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ENVIRONMENTAL CHANGE AND THE
DETERMINATION OF WAGES, 1881-1940

by
William Dale Crist

A DISSERTATION
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TITLE

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BY

William Dale Crist

APPROVED

DATE

Charles J. Kennedy

May 8, 1972

Campbell R. McConnell

May 8, 1972

Gerald E. Thompson

May 8, 1972

K. Broman

May 8, 1972

SUPERVISORY COMMITTEE

GRADUATE COLLEGE

UNIVERSITY OF NEBRASKA

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ENVIRONMENTAL CHANGE AND THE
DETERMINATION OF WAGES, 1881-1940

INTRODUCTION

The present study is based upon the assumption that change in the labor-market environment is relevant to the determination of wages. The object of the study is to ascertain how relationships between the wage level and other aggregate economic variables were associated with historical change in the economic environment of the United States to the extent that we have been able to observe the labor market. The study's 1881-1940 historical scope is intended to include labor-market experiences through a period of extensive industrialization, national growth, increasing labor organization, and changing government role.

The first of two general conclusions is that changes in eight separate aspects of the environment have combined over time to produce change in the aggregate environmental conditions under which wage bargains are made. The eight aspects of the environment are (1) labor attitudes, (2) entrepreneurial attitudes, (3) demographic characteristics, (4) transportation, (5) communication, (6) the quality of labor, (7) labor-movement intensity, and (8) the law. The second general conclusion is that the changing labor-market

environment has caused the level of wages to be related inconsistently to the following aggregate variables:

(1) the number of business failures, (2) the level of consumer prices, (3) the level of common stock prices, (4) real gross national product per capita, (5) real gross national product per unit of capital, (6) immigration as a percent of population, (7) nonagricultural labor productivity, (8) the level of unemployment, and (9) annual steel production. The evidence suggests the importance of considering historical circumstances explicitly in analyzing the determination of wages because environmental conditions in the labor market have varied over time and relationships between the wage level and other aggregate economic variables may be inconsistent from one period of time to another.

The study proceeds in two separate stages. Stage one provides the evidence leading to the first general conclusion by analyzing effects on the labor-market environment of historical change in specific variables representative of the eight environmental aspects. Some of the variables considered in this regard are (1) union membership, (2) the number of work stoppages, (3) immigration as a percent of population, (4) the rate of urbanization, (5) the number of automobiles registered, (6) the number of telephones in service, (7) the number of high school graduates, (8) an index of labor productivity, and (9) changes in the law.

Of the eight environmental aspects considered in the first stage of the study, labor and entrepreneurial attitudes are revealed by the data as factors strongly associated with the changing labor market. An extensive analysis of labor and entrepreneurial attitudes is undertaken in stage one of the study to provide the evidence necessary to rely upon these basically qualitative variables as the major criteria for identifying environmental change.

The ultimate goal of the first stage of the study is to identify historical turning points in the changing labor market so that specific segments of time may be identified as being somewhat different environmentally. On the basis of evidence presented in Chapter Two, the 1881-1940 period is divided into the following time segments: 1881-1900, 1901-1915, 1916-1920, 1921-1929, 1930-1934, and 1935-1940. The specification of these time segments provides a framework for the second stage of the study. In order to make the study's second stage more meaningful, the effort of stage one concentrates on minimizing the arbitrariness in determining the chronological boundaries of the time segments.

The second stage of the study provides the evidence leading to the second general conclusion by quantitatively testing time-series relationships between wage-level data and each of ten variables. Both simple and multiple correlation analysis are used to measure the direction

and closeness of relationship between the variables considered. Simple correlation coefficients are determined for each of the specified time segments and for the overall period. These coefficients are then compared to determine consistencies or inconsistencies from one period of time to another. On the basis of the time-segment comparisons, observations are made regarding the nature of historical interrelationships between the "independent" variables. General observations are then made regarding relationships between the wage level and each of the independent variables under varying environmental conditions.

Analysis of the relationship between wages and environmental change is made more explicit by interpreting selected time-segment comparisons of correlation coefficients in recognition of the specified environmental differences. Eight specific ex-post conclusions regarding wage determination during 1881-1940 are made on the basis of these interpretations. The conclusions are as follows:

- (1) The level of wages was closely and consistently related to the level of the money supply in every type of labor-market environment considered.
- (2) Attitudinal changes in the labor market altered relationships between the level of wages and indicators of economic prosperity and expansion.
- (3) Labor and management attitudes were more important to the determination of money wages when the rate of cyclical economic expansion or contraction was slow than when it was rapid.
- (4) Where monopsony existed,

real wages were related more closely to increases in productivity if management's monopsonistic prerogatives were being challenged institutionally than they were if management's prerogatives remained unchallenged. (5) Wage determination was influenced by the psychological impact of supposed incipient change in institutional power forces in the labor market. (6) The relationship of changes in the level of money wages to changes in consumer prices was not affected by change in the labor-market environment. (7) The relationship of aggregate unemployment to the level of wages was affected by change in the labor-market environment. (8) The relationship of nonagricultural labor productivity to the level of wages was indeterminate during 1890-1940.

In addition to the correlation analysis, a stepwise regression procedure is used to regress selected independent variables on wage-level data for each time segment and for the overall period. Time-segment comparisons of the resulting multiple regression equations are made. These comparisons provide additional evidence of the effect of environmental change on the aggregate interrelationships considered.

In summary, stage one of the present study emphasizes the role of labor and entrepreneurial attitudes as criteria in the identification of environmental differences between specified segments of time within the 1881-1940 period. The second stage of the study relies upon time-segment

comparisons of correlation coefficients and regression equations to make observations regarding relationships between the wage level and other aggregate economic variables in a changing labor market. Finally, conclusions are made regarding probable relationships between the level of wages and different patterns of change in the labor-market environment.

PREVIEW

CHAPTER II

ANALYSIS OF ENVIRONMENTAL CHANGE

SIMILAR STUDIES

Empirical studies relying upon time series several years in length are weakened when environmental change is so great as to make isolation of specific variable relationships difficult and perhaps untenable.¹ Change in the United States economy from 1881 to 1940 was so extensive that it is not surprising to discover that virtually no basic environmental relationship remained unchanged throughout the period. Assuming that changes in wages are in some way related to environmental change, any relationship that endures between wages and other specific variables over a long period of time is therefore of particular significance. This study's specification of environmentally-different time segments is designed to provide a suitable framework for measuring the closeness of the relationship between wages and environmental change, and for analyzing historical relationships between wages and other specific variables.

To the best of the author's knowledge, no previous empirical study of wage determination has emphasized

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1. Cf. Otto Eckstein and Thomas A. Wilson, "The Determination of Money Wages in American Industry," Quarterly Journal of Economics, August, 1962, pp. 401, 409-413; and Frederick C. Mills, Statistical Methods, 3rd ed. (New York: Holt, Rinehart and Winston, 1955), p. 324.

attitudinal change as an important element of the changing labor environment. Numerous studies of wage determination have noted certain specific historical differences (for example, union-nonunion, prosperity-depression, or peace-war distinctions) but have not attempted to consider the inclusive concept of change in the total environment.²

John Dunlop has observed a relationship between pervading environmental change and progress of the labor movement, but wrote nothing to encourage further specification of the different "periods" or separate analyses of the labor movement within each period.³ Walter Rostow's discussion of five categories of a society's "economic dimensions" is important to his specification of certain stages of growth and is conceptually similar to the present study's consideration of environmental variables. However, Rostow's "stages" of growth are intended to aid interpretation of

2. The most convenient single source for comparing the methods and conclusions of several such studies is H. Gregg Lewis, Unionism and Relative Wages in the United States (Chicago: The University of Chicago Press, 1963). For further studies comparing wage changes in specified historical "periods" see John W. Kenderick, Productivity Trends in the United States (Princeton, N.J.: Princeton University Press, 1961); Robert Ozanne, "Impact of Unions on Wage Levels and Income Distribution," Quarterly Journal of Economics, May, 1959, pp. 177-196; and Albert Rees, "Postwar Wage Determination in the Basic Steel Industry," American Economic Review, June, 1951, pp. 389-464.

3. John T. Dunlop, "The Development of Labor Organization: A Theoretical Framework," in Richard A. Lester and Joseph Shister (eds.), Insights Into Labor Issues (New York: The Macmillan Company, 1949), pp. 191-192.

"...the sequence of modern history..." and are not designed to provide an explicit framework of analysis for interpreting specific time-series data.⁴

The present study's attempt to distinguish periods of history as being in some way unique for purposes of further quantitative analysis closely approaches the method used in a study by Robert Ozanne.⁵ In his Wages in Practice and Theory, Ozanne divides the 1861-1960 period into sub-periods categorized as peacetime prosperity, depression, and wartime. In addition to dividing the overall period into specifically defined "prosperity periods," Ozanne attempts to pinpoint the causes of wage change by further dividing the prosperity periods into even shorter time segments called "period chronology profiles." An Ozanne period chronology profile, the chronological boundaries of which are determined by "exact changes in rates of pay," relates various distinguishing features of that particular period to wage changes within the period. While pursuing the same basic objective, my time-segment

4. W.W. Rostow, The Stages of Economic Growth (Cambridge: The Cambridge University Press, 1960), p. 1. In criticizing Rostow's stages of growth thesis for inadequate specification of the separate stages, Simon Kuznets has touched on some of the problems of specification in history, particularly with reference to determining uniqueness of separate time segments. See Simon Kuznets, "Notes on the Take-Off," in W.W. Rostow (ed.), The Economics of Take-Off into Sustained Growth (New York: St. Martin's Press, 1964), pp. 22-43.

5. Robert Ozanne, Wages in Practice and Theory (Madison, Wisc.: The University of Wisconsin Press, 1968), pp. 3-58.

specification is different in that the boundaries of each segment are determined by changes in environmental characteristics rather than changes in the "dependent" variable, viz., wages. Professor Ozanne's study is basically an investigation of wages in a particular firm and "environmental features" of each of his periods are selected more for relevance to that firm than to the aggregate economy. The present study's interest in the impact of a changing environment on the aggregate wage level is conceptually similar to Ozanne's interest in minute details of forces and factors potentially related to wage determination in the single firm.

PRELIMINARY DEFINITIONS

The labor-market environment is defined to include all conditions and circumstances, both natural and institutional, that exist in the labor market during a specified segment of time. To say that certain conditions or institutions "exist" does not imply that their influence is pervasive or static. It is important to bear in mind that the analytical method employed in the present study emphasizes environmental change rather than a static historical setting. This emphasis is especially necessary in stage one of this study because of the importance assigned human expectations as an environmental variable. For example, if an attempt is made to organize a national labor union where no union had existed previously, the organizational

activities and the ensuing struggle for recognition would be foreign to the prevailing environment and would generate uncertainty. Such uncertainty might influence wages by causing anticipatory reactions on the part of both labor and management. The considerable number of similar uncertainty-generating events during the 1881-1940 period justifies the present study's emphasis on changing attitudes as a criterion of environmental change.

Determining the nature of environmental change during specific segments of time is somewhat dependent upon the theory that, as time passes, institutional change is more likely to occur as a result of specific traumatic experiences than as a result of avant garde policy decisions.⁶ For example, there is considerable evidence that 19th century employers invested in safety devices for protection of their employees only after industrial accidents reached a morally-intolerable level and public opinion was aroused against the employers.⁷ The present study defines any phenomenon that has a particularly unsettling effect on decision making as a "traumatic experience."

6. Cf. John Kenneth Galbraith, The Affluent Society (Boston: Houghton Mifflin Company, 1958), pp. 1-20. Discussion of this theory with regard to its implications for quantitative analysis of time series is located in Chapter Three of the present study. The fifth specific conclusion of the present study (see p. 5) refers to this theory.

7. See John R. Commons, History of Labor in the United States, 1896-1932 (New York: The Macmillan Company, 1935), III, 359-370.

The concept of considering traumatic experience as a source of business policy decisions relates directly to the concept of labor-movement intensity and the importance of changing labor and entrepreneurial attitudes. Labor-movement intensity is defined as a quantitative measure of labor's aggregate institutional presence in the labor-market environment. American labor economists and historians traditionally refer to labor's institutional presence as the "labor movement" and usually equate the American labor movement with the extent of collective bargaining or, simply, the level of union membership.⁸ This usual definition of the labor movement is generally satisfactory for analysis of the contemporary market inasmuch as organized labor has, since about 1940, been identifiable as an entity existing and preserved in law.⁹ Prior to the late 1930's, however,

8. For example, see Dunlop, "The Development of Labor Organization: A Theoretical Framework," loc. cit., pp. 163-193; Sumner H. Slichter, The Challenge of Industrial Relations (Ithaca, N.Y.: Cornell University Press, 1947), pp. I-28; and Ben Stephansky, "The Structure of the American Labor Movement," Interpreting The Labor Movement (Madison, Wisc.: Industrial Relations Research Association, 1952), pp. 39-69.

9. There are still isolated exceptions, however, and these serve as a clear example of the need for a distinction between the labor movement as a measure of labor's ability to bargain collectively, per se, and labor's "institutional presence" via militancy in a changing labor market. The California farm labor movement led by Cesar Chavez influences the market by generating "trauma" through militant activities in a sector of the labor market in which no collective bargaining framework exists. The attitudes, tactics and struggles on both sides of the California farm labor market seem to parallel the 19th century industrial experience.

labor group activities usually were not conducted in a uniformly dependable collective-bargaining framework and, therefore, the usual definition of the labor movement is less relevant for that period. That is, in the absence of legal recognition of the right to bargain collectively, almost every strike ostensibly for higher wages was also necessarily a strike for recognition as a legitimate institution in the market place.¹⁰

In view of the difficulty in obtaining a consistent definition of the labor movement over the entire 1881-1940 period, the present study relies upon the concept of labor-movement intensity to measure change in labor's aggregate institutional presence. The level of labor-movement intensity is quantified by formulating a combination of the number of work stoppages, workers involved in stoppages, and union membership.¹¹ Measuring labor

10. Because no adequate legal framework for collective bargaining existed prior to the National Labor Relations Act (with the exception of the railroad industry), labor militancy during most of the 1881-1940 period represented primarily an attempt to change existing institutions. Irving Bernstein has discussed the problem of labor-movement definition and has noted that union "membership, obviously, is not a perfect index of trade union growth and influence." "The Growth of American Unions," American Economic Review, June, 1954, p. 301.

11. It should be noted that this definition of labor-movement intensity does not distinguish the specific goals of the individuals or groups involved. That is, no attempt is made in the present study to determine whether the goal of labor activities such as strikes, boycotts or spontaneous demonstrations was higher wages, official recognition or political advantage. The level of activity is of signal concern, for whatever purpose.