Faculty Working Papers

IMPACT OF THE RECENT INFLATION ON LABOR SKILL DIFFERENTIALS

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ABSTRACT

The aggregate (or pooled) labor skill differential in the manufacturing sector remains relatively stable over the twenty-two year period 1952-73, in spite of swings in the business cycle over this time plus sharply increasing rates of inflation the past decade.

Within this overall picture, one discerns interesting secular trends among individual cities (metropolitan labor markets) when the manufacturing sector is disaggregated. The twenty-two year movements in the manufacturing skill differentials for 10 of 16 U.S. cities is toward convergence at one of two central-tendency values. A comparison of degrees of unionization of all 16 cities with respective secular skill differential estimates in 1973 supports the proposition that within the manufacturing sector the secular reduction in variance among cities is accompanied by a reallignment into "unionized city" and "less-unionized city" elements. The manufacturing skill differential central-tendency value for less-unionized cities is about 15 percent greater than that for the unionized cities.

In the non-manufacturing sector during 1965-73, the labor skill differentials widened dramatically in 12 of 14 cities with adequate data. This coincides with the change in economic conditions about 1965, as nationwide the civilian labor force approached full employment and annual inflation rates began an upward climb. Skill differentials in the non-manufacturing sector generally are more responsive to changing market conditions than in the manufacturing sector, so further tests provide estimates of the "pure inflation" effects on the non-manufacturing skill differentials of the respective cities.

I set out a group of interrelated propositions regarding various wage relationships in the manufacturing and non-manufacturing sectors. These propositions are examined to provide some light on the decidedly different behavior of labor skill differentials in the two sectors during 1965-73.

Industrywide collective bargaining, consolidated bargaining, and coercive comparisons within the more-unionized manufacturing sector have resulted in negotiated wage-scale rigidities that would seem impervious to business cycle or inflation shocks. The level of the overall wage scale in this administered manufacturing sector is generally higher than in the more competitive non-manufacturing sector, providing employers in manufacturing with a wage premium with which to maintain labor queues over the course of normal business fluctuations.

Employers in the non-manufacturing sector bid to attract skilled workers from manufacturing as demand increases and labor markets tighten. As the economy experiences the Phillips Curve squeeze, non-manufacturing employers increase their wage-offers for skilled workers at rates-of-change that exceed the inflation-induced increases in the manufacturing sector.

This horizontal wage-link for skilled workers between the two sectors during the phenomena of tight labor markets-plus-inflation is absent in markets for unskilled workers. The impact on relative wage changes from the entrance of significant numbers of labor reserve individuals into the ranks of unskilled workers during tight labor markets is concentrated in non-manufacturing unskilled laborers. This outward shift of the labor supply curve in the more competitive non-manufacturing unskilled labor markets results in a depressing force on relative wage changes for this element of the labor force.

The economic conditions affecting the rate of wage increases for skilled workers in non-manufacturing when combined with the other diverse forces depressing wage increases for non-manufacturing unskilled workers are mutually reinforcing in inducing a sharp widening of the non-manufacturing skill differential during inflation.

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The skill differential (also termed the occupational differential or skill margin) is a measure of the percentage difference between the hourly earnings of workers designated as skilled and those designated as unskilled. This concept is used as one indicator of the relative economic well-being of two major groups of earners. A period of sharp inflation such as that experienced in the United States since 1965 may be a pervasive force distorting relative earnings patterns throughout the economy. Government anti-inflationary wage policy - such as the wage-price freeze in August, 1971 - in turn may not be neutral with regard to relative earnings patterns. If relative wages indeed are distorted during inflation, government intervention could further distort the changed relative economic well-being among workers or, alternatively, could mitigate the exceptional situation.

This paper analyzes labor skill differentials in the United States during the twenty-two year period 1952-73. Both the manufacturing and the non-manufacturing sectors are studied, because the respective skill differentials in the two sectors had decidedly different patterns during the 1965-73 inflation. The skill differentials in the manufacturing sector have re-

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Any comments or suggestions for further refinement of this working paper will be appreciated. I am pleased to acknowledge the following assistance in preparation of this paper: Carol King, for data gathering in the earlier stages; Dale Parr, for data collection, programming, and excellent general assistance; Helen Lowry, for programming and statistical assistance; and the librarians at the Institute of Labor and Industrial Relations, University of Illinois-Urbana. Primary elements of this study are sponsored by a U. S. Department of Labor research contract.

mained relatively stable throughout the two decades, though one discerns interesting secular trends among individual cities when the sector is disaggregated. Skill differentials in the non-manufacturing sector (specified here as excluding government services, the construction, extractive, and agriculture industries) are generally more volatile during the "normal" economic fluctuations prior to 1965, and then rose sharply as the economy experienced relative full-employment plus sharp increases in price indices. The non-manufacturing skill differentials in the bulk of sampled U.S. cities indeed rose well above secular averages during the first nine years of this present inflation, meaning that the relative economic well-being was sharply distorted in the favor of skilled workers.

The labor skill differential of course is an incomplete measure of relative economic welfare. This indicator only purports the relationship of straight-time hourly earnings of skilled and unskilled workers. The total hours worked and consequent weekly or monthly earnings are not measured. Nor are premium pay for overtime, late shifts or weekends included.[1] The focal point moreover is on the hourly earnings of the individual worker; the welfare implications of changing real incomes when a second family member secures employment during tight labor markets are not considered. But to the extent that labor skill differentials in one major sector jump sharply upward during tight employment-and-inflation, the realtive welfare of the composite family unit may be affected.

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[1] Nonproduction bonuses are excluded, but cost of living allowances and incentive earnings are included.

PRELUDE

Our concentration is on the impact of the recent inflation on skill differentials. The forces exerting on wage changes are complex, and to appreciate inflation effects we must attempt to abstract from other secular and cyclical considerations. The overall abstract framework for the study of skill differentials is dominated by two perspectives of the labor market; the first is the basic premise of reasonably-competitive markets, and the second stresses strategies and conditions under institutional settings of collective bargaining and bi-lateral concentrated economic power. Economists have tended to stress the familiar competitive economic model in seeking a theoretical foundation for changes in the labor skill differential over time, though in reality the forces exerted thorough collective bargaining--only secondarily reflecting existing or anticipated market conditions--may profoundly affect the skill differentials in specific labor markets.

According to the competitive model, skilled jobs should pay more than unskilled jobs by an amount necessary to cover the costs involved in acquiring skill--namely, training costs and income foregone--plus a surplus allowing for a return on investments in skills equal to the return attainable on alternative investments. The skill differential is affected in the long run by changes in labor supply, or changes in adjustment of supply to changing labor market demand conditions. Historically the skill differential has been affected by immigration and by migration from agriculture to industry. The skill differential in manufacturing secularly narrowed

throughout the first half of this century.[2/] This secular decline has been attributed to the decline in immigration over the fifty-year period and changes in the cost and time of education.[3/]

Economists have identified a stabilization in the manufacturing skill differential between the early-fifties.and the mid-sixties.[4/] The various authors generally have compared index-values or individual-city values of the manufacturing skill differential in the first year of the study with comparable values in the last year, rather than analyze year-by-year variations in the skill differential throughout the period. The different methods of measurement have resulted in conflicting claims of a modest narrowing or an overall modest widening of this skill differential during the approximate fifteen-year period, but aggregate national manufacturing wage indexes or other measures of median skill differential values among several cities would substantiate the general argument that the skill differential in manufacturing stabilized between 1952 and 1964.

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[2]Paul G. Keat, "Long-Run Changes in Occupational Wage Structure, 1900-1956," Journal of Political Economy, 68 (December 1960), pp. 584-600; Harry Ober, "Occupational Wage Differentials, 1907-1947," Monthly Labor Review, 71 (August 1948), pp. 127-134.

[3]Keat, op.cit. 594-599.

[4]Martin Segal, "Occupational Wage Differentials in Major Cities During the 1950's" Mark Perlman, ed. Human Resources in the Urban Economy, Baltimore: Johns Hopkins Press, 1963. pp. 195-207. Also George H. Hildebrand and George E. Delehanty. "Wage Levels and Differentials," in Robert A. Gordon and Margaret S. Gordon, Ed. Prosperity and Unemployment, New York: Wiley, 1966. pp. 265-301

The competitive labor market framework also has been a basis for theoretical postulates on cyclical movements in the skill differential. Melvin Reder and Walter Oi agree that the skill differential in a quasi-competitive setting ought to widen during a recession and narrow as the economy approaches full employment, though each offers an alternative theory in explanation.[5/] Reder stresses relative elasticities of supply in both skilled and unskilled workers during recessions and expansions. Labor is more mobile in the downward directions because of the costs and time in acquiring new skills. Unemployed skilled workers during a recession sharply expand the stock of available unskilled in competing for employment, according to Reder. The clearing wage in the competitive market for unskills consequently suffers relative to the (recession) wages of skilled workers. The labor mobility is in the opposite direction as the economy expands and labor markets tighten. Employers turn to on-the-job training and other upgrading of unskilled workers in their efforts to fill skilled positions. The remaining stock of unskilled workers therefore shrinks, vis-a-vis the skilled market, and the skill differential correspondingly narrows during this expansionary period.

Oi alternatively stresses the investment-in-skill-acquisition approach to variations in the skill differential over the business cycle,

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[5]Melvin Reder, "The Theory of Occupational Wage Differentials," American Economic Review , 45 (December 1955), pp. 833-852. Also Reder, "Wage Structure Theory and Measurement," in National Bureau of Economic Research, Aspects of Labor Economics, Princeton, 1962, pp. 257-311. Walter Oi, "Labor as a Quasi-fixed Factor," Journal of Political Economy, 70 (December 1962), pp. 538-555.

still within the general framework of competitive labor markets. Oi argues that skilled workers have a greater "degree of fixity", which relates hiring and training expenses over the employment period to total employment costs.[6/] Employers who profit-maximize presumably will prefer to retain workers with "high fixity" (i.e. skilled workers) during economic downturns, rather than turn them loose. Oi notes that even the intermediate course of laying off workers, rather than dismissing them, is expensive in subsequent hiring and training expenses as only 39 percent of total workers laid off during 1953-58 were recalled by their respective firms. This employer-hoarding therefore results in a relatively more moderate decline in the demand for skilled workers than the unskilled during a recession and a consequent widening in the skill differential.

Oi's competitive-market theory regarding a widening of the skill differential during recessions has been further refined by Reder and by S. C. Salop. Reder observed that "grades" exist within most skilled occupations that reflect experience in addition to basic skills.[7/] Employers tend to try and retain the experienced workers in each skill occupation during a recession, and hence there is a bias for average effective wages among employed skilled workers during a recession to remain higher than the case of a single-grade, one-wage occupation. Salop modifies Oi's argument to consider situations where the firm has some control to affect its wage-rates[8/] Salop provides a

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[6] Oi. op. cit. p. 541.

[7] Reder. "Wage Structure Theory and Measurement" op. cit. p. 271.

[8] S. C. Salop, "Wage Differentials in a Dynamic Theory of the Firm," Journal of Economic Theory, 6 (August 1973), pp. 321-344.

theoretical basis to demonstrate that an optimizing firm never discharges labor in a recession where training and turnover costs are minimal-as with unskilled workers. Rather, the firm follows the alternative strategy of lowering the wage rate and thereby inducing excess labor to quit while saving some wage costs on remaining employees.[9/] The training and turnover costs for skilled workers, however, may be sufficiently high that the alternative employer-hoarding strategy discussed by Oi or temporary layoffs may be preferable to reductions in the skilled wage rates.

In any event, neither Reder nor Oi place much stress on the responsiveness of the labor skill differential to short-term changes in overall employment levels. Reder compared wage indices for the manufacturing sector skill differential during the peak-and-trough years of 1918-19, 1931-32, 1937-40, and 1945-47 to discern that the skill differential was narrower during low-employment periods and wider during the depression. Reder further commented, "But our hypothesis does not imply that it (the skill differential) should vary with small changes in business conditions; the ordinary period of prosperity does not usually absorb a large enough fraction of the labor reserve to induce a sharp rise in unskilled rates." [10/] Oi also focused on the early Depression years and 1951-58.[11/] Oi tested a variant of skill differentials;

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[9] Ibid. p. 327.

[10] Reder. "The Theory of Occupational Wage Differentials," op. cit. p. 842.

[11] Oi Op. Cit. 547-553.

he postulated that high-wage occupations would experience smaller rates of change in employment than the low-wage counterparts during the Depression years 1928-30. Oi's analysis of high-wage and low-wage workers in four selected industries tended to support his hypothesis and its converse that "low-wage occupations, corresponding to low-degrees of fixity, do experience relatively greater changes in employment."[12/]

In addition to the possible effect of significant changes in labor demand or labor supply on the skill differential, arguments have been advanced that inflation accompanying prosperity would act as an independent force to further narrow the skill differential. J. R. Hicks is frequently cited for his remarks in 1955 that during severe inflation employers and employees alike acknowledge the purchasing power plight of low-wage workers.[13/] A reinforcing assumption is that low-wage workers will fight harder to protect their real incomes.from the damaging effects of price increases on real income.[14/]

Actual tests of the independent impact of inflation and the labor skill differential to date "have been sparse and inconclusive."[15/] Much of the discussion centers on Robert Evan's 1963 study of changes in skill differentials during the Civil War, World War I, and World War II.[16/]

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[12]Ibid. p. 549.

[13]J. R. Hicks, "Economic Foundations of Wage Policy, "Economic Journal, 65 (September 1955), pp. 389-404.

[14]Richard Perlman. Labor Theory. New York, Wiley, 1959, p. 100.

Evans used a historical index of wages of skilled handicraftsmen and unskilled laborers for the Civil War period and ratios of union wage scales in the building trades for the latter two wartime periods. No data are presented on unemployment during the Civil War years, so an observation that the constructed skill differential declined each year from 1861 to 1865 and rose in 1866 cannot be tested to distinguish between a) the effects of shifts in labor excess demand or excess supply, or b) an independent inflationary effect. Likewise, Evan's observations on the narrowing skill differential in the building trades during both world wars are inconclusive. Using Evan's data, the respective labor markets were "tight" (as distinguished from "tightening) in only one year during the four-year World War I period. Correspondingly, only two years during the Second World War lend themselves to a possible "test" of the skill differential-inflation hypothesis. Indeed, a period of tight labor markets ("full employment") as short as one or two years may be inadequate to test a pure inflation effect because of the possibility of lags in adjustment of supply in both markets for skilled and unskilled workers that could be too sensitive to discern in so short an observation period.[17/]

A recent article by Gustman and Segal provides another insight on the changes in skill differentials during an inflationary period, though the authors concentrate on secular trends and unemployment effects.[18/] The authors stress that the skill differential in the building construction

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[17]Perlman, op. cit. p. 102.

[18]Alan L. Gustman and Martin Segal, "The Skilled-Unskilled Wage Differential in Construction," Industrial and Labor Relations Review 27 (January 1974) pp. 261-75.

industry declines secularly during the period 1953-70. The authors further conjecture that the differential would narrow still more if overall unemployment were to fall below 3.5 percent. Yet the skill differential for this industry as calculated by Gustman and Segal actually widened consistently each year over the five-year period 1965-69.[19/]

Gustman and Segal put forth a unique labor-market cycles hypothesis that is relevant for our later analysis of the non-manufacturing sector. The authors argue that labor markets in the building construction sector are not competitive or quasi-competitive and therefore do not fit the Reder or Oi framework for relative wage movements over the business cycle. The authors suggest that the sharp divisions along craft and union lines in construction inhibit the kind of upgrading that Reder noted as an important supplement to the supply of skilled workers during economic expansion. Any interdependence that may exist between union policies for skilled craftsmen and unions representing the unskilled may weaken during a prolonged upswing. Any excess supply of skilled craftsmen may decrease more rapidly than any excess of the unskilled, because of compartmentalization of occupations reinforcing the relatively inelastic supply of the skilled. The relative bargaining position of the skilled craftsmen therefore is strengthened. Since there is less concern about nonunion competition during an upswing, there is less incentive for the various craft and trade unions to coordinate wage and strike policies even when operating under joint demand.[20/]

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[19] Ibid. p. 262

[20] Ibid. pp. 269-70.

The basic model of Gustman and Segal concentrates on changes in unemployment rates and time trend variables; discussion of a pure inflation effect is not included.

The building construction industry is unique among the sectors because of its structure and economic volatility; for these reasons I have excluded this industry from the detailed analysis of either the manufacturing or the non-manufacturing sectors. Nonetheless both the contributions and the omission in the Gustman and Segal work are provocative. Perhaps relative wages between skilled and unskilled workers actually run contrary to script during periods of tight labor markets and rapidly accelerating inflation. The volatility of relative wages, employment, and prices since 1965 affords a unique opportunity to examine determinants of change in the labor skill differential.

THE BASIC MODEL, AND DATA SOURCES

The attention in this study is focused on changes in the labor skill differential during the twenty-two year period 1952-73, with specific emphasis on the inflationary period 1965-73. The abstract economic model in functional form is $D = D(U, P)$; where D is the labor skill differential, U is unemployment, and P is the consumer price index. This is a common variant of the microtheory competitive market for labor services, wherein labor utilization is a function of the real wage and labor supply.

The skill differential is specified as the ratio of weighed wages of skilled workers to the weighed wages of unskilled workers for a given period of time, or $\hat{W}_s / \hat{W}_u$. These are specific average hourly effective wages and not either contractual wage rates nor a measure of total weekly compensation.

The skill differentials are expressed on a percentage basis, rather than on absolute differences. The percentage basis more accurately portrays changes in relative welfare positions among different classes of workers, which is my objective.[21/]

Since the labor skill differential is a composite of different occupation wages, the three critical dynamic variables are changing wages, prices, and unemployment. This work therefore bears a resemblance to the many recent wage determination studies using these same variables and consequently shares inherent methodological and statistical problems.

Unemployment rates have been used by economists both in relative and absolute wage determination studies as a proxy for the excess supply conditions in the labor market. As such, this variable has come under criticism for reasons of market structure or because of measurement considerations. The first argument notes that when labor markets are not competitive, the tradeoff between wages and unemployment is not direct but rather works indirectly through product demand and bargaining power. [22/]

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[21]For a more detailed discussion of the relative merits of the alternative specifications of the skill differential, see Perlman, Labor Theory, op. cit. pp. 85-92.

[22]Daniel S. Hamermesh, "Wage Bargains, Threshold Effects, and the Phillips Curve," Quarterly Journal of Economics, 84 (August 1970) pp. 501-517

The second concern over using unemployment rates as a proxy for the excess supply of labor is that the unemployment rate alone cannot adequately represent labor market conditions.[23/] Wachter points out that during the 1966-69 period the unemployment rate was nearly constant at a rate below 4.0 percent "full employment", but vacancies increased. Thus on the labor demand side a true labor market variable should have signaled increasing tightness over the period, instead of a "tight" condition.[24/]

On the supply side the official specification of what individuals constitute the civilian labor force excludes consideration of the labor reserve. This labor reserve is an estimate of the deviation of the actual labor force from the labor force that would be observed if the economy were continuously at "true" full employment. The labor reserve includes discourged workers and secondary workers (principally women and youth). This is a valid concern, as studies have indicated that during periods of less than full employment the level of reported unemployment understates the magnitude of available labor reserves, and that the reported unemployment rate overstates the amount of excess demand in the labor market.[25/] One frustration with consideration of the labor reserve force is that estimates of this economic variable also present controversial measurement problems.[26/]

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[23]Michael L. Wachter, "A Labor Supply Model for Secondary Workers," The Review of Economics and Statistics 54 (May 1972), pp. 141-151.

[24]Ibid. p. 145.

[25]N. J. Simler and Alfred Tella, "Labor Reserves and the Phillips Curve," The Review of Economics and Statistics 50 (February 1968) pp. 32-49.

[26]C. F. Wayne Vroman, "The Labor Force Reserve: A Re-Estimate," Industrial Relations, 9 (1969-70), pp. 374-393.

Moreover, the available estimates for the labor force reserve are at the national level, and this study concentrates on individual urban labor markets. I shall not dismiss consideration of the labor market reserve completely, however; secondary worker movements into the labor force may be an important element in understanding movements in the skill differential during 1965-69--specifically in the non-manufacturing sector.

Nonetheless I shall use unemployment rates as an acceptable proxy for excess labor supply. This is a reasonable measure, and even critics have ended up incorporating it into their estimation models.[27/] My statistical models will actually use the reciprocals of unemployment rates. The improved fits obtained confirm the arguments of others that the rationale for the transformation: that at some high level of unemployment, wage dispersion becomes relatively insensitive to further increases in unemployment.[28/]

The worker-employer hiring transaction turns on the level of real wages in the competitive theory of labor markets. Whether in this theoretical context or in studies of money wage determination, changes in the consumer price could largely be ignored if one assumed that workers and employers alike had

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[27]Hamermesh, op. cit., p. 509; William A. Howard and N. Arnold Tolles, "Wage Determination in Key Manufacturing Industries, 1950-70," Industrial and Labor RElations Review 27(July, 1974) pp. 553-556

[28]Michael L. Wachter, "Cyclical Variation in the Interindustry Wage Structure," American Economic Review 60 (March 1970) pp. 75-84. See also Hamermesh, op. cit; p. 509; and Arnold H. Packer and Seong H. Park, "Distortions in Relative Wages and Shifts in the Phillips Curve." The Review of Economics and Statistics 55(February 1973), pp. 16-22; and Gustman and Segal, op. cit. pp. 261-275.

correct expectations that the modest rate of change in the consumer price index would remain constant.[29/]

It is only when changes in the price index take sharp, unexpected upward or downward jumps that the wage determination process might be affected. Hamermesh has commented, "It may be that there is some threshold rate of inflation that awakens workers to the erosion in their living standards. This feeling may in turn be reflected in the settlements reached by the negotiators representing these workers. To the extent that such feelings exist, they should be incorporated in equations explaining wage changes."[30/] I therefore shall use annual rates change in the consumer price indexes rather than the absolute levels of these indexes, as a concentration on changes in the rate of change in a price index will minimize the bias of long-run creeping inflation.

My basic model to ascertain "pure inflation" effects on labor skill differentials, then, is $D = D(u^{-1}, \dot{p})$ where D is the annual skill differential in either the manufacturing or the non-manufacturing sectors of selected U. S. urban areas. The reciprocal of unemployment and the percentage change in the consumer price index from the preceding year are the local values of these variables for each respective urban area. This specification is but one step removed from the popular wage determination models

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[29]For a comprehensive theoretical analysis of wage change theory with anticipated inflation see Jim Taylor, Unemployment and Wage Inflation. Burnt Meadow, U.K.; Longman, 1974, esp. pp. 49-56.

[30]Hamermesh, op. cit. p. 504

recently criticized by Cargill and Meyer, and Rowley and Wilton.[31] Cargill and Meyer offer the following as a "representative" distributed lag wage determination model:

$$\dot{W}(t) = \Sigma_{\tau=o}^{s1} B_1(\tau)\, \dot{p}(t-\tau) + \Sigma_{\tau=o}^{s2} B_2(\tau)\, U_n^{-1}(t-\tau) + \varepsilon(t)$$

$\dot{W}(t)$: percentage change in the money wage rate

$\dot{P}(t)$: percentage change in the price level

$U_n^{-1}(t)$: reciprocal of the unemployment ratio

$\varepsilon(t)$: residual term.

Cargill and Meyer then note that the variables entering the wage equation must be regarded as coming from a larger structural system of equations. It is unrealistic to assume the absence of feedback between wages and prices (and--in a longer time horizon--between wages and employment). Cargill and Meyer continue, "Most studies simply avoid the issue by adopting a single-equation approach with the least squares (OLS)."[32]

There is no simple solution to alleviate this serial correlation dilemma. The presence of serial correlation is acknowledge in some of the subsequent excercises in this paper, and I shall discuss the probable impact on coefficient estimation. Minimal use of lengthy

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[31] Thomas F. Cargill and Robert A. Meyer, "Wages, Prices and Unemployment: Distributed Lag Estimates," Journal of the American Statistical Association, 69 (March 1974), pp. 98-107. J.C.R. Rowley and D.A. Welton, "Quarterly Models of Wage Determination: Some New Efficient Estimates," American Economic Review, 63(June 1973) pp. 380-389

[32] Cargill and Meyer, op. cit. p. 99.

distributed lag functions may tend to reduce, though not eliminate this problem.

It is reasonable to assume that money wages alone may respond with distinct lags to either changing labor market conditions or to rising inflation. Wachter has commented, "One would expect the lags to be quite long. First, to the extent that wage contracts in the unionized sector are as long at three years, the adjustment lag of noncompetitive firms can be expected to be at least three years. Second, in general, the longer the time horizon of the forecast (made necessary by the fixed wage contract), the longer the expectational lag." [33/] Wachter's dependent variable in this cited study is the coefficient of variation in overall average inter-industry wages. His lag weights indicate that the lag-in-response is 50 percent complete in the year t+3 for changes in the rate of change in prices, and in the year t+1 for changes in the reciprocal of unemployment. In Wachter's 1970 paper on the same subject, the bulk of response in interindustry wage variations to changing unemployment occur immediately or with a one-year lag.[34/]

Though there is some evidence to support the proposition changes in unemployment or inflation will affect the level of money wages with a lag or lag-series, there is no obvious a priori reason why the labor skill differential ought to be likewise affected through a complex lag-structure

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[33]Michael L. Wachter, "Phase II, Cost-Push Inflation, and Relative Wages." American Economic Review (64(June 1974), p. 485

[34]Wachter, American Economic Review, 60 (March 1970) op. cit; p. 80. On the issue of the impact of 2 or 3-year labor contracts on "wage round" theory, see Hemermesh, op. cit; p. 502.

relationship. Nonetheless, some sample experiments were performed on the data using a series of straightforward annual lags and distributed lags. As the analyses will indicate, more sophisticated polynomial distributed lags and other distributed lag functions are not relevant to the data at hand. The labor skill differential in the manufacturing sector is remarkably stable throughout the twenty-two year period, in spite of significant and abrupt shifts in important economic parameters. In the non-manufacturing sector during 1952-64, the labor skill differential in many sample-cities responds to shifts in unemployment during the year in question or with a one-year lag. At the outset of the present sharp inflation in 1965, the labor skill differential in the vast majority of the sample-cities jumps sharply upward immediately or with a one-year lag. Further lag analysis therefore is not critical.

At the outset I had to make a decision between studying labor skill differentials in an indu try context (such as "Furniture;" "foundries") or in a geographic labor market area. I chose the latter route, largely on the premise that relative welfare is the relation of a worker to his peers and others within the context of his surroundings. Each approach has merit to its own subset of issues.

The U. S. Bureau of Labor Statistics publishes annual Area Wage Surveys for Major Standard Metropolitan Statistical area's in the U. S.[35/] The sixteen metropolitan areas in this study were selected so that two or more cities

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[35]U. S. Department of Labor. Bureau of Labor Statistics. Area Wage Survey. Washington, D. C. Annual, by metropolitan area. Bulletin numbers vary annually and are listed for all areas on the inside back cover of each issue.

were located in the four U. S. Census regions: northeast, north central, south and west. Additional cities were added from the"north central" region (e.g. Ohio, Michigan, Illinois, etc.) to facilitate an anticipated in-depth regional analysis. While no conscious effort was made to design this study to complement any specific prior work, twelve cities herein correspond with twelve of the sixteen cities in the separate studies by Segal and by Hildebrand and Delehanty. The sixteen metropolitan areas in this project are: Atlanta, Boston, Chicago, Cincinnatti, Cleveland, Dallas, Davenport-Moline (Quad Cities), Detroit, Houston, Los Angeles, Milwaukee, Minneapolis-St. Paul, New York, Philadelphia, St. Louis, and San Francisco-Oakland (identified as "San Francisco").

The manufacturing and the non-manufacturing sectors were selected for analysis. The manufacturing sector is familiar; the non-manufacturing sector as specified throughout this study is comprised of transportation; communication, and other public utilities; wholesale trade; retail trade; finance; insurance; real estate; and services. Major industry groups specifically excluded from non-manufacturing as specified are government operations, construction, and the extractive industries. The non-manufacturing sector therefore covers a large segment of the U. S. economy with significant numbers of skilled workers, while at the same time excludes the volatile construction industry.

Four skilled occupations were chosen as representative of the 13 skilled occupations (or journeymen) commonly reported in the area wage surveys over the twenty-two year period: maintenance electricians, stationary engineers, machinists, and machine-tool operators. Two standard unskilled occupations

are used: janitors, porters, and cleaners; and packers-shipping.

The separate wage data for men and women workers have been collected for each city whenever available. The data for women are not as complete as that for men, however, and in some instances the reported hourly earnings may be suspect because of small sample size. The skill differential analysis throughout the balance of this paper is restricted to men only; any exception will be explicitly noted. The increased entry and retention of women in the labor force starting in the mid-sixties may be most relevant to the behavior of the men's labor skill differential in the non-manufacturing sector, and in integration of the two sets of earnings data at some future date may provide some interesting labor market observations.

The representative average annual wages of skilled workers and unskilled workers are the reported median straight-time hourly earnings for each occupation, weighed by the BLS estimate of the number of workers employed that year in each respective occupation for the metropolitan area. The firms surveyed are establishments with 50 or more employees, and the minimum establishment size is 100 employees for manufacturing, public utilities, and retail trade in the 12 largest areas.[36/] The Bureau of Labor Statistics urges caution in using these employment estimates.[37/]

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[36]James N. Houff, "Improving Area Wage Survey Indexes," Monthly Labor Review, 96 (January 1973) pp. 52-56

[37]U. S. Department of Labor, Bureau of Labor Statistics. BLS Handbook of Methods. Washington: GPO, 1971 p. 140

The BLS suggests that these estimates are provided to serve only as general guides to the size of the labor force included in each area survey. Nonetheless, there seems to be no way to verify the BLS occupation estimates against the U. S. Census occupation surveys, as the specifications for respective occupations are significantly different in the two sources. I therefore have accepted the BLS area employment estimates for each selected occupation as adequate for purposes of weighing wages to derive a representative annual wage for skilled labor and for unskilled labor in each metropolitan area.

The annual area wage surveys are not reported as of a uniform month for all areas. Rather, the reporting months are scattered throughout the calendar year for the various cities, and even a specific city might change its reporting month over the twenty-two year period in this study. In order to facilitate comparisons I selected July1, as the common annual date for all cities. I have assumed that observed changes in wage data occured in smooth, equal monthly increments between the two reporting periods and then adjusted the reported wages in each instance to July 1. This smoothing transformation does not seem to significantly affect the analysis, though I would suggest caution in interpreting any one-year lags that seem to occur between price or unemployment changes and the labor skill differential. These lags for different cities may in fact be a consequence of this process of adjustment to a uniform annual date for analysis.

The price indexes for each labor market area are the SMSA consumer price indexes on all items, 1950-73, as reported by the Bureau of Labor Statistics.[38/]

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[38]U. S. Department of Labor, Bureau of Labor Statistics. Handbook of Labor Statistics, 1973. Washington: GPO, 1974.

The annual unemployment for each labor market area is from published sources for the years 1959-73.[39/] The Washington office of the Department of Labor provided unpublished worksheet data for the respective cities for 1950-58. Again, the Department of Labor does urge caution in using these earlier-year annual area unemployment estimates, but these are the most reliable area data available.[40/] The unemployment estimates in earlier years are adjusted for the 1967 change in the definition of unemployment.

The availability of area wage data determine the length of the time-series for each city. Most cities have reasonably complete data in the manufacturing sector for the entire twenty-two year period, but Davenport-Moline and Houston are added to the area wage surveys in the latter fifties or early sixties. Somewhat fewer cities have complete data on the non-manufacturing sector for the twenty-two year period, but nowhere in the analysis that follows does the number of observed labor market areas in any specific instance fall below twelve cities.

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[39] U. S. President, Manpower Report of the President. Washington GPO , Annual, 1963-73.

[40] U. S. Department of Labor. Bureau of Labor Statistics. How the Government Measures Unemployment. Report 418. Washington: GPO, 1973.

THE MANUFACTURING SECTOR, 1952-73

The single, overriding feature of the aggregate, or pooled labor skill differential in the manufacturing sector during this twenty-two year period is its stability. The BLS now provides indexes of average hourly earnings consolidated for all sampled metropolitan labor markets nationwide, reconstructed back to 1960. One can apply these wage indexes to derive one estimate of a national urban labor skill differential for men in manufacturing. These aggregated annual manufacturing skill differentials appear on Table 1, together with complementary national unemployment and price data for the fourteen years 1960-73.

Table 1. Indexes of Average Hourly Earnings, 1967= 100 24.

Manufacturing, Men. Skilled Maintenance, and Unskilled Plant.

	Skill Differential all Metro areas	Total UE Rate	Male UE Rate, %	CPI Urban wage Earners	c/o Change In CPI
1960	1.0087	5.5	5.4	88.7	1.5
1961	1.0072	6.7	6.4	89.6	.7
1962	1.0035	5.5	5.2	90.6	1.2
1963	1.0011	5.7	5.2	91.7	1.6
1964	0.9978	5.2	4.6	92.9	1.2
1965	0.9935	4.5	4.0	94.5	1.9
1966	0.9979	3.8	3.2	97.2	3.4
1967	1.0000	3.8	3.1	100.0	3.0
1968	1.0019	3.6	2.9	104.2	4.7
1969	1.0063	3.5	2.8	109.8	6.1
1970	1.0008	4.9	4.4	116.3	5.5
1971	0.9938	5.9	5.3	121.3	3.4
1972	0.9899	5.6	4.9	125.3	3.4
1973	0.9884	4.9	4.1	133.1	8.8

As I said earlier, Reder and Oi each offered hypotheses based on competitive labor market models to postulate that the labor skill differential would widen during times of increasing unemployment and recession, and that the skill differential would narrow as labor markets became very tight approaching full employment. Neither Reder nor Oi placed much stress on the sensitivity of the labor skill differential to moderate, short-run changes in employment levels. Segal concentrated on this issue of manufacturing (men) skill differential responsiveness to changing unemployment for four cities only (Atlanta, Chicago, New York, San Francisco) during 1951-61.[41/] Segal found the coefficient of correlation between the percentage change in the skill differential and the reciprocal of general unemployment was -0.733 for Chicago. There was no significant association between these variables for the other three cities. Segal concludes, "Nevertheless in view of the results pertaining to the other cities the reasonable interpretation of the data must emphasize a lack of a clear pattern of short-run fluctuations in the skill ratio (ed: skill differential) of manufacturing workers during the 1950's."

Other authors have presented hypotheses for the general stability of wages overall in the manufacturing sector. The postulates that seem most reasonable to this writer are grounded in the presence of the absence of Competition both in key product markets and labor markets in the manufacturing sector. Wachter (1970), and Ross and Wachter (1973), provide some insights

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[41]Martin Segal, op. cit. p. 200.

on wage movements in a noncompetitive setting, though they do not directly address the skill differential issue of rigid wage scales. Wachter does suggest that unions interested in a certain minimum rate of wage increase during loose labor markets, even at the expense of a somewhat slower rate of growth during tighter labor markets.[42/]

Ross and Wachter expand on this theme, though again concentrating on industrywide average wages rather than wage scales.[43/] The authors observe that industries with price discretion have price structures that probably are different than that which would prevail if the sector were competitive. Ross and Wachter continue,

> "In order to preserve the industry price structure, it is necessary for the firms to develop an agreed upon method of signaling when prices should change in response to changing demand and cost conditions....A traditional method for achieving this reliability is to base prices on a markup on certain standard costs that are both important in total industry variable costs and nearly identical for all firms in the industry: Thus, prices are often based on a markup on wages. Unions can be helpful if industry-wide settlements are the rule although the mere existance of a long-term wage contract is not sufficient to ensure the desired wage stability. For a long-term wage contract to have operational significance, it is necessary that the contract include a wage premium that will insulate the firm from short-run changes in the economy=wide demand for labor. If this were not the case, wage rates would have to be adjusted frequently to reflect market forces, and the advantage of stable administered prices would be lost. On the other hand, with a wage premium the administered firm hires workers off a queue. Fluctuations in product demand and this in the derived demand for labor, cause fluctuations in numbers hired off the queue but not in the size of the money wage rate offered." [44/]

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[42] Wachter, American Economic Review March 1970, op. cit. pp. 77-78

[43] Ross and Wachter, op. cit. pp. 676-78.

[44] Ibid. pp. 677-78.

An aggregate national manufacturing skill differential that is based on composite wage indexes may elude opposing compensating forces among regions or based on other considerations. Other institutional issues such as the impact of changing unionization cannot be effectively analyzed when confronted with nationwide indexes. The productive alternative is to construct annual skill differentials for select metropolitan labor market areas, based on occupation wage and employment data in the area wage surveys.

The movement of the skill differential in the 16 sample cities when pooled supports the general impressions of the aggregate differential constructed from BLS nationwide wage indexes. A pooled model was used for the 1952-73 period of the form:

$$Y_i = \alpha_1 x_{ji} + \alpha_2 x_{ji} + \ldots\ldots + \alpha_{16} x_{ji} + \beta i$$

Where $i = 1, 2, \ldots, 22$ years; 1952-73

$x_{ji} = o$; or 1 for specific city intercept

$j = 1, 2, \ldots, 16$ identifier for cities

This form if pooled model for the 16 cities is necessitated by the variations in the actual and estimated skill differential values among the 16 cities in 1952 = i_1. (This is an initial insight into the variations among manufacturing skill differentials when one concentrates on comparisons among cities. In 1952 Atlanta had the highest observed manufacturing skill differential at 1.7666; Cleveland was lowest at 1.3779). The estimated trend-value of the manufacturing skill differential for each city in 1952 is given in Table 2, together with the pooled value for the trend coefficient $\hat{\beta}$.

Table 2. Pooled Time-trend for the Manufacturing Sector (Men) Labor Skill Differential in 16 Cities, 1952-73

R^2 = .854 F(16,304) = 111.23
SE = .0379

	Atlanta	Boston	Chicago	L.A.	N.Y.
Coefficients	1.68937D 00	1.52735D 00	1.59883D 00	1.52737D 00	1.65866D 00
Std. Errors	9.04335d-03	9.04335D-03	9.04335D-03	9.04335D-03	9.04335D-03
T-Ratios	186.807693	168.892471	176.796326	168.894470	183.411926
Prob.In Tail	0.0	0.0	0.0	0.0	0.0

	St. Louis	Phila	Detroit	Cleveland	Houston
Coefficients	1.54931D 00	1.50023D 00	1.42825D 00	1.41808D 00	1.64582D 00
Std. Errors	9.04335D-03	9.04335D-03	1.11265D-02	9.04335D-03	1.15126D-02
T-Ratios	171.320663	165.892776	128.365051	156.809753	142.958206
Prob In Tail	0.0	0.0	0.0	0.0	0.0

	Quad Cit	Dallas	Minn	Milw	S.F.
Coefficients	1.47668D 00	1.69656D 00	1.51241D 00	1.49068D 00	1.42527D 00
Std. Errors	1.15126D-02	9.04335D-03	9.04335D-03	9.04335D-03	9.04335D-03
T-Ratios	128.266815	187.603348	167.240311	164.837250	157.604401
Prob.In Tail	0.0	0.0	0.0	0.0	0.0

	Cinci	$\hat{\beta}$
Coefficients	1.53657D 00	-9.04260D-04
Std. Errors	1.15126D-02	3.52279D-04
T-Ratios	133.469193	-2.566889
Prob.In Tail	0.0	0.005370

Although the pooled twenty-two year time-trend coefficient for the skill differential in manufacturing is negative and significant at .01, the $\hat{\beta}$ annual value is only -.0009. At this rate the pooled manufacturing skill differential for the 16 cities would have declined less than 2 percent in twenty-two years. One would be pressed to claim that the manufacturing labor skill differential is continuing to secularly decline based on this evidence. Rather, the data would seem to reinforce the stability hypothesis.

We shall see in the non-manufacturing sector that the movement of the skill differential breaks into two strong segments, 1952-64 and 1965-73. My basic focal point is the impact of "pure inflation" on the labor skill differential, and I identify the middle of 1965 as the relevant "full-employment and inflation" takeoff point. Therefore, it is relevant to pose the question: Did the skill differentials in manufacturing respond differently in the inflation period 1965-73 then in prior years?

Since the overall suspicion is that the manufacturing skill differentials remain reasonably (and remarkably) stable regardless of shocks to other economic parameters, one can apply a t-test for the difference in pooled time slopes between the early period and the inflation period:

$$\frac{\hat{\beta}_{t_1} - \hat{\beta}_{t_2}}{\sqrt{S.E._{t1}^2 - S.E._{t2}^2}} \sim T, \quad \frac{.002506}{.001340} = 1.87; \quad \text{not significant at 5\% level}$$

Where t1 = 1952-64 period
t2 = 1965-73 period

The pooled time slopes therefore are not significantly different in manufacturing between the two periods.

Another approach to analyze stability of labor skill differentials in the manufacturing sector even in the face of sharp inflation is to examine the relative stability for each of the cities. One can take the secular, linear time trend for each city estimated 1952-64; and then compare extrapolated predicted values of each respective city's manufacturing skill differential in each year with the actual recorded values. For this test, Houston and Detroit were eliminated because of data problems.[45] For the 14 remaining cities, 118 of 126 possible observations for 1965-73 fall within .95 confidence bounds. In fact, all observed manufacturing skill differentials for this period are within the confidence intervals in 11 of 14 cities. Cleveland has one exceptional year, Los Angeles has three such years, and Dallas has four years where the observed skill differential is outside the extrapolated linear time-trend confidence intervals. Whatever the secular trends for each city in the manufacturing sector, then, the skill differentials are extremely stable.

I tested for relationships between changing unemployment or changing price levels on manufacturing skill differentials for each city, both 1952-64 and 1965-73, using the basic model $D=D(^{1}/_{u},\dot{P})$ thirteen different

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[45] Houston has only four annual observations before 1965, and Detroit has missing wage data for four years during the period.

possible combinations of lags. As one would anticipate from the above discussion, the results were insignificant or inconclusive. The best predictor among the straight-lag and distributed-lag functions was $D = \alpha + \beta_1(\frac{1}{7}u_{-1}) + \beta_2\dot{P}_{-1}$, but even most-preferred lag equations, $\partial D/\partial U$ is insignificant (at .05) in the majority of tested cities for both periods. Likewise the response of the manufacturing skill differentials to changes in the annual rate of inflation either is insignificant for some cities throughout the twenty-two year periods or the cities offset each other. I made no attempt to correct for any serial correlation that may be present; manufacturing skill differentials for the 16 cities are simply too stable with regard to changing unemployment or prices to merit further five tuning.

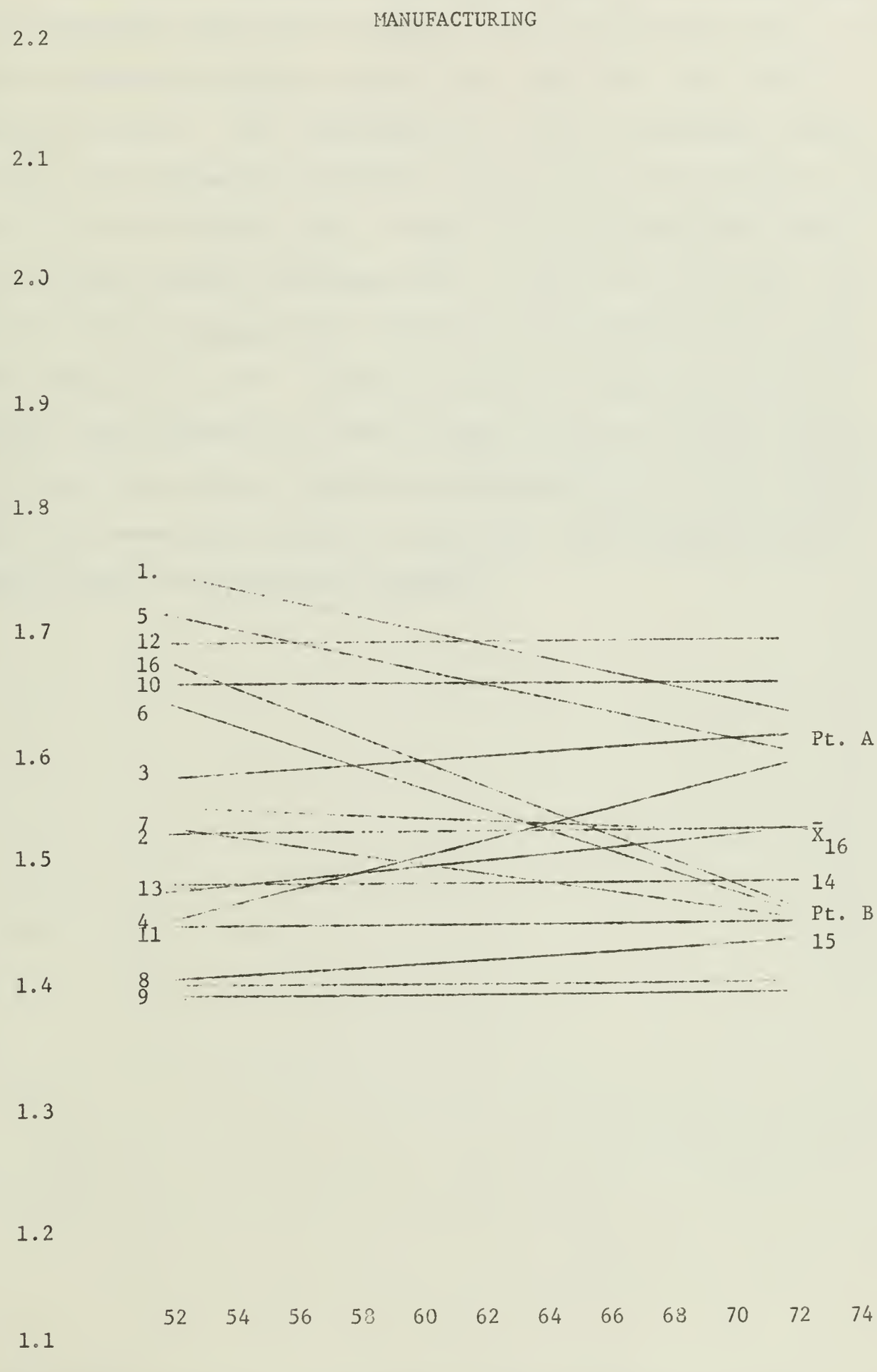
Though the manufacturing skill differentials in the sample cities are relatively insensitive to short-run changes in economic conditions, the secular trends in 9 of the 16 cities result in interesting convergence points. The estimated skill differentials are illustrated for 1952 and 1973. The low R^2's and insignificant beta coefficients for 7 cities simply reinforce the secular stability of the manufacturing skill differentials for these cities. In 8 of the 9 instances of secular change, the cities are converging to one of two points. The ninth city--Minneapolis--alternatively has widened secularly to approach the 1973 mean-value of manufacturing skill differentials for the 16 cities.

Table 3. Secular Trend Analysis of the Manufacturing Skill Differential in 16 Cities, 1952-73.

$$D_{ji} = \alpha_j + B_{ji}; \quad i = 1,2...., 22 \text{ years}$$

ID# and City	Est.Skill Differential 1952	$\hat{\beta}$, Annual Time-trend at .05 Significance	Est.Skill Differential, 1973	R^2
1. Atlanta	1.7434	- .0056	1.6236	.327
2. Boston	1.5230		1.5230	.017
3. Chicago	1.5696	.0016	1.6056	.278
4. Los Angeles	1.4483	.0060	1.5797	.745
5. New York	1.7104	- .0054	1.5914	.636
6. St. Louis	1.6326	- .0081	1.4534	.887
7. Philadelphia	1.5318	- .0036	1.4515	.610
8. Detroit	1.3929		1.3929	.105
9. Cleveland	1.3842		1.3842	.141
10. Houston	1.6518		1.6518	.015
11. Quad Cities	1.4450		1.4450	.054
12. Dallas	1.6864		1.6864	.000
13. Minneapolis	1.4753	.0023	1.5263	.533
14. Milwaukee	1.4802		1.4802	.000
15. San Francisco	1.3970	.0016	1.4312	.402
16. Cincinnatti	1.6701	-.0095	1.4607	.669
$\bar{X}$:	1.5464		1.5179	

The secular time-trend of the manufacturing skill differentials for each of the 16 cities and the mean-value for these cities are illustrated in DIAGRAM 1. MANUFACTURING SKILL DIFFERENTIALS FOR 16 SELECT CITIES (LINEAR TRENDS); 1952-73.

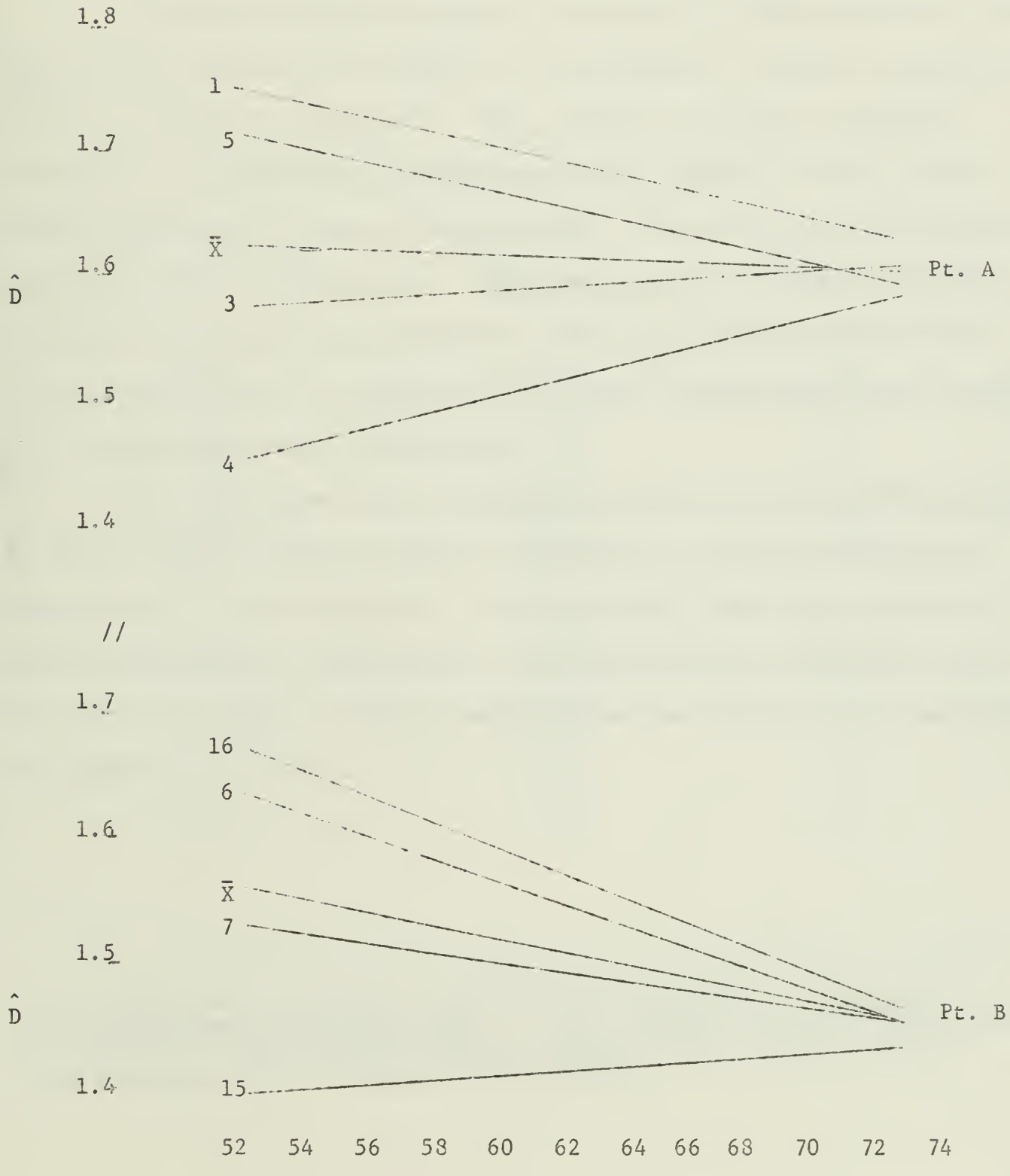


Note: The numbers correspond to individual cities as numbered in Table 3.

Four of the cities with some secular change in the manufacturing skill differential during 1952-73 appear to be converging about Point A $\tilde{}$ 1.60: Atlanta, Chicago, Los Angeles, and New York. Four other cities tend to converge at Point B $\tilde{}$ 1.45 : Cincinnatti, St. Louis, Philadelphia; and San Francisco. The movements of individual cities appear more meaningful in the context of the convergence points. Though the manufacturing skill differential for San Francisco has widened over the twenty-two year period; this city maintains its ranking of the third-lowest skill differential in this sector among the 16 cities. Moreover, the rate of expansion for the San Francisco skill differential is such to bring it close to the same values for 4 other cities--three of which are converging to $D_j = 1.45$ and the Quad Cities which essentially remained at this value. The 8 cities with convergence trends are illustrated in Diagram 2.

Diagram 2

MANUFACTURING
SKILL DIFFERENTIALS FOR
8 CITIES SECURLARLY CONVERGING,
1952-73



Note: The numbers correspond to individual cities as numbered in Table 3.

One plausible hypothesis for the skill differential changes that did occur between 1952 and 1973 is the increased presence of unionization and national, industry-wide collective bargaining agreements that has resulted in a clustering effect for select cities.

The BLS publishes estimates of the percent of plantworkers in area wage survey cities who are employed in establishments in which a contract(s) covered a majority of workers.[46/] This percent of collective bargaining coverage is not necessarily synonymous with the strength of unions and consequent capacities to achieve target-demands. Nonetheless, the BLS survey does provide an index of unionization. The average annual collective bargaining coverage of manufacturing plantworkers between July 1968 and June 1972 is illustrated in table 4, together with the cities' trend-estimate (not actual) 1973 manufacturing skill differentials.

The four cities with the highest manufacturing skill differentials in 1973 -- Dallas, Houston, Atlanta, and Chicago -- each have "indexes of unionization" of less than 75.0. The cities with a lower union profile are tending nationwide to cluster about a mean manufacturing skill differential for their group which is about 10 percent above the overall U. S. average for the 16 cities.

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[46]U. S. Department of Labor. Bureau of Labor Statistics. Area Wage Surveys-Selected metropolitan Areas. Annual summary bulletin at conclusion of each year. E.g. Bulletin 1725-95, September 1973; Appendix table 4. Also Bulletin 1660-90, November 1970; Table 3.

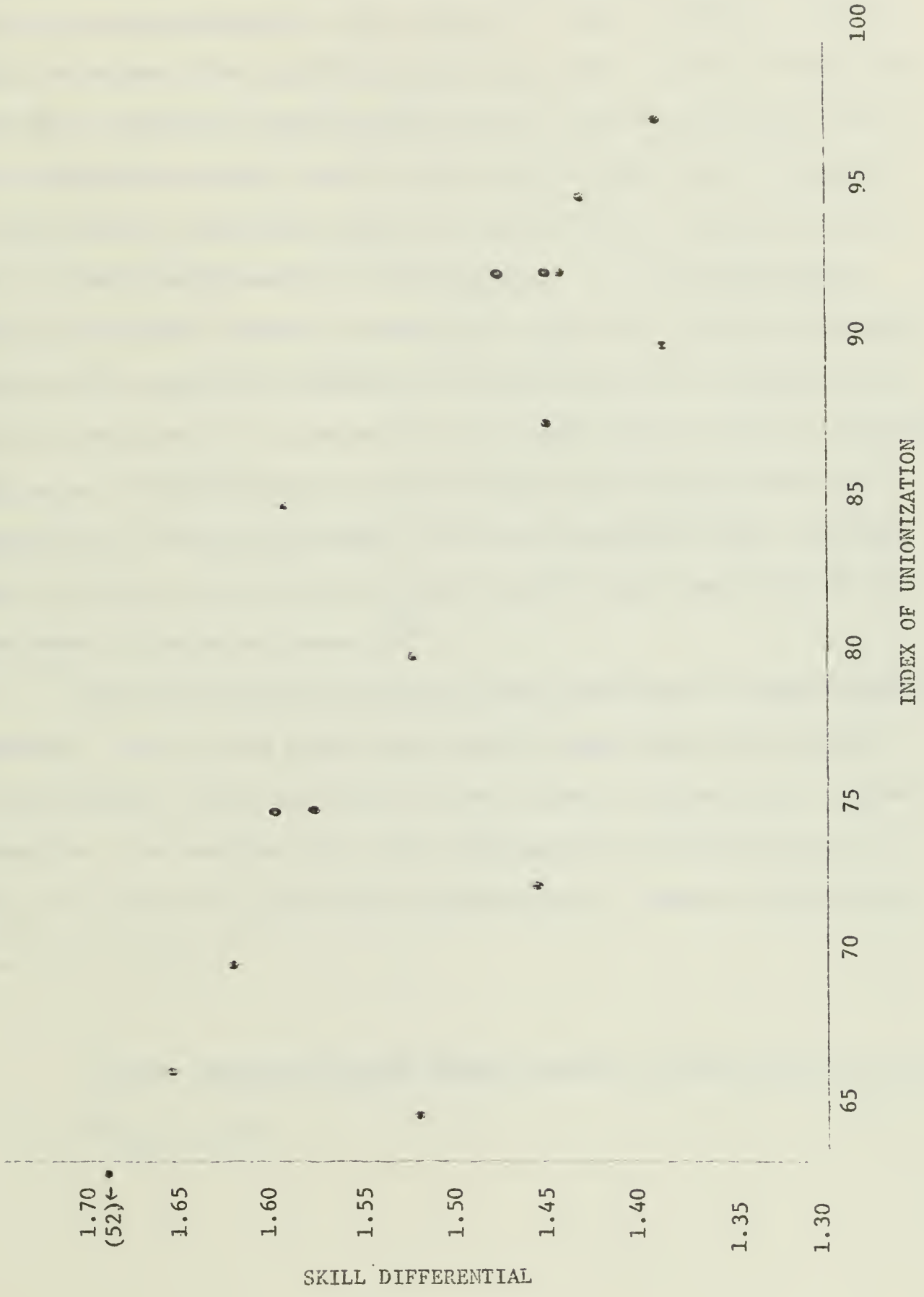
On the other hand, the four cities with the lowest, or most narrow 1973 manufacturing skill differentials -- Cleveland, Detroit, San Francisco, and the Quad Cities -- have 89.5 or higher "indexes of unionization." The eight cities below the mean skill differential decidedly are the "more-union" cities. The central tendency value of the lower convergence point B is 1.45, or 5 percent below the 16-city mean.

Table 4. Indexes of Unionization*, and 1973 Manufacturing Skill Differentials for Selected Cities

ID# and city, in descending order by 1973 $\hat{D}$	Adj. 1973 skill differential	1968-72 index of unionization
12. Dallas	1.6864	52.0
10. Houston	1.6518	67.0
1. Atlanta	1.6236	69.5
3. Chicago	1.6056	74.5
5. New York	1.5914	84.5
4. Los Angeles	1.5797	69.5
13. Minneapolis	1.5263	79.5
12. Boston	1.5230	64.5
$\bar{X}$	1.5179	
14. Milwaukee	1.4802	92.0
16. Cincinnatti	1.4607	72.0
6. St. Louis	1.4534	92.0
7. Philadelphia	1.4515	87.0
11. Quad Cities	1.4450	92.0
15. San Francisco	1.4312	94.5
8. Detroit	1.3929	97.0
9. Cleveland	1.3842	89.5

*The average annual percent of manufacturing plantworkers is establishments in which a collective bargaining contract(s) covered a majority of workers, 1968-72.

DIAGRAM 3. RELATIONSHIPS OF 1973 MANUFACTURING SKILL DIFFERENTIALS AND INDEXES OF UNIONIZATION FOR 16 SELECT CITIES.



Melvin Reder postulated in 1955 that considerations attendant to geographic regions would explain any variance in manufacturing skill differentials among metropolitan labor markets.[47] Reder commented, "If this theory is correct, then one would expect that, within the United States, the South-where semiskilled manufacturing jobs are relatively infrequent, mininum educational standards are low, and racial prejudice acts as a barrier to substitution of unskilled negroes for skilled whites - would be an area where the skill margin would be relatively high. In the Far West where minimum educational standards are relatively high, where negroes and foreign immigrants are relatively infrequent, and where females and children are an unusually small part of the labor force, one would expect to find a relatively high degree of substitutability between skilled and unskilled labor and, consequently, a narrow skill margin. And, as is generally known, the skill margin is higher in the South and lower in the Far West than in any of the other parts of the United States."[48]

The 1953 rankings among the 16 cities would tend to support Reder's hypothesis. But the more significant secular changes that have occurred in the subsequent twenty-two years now would seem to challenge his "regional" perspective. The manufacturing skill differentials of Concinnatti and St. Louis - two cities with broad union representation - narrowed sufficiently

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[47] Reder, American Economic Review (December, 1955) op.cit.;pp. 846-47.

[48] Ibid. p. 847.

to cross below the 1973 skill differential average for all 16 cities. Los Angeles rose secularly, on the other hand, at a rate sufficient to cross the 16-city average and converge with the wider skill differentials of the less-unionized cities. New York City--a 1953 anomaly among Northeast, more-unionized cities--did register a secular decline to a more reasonable ranking, though at a rate less than Cincinnatti and St. Louis. Likewise, the skill differential of Philadelphia narrowed between 1952 and 1973 to a level that more closely reflects the index of unionization for that metropolitan labor market.

Reder preferred to work out from his basic premise of competitive labor markets to explain variations in labor skill differentials. I prefer to stress the noncompetitive product and labor markets in the manufacturing sector as the structural framework affecting skill differentials. Specifically the labor unions in concert with the large, national manufacturing corporations are the pervasive forces contributing both to the aggregate, or pooled stability of the manufacturing skill differential nationwide, and to the secular changes and variations that are observed among individual cities.

THE NON-MANUFACTURING SECTOR, 1952-64 AND 1965-73

The performance of the labor skill differentials in the non-manufacturing sector stand in sharp contrast with manufacturing skill differentials over this twenty-two year period. Overall skill differentials in the non-manufacturing sector widened so dramatically with the onset of rising inflation in 1965 that the analysis of this sector must be discussed in the framework of two periods. This sudden turn of events in 1965 with a decided widening of skill differentials is observed in twelve of the fourteen cities with relatively complete time-series wage and employment data for the non-manufacturing sector.[49/] The average individual city increase in non-manufacturing skill differential was 18 percent for the 1964-73

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[49]Milwaukee and the Quad Cities lack non-manufacturing wage data for many of the years, but may be included in some pooled models where degrees of freedom and sequential-year observations permit. Generally we are limited to 14 non-manufacturing cities.

nine-year period, ranging from 4 percent to a high of 27 percent.

If the "pure inflation" effect can be isolated, the significant widening of skill differentials in this sector would contradict the casual conjectures of Hicks, Perlman, and others previously discussed. To the extent that 1966-70 were wartime years, the widening of the labor skill differential in the non-manufacturing sector would contradict the findings of Evans during the Civil War, and World Wars I and II. Moreover, the five years 1965 through 1969 is the longest continuous full-employment-and inflation period available for analysis.[50/]

The "non-manufacturing sector" as defined by BLS includes transportation; communication and other public utilities; wholesale trade; retail trade; finance, insurance, and real estate; and services. The government sector is excluded, as are construction and the extractive industries. This non-manufacturing sector has been largely ignored in relative wage studies; though continued avoidance cannot be justified in consideration both of the absolute and growing importance of this sector.

Certainly the conceptualization of skilled workers and unskilled workers employed together in the same productive process is not as clear in

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[50]The BLS annual national unemployment rates were equal to or less than 4.0 percent throughout this period, in spite of a mini-recession in early 1967 and the start of a second mini-recession in latter 1969.

the non-manufacturing sector as it might be in one's image of a manufacturing firm. The presence of unskilled workers in non-manufacturing is acknowledged, but skilled workers somehow seem to blend into the surroundings. The 1970 Census provides one basis for appreciating the numbers of skilled workers in this non-manufacturing sector.[51/] The category "craftsmen and kindred workers" is representative of what is commonly understood as skilled workers and includes occupations such as carpenters, electricians, mechanics, machinists, and stationary engineers. Of the 10.1 million craftsmen and kindred workers, the manufacturing sector accounts for 3.6 million such workers and construction another 2.6 million such skilled or journeymen workers. Eliminating government, agriculture, extractive, and other excluded categories, the U. S. Census indicates that there are 3.4 million craftsmen and kindred workers in the "non-manufacturing" sector so defined. This is almost the same number of skilled workers as in the manufacturing sector, and the concepts of relative wages, wage scales, or skill margins are appropriate to both sectors.

I will demonstrate more precisely that the non-manufacturing skill differentials 1952-73 must be treated as two periods, when post-1964 data are introduced. But what of the skill differential movements in this sector between 1952 and 1964? Rather than discussing changing median values, one can apply a pooled time-series model of the form:

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[51] U. S. Census. Occupation By Industry-1970. PC(2)-7C. Washington GPO, 1971. Table 1.

$$Y_i = \alpha_1 x_{ji} + \alpha_2 x_{ji} + \ldots\ldots + \alpha_{15} x_{ji} + \beta i$$

shere i = 1,2,....13 years; 1952-64

x_{ni} = o; or 1 for specific city intercept

j = 1,2,....15 identifier for cities.

The results are illustrated in Table 4.

The pooled time-trend beta coefficient is not significant, indicating an overall absence of any pronounced narrowing or widening trend in the non-manufacturing skill differential during 1952-63. When one studies the patterns of change in the skill differentials for the individual cities during this period, the scene is more mixed than the two-point convergence theorem postulated for the naufacturing sector. The linear time-trends for the skill differentials in the respective cities are reproduced in Table 5. Though non-linear transformations would improve the fit in a few cities, the overall conclusions remain unchanged.

Table 4. Pooled Non-Manufacturing Skill Differential (Men Only) in 15 Selected Cities, 1952-64

R^2 = .852 F(15, 145) = 55.85
SE = .0657

	Atlanta	Boston	Chicago	L.A.	N.Y
Coefficients	1.93964D 00	1.61243D 00	1.71711D 00	1.71922D 00	1.58939D 00
Std. Errors	2.09106D-02	2.09106D-02	2.09106D-02	2.09106D-02	2.09106D-02
T-Ratios	92,758469	77.110535	82.116821	82.217621	76.008774
Prob In Tail	0.0	0.0	0.0	0.0	0.0
	St. Louis	**Phila**	**Detroit**	**Cleveland**	**Houston**
Coefficients	1.56096D 00	1.63176D 00	1.76971D 00	1.75704D 00	1.91455D 00
Std. Errors	3.09214D-02	2.09106D-02	3.09214D-02	2.09106D-02	3.35134D-02
T-Ratios	50.481445	78.034973	57.232437	84.026428	57.127823
Prob In Tail	0.0	0.0	0.0	0.0	0.0
	Dallas	**Minn**	**Milw**	**S.F.**	**Cinci**
Coefficients	1.79627D 00	1.56853D 00	1.48335D 00	1.41886D 00	1.98085D 00
Std. Errors	2.09106D-02	2.09106D-02	2.49179D-02	2.09106D-02	3.35134D-02
T-Ratios	85.902161	75.011108	59.529709	67.853546	59,106140
Prob in Tail	0.0	0.0	0.0	0.0	0.0
	$\hat{\beta}$				
Coefficients	-1.25982D-04				
Std. Errors	1.46379D-03				
T-Ratios	-0.086066				
Prob in Tail	0.465766				

Table 5. Non-Manufacturing
Time Trends 1952-64
$D_j = \alpha + bT$

City	$\hat{\alpha}$	$\hat{b}$	R^2
Atlanta	1.6953	.0347	.857
	**	**.0043	SE.058
Boston	1.5537	.0083	.399
	**	**.0031	SE.041
Chicago	1.7330	- .0024	.153
	**	.0017	SE.023
Los Angeles	1.7749	- .0081	.500
	**	**.0025	SE.033
New York	1.5688	.0028	.059
	**	.0034	SE.046
St. Louis	1.5537	.0017	.001
	**	.0250	SE.105
Philadelphia	1.6101	.0030	.172
	**	*.0020	SE.027
Detroit	1.8333	- .0185	.644
	**	**.0069	SE.029
Cleveland	1.8828	0 .0181	.968
	**	**.0010	SE.013
Houston	insufficient data		
Dallas	1.7761	.0028	.049
	**	.0037	Se.049
Minneapolis	1.6918	0 .0177	.872
	**	**.0021	SE.028
Milwaukee	insufficient data		
San Francisco	1.3779	.0057	.245
	**	**.0030	SE.041
Cincinnatti	2.0336	- .0180	.627
	**	**.0080	SE.025

**: coefficient is .05 significant

When one discusses the issue of possible convergence of skill differentials in the non-manufacturing sector, Atlanta distorts the overall picture. The non-manufacturing skill differential in Atlanta has widened consistently and dramatically over the entire twenty-two year period, from a 1952 observed value of 1.7455 to a 2.6353 value in 1973. The next-highest 1973 observed non-manufacturing skill differential is 2.3244 for Houston.

Using the secularly-estimated values for skill differentials in each city in 1952 and again in 1964, the results are as follows with Atlanta included:

NON-MFG.

$\hat{D}_i$

Year	No. of Cities	Mean	Deviation	Variance	Skewness
1952	15	1.6982	0.1742	.0303	.0546
1964	15	1.6860	0.2010	.0404	.9370

With Atlanta removed, the remaining 14 cities reflect the following changes in relative variation between 1952 and 1964:

Non-mfg.

$\hat{D}$

Year	No. of Cities	Mean	Standard Deviation	Variance	Skewness
1952	14	1.6984	0.1803	.0325	.0494
1964	14	1.6531	0.1643	.0270	.8660

Though some skewness is present in 1964 toward higher values (even with Atlanta excluded), there is an observed tendency for the variance among non-manufacturing skill differentials in the 14 remaining cities to be less than in 1952. The four cities with the widest estimated non-manufacturing skill differentials in 1964 are Atlanta, Concinnatti, Houston, and Dallas. The three cities clustered about the narrowest estimated non-manufacturing skill differentials are San Francisco, Milwaukee, and Minneapolis; Beyond these observations, it is difficult to discern any other pronounced secular movements in the non-manufacturing sector between 1952 and 1964.

Abstracting from secular movements in those seven cities exhibiting such changes, the 1952-64 non-manufacturing skill differentials are more prone to annual fluctuations than in the manufacturing sector. This volatility generally is common among the 14 non-manufacturing cities during

this period, but no single predictive pattern for changes in the respective skill differentials can be discerned. Differences in sampling, reporting, and data transformation may contribute to some element in these annual fluctuations,but in comparison with the manufacturing sector--I must conclude that the labor skill differential is more susceptible to shocks of changing labor market conditions and general economic considerations during "normal" times of moderate swings in employment, profits and prices.

This brings us to 1965, when non-manufacturing skill differentials responded dramatically to the increase in the rate of inflation. The skill differential widened sharply since 1964 in 12 of the 14 cities with adequate non-manufacturing sector wage and employment data. New York and Detroit are the two contraditions; in each of these cities the skill differential in this sector narrowed.

The sharp contrast in overall performance of labor skill differentials in non-manufacturing in the two periods 1952-64 and 1965-73 can be appreciated by an analysis of the changes that occurred as the economy approached full-employment plus accelerated inflation. A pooled model again can be utilized to test whether the aggregate time-trend coefficients were significantly different between the two periods. Unlike the manufacturing sector where there was no significant statistical difference in the pooled time-trend coefficient in the thirteen years preceding 1965 and in subsequent years, the t-test for the non-manufacturing sector reveals:[52/]

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[52]New York, Detroit, and the Quad Cities are excluded from the original 16 cities for this purpose of testing time-trend slopes. Milwaukee had an adequate number of observations for inclusion in a pooled model. In each instance the individual intercepts were set at 1951=0 for this t-test exercise only.

$$\frac{\hat{\beta}_{t1} - \hat{\beta}_{t2}}{\sqrt{S.E._{t1}^2 - S.E._{t2}^2}} \sim T, \quad \frac{-.000244 - .030799}{\sqrt{(.001596)^2 + (.002851)^2}} =$$

$$\frac{-.031043}{.003267} = -9.50 \text{ ; significant at 1\% level,}$$

where t1 = 1952-64 period
t2 = 1965-73 period

A separate pooling for non-manufacturing sector cities 1965-73 was calculated, with i_o = 1964, in order to derive more reasonable estimates of intercept values for each respective city. Also, the maximum number of cities with reasonable number of observations were pooled, when this latter period is considered separate from the preceding thirteen years. The pooled model takes the form:

$$Y_i = \alpha_1 x_{ji} + \alpha_2 x_{ji} + ... + \alpha_{14} x_{ji} + \beta i$$

where i = 1,2, ,9 years; 1965-73

x_{ni} = 0; or 1 for specific city intercept

j = 1,2,...., 14 identifier for cities

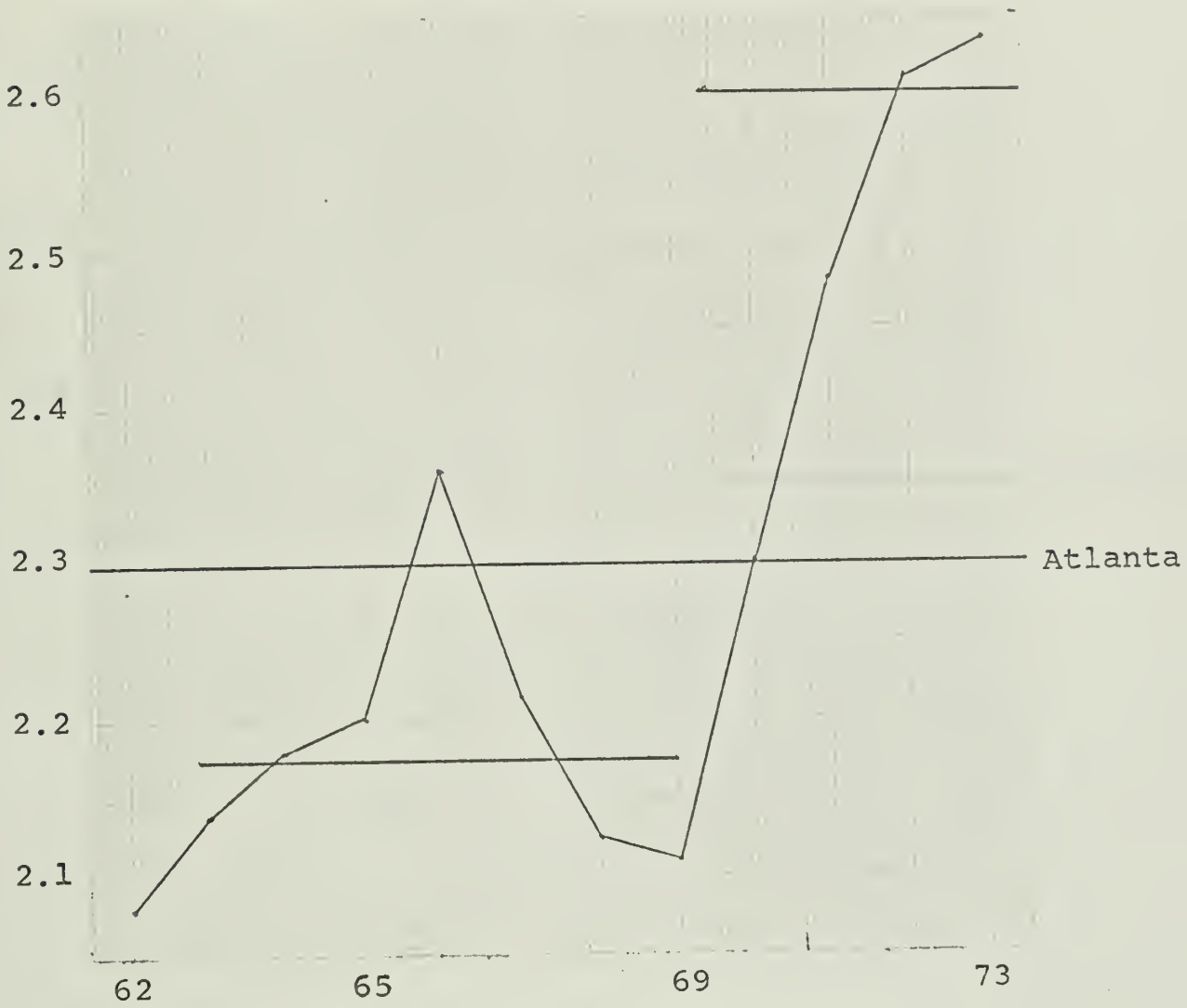
New York and Detroit were excluded from the non-manufacturing sector pooled data and will be separately analyzed. When grouped, the fourteen remaining sample cities in Table 6 demonstrate strong reinformcing qualities (R^2=.914) in the widening of the skill differential in this sector with the outset of rising inflation. The highly-significant nine-year pooled time-trend beta coefficient for these 14 cities is .0302; with the actual median skill differential of the eleven cities with complete 1965-73 non-manufacturing wage data increasing from 1.70 in 1965 to 2.01 in 1973.

Table 6. Pooled Time-trend Analysis of the Non-manufacturing Labor Skill Differential in Fourteen Cities, 1965-73.

R^2 = .914 F(14, 100) = 76.00
SE = .0776

Atlanta	Boston	Chicago	L.A.	St. Louis	
Coefficients	2.18410D 00	1.69007D 00	1.71905D 00	1.68474D 00	1.73842D 00
Std. Errors	2.96741D-02	2.96741D-02	2.96741D-02	2.96741D-02	2.96741D-02
T-Ratios	72.602951	56.954315	57.930847	56.774597	58.583878
Prob in Tail	0.0	0.000000	0.0	0.000000	0.0
	Phila	Cleveland	Houston	Quad Cit	Dallas
Coefficients	1.58439D 00	1.64845D 00	2.96741D 00	1.46601D 00	1.71637D 00
Std. Errors	2.96741D-02	2.96741D-02	2.96741D-02	3.94760D-02	2.96741D-02
T-Ratios	53.393036	55.551666	68.791794	37.136673	57.840622
Prob in Tail	0.000000	0.000000	0.0	0.000000	0.000000
	Minn	Milw	S.F.	Cinci	$\hat{\beta}$
Coefficients	1.42577D 00	1.44818D 00	1.41961D 00	1.88865D 00	3.01573D-02
Std. Errors	2.96741D-02	3.94760D-02	2.96741D-02	3.03976D-02	2.90823D-03
T-Ratios	48.047562	36.685135	47.840118	62.131607	10.369637
Prob in Tail	0.000000	0.000000	0.000000	0.0	0.000000

Diagram 4. Non-manufacturing Skill Differentials (Men Only) for Select Cities, 1962-73



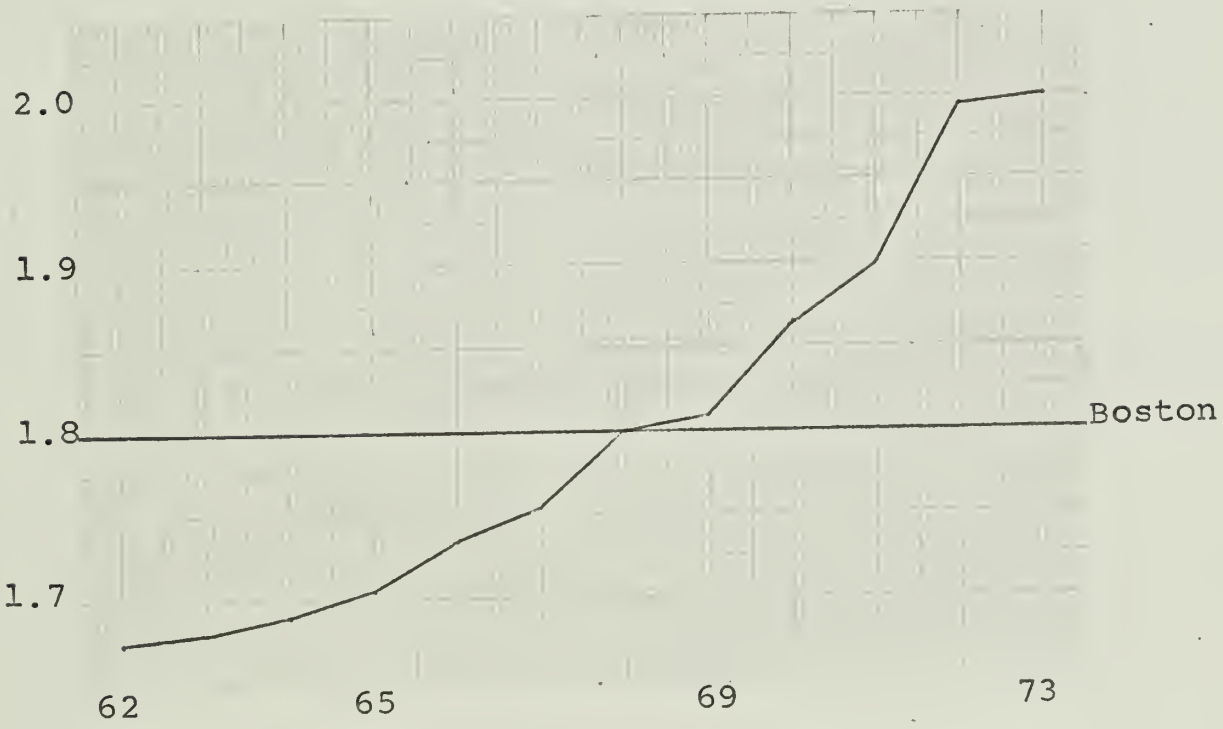


Diagram 4, continued

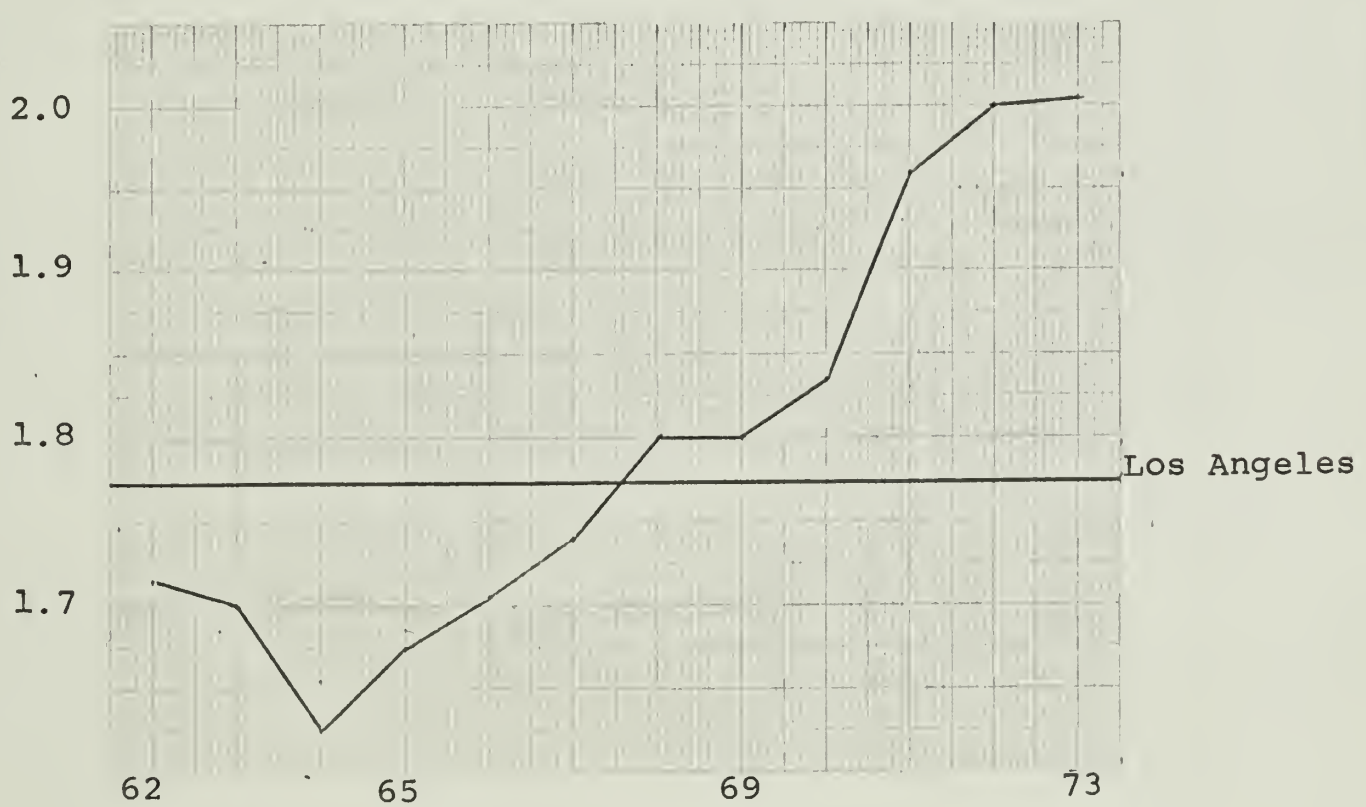


Diagram 4, continued

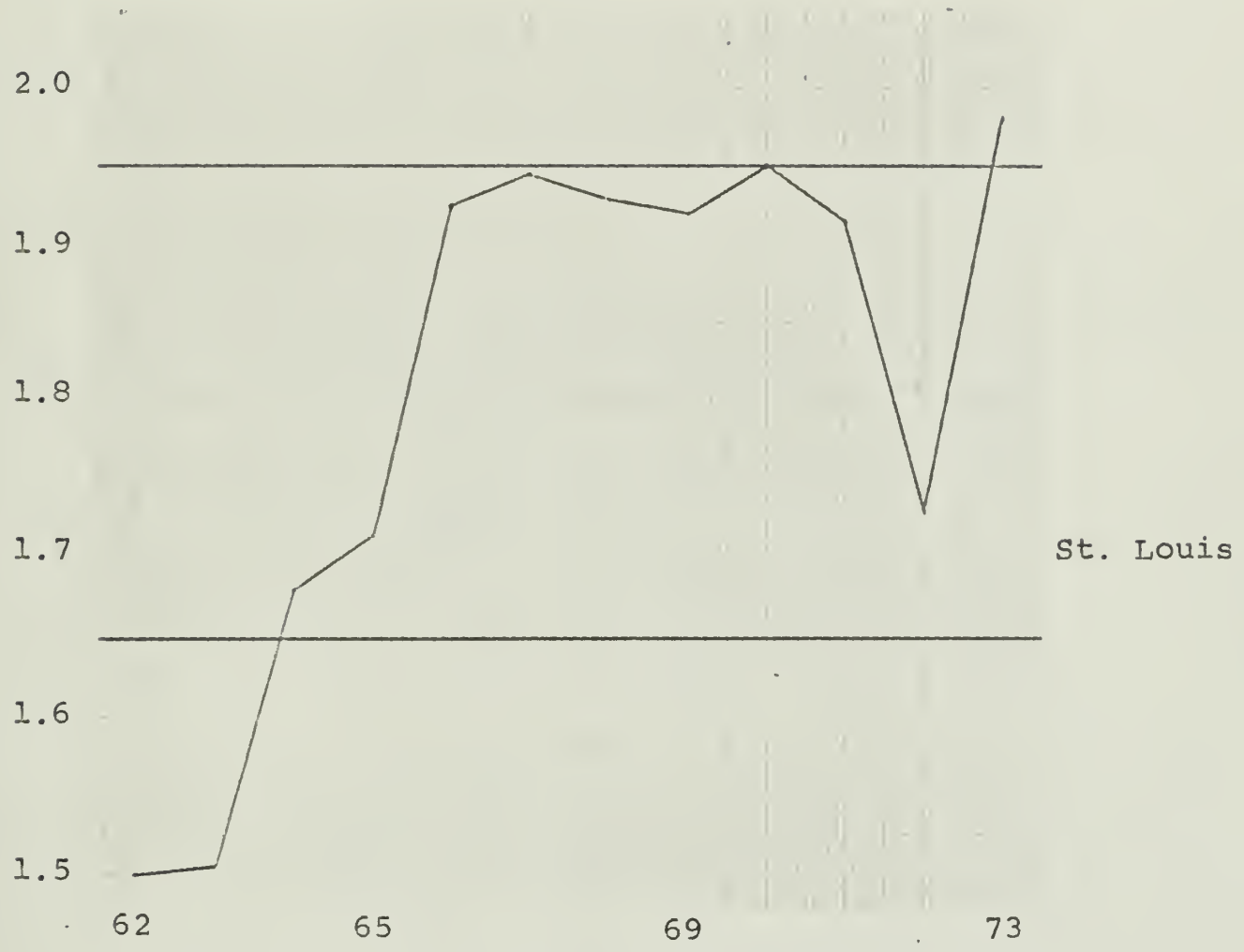


Diagram 4, continued

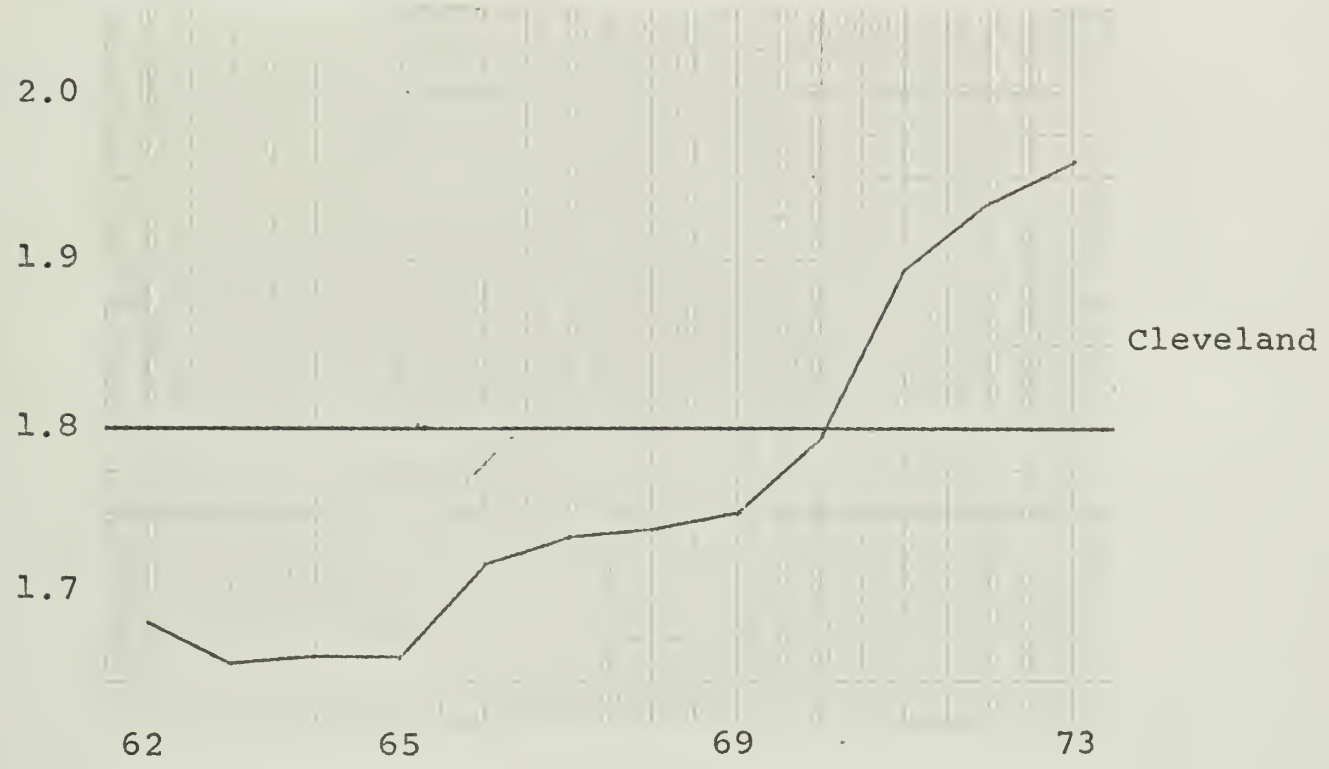
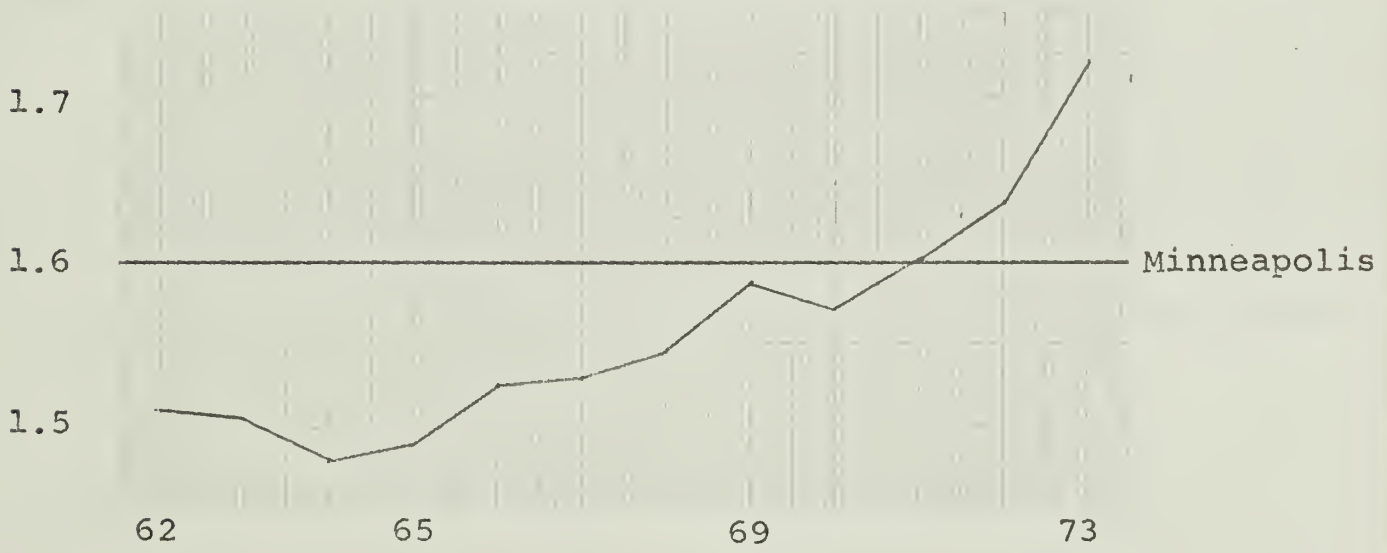
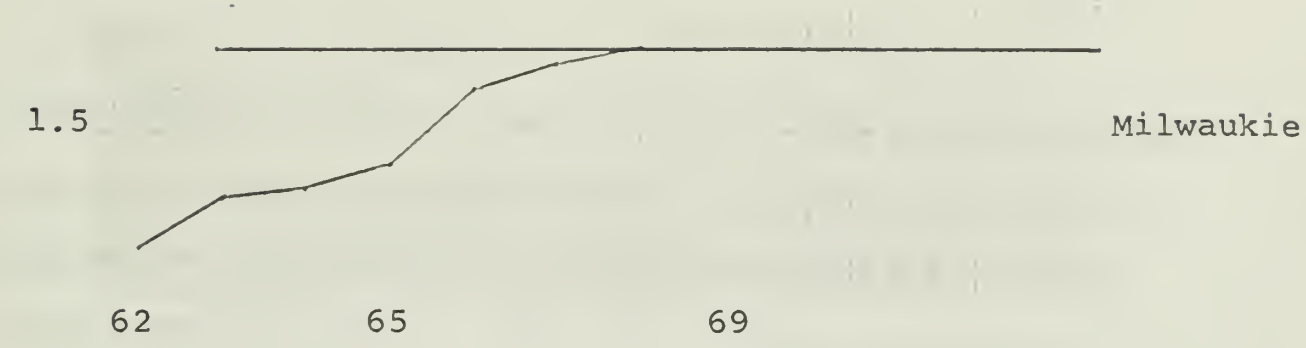
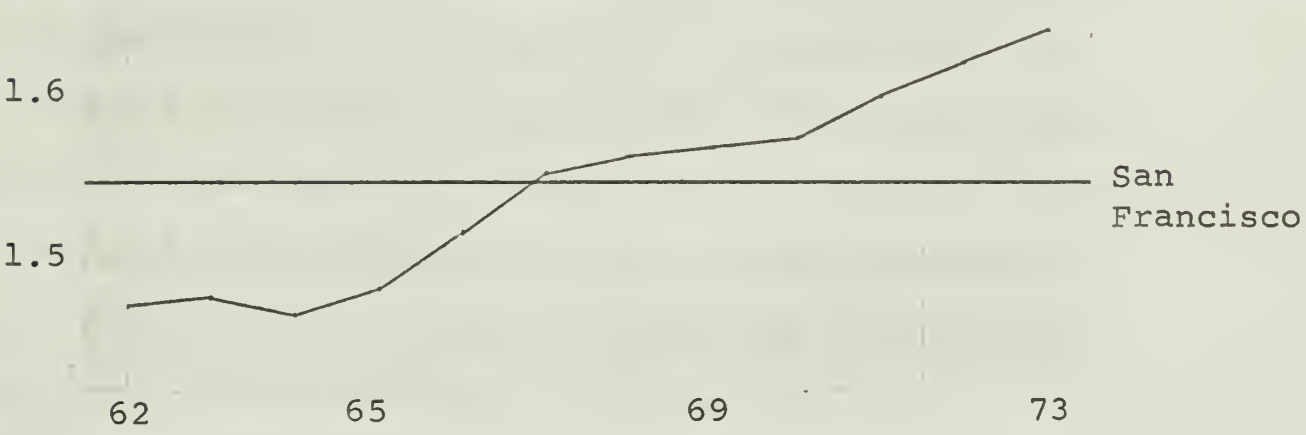
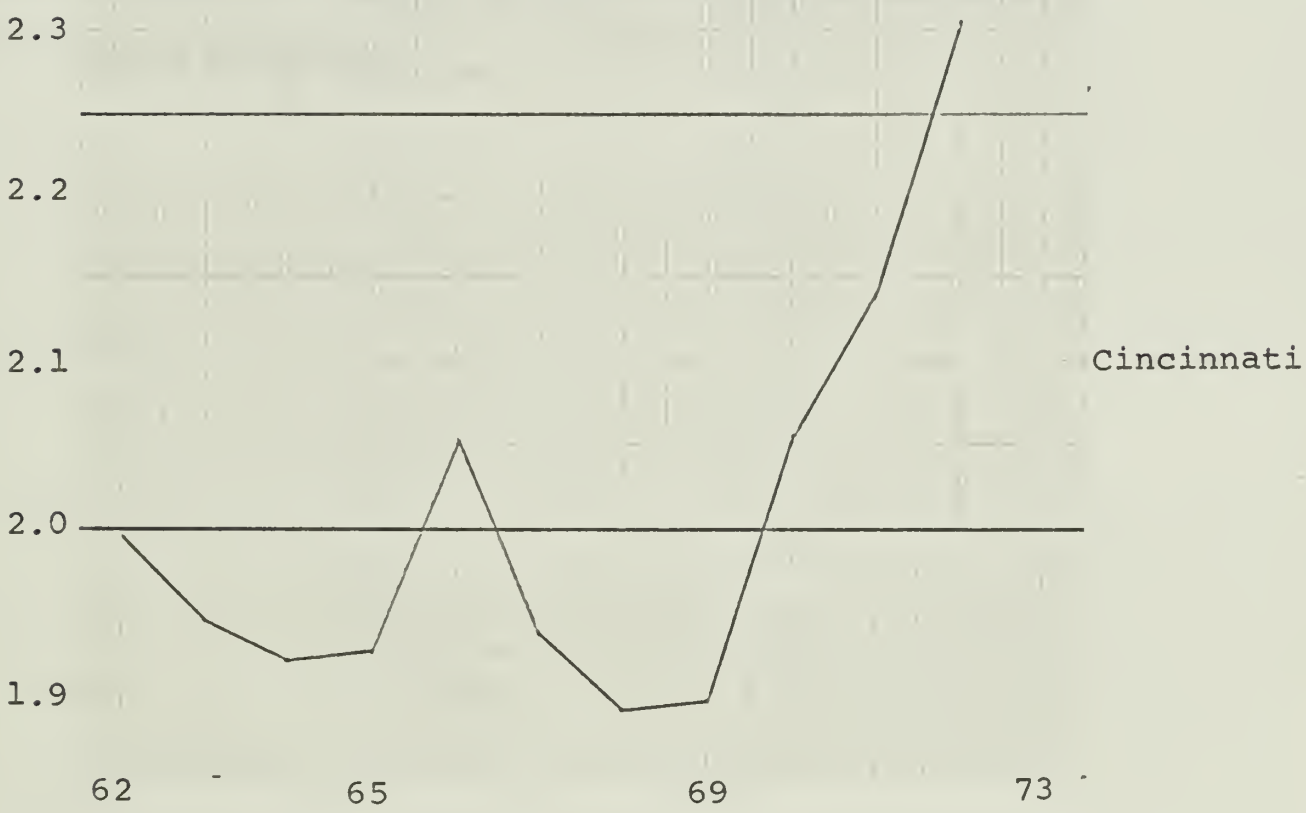


Diagram 4, continued




1.5
Milwaukie
62
65
69


1.6
1.5
San
Francisco
62
65
69
73


2.3
2.2
2.1
Cincinnati
2.0
1.9
62
65
69
73

I then expressly tested for the sensitivity of the non-manufacturing skill differential to changes in unemployment and to changes in the inflation rate. Distributed lag functions were not productive; normal lag functions produce the most acceptable results. Again, four separate combinations of single-year lags are employed, and the most meaningful lag equation is illustrated for each city. I must again stress the rationale for selecting from among four lag equations. The annual wage and employment data are reported in different months among the sample cities. I did smooth the data in adjusting each observed month to a universal July 1 observation date for all cities. I therefore have some reservations in attaching any empirical significance to the presence or absence of a one-year lag in response by the non-manufacturing skill differential to changing unemployment or inflation in any specific city. Though the equation of the form $D = \alpha + B_1 (1/u)_{-1} + \beta_2 \dot{P}$ would provide acceptable values in each of the 12 cities, overall considerations suggest the best-fit equation regardless of purported one-year lag differences.

Table 7. Response of Non-manufacturing Labor Skill Differential to Changes in Unemployment and Changes in Inflation Rates for Selected Cities, 1965-73

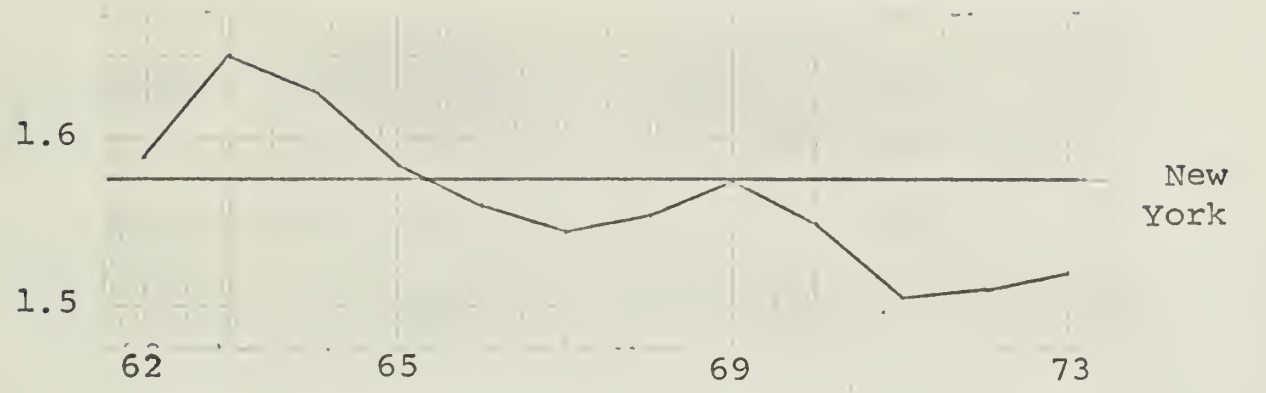
Estimating Equation and City	Changing Unemployment, U^{-1}	Changing Inflation Rates, $\dot{P}$	R^2 D-W
$D = D\ (1/u, \dot{P})$			
Philadelphia	-.0056	.0043	.863
	(.0011)	(.0020)	2.16
$D = D\ (i/u, \dot{P}_{-1})$			
Dallas	-.0026	.0134	.741
	(.0008)	(.0053)	2.68
$D = D\ [(1/u)_{-1}, \dot{P}]$			
Boston	-.0129	.0510	.786
	(.0037)	(.0136)	1.82
Chicago	-.0140	.610	.726
	(.0049)	(.0188)	2.03
Los Angeles	-.0256	.0853	.823
	(.0065)	(.0178)	1.37
St. Louis	.0047	.0533	.714
	(.0036)	(.0149)	1.99
Minneapolis	-.0051	.0367	.892
	(.0009)	(.0059)	2.28
San Francisco	-.0075	.0339	.810
	(.0029)	(.0069)	1.48
Cincinnatti	-.0254	.0777	.658
	(.0082)	(.0345)	2.10
$D = D\ [(i/u)_{-1}, \dot{P}_{-1}]$			
Atlanta	-.0301	.0534	.707
	(.0088)	(.0259)	1.74
Cleveland	-.0104	.0318	.695
	(.0032)	(.0120)	1.61
Houston	-.0078	.0587	.403
	(.0058)	(.0300)	2.07

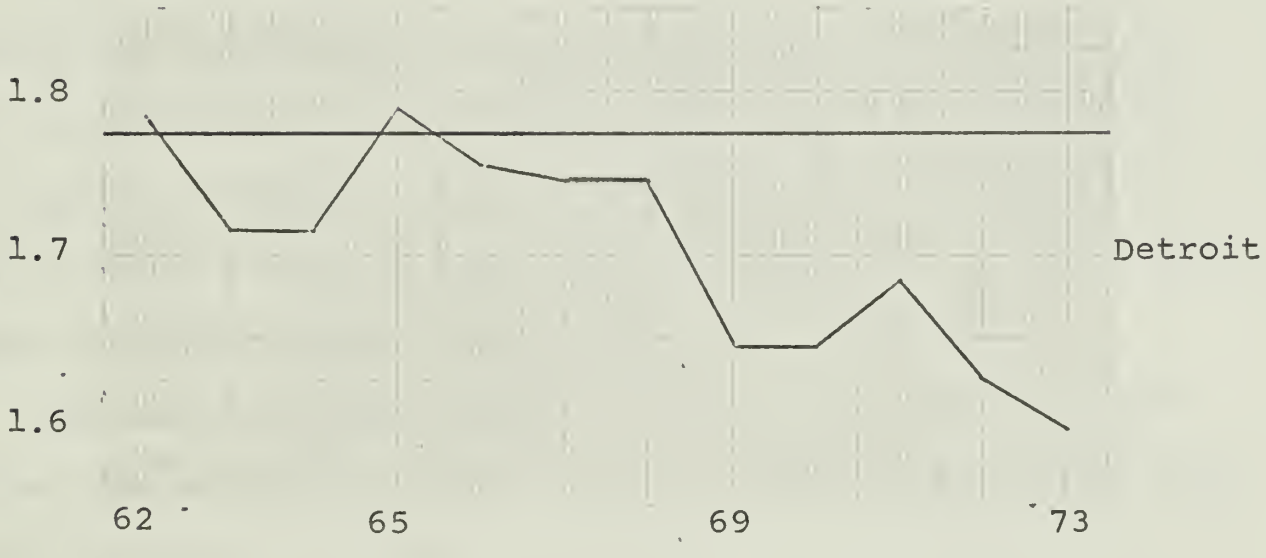
Note: All unemployment coefficients are significant at .05, except St. Louis and Houston. All price level change coefficients are significant at .05. Values in parentheses are standard errors of coefficient.

The estimated positive relationships between the increase in the inflation rate since 1965 and the widening of the non-manufacturing skill differential is significant at the .05 confidence level in each of the 12 cities. The resultant statistical correlation between changing unemployment and the non-manufacturing skill differential during this period also is interesting. In 10 cities the reciprocal-of-unemployment beta coefficient is negative and significant at .05, implying -- ceteris paribus -- that the labor skill differential would continue to narrow as labor markets grew increasingly tighter, and vice versa. This reaffirmation of the Reder and Oi hypotheses in competitive labor markets together with minimal serial correlation both further support the "pure inflation" effect findings in 12 of the 14 non-manufacturing sector cities.

This leaves New York and Detroit as the two sample cities where the non-manufacturing skill differential continued to narrow during 1965-73. The actual skill differentials for these two cities are illustrated in Diagram 5.

Diagram 5. Non-manufacturing Skill Differentials (Men Only) For New York and Detroit, 1962-73





The estimating equations for these two cities yielded the following results:

Estimating Equation and City	Changing Unemployment, U^{-1}	Changing Inflation Rates, $\dot{P}$	R^2 D-W
$D = D\,[(i/u)_{-1}, \dot{P}_{-1}]$			
New York	.0041	-.0159	.843
	(.0013)	(.0030)	2.90
$D = D\,[(i/u)_{-1}, \dot{P}]$			
Detroit	.0054	-.0333	.847
	(.0015)	(.0077)	2.70

All beta coefficients are significant at the .05 confidence interval. Note that the signs are universally reversed for these two "deviant" cities. New York and Detroit are so noticeably different from the other 12 cities that their inclusion in any post-1964 pooling exercises severely distorts the statistical analysis.

The plausible determinants of a continued narrowing of the non-manufacturing skill differentials in New York and Detroit are conjectural at this time, though a detailed look at relative wage changes may provide some insight. The secular changes in the non-manufacturing skill differentials for these two cities can best be appreciated when compared with relative values and movements in their respective manufacturing skill differentials.

New York is an anomaly among the 15 cities (Quad Cities excluded) with adequate time-series data on both sectors, in that the manufacturing skill differential consistently is larger, or wider than the non-manufacturing skill differential throughout the twenty-two year period. The New York manufacturing skill differential of 1.71 in 1952 is exceptionally high, given region and unionization considerations, though this skill margin declines

secularly 1952-73. The 1952 non-manufacturing skill differential of 1.56 placed New York well below the median at 11th of 15 cities in descending order. This city's non-manufacturing skill differential is relatively volatile, with annual jumps about a relatively stable ten-year mean-value, so that New York did not change its ranking in the non-manufacturing sector.

The New York skill differentials for the two sectors almost converged in 1963, with a sharp narrowing of the manufacturing skill differential and a corresponding widening of the skill margin in non-manufacturing sector during that year. From this point -- which represents an abnormal high for the non-manufacturing sector -- each respective skill differential has declined secularly the last ten years such that the New York manufacturing skill differential remains about 5 percent greater than its non-manufacturing counterpart.

Detroit's manufacturing skill differential performance stands in contrast to that of New York. Detroit and Cleveland together have the narrowest manufacturing skill differentials during the entire 1952-73 period, that remain stable throughout the twenty-two years. The Detroit 1952 non-manufacturing skill differential at 1.83 was exceptionally high for a highly industrialized, unionized city. At the outset Detroit's non-manufacturing skill differential ranked 4th highest among the 15 cities (Quad Cities excluded). It is not surprising that Detroit registered the greatest secular rate of decline in non-manufacturing skill differentials 1952-64, so that at the end of this first period Detroit ranked 10th among the 15 cities in descending order. The continued decline in the non-manufacturing skill differentials for Detroit and New York during 1965-73 against the countervailing trend of all other sample cities resulted in their ranking as the lowest (narrowest) among the cities for this sector in 1973.

One can disaggregate the data still further and examine relative wage changes themselves. Here one can isolate the relevant difference between

New York and Detroit on one hand, and 13 other cities. When one takes the ratio of median annual unskilled wages in the manufacturing sector-to-the median annual unskilled wages in the non-manufacturing sector, New York and Detroit are the only 2 cities among the 13 so-tested where the ratio declines between 1964 and 1973. In other words, the rate of increase in money wages of unskilled workers in the non-manufacturing sector were greater than for their counterparts in the manufacturing sector during this period. One plausible explanation is that the rate of increase in unionization of unskilled workers in non-manufacturing -- specifically janitors -- has been such in these two cities that this increase in collective bargaining has caused the rate of increase in median wages among the unskilled in this sector to exceed the rate increase in manufacturing.

DETERMINANTS OF WIDENING NON-MANUFACTURING SKILL DIFFERENTIALS, 1965-73.

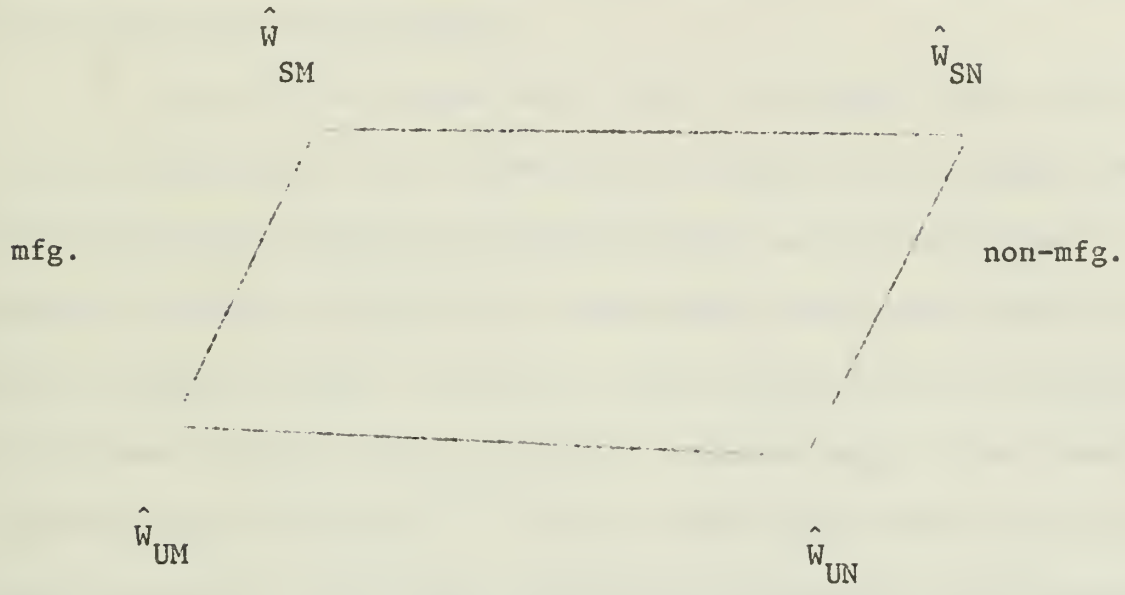
New York and Detroit aside, what caused the non-manufacturing skill differentials in the other 12 cities to widen so abruptly during 1965-73? I suggest two hypotheses, each of which has a distinct orientation but neither

of which is mutually exclusive. One or the other of these postulated conditions may be dominant, but both may be present to reinforce the non-manufacturing skill differential's widening during tight labor market-and-inflation conditions.

One plausible hypothesis to explain the sharply-widening non-manufacturing skill differentials during 1965-73 is what I would term a "skill-link" wage relationship among skilled workers in both sectors that does not carry over to unskilled workers. This is a non-competitive labor market setting, in which three of the corners of the parallelogram or directly or secondarily linked through collective bargaining during this inflationary period, while unskilled workers in the non-manufacturing sector stand apart without monopsonistic wage negotiation leverage. A second hypothesis stresses the consequences of stronger competitive elements in the non-manufacturing sector, where decidedly different excess demand elasticities result in corresponding different rates of wage increases between skilled workers and unskilled workers.

Each of these hypotheses can be examined with regard to labor market conditions and relative wage change in the two sectors. I can best illustrate the overall wage relationships as a parallelogram, with the manufacturing wage scale as the left vector and non-manufacturing wages to the right:

Diagram 6. Manufacturing and Non-manufacturing Wage Relationships Within A Labor Market (SMSA)



During the crucial period 1965-73, the labor skill differential in the manufacturing sector maintained its relative stability. The money wages of skilled workers ($\hat{W}_{SM}$) and unskilled workers ($\hat{W}_{UM}$) therefore were increasing at approximately the same rates in manufacturing. In the non-manufacturing sector and the right of the parallelogram, however, the labor skill differential has widened sharply over this latter nine-year period.

What are the changing relative wage relationships in each of 15 cities between the two sectors during this dynamic inflation period? Several permutations are possible. The money wages of skilled workers in non-manufacturing may have increased at a greater rate than their counterparts in manufacturing, though wage relationships among unskilled workers in both sectors remained relatively stable. Or, wage increases among skilled workers in both sectors were of equal rates, while the wages of manufacturing unskilled workers increased at a higher rate than the unskills in non-manufacturing. Or, the rates of increases in 1965-73 wages for both skilled and unskilled workers in manufacturing exceeded their counterparts in non-manufacturing,

through within the latter sector the skilled workers fared somewhat better with greater percentage wage increases than their unskilled non-manufacturing brethren. Each of these possible relationships must be examined with regard to the two proposed hypotheses.

The skill-link hypothesis draws its origins from Arthur Ross' "coercive comparisons" and "consolidated bargaining" in linked labor markets.[53] Ross stressed the interunion competitiveness and the advantages of multi-employer collective bargaining in determining relatively stable interindustry wage structures. Butler and Kim in turn concentrate on more specific (and more relevant to this study) facets of relative wages: the dynamics of occupation wage structures.[54] These authors argue that the metropolitan wage structure of a reasonably homogeneous occupation such as machinists or electricians is not a set of random numbers, but rather has a strucutre among industries that is shaped by local considerations and tends to have the same configureation year after year. Butler and Kim propose their "steel spring" hypothesis: given a shock that may momentarily upset the normal metropolitan occupation wage structure, the shape of the normal configuration will determine responding wage changes that will restore the wage structure to its normal configuration.[55] The authors acknowledge that their

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[53] Arthur M. Ross. Trade Union Wage Policy, Berkeley: University of California Press, 1948. pp. 50-52; 64-68.

[54] Arthur Butler and Kye Kim, "The Dynamics of Wage Structures," Southern Economic Journal, 39(April, 1973) pp. 588-600.

[55] Ibid. pp. 588-89.

hypothesis is consistent with the concept of coercive comparison but argue that wage structures could act like steel springs even without the intervention of unions. They observed wage structures of machinists and electricians in 15 cities for 1951-69, but did not test for unskilled blue-collar workers. Butler and Kim found some results favorable to their basic hypothesis in the Northeast and North-central cities, plus San Francisco; but not in the South or the balance of the West (Note: the less-unionized cities).

Butler and Kim restricted their analysis to industries in the manufacturing sector; my "skill link" hypothesis would bridge manufacturing and non-manufacturing. Skilled workers in both sectors could be directly linked by common craft unions and multi-employer bargaining, or indirectly linked by coercive comparison. The median skilled workers' wage rates need not be equal in each city for the two sectors; Ross and Wachter noted that the administered sector deliberately pays wage premiums.[56/] Whatever the rates of skilled workers' wages in manufacturing to the wages of skilled workers in non-manufacturing, this relationship would remain relatively stable under my "skill link" hypothesis.

In other words, fixed attitudes to maintain rigid wage scales within industrial unions in the manufacturing sector would be a dominant force behind the relatively stable manufacturing skill differentials. The "skill link" would join three of the four respective labor forces. Negotiated settlements and the "skill link" result in wage rate increases that exceed the isolated, competitive labor markets for unskilled workers in the non-manufacturing sector.

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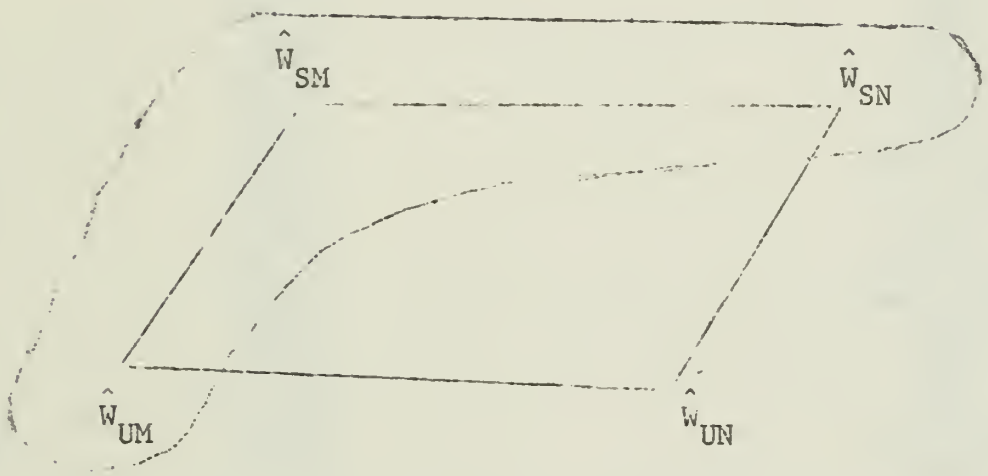
[56] Ross and Wachter, op. cit. pp. 676-78.

Diagram 7. The "Skill Link" Among Administered Elements in a Labor Market (SMSA)



One test of the "skill link" hypothesis is to examine the stability of relative wages between skilled workers in the two sectors during 1965-73. A strong link would be indicated by no significant changes in relative wages over the nine years. Alternatively, the rate of money wage increases in the labor markets for manufacturing skilled workers could be greater than their non-manufacturing counterparts if unions dominate wage changes during inflation and there is a greater percentage of union workers among the skilled in manufacturing than non-manufacturing. The first data column on Table 7 illustrates the trend of secular changes in the relative wage relationships among skilled workers in the two sectors.

Table 7. Intersectoral Wage Relationships Between Skilled Workers, and Between Unskilled Workers in the Manufacturing and Non-manufacturing Sectors; 1964-73
$WM/WN = \alpha + \beta i$; $i = 1, 2, \ldots, 9$: 1964-73 years

City	Median Manufacturing Skill Wage ÷ Median Non-Mfg. Skill Wage	Median Manufacturing Unskilled Wage ÷ Median Non-Mfg. Unskilled Wage
Atlanta	-.0215	.0188
Boston	-.0112	.0163
Chicago	-.0147	.0103
Los Angeles	-.0051	.0118
New York	-.0078	-.0084
St. Louis	-.0145	not sign.
Philadelphia	-.0127	not sign.
Detroit	-.0029	-.0198
Cleveland	-.0158	not sign.
Houston	-.0244	not sign.
Dallas	-.0081	.0080
Minneapolis	-.0051	.0080
Milwaukee	not sign.	.0163
San Francisco	-.0065	not sign.
Cincinnatti	not sign.	.0288

Note: The beta coefficients illustrated are accepted at .05 or less probability (in tail).

The negative beta coefficients in 13 of the 15 illustrated cities indicate that the secular rates of increase in money wages of skilled workers in non-manufacturing exceeded the corresponding rates of increase in the manufacturing sector. This interpretation of the data would seem to contradict the "skill link" hypothisis that non-competitive forces link the union-dominated workers in the manufacturing sector with skilled workers in the non-manufacturing sector. Rather, disproportionate rates of increase in wages of skilled workers in the non-manufacturing sector compliments the competitive-non-competitive sector dichtomy of Ross and Wachter -- where the competitive sector (e.g. non-manufacturing) must increase its relative wage to attract labor from the queue of the high wage, administered sector in order to expand productive output.[57/]

This analysis of relative wage changes does not preclude the presence of skill links between the two sectors. Indeed the skilled worker wage relationships were most stable in the more-unionized cities of Milwaukee, Detroit, and Cincinnatti; and least stable in Houston and Atlanta. But the data do suggest that the alternative hypothesis which focuses on competitive labor market forces throughout the non-manufacturing sector may be more productive in explaining the widening skill differentials in non-manufacturing during full-employment and inflation.

The two-sector competitive labor market hypothesis is a variation of the methodological framework of Reder and Oi. These latter authors assumed the presence of a single productive sector and analyzed relative wage changes in the context of vertical worker mobility between the skilled and unskilled

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[57] Ross and Wachter, op. cit. p. 686.

labor markets. The relative supply elasticities of unskilled workers were significantly less than skilled workers as one approached full employment, and Reder and Oi agreed that under these conditions a narrowing of the skill differential will result.

This alternative two-sector model assumes union-dominated, rigid wage scales and secular wage premiums in the administered manufacturing sector. I postulate that horizontal skilled labor mobility between sectors is more important than training and upgrading within the non-manufacturing sector in the short run; that an increase in wages sufficient to attract skilled workers from the manufacturing sector queues or payrolls is more efficient than the training costs and longer-term obligations incurred in upgrading unskilled workers.

The widening of the non-manufacturing skill differential is reinforced by the relatively high elasticity of supply of individuals in the market for unskilled workers during so-called "full employment" and inflation. This is not a contradiction of Reder and Oi, but rather is an empirical question regarding specifications of "full employment". Both Reder and Oi understate the impact of the reserve labor force on the different labor markets during times of tightening labor conditions and combined with rising inflation. Clearly the increased vacancy rates associated with tight labor markets are an encouragement to secondary workers, principally women and youth. But inflation itself may be a separate factor attracting active labor force participation among secondary workers. Wachter implies this

attraction in his discussion of maintenance of household standards of living over time.[58/]

An application of Johnston's income tax-net wage theory can reinforce this "pure inflation" attraction to the labor reserves.[59/] Johnston and

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[58]Michael L. Wachter, Review of Economics and Statistics, 1972; op. cit. Wachter states, "The variable W/W_1^* as a relative standard of living variable, may also have direct effects on labor force participation as well. For example, when past wages (as a proxy for desired current levels) are high relative to present wages, all secondary workers, but especially wives, may be tempted to sacrifice leisure and enter the labor market, thus supplementing their family's income." p. 143.

This pure-inflation effect on the secondary labor force is also implied (though not specified) in Ralph E. Smith, "Dynamic Determinants of Labor Force Participation; Some Evidence from Gross Change Data," The Urban Institute, Working Paper 350-49. August 14, 1973. p. 15.

[59]J. Johnston and M. Timbrell, "Empirical Tests of a Bargaining Theory of Wage Rate Determination", Manchester School of Economic and Social Studies, 41(June, 1973) pp. 141-168.

Timbrell note the impact of inflation on after-tax wages under an income tax system where increasing increments of income are taxed at graduated rates. The graduated income tax therefore only aggrevated the purchasing power plight of the head-of-household during inflation, and may further reinforce the entry of secondary workers as multiple household income-earners.

The disproportionately large entry of secondary workers into the civilian labor force as labor markets tightened has been substantiated: of the 1.9 million more persons who worked in 1967 than in 1966, 1.3 million were adult women and youths.[60/] Bogan has noted that the first sharp gain made by women in year-round, full-time jobs was in 1964, with the notable increase among Negro women as a specific indicator of the tightness in labor markets.[61/] Bogan further noted that the economic slowdown of early 1967 failed to reduce the influx of secondary workers into the labor force. Though the most dramatic percentile increase of women in major occupational groups between 1960 and 1970 was an 80 percent gain in skilled craftsmen and kindred workers, this 218,000 increase in women skilled workers represents only 2.8 percent of the total 8.0 million increase in female workers.[62/] Additional women as service workers other than household, clerical, operatives, and nonfarm laborers account for 70 percent of the increase in the female labor force.

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[60]Forrest A. Bogan, "Work Experience of the Population: Spotlight on Women and Youths," Monthly Labor Review, 92(June, 1969), pp. 44-50.

[61]Ibid. p. 47.

[62]Janice N. Hedges, "Sex Stereotyping: Its Decline in the Skilled Trades," Monthly Labor Review, 97(May, 1974), pp. 14-22.

The concentrated entry of the secondary labor force into the unskilled, non-manufacturing labor markets is reflected in the different excess supply implications of unemployment rates between the skilled and unskilled workers. Gordon constructed the following table and commented in his conclusion, "Among the occupational and industrial changes in the pattern of unemployment, only one needs to be repeated here: the relative deterioration in the position of unskilled laborers in 1965-67."[63/]

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[63]Robert A. Gordon, "Unemployment Patterns With Full Employment", Industrial Relations, 8(October, 1968), pp. 46-72. p. 71

Table 8. Unemployment Rates by Occupation: Actual and Relative To National Rate; 1965 and 1967.[a]

Occupation	Actual Rates		Relative to National Rate	
	1965	1967	1965	1967
Blue Collar:				
Craftsmen & foreman	3.6	2.8	0.80	0.70
Operatives	5.5	4.8	1.22	1.21
Laborers	8.6	8.7	1.91	2.19

[a]The 1967 rates are adjusted to correspond with definitions of unemployment in the prior period.

Source: Gordon, op. cit., p. 67.

If employers in the non-manufacturing sector are horizontally competitive with the manufacturing sector for their initial incremental supply of skilled workers during an economic boom but dip into an unorganized, rapidly expanding labor pool for their unskilled workers, what will be the affect on relative wages? Not only would the non-manufacturing skill differential widen dramatically, but the occupational wage differentials between the unskilled in manufacturing and non-manufacturing also should widen if rigid, negotiated wage scales dominate in manufacturing.

The analysis of wage relationships in Table 7 indicates a negative time-series coefficient between skilled workers in the two sectors for 13 of the 15 cities; and no significant difference in inter-sectoral skilled wages for the latter 2 cities. These findings would support the horizontally-competitive proposition, in that employers in the non-manufacturing sector must increase their relative wages to attract moveable skilled workers from the higher-wage manufacturing sector.

Wages of unskilled workers in manufacturing rose at rates in excess of increases for their unskilled counterparts in non-manufacturing in 8 cities during 1965-73, and remained relatively unchanged in 5 cities. This provides some evidence, though not a universal argument, that relative wages of unskilled workers in manufacturing are not suseptible to the dampening effects from outward shifts in the overall supply of the unskilled. Neither sector needs to bid up relative wages to increase their respective queues, however. The maintenance of rigid wage scale parities in some industries in manufacturing, and not increased wage premiums, cause money wages of unskills in that sector to rise at rates in excess of unskilled workers in non-manufacturing.

New York and Detroit remain the anomolies; the manufacturing/non-manufacturing wage differential for unskills actually narrowed during this period. As I preveriously discussed, an intensive unionization of certain classes of unskilled workers in these 2 cities during 1965-73 could explain the narrowing both of the inter-sectoral wages of their unskilled workers, and the non-manufacturing skill differentials for these 2 cities alone.

The dampening effect on relative increases in money wages of the non-manufacturing unskilled because of the entry of significant numbers of labor force reserve women and youths into this labor market during 1964-68 is not intended to be suggestive that this is a statement of sex discrimination in wages. The data used in this report are not sufficiently refined at this stage to test for sex discrimination wage differences.

Rather, other factors than overt wage discrimination contribute to the wage differentials between occupations and sectors. First, the non-manufacturing sector <u>is</u> the lower wage sector. Second, all labor markets did not tighten at the same rates during the move to aggregate "full employment." The entry of signficant numbers of labor reserve individuals into the ranks of the unskilled in non-manufacturing continued to shift that labor supply curve out at a pace about equal to the increase in employer demand for these labor services, so that queues among these non-manufacturing unskilled workers did not shrink as dramatically during 1965-67 as in other occupations. Third, each occupation has its own wage scale comprised of grades or classifications. The entry wage is traditionally less than the median wage in each occupation. Given the competitive factors adverse to money wage increases for non-manufacturing unskilled workers during this period, any entrant into this labor market could expect a deteriorating relative wage relationship with other bluecollar workers.

The actual entrants were predominately women and youths.

The impact of sex discrimination on earnings may be more in the availability of job opportunities among the various labor markets than in specific wage rates themselves. Cohen attempted to estimate weights for the different determinates of pay differentials between women and men.[64] He attributes earnings differences between the sexes in nonprofessional occupations to seniority, union membership, length of work-year, and presumed greater mobility among men. Cohen states, "No doubt some discrimination remains, but it is unlikely that much of it is due to wage differences between men and women with the same job."[65] The largest apparent difference in wages was due to a greater portion of women in traditionally lower paying jobs. This is reinforced by wage premiums in the manufacturing sector. McNulty observed that occupational averages for women were consistently higher among establishments employing both men and women in the same job than in establishments employing women only; "Establishments employing women only in an occupation were frequently found to be in the lower paying industry segments of non-manufacturing."[66]

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[64] Malcolm S. Cohen, "Sex Differences in Compensation," The Journal of Human Resources, 6(Fall, 1971), pp. 434-47.

[65] Ibid, p. 446.

[66] Donald J. McNulty, "Differences in Pay Between Men and Women Workers," Monthly Labor Review, 90(July, 1967), pp. 40-43.

In the increased entry of women into the labor force since 1964, specifically into the non-manufacturing unskilled labor markets, a secular phenomenon reflecting pronounced institutional and attitudinal changes? Or is this entry of women more of a reserve labor force phenomenon that will vary with the business cycle? As with much of economics, the situation appears mixed. The quit rate has been used as one measure or workers' attitudes, and the traditional role of women in increasing quit propensities underwent a "drastic reversal" during the last decade commencing with 1964-65.[67/] As the relative proportion of women workers among industries increased, the quit rate (in manufacturing) decreased. Barnes and Jones acknowledge that changing work attitudes among women may have affected quit rates since 1965, though the increased worklife and increased participation of women may simultaneously reduce their quitting to exit and increase their quitting to move within the labor force.[68/] The levels of quits of men and women may respond differently to changes in job opportunities associated with the business cycle, which must be factored out of attitudinal changes attributed to secular causes.

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[67]Paul A. Armknecht and John F. Early, "Quit Rates in Manufacturing: A Study of Their Causes," Monthly Labor Review, 95 (November, 1972) pp. 31-37.

[68]William F. Barnes and Ethel B. Jones, "Manufacturing Quit Rates Revisited: A Cyclical View of Women's Quits," Monthly Labor Review, 96 (December, 1973), and John F. Early, "Manufacturing Quit Rates Revisited: Secular Changes and Women's Quits," Monthly Labor Review, 96(December, 1973), pp. 57-58.

Net discouraged potential-worker inflows rather than outflows may dominate short-run changes in the labor force, and a pronounced decline of women entering the labor force was observed during the downswing in 1970 and 1971.[69/] Even the data on net changes in the labor force -- without a further refinement for leavers, entrants, and intended entrants -- reflects continued cyclical employment among women (and minorities) as last-hired and first-laid-off.

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[69] Jacob Mincer, "Determining Who Are the Hidden Unemployed," Monthly Labor Review, 96(March, 1973); pp. 27-30.

Table 9. Changes in the Number of Women and Male Youths as a Percent of the Net Changes in Civilian Labor Force, 1963-73 (in thousands)

YEAR	Total Civilian Labor Force	Δ in Total	Δ, women	Δ, male youths[a]	Δ; women and youths	Δ women/ Δ total; %	Δ women + male youths/ Δ total; %	National Unemployment Rate; %
1962	70614							
1963	71833	1219	690	144	834	56.6	68.4	5.7
1964	73091	1258	708	177	885	56.3	70.3	5.2
1965	74455	1364	788	33	821	57.8	60.2	4.5
1966	75770	1315	1099	79	1178	83.6	89.6	3.8
1967	77347	1577	1061	48	1109	67.3	70.3	3.8
1968	78737	1390	844	29	873	60.7	62.8	3.6
1969	80733	1996	1308	83	1391	65.5	69.7	3.5
1970	82715	1982	1008	38	1046	50.9	52.8	4.9
1971	84112	1397	571	42	613	40.9	43.9	5.9
1972	86542	2430	1186	94	1280	48.8	52.7	5.6
1973	88713	2171	1233	114	1347	56.8	62.0	4.9

a: Male youths are ages 16 and 17 throuhout the period.

Source: U.S. Department of Labor. Handbook of Labor Statistics -- 1974. Washington: GPO, 1974. Table 3, p. 32.

The labor skill differential in the non-manufacturing sector is more responsive to changing labor market conditions than in manufacturing, and throughout 1965-73 the non-manufacturing skill differentials of the respective cities continued to be directly related to changes in unemployment (Table 7).[70/] One would anticipate that in future normal swings in excess labor supply corresponding to changes in business conditions and in the absence of a sharp increase in inflation, than the non-manufacturing skill differential likewide should widen during extended recessions and narrow as the economy approached full employment.

But this response by the non-manufacturing skill differential to generally-competitive conditions in that sector will be upset as the economy encounters the Phillips Curve dilemma of overall relatively low unemployment and sharply increasing inflation. Though the labor market for skilled workers becomes increasingly tighter, the movement of the reserve labor force into the available unskilled labor supply prolongs the tightening process in that labor market.

The result is a pure inflation effect on the labor skill differential in the non-manufacturing sector that widens this wage differential dramatically over a prolonged inflationary period. Employers in the non-manufacturing sector increase their wage-bids for skilled workers at rates that even exceed the inflation-induced wage changes for skilled workers in the manufacturing sector. Relative wage rigidities in the collectively-bargained wage scales within the manufacturing sector protect unskilled workers in that administered sector from the otherwise depressing wage effects from significant numbers of labor reserve entrants into the ranks of unskilled labor.

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[70] That is, $\partial D/\partial U^{-1} < 0$.

This "three-corner" link of inflation and inflation expectations on the money wages of skilled and unskilled workers in manufacturing plus the skilled workers in non-manufacturing leaves the non-manufacturing unskilled laborers holding the bag.

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