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An Assessment of the Validity of the Unemployment Variable as a Determinant of Changes in Money Wages in Wage-Estimation Models

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**AN ASSESSMENT OF THE VALIDITY OF THE UNEMPLOYMENT VARIABLE
AS A DETERMINANT OF CHANGES IN MONEY WAGES
IN WAGE-ESTIMATION MODELS**

by

James L. Jennings

**A thesis presented in partial fulfillment
of the requirements for the degree of**

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March, 1972**

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AN ASSESSMENT OF THE VALIDITY OF THE UNEMPLOYMENT VARIABLE
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IN WAGE-ESTIMATION MODELS

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Chapter 1

INTRODUCTION

Inflation and the Phillips Curve

Since World War II economists have devoted considerable attention to the problem of inflation; its causes, detrimental and even beneficial effects, and means of control. Much of the discussion has centered upon the irrepressible problem of which came first; the push or the pull. While demand-pull inflation is somewhat responsive to monetary and fiscal controls, cost-push inflation is not only more difficult to control but clouds the situation by making it perplexing to determine which type of inflation is prevalent. Traditional theory provides that demands for higher wages (cost-push) are most successful when unemployment is low, for management is said to be less reluctant to resist the demands of labor because the high level of aggregate demand (as evidenced by low unemployment) enables higher costs to be passed off more easily through higher prices.

In 1958, A. W. Phillips, a British economist, presented an interesting study demonstrating an inverse relationship between the

level of unemployment and the rate of change in money wages.¹ What has now become known as the Phillips curve suggests that if price stability is desired a relatively high level of unemployment must be accepted and that higher than average wage changes or inflation must be accepted if a low level of unemployment is desired.

The Phillips curve development has not been particularly helpful in resolving the cost-push, demand-pull dilemma because such a trade-off between prices and unemployment can be the result of demand-pull aspects with employers bidding up wages to attract scarce labor when aggregate demand is high, or cost-push elements with the scarcity of labor influencing wage demands. Even cost-push tendencies of a more complex derivation than the existence of a tight labor market could be reflected by an inverse relationship between wage rates and unemployment. The statistically significant inverse relation between money wage changes and unemployment has, thus, been subjected to two principal explanations: that employers bid up wages when unemployment is low and that labor is less restrained in its wage demands when low unemployment prevails. Apart from more involved extensions of these two possibilities, a third alternative presents itself in that the inverse relation could be caused by external influences on the two variables with the actual level of unemployment having no, or little, causative influence on wage levels.

Phillips' original article has spawned many subsequent studies enlarging upon the idea of a quantified trade-off relationship and

¹A. W. Phillips, "The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957," Economica, XXV (November, 1958), 283-99.

debating its various aspects; however, interest in the initial trade-off concept with only unemployment as an independent variable has not waned. Phillips contended that the level and rate of change in unemployment "explained" wage changes. He was assuming that wages represented the market price of the commodity labor and were determined by market supply and demand conditions. Other studies, which are discussed later, developed more complex wage-estimation models but continued to assume that the level of unemployment has a causative effect on wage changes.

The Relation between Wages and Unemployment

With a perfectly competitive labor market as a reference, high levels of unemployment are said by many researchers (in order to justify the use of the unemployment variable) to represent an excess supply of labor while low levels are said to reflect excess demand for labor with unfilled vacancies exceeding the supply of unemployed persons. Zero excess demand is assumed to be some positive amount of unemployment where job vacancies equal the number of persons looking for work. Such a definition must be predicated upon the assumption that the level of unemployment representing zero excess demand remain stable during any period of study. Even if one accepts the thesis that wages are substantially determined by the supply and demand for labor, consideration must be given to the contention of Frederick Meyers that intersecting supply and demand schedules for labor cannot even be drawn because labor's availability in the market is functionally related to something different

from those influences on employers in offering to buy the services of labor.²

Unfortunately, the absolute level or rate of unemployment does not reflect any trend in the demand for labor. Isolation of each unemployment rate observation with its corresponding historical rate of change in money wages (which is the source data for any trade-off function) leaves much to be desired; for a low unemployment rate can suggest that the economy will be (the rate will go lower), has been (the rate is rising), or is in a prosperous period. Surely, the corresponding wage rate change would be expected to reflect the particular state of the economy which implies its trend as well as current level of operation; however, since the unemployment rate does not do this, any adherence to the position that unemployment is a determinant or estimator of wage changes is quite tenuous. According to a study by Eckstein and Wilson, economic conditions prevalent and anticipated during the period of wage negotiations impose a significant influence on the rate of change in wages.³

When using the level of unemployment to explain the rate of change in wages, an absolute or stock variable is being used to explain a relative or flow variable. To maintain that the absolute variable is

²Frederick Meyers, "Is a Theory of Wages Possible?" Southern Economic Journal, XVII (January, 1951), 323. While assuming employers are pecuniarily motivated, Meyers maintained that the population did not consist of people weighing the decision of whether or not to work depending upon the potential income and that those in the labor force were not, in any substantial numbers, actively trying to obtain highest possible wages.

³Otto Eckstein and Thomas A. Wilson, "Determination of Money Wages in American Industry," Quarterly Journal of Economics, LXXVI (August, 1962), 587.

relatively low or relatively high is inadequate. Association of unemployment rates with average, observed wage changes may provide a relation of possible use in warning policymakers of what might be expected, based on past experience, when trying to attain certain goals; but whether this relation can be extended to allow one to state that one variable will be a significant determinant of the other is questionable.

The high correlation between two variables can, of itself, only indicate a tendency of inverse occurrence. Such correlation is not proof of a trade-off in the strictest sense of the term, that is, that high wage changes are the penalty that the economy must pay for low unemployment or that the lowering of the unemployment rate caused the wage increases. Strong correlation between two variables in the same time period may constitute a reason for suspecting that both variables are reacting to the same exogenous influences rather than to each other. Even if one were to maintain that the labor market is highly competitive with wages reacting to supply and demand for labor, the strong correlation as proof of a causal relationship would still hinge upon whether there were other factors of more significance affecting wages and whether the unemployment variable adequately reflected labor market conditions. If external variables, such as profits, prices, productivity, or the general economic climate, are responsible for the inverse occurrence, such observed inverse movement of wages and unemployment and the possible utility of the relation in policymaking would not be invalidated; but the relation would then be more likely to show only general tendencies of movement and not reflect any rigorously quantifiable, predictable, or irrevocable aspects. Certain of the exogenous factors could exert a greater short-term influence on one of the variables than on the other.

Because of the good correlation between unemployment and the rate of change in wages, any additional independent variables highly correlated with wages might also tend to be highly correlated with unemployment, representing a possible distortion of relationships among independent variables. (When both the independent and dependent variables have their highest correlation when both are in the same time period, it may be additionally difficult to discern causative influences.) Assuming a causative effect by unemployment but depending upon whether one favors the position that wages rise because of bidding for scarce labor or because the scarcity of labor results in less restraint on labor negotiators in demanding pay raises, one may or may not expect unemployment rate changes to precede or to coincide with the wage changes. If bidding is prevalent, then wage increases would naturally share the same time period as the influential level of labor scarcity. If, on the other hand, organized labor is the moving force in initiating wage changes, one might expect the unemployment rate variable to lead wage changes; for labor negotiators may not know existing unemployment rates at the time of negotiations (due to the delay in publication) and wage increases may not be implemented at the time of negotiations.

The possible presence of both bidding and labor-initiated wage changes necessitate lead-lag tests in order to try to establish prevalent or causative relationships although the existence of both wage-change pressures could tend to cancel out one another and cause the tests to be inconclusive. Some benefit may be obtained by allowing the wage variable to lead unemployment; for, if the variable remained significant, doubt

would be in order as to the causative influence of unemployment on wages. Tests by R. G. Bodkin show that when unemployment leads wages its regression coefficient becomes insignificant.⁴

Delimitations of Study

Although it is difficult to ignore good correlation between the two variables, an analysis of the variables under the assumptions that they are both responding to external forces and that unemployment is an inadequate measure of labor market conditions can lead to uncertainty about the validity of the supposed cause-and-effect relationship. After reviewing previous research, this paper considers the influence of unemployment on wage changes from a theoretical standpoint and, hopefully, engenders some reservation concerning the soundness of accepting the unemployment rate as an adequate barometer of labor market conditions and, thus, the logic of considering it as a primary determinant of wage changes.

With the possible exception of wage rate changes leading unemployment, tests involving lags between the variables offer little likelihood of rendering assistance in establishing or denying any causative influence of the unemployment variable; however, the tests will be conducted. A second series of tests will be undertaken in which the unemployment variable in the wage-estimation models is replaced by a variable representing changes in demand for labor as well as its excess supply. Regretably, unless this variable is significant when leading the wage

⁴Ronald G. Bodkin, The Wage-Price-Productivity Nexus (Philadelphia: University of Pennsylvania Press, 1966), pp. 102-4.

variable, its estimation ability may well not improve upon the unemployment rate variable and its causative effect may be subject to some of the same deficiencies as the unemployment rate. Lastly, tests will be conducted to consider the effect of a variable representing changes in aggregate demand, the change in the level of public and private debt. As a source of aggregate demand and, therefore, as a causative influence on unemployment and wages, this debt variable has the potential of indicating the responsiveness of wage changes and unemployment to external factors and possibly to each other. The variable could suggest a reversal of the assumed cause-and-effect relationship between wages and unemployment. According to Culbertson, when price (wage) push is not offset by higher demand, wage push becomes a potential cause of unemployment which will generally be "structural" in appearance, for the least qualified workers (from the position of job-related abilities and social or discriminatory factors) would be the first dismissed.⁵

Because of the complexities of the wage issue and the limited scope of this study, no conclusive findings are anticipated. Success will have been attained if some reasonable doubt can be raised as to the validity of considering the unemployment rate as a major determinant of changes in money wage rates. Once again, no effort is made to deny the strong, inverse correlation between the two variables or any utility such a relation may have.

⁵John M. Culbertson, Macroeconomic Theory and Stabilization Policy (New York: McGraw-Hill, Inc., 1968), p. 264.

Chapter 2

A SELECTED REVIEW OF PREVIOUS RESEARCH

Although wage theory has occupied a prominent place in the development of economic thought, economists still lack an acceptable theory of wages. Recent literature has concentrated on those factors affecting changes in wage rates, rather than endeavoring to resolve the older problem of determining a "fair" wage. Given a wage rate, be it just or not, economists have been trying to determine what economic influences might cause labor to seek, and business to grant, increases. With the problems of unemployment and inflation being of prime importance in most economies and being interrelated with the wage level, A. W. Phillips' previously mentioned study of wages and unemployment in Britain from 1861 to 1957 prompted a continuing and active discussion of wage changes and determinants. For purposes of this study an intensive review of the literature is not necessary and will be substituted by a survey of those major studies establishing the more significant variables and the usage of the unemployment variable.

A. W. Phillips

Though admittedly tentative, Phillips concluded that statistical evidence supported his hypothesis that the rate of change and level of unemployment did explain the rate of change in money wages and that the relationship between the variables was stable over time. The primary hypothesis that he was testing was based on the assumption that wages

represented the price of labor services and, as with other markets, changes in this price should be determined by supply and demand. Phillips derived his nonlinear curve by associating the various rates of change in money wages observed for each level of unemployment and computing an average of wage changes for each unemployment level. A curve was then fitted to the averages. Phillips' contention that wage increases tended to be higher when demand for labor was high and unemployment low is reasonable for a competitive labor market. He failed, however, to explain the validity of using the unemployment rate as a measure of the demand for labor or to establish that the labor market in Britain was competitive. After drawing his curve, Phillips did attempt to consider the effect on wages of the rate of change in the level of unemployment (that is, the trend and intensity of the unemployment rate). He concluded after studying the time paths of his scatter diagrams that wages rose faster than average when unemployment was declining and slower when it was rising. Other than the effect of rapid increases in import prices, Phillips considered no other variables.

Richard G. Lipsey

Richard G. Lipsey's effort to extend and amplify Phillips' work concluded in substantial support of his predecessor's findings.⁶ Specifically, he supported Phillips' hypothesis that money wage changes were significantly related to both the level and rate of change in unemployment. He did deny a contention of Phillips that the rate of

⁶Richard G. Lipsey, "The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1862-1957: A Further Analysis," Economica, XXVII (February, 1960), 1-31.

change in unemployment had lessened in importance over time and gave more weight to the influence of the cost of living on wage negotiations (although he maintained that this effect was weak). As did Phillips, Lipsey retained the questionable assumption that unemployment reflects demand, or excess demand, in the labor market.

Rattan J. Bhatia

Rattan J. Bhatia conducted two studies of the rate of change in money wages.⁷ The first was to test Phillips' hypothesis on the United States economy from 1900 to 1958 and the second to consider variables for the rate of profit and rate of change in profits from 1939 to 1959. Bhatia did not conclude that unemployment and the rate of change in unemployment were significant influences on wage changes in the United States. He noted in his first article that changes in the cost of living appeared to be an important influence on wages but was also highly correlated with the level of unemployment, though not with changes in the rate of unemployment. He determined that there was a somewhat better correlation between changes in wages and prices (although not for the postwar period) than between changes in earnings and the level of and rate of change in unemployment. Because of the mutual influence wages and prices have on each other, a high correlation in the same time period is somewhat meaningless in establishing causative influence.

⁷Rattan J. Bhatia, "Unemployment and the Rate of Change of Money Earnings in the United States, 1900-1958," Economica, XXVIII (August, 1961), 286-96, and "Profits and the Rate of Change in Money Earnings in the United States, 1935-1959," Economica, XXIX (August, 1962), 255-62.

In his second study, Bhatia tested the relation between manufacturing wage changes and profits (percentage return on equity capital) using monthly data for the period 1948 to 1959. With a two-month lag in the wage variable, he obtained a coefficient of determination of .57 between wage changes and the rate of profit and a coefficient of .80 when changes in the rate of profit were included in the regression model. He concluded that the postwar period had been one of profit-push rather than cost-push inflation, with demand-pull inflation increasing prices and profits and then wages. Such conclusions may have been premature; however, his introduction of the rate of change of profits did add a more dynamic element to the model.

George L. Perry

One of the most thorough and intensive studies of the problem was that undertaken by George L. Perry.⁸ Trying to correct the inequities and incomparable aspects of earlier studies, he used annualized quarterly data for the United States between 1947 and 1960. He introduced into his model variables measuring unemployment, cost of living, profits, and changes in the rate of profits with a one-quarter lag for prices and profits. He favored the lag on the basis of logic but found that dropping all lags did not have much of an effect on the coefficient of determination which declined from .870 to .854, with the coefficient for the rate of change of profits becoming insignificant. He found that, as a measure of changes in economic conditions, the rate of change of profits was superior to dummy variables tested which measured persistent periods of

⁸George L. Perry, Unemployment, Money Wage Rates, and Inflation (Cambridge: M. I. T. Press, 1966).

rising or falling unemployment. The use of the dummy variables in addition to the rate of profits added little to the explanatory power of the model.

As with most other studies, Perry used no lag in the unemployment variable. He recognized that although the excess demand for labor (which he measured by the level of unemployment) could and did influence some wage negotiations, it was only one of the variables which might enter the collective bargaining situation. He stated that "the relevant market area over which unemployment should be measured is, for some parts of the argument, geographically small as far as the effect of unemployment on wages is concerned. There is only one consideration based on a broad measure of unemployment; that a strong demand for labor is associated with strong product demand."⁹ He considered local labor market conditions to be a second reason for expecting unemployment to be related to wage changes. He maintained that recent studies suggested that aggregate unemployment was a valid measure of local conditions. Perry was critical of Bhatia for considering profitability as a sole explanatory variable; however, he rather easily assumed that unemployment was a valid reflection of labor market supply and demand conditions and apparently the most important determinant of wage changes.

When regressing the quarterly average of annual changes in wages (W) against average unemployment for the civilian labor force (U), Perry got a coefficient of determination of .498. When changes in the cost of living (C) were considered, R^2 increased to .760 with no lag and to .732

⁹Ibid., pp. 24-5.

with prices lagging behind wages by one quarter. Introduction of the rate of profit (R) as an independent variable raised R^2 to .810. He concluded that the results strongly supported a theory of wage determination with these three variables and a fourth one representing changes in the rate of profit (dR). His final equation with a coefficient of determination of .870 was as follows (standard errors of the coefficients are shown in parentheses):

$$W_t = -4.313 + 0.367C_{t-1} + 14.711U_t^{-1} + 0.424R_{t-1} +$$

(0.054) (2.188) (0.068)

$$0.796dR_t + e_t$$

(0.176)

Perry illustrated the validity of including all four explanatory variables in the model by showing the individual explanatory power of each variable. Squared partial correlation coefficients were as follows: $C_{t-1} = .508$, $U_t^{-1} = .501$, $R_{t-1} = .456$, and $dR_t = .316$. Thus, the weakest variable, change in the rate of profits, explained 32 percent of the variance in wages left unexplained by the other three variables. Although Perry's study was quite extensive, his final selection of variables was as stated and is considered sufficient for this paper.

Ronald G. Bodkin

Ronald G. Bodkin's study was similar in scope to that of Perry.¹⁰ As in other studies, he considered unemployment as a measure of excess supply in the labor market and assumed that wages respond to excesses in demand and supply. He began development of his model under the assumption that wage changes were a function of the level of unemployment and changes

¹⁰Bodkin, pp. 95-229.

in the price level. Instead of percentage changes in wages and prices and unemployment as a percentage of the labor force, Bodkin used the absolute price (P) and wage (W) level changes and the absolute level of unemployment (U). A time trend variable (t) was also introduced which Bodkin said could be of significance either because the dependent variables were stated in absolute terms or because it could represent the increasing power of the labor supply resulting from trade union growth. Using annual data for the period 1900 to 1957, he obtained a coefficient of determination of .8243. When price changes were allowed to lag behind the other variables by one year or six months, coefficients of determination were .5394 and .7055, respectively.

All coefficients for the unemployment variable were low, suggesting to Bodkin that wage changes were not very sensitive to the level of unemployment. Lagged values for unemployment gave the following results:

$$dW_t = -.01916 - 0.0662 \times 10^{-5} U_{t-1} + 0.6606 \times 10^{-2} dP_t + \\ (.00656) \quad (0.1019 \times 10^{-5}) \quad (0.0603 \times 10^{-2}) \\ 0.1578 \times 10^{-2} t \quad R^2 = .8152 \\ (.0199 \times 10^{-2})$$

$$dW_t = -.01768 - 0.1337 \times 10^{-5} U_{t-1/2} + 0.6433 \times 10^{-2} dP_t + \\ (.00657) \quad (0.1068 \times 10^{-5}) \quad (0.0617 \times 10^{-2}) \\ 0.1619 \times 10^{-2} t \quad R^2 = .8191 \\ (.0198 \times 10^{-2})$$

Although there was little change in the coefficients of determination, coefficients of the unemployment variables became insignificant statistically, being smaller than their standard errors.

Introduction of productivity change (A) resulted in the following equation:

$$\begin{aligned}
 dW_t = & -.01585 - 0.1596 \times 10^{-5} U_t + 0.6358 \times 10^{-2} dP_t + \\
 & (.00597) \quad (0.1013 \times 10^{-5}) \quad (0.0598 \times 10^{-2}) \\
 & 0.1408 \times 10^{-2} t + 0.2046 \times 10^{-2} dA_t \quad R^2 = .8447 \\
 & (0.0199 \times 10^{-2}) \quad (0.0776 \times 10^{-2})
 \end{aligned}$$

With a one-year lag in the productivity variable, the coefficient for productivity attained a negative sign. Bodkin suggested that the productivity variable was serving as a proxy for some other variable, such as the excess demand for labor or anticipated future profitability. When profits were introduced as an explanatory variable, coefficients for unemployment and profits became insignificant with a possible inter-correlation between the variables preventing the full effect of either variable from showing in the results. Ruling out the use of both variables in the same formula, Bodkin found the unemployment variable to be superior to the profit variable. Introducing a lag in the profit variable did not change the results.

Chapter 3

A THEORETICAL FRAMEWORK FOR WAGE CHANGES

Macroeconomics v. Microeconomics

The wage-estimation models are, of necessity, macroeconomic phenomena. Presumably, there are national, aggregate relationships among the variables to give meaningful results; however, to understand unemployment and wage changes, one must consider microeconomic conditions. It is only through microeconomic consideration that the economic and social influences on the wage and labor market can be approached. From a macroeconomic standpoint, wages should not rise at all when unemployment exists; but aggregate measures do not reflect immobility of labor, monopoly power, problems of particular markets, firms, and industries, and other economic and noneconomic factors which determine wages and unemployment.

Business-Initiated Wage Changes

Employment of an unemployed person at the average wage rate would obviously have no effect on average wages. More basically, one must assume that an unemployed person would accept a job at any realistic wage rate (which could be less than average) and that it is not necessary to entice him with higher-than-average wage offers. Higher wages may, of course, be a means of attracting new participants to the labor force.

When the economy is experiencing high levels of aggregate demand from which labor demand is derived, the local ranks of the unemployed may be inadequate in skills or numbers to meet the labor needs of business. A situation could arise in which higher-wage-paying businesses would have job openings at their existing, higher-than-average rates and would attract workers from lower-paying jobs or from the unemployed. The expansion of employment with the better-paying firms would have an upward effect on average wages which may be reinforced by efforts of lower-paying employers to retain or attract workers by raising their wage schedules. The impetus to the upward movement in average wages, therefore, need not be the result of aggressive wage policies but only expansion of the workforce of the better-paying businesses.

These firms with expanding demand for goods and services and technological growth pressure the general wage market simply by trying to meet their labor demands with wages reflecting employee productivity and product demand in their more profitable industry. According to Solomon Fabricant, expansion of output and employment of labor and capital was greater than average in those industries with higher-than-average advances in productivity with prices falling in relation to prices of goods in less productive industries.¹¹ Those businesses with weaker markets must rely on lower profits or higher prices to retain workers. Chamberlain and Cullen noted that the profitability of a firm is generally correlated with its position in the wage spectrum,¹²

¹¹Solomon Fabricant, Basic Facts on Productivity Change, Occasional Paper No. 63 (New York: National Bureau of Economic Research, Inc., 1959), pp. 23, 35.

¹²Neil W. Chamberlain and Donald E. Cullen, The Labor Sector (New York: McGraw-Hill, Inc., 1971), p. 393.

although Fabricant found that there was little long-term difference in trends in hourly earnings between those industries in which productivity increased rapidly and those in which there were slower rises.¹³ In other words, the less profitable industries appear to have followed the upward wage movements of the more productive industries, though only in a relative relation with no narrowing of the wage gap.

Although scarcity of labor is certainly a basic influence on higher wages (though possibly not a major one), expanding demand for workers by the stronger industries and the necessary defensive wage actions by other employers are of critical importance. The nature and degree of increasing labor demand when confronted with supply would be the determining influence on wages to the extent that labor market conditions are, in fact, influential. For example, one might expect differing wage rate changes with unemployment at four percent with labor demand expanding than if demand were constant or declining.

The bidding for workers, though the phrase may be misleading, is the only example of business-initiated wage increases (assuming the goal of profit maximization) and, as stated, can be due either to increasing demand for labor by higher-paying firms or general, economy-wide increases in demand relative to scarce supply. Labor scarcity makes possible the shift in workers to better-paying jobs but only when considered in conjunction with labor demand can the extent of wage changes be determined. Studies have, however, raised doubt about the actual extent of labor mobility and the primacy of wages in influencing workers to accept employment in particular jobs.

¹³Fabricant, p. 30.

Meyers stated that investigations of the motivating forces on workers in job selection showed that wages were only one of a number of factors, any one of which could be primary in importance in the worker's mind.¹⁴ Though concerned with wage levels, Meyers noted that workers were also, for the most part, immobile and that what mobility did occur was planless and irrational in the setting of wage patterns, though possibly entirely logical in the context of other behavior patterns.¹⁵ Chamberlain and Cullen acknowledged a considerable amount of mobility throughout the labor sector providing some check on wage differentials but found that "worker mobility erodes wage differentials with far less effectiveness in real labor markets than in competitive theory."¹⁶ They stated that when all job changes at any given time were considered, there was only a weak tendency toward low- to high-paying job movement with such movement more frequent when shifts were voluntary, long-distance rather than local, in tight labor markets, and among white-collar rather than blue-collar workers.¹⁷ Thus, even though worker mobility increases in tight labor markets, Chamberlain and Cullen, as well as Meyers, (in recognizing the weak tendency to higher-paying jobs and the significance of non-wage influences) place doubt on the validity of embracing the theory that wages are substantially determined by the supply and demand for labor with its underlying assumption that maximum income is the motivating force on workers. Evidence seems to

¹⁴Meyers, 322-323.

¹⁵Ibid.

¹⁶Chamberlain and Cullen, p. 351.

¹⁷Ibid., pp. 61, 350.

suggest that, at best, only an increased likelihood of shifts to higher-paying jobs occurs in tight labor markets and that wage increases must be significantly influenced by other factors. Employer bidding as a primary cause of wage changes must be accepted cautiously, if at all, if the necessary assumptions of worker mobility and wage maximization are deemphasized.

Labor-Initiated Wage Changes

The consent by business to wage demands initiated by labor, regardless of bargaining tactics, must be predicated upon the long-range ability of business to be able to pay the higher wages through changes in profits or prices. Labor initiated pay raises are complex in cause and, from an institutional and competitive view, include among others: (1) efforts to maintain or increase labor's share of national income or purchasing power, (2) from a microeconomic standpoint, to stay competitive or gain in comparison with other workers, and (3) to take advantage of excess demand for labor or a tight labor market. The first two motivations, which are most basic, need not be affected by the level of unemployment but do require negotiating ability and strength on the part of labor. Although strikes or strike threats may in some respects be considered as manipulations of the labor supply, they are distinct from excess supply as represented by involuntary unemployment. Excess demand, as represented by the third reason, is not wholly distinct from the first motive; for it is demonstrative of a high level of aggregate demand which will increase profits through higher output or prices. For labor to be able to demand higher wages implies bargaining power and some isolation from the vagaries of supply and demand, which security

organized labor in the United States enjoys through its guarantee of exclusive recognition as bargaining agents by the National Labor Relations Board. Thus, supply and demand for labor or the possibility of low unemployment levels being a distinct and significant influence on labor-initiated wage demands appears somewhat in doubt.

Although only approximately 28 percent of the non-agricultural labor force in the United States is unionized,¹⁸ unions do appear to be a major factor in setting wage trends and in influencing demands of non-union workers. The assumption that unions, and labor in general, would be less restrained in wage demands simply because unemployment is high appears to rest on the qualification that the first two suggested motives for labor-initiated wage demands are not justified at the time. That any observed wage demands are not high when unemployment is low or that they are resisted successfully by business if they are high suggests either that the two motivations are not operative because of low profit or price conditions or that the failure of labor to pursue its goals is only temporary. Price increases alone could instigate wage demands and, in effect, create a vicious circle of labor-caused price increases which, in turn, provide a stimulus for even higher wage demands.

The second motivation may defy explanation by being substantially a social reaction with a group of workers possessing bargaining strength deciding they are "worth" more than they are being paid, especially in comparison with other occupations. Joan Robinson calls attention to a

¹⁸Sanford Cohen, Labor in the United States (Columbus: C. E. Merrill Publishing Co., 1970), p. 140.

situation that may well be becoming more prevalent in the United States today:

The distribution of income thrown up by the market can be tolerated as long as every individual feels that his position in it is due to fate or to his own merits. When it becomes evident that the relative incomes of individuals are mainly determined by the bargaining position of the group to which they belong, the ethics of the system--a fair day's work for a fair day's wage--disintegrates, industrial discipline is undermined, and the tradition of public service gives way to a general scramble for advantage . . .¹⁹

The scarcity of supply of labor would continue to lose any effect it might have had as a market regulator of wages as such conditions become more prevalent.

Supply and Demand of Labor

At any rate, the excess supply of labor appears to be an inadequate explanation to justify wage demands though it may be a valid measure of economic activity and, therefore, of profit and price trends which, of themselves, could instigate higher wage demands and finance them as well. From the position of management, a small excess supply of labor can necessitate bidding and wage increases; but both the nature and degree of demand for labor are of critical importance.

It is difficult to make any sound judgment about the possible correlation between wages and a variable representing both the supply and demand for labor. One might expect a correlation as good as that of the unemployment rate on the basis that the variable would be more completely representative of market conditions. The demand aspect, however, introduces an unpredictable factor and time influence. If the

¹⁹Joan Robinson, Economic Heresies (New York: Basic Books, Inc., 1971), p. 93.

variable is truly indicative of labor market conditions and such conditions are, in fact, not a significant influence on wages, the correlation may be low.

Before discussing other wage-determination variables, a summary is in order since the validity of the unemployment variable is of prime importance. Hopefully, the preceding discussion has, at a minimum, raised some doubt about the value of the rate of unemployment as a determinant of wage changes. It appears to have some utility as an indicator of wage changes because of its high correlation with wages, but its failure to lead wages actually leaves it in the position of only "accompanying" wage changes. Failing as a leading estimator, it also seems to be a questionable determining influence on wage changes.

Other Variables Affecting Wages

Except for the unemployment variable, previously used variables of prices, profits, and productivity are consistent with this discussion of influences on wages. Gains in productivity and prices would ultimately be reflected in profits, ceteris paribus; but both are still of use for reasons attributable to the complexities and interrelations of the variables. For example, rising prices can signal future profit gains but can also reflect rising costs and lower profits. Although interrelated, prices can be associated with the effort of labor to retain purchasing power, and profits with the income-distribution influence on labor. Productivity gains provide a potential source of profit but can also exercise a negative influence on employment by requiring fewer workers to produce a given output. Because of the ramifications of these variables and their wide publication, they are

retained in this study as independent variables likely to influence wages. In addition to profit or return on equity, a variable showing the rate of change in profits, as suggested by Ferry and Bhatia, will be used.

There appear to be three economic sources of disturbance to wages which are external to the circular flow of income: changes in aggregate demand, productivity or technological gains, and price increases due to imperfect competition in factor and product markets which are funded by monetary expansion. Those factors influencing wages (demand for labor, profits, and prices) are all determined by the vagaries of aggregate demand, productivity, and internally generated price increases. Though possibly less immediately prominent than labor market conditions and profits, they would appear to exert a more critical, basic, and causative influence on wages while profits and unemployment levels, in effect, act as intermediate variables.

Prices and productivity changes have been considered in other studies but have a close time proximity in movement with wages; however, a variable representing public and private debt changes should clearly move in advance of wages and unemployment and may assist in measuring the responsiveness of wages and unemployment to each other, especially from the standpoint of time. Increased debt might be the source of financing higher prices and, thus, higher wages to the extent that wages are not supported by productivity gains. In addition, since deficit financing has been the primary means of reducing unemployment, the debt change variable should influence unemployment to some extent. Conceivably, the responsiveness of the two variables to changes in debt differs and may provide an indication of the relation of the two variables to each other.

Chapter 4

EMPIRICAL TESTS OF THE WAGE-UNEMPLOYMENT RELATION

Introduction

All tests and models in this study encompass the period beginning in the third quarter of 1949 and ending with the fourth quarter of 1969. Data sources are noted in the bibliography. Quarterly or monthly statistics were available for all variables with the exception of productivity (output per man-hour) and net public and private debt outstanding. Interpolation of annual data for these two variables was necessary to obtain quarterly figures.

In order to conduct lag tests, all data were converted to running annual totals with the figures for each quarter representing the current and preceding three quarters. It was hoped that such annual data would reflect trends of movement within each year without being subject to the sometimes radical variations observed in quarterly data. The least-squares method of computation was used in the various regression tests in this chapter.

Although the variables used have been discussed from a theoretical standpoint, more specific identification of the data is warranted. Symbols and definitions used are as follows, with all rate-of-change computations based on the difference between the current annualized total and the annualized total of the preceding quarter divided by the

total of the preceding quarter:

dW = the rate of change in wages as represented by the average hourly earnings (excluding overtime) for production workers on payrolls of private manufacturing establishments;

U = the rate or level of unemployment based on the number of workers unemployed as a percentage of the civilian labor force and as adjusted for seasonal variations;

dE = the rate of change in the number employed in the civilian labor force as adjusted for seasonal variations;

dP = the rate of change in the price level as reflected by the Consumer Price Index;

dD = the rate of change in the total of net public and private debt;

R = the rate or level of corporate profits as measured as a percentage return on stockholder's equity after taxes with dR representing the rate of change in this variable; and

dT = the rate of change in the level of output per manhour in manufacturing establishments.

Lag Tests between Unemployment and Money Wage Changes

A review of the regression results of previous research offers little assistance in furnishing statistical evidence sustaining or denying any cause-and-effect relation between wage changes and unemployment. The high correlation generally obtained between the two variables in the same time period has served to some as evidence that wages are significantly influenced by the level of unemployment and to others not concerned with causality that unemployment is a satisfactory "indicator" of wage changes. Aside from Bodkin's efforts in regressing unemployment for earlier time periods against wages, no previous development of lag tests is available. Although cause and effect can be neither proven nor disproven by statistics, results may possibly suggest likely conclusions or areas warranting further study.

A series of tests were conducted allowing the unemployment variable to lag and to lead wages by as much as three quarters. A summary of the results is shown in Table 1. Because of the cyclical movement and the four-quarter span of both variables, residuals resulting from the least-squares computation are serially correlated. Positive autocorrelation is indicated by a value of .38 from the Durbin-Watson test on the relation with zero lags. Although there is no reason to conclude that the regression results are automatically unreliable, caution must be used in analysis. Consideration should be given to the probability of similar biases in previous studies.

With autocorrelation least-squares estimates do provide unbiased regression coefficients, but variances could be understated. Klein and Ball found that least-squares estimates of wage changes using prices and unemployment were insignificantly affected by the presence of autocorrelation.²⁰ This should be kept in mind as well as the inability of a lagged variable to exert any "feedback" on variables already a matter of record. The latter is relevant when considering the interaction between wages and unemployment implied by theory.

The test results in Table 1 are interesting even though some distortion by autocorrelation may exist. With a zero lag or with unemployment leading wages, a negative regression coefficient is expected according to theory; however, with wages leading unemployment, theory would suggest a positive coefficient to reflect the possibility of higher wages raising the level of unemployment. The presence of a

²⁰L. R. Klein and R. J. Ball, "Some Econometrics of the Determination of Absolute Prices and Wages," Economic Journal, Vol. 69 (September, 1959), 472-3.

Table 1. Regression Results for Wage Changes and Unemployment

Dependent Variable	Independent Variable	Regression Coefficient	Standard Error of Regression Coefficient	Computed t-Value	Coefficient of Determination
dW	U_{t-2}	- .66832	.15335	-4.358	.1919
dW	U_{t-1}	- .90829	.13596	-6.680	.3581
dW	U	-1.07202	.11840	-9.053	.5061
U	dW_{t-1}	- .48015	.05089	-9.434	.5266
U	dW_{t-2}	- .40728	.05660	-7.196	.3929
U	dW_{t-3}	- .29371	.06280	-4.676	.2147

negative coefficient in all combinations does indicate that possibly the negative relation is not primarily influenced by causality but simply inverse occurrence. This surely does not prove the absence of causality but is consistent with the hypothesis that exogenous factors (such as changes in aggregate demand, productivity or technological gains, and price increases) determine both variables and that unemployment is not especially a prominent factor in influencing wages.

Coefficients of determination and t-values cannot be interpreted too rigorously because of the potentially unreliable residuals although each variable combination is subject to the same element of bias.²¹ The best t-value occurs for the function with wages leading unemployment by one quarter which is unexpected from a theoretical standpoint. Comparison of results with wages leading unemployment with those for unemployment leading wages by comparable periods does appear to justify consideration. The suggested unlikelihood of unemployment leading wages, as reflected by the coefficients of determination and t-values, is once again consistent with the hypothesis that both variables are determined by exogenous factors. Bodkin similarly found that as the period of time by which unemployment is allowed to lead wage increases both t-values and coefficients of determination decline.²²

With the suggestion that wages may lead unemployment and, therefore, employment, several tests were run to measure the relationship

²¹Based on the sample size, t-tests of the significance of regression coefficients are valid when the computed value exceeds the critical value of 1.993 for 5% probability and 2.646 for 1% probability. All other t-tests in this study will be subject to the same limits.

²²Bodkin, pp. 102-4.

between changes in wages and changes in employment. Though inconclusive and subject to the same potential problem of autocorrelation, the results in Table 2 are not inconsistent with the possibility that wages may lead unemployment. The negative coefficient is reasonable when considering the theoretical possibility of higher wages having a negative effect on employment. Results are significant with wages leading changes in the level of employment by six months. The results are more impressive when considered in comparison with a zero or one-quarter lead for wages. Since the unemployment rate does not necessarily reflect changes in the size of the labor force or changes in employment and is not as dynamic a variable as changes in the level of employment, the relation between employment changes and wages need not be expected to present an exactly opposite result as that between unemployment and wages. Ignoring cause and effect, the results do suggest, though very inconclusively, that wages may move before changes in employment which is consistent with the possible movement of wages before unemployment. In the absence of any compelling reason for suspecting any but a very minor theoretical influence by wages on employment, these findings are not inconsistent with the hypothesis that wages and unemployment are responding to exogenous variables and not to each other. A better correlation between wages and employment would have tended to violate that hypothesis. Further study is certainly warranted.

Tests of a Variable Reflecting the Supply and Demand for Labor

Under the assumptions that the level of unemployment does not adequately reflect supply and demand conditions in the labor market and that supply and demand should exert some influence, though not

Table 2. Regression Results for Wage Changes and Changes in Employment

Dependent Variable	Independent Variable	Regression Coefficient	Standard Error of Regression Coefficient	Computed t-Value	Coefficient of Determination
dW	dE	.17270	.14860	1.162	.0166
dE	dW _{t-1}	- .08748	.08259	-1.059	.0138
dE	dW _{t-2}	- .26548	.07609	-3.489	.1321

necessarily a significant influence, on wage rates, a variable has been designed for this study which attempts to measure both market forces.

A ratio has been used posing changes in total employment (or labor

demand) against available supply: $\frac{E_t - E_{t-1}}{U_{t-1} + (LF_t - LF_{t-1})}$ or $\frac{dE}{U_{t-1} + dLF}$.

The change in employment is the absolute increase or decrease in civilian employment (seasonally adjusted) from the preceding to the current quarter. Though not measuring unfilled demand or vacancies, such changes should adequately reflect labor market demand conditions. The available market supply is based on the absolute number unemployed at the end of the preceding quarter adjusted for changes in the size of the civilian labor force during the current quarter.

Labor market conditions would be "tightest" as positive changes in demand approach total supply, or as the ratio approaches one. Changes in demand could be negative. Presumably, the larger the negative ratio (which could exceed minus one), the less the market pressure on wages; however, any negative ratio would indicate a decline in labor demand and little market pressure for higher wages. The variable has the usual strengths and weaknesses of an aggregate measure.

When initial tests were run with both wages and the supply-demand variable in the same time period, the regression coefficient was insignificant, as shown in Table 3. A significant t-value and a coefficient of determination of .138 were obtained with the demand-supply variable leading wages by one quarter, which is reasonable according to theoretical expectations. The positive coefficient is also acceptable, for the variables should be directly related.

Although not possessing nearly the explanatory power of the unemployment rate, the validity of the demand-supply variable should not

Table 3. Regression Results for Wage Changes and Demand-Supply of Labor

Dependent Variable	Independent Variable	Regression Coefficient	Standard Error of Regression Coefficient	Computed t-Value	Coefficient of Determination
dW	D-S _L t-1	.02028	.00566	3.585	.1384
dW	D-S _L	.01162	.00596	1.951	.0454
D-S _L	dW _{t-1}	- .48015	2.04389	- .234	.0007

be dismissed on this account alone; for the actual influence of labor market conditions on wage changes may not be great, certainly not to the extent suggested by the explanatory ability of the unemployment rate. Depending upon the actual validity of the demand-supply variable itself, some influence by market conditions on wages, though not significant, is suggested by the tests. A test was conducted with wages leading the demand-supply variable by one quarter for comparison with other findings. The resulting regression coefficient was quite insignificant though possessing what would be an expected negative sign.

As shown in Table 4, additional tests were conducted involving the substitution of the demand-supply variable for unemployment in two wage-estimation models. In both instances, the coefficients of determination declined over .20 while the regression coefficients for the demand-supply variable were insignificant. The substitution in the first model did have the effect of making the coefficients of both the level and the rate of change in the level of profits significant and in the second model of making the coefficient for the productivity variable significant. The unemployment variable obviously has superior explanatory power although it tends somewhat to retard the explanatory power of other variables.

The failure of the demand-supply variable to remain significant when placed in these models suggests that there is some interaction with other variables; however, in the absence of the unemployment rate variable, the demand-supply variable does possess some explanatory power and increases the significance of other variables. Results neither support nor deny the validity of the variable as a measure of the effect of labor market conditions on wages. Contrary to the previous results,

Table 4. Regression Results for the Substitution of the Demand-Supply Variable for Unemployment in Wage Estimation Models

Dependent Variable	Independent Variable	Regression Coefficient	Standard Error of Regression Coefficient	Computed t-Value	Partial Correlation Coefficient	Coefficient of Determination
(a) dW	U	- .87595	.11734	-7.465	-.64798	.6739
	dP	.28009	.05201	5.385	.52308	
	R	.10370	.06010	1.725	.19293	
	dR	.00467	.00554	.842	.09562	
dW	D-S _L t-1	.00823	.00533	1.543	.17325	.4548
	dP	.30457	.06807	4.474	.45424	
	R	.21561	.07956	2.710	.29509	
	dR	- .01351	.00664	-2.035	-.22601	
(b) dW	U	- .81892	.11306	-7.243	-.63658	.6720
	dP	.27619	.05184	5.328	.51901	
	dT	- .03484	.06871	- .507	-.05768	
	R	.12311	.06118	2.012	.22353	
dW	D-S _L t-1	.00734	.00524	1.399	.15745	.4622
	dP	.33975	.06577	5.165	.50731	
	dT	- .19286	.08405	-2.294	-.25297	
	R	.23967	.07980	3.003	.32382	

which failed to show clearly the level of unemployment or rate of change in employment as leading wage changes or even sharing the same time period, this variable does appear to give best results when leading wages; and its limited explanatory power is not unrealistic.

Tests of a Variable Measuring Changes in the Level of Debt

In order to consider the responsiveness of unemployment and wage changes to each other, a series of tests were conducted using a variable representing the rate of change in net public and private debt. Changes in debt would be expected to have an effect on both variables from a theoretical standpoint as deficit spending is a primary means of combating unemployment and also a means of financing higher wages and prices.

Acknowledging the presence of autocorrelation,²³ coefficients were significant in all instances at a 1% level of probability as shown in Table 5. The assumption that debt is a means of funding wage increases is sustained by the observed immediate significance of the coefficient when both debt and wages are in the same time period; but with a coefficient of determination of only .08, little explanatory ability is present. A maximum t-value and coefficient of determination are observed when the debt variable leads wages by six months which should be reasonable considering the time lag of the multiplier effect on the economy of any changes in debt.

When regressing debt changes against unemployment (Table 6), all t-values were significant at 1% except when both variables shared the

²³A value of .25 was obtained from the Durbin-Watson test on the relation between wage changes and changes in debt with zero lags.

Table 5. Regression Results for Wage Changes and Changes in Public and Private Debt

Dependent Variable	Independent Variable	Regression Coefficient	Standard Error of Regression Coefficient	Computed t-Value	Coefficient of Determination
dW	dD	.35560	.13314	2.670	.0819
dW	dD _{t-1}	.52285	.12440	4.202	.1809
dW	dD _{t-2}	.57204	.12139	4.712	.2173
dW	dD _{t-3}	.51945	.12459	4.169	.1785

Table 6. Regression Results for Unemployment and Changes in Public and Private Debt

Dependent Variable	Independent Variable	Regression Coefficient	Standard Error of Regression Coefficient	Computed t-Value	Coefficient of Determination
U	dD	-.17561	.09009	-1.949	.0453
U	dD _{t-1}	-.30410	.08464	-3.592	.1389
U	dD _{t-2}	-.59286	.07976	-4.925	.2327
U	dD _{t-3}	-.43722	.07702	-5.676	.2872

same time period. This is reasonable to expect as unemployment is slow to react to changes in spending. The maximum correlation occurs when debt changes lead unemployment by three quarters. It is interesting to note that the responsiveness of unemployment after two quarters is statistically similar to that of wages after two quarters, although unemployment does not reach its best relation until the third quarter.

Aside from the obvious conclusions that unemployment is ultimately more responsive to changes in debt but reacts more slowly than wages, little else can be said. The movement of both variables to a somewhat similar degree does indicate that exogenous variables like debt could account for the good correlation between wages and unemployment; however, such is not proven. Debt is not the only (nor necessarily the major) influence on either variable, as shown by the coefficients of determination. Considering that debt does explain over twenty percent of the variation in each of the variables after a six-month lag, a good correlation between the two variables is a reasonable expectation regardless of whether or not there is any causal relationship between them.

The similarity in the coefficient of determination for debt changes with a six-month lead regressed against unemployment and against wages is consistent with the tendency of wages and unemployment to have their best correlation with each other when both are in or close to the same time period. In addition, the slower response to debt changes by unemployment is compatible with the weaker correlation between wages and unemployment when unemployment leads wages and the slightly better correlation when wages lead unemployment, though surely further study is needed before any conclusions can be drawn.

The failure of the wage coefficient to have a positive sign when leading unemployment (as theory might suggest) is again in agreement with the debt tests. If the two variables are more strongly influenced by external factors than by each other, the negative relation could be dictated by the external factors. The results suggest that changes in debt lead to higher wages and lower unemployment with wages reacting first. The advance movement of the wage variable would cause any relation with wages leading unemployment by a brief period to show a significant but inverse correlation. Such inverse relationship would be unfounded according to any wage or employment theory but completely logical within the assumption that there is no significant causality between the two variables.

Chapter 5

SUMMARY AND CONCLUSIONS

The position that the level of unemployment exerts a causative influence on the rate of change in money wages has been attacked from two standpoints in this study: that the level of unemployment is an inadequate measure of supply and demand conditions in the labor market and that, even if an adequate measure, labor supply and demand should not constitute a major influence on wage changes. An attempt has been made to establish that both variables react to external influences, rather than to each other, in order to reinforce the contention that unemployment does not exert a significant influence on wage changes.

The unemployment level is a stock variable which fails to show the direction or magnitude of the unemployment situation. The proposal that the excess supply of labor, which is all that the unemployment level can reflect, causes certain reactions in the wage variable is not clearly warranted when the variables are analyzed in conjunction with wage and employment theory. The strong inverse correlation between wage changes and unemployment may have prompted a forced, theoretical marriage of convenience between the variables by researchers.

Although it is reasonable to assume that the existence of scarce labor would tend to be associated with, if not influence, higher wages, the level of unemployment measures the excess supply of labor, not the scarcity. Scarcity, by definition, requires consideration of both demand

and supply. To maintain that the excess supply of labor is a determinant of wage changes is to ignore the demand aspect of the labor market which would indicate the employer's position in initiating or granting wage increases.

The contention that the relative level of unemployment, high or low, adds the necessary dynamic aspect to the unemployment variable for its association with the flow variable of wage changes and increases the utility of the variable as a measure of economic activity has no effect on the cause-and-effect argument. If the absolute level of unemployment fails to measure labor supply and demand conditions, its relative position must also fail. That a lower level of unemployment cannot be attained without an increase in the level of demand for labor is indisputable, but isolated observations of "low" unemployment (with corresponding wage changes for source data for regression computations) would not indicate whether that "low" level was historically in an upward, downward, or zero trend. In the absence of knowledge about the direction of movement of an unemployment observation, no assumption can logically be made about the demand for labor and, thus, about wage change expectations.

Regardless of the validity of the level of unemployment as a measure of labor market conditions, regression tests conducted did not contradict the hypothesis that both wages and unemployment were reacting to external variables and not to each other. Lag tests between wage changes and unemployment, even considering the presence of autocorrelation, showed a stable trend in the relationship and a strongly inverse correlation, regardless of the leading variable. Such results support

the contention of the presence of external influences and somewhat deny the likelihood of any cause-and-effect relation being prominent.

Regression results with wages leading unemployment were clearly superior to those with unemployment leading wages for comparable periods. In addition to the best correlation between the two variables occurring with wages leading unemployment by one quarter, additional evidence suggesting the movement of wages in advance of unemployment was found by testing the relationship between changes in wages and changes in employment. This relation was significant only with wages leading employment changes.

Since the wage-unemployment tests with lags distinctly showed an inverse relation between the variables which would contradict what theoretical relation might exist with wages leading unemployment, the presence of exogenous factors is suggested. (There is, of course, no reason to suspect a major theoretical influence by wage changes on unemployment.) Lag tests between changes in debt and changes in wages and between changes in debt and the level of unemployment were quite consistent with previous test results. Wages did tend to react sooner to changes in debt than did unemployment although unemployment was ultimately more responsive. Both variables reacted to a comparable extent to debt changes after six months. The results were consistent with the previously demonstrated tendency of wages to lead unemployment. Though certainly not conclusive, all tests did tend to sustain the hypothesis that wage changes and unemployment are highly correlated because of external factors and did not support the position that the level of unemployment is a major determinant of wage changes.

Previous studies raised doubt about the primacy of higher income as a motivation of workers in changing jobs and the actual extent and effect of mobility in the labor market in lowering wage differentials. Both mobility and income maximization by workers are vital factors underlying the assumption that labor market supply and demand conditions determine wage changes, especially from the standpoint of employer bidding. Assuming that labor market conditions should influence wage changes (but not to the extent suggested by the relation between unemployment and wage changes), the demand-supply variable was designed and tested. The variable attempted to measure labor market demand conditions in conjunction with excess supply conditions; however, the actual validity of the variable was not proven. The variable was more significant when leading wage changes, contrary to the results when unemployment and changes in employment were leading, and possessed an expected positive coefficient. The variable explained only 13.8% of the total variation in wage changes. Though surely not possessing the explanatory power of the unemployment rate, the demand-supply variable did respond satisfactorily.

The scope of the tests in this study was quite limited; and, if for no other reason, this is justification for caution in analyzing the results. The findings were consistent and significant enough to warrant additional study and reconsideration of previous positions concerning the validity of the unemployment variable as a measure of labor market conditions and as a determinant of money wage changes. Even for those who

assume that unemployment has little causative influence on wage changes but who find utility in the "trade-off" occurrence, the possible advance movement of wages should be weighed in the formulation of inflation-unemployment policy.

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