymptotic standard errors provides us some basis for statistical test of significance of the difference between Gini coefficients.

CHAPTER II: FOOTNOTES

[1]H. Gregg Lewis, Unionism and Relative Wages in the United States (Chicago: University of Chicago Press, 1963).

[2]Sherwin Rosen, "Trade Union, Power, Threat Effects and the Extent of Organization," Review of Economic Studies 36 (April 1969): 185-196.

[3]Also,wages of union members will be rendered higher by unionization of others in the same industry or closely related industries. See Albert R. Rees, The Economics of Work and Pay (New York: Harper and Row, 1973); H. Gregg Lewis, Unionism and Relative Wages in the United States (Chicago: University of Chicago Press, 1963); Sherwin Rosen, "Trade Union, Power, Threat Effects and the Extent of Organization," Review of Economic Studies 36 (April 1969): 185-196; Orley Ashenfelter, "The Effect of Unionization on Wages in the Public Sector: The Case of Fire Fighters," Industrial and Labor Relations Review 24 (January 1971): 191-202; for discussions on this problem.

[4]This approach is found also in studies for sex discrimination in wages. See Ronald Oaxaca, "Male-Female Wage Differentials in Urban Labor Markets," International Economic Review 14 (October 1973): 693-709; also "Sex Discrimination in Wages," in Discrimination in Labor Markets, ed.: Orley Ashenfelter and Albert Rees (Princeton: Princeton University Press, 1973) for a detailed analysis.

[5]Gary S. Becker, Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education (New York: National Bureau of Economic Research, 1964); also Human Capital and the Personal Distribution of Income: An Analytical Approach, Woytinsky Lecture No. 1 (Ann Arbor: University of Michigan, 1967).

[6]Jacob Mincer, "The Distribution of Labor Incomes: A Survey with Special Reference to the Human Capital Approach," Journal of Economic Literature 8 (March 1970): 1-26; also Schooling, Experience and Earnings (New York: National Bureau of Economic Research, 1974).

[7]Gary S. Becker and Barry R. Chiswick, "Education and the Distribution of Earnings," American Economic Review 56 (May 1966): 358-369.

[8]See Yoram Ben-Porath, "The Production of Human Capital and the Life Cycle of Earnings," Journal of Political Economy 75 (August 1967): 352-365 for a detailed analysis.

[9]Jacob Mincer, "The Distribution of Labor Incomes: A Survey with Special Reference to the Human Capital Approach," Journal of Economic Literature 8 (March 1970): 1-26; also Schooling, Experience and Earnings (New York: National Bureau of Economic Research, 1974).

[10]Orley Ashenfelter and George Johnson, "Unionism, Relative Wages, and Labor Quality in U. S. Manufacturing Industries," International Economic Review 13 (October 1972): 488-508 relax this assumption and posit, instead, that U_i and Schooling_i are endogenous.

[11]The truncation of the sample by deciles does not allow a least squares estimation technique to provide an unbiased and consistent estimate of m_p for each p^{th} decile. The problem can be alleviated by using nonlinear regression, maximum likelihood estimation and an instrumental variable technique. Another way is to use values of X for which the expected value of Y given X is well below the truncation point. See David L. Crawford, "Estimating Earnings Functions from Truncated Samples," Discussion paper, Institute for Research on Poverty, University of Wisconsin, Madison, July 1975 and Jerry A. Hausman and David A. Wise, "Social Experimentation Truncated Distributions, and Efficient Estimation," Econometrica 45 (May 1977): 919-938 for details.

[12]By using $\hat{m}$ instead of $\hat{m}_p$, the p^{th} decile union nonunion differential, in the determination of earnings components, we mitigate the problem of workers being pushed into a higher bracket while others are pulled down as unionism may have different degrees of influence along the earnings range. For example, regression equations encompassing binary explanatory variables for the different deciles show union-nonunion earnings differentials of -4.4 percent to 0.0 percent in the lower deciles and about 2.3 percent to 3 percent in the higher deciles, with a drastic decline of -13.0 percent in the highest earnings bracket. The negative sign implies that nonunion wages are higher than union wages.

[13]A. B. Atkinson, "On the Measurement of Inequality," Journal of Economic Theory 2 (September 1970): 244-263.

[14]Hugh Dalton, "The Measurement of the Inequality of Incomes," Economic Journal 30 (September 1920): 348-361.

[15]Atkinson, op. cit.

[16]Amartya Sen, On Economic Inequality (Oxford: Clarendon Press, 1973).

[17]Ibid., p. 3.

[18]A rigorous mathematical treatment can be found in Atkinson, op. cit., and Sen, op. cit.

[19]Robert Rasche, J. Gaffney, A. Koo, and N. Obst, "Functional Forms for Estimating the Lorenz Curve," Working Paper No. 7706, Department of Economics, Michigan State University, February 1978.

[20]Ibid.

[21]Nanak C. Kakwani and N. Podder, "On the Estimation of Lorenz Curves from Grouped Observations," International Economic Review 14 (June 1973): 278-291.

[22]Ibid.

CHAPTER III

THE NATIONAL SURVEY OF WORKING CONDITIONS

3.1 Introduction

In this chapter we investigate data provided by the National Survey of Working Conditions. The survey was conducted in November and December, 1969, and January 1970 by the Survey Research Center of the Institute for Social Research, the University of Michigan. It covers 1533 self-employed and salaried men and women, each with 660 variables of information regarding their actual job situations and areas affected by the job. This study selects a sample of 1238 individuals 16 to 65 years old who are fully employed and whose weekly working hours are less then 70 hours. The natural logarithm of average hourly earnings is regressed on 24 relevant variables gleaned from the 660 variables provided by the survey. Most of these variables are of qualitative nature. There are four broad categories of variables summarizing population and regional characteristics, occupational characteristics, human capital and working conditions. The variables comprising the latter category are unique to this sample.

3.2 Explanatory Variables

3.2.1 Population Characteristics

It is an observed fact that women in general earn less than men, and blacks and some other minority groups earn less than whites. The causes of these differentials are complex. In part they arise from current discrimination in the labor market and in part are themselves the result of past discrimination in the labor market and in education or training opportunities.[1] Since it is a violation of federal laws to pay lower wage rates to women and blacks for the same job in the same work place than to other workers, the most common form of discrimination is to deny them employment in jobs for which they are qualified or demand higher qualifications for the same wage as others. Hence, minorities will be overrepresented in the work forces of the employer who pays the lowest wage within an occupation. Moreover, employers frequently prefer minorities for certain kinds of jobs because the limited options available to blacks and women and their concentration in certain occupations make them dependable sources of labor. Stereotypes are thus developed.[2] On the other hand, the clustering of minorities within certain occupations has the effect of further depressing relative wages and reinforcing employers' profit motives to hire blacks, for example, where all-black work forces can be employed for less than white work forces.

In consideration of the above, for each of the sex and race characteristics, dummy variables are used, one for being female or

black, zero otherwise. A negative relationship between earnings and these variables is expected.

3.2.2 Regional Characteristics

Economic theory has asserted that income differentials between areas would induce migration flows, and all of the evidence suggests that this indeed has occurred. But the theory also predicts that in the long run, the migration of labor, accompanied by a reverse migration of capital, will bring the incomes of different areas into equality. Nothing of that nature has occurred. Classical theory deals only with a system in equilibrium that is disturbed by a once-and-for all shock, whereas most disequilibria are not instigated by single events. The growth of industrial societies has stimulated urbanization, tended to require a broad range of skills and professional competence, to create increasing levels of general education, to restricture the work forces, to meet new labor and management requirements. These and other characteristics create more disparity in wages between urban and rural areas, northern and southern regions.

To capture these discrepancies, two binary variables, representing large urban areas and southern regions, are incorporated into the earnings function. From the sample under study, 34 percent of individuals report themselves to be living in large size SMSAs with a population of 750,000 and above, while 24 percent of respondents are from the South. Coefficients for the two variables should

show higher earnings in urban areas and lower earnings in the South relative to rural and other geographical areas.

3.2.3 Occupational Characteristics

One's earnings depend on one's occupation. Occupational differentials reflect differences among workers in levels and types of skills and in conditions of work. Rees[3] points out that in the very short run, supply is inelastic and largely determines the number of people in the occupation, while demand determines their wage. With time and better information on the perspective of training costs, with firmer establishment of tastes and expected earnings, the number of qualified people will increase. Thus, in the long run, the supply of labor to an occupation could be highly elastic. However, even assuming a perfectly competitive market, occupational differentials still remain. The advantages of an occupation include not only the salary and any amenities attached with it, but also the prestige, status and satisfaction which are derived from it. Hence, there should be a job-related premium in order to compensate for an occupation which is unpleasant and which is held in low esteem.[4] The subject of nonpecuniary compensation will be taken up in a later section.

One component of occupational wage differentials is due to rents from scarce natural talents. Clearly, the earnings of a Nobel laureate include rents which make up all of the differences in earnings between him and the average member of the profession. With the advent of industrialization and the stronger and wider emphasis

on acquiring a skill through training and education, a major component of earnings differentials is the return on investment in acquiring the skills. The private costs of the training needed to obtain skills must be recouped over the worker's working life with a rate of return equal to that of other equally risky investments or equal to the subjective rate of discount used by each individual in making his initial decision. In order to make sure of receiving the "just and fair" pecuniary compensation,members of certain professions have erected barriers to entry for the express reason of controlling the number of entrants and thus decreasing the elasticity of supply. This is the raison d'être of almost all license boards, guilds, craft unions and the like.

In view of the above facts, this study has included in the earnings equation dummy variables which describe workers falling in the occupational categories of professionals, clerical, craftsmen, operatives, and service occupation. Some interactive variables are also included to take into consideration the barriers to entry created by unions.

3.2.4 Human Capital

It would be redundant to talk about the effect of training and education on earnings differentials in this section, but it should be relevant to point out that up to this point the term "training" and "educational level" are too general and do not entail any measure of the length of time involved in those processes. In contrast, human capital models point out individual investment

behavior as a basic factor in earnings differentials. Further, and most importantly, the model takes the length of training as the basic source of heterogeneity. J. Mincer[5] points out that training increases productivity and thus raises the real wage, but the time spent in training necessitates postponement of earnings to a later age. The various amounts of training are undertaken in the hope that future earnings are sufficiently large to compensate for the cost of training, mainly the foregone earnings. From these simple assumptions, Mincer,[6] Chiswick,[7] Becker,[8] and Ben-Porath[9] have expanded the human capital model to account for some qualitative features of observed distributions of earnings such as the life-cycle hypothesis and the optimization of earnings over time.

Closer to this paper's concern is the correlation between earnings and investment in human capital. Empirical results show that the goodness-of-fit, measured by the coefficient of determination, is highest for individual earnings when schooling and experience variables are incorporated in a parabolic earnings profile in logarithm.[10] The schooling variable is the number of years of school the individual has completed, while the experience variable is the person's age at his last birthday minus the years of schooling minus the first six years of his life. To take into account diminishing returns on investment, the experience variable is employed as a quadratic, reflecting the nonlinearity of the earnings function. The sign of the coefficient of the squared term is expected to be significantly negative.

3.2.5 Working Conditions

Adam Smith[11] argued that the wage should reflect compensation for unpleasant jobs or for jobs held in low esteem. It is not only compensation for opportunities foregone, but also it should cover the psychic, and in some instance, the physical cost of holding a job. A pictorial example of occupational hazards is the tribulation of Charlie Chaplin in Modern Times, where an assembly line worker, despite the simplicity of such task as tightening bolts, could be severely affected mentally and physically on and off a job that is so repetitious and fast-paced. Hence, besides the North-South difference, rural versus urban zones, the lack and length of training, earnings differentials can be explained by the nonpecuniary aspects of the jobs.

Assuming that the marginal rate of substitution between pecuniary and nonpecuniary returns diminishes with income, the question is how much an individual worker is willing to pay for more and more pecuniary goods in order to keep him on the same indifference curve. To answer this question, Rosen[12] states that workers operating within the confines of a budget constraint will tend to pay for fewer pecuniary goods if kept at a lower preference level. Workers' indifference maps reflect tastes. On the other hand, firms do supply the nonpecuniary benefits. Operating under increasing long run marginal cost, firms require a higher proportion of pecuniary returns, namely market price, in order to produce more nonpecuniary benefits. Thus the firm will have to be at a higher

isoprofit curve. For a given market price, the higher profit firm will provide more of the nonpecuniary goods. The price which clears the market is the locus of equilibrium points between the isoprofit and indifference maps. R. E. B. Lucas[13] attempts to test this hypothesis by including in the wage equation proxies for nonsedentary, hazardous, repetitive and supervisory aspect of jobs. His results were mixed, except for the "repetitive" variable which significantly explained a small percentage of the increase in the wage.

Expanding on the hypothesis that differential wages are due to nonpecuniary aspects of occupation, this thesis attempts to view work pace and work scheduling as substitutes for individual skills. The heterogeneity of the labor pool forces an employer to use certain work requirements, especially work pace, as a screening device for identifying productive workers.[14] Technological innovations and mass production have transformed the idyllic Smithian pin shop into a cobweb of assembly lines along which workers produce more output at faster speed. Those workers who are able to race at the prescribed speed are judged to have superior ability and are compensated accordingly. Higher wages then induce people to work under higher "speed" or harder working conditions, and, at the same time increase their desire to move toward a less hectic, more leisurely occupation which in essence requires a higher educational attainment. On the other hand, excessively harsh working conditions, in the eyes of the involved worker, create an atmosphere which is conducive toward union organization. The latter represents a mechanism for

mitigating the problems of the work place. Giving support to this hypothesis, Duncan and Stafford[15] show that higher earnings of union members reflect in part nonpecuniary benefits rather than rents.

In the sample under study, proxies for working conditions came from respondents' description of their jobs. Solicited descriptions of jobs have the following format. "A job that requires that you work very fast. Would you say this is a lot like your main job, somewhat like your main, a little like your main job, or not at all like your main job?" The subjective answers are incorporated into a binary variable. For those respondents who claim that their jobs are a lot, somewhat, or a little like the description, the variable is assigned a value one and zero otherwise. Similarly, binary explanatory variables are also used for jobs which require hard work and physical effort, and for jobs which allow some degree of freedom on how the task is performed. Moreover, to take into account the previous proposition that, besides the intellectual skill provided by formal schooling, physical skill may cause, at least in the short run, large wage differences, another binary variable is included in the earnings equation for jobs which are described as requiring some "high degree of skill."

3.3 Estimation

The basic equation is a regression of the natural logarithm of average hourly earnings on a set of dummy variables representing population characteristics, human capital indicators, industrial and occupational characteristics. Separate regressions were run to

allow for interactions between union membership and industry, as well as between union membership and occupation. The general form of the equation is as follows:

$$\ln E_i = f\,(\text{Union}_i, \text{Experience}_i, \text{Experience}_i^2, \text{Education}_i, \text{Female}_i, \text{Black}_i, \text{Urban}_i, \text{South}_i, \text{Working Conditions}_i, \text{Industry}_i, \text{Occupation}_i) \qquad (27)$$

where: E_i is the average hourly earnings received by the ith worker.

Other continuous variables are education, i.e., the years of schooling completed, and experience (which is Age-Education-6). Measured as dummy variables are union status, female, black, urban, south, working conditions, industry and occupation. Variables which encompass working conditions are: FAST WORK, FREEDOM, SKILL, HARDWORK, PHYSICAL WORK. The Variable FREEDOM is used to describe "A job that allows you a lot of freedom as to how you do your work." In other words, FREEDOM is not meant to describe idleness or free time on the job, but it is a proxy for a job which provides responsibility to the holder. The other working conditions variables are self-explanatory. Industry variables are construction, manufacturing, transportation, wholesale and retail trade, finance and service. Occupation variables are professionals and managers, clerical, craftsman, operatives and service workers. The reference group subsumed in the constant is a nonunionized white worker not residing in the south and holding a farming job.

3.4 Empirical Results

Table 3.1 gives the results of the least-squares estimation of equation (27). In column 1 estimated coefficients for the relevant variables are presented, while in column 2 estimates of the interactions between unionism on the one hand and industry and occupation on the other hand are introduced. Columns 3 and 4 tabulate regression results for the blue-collar and white-collar workers samples. Estimates are classified by subgroups such as working conditions, industries, occupations and union interactions.

The value of the adjusted R^2 is relatively high given the nature of the data set. For 1237 observations, the adjusted R^2 is about .53. As expected, the estimated coefficients for human capital indicators and individual characteristics have the theoretically correct sign and are highly significant. In the overall sample (column 1) the experience variable contributes, with significant diminishing returns, about 5.1 percent to the explanation of the variations in earnings given all other regressors.[16] This contribution drops to 4.7 percent in the blue-collar workers sample, but increases drastically up to 88.4 percent in the white-collar workers sample (column 3 and 4 respectively). At the same time the education variable contributes about 8.7 percent to the explanation in earnings for the overall sample, while it is 5.8 percent for the blue collar sample and 10.7 percent for the white collar sample. This result reinforces the notion that formal schooling and post-schooling

TABLE 3.1.--Hourly Earnings Regressions, Working Conditions Data, 1969 (absolute value of standard errors in parentheses)

Explanatory Variables	(1)	(2)	Blue Collar (3)	White Collar (4)
Constant	.1052 (.0877)	.1169 (.0827)	.1656 (.1158)	.3560 (.1611)
UNION	.1239 (.0249)	.1183 (.0614)	.2129 (.0450)	-.0174 (.0400)
Exper	.0170 (.0021)	.0166 (.0021)	.0149 (.0027)	.0196 (.0003)
$Exper^2$	-.00027 (.00004)	-.00026 (.00004)	-.00022 (.00005)	-.00032 (.00007)
Education	.0593 (.0055)	.0598 (.0055)	.0487 (.0079)	.0672 (.0082)
Female	-.4399 (.0267)	-.4322 (.0259)	-.5020 (.0379)	-.4277 (.0356)
Black	.0191 (.0361)	.0244 (.0360)	.0285 (.0446)	.0571 (.0606)
SMSA	.1610 (.0251)	.1558 (.0251)	.1065 (.0344)	.1847 (.0353)
SOUTH	-.1393 (.0290)	-.1332 (.0289)	-.1584 (.0385)	-.1051 (.0436)
Working Conditions				
Fast Work			.0590 (.0358)	.0144 (.0378)
Freedom	.0601 (.0228)	.0579 (.0226)	.0328 (.0307)	.0804 (.0334)
Skill	.0894 (.0252)	.0912 (.0249)	.1175 (.0325)	.0431 (.0385)
Hard Work	.0479 (.0274	.0613 (.0254)	-.00297 (.0390)	.0911 (.0376)

TABLE 3.1.--Continued

Explanatory Variables	(1)	(2)	Blue Collar (3)	White Collar (4)
Physical	-.0820 (.0282)	-.0818 (.0278)	-.0525 (.0345)	-.0921 (.0477)
Industries				
Construction	.1032 (.0600)	-.0086 (.0770)	.1474 (.0585)	.1103 (.1644)
Manufacture	.0407 (.0429)	.0567 (.0438)	.1060 (.0424)	.0073 (.0662)
Transport	.0489 (.0555)	.0186 (.0758)	.1190 (.0595)	-.0647 (.0881)
Wholesale Retail	-.1388 (.0432)	-.1821 (.0430)		-.2086 (.0615)
Finance	.0543 (.0641)	.0484 (.0644)		.0199 (.7538)
Service	-.1054 (.0430)	-.1024 (.0431)		-.1640 (.0598)
Occupations				
Professionals/ Managers	.2488 (.0469)	.2627 (.0376)		-.0670 (.0971)
Clerical	.1498 (.0441)	.1589 (.0331)		-.1731 (.0983)
Craftsmen	.0885 (.0427)	.0828 (.0345)	.0652 (.0490)	
Operatives	.0475 (.0529)	-.0053 (.0679)	.0382 (.0669)	
Service	-.0266 (.0477)	-.0319 (.0477)		-.2700 (.216)

TABLE 3.1.--Continued

Explanatory Variables	(1)	(2)	Blue Collar (3)	White Collar (4)
Interactions				
UCONSTR		.1949 (.1083)		
UMANUF		-.0142 (.0732)		
UTRANSP		.0401 (.1067)		
UWHRT		.1606 (.0902)		
USERVI		-.0969 (.0784)		
UCRAFTS		-.0470 (.0929)		
UOPER		.2860 (.2306)		
UCRAFCO		.2892 (.1225)		
N	1237	1237	636	582
$\bar{R}^2$	.5280	.5289	.5393	.5555

experience are strong elements in explaining variations in earnings within the white-collar occupation. Female workers earn on the average 36 percent less than their male counterparts with a greater discrepancy in the blue-collar sample. Earnings differential between black and white workers is small and not at all significant. As far as residential location and regional observations are concerned, workers living in large urban areas have a 17.5 percent edge and southerners earn about 15 percent less than workers in other parts of the country.[17] White collar workers in urban areas have higher earnings than any group; at the same time, they do not suffer financially as much for residing in the south.

Variables depicting working conditions attempt to explain the effects of nonpecuniary aspects of the jobs on earnings. These binary variables encompass mainly the physical side of a job, while subsuming in the constant its creative aspect. The estimated coefficients for variables in the overall sample such as freedom on the job (FREEDOM), job requiring manual skill (SKILL), job requiring hard work (HARD WORK) are all statistically significant at the 10 percent level and have the expected sign. Freedom on the job provides the worker with some degree of responsibility which implies either intellectual or manual ability. One unexpected result is the highly significant, but negative, estimated coefficient for the variable depicting physical effort on the job (PHYSICAL). One reason is that jobs on which physical efforts are needed are generally menial jobs and for which machine utilization is minimal.

The regressions for blue-collar and white-collar sub-groups provides some interesting contrasts, as seen in column 3 and 4. For the blue-collar workers, coefficients for FASTWORK become highly significant, as are those for SKILL; while the estimate for PHYSICAL is statistically significant at the 13 percent level only, FREEDOM and HARD WORK are not at all significant. In the white-collar sub-group, FAST WORK has very little effect on earnings, as expected from that category of workers, but coefficients for FREEDOM, HARD WORK, and PHYSICAL do show a significant explained variation in earnings. The first two variables have positive estimated coefficients while the latter is negative. In other words, work pace is best measured by the proxy variable FASTWORK for the blue-collar worker to reflect the intensive utilization of capital, while it is best accounted by the proxy FREEDOM in the white-collar group to reflect the more flexible work schedule and the higher degree of extensive responsibility. Moreover, hard work is a disutility for a white-collar worker, so that he must be compensated proportionately, and having to provide physical effort is considered menial. In contrast, for a blue-collar worker, hard and physical jobs are considered the norms, so that these proxies do not provide any statistical effect on earnings, while acquiring a skill should reflect opportunity costs and obstacles to entry.

The estimated relative effect of unionism on earnings in the overall sample is .1239 or a union-nonunion earnings differential of

13.19 percent.[18] The difference in the effects of unionism on earnings is clearly significant when the sample is disaggregated into blue-collar and white-collar. The proportionate differential is about 23.7 percent in the blue-collar category while it is almost nil in the white-collar.

The industry and occupation variables subsume, as reference groups, agriculture and mining, farmers and laborers. In the overall sample, the estimated coefficients for construction, wholesale and retail trade, and service industries are significantly large. Among the different classifications of occupations, professionals and managers, clerical and craftsmen make significant contributions in explaining variations in earnings. One interesting result concerns the effect of unionism on certain sectors, especially in construction and wholesale retail trade[19] (column 2). The estimated coefficients for construction and wholesale retail trade are -.0086 and -.1821 in the nonunion sector. The former value is not statistically significant. However, the coefficient for the unionized construction industry variable (UCONSTR) is .1949 and that of wholesale retail trade (UWHRT) is .1606. Both are statistically significant. Thus, the union-nonunion earnings differential within the two industries are respectively 37 percent and 32 percent.[20] The effects of unionism in manufacturing, transportation and service industry (portrayed by UMANUF, UTRANSP, and USERVI respectively) are not at all significant, similarly for craftsmen and operatives

(UCRAFTS and UOPER). As expected, the blue-collar sample shows the stronger relative effects of construction, manufacturing and transportation on earnings, while the estimated coefficients for the occupation variables such as craftsmen and operatives are small in magnitude and are not statistically significant. This is due to a simultaneity problem between the dependent variable and the explanatory variables CRAFTSMEN and OPERATIVES. On the other hand, typical white-collar industries and occupations, such as wholesale-retail trade, service and clerical work show a significant relative effect on earnings in the white-collar sample.[21]

In summary, the empirical results show that: (1) besides human capital indicators, nonpecuniary aspects of the work place contribute significantly in explaining variations in earnings. Moreover, these effects are occupation specific; (2) the proportionate union nonunion earnings differential in 1969 is about 13.2 percent; this value increases to 23.7 percent for the blue collar sample, but becomes negligible in the white-collar sample, and (3) in some industries, such as construction and wholesale-retail trade, unionism provides an edge greater than 30 percent relative to nonunion earnings. The relative effect of unionism is found to be small and not significant in manufacturing, transportation, and service industries.

3.5 Determination of Union and Nonunion Earnings Distributions

The observed average hourly earnings E_p for the pth decile is a weighted average of the mean hourly union earnings E_p^u and the mean hourly nonunion earnings E_p^N. The latter value can be determined as $E_p^N = E_p/(1 + UNION_i \cdot \hat{m})$, where $\hat{m}$ is the estimated differential due to unionism and $UNION_i$ is the membership status of the ith individual. The mean union earnings is derived as $E_p^u = (E_p - E_p^N)/UNION_i + E_p^N$. The union-nonunion earnings differential have been estimated from the overall sample as $\hat{m} = 13.19$ percent. Essential for the computation of the components of earnings is the incidence of unionism over the ten deciles. Table 3.2 shows the percentage of unionized workers for the different deciles. The skewed bell shape distribution of union membership over the spectrum of earnings, with a large mode encompassing the seventh, eighth, and ninth deciles, is clearly implied. As expected, union membership is small in the lower deciles, less than 15 percent, but increases progressively up to the ninth decile. In the highest decile membership plummets down to 28 percent. The low percentage of unionized workers in the highest decile is due to the high concentration of professionals and other white-collar workers within that earnings bracket.

Table 3.3 shows earnings shares received by deciles of unionized and nonunionized recipients. In order to compare the relative shares, column 3 of Table 3.3 provides the resulting difference between nonunion and union earnings shares. The results do

TABLE 3.2.--Incidence of Unionism by Deciles Among Private Workers, Survey of Working Conditions, 1969 (in percent)

Earnings Rank	Unionization Rate
Lowest Decile	8.87
2nd Decile	14.52
3rd Decile	28.23
4th Decile	33.06
5th Decile	34.68
6th Decile	41.13
7th Decile	53.66
8th Decile	51.61
9th Decile	53.66
Highest Decile	27.64

TABLE 3.3.--Relative Shares of Union and Nonunion Earnings by Deciles, Survey of Working Conditions, 1969 (in percent)

Earnings Rank	Union (1)	Nonunion (2)	Change (2) - (1)
Lowest Decile	3.57	3.64	.07
2nd Decile	5.21	5.30	.09
3rd Decile	6.31	6.37	.06
4th Decile	7.34	7.41	.07
5th Decile	8.44	8.44	.00
6th Decile	9.92	9.91	-.01
7th Decile	11.13	11.06	-.07
8th Decile	12.23	12.01	-.22
9th Decile	13.96	13.08	-.16
Highest Decile	21.89	22.06	.17
Percent	100	100	

show some symmetry in the relative effect of union shares about the fifth decile.[22] In deciles lower than the fifth, the shares of nonunion workers are about .07 percentage points greater than those of union workers. By contrast, beginning with the sixth decile union workers' shares predominate, culminating at .22 percentage points above nonunion shares. This is due to the higher incidence of unionism within the upper middle class. In the highest decile, however, with the decline in union membership, nonunion earnings shares are .17 percentage points greater than union shares. Variations in earnings shares could be further explained by examining the various sources of earnings for a given decile; in other words, what types of occupational jobs fall in what earnings bracket. One can then infer their impact on the earnings shares. This problem will be discussed in the following section.

3.6 Lorenz Curves and Measures of Inequality

With the symmetrical variations in the relative shares of both types of earnings, the question arises whether or not these variations are in effect interdecile transfers of earnings toward an improved redistribution among receivers. The problem is basically that of comparing two frequency distributions. Comparison is done by means of a Lorenz curve which is the graphical relationship between the cumulative distribution of earnings and the cumulative distribution of earners. Figure 3.1 shows the Lorenz curves fitted for both union and nonunion cumulative distributions. The Lorenz curve for the nonunion earnings distribution lies above that of

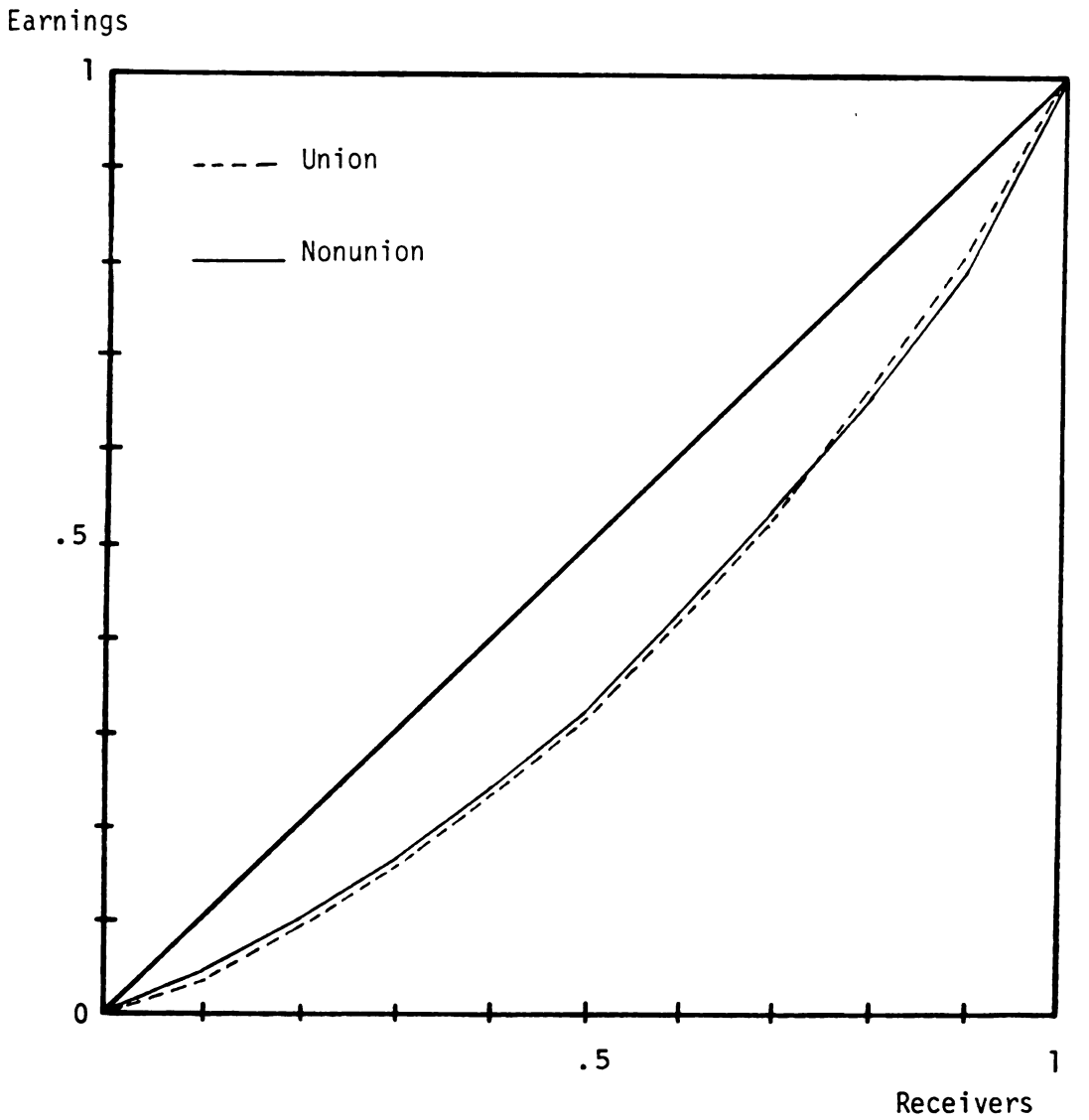

Figure 3.1.--Lorenz Curves for Union and Nonunion Earnings, Survey of Working Conditions, 1969.

TABLE 3.4.--Occupational Incidence by Deciles, Survey of Working Conditions, 1969
(in percent)

Earnings Rank	Professionals (1)	Clerical (2)	Craftsmen (3)	Operatives (4)	Service (5)	Other* (6)	Total (7)
Lowest Decile	6.45	30.65	4.03	8.87	37.10	12.90	100
2nd Decile	11.29	31.45	10.48	11.29	23.39	12.10	100
3rd Decile	10.48	40.32	10.48	12.90	15.32	10.50	100
4th Decile	16.13	31.45	16.13	14.52	8.06	13.71	100
5th Decile	20.97	25.00	25.81	8.87	8.06	11.29	100
6th Decile	23.39	20.97	21.77	6.45	12.10	15.32	100
7th Decile	21.14	20.33	34.15	8.13	4.88	11.37	100
8th Decile	29.84	12.90	29.84	6.45	7.26	13.71	100
9th Decile	30.89	13.01	29.27	7.32	4.88	14.63	100
Highest Decile	63.41	15.45	10.57	1.63	2.44	6.50	100

*Sales, Laborers, Farmers

union up to some interval between the 70 and 80 cumulative percentage points of receivers. In other words, union earnings are less equal up to the 7th decile and are more equal than nonunion earnings in the three highest deciles. Examination of the distribution of various occupations is needed to explain this finding.

Table 3.4 provides the distribution in percent of various occupations in the different deciles. There is a high concentration of service and especially clerical workers within the lowest to 4th decile range. Furthermore, there is also a relatively large percentage of operatives and professionals in that low earnings group. Service and clerical workers tend to have lower wages than other occupations, and the unionization rate among them is less than 30 percent. As for the reasons that some operatives, craftsmen, and professionals fall into this lower earnings group, they may be holding jobs which do not need a high level of skill or jobs which do not require some degree of responsibility. There is little variation in differences in the wage structure of the lower earners group, a structure which is strongly influenced by minimum wage legislation. This homogeneity in wages, coupled with a relatively high number of nonunionized workers, tends to push the lower end of the Lorenz curve toward the line of total equality. On the other hand, craftsmen are gathered strongly in the 5th to 9th decile range, and union membership is correspondingly at its highest. Within that range, there is a large concentration of professionals, particularly in the highest decile.[23] The disparity

TABLE 3.5.--Estimates of Lorenz Curves and Gini Coefficients, Survey of Working Conditions, 1969

	Overall Earnings (1)	Union Earnings (2)	Nonunion Earnings (3)
$\hat{\alpha}$	.7829 (.0066)	.7799 (.0083)	.7721 (.0088)
$\hat{\beta}$	.7438 (.0062)	.7489 (.0078)	.7610 (.0086)
Gini	.27558 (.00027)	.27410 (.00037)	.27114 (.00028)

NOTE: Figures in parentheses are asymptotic standard errors.

of wages encountered in professional occupations does not provide a sufficiently high cumulative percentage shares relative to those provided by union wages. Hence Lorenz curve for union earnings in the upper deciles tend to lie closer to the line of equality.

Using the functional form of the Lorenz curve discussed in Section 2.5, Gini coefficients for the union and nonunion earnings distributions are derived, and their statistical differences tested. Table 3.5 shows the results for the estimated parameters.[24] The Gini value for union earnings is approximately .274 while it is .271 for nonunion earnings. In other words nonunion earnings provide a more equal distribution among recipients than union earnings. Since the asymptotic standard errors for the estimated Gini coefficients are known, it is possible to test the hypothesis that the difference between union and nonunion Gini coefficients are nonzero. The value of the t-statistics is 6.38.[25] This shows that the Gini coefficient for union earnings distribution is statistically different from the coefficient of nonunion earnings distribution and the latter is smaller than the former.

3.7 Conclusion

Results from this chapter can be summarized as follows: the relative earnings differential due to unionism is about 13 percent on the average, though it varies by industry and by occupation. It is about 32 percent in the construction industry and negligible in manufacturing. Within occupations, the differential among craftsmen and operatives is not significant.

The separate distributions of union and nonunion earnings and the subsequent fitting by their respective Lorenz curves show a more equal distribution of the nonunion earnings up to the 7th decile; with less equality above that. Estimation of the Lorenz curves and subsequent derivation of Gini coefficients show that the distribution of nonunion earnings among recipients is relatively more equal than that of union earnings.

CHAPTER III: FOOTNOTES

[1]Albert E. Rees, The Economics of Work and Pay (New York: Harper and Row, 1973), p. 178.

[2]Ray Marshall, "The Economics of Racial Discrimination: A Survey," Journal of Economic Literature 12 (September 1974): 863-864.

[3]Rees, op. cit., p. 166.

[4]Adam Smith, An Inquiry Into the Nature and Causes of the Wealth of Nations, ed.: Edwin Cannan (Chicago: University of Chicago Press, 1976), Cahpter X, Part I, p. 112.

[5]Jacob Mincer, "The Distribution of Labor Incomes: A Survey with Special Reference to the Human Capital Approach," Journal of Economic Literature 8 (March 1970): 1-26; also Schooling, Experience and Earnings (New York: National Bureau of Economic Research, 1974).

[6]Ibid.

[7]Barry R. Chiswick, "The Average Level of Schooling and the Intra-regional Inequality of Income: A Clarification," American Economic Review 58 (June 1972): 466-472.

[8]Gary S. Becker, Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education (New York: National Bureau of Economic Research, 1964).

[9]Yoram Ben-Porath, "The Production of Human Capital and the Life Cycle of Earnings," Journal of Political Economy 75 (August 1967): 352-365.

[10]Mincer, "The Distribution of Labor Incomes: A Survey with Special Reference to the Human Capital Approach," 1970.

[11]Smith, op. cit.

[12]Sherwin Rosen, "Hedonic Prices and Implicit Markets" Product Differentiation in Pure Competition," Journal of Political Economy 82 (January/February, 1974): 34-55.

[13]R. E. B. Lucas, "Hedonic Wage Equation and Psychic Wages in the Return to Schooling," American Economic Review 67 (September 1977): 549-557.

[14]G. Akerlof, "The Economics of Caste and of the Rat Race and Other Woeful Tales," Quarterly Journal of Economics 90 (November 1976): 599-617.

[15]Greg Duncan and Frank Stafford, "Pace of Work, Unions and Earnings in Blue Collar Jobs" (Ann Arbor: University of Michigan, March, 1977). (Mimeographed).

[16]The marginal contribution of a regressor to the explanation of the dependent variable y given all the other regressors is given by the partial determination coefficient

$$R^2_{yj.1,\ \ldots,\ j-1,\ j+1,\ \ldots,\ k}$$

The partial determination coefficient of y and a regressor x_j is defined as

$$R^2_{yx_j} = \frac{(b_{j/S_{bj}})^2}{(b_{j/S_{b_j}})^2 + (N-K-1)}$$

where: S_{b_j} is the standard error of the estimate b_j

It is to be emphasized that the sum of the partial determination coefficients R^2_{yxj} (j = 1, . . ., k) is not in general equal to the R^2 of the original regression.

[17]The determination of this percentage differential is obtained from (exp $\hat{b}_j$ - 1) where $\hat{b}_j$ is the estimated coefficient of X_j.

[18]This result falls within the range of H. G. Lewis, Unionism and Relative Wages in the United States (Chicago: University of Chicago Press, 1963), who has estimated the proportionate wage advantage of union members over labor in nonunion sector to be 10 percent to 15 percent for the 1955 to 1958 period. There has been a plethora of studies since then. The only consistency is that union-nonunion proportionate wage difference varies over time and across industries. Appraisal of past and present economic analyses of trade unionism is provided by George E. Johnson, "Economic Analysis of Trade Unionism," American Economic Review, Papers and Proceedings 65 (May 1975): 23-28.

[19]The interaction terms are the product of two dummy variables--union status and industry--and they allow the differential union effect to be different at all industrial sectors. Similar analysis is carried out for the different occupational classifications.

[20]These values are obtained by taking the algebraic sum of the union status and relevant industry estimates. The antilog is calculated from the resulting sum (see Becker, op. cit.).

[21]Problems generated by the broad groupings of industries and occupations and their contributions in the explanation of variations in earnings will be discussed in Section V.

[22]Due to the small number of observations, the deciles include self-employed workers. The sample means for overall earnings is $3.43, while it is $3.29 for nonunion earnings and $3.34 for union earnings.

[23]The number of operatives declines steadily, beginning with the fifth decile.

[24]Estimation is similar to Method IV of Nanak C. Kakwani and N. Podder, "Efficient Estimation of the Lorenz Curve and Associated Inequality Measures from Grouped Observations," Econometrica 44 (January 1976): 137-148. The NONLIN program developed by the Research Biostatistics Unit of the Upjohn Company, Kalamazoo, Michigan, was used.

[25]We assume the covariance of the estimates of the Gini coefficients to be equal to zero.

CHAPTER IV

THE NATIONAL LONGITUDINAL SURVEY: OLDER MALE WORKERS

4.1 Introduction

In this chapter we look at another set of microdata, provided by the National Longitudinal Survey. The survey attempts to interview a representative sample of individuals over a ten-year period starting from 1966. It covers four groups of the U. S. population: men 45 to 59 years of age, women 30 to 44 years of age, and young men and women 14 to 24 years of age as of 1966.

The data collected include an abbreviated lifetime work history of each respondent up to the time of the first survey and information about a variety of social, psychological, and economic characteristics. Since the data contain an almost complete record of the labor-market activity of the respondents over the ten-year period, they allow one to investigate both the antecedents and consequences of particular economic events. They include a three-year span in which the labor market was relatively tight and improving (1966-1969), a two-year period during which unemployment rose (1969-1971) as well as a three-year period during which the unemployment rate reached a peak of 9 percent (1974-1976).

The breakdown of the surveys and hence of the data by age and by sex, allows one to concentrate the investigation on one cohort at a time. This study selects the older cohort of men who are private wage and salary workers.

4.2 Characteristics of Older Workers

There are several reasons for studying older males. Data for young men and women present a picture of instability, of lateral and vertical mobility and of interrupted labor-force participation. Those are features which can, at worst, negate the impact of unionism on earnings and, at best, make it difficult to assess the relationship between regressors and dependent variables when the specified model is not dynamic. From their inception, unions have pressed for standard rates among comparable workers across establishments in an industry and for ranges of rates for workers in a given occupation within an establishment. This cartelization of wage rates by unions would be attenuated if young workers opted to be paid on the basis of personal characteristics and ability, e.g., human capital indicators and specialized training, or if the standard rate is linked to seniority rather than merit. The lack of seniority concomitant with the high incidence of lateral and geographical mobility of young workers, the latter being enhanced by lower migration costs, makes their earnings more strongly influenced by local market conditions than by such institutions as collective bargaining.

Arrayed against this career turmoil in youth is the stability of the older cohort. A large majority of older workers enjoy a favorable status in the labor market as measured by regularity of employment, occupational assignments, and degree of job satisfaction. Most of them have moved up the occupational ladder during the course of their careers and regard their current positions as the highest they could attain. This is not to be construed however, that men in their forties and fifties do not experience job changes. One would expect that the incidence of movement is more among semi-skilled occupational categories, e.g., laborers and farm workers, than among others and is much more likely to occur among short-service than long-service workers. On the other hand, job changes requiring geographical migration would be rare. Moreover, it should be emphasized that variations in health and physical well-being are important in explaining variations in the labor market experience of men in this age group. Chronic health conditions and disabilities may not only require withdrawal from the labor market, but also may pose barriers to re-employment if a job is lost for other reasons.

As for education, middle-aged workers have, on the average, less formal schooling than younger workers and their education is less likely to be relevant to current occupational requirements, thus creating some difficulty for them in competing for jobs.[1] Only those workers who have invested heavily in human capital and who hold occupations which make use of that investment are able to

move up the occupational ladder and continue to do so while benefiting from an economic rent. Those with little schooling may be disproportionately concentrated in older and declining segments of the economy, where even long seniority may not provide immunity to layoff. On the issue of occupational training, A. Adams[2] finds that participation in formal occupational training during middle age does not have a consistently positive effect on earnings and employment. Instead, it varies according to prior training experience, institutional source of training, and race. For white men the effect is marginal at best, while for black men it is substantial, especially for those who have participated in company training programs.[3]

Finally, middle-aged workers are less likely than young workers to become unemployed, due to long tenure and reluctance to leave their job voluntarily, and the likelihood of remaining unemployed is much higher. The net result is to create unemployment rates for men in their fifties that are lower than those for younger men.

With the older cohort, the rate of human capital accumulation decreases since additional experience becomes less useful and the opportunity cost of time invested in training is greater than the remaining time necessary to capture its return. Personal investment is no longer profitable. Y. Ben-Porath[4] points out that at a certain time horizon t, the gross rate of human capital accumulation, is just equal to its rate of depreciation and as the individual approaches T, the end of working life, his relative potential

earnings declines. Hence older workers, faced with the prospect of competing against younger workers who are receiving a higher return from earlier and more intensive human capital investment, would attempt to seek the protection of unionism. Indeed, this interpretation has been backed by an incidental result found by S. Rosen.[5] Rosen finds, using aggregate data, that unions appear to benefit older and less educated workers to a greater extent than they benefit younger and more educated workers. In this light, one can assert that the essence of the union standard rate, involving as it does the elimination of any formal evaluation of job performance, is to protect the established workers. The standard rate provides on the supply side, a "fair and equal" wage based on job categories regardless of productivity level, while on the demand side it is a device to create a monopsonistic market position for some employers while denying others of the benefit of local market conditions. The protection from market conditions, and, within the firm protection from competition with other workers in terms of performance on the job, tend to make the relative wage advantage of older union members larger. G. Johnson and K. Youmans[6] (Table II, p. 175) finds that the union-nonunion wage differentials for manufacturing workers within the age group of 45-65 years old and with an education level of 12 years, range from 25 percent to 56 percent while for those with 8 years of schooling the relative proportional effect is from 35 percent to 69 percent. Johnson and Youmans also find that this relative advantage is not concentrated within the middle age group

only: the less educated younger union members also benefit more from unionism. One can regard unionism as the equivalent of the Civil Service system wherein employees advance upward through a strict seniority system as long as they are not obviously incompetent.

This long preamble provides an overview of the human aspects of the data. In the following sections we will: (1) estimate the relative wage effect of unionism; (2) investigate the incidence of unionism by earnings class, (3) determine the union and nonunion average hourly earnings, and (4) proceed to estimate the relative degree of inequality between the distributions of union and non-union earnings.

The basic equation to be estimated is similar to equation (27) in Chapter III. It is a regression of the natural logarithm of average hourly earnings on a set of dummy variables representing population and regional characteristics, human capital indicators, industrial and occupational characteristics. Separate regressions were run to allow interactions between union membership and industry, as well as between union membership and occupation. The general form of the equation is as follows:

$$\begin{aligned} \text{Ln } E_i = f\,(&\text{UNION}_i, \text{Experience}_i, \text{Experience}_i^2, \text{Marital} \\ &\text{status}_i, \text{Black}_i, \text{Education}_i, \text{Occupational} \\ &\text{Training}_i, \text{Health}_i, \text{Urban}_i, \text{Region}_i, \text{Industry}_i, \\ &\text{Occupation}_i) \end{aligned} \qquad (28)$$

where: E_i is the average hourly earnings received by the ith individual.

Other continuous variables are schooling and experience (which is measured as Age-Schooling-6). Measured as dummy variables are union status, marital status, black, occupational training, health problems, urban, region, industry, and occupation. The reference group, subsumed in the constant, is a nonunionized single white worker residing in the rural South, with no health effects on work capacity, and holding a farming job.

4.3 Empirical Results

The survey of the cohort of older men provides union status data for the years 1969 to 1971 only. Data for average hourly earnings and other relevant variables are obtained for the same year for the week prior to the survey.

Table 4.1 gives the results of the least squares estimation of equation (28). Column 1 through column 3 show estimates for the 1969 data, while Column 4 through 6 show estimates for the 1971 data. For greater ease of interpretation some of the estimated coefficients shown in column 1 and 4 are expressed as deviations from their means. By contrast, the estimated coefficients shown in column 4 and 6 are unadjusted but are influenced by interaction variables. Sample means for the various variables are provided in column 2 and 5. Estimates are classified by subgroups such as residence, region, industries, occupations, and union interactions.

The value of the adjusted R^2 is relatively high. With 2807 observations in the 1969 sample, the adjusted R^2 is about .47; with 2646 observations in the 1971 sample R^2 is about .49. Values for R^2

TABLE 4.1.--Hourly Earnings Regressions, National Longitudinal Survey, Men (absolute value of standard errors in parentheses)

Explanatory Variables	1969			1971		
	b*	Means	b**	b*	Means	b**
Constant	.6145		1.0166 (.2561)	.9700		1.3672 (.2819)
UNION	.1595 (.0154)	.393	.2602 (.0690)	.1462 (.0154)	.382	.2609 (.0719)
Exper	-.0331 (.0121)	38.40	-.0323 (.0118)	-.0352 (.0129)	40.32	-.0368 (.0128)
$Exper^2$	.000405 (.000154)		.000392 (.000151)	.000387 (.000157)		.000407 (.000155)
Married, Spouse	.1721 (.0388)	.876	.1708 (.0381)	.1484 (.0392)	.859	.1473 (.0387)
Married, no Spouse	.1281 (.0436)	.094	.1294 (.0427)	.0727 (.0433)	.110	.0736 (.0428)
Education	.0268 (.0029)	9.75	.0258 (.0029)	.0260 (.0031)	9.71	.0260 (.0030)
Black	-.0945 (.0181)	.266	-.0907 (.0177)	-.0715 (.0183)	.262	-.0709 (.0181)
Occupational Training	.0634 (.0212)	.119	.0661 (.0208)	.0336 (.0217)	.118	.0255 (.0214)

TABLE 4.1.--Continued

	1969			1971		
	b*	Means	b**	b*	Means	b**
Health	-.0652 (.0173)	.173	-.0625 (.0169)	-.0753 (.0165)	.212	-.0762 (.0163)
Residence						
Central City	.0366 (.0100)	.398	.1334 (.0168)	.0330 (.0095)	.388	.1328 (.0169)
Greater SMSA	.0670 (.0100)	.328	.1675 (.0169)	.0724 (.0100)	.323	.1744 (.0172)
Rural	-.1036 (.0100)	.274		-.1053 (.0101)	.289	
Regions						
N-East	.0147 (.0189)	.267	.0951 (.0184)	.0203 (.0118)	.266	.1084 (.0189)
N-Central	.0168 (.0109)	.296	.1014 (.0177)	.0253 (.0114)	.294	.1210 (.0183)
West	.0533 (.0138)	.148	.1240 (.0216)	.0541 (.0141)	.153	.1452 (.0219)
South	-.0849 (.0119)	.289		-.0996 (.0122)	.287	

TABLE 4.1.--Continued

	1969			1971		
	b*	Means	b**	b*	Means	b**
Industries						
Construction	.1558 (.0207)	.106	.1447 (.0491)	.2319 (.0212)	.099	.3130 (.0478)
Manufacture	.0507 (.0132)	.370	.2392 (.0442)	.0226 (.0140)	.367	.2738 (.0435)
Transport	.0375 (.0197)	.113	.1461 (.0519)	.0752 (.0197)	.116	.3021 (.0508)
Wholesale/ Retail Trade	-.1531 (.0243)	.121	-.0285 (.0467)	-.1513 (.0192)	.125	.0279 (.0457)
Finance	-.0118 (.0336)	.032	-.0990 (.0541)	.0215 (.0389)	.034	.2072 (.0533)
Service	-.1520 (.0192)	.132	-.0236 (.0463)	-.1674 (.0197)	.128	.0204 (.0464)
Public Administration	.1149 (.0217)	.095	.2563 (.0478)	.1268 (.0217)	.097	.3461 (.0478)
Agriculture	-.0816 (.0352)	.031		-.1592 (.0342)	.034	

TABLE 4.1.--Continued

TABLE 4.1.--Continued

	1969			1971		
	b*	Means	b**	b*	Means	b**
Occupations						
Professionals	.2581 (.0499)	.099	.3740 (.0937)	.2503 (.0249)	.091	.2645 (.0809)
Managers	.3154 (.0230)	.101	.4310 (.0935)	.3114 (.0221)	.107	.3260 (.0803)
Sales	.1522 (.0341)	.041	.2678 (.0977)	.0840 (.0361)	.035	.1045 (.0871)
Clerical	-.0638 (.0257)	.072	.0742 (.0939)	-.0803 (.0250)	.072	-.0375 (.0815)
Craftsmen	.0249 (.0176)	.250	.1581 (.0930)	.0184 (.0170)	.254	.0449 (.0802)
Operatives	-.1358 (.0187)	.228	-.0677 (.0940)	-.1232 (.0183)	.227	-.1456 (.0809)
Laborers	-.2189 (.0234)	.111	-.0764 (.0920)	-.2394 (.0235)	.109	-.2009 (.0804)
Service	-.1859 (.0239)	.094	-.0559 (.0932)	-.1967 (.0234)	.098	-.1692 (.0806)
Farmers	-.1461 (.0819	.004		-.0246 (.0700)	.007	

TABLE 4.1.--Continued

TABLE 4.1.--Continued

	1969			1971		
	b*	Means	b**	b*	Means	b**
Interactions						
UCONSTRU		.054	.2132 (.0789)		.042	.1327 (.0829)
UMANUF		.189	-.2679 (.0718		.176	-.2609 (.0743)
UTRANSP		.074	-.1083 (.0791)		.073	-.1899 (.0808)
UWHRT		.022	-.0949 (.0832)		.025	-.0318 (.0837)
USERVI		.026	-.1359 (.0809)		.029	-.0778 (.0827)
UPUBADM		.017	-.2173 (.0869)		.026	-.2111 (.0855)
UCRAFTS		.123	.0025 (.0357)		.118	.0091 (.0364)

TABLE 4.1.--Continued

	1969			1971		
	b*	Means	b**	b*	Means	b**
UOPER		.137	.1424 (.0373)		.127	.1222 (.0382)
N	2807		2807	2646		2646
$\bar{R}^2$	.4718		.4936	.4913		.5066

*Coefficients adjusted to deviations from means

**Unadjusted coefficients.

increase significantly in both samples as union interaction variables are included in the regression.

As far as human capital indicators are concerned, a surprising result is the significantly negative sign of the experience variable for both years. It should be noted that the survey covers mature workers at an age where the investment in human capital is depreciating. The estimated coefficients on experience and experience squared are -.0331 and .000405 for 1969 and -.352 and .000387 for 1971. This implies, first of all, that the experience effect on earnings decreases at a greater rate as the individual moves into this old cohort. Second, in the latter year, the rate of decrease abates somewhat in the later years. Third, the effect of experience, as defined by age-years of schooling-6, reaches a minimum on a cross sectional basis anywhere from 41 to 45 years.

The mean schooling attainment is about 9.7 years, and the estimated coefficient is of similar and statistically significant magnitude, .0268 and .0260 for 1969 and 1971 respectively. One interesting result is the estimated coefficient on the occupational training variable (OCCUP TRNG). For both years about 12 percent of the workers surveyed have participated in some kind of occupational training, within the twelve months previous to the survey week, whether it is company sponsored or from some other federal institutions. The estimated coefficient for this variable is .0634 in 1969 and is statistically significant at the 5 percent level, while it is .0336 in 1971 and it is not significant. This difference in the effects of occupational training on earnings for the two years may

be the result of two combined forces. First, the worker's earnings decline further due to an increase in age level by two years; second, the 1971 market conditions may have negated any marginal return from training. The latter possibility seems to be more plausible, since the estimated coefficient for the formal schooling variable has not changed in significance and magnitude over the two years. In other words, within the two year span, it is unlikely that the prior investment in training depreciates so quickly due to aging, while the prior investment in formal schooling provides the same net return over the same period of time. One would conjecture that the type of occupational training received by the older cohort is only marginally job related and an incomplete solution for the decline in return from an already obsolete human capital stock.

One of the more conspicuous negative effects on earnings within this older group of men is that of health. The percentage of workers with a health problem that affects the kind of work they can participate in increases from 17.3 percent in 1969 to 21.2 percent in 1971, while the magnitude of the estimated coefficient increases in absolute value and becomes more significant statistically over the two-year period. The worker with a health disability will earn 6.7 percent to 7.8 percent less than a healthy worker. Married workers have, on the average, a 14 percent edge on the earnings of single workers.

In order to facilitate interpretation, coefficients for residential and geographical locations, industrial and occupational

characteristics have been adjusted to deviations from means. This allows us to look at the relative magnitude of the relevant coefficients among themselves, whereas the unadjusted coefficients are based on some reference groups. Results show that workers living in large urban areas earn about 3 percent to 7 percent more than the average, while those living in rural areas earn 10 percent less. As far as geographical location is concerned, individuals living in the West have the highest earnings level followed by those living in the North Central states.[7]

The industrial and occupational categories used as control variables in the earnings equation are very broad. Agriculture and fisheries are left out of the industry categories, while farmers and farm managers are not included in the occupational variables. Again, estimated coefficients for the above variables have been adjusted to deviations from means for greater ease of interpretation. The effects of unionism within certain industries and within certain occupations are also investigated for both years.

Among the industries workers in construction earn 15 percent to 23 percent more than the average, followed by those in public administration with 12 percent. Workers in manufacturing and transportation earn in the range of 2 percent to 7 percent above the average wage with some fluctuations over the two year span. In contrast, workers in the service industries and wholesale-retail trade earn about 15 percent less than the average wage.

Among the occupations only professionals, managers, sales workers and craftsmen have earnings which are higher than the average. Over the two-year period, managers have the highest earnings, followed by professionals; their wages are, respectively, 31 percent and 25 percent above the average. Earnings level for sales workers and craftsmen decline by nearly a half in 1971. One surprising result is the significant negative sign of the adjusted coefficient for operatives: -.1358 in 1969 and -.1232 in 1971, while it is only -.0638 and -.0803 for clerical workers.

The percentage differential between union and nonunion earnings is 17.3 percent in 1969, while it is 15.7 percent in 1971, a decrease of about 9 percent.[8] The fact that the effects of unionism and earnings decline in 1971 may be explained by aging.[9] The earnings equation with interaction terms provides a more interesting look at the union-nonunion proportionate effects on earnings for some of the industry and occupation groups. In 1969 the effect on unionized construction workers' earnings relative to that of nonunionized workers is 0.4734 or a union-nonunion earnings differential of 60.5 percent. However, for manufacturing industry, it is -.0077, which translates into a zero union-nonunion earnings differential. Conversely, in the transportation industry the relative effect of unionism is .1518 or approximately a 16.4 percent union-nonunion earnings differentials. As expected, the construction industry, which is organized by stronger unions, has the largest spread between union-nonunion earnings, followed by the transportation industry.

The seeming equality between union and nonunion earnings in the manufacturing sector may be the result of several possibilities. Of the individuals surveyed, 37 percent are employed in manufacturing; out of these, 19 percent (18 percent in 1971) are unionized, or about half of the workers in manufacturing are organized, a situation which may lead to a significant degree of spillover, so that wages of nonunion workers can be rendered higher by unionization of others. S. Rosen[10] finds that threats of unionism can raise nonunion wages. Also, the above effect may be compounded by the relative inelasticity of the supply of the nonunion labor in the older age group. Finally, nonunion wages are more apt to follow the business cycle, while the union wages are held rigid by collective bargaining, which provides contracts lasting on the average two to three years. Hence, in periods of high economic activity, union wages will tend to lag behind the increase in the nonunion sector.

Turning to wholesale and retail trade, finance and services, their respective effects on both 1969 and 1971 earnings are not statistically significant. An exception, however, is the highly significant proportionate effect of the 1971 finance variable in the nonunion sector, even though only 3.5 percent of the individuals surveyed are in this category. One possible explanation is that the different components of this sector, namely banks, insurance, and real estate are staffed by highly skilled and experienced white collar workers who may be immune to any transitory downturn of the economy. Moreover, the average hourly earnings reported by such

individuals may include bonuses and commissions. The latter component of earnings may not be significant in the 1969 economic boom due to high spillovers, but during the 1971 downturn it may have an effect as the spread between the outstanding and average workers increases.

As for the effect of unionism on occupations, only the coefficient for the interaction term between unionism and operatives (UOPER) is highly significant with a magnitude of .1424 and .1222 for 1969 and 1971. [The coefficients for the interaction between unionism and craftsmen (UCRAFTS) is not statistically significant at any reasonable level, and its estimated magnitude is zero.] Consequently, the relative union-nonunion earnings differential for operatives is about 50 percent. The results seem to indicate that, for 1969, nonunionized craftsmen were quicker to take advantage of the economic upturn than nonunionized operatives, and secondly, the latter group is worse off than the unionized operatives. There is not much difference between the percentage of unionized craftsmen, about 12.3 percent, and that of operatives, about 13.7 percent. Hence, the question is why unionization among craftsmen is not as strong as that of operatives? One plausible explanation has to do with the hedonic aspects of job characteristics. The operatives category encompasses assemblers, riveters and fasteners, precision machine operators, etc., in other words, individuals who work along an assembly line, the speed of which dictates the specialization and productivity of a job. Since we are dealing with the older cohort

of workers, the nonpecuniary aspects of a job, namely strenous working conditions, do indeed contribute to the demand for a higher pecuniary return. These demands will be fulfilled if voiced through a strong union.[11] Craftsmen, on the other hand, encompass individuals such as painters, plumbers, mechanics etc., who are rarely subjected to a capital-intensive job, but participate in jobs which require a certain level of manual skills. In this case then, productivity is based less on physical stamina than on personal dexterity, a factor that unionism cannot influence.

The results for the 1971 earnings equation show a drastic change in the magnitude of the estimated coefficients for some professional variables. The relative effects of the professionals and managers variables have decreased to .2645 and .3260, respectively, and are still highly significant. However, the estimated coefficient for the sales workers and nonunionized craftsmen control variables have not only declined in magnitude, but also lost their statistical significance. For nonunionized operatives the proportionate effects have become negative in 1971 but are still insignificant. The union-nonunion earnings differentials for operatives remain high, about 47 percent, which confirms the strength of organized assembly line workers and machinists. The most dramatic changes occur in the magnitude of the estimated coefficients for laborers and service workers variables. They are respectively -.2009 and -.1692 and are highly significant, proving that unskilled workers are the most susceptible to adverse market conditions, and it is more so for older workers.

In summary, the empirical results show that the relative effect of unionism on earnings declined from 1969 to 1971, whereas the percentage of workers unionized remains identical; in some specific industries such as construction, unionism provided on the average an edge of 50 percent relative to nonunion earnings over the two years, while in the transportation sector unionism increased its relative margin in the latter year. Also, the relative strength of unionism within the manufacturing sector was negligible. This result is due to the data base not providing a more detailed classification, and the ability of the nonunion sector to increase its earnings share with respect to the union sector. As far as occupations are concerned, the nature of the jobs performed by craftsmen and operatives lead to a relative strengthening of unionism in the latter occupation.

As expected, human capital indicators show the strong declining rate of return on prior investment in the later part of life. Similarly, health problems also contribute a negative proportionate effect on earnings.

4.4 Determination of Union and Nonunion Earnings Distributions

The union-nonunion earnings differentials have been estimated from the previous regression equation as $\hat{m} = 17.3$ percent in 1969 and $\hat{m} = 15.7$ percent in 1971.[12] The computation of union and nonunion earnings follows the steps outlined in section 3.9. Table 4.2 shows the percentage of unionized workers for the different deciles and column 3 depicts the interyear change in the incidence.

TABLE 4.2.--Incidence of Unionism by Deciles Among Private and Public Workers, National Longitudinal Survey, 1969 and 1971 (in percent)

Earnings Rank	1969 (1)	1971 (2)	Change (2) - (1)
Lowest Decile	7.83	6.79	-1.04
2nd Decile	18.15	18.05	-0.10
3rd Decile	34.75	35.34	0.59
4th Decile	51.42	50.75	-0.67
5th Decile	57.14	50.00	-7.14
6th Decile	62.14	54.55	-7.59
7th Decile	55.00	57.41	2.41
8th Decile	44.84	51.33	6.49
9th Decile	41.22	35.09	-6.13
Highest Decile	20.64	23.11	2.47

The skewed bell shape distribution of union membership over the spectrum of earnings with a mode centered around the sixth or seventh decile is clearly implied for both years. As expected, union membership is small in the lower decile and is relatively stable over the two years. However, in the middle and upper-middle range of the earnings spectrum, there is more instability in the incidence, a sharp interyear decrease within the fifth, sixth, and ninth deciles contrasted to an increase in the seventh and eighth deciles. Finally, in the highest decile the percentage of union workers hovers in the twenties with a slight increase in the later period. The comparison of union incidence between the older cohort of men and the Survey of Working Conditions in 1969 shows some interesting results: workers of similar age tend to be more unionized than others and their unionization rate peaks at the sixth decile while in the more general sample the incidence peaks between the eighth or ninth decile. In both samples the percentage of unionized workers drastically declines in the highest decile.

The interyear fluctuations in the incidence of unionism could be explained mainly through the influence of market conditions. The rigidity of union wages prevents any short-term gain in wages as the demand for labor schedule shifts right, whereas the more flexible nonunion wages react quickly to any disequilibrating situation. Workers, perceiving the rapid adjustment of nonunion wages toward market equilibrium, will drop their union membership. This change in status does not happen instantaneously, but incorporates a certain

behavioral lag. Thus, despite worsening economic conditions, the incidence of unionism within the middle class decreased in 1971. On the other hand, within certain occupations, unionism does provide some positive externalities which in turn attract unorganized workers, again with a behavioral lag. The low percentage of unionized workers in the highest decile may be due to the high concentration of white-collar workers and other professionals within that earnings bracket.

Using the different incidence of unionism of each decile as weights, mean union and nonunion earnings are computed. The relative shares of both components of earnings are shown in Table 4.3. Columns 3 and 6 show the interyear fluctuations in relative shares of the two components of earnings. The data in Table 4.3 show a striking similarity in the changing pattern of union and nonunion earnings distribution in the period 1969 to 1971. In both distributions there was a substantial decrease in the proportion of earnings in the lowest two deciles and in the highest decile. Between 1969 and 1971 union workers in the lowest two deciles had their shares decreased by 0.13 percent of the total while the share of the top decile declined by 0.40 percent. During this same period nonunion workers in the lowest two deciles saw their share declined by 0.17 percent, while the share of the top decile declines by 0.51 percent. These changes indicate that there was some earnings redistribution away from the highest decile; and that there was some earnings redistribution away from the lowest deciles for nonunion workers.

TABLE 4.3.--Relative Shares of Union and Nonunion Earnings by Deciles, National Longitudinal Survey, 1969 and 1971 (in percent)

Earnings Rank	Union			Nonunion		
	1969 (1)	1971 (2)	Change (2) - (1)	1969 (4)	1971 (5)	Change (5) - (4)
Lowest Decile	4.06	3.95	-0.11	4.17	4.04	-0.13
2nd Decile	5.49	5.47	-0.02	5.62	5.58	-0.04
3rd Decile	6.64	6.67	0.03	6.70	6.72	0.02
4th Decile	7.62	7.66	0.04	7.52	7.56	0.04
5th Decile	8.51	8.53	0.02	8.32	8.44	0.12
6th Decile	9.32	9.41	0.09	9.03	9.25	0.22
7th Decile	10.15	10.32	0.17	9.95	10.09	0.14
8th Decile	11.67	11.70	0.03	11.64	11.55	-0.09
9th Decile	13.98	14.13	0.15	14.00	14.23	0.23
Highest Decile	22.56	22.16	-0.40	23.05	22.54	-0.51
Percent	100	100		100	100	

The similarity between union and nonunion relative shares disappears as one compares the large gain accumulated by the nonunion middle class. Within the nonunion category there is a high degree of earnings transfer between deciles. These variations could be explained if one could examine the various sources of earnings for a given decile, in other words, what types of occupational jobs fall in what earnings bracket. Then one can infer the impact of market conditions on these jobs categories. This problem will be taken up in the following section. In the union sector, by contrast, there is less variation in the relative earnings shares, reflecting the rigidity of the standard rate.

4.5 Lorenz Curves and Measures of Inequality

One way of viewing the extent of the distribution of relative shares among recipients is in terms of the Lorenz curve. It is the graphical relationship between the cumulative distribution of earnings and the cumulative distribution of earners. Figures 4.1 and 4.2 show the Lorenz curves fitted to both union and nonunion cumulative distributions in 1969 and 1971, respectively. In both years the Lorenz curve for the nonunion earnings distribution lies above that of union up to some interval between the forty and fifty cumulative percentage points of receivers. In other words, union cumulative earnings are less equal up to the fourth decile and are more equal than nonunion earnings in the higher half of the distribution spectrum. Examination of the distribution of various occupations is needed to explain this finding.

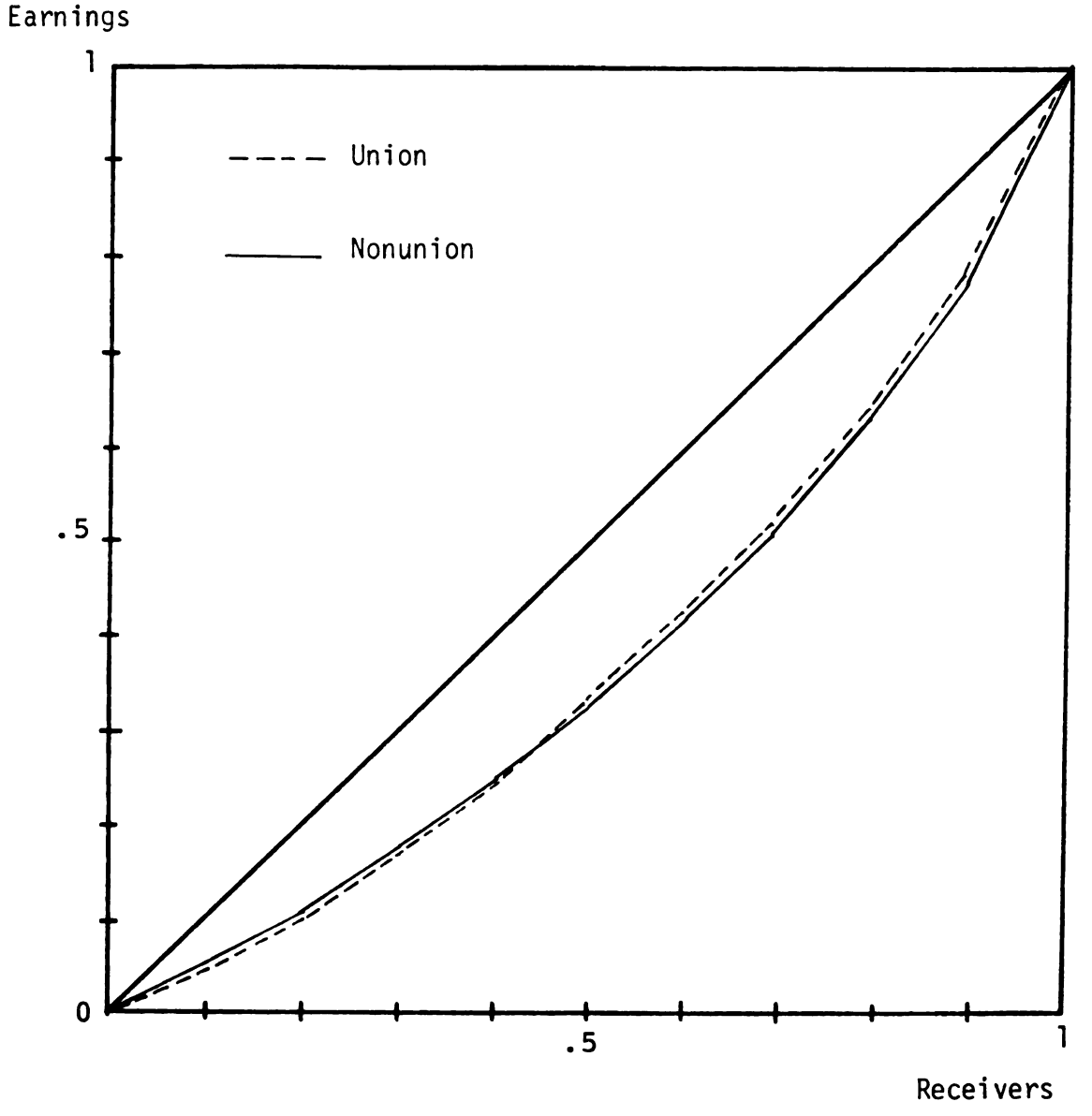

Figure 4.1.--Lorenz Curves for Union and Nonunion Earnings, National Longitudinal Survey, 1969.

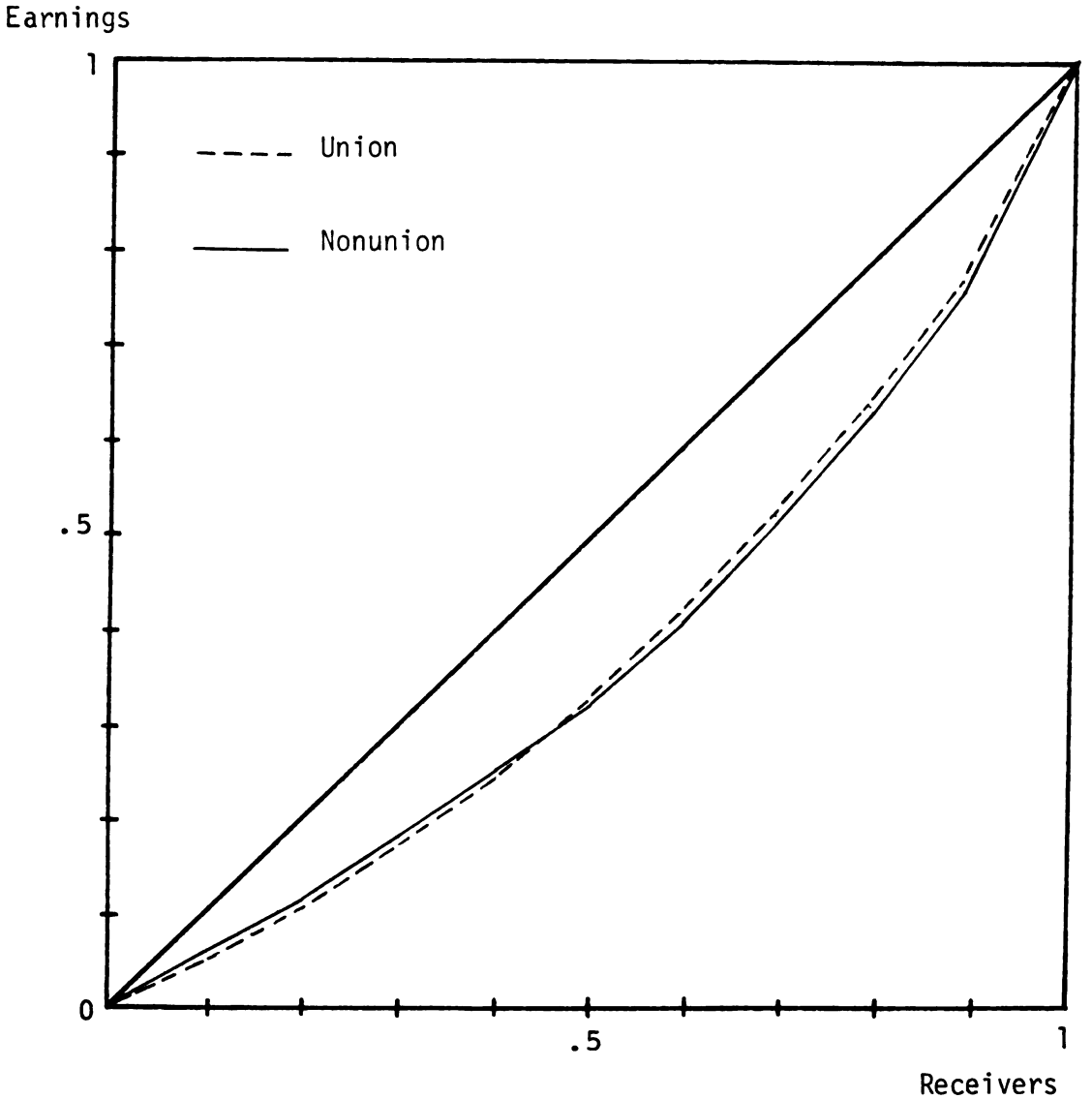

Figure 4.2.--Lorenz Curves for Union and Nonunion Earnings, National Longitudinal Survey, 1971.

The above distribution pattern can be inferred from the relative shares of union and nonunion earnings in their respective years as shown in Table 4.4. Columns 3 and 6 show the difference between union and nonunion relative shares in both years. From the lowest through the third deciles nonunion relative shares are consistently higher than those of union for both years, with a greater magnitude in the 1969 period. Meanwhile, the incidence of unionism, as reported in Table 4.2, remains below 36 percent over the same decile range. Moreover, from Tables 4.5 and 4.6, which show the percentage distribution of various occupations in the different deciles, we see there is an extremely high concentration of service workers and laborers between the lowest and third deciles. Furthermore, there is also a relatively large percentage of operatives (in the high 20's) of craftsmen (in the high 10's) of sales and clerical workers in that low earnings group. In the case of laborers and service workers, the reasons for being in this group are obvious. Also, the unionization rate within these two occupations is less than 10 percent. Sales workers, especially those in retail trade, and clerical workers holding monotonous jobs also will tend to gravitate to the lower end. As for the reasons that some operatives and craftsmen fall in this lower earnings group, they may be holding jobs which do not need a high level of skill or jobs which do not require some degree of responsibility. The main crux of the finding is that workers in this low end of the earnings distribution are holding jobs specific to their occupations for which there is a very low of cost

TABLE 4.4.--Difference in Relative Shares of Union and Nonunion Earnings by Deciles, National Longitudinal Survey, 1969 and 1971 (in percent)

Earnings Rank	1969			1971		
	Union (1)	Non-Union (2)	Difference (1) - (2)	Union (4)	Non-Union (5)	Difference (4) - (5)
Lowest Decile	4.06	4.17	-.11	3.95	4.04	-.06
2nd Decile	5.49	5.62	-.13	5.47	5.58	-.11
3rd Decile	6.64	6.70	-.06	6.67	6.72	-.05
4th Decile	7.62	7.52	-.10	7.66	7.56	.10
5th Decile	8.51	8.32	.18	8.53	8.44	.09
6th Decile	9.32	9.03	.29	9.41	9.25	.16
7th Decile	10.15	9.95	.20	10.32	10.98	.23
8th Decile	11.67	11.64	.03	11.70	11.55	.15
9th Decile	13.98	14.00	-.02	14.13	14.23	-.10
Highest Decile	22.56	23.05	-.49	22.16	22.54	-.38
Percent	100	100		100	100	

TABLE 4.5.--Occupational Incidence by Deciles, National Longitudinal Survey, 1969

Earnings Rank	Professionals (1)	Managerials (2)	Sales (3)	Clerical (4)	Craftsmen (5)	Operatives (6)	Services (7)	Laborers (8)	Other* (9)	Total (10)
Lowest Decile	2.85	2.85	2.14	3.56	11.74	26.33	22.06	27.40	1.07	100
2nd Decile	2.85	7.83	2.85	4.27	14.95	28.47	18.86	19.57	0.35	100
3rd Decile	3.90	4.25	5.67	6.74	16.67	27.30	18.44	16.31	0.72	100
4th Decile	2.84	3.90	3.55	7.80	23.05	30.85	12.77	14.89	0.35	100
5th Decile	5.00	5.00	3.93	10.00	24.29	32.85	8.93	9.64	0.36	100
6th Decile	4.29	5.71	3.57	12.14	31.43	30.36	4.64	6.79	1.07	100
7th Decile	7.50	5.71	3.21	11.07	35.71	27.50	1.43	7.14	0.73	100
8th Decile	16.01	16.73	4.63	6.41	36.30	11.03	3.56	4.98	0.35	100
9th Decile	19.00	17.20	5.38	6.81	37.63	9.32	1.43	3.23	0.00	100
Highest Decile	35.59	31.32	5.69	3.20	18.51	3.56	1.42	0.00	0.71	100

*Farmers

TABLE 4.6.--Occupational Incidence by Deciles, National Longitudinal Survey, 1971

Earnings Rank	Professionals (1)	Managerials (2)	Sales (3)	Clerical (4)	Craftsmen (5)	Operatives (6)	Services (7)	Laborers (8)	Other* (9)	Total (10)
Lowest Decile	2.26	3.02	3.40	3.40	8.68	25.66	23.02	29.43	1.13	100
2nd Decile	3.38	5.64	3.38	5.20	14.66	28.57	22.18	16.17	0.82	100
3rd Decile	2.26	5.26	4.14	7.52	22.56	24.06	16.92	16.92	0.36	100
4th Decile	4.14	4.14	2.63	6.02	22.18	37.22	11.65	12.00	0.02	100
5th Decile	5.30	5.68	3.03	9.85	31.06	26.14	7.95	10.23	0.76	100
6th Decile	5.30	6.06	2.27	9.09	32.58	30.31	6.44	6.82	1.13	100
7th Decile	7.98	7.60	1.90	12.17	33.84	25.10	3.42	7.60	0.39	100
8th Decile	11.03	11.79	3.42	9.51	33.84	20.15	3.04	6.84	0.38	100
9th Decile	20.75	22.64	4.15	5.65	36.60	6.04	1.51	1.89	0.77	100
Highest Decile	28.79	35.61	6.44	3.41	18.56	3.41	1.52	0.00	2.26	100

*Farmers

of information and search, which have no screening barrier, and for which there is some prevalent or "natural" wage accepted by both the employers and the unorganized workers. This implicit acceptance of some prevalent wage is equivalent to the union standard rate.[13] Hence, as with the union rate, there is little variation in differences in the wage structure of the lower earners group. This homogeneity in wages, coupled with a relatively low level of unionism, tends to push the lower end of the Lorenz curve toward the line of total equality. The heterogeneity found in the higher wage earners group derives from prior intensive investment in human capital and acquired skill. Indeed, in the highest decile the mean level of education is about 13.2 years, which reflects the large concentration of professionals and managers, two occupations wherein the level of organization is low. On the other hand, craftsmen are concentrated strongly in the upper deciles, and union membership is correspondingly at its highest. Hence, union's cumulative shares tend to be greater than nonunion's. Consequently, the Lorenz curve for union earnings lie closer to the line of equality in the upper deciles.

The Gini coefficients for the union and nonunion earnings distributions are obtained from the estimated functional form of the Lorenz curve discussed in Section 2.5. Table 4.7 shows the results of the estimated coefficients with their corresponding standard errors. The existence of asymptotic standard errors allows statistical testing. The Gini value for union earnings was approximately .265 and .264 in 1969 and 1971 respectively, as for nonunion earnings it was .267 and .265. In other words, union earnings provide a more

TABLE 4.7.--Estimates of Lorenz Curves and Gini Coefficients, National Longitudinal Survey, 1969 and 1971

	Overall Earnings (1)	Union Earnings (2)	Nonunion Earnings (3)
1969			
$\hat{\alpha}$	.7372	.7301	.7081
	(.0057)	(.0041)	(.0042)
$\hat{\beta}$	.8060	.8139	.8344
	(.0062)	(.0045)	(.0050)
Gini	.26517	.26496	.26724
	(.00014)	(.00015)	(.00036)
1971			
$\hat{\alpha}$	.7493	.7429	.7246
	(.0039)	(.0039)	(.0031)
$\hat{\beta}$	.7950	.8020	.8196
	(.0042)	(.0043)	(.0035)
Gini	.26400	.26377	.26507
	(.00013)	(.00016)	(.00017)

NOTE: Figures in Parentheses are asymptotic Standard Errors

equal distribution among recipients than nonunion earnings. Furthermore, over the two-year span, the magnitudes of the relevant Gini coefficients tend to decrease. Since the standard errors for the relevant estimated Gini coefficients are known, it is possible to test the hypothesis that the difference between UNION and NONUNION Gini coefficients is zero. The values of the t-statistics are 5.84 and 5.57 in 1969 and 1971, respectively.[14] This shows that the UNION Gini is statistically different from NONUNION Gini, and that the former is smaller than the latter.

4.6 Conclusion

In analyzing the impact of unionism on the distribution of earnings of the older male cohort, we have found the following results. The relative earnings differential due to unionism within that age group is about 16 percent to 18 percent on the average. This differential varies by industry and by occupation. It is greater than 50 percent in the construction industry and is negligible in manufacturing, and within occupations the differential among operatives gravitates around 45 percent to 50 percent, while it is not significant among craftsmen.

The separate cumulative distributions of union and nonunion earnings, and the subsequent fitting of Lorenz curves show a more equal distribution of the nonunion earnings in the lower deciles than the upper deciles. The Gini coefficients obtained by estimating a functional form of the Lorenz curve show that the distribution of union earnings is relatively more equal than that of nonunion earnings over both years.

FOOTNOTES: CHAPTER IV

[1]This aspect of the problem of finding jobs does not consider discrimination by employers against older job applicants.

[2]Arvil V. Adams, "Earnings and Employment of Middle Aged Men: A Special Study of Their Investment in Human Capital," in The Pre-Retirement Years Vol. 4, ed.: Parnes et al., Manpower Research Monograph No. 15.

[3]One explanation is that such programs may be the result of the enforcement of fair employment practices legislation.

[4]Yoram, Ben-Porath, "The Production of Human Capital and the Life Cycle of EArnings," Journal of Political Economy 75 (August 1967): 352-365.

[5]Sherwin Rosen, "Trade Union, Power, Threat Effects and the Extent of Organization," Review of Economic Studies 36 (April 1969): 185-196.

[6]George E. Johnson and K. C. Youmans, "Union Relative Wage Effects--by Age and Education," Industrial and Labor Relation Review 25 (January 1971): 171-179.

[7]An F test has been carried out for the two sets of location variables. Results show that both sets have a highly significant effect on earnings with F values greater than 25.0.

[8]This percentage differential is obtained by taking the (antilog of $\hat{6}$) minus one, where $\hat{6}$ is the estimated coefficient on unionism.

[9]However, this differential is still 2.5 percentage points higher than the one estimated from the more heterogenous sample used in Chapter III.

[10]Rosen, op. cit.

[11]See Richard B. Freeman, "Individual Mobility and Union Voice in the Labor Market," American Economic Review Papers and Proceedings, 66 (May 1976): 361-368.

[12]Attempts to estimate union effects by deciles do not provide any significant results. Dummy variables which capture the interaction between unionism and each decile are also incorporated into the regression equation. The resulting coefficients are highly overestimated.

[13]Workers at this lower earnings scale are also influenced by minimum wage legislation.

[14]We again assume the covariance of the estimates of the Gini coefficients to be equal to zero.

CHAPTER V

THE NATIONAL LONGITUDINAL SURVEY: DISAGGREGATED ESTIMATES

5.1 Introduction

Changing employment patterns within the U. S. economy over the past decade have had an impact on the industrial composition of union membership. Employment in the manufacturing sector, where unions have traditionally been strongest, has remained relatively stable since 1962, while employment in service-producing industries, including government, has increased by 41 percent.[1] Thus, it is not entirely coincidental that unions have made their most sizable gains in the government and nonmanufacturing sectors. Since 1956, only in the government sector have unions consistently gained both in absolute numbers and as a percentage of total employment. Union membership in the manufacturing sector, which had stabilized around 46.7 percent of the total organized work force, declined significantly, beginning 1970, to 42.8 percent in 1972.[2] Union membership in nonmanufacturing has increased mainly due to the higher demand for employment in services. Indeed, the strongest relative gains are in service oriented industry groups and in contract construction, while there are some losses in wholesale and retail trade and in transportation over the same time period.[3]

Taking into consideration the patterns of union membership in the aggregate, the sample of older male workers from Chapter IV is divided into two main industry groups which are further subdivided into blue collar occupations. Section 5.2 provides the estimated union-nonunion earnings differential in the manufacturing and non-manufacturing sectors, section 5.3 looks at the union incidence and relative shares by earnings deciles, and finally, Gini coefficients for both union and nonunion earnings are determined in Section 5.4.

5.2 Union-Nonunion Earnings Differential

Equation (28) is again used to fit the separate samples. Using the same control variables for both industry groups, the union-nonunion earnings differential is estimated and is presented in Table 5.1. The various regression coefficients for the different control variables are relegated to the Appendix.

Within the manufacturing sector, union workers held a 6.30 percent advantage over otherwise identical workers in 1969. This gap increased to 9.43 percent in 1971. The latter figure tends to reflect the inherent rigidity of union contracts. Theoretically, excess labor supply during economic downturns will cause nonunion wages to decline faster than union wages, as employers not parties to collective bargaining agreements--frequently of two to three year duration--are able to react more quickly to labor market changes. Hence, unionism shows its intrinsic power in time of relatively high unemployment.

Organized production workers--craftsmen, operatives and nonfarm laborers--in manufacturing had a 8.12 percent edge over

TABLE 5.1.--Union-Nonunion Earnings Differentials in Manufacturing and Nonmanufacturing, National Longitudinal Survey, 1969 and 1971

Year	Manufacturing		Nonmanufacturing		
	Overall	Blue Collar	Overall	Blue Collar	White Collar
1969	.0629	.0812	.3184	.4787	.0245
1971	.0943	.0863	.2760	.4210	.0563

unorganized workers in 1969. This union-nonunion earnings differential remained at the 8 percent level in 1971. The stability in the differential can again be explained by the spillover enjoyed by unorganized workers. Indeed, in 1969, 62 percent of the blue collar workers in manufacturing were unionized, while in 1971 the sample showed that the degree of unionism remained high, at 57 percent. The threat of unionism may induce nonunion employers to raise wages above the competitive wage rate. Moreover, the presence of unionism in one part of an industry may result in increased wages not only in that part of the industry, but also in related manufacturing industries. Within this institutional framework, nonunionized workers do accumulate some strong and uninterrupted externalities from unionism which push the level of wages above that of a more competitive and less concentrated sector. Also, besides the potential relative wage advantage due to union membership, the typical worker may benefit from the influence of the union on the nonpecuniary aspects of his work attachment, especially through grievance procedures and seniority systems. One of the factors which explains the narrowing gap in manufacturing wages in union and nonunion plants in the same industry is the greater improvement of nonwage benefits in union than in nonunion plants. There are a number of studies in the industrial relations literature showing that nonpecuniary factors are a key determinant in the worker's decision to join a union.[4,5] Almost all of the U. S. steel workers interviewed by the aforementioned authors do not state receiving

higher wages as a reason for joining unions, but believe that unions are a conduit for correcting personal grievances and that union procedures could eliminate any bad work experience.

By contrast, the nonmanufacturing sector shows a 31.8 percent union-nonunion earnings differential in 1969 which declined to 27.6 percent in 1971.[6] This is a marked difference from the widening gap in union-nonunion differential found in the manufacturing sector for the latter year. This decline in differential is not due to a change in the average degree of unionization for it remains constant at 32 percent over the two year span. Rather this may suggest, on the one hand, a gain of the nonunion sector in spite of unfavorable market conditions, and on the other hand, because of the diversity of the nonmanufacturing sector and hence of the various union bargaining units, unionism may be weaker than otherwise. The gain from the nonunion side can be seen from the occupational mix of the nonmanufacturing sector; there is a relatively high number of professionals and managers along with clerical sales, services, and public workers for whom earnings are determined by the level of education, job tenure, and personal characteristics and/or shift in demand due to change in industrial mix rather than based on piece rate and working conditions. As the sample is narrowed down to encompass only blue collar workers, the union-nonunion differential remains above 40 percent over the two years. In this case, there is lesser variation in earnings due to homogeneity in the sample and strong spillovers from unionism in the blue collar

occupations. Furthermore, unionized white collar workers in non-manufacturing industries earned about 2.4 percent more than their nonunionized counterparts in 1969, and this differential increased to 5.6 percent in 1971. At the same time, the unionization rate among blue collar workers went from 18 percent to 22 percent over the two-year span.

One result which stands out from Table 5.1 is the significantly large magnitude of the union-nonunion differential in non-manufacturing relative to the manufacturing sector.[7] It should be emphasized that comparisons between the two industrial groups are misleading at best. The problem arises due to: (a) conceptual differences between union membership and collective bargaining coverage, and (b) inaccuracy in the measurement of variables.

The fact that an individual belongs to a union cannot have much effect on his earnings. What counts is the extent of union membership within a worker's place of employment and the extent of collective bargaining coverage among the firms with which his employer must compete.[8] Presumably most union members are in organized plants so union membership would be a good proxy for the ability of the union to influence the terms of employment set by the employer. On the other hand, union membership would not be a very good proxy for the extent of unionism within the industry, since there are many industries in the nonmanufacturing sector with substantial numbers of both union and nonunion plants. Hence, it is a weak variable for determining the power of a union in an organized

plant to raise wages without taking into account the interdependence among combined effects of union membership and the extent of collective bargaining, and the inclusion only of union status as an explanatory variable in the earnings equation understates the true relationship.

The other problem arises from the very broad groupings of industries. The introduction of dummies for such categories as "wholesale and retail trade" or "services" cannot possibly capture industry characteristics like plant size or employment growth. Hence, some of the earnings difference that we attribute to unionism is actually due to other industry characteristics. This difference is much wider in nonmanufacturing than in manufacturing. While the grouping "manufacturing" is quite broad, it provides more internal homogeneity than such diverse and heterogeneous classifications as mining, construction, transportation, services, and public administration which constitutes the nonmanufacturing sector.

In summary, union workers in manufacturing have a 6 to 9 percent edge in earnings over nonunion workers while those in nonmanufacturing have a 28 to 47 percent advantage, with organized production workers having the greatest gain.

5.3 Union and Nonunion Relative Shares

Using the estimated union-nonunion earnings differentials presented in Table 5.1, union and nonunion earnings for both the manufacturing and nonmanufacturing sectors are determined. From these values their respective relative shares are computed and

presented in Table 5.4 to 5.7. Crucial to the determination of earnings and shares is union membership at each earnings decile. Table 5.2 and 5.3 show the incidence of unionism by earnings bracket for both the 1969 and 1971 years.

As the sample is dichotomized into the manufacturing and nonmanufacturing sectors and each is further narrowed down for production workers, the distribution of union membership over the spectrum of earnings follows a nearly flat, slightly skewed bell shape curve with a mode centered around the sixth or seventh decile. In general, in both years, union membership in manufacturing shows a very steep decline within the highest decile with approximately 7 percent of the sample; this is expected, as only relatively high-paying white collar jobs are found in the top decile. In 1971, however, the overall level of union membership in manufacturing showed a substantial decline from what it was in 1969 with some aberrations at the sixth and eighth deciles. This trend has been observed in the aggregate and also in the overall sample which is reported in Chapter IV. As for production workers, there is a relatively smaller percentage of union workers in the two lowest and highest deciles. Overall, the percentage of organized blue collar workers is relatively high, greater than 50 percent, and is equally distributed through the third to ninth deciles. Again, the declining trend in union incidence is also observed for the latter year. This high incidence of unionism in the blue-collar sample explains the relative stability of union-nonunion earnings differentials which derives from the large spillover effects.

TABLE 5.2.--Incidence of Unionism by Deciles in Manufacturing and Nonmanufacturing, National Longitudinal Survey, 1969 (in percent)

Earnings Rank	Manufacturing		Nonmanufacturing		
	Overall	Blue Collar	Overall	Blue Collar	White Collar
Lowest Decile	24.0	22.4	2.7	3.2	3.4
2nd Decile	48.1	44.7	9.3	7.5	10.2
3rd Decile	63.5	67.1	18.1	17.2	21.8
4th Decile	77.0	72.4	31.9	30.1	25.3
5th Decile	71.2	77.3	39.0	46.7	32.3
6th Decile	66.3	77.3	56.0	56.5	32.2
7th Decile	67.3	77.3	45.1	71.7	21.8
8th Decile	52.0	68.0	43.4	59.8	18.4
9th Decile	35.0	69.3	42.3	68.5	11.5
Highest Decile	6.8	49.3	29.3	83.7	10.3

TABLE 5.3.--Incidence of Unionism by Deciles in Manufacturing and Nonmanufacturing, National Longitudinal Survey, 1971 (in percent)

Earnings Rank	Manufacturing		Nonmanufacturing		
	Overall	Blue Collar	Overall	Blue Collar	White Collar
Lowest Decile	16.3	12.5	2.4	2.3	3.6
2nd Decile	49.0	51.4	10.0	9.3	12.0
3rd Decile	58.2	59.7	18.2	12.8	17.1
4th Decile	62.9	61.1	37.1	39.5	40.2
5th Decile	64.9	62.5	37.6	39.5	30.5
6th Decile	68.0	65.3	44.1	52.3	39.0
7th Decile	64.9	74.6	54.1	60.5	29.3
8th Decile	56.7	70.4	43.5	60.5	24.4
9th Decile	32.0	66.2	44.1	64.0	18.3
Highest Decile	7.2	45.1	30.0	80.0	9.8

The nonmanufacturing sector, as expected, is comparatively less unionized. In the first three deciles fewer than 20 percent of the workers are unionized, with only 2 percent in the lowest. In the highest decile about 30 percent of the workers are unionized, a relative decline from the middle earnings bracket. However, from 1969 to 1971, there was a noticeable increase in the unionization level in the first and last four deciles, while there was a decline in the fifth and sixth decile. This pattern follows the trend of unionization found in the aggregate. By contrast, the disaggregation of the sample shows that the unionization level for production workers increases as one moves up the earnings scale, culminating at 84 percent at the highest decile in 1969. Overall, there was a decline in union incidence within the ranks of blue collar workers in 1971, an observed general trend. The high percentage of unionized workers in the upper deciles and especially in the highest decile may be due to the concentration of craftsmen and other highly skilled production workers within that earnings bracket. Indeed, a frequency count of blue collar workers shows a steep increase in the number of craftsmen past the fifth decile, while operatives and laborers drop in number as one moves up in deciles. In contrast, the unionization level among white collar workers in nonmanufacturing varies from 3 percent in the lowest decile to 39 percent in the sixth decile with a slight increase in 1971.

Taking the different incidence of unionism in each decile as weights, mean union and nonunion earnings are computed. The

relative shares of both components of earnings are shown in Tables 5.4 and 5.5. The data presented in Tables 5.4 and 5.5 for the manufacturing grouping show a small but noticeable increase in relative shares for both union and nonunion earnings in almost all the deciles with the exception of the highest decile. Between 1969 and 1971, union workers in the highest decile had their shares decreased by 1.13 percent of the total. During this same period nonunion workers in the highest decile saw their share declined by 1.03 percent. In other words, there was a redistribution of earnings away from the highest decile within the manufacturing sector. A different pattern of temporal change in relative shares emerges for production workers in manufacturing. In the period 1969-1971, there was a substantial decrease in the proportion of union and nonunion earnings in the four lowest deciles, followed by an increase in the four highest deciles. This V-shape pattern which centers at the fifth decile is engendered in part by the distribution of occupational categories such as laborers, operatives, and craftsmen over the earnings range and in part by market conditions. Unskilled and semi-skilled workers tend to be concentrated at the lower end of the earnings scale and are most adversely affected by an economic slow-down whether they are unionized or not. On the other hand, highly skilled workers, who tend to be concentrated in the upper deciles and protected by long tenure, high cost of search and firm specific training, are somewhat less influenced by market conditions.

TABLE 5.4.--Relative Shares of Union and Nonunion Earnings by Deciles in Manufacturing and Nonmanufacturing, National Longitudinal Survey, 1969 (in percent)

Earnings Rank	Manufacturing				Nonmanufacturing					
	Overall		Blue Collar		Overall		Blue Collar		White Collar	
	Union	Nonunion	Union	Nonunion	Union	Nonunion	Union	Nonunion	Union	Nonunion
Lowest Decile	4.54	4.60	5.15	5.15	3.71	3.85	4.15	4.70	3.64	3.64
2nd Decile	6.17	6.18	6.96	7.09	5.14	5.32	5.55	6.29	5.01	5.01
3rd Decile	7.16	7.10	8.17	8.15	6.28	6.46	6.66	7.48	5.99	5.99
4th Decile	7.93	7.78	8.94	8.87	7.30	7.38	7.83	8.60	7.01	7.01
5th Decile	8.54	8.42	9.52	9.41	8.29	8.27	8.75	9.16	7.98	7.97
6th Decile	9.14	9.04	10.08	9.95	9.34	8.91	9.87	9.94	8.97	8.96
7th Decile	9.87	9.76	10.75	10.65	10.36	10.19	10.65	10.35	10.40	10.40
8th Decile	11.18	11.18	11.42	11.39	12.03	11.87	12.08	11.98	12.01	12.01
9th Decile	13.29	13.41	12.86	12.81	14.50	14.36	14.60	13.86	14.54	14.55
Highest Decile	22.18	22.54	16.15	16.38	23.05	23.39	19.86	17.64	24.44	24.45

TABLE 5.5.--Relative Shares of Union and Nonunion Earnings by Deciles in Manufacturing and Nonmanufacturing, National Longitudinal Survey, 1971 (in percent)

	Manufacturing				Nonmanufacturing					
	Overall		Blue Collar		Overall		Blue Collar		White Collar	
	Union	Nonunion	Union	Nonunion	Union	Nonunion	Union	Nonunion	Union	Nonunion
Lowest Decile	4.59	4.68	5.07	5.22	3.57	3.69	3.89	4.33	3.53	3.54
2nd Decile	6.26	6.26	6.84	6.90	5.10	5.26	5.43	6.03	4.88	4.89
3rd Decile	7.28	7.22	8.03	8.03	6.27	6.43	6.80	7.54	5.89	5.90
4th Decile	7.95	7.85	8.78	8.78	7.33	7.35	7.81	8.27	6.94	6.90
5th Decile	8.67	8.53	9.51	9.49	8.40	8.40	8.95	9.47	8.00	7.98
6th Decile	9.39	9.21	10.28	10.24	9.44	9.33	9.98	10.15	9.05	9.01
7th Decile	10.08	9.92	10.83	10.66	10.49	10.13	11.04	10.87	10.28	10.27
8th Decile	11.28	11.20	11.53	11.41	12.01	11.88	12.18	11.98	12.06	12.06
9th Decile	13.45	13.62	12.82	12.74	14.52	14.35	14.32	13.87	15.00	15.00
Highest Decile	21.05	21.51	16.31	16.53	22.87	23.18	19.60	17.49	24.38	24.45

As for the nonmanufacturing sector, there is again a similarity in the temporal change among deciles for both union and nonunion earnings. In 1971 the relative shares for both components of earnings declined in the three lowest deciles and in the highest decile. Specifically, between 1969 and 1971 union workers in the lowest three deciles had their shares decreased by 0.19 percent of the total while the share of the top decile declined by 0.18 percent. During the same period nonunion workers in the lowest three deciles saw their shares decline by 0.25 percent, while the share of the top decile declined by 0.21 percent. In other words, the middle and upper earnings classes have gained, with the nonunion sector having the greatest fluctuation. Regarding unionized blue collar workers, those who fell within the lowest two deciles had their earnings shares drop by 0.38 percent over the two-year span, while comparable nonunionized blue collar workers suffered a 0.63 percent loss in shares. Moreover, in the same period, union workers in the top two deciles experienced a 0.54 percent decrease in their shares, while nonunion workers had only a 0.14 percent decline.[9] As for the white collar workers in nonmanufacturing, there is not much difference between the relative shares received by unionized and nonunionized workers. The unionization level among these nonproduction workers in each decile is relatively low. Also, there is a similarity in temporal changes in shares for both the union and nonunion sector. From 1969 to 1971 the general pattern was that the middle and upper earnings classes

showed the greatest gain in relative shares. However, in the highest decile there was no change in shares for the nonunion sector and a slight decrease for the union sector. It seems, therefore, that, in nonmanufacturing at least, poor nonunionized blue collar workers, due to the lack of saleable skills and the unavailability of externalities generated by strong unions, are affected the most by adverse market conditions. Well-paid blue collar workers' earnings do not benefit from unionism. This may come about as unionism is not aiming at raising wages for already highly paid craftsmen but at improving working conditions and other nonpecuniary factors. On the other hand, white collar workers in the middle and upper earnings brackets, whether they are unionized or not, consistently gain in shares.

In this section we observe that from 1969 to 1971 within the manufacturing sector relative earnings shares increased over almost all earnings classes with the exception of the highest decile. During the same period only blue-collar workers who were in the upper earnings brackets had their shares increased. In contrast, the nonmanufacturing sector showed a decline in earnings shares at both ends of the earnings spectrum with the poorer blue-collar workers being most sensitive to economic fluctuations.

5.4 Lorenz Curves and Inequality

Since relative earnings shares for organized and unorganized workers in a given year do not follow any recognizable pattern, the comparison between union and nonunion earnings is best carried out

by an analysis of their cumulative shares. The distribution of these shares among workers provides an insight into the role played by unionism over the earnings spectrum. Figures 5.1 to 5.10 show the Lorenz curves relating cumulative shares to the cumulative percentage of workers for the manufacturing and nonmanufacturing sectors and their respective blue collar subgroups. At first glance, the respective Lorenz curves for union and nonunion earnings intersect each other, with the exception for those production workers in nonmanufacturing. In this latter category the nonunion Lorenz curve is everywhere above the union curve, lying closer to the line of perfect equality. A closer perusal of the graphes reveals that Lorenz curves for nonunion earnings systematically intersect union Lorenz curves from above. The points of intersection in most of the cases are located below the fifth decile. In manufacturing the nonunion Lorenz curve lies above the union curve up to the fourth decile for both years.[10] As remarked in Chapter IV, this is due to: (a) the high concentration of unskilled workers at the lower end of the earnings scale, (b) the implementation of a "prevalent wage," determined mainly by the worker's ability to carry out a task rather than by any other personal characteristics such as education or manual skills, and (c) the lower incidence of unionism in the lower deciles. Similarly, in nonmanufacturing nonunion Lorenz curves intersect union curves from above between the fifth and sixth decile. In other words, in both industrial classifications, nonunion earnings have a more equal distribution

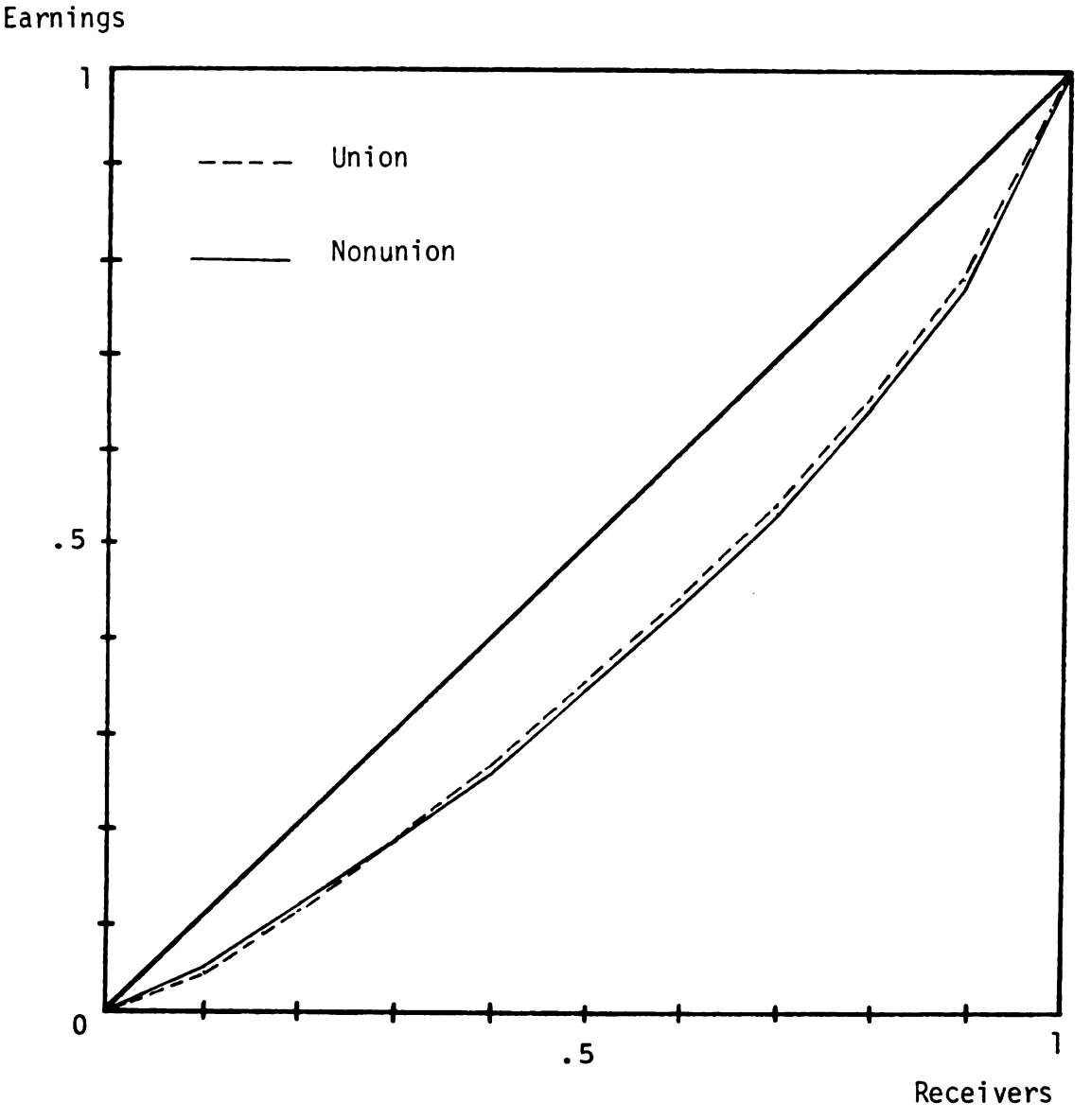

Figure 5.1.--Lorenz Curves for Union and Nonunion Earnings, Manufacturing, National Longitudinal Survey, 1969.

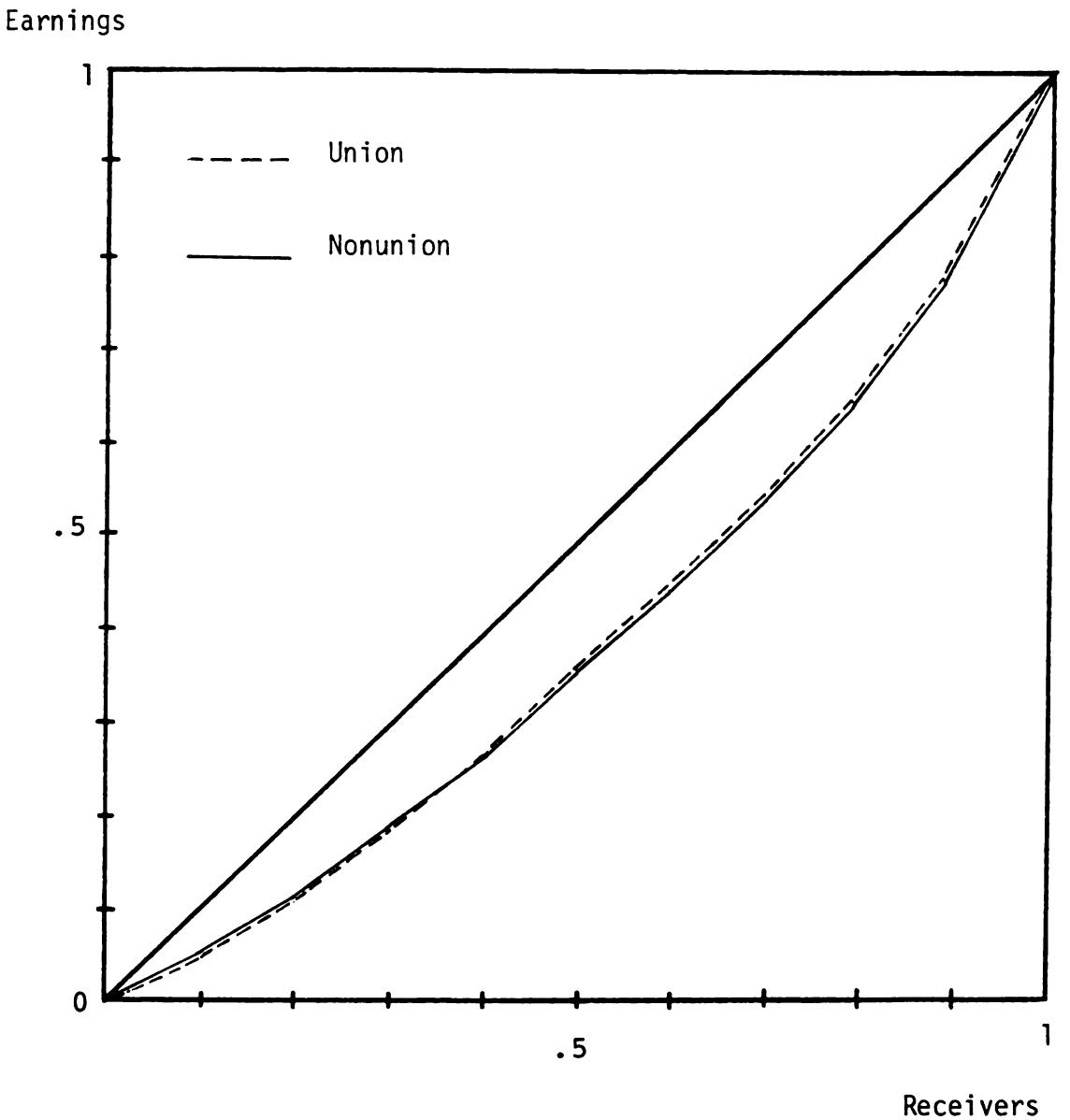

Figure 5.2.--Lorenz Curves for Union and Nonunion Earnings, Manufacturing, National Longitudinal Survey, 1971.

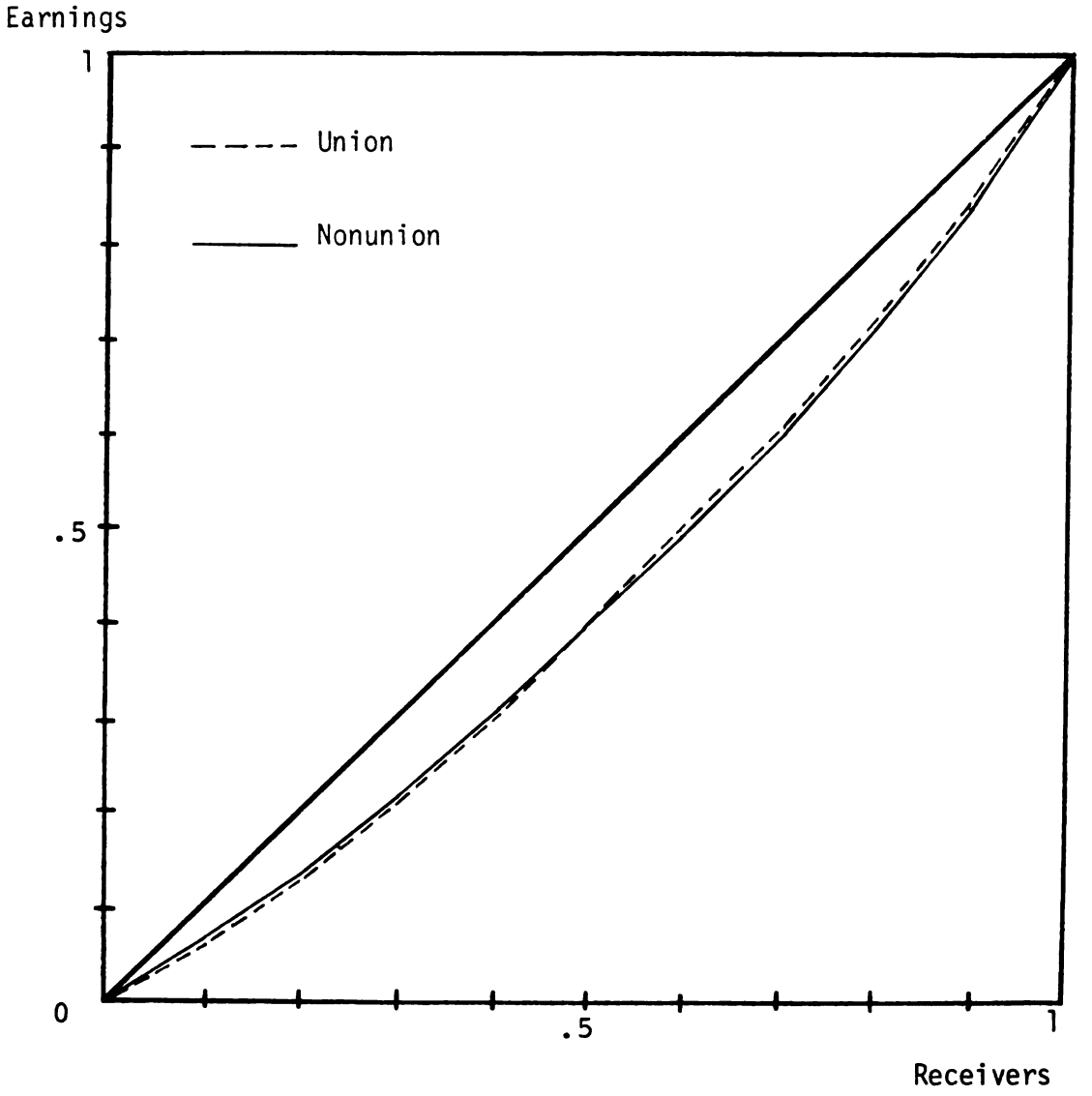

Figure 5.3.--Lorenz Curves for Union and Nonunion Earnings, Blue Collar Workers in Manufacturing, National Longitudinal Survey, 1969.

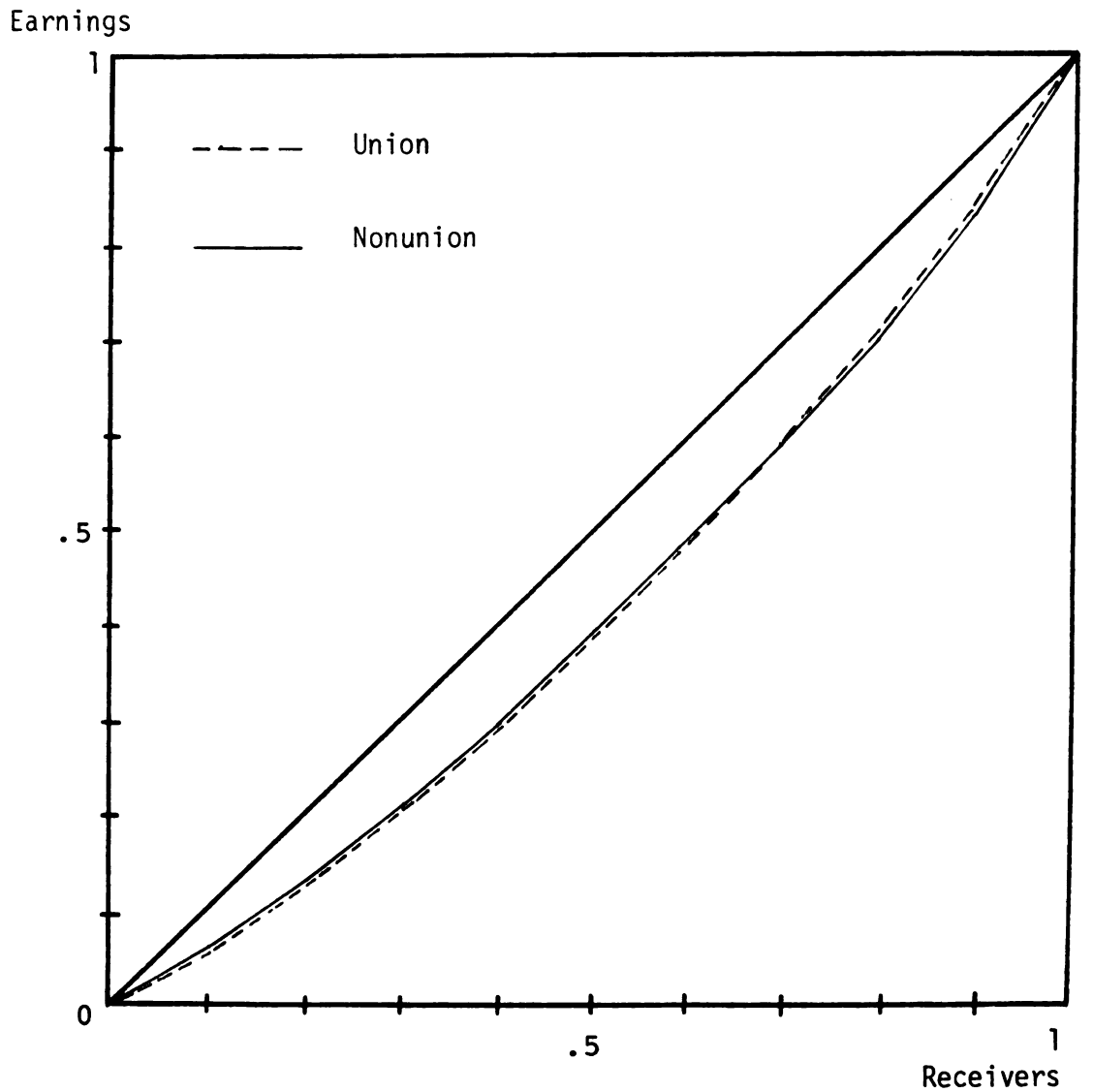

Figure 5.4.--Lorenz Curves for Union and Nonunion Earnings, Blue Collar Workers in Manufacturing, National Longitudinal Survey, 1971.

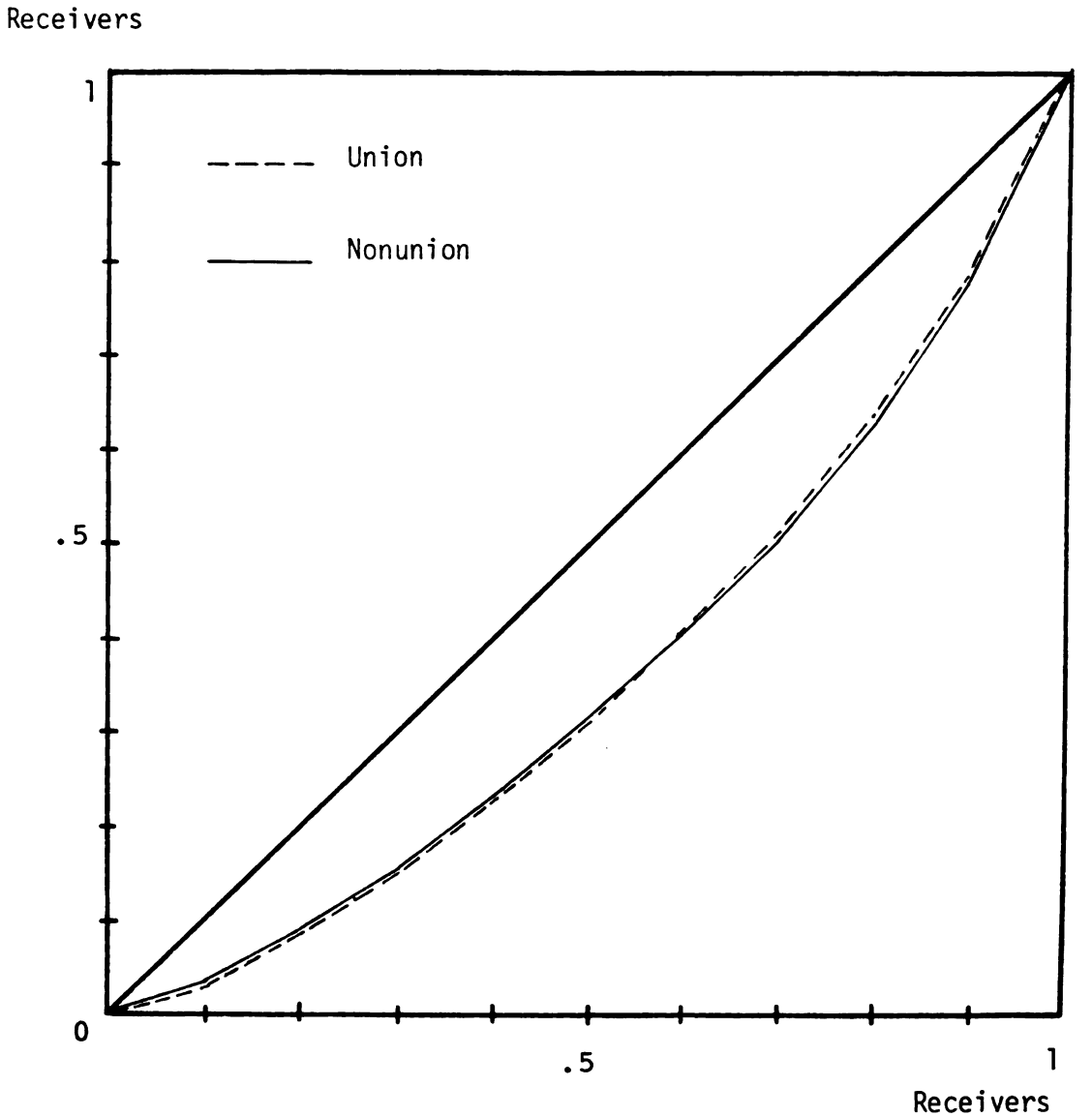

Figure 5.5.--Lorenz Curves for Union and Nonunion Earnings, Nonmanufacturing, National Longitudinal Survey, 1969.

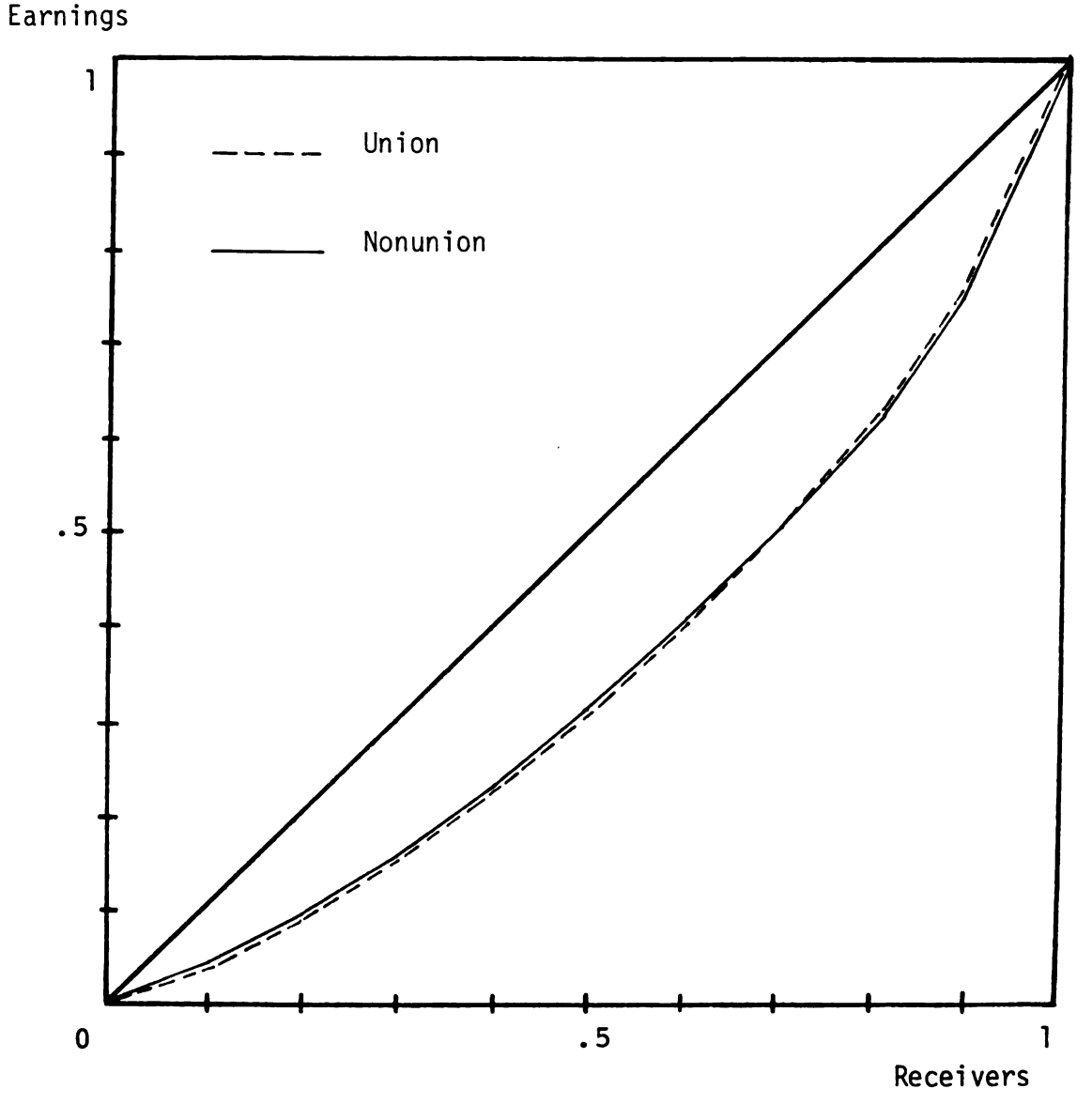

Figure 5.6.--Lorenz Curves for Union and Nonunion Earnings, Nonmanufacturing, National Longitudinal Survey, 1971.

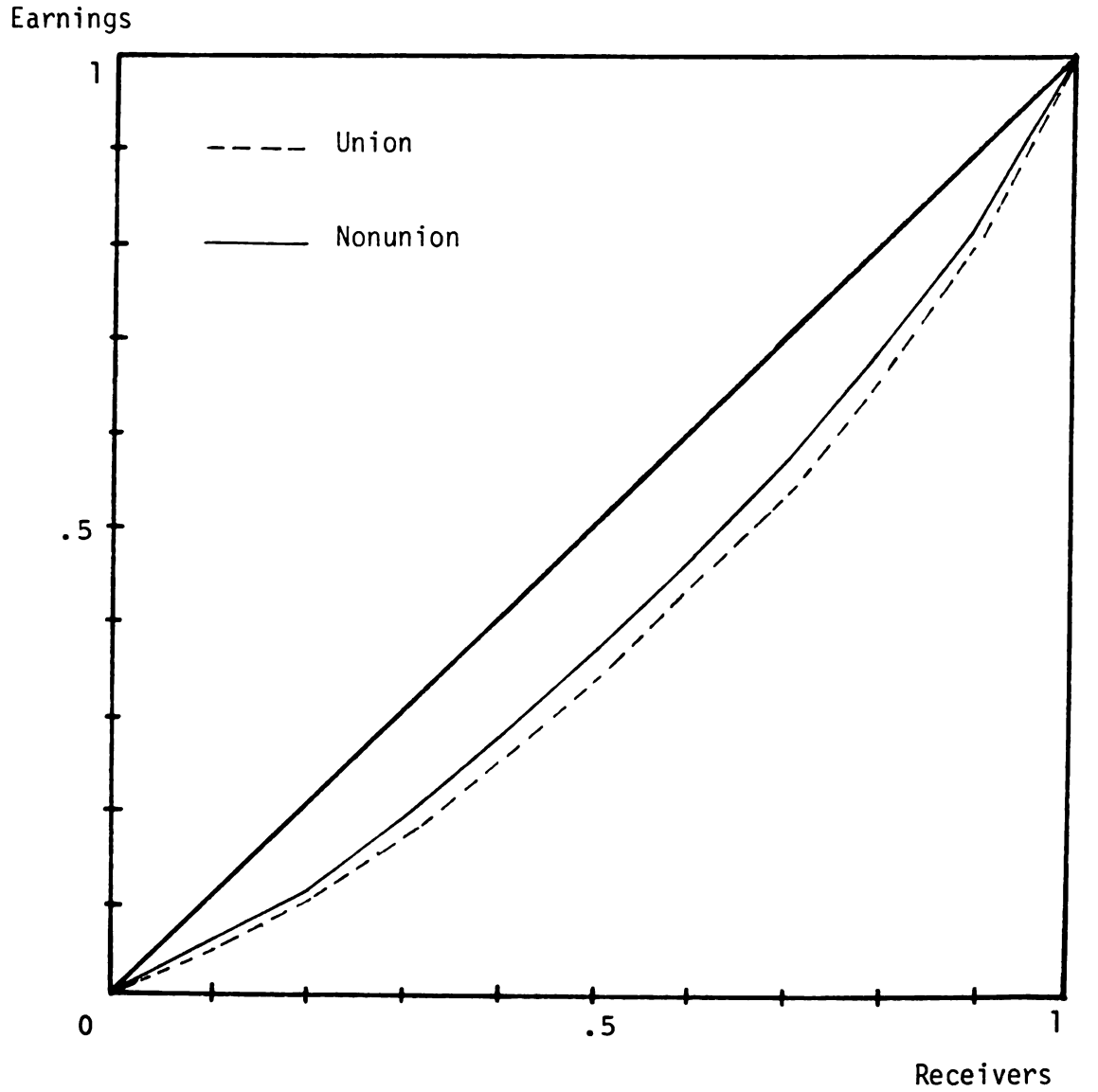

Figure 5.7.--Lorenz Curves for Union and Nonunion Earnings, Blue Collar Workers in Nonmanufacturing, National Longitudinal Survey, 1969.

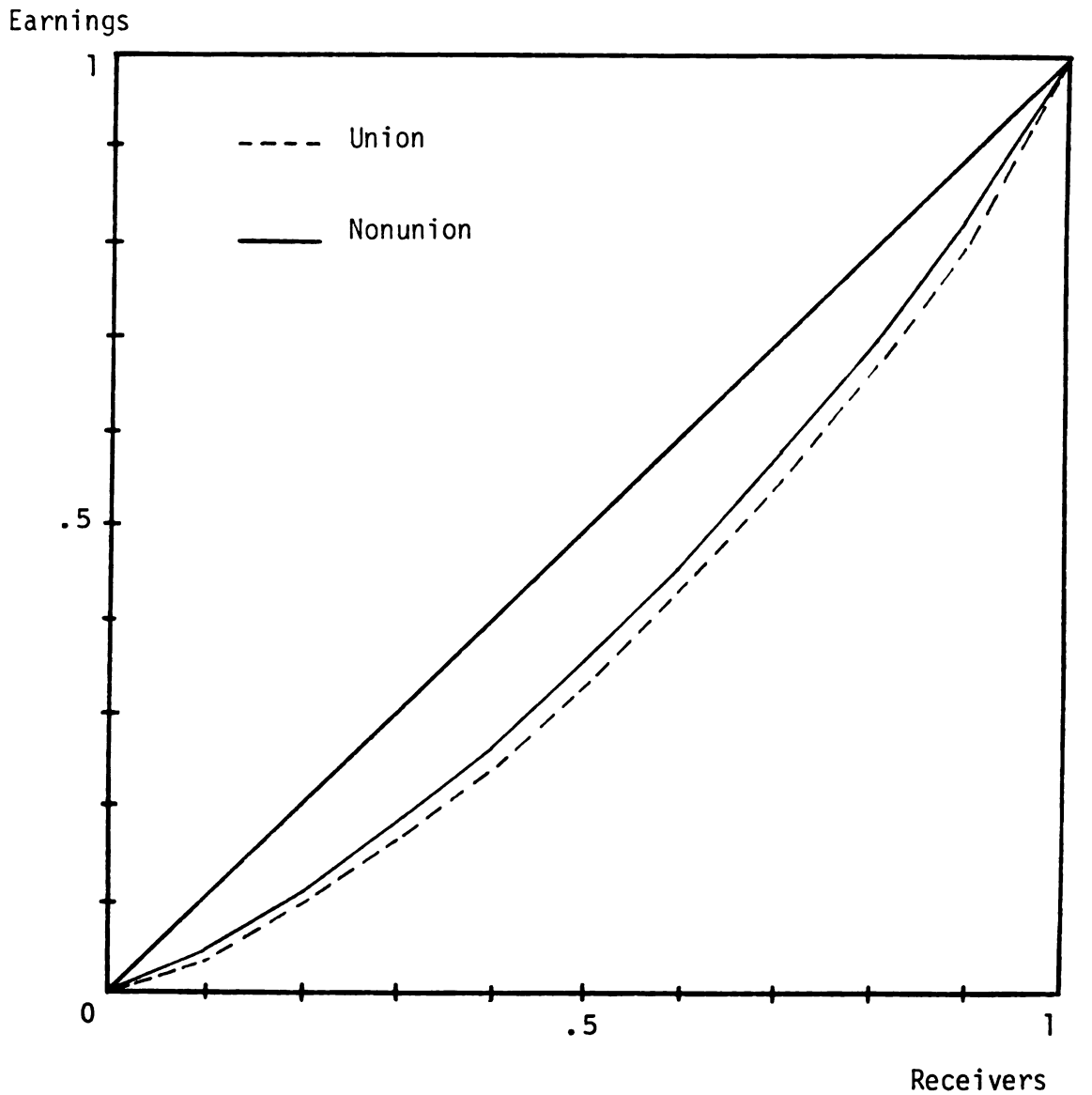

Figure 5.8.--Lorenz Curves for Union and Nonunion Earnings, Blue Collar Workers in Nonmanufacturing, National Longitudinal Survey, 1971.

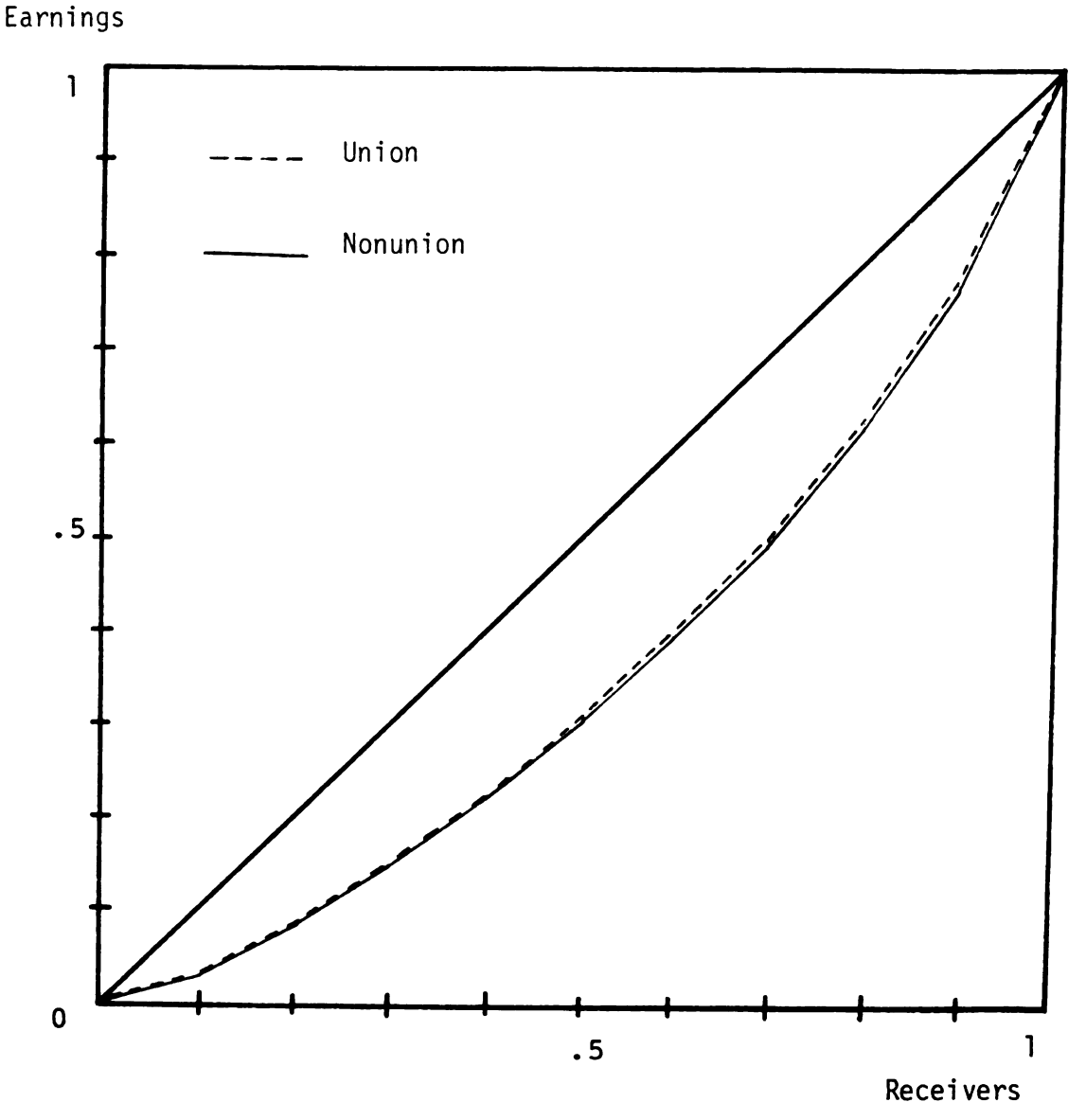

Figure 5.9.--Lorenz Curves for Union and Nonunion Earnings, White Collar Workers in Nonmanufacturing, National Longitudinal Survey, 1969.

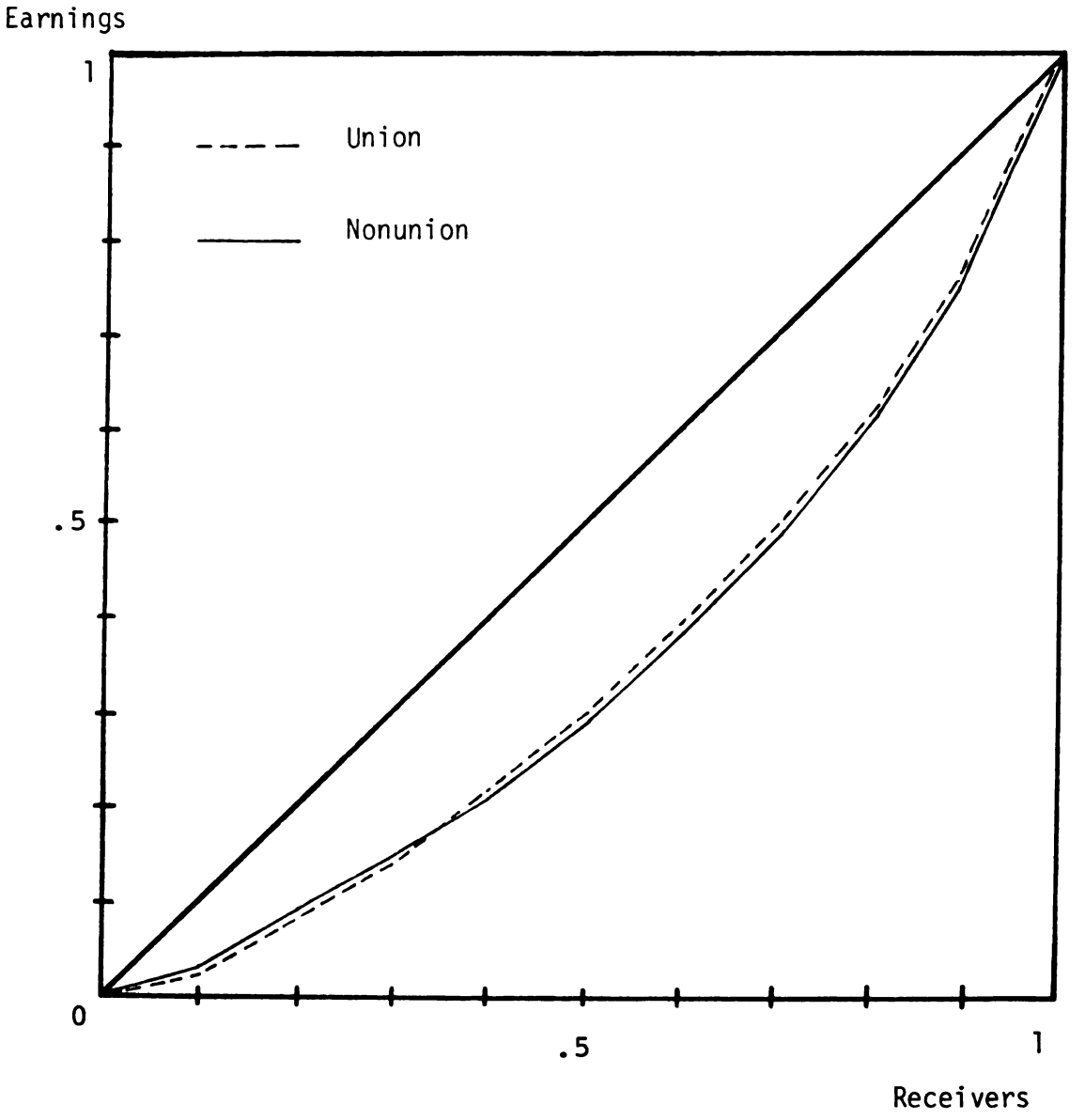

Figure 5.10.--Lorenz Curves for Union and Nonunion Earnings, White Collar Workers in Nonmanufacturing, National Longitudinal Survey, 1971.

in the lower deciles, while union earnings, which are based on standard rates, have a more equal distribution within the upper deciles.[11] However, one startling result is found for the production workers in nonmanufacturing. The Lorenz curves which fit nonunion earnings for both years do not intersect the union curves and are completely and everywhere above them, lying closer to the line of perfect equality. This is due primarily to the smaller percentage of unionized workers found in the lower earnings deciles, which consequently generates a higher relative shares for nonunion earnings in a given decile up to the sixth decile. The subsequent cumulative effect of earnings shares allows nonunion workers to enjoy a more equal distribution in earnings.

The functional form of the different Lorenz curves is estimated via the nonlinear method discussed in Chapter II, and the respective Gini coefficients, a measure of inequality in the distribution of earnings, are reported in Table 5.6 for both years. The Gini coefficients for union earnings in manufacturing are smaller than those of nonunion earnings. In 1969, for example, the union coefficient is .2396 compared to .2439 for the nonunion coefficient at the same time the average hourly earnings are $4.03 and #3.97, respectively.[12] The coefficients of both earnings for blue collar workers in manufacturing were approximately the same with a value of .1642 to .1647 in 1969 and their respective hourly earnings were $3.47 and $3.36.

TABLE 5.6.--GINI Coefficients for Union and Nonunion Earnings in Manufacturing and Nonmanufacturing, National Longitudinal Survey, 1969 and 1971

	Manufacturing		Nonmanufacturing		
	Overall	Blue Collar	Overall	Blue Collar	White Collar
1969					
Union	.23959 (.00253)	.16472 (.00105)	.28490 (.00039)	.24678 (.00107)	.30249 (.00073)
Nonunion	.24391 (.00307)	.16422 (.00081)	.28165 (.00059)	.20163 (.00148)	.30270 (.00107)
Overall	.23837 (.00139)	.16515 (.00135)	.28928 (.00053)	.25323 (.00101)	.30220 (.00101)
1971					
Union	.22991 (.00149)	.16990 (.00074)	.28495 (.00055)	.24593 (.00047)	.30794 (.00080)
Nonunion	.23462 (.00155)	.16842 (.00166)	.28140 (.00075)	.20745 (.00055)	.30885 (.00072)
Overall	.22804 (.00148)	.17019 (.00075)	.28869 (.00071)	.24966 (.00120)	.30740 (.01041)

NOTE: Figures in Parentheses are Asymptotic Standard Errors.

Gini coefficients for earnings in nonmanufacturing show that nonunion workers enjoy a slightly more equal distribution, with a value of .2816, than do union workers, with .2849 in 1969. The nonunion hourly earnings in that year was $3.51 and that of union was $3.64. On the other hand, nonunionized blue collar workers in manufacturing show a significantly smaller Gini coefficient of .2016 than that of unionized workers, which is .2468. The average hourly earnings for this nonmanufacturing subgroup is about $3.17 for the unionized blue collar workers and $2.79 for the nonunionized workers. In contrast, the 1969 Gini coefficients obtained from the earnings distributions of white collar workers in nonmanufacturing showed a value of .3025 for the union sector and a value of .3086 for the nonunion sector. This implies that union earnings in this subgroup has a more equal distribution than nonunion earnings. Also, both unionized and nonunionized white collar workers earned about $4.31 an hour in 1969. As for the 1971 earnings distributions within the two industrial and occupational classifications, the same general pattern was found. The average hourly earnings in 1971 ranged from $3.67 for unionized blue collar workers in nonmanufacturing to $4.90 for unionized white collar workers.

The basis for the above results is primarily the level of unionization within each earnings bracket. In manufacturing, for example, the incidence of unionism is nearly 50 percent at the second decile and stays above 60 percent up to the ninth decile. The high incidence of unionism provides: (a) a greater share in

union earnings, (b) some degree of spillover enjoyed by nonunionized production workers in manufacturing, a fact which renders the distribution of earnings in the latter group more equal. On the other hand, the level of unionization in nonmanufacturing does not reach 50 percent until the sixth decile even for production workers. Although unionization reaches 80 percent in the top decile, it is not enough to compensate for the cumulated earnings shares generated by the nonunion sector.

5.5 Conclusion

In this chapter we have divided the sample into two main groups: manufacturing and nonmanufacturing. These groups are further subdivided into production workers and white collar workers. A regression equation is fitted for the different samples to estimate the union-nonunion earnings differentials. In manufacturing, despite the presence of strong unions, the differential between union and nonunion earnings is about 6 to 9 percent, while in nonmanufacturing this differential varies widely from 2 to 48 percent. The causes underlying the two sets of estimates are probably (a) a high degree of externalities generated by strong unions in manufacturing, especially among production workers; (b) a somewhat greater level of internal homogeneity in manufacturing relative to nonmanufacturing; (c) an inherent inability of dummy variables to reflect the characteristics of the wide range of industries in nonmanufacturing. Further, the regression understates the dual effect of unionism in determining employment demand and collective

bargaining as a tool for raising wages. These two effects would presumably be correlated for the economy as a whole, but the disaggregation of the sample may have understated the true relationship in the population.

From the estimates of earnings differentials, both components of union and nonunion earnings are determined for each earnings deciles taking into account the incidence of unionism as weights. As expected, the level of unionization is low at both ends of the earnings spectrum, while blue-collar workers tend to be highly unionized within the upper deciles. The subsequent determination of the cumulative earnings shares for the two types of workers allow the tracing of Lorenz curves via a new functional form of the Pareto density and the computation of Gini coefficients. The results show that union workers in manufacturing have a more equal distribution in earnings than their nonunion counterparts. This difference in inequality disappears in the case of production workers. By contrast, nonunion workers in nonmanufacturing have a slightly more equal distribution of earnings than union workers. This gap is greater still for production workers.

CHAPTER V: FOOTNOTES

[1]U. S. Bureau of Labor Statistics, Employment and Earnings, February, 1973.

[2]See U. S. Bureau of Labor Statistics, Directory of National Unions and Employee Association, 1973 (Table 15, p. 79). Ten industry groups experienced declines but the most substantial loss in membership was registered in the fabricated metal product industry due primarily to a shift in the industrial composition of the steelworkers.

[3]Ibid., p. 79.

[4]Joel Seidman, et al., The Worker Views His Union (Chicago: University of Chicago Press, 1958), and "Why Workers Join Unions," Annals of the American Academy of Political and Social Science 274 (March 1951): 75-84.

[5]E. Wight Bakke, "Why Workers Join Unions," in Readings in Labor Economics and Industrial Relations, ed: Joseph Shister (Philadelphia: Lippincott, 1956).

[6]This may stem from the actions of the Construction Industry Stabilization Committee.

[7]We may look at this difference as mainly that between Construction and manufacturing industries.

[8]Leonard Weiss, "Concentration and Labor Earnings," American Economic Review 56 (March 1966): 96-117. Also, members of the labor seminar at the Center for Human Resource Research, the Ohio State University, have pointed this problem out to me.

[9]Nonunionzed blue collar workers in nonmanufacturing within the fourth decile also have their earnings shares decreased by 0.33 percent over the two year span.

[10]The Lorenz curves for production workers intersect at somewhat higher earnings bracket, between the fifth and sixth decile.

[11]Figures 5.9 and 5.10 show that the union and nonunion Lorenz curves for the white collar workers in nonmanufacturing to be tangent to each other up to the fifth decile.

[12]The values for the various hourly earnings are determined from the sample.

CHAPTER VI

SYNTHESIS AND RECONCILIATION OF TWO SAMPLES

6.1 Introduction

This study has attempted to show, for two microeconomic data sets, the union effect on the size distribution of earnings. The relative effect of unionism is first estimated via a regression equation fitted to two samples. Then from the weighted average earnings, union and nonunion earnings are derived. Finally, relative shares and union incidence are analyzed via two Lorenz curves which provide the basis for a measure of inequality.

Results obtained with the Survey of Working Conditions show that the relative earnings differential due to unionism is about 13 percent on the average. This differential varies by industry and by occupation. It is about 32 percent in the construction industry and is negligible in manufacturing, and within occupations, the differential among craftsmen and operatives is not significant. The union effect on the size distribution, on the other hand, is not large enough to provide a more equal distribution of earnings for union members relative to unorganized workers.

Results obtained with the National Longitudinal Survey of mature men show that for them, the relative earnings differential due to unionism is about 16 to 18 percent on the average. This

differential varies by industry and by occupation. It is greater than 50 percent in construction industry and is negligible in manufacturing, and within occupations, the differential among operatives gravitates around 45 to 50 percent while it is not significant among craftsmen. As for the impact of unionism on the size distribution, the distribution of earnings is relatively more equal than that of nonunion over the 1969 to 1971 time span.

Results obtained from breaking down the National Longitudinal Survey sample show that union effect on relative wages ranges from 6 to 9 percent in manufacturing and from 2 to 48 percent in nonmanufacturing. The earnings differential for production workers is about 8 percent in the former sector and about 45 percent in the latter. Unionized white collar workers have about 3 percent edge in earnings on their nonunionized counterparts. Union workers in manufacturing have a more equal distribution of earnings than their nonunion counterparts. This difference in inequality disappears when production workers alone are considered. However, in nonmanufacturing, nonunion workers' earnings are more equally distributed than those of unions, and this is more true for production workers.

The seemingly paradoxical results derived from the Survey of Working Conditions (SWC) and the National Longitudinal Survey (NLS) can be explained by the difference in homogeneity between the two samples. The latter sample is less heterogeneous in age and sex than the former. To reconcile both samples, an attempt is made to investigate only certain age groups within the Survey of Working Conditions.

6.2 The Survey of Working Conditions: Older Workers

As discussed in Chapter III, the Survey of Working Conditions of 1969 aimed at assessing work-related problems experienced by employed people. The surveyed workers ranged from 16 years old to those who were about to retire. In order to have a group of data which is comparable to the National Longitudinal Survey, the Survey of Working Conditions is disaggregated into three subsamples by age groups. One encompasses workers who are at least 35 years old, the other two comprise workers who are at least 40 years old and at least 45 years old. Equation (27) is fitted for each subsample. The estimated relative effect of unionism on earnings for each age group is presented in Table 6.1.[1] The union-nonunion earnings

TABLE 6.1.--Union-Nonunion Earnings Differentials for Three Age Groups in the Survey of Working Conditions, 1969

Age		
35 and above	40 and above	45 and above
.0791	.0987	.1190

differential for those workers who were at least 35 years old was about 8 percent in 1969. This value increased to 12 percent when workers who were at least 45 years old were investigated.[2] The larger union differential obtained from the older workers is discussed previously in Section 4.1. By comparison, the estimated union-nonunion differential obtained from the NLS' older cohort of men is

about 16 to 18 percent. The discrepancy in union relative wage effects in the two samples comes from the better specification of the regression equation fitted to the SWC data. In other words, the effect of unionism on earnings has been controlled by explanatory variables depicting working conditions.[3] Hence, the marginal effect of union status will be lessened.

The lack of sufficient observations in the subsamples comprising 40 and 45 years old workers, does not allow a meaningful analysis of relative shares by deciles. Hence, only the subsample of 35 year old workers is used. From this subsample, union and nonunion hourly earnings are determined and their respective values were $3.60 and $3.55 in 1969. From these values their respective relative shares are computed and presented in Table 6.3. Crucial to the determination of earnings and shares is the union membership at each earnings bracket. Table 6.2 shows the incidence of unionism by earnings bracket for the 35 year old plus subsample.

The distribution of union membership over the spectrum of earnings follows a flat and skewed bell-shape curve with a mode centered at the eighth decile. In the lowest decile only 12 percent of the workers are unionized, while in the eighth decile the unionization rate peaks at 60 percent. Most interesting is the unionization rate of 33.3 percent found in the third, fourth, and fifth deciles. In the highest decile only 25 percent of the workers are unionized, a result which is prevalent in all samples. Since older workers tend to join the unions more often, the incidence of unionism found

TABLE 6.2.--Incidence of Unionism by Deciles Among Workers with Age 35 Years and Above, Survey of Working Conditions, 1969 (in percent)

Earnings Rank	Unionization Rank
Lowest Decile	11.6
2nd Decile	27.5
3rd Decile	33.3
4th Decile	33.3
5th Decile	33.3
6th Decile	53.6
7th Decile	57.4
8th Decile	60.3
9th Decile	45.6
Highest Decile	25.0

in this subsample is relatively higher than that found in the overall SWC sample, and is more similar to that in the NLS.

The relative shares of both components of earnings are shown in Table 6.3. In order to compare relative shares, column 3 provides the resulting difference between nonunion and union earnings shares. The results do show some symmetry in the relative effect of union shares about the fifth decile. In deciles lower than the fifth, the earnings shares of nonunionized workers are about .04 percentage points greater than those of unionized workers. However, beginning with the sixth decile unionized workers' shares predominate, culminating at .17 percentage point above nonunion shares. This is again due to the concentration of craftsmen within the upper middle class, and union incidence is also at its highest. In the highest decile, however, with the decline in union membership and the greater concentration of professionals, nonunion earnings shares are .20 percentage points greater than union shares.

The relationship between the cumulative distribution of earnings and the cumulative distribution of earners as portrayed by the Lorenz curve is presented in Figure 6.1. The Lorenz curve for the nonunion earnings distribution lies above that of union up to some interval between the sixty and seventy cumulative percentage points of receivers. As previously found in all samples, the distribution of union earnings is less equal up to the sixth decile and is more equal in the four highest deciles. The Gini coefficients for the union and nonunion earnings distributions are again obtained from the estimated functional form of the Lorenz curve

TABLE 6.3.--Relative Shares of Union and Nonunion Earnings by Deciles for the Sample of Workers with Age 35 Years and Above (in percent)

Earnings Rank	Union (1)	Nonunion (2)	Difference (2) - (1)
Lowest Decile	3.80	3.85	.05
2nd Decile	5.05	5.09	.04
3rd Decile	6.08	6.11	.03
4th Decile	7.17	7.21	.04
5th Decile	8.27	8.31	.04
6th Decile	9.51	9.43	-.08
7th Decile	10.52	10.40	-.08
8th Decile	12.09	11.92	-.17
9th Decile	13.90	13.87	-.03
Highest Decile	23.61	23.81	+.20
Percent	100	100	

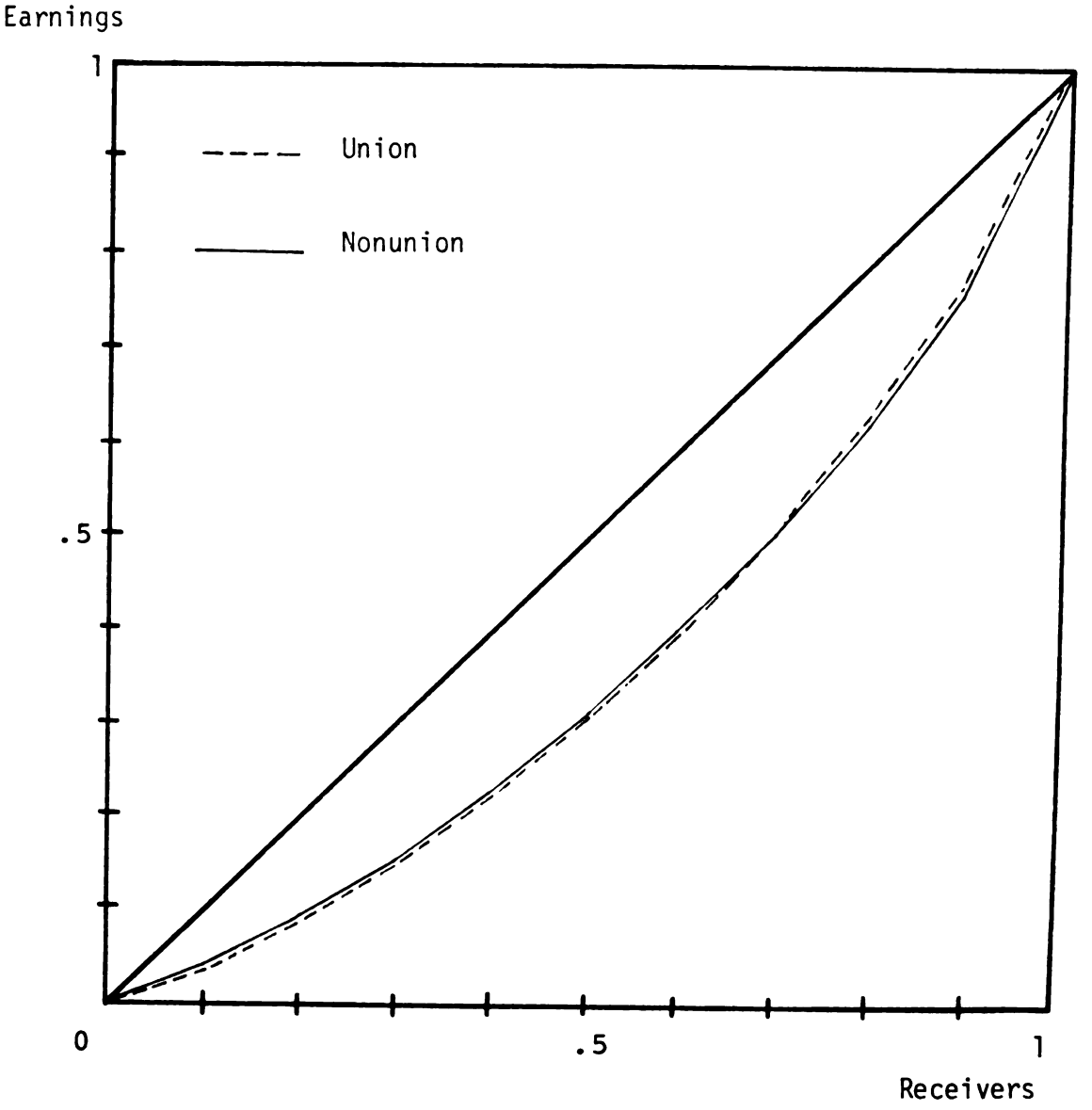

Figure 6.1.--Lorenz Curves for Union and Nonunion Earnings, 35 Years Old and Above, Survey of Working Conditions, 1969.

discussed in Section 2.5. Table 6.4 shows the results of the estimated coefficients with their standard errors. The Gini value for union earnings is approximately .287 with an asymptotic standard error of .001. As for nonunion earnings, it is also .287 and again with a standard error of .001. By contrast, as reported in Table 3.5, the Gini coefficients derived from the overall SWC sample are .274 and .271 with nonunion earnings distribution having the smaller value.[4] In other words, as the Survey of Working Conditions is disaggregated to include only workers who are at least 35 years old, but with the greater incidence of unionism among workers, union earnings tend to provide a more equal distribution among recipients. For a more homogeneous sample, such as the National Longitudinal Survey of older cohort of men, the distribution of union earnings is unequivocally more equal than that of nonunion earnings.

In summary, the disaggregation of the overall SWC sample sheds some light on the relative effect of unionism on earnings at different age levels. The union-nonunion earnings differential is greater among older workers, and this is complemented by a higher incidence of unionism within each earnings decile. Gini coefficients, derived from the sample of workers who are at least 35 years old, show that the distribution of union earnings is equal to that of nonunion earnings.

6.3 Conclusion

The seemingly disparate results on the union effect on the size distribution of earnings have two basic underlying causes,

TABLE 6.4.--Estimates of Lorenz Curves and Gini Coefficients for the Sample of Workers with Age 35 Years and Above, Survey of Working Conditions, 1969

	Overall Earnings (1)	Union Earnings (2)	Nonunion Earnings (3)
$\hat{\alpha}$	.7323 (.0061)	.7303 (.0063)	.7216 (.0062)
$\hat{\beta}$	.7757 (.0073)	.7781 (.0072)	.7885 (.0064)
GINI	.28817 (.00191)	.28701 (.00122)	.28702 (.00112)

NOTE: Figures in parentheses are asymptotic standard errors.

namely: (1) the union's ability to raise wages, thus yielding some threat on nonunion employers; and (2) the pattern of union incidence among earnings deciles. As previously discussed, the sample for the mature workers is less heterogeneous than the wider range of data obtained from the Survey of Working Conditions, thus allowing a stronger union effect. This is upheld by the difference in magnitude of the estimated union-nonunion proportionate advantage from both samples and by the difference in union incidence within earnings deciles. Thus, the union shares obtained from the older cohort are in general greater than those obtained from the survey of Working Conditions and it follows that the cumulative shares of the former are greater than the latter. As the overall sample of the Survey of Working conditions is disaggregated to provide some degree of homogeneity in age, cumulative union earnings shares are equal to cumulative nonunion earnings shares. In other words, homogeneity in the sample and higher incidence of unionism lead to higher cumulative union earnings shares and finally to a more equal distribution of earnings among unionized recipients.

Granting that unionism raises wages, the reduction in the unequal distribution of earnings lies essentially on (1) the high percentage of unionized workers at each earnings brackets and hence on the union shares and (2) on the homogeneity in age of the sample. To the extent that homogeneity in age contributes to equality of the earnings distribution, homogeneity in individual characteristics, e.g., skill, within strongly unionized industries and occupations

will have a similar effect. In the present study, unions do have a significant impact in reducing inequality in the size distribution of earnings.

CHAPTER VI: FOOTNOTES

[1]The complete regression equations can be found in the Appendix.

[2]The greater differential found in the older age group is also discussed in G. E. Johnson and K. C. Youmans, "Union Relative Wage Effects by Age and Education," Industrial and Labor Relation Review 25 (January 1971): 171-179.

[3]Indeed, the adjusted R^2 for the SWC's 45 year old sub-sample is .565, while it is .472 for the NLS's sample.

[4]The smaller magnitude of these Gini coefficients is due to a larger sample.

APPENDIX

TABLE A.1.--Hourly Earnings Regressions, National Longitudinal Survey, Disaggregated Data, 1969
(Absolute value of standard errors in parentheses)

Explanatory Variables	Manufacturing All	Means	Manufacturing Blue Collar	Means	Nonmanufacturing All	Means	Nonmanufacturing Blue Collar	Means	Nonmanufacturing White Collar	Means
Constant	1.3192 (.3998)		1.4332 (.4608)		1.0587 (.3473)		.3372 (.5205)		.4251 (.4922)	
Union	.0610 (.0216)	.511	.0781 (.0209)	.620	.2764 (.0213)	.322	.3911 (.0246)	.451	.0242 (.0393)	.186
Experience	-.0422 (.0189)	38.24	-.0369 (.0227)	39.02	-.0265 (.0164)	38.52	.0123 (.0253)	40.23	.0021 (.0251)	36.71
Experience^2	.000581 (.000241)		.000439 (.000285)		.000286 (.000209)		-.000201 (.000311)		-.00013 (.00033)	
Married, Spouse	.0849 (.0680)	.905	.1334 (.0652)	.889	.2436 (.0501)	.859	.2767 (.0624)	.846	.2569 (.0830)	.874
Married, No spouse	.0389 (.0754)	.076	.0602 (.0726)	.088	.2011 (.0566)	.106	.2401 (.0701)	.118	.1719 (.0946)	.092
Education	.0314 (.0043)	9.65	.0186 (.0047)	8.82	.0229 (.0411)	9.80	.0154 (.0052)	8.11	.0535 (.0060)	11.59
Black	-.0792 (.0267)	.244	-.1153 (.0254)	.285	-.1085 (.0252)	.280	-.1799 (.0304)	.333	-.1811 (.0412)	.223
Occupational Training	.0968 (.0314)	.110	.1099 (.0349)	.088	.0696 (.0292)	.123	.1989 (.0524)	.054	.0546 (.0385)	.196
Health	-.0626 (.0259)	.159	-.0615 (.0265)	.166	-.0557 (.0238)	.183	-.0582 (.0307)	.179	-.0909 (.0384)	.187

TABLE A.1.--Continued

Explanatory Variables	Manufacturing All	Means	Manufacturing Blue Collar	Means	Nonmanufacturing All	Means	Nonmanufacturing Blue Collar	Means	Nonmanufacturing White Collar	Means
Regions										
Central City	.1173 (.0255)	.386	.1098 (.0257)	.412	.1221 (.0235)	.405	.1061 (.0291)	.403	.1514 (.0397)	.408
Greater SMSA	.1475 (.0252)	.367	.1784 (.0259)	.323	.1654) (.0243)	.307	.1162 (.0311)	.257	.2278 (.0399)	.359
North and East	.1177 (.0282)	.300	.1295 (.0298)	.285	.0814 (.0260)	.248	.0692 (.0340)	.224	.0631 (.0409)	.273
North Central	.1539 (.0269)	.362	.1890 (.0279)	.376	.0608 (.0254)	.257	.0545 (.0321)	.268	.0475 (.0416)	.245
West	.1713 (.0353)	.124	.1902 (.0372)	.119	.1066 (.0295)	.116	.1737 (.0386)	.153	.0052 (.0464)	.171
Occupations										
Professionals	.4436 (.1398)	.090			.2830 (.1128)	.105				
Managers	.4797 (.1407)	.072			.3679 (.1107)	.116				
Sales	.4116 (.1565)	.014			.1435 (.1138)	.057				

TABLE A.1.--Continued

Explanatory Variables	Manufacturing All	Means	Manufacturing Blue Collar	Means	Nonmanufacturing All	Means	Nonmanufacturing Blue Collar	Means	Nonmanufacturing White Collar	Means
Clerical	.1013 (.1402)	.055			.0653 (.1116)	.081				
Craftsmen	.1557 (.1357)	.276			.1532 (.1081)	.235				
Operatives	.0089 (.1351)	.377			-.0618 (.1091)	.140				
Laborers	-.0538 (.1387)	.072			-.1047 (.1095)	.133				
Services	-.1149 (.1422)	.038			-.1535 (.1096)	.125				
N	1038		753		1785		907		865	
$\bar{R}^2$	.4864		.3075		.4134		.4052		.3322	

TABLE A.2.--Hourly Earnings Regressions, National Longitudinal Survey, Disaggregated Data, 1971
(Absolute value of standard errors in parentheses)

Explanatory Variables	Manufacturing All	Means	Manufacturing Blue Collar	Means	Nonmanufacturing All	Means	Nonmanufacturing Blue Collar	Means	Nonmanufacturing White Collar	Means
Constant	1.4710 (.4395)		1.5765 (.5333)		1.5775 (.3877)		.3582 (.6206)		.7176 (.5519)	
Union	.0901 (.0210)	.480	.0828 (.0218)	.568	.2437 (.0218)	.325	.3513 (.0267)	.425	.0548 (.0379)	.225
Experience	-.0397 (.0200)	40.10	-.0381 (.0251)	40.74	-.0326 (.0177)	40.44	.0094 (.0286)	42.05	.0043 (.0271)	38.81
Experience^2	.00050 (.00024)		.000456 (.000301)		.000320 (.000210)		-.000105 (.000334)		-.00021 (.00034)	
Married Spouse	.1150 (.0682)	.886	.0488 (.0696)	.866	.2065 (.0509)	.844	.2246 (.0683)	.820	.2929 (.0797)	.877
Married No Spouse	.0765 (.0738)	.096	.0371 (.0754)	.112	.0989 (.0568)	.119	.0631 (.0746)	.144	.1827 (.0928)	.093
Education	.0278 (.0044)	9.62	.0243 (.0051)	8.90	.0235 (.0042)	9.76	.0285 (.0056)	8.12	.0457 (.0063)	11.44
Black	-.0590 (.0262)	.241	-.1066 (.0270)	.266	-.0825 (.0259)	.273	-.0994 (.0323)	.321	-.2116 (.0423)	.225
Occupational Training	.0967 (.0314)	.104	.1468 (.0373)	.088	.0251 (.0303)	.127	.0677 (.0546)	.057	.0316 (.0405)	.196
Health	-.0374 (.0240)	.187	-.0415 (.0264)	.200	-.0825 (.0231)	.226	-.0586 (.0306)	.223	-.1458 (.0374)	.226

TABLE A.2.--Continued

Explanatory Variables	Manufacturing All	Means	Manufacturing Blue Collar	Means	Nonmanufacturing All	Means	Nonmanufacturing Blue Collar	Means	Nonmanufacturing White Collar	Means
Regions										
Central City	.1149 (.0246)	.383	.1235 (.0268)	.389	.1508 (.0241)	.390	.1603 (.0310)	.385	.1310 (.0405)	.397
Greater SMSA	.1589 (.0246)	.358	.1984 (.0271)	.330	.1814 (.0250)	.303	.1590 (.0329)	.262	.2171 (.0408)	.346
North East	.1307 (.0282)	.306	.1275 (.0320)	.302	.0931 (.0270)	.244	.0982 (.0362)	.233	.0308 (.0428)	.255
North Central	.1720 (.0268)	.373	.1921 (.0302)	.386	.0799 (.0265)	.248	.0749 (.0353)	.239	.0288 (.0423)	.257
West	.1597 (.0358)	.121	.1483 (.0409)	.117	.1301 (.0298)	.171	.1691 (.0398)	.168	.0398 (.0474)	.175
Occupations										
Professionals	.4078 (.1141)	.076			.1259 (.1167)	.100				
Managers	.5252 (.1143)	.072			.1957 (.1150)	.128				
Sales	.5686 (.1423)	.010			-.1004 (.1197)	.049				

TABLE A.2.--Continued

Explanatory Variables	Manufacturing All	Means	Manufacturing Blue Collar	Means	Nonmanufacturing All	Means	Nonmanufacturing Blue Collar	Means	Nonmanufacturing White Collar	Means
Clerical	.0419 (.1151)	.056			-.1188 (.1169)	.081				
Craftsmen	.1056 (.1099)	.309			.0227 (.1139)	.223				
Operatives	-.0389 (.1096)	.367			-.1715 (.1151)	.146				
Laborers	-.1330 (.1149)	.061			-.2684 (.1156)	.137				
Services	-.1045 (.1173)	.042			-.3153 (.1152)	.130				
N	971		715		1675		846		817	
$\bar{R}^2$	.5094		.3026		.4282		.3755		.3581	

TABLE A.3.--Hourly Earnings Regressions, Various Age Groups, Working Conditions Data, 1969 (Absolute value of standard errors in parentheses)

Explanatory Variables	35 and above	40 and above	45 and above
Constant	.3667 (.1564)	.2650 (.2269)	-.2195 (.3687)
Union	.0761 (.0295)	.0941 (.0332)	.1124 (.0369)
Experience	.0173 (.0073)	.0204 (.0111)	.0455 (.0175)
Experience^2	-.00030 (.00011)	-.00034 (.00015)	-.00065 (.00022)
Education	.0526 (.0063)	.0525 (.0069)	.0520 (.0076)
Female	-.4978 (.0328)	-.5027 (.0371)	-.5091 (.0424)
Black	-.0101 (.0492)	-.0239 (.0594)	-.0438 (.0680)
SMSA	.1334 (.0304)	.1466 (.0339)	.1434 (.0383)
South	-.1640 (.0345)	-.1402 (.0387)	-.1406 (.0445)
Working Conditions			
Fast Work	.0390 (.0327)	.0079 (.0367)	.0525 (.0412)
Freedom	.0566 (.0273)	.0558 (.0305)	.0679 (.0343)
Skill	.0752 (.0291)	.0884 (.0324)	.0621 (.0361)
Hard Work	.0457 (.0332)	.0371 (.0370)	.1247 (.0415)
Physical	-.0891 (.0337)	-.0620 (.0372)	-.0667 (.0428)
Industries			
Construction	.0915 (.0688)	.0589 (.0793)	.1094 (.0959)

TABLE A.3.--Continued

Explanatory Variables	35 and above	40 and above	45 and above
Manufacturing	.0303 (.0492)	.0379 (.0544)	.0476 (.0614)
Transport	-.0037 (.0651)	.0110 (.0707)	.0393 (.0783)
Wholesale/ Retail	-.1320 (.0497)	-.1328 (.0569)	-.0978 (.0642)
Finance	-.0113 (.0784)	-.0469 (.0884)	.0377 (.1022)
Service	-.1023 (.0497)	-.1313 (.0565)	-.0715 (.0642)
Occupations			
Professionals/ Managers	.1941 (.0557)	.2550 (.0617)	.2088 (.0690)
Clerical	.0597 (.0539)	.0896 (.0601)	.0387 (.0661)
Craftsmen	-.0194 (.0508)	.0112 (.0560)	-.0112 (.0625)
Operatives	-.0120 (.0626)	.0269 (.0682)	-.0146 (.0752)
Service	-.0381 (.0597	.0436 (.0650)	.0175 (.0705)
N	684	560	424
$\bar{R}^2$	.5645	.5670	.5652

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