Determinants of Interindustry Wage Structure Variations in Indian Manufacturing and a Comparison of U.S. Studies

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While some analysts of the Indian economy claim that the wage determination process in Indian manufacturing industries is dominated by government wage settlement procedures and policies, others argue that custom and tradition, held to be characteristic of a less developed economy, play the major role. The argument of this paper is that the economic forces which are found to be the key determinants of wages in manufacturing industries of advanced economies like the United States are also the main variables operating on wages in Indian industries. This is demonstrated by explaining two-thirds to three-fifths of interindustry wage structure variations in Indian manufacturing in terms of such economic variables as changes in labor productivity, past rates of profit, changes in output, degree of concentration in the product market, degree of unionization, and original level of wages. The hypothesis, methodology, and the data are discussed in Section I. Section II presents the results of multiple regression analysis. Since some of the variables included in our hypothesis are compatible with both the competitive model and the non-competitive model of wage determination, Section III considers each of the two models as the major underlying explanation. Section IV provides a comparison of results of the present paper with those of similar studies of interindustry wage structure variations in U.S. manufacturing. The final section includes the summary and conclusions.

I. Hypothesis, Methodology, and Data

Our hypothesis states that short-run changes in the interindustry wage structure depend upon: (1) changes in labor productivity, \( DNPP \); (2) changes in output, \( DO \); (3) past rates of profit, \( PP \); (4) degree of unionization, \( U \); (5) degree of concentration, \( C \); and (6) original level of wages, \( OW \). Factors of
changes in productivity, changes in output, and past rates of profit are compatible with the short-run competitive demand model of wage determination. A priori the expectation is that if these three variables in fact cause changes in demand for labor, we should expect the following relationships between wage changes and these variables:

\[ \Delta W/\Delta NVP > 0, \quad \Delta W/\Delta O > 0, \quad \text{and} \quad \Delta W/\Delta PP > 0. \]

However, in the long run, according to the competitive theory, there should be zero correlation between wage changes and these variables, as labor market adjustments under competition would reallocate labor in the direction of industries which show greater advancement in productivity, high profit rates, and rapid increases in output. Unless the skill-mix or occupational structure of industries is permanently altered and is related to these factors, this reallocation would tend to equalize wage increases among the industries. The absence of required data precluded the test for the long run hypothesis.

For a measure of imperfection in the product market, the degree of concentration in the market is added as an explanatory variable; and to account for the effect of unions on wage changes, the degree of unionization is included. While wage changes are expected to be positively related with the \( U \) variable, i.e., \( \Delta W/\Delta U > 0 \), the expected sign for \( C \) cannot be determined a priori in view of the various arguments ascribing different roles to this variable. At least three different arguments have been advanced as to the role of the degree of concentration in affecting wage changes. The first is that union pressure may cause concentrated industries to grant higher wage increases because of the ability of the latter to pass the burden of increased costs onto the consumer in the form of higher prices; productivity gains in concentrated industries may not get transformed into lower prices as would be expected under competition. Second, the opposite argument is that, while concentrated industries may have the resources to pay higher wage increases, they also have greater ability to withstand union power; union power thus may lead to larger increases in wages in industries where concentration is low rather than high. Third, concentrated industries, even without strong unions, may voluntarily pay higher wage increases, because they can afford to simplify recruiting and attract better labor, reduce costly turnover and absenteeism, and enhance their reputation in the community. While the test of the last argument cannot be made at present because of the absence of required data, both Lewis and Weiss have earlier suggested that an interaction term, the mathematical product of \( C \) and \( U \), be included along with \( C \) and \( U \) to test which one of the first two arguments holds. Following these authors, regression equations, including the interaction term (\( C \times U \)), are also estimated. The results of these equations are presented after presenting the regression results of the main hypothesis of the paper.

The inclusion of the \( C \) variable is based on the argument that changes in wages are not independent of original levels of wages. If in time the same absolute increases, the relative wage differentials would be narrowed. On the other hand, if the same relative increases are bargained, the wage increases because of the ability of the latter to pass the burden of increased costs onto the consumer, in the form of higher prices; productivity gains in concentrated industries may not get transformed into lower prices as would be expected under competition. Second, the opposite argument is that, while concentrated industries may have the resources to pay higher wage increases, they also have greater ability to withstand union power; union power thus may lead to larger increases in wages in industries where concentration is low rather than high. Third, concentrated industries, even without strong unions, may voluntarily pay higher wage increases, because they can afford to simplify recruiting and attract better labor, reduce costly turnover and absenteeism, and enhance their reputation in the community. While the test of the last argument cannot be made at present because of the absence of required data, both Lewis and Weiss have earlier suggested that an interaction term, the mathematical product of \( C \) and \( U \), be included along with \( C \) and \( U \) to test which one of the first two arguments holds. Following these authors, regression equations, including the interaction term (\( C \times U \)), are also estimated. The results of these equations are presented after presenting the regression results of the main hypothesis of the paper.

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The wage measure used in this paper is an average compensation measure for all employees; it is obtained by dividing the total annual wage bill, including fringe benefits, of a given industry by the labor input, i.e., man-days worked (average daily employment times the number of days worked during the year).

Net value productivity is defined as valued added by manufacture, including depreciation, divided by the labor input. It measures the difference between output and purchases from other firms consumed in the production process, both valued at their respective prices, relative to industry employment (man-days).

Changes in net value productivity are measured in money terms rather than in real terms. This is preferred because the relationship

\[ W = (1 - \frac{P}{P_0}) \frac{Q}{Q_0} \]

Where \( W \) is a constant, it is assumed that the determination of wage changes can be considered a linear approximation of changes in wages obtained from the above function. If the above expression is not significantly different from zero, the rate of change in wages derived from the above expression will depend on changes in net output. Given this result, the change in output between the two periods is found to be

\[ \frac{Q}{Q_0} \]

The sample consists of twenty-nine major manufacturing industries of India. The level of aggregation of these industries, however, varies from the two-digit Standard Industrial Classification (SIC) level to the three-and-in-a few cases to the four-digit level. The data on earnings, changes in net value productivity, past rates of profit, and original level of wages are computed from the Census of Indian Manufactures (CIM) and the Annual Survey of Industries (ASI), both published by the Central Statistical Organization, Government of India. The degree of utilization—industry members as percentage of the total employment in each industry—varies from 30% to 65%. The data are drawn from the Labour Bureau, Government of India. The source for the data on changes in output is Monthly Statistics of Production of Selected Industries of India, the Central Statistical Organization, Government of India. The degree of concentration represents

\[ N = \frac{1}{2} \left( \frac{P}{P_0} \right) \]
the percentage share of the eight largest establishments in the total industry's output, computed from the distribution by establishment size of the output of different industries published in the CII report (1958).\textsuperscript{21}

II. Regression Results

The regression results of absolute wage change equations are shown in Table 1, and those of percentage wage change in Table 2. Since results of multiple regression equations including all of our explanatory variables may conceal some of the important interrelationships which affect the significance of some variables in those equations, alternative equations in the appropriate cases are also presented.

Equation 1 (Tables 1 and 2), which includes all the variables, shows that for both absolute and percentage wage changes, the variables DNPV, DO, PP, and U all have the expected signs and are statistically significant, whereas C and OW are not. The proportion of the variance explained for percentage changes is 68 percent, and for absolute changes it is 86 percent. However, the relatively small proportion explained for percentage wage changes seems consistent with the observation that the wage determination process in Indian manufacturing is dominated by "flat-rate" increases rather than percentage wage increases.\textsuperscript{22} This is further

\textsuperscript{21}These concentration ratios are the same as those used in an earlier paper exploring price-cost margins in Indian manufacturing industries. Details of measurement, see Pawar K. Sawant and Ranu L. Sawant, "Capacity Utilization, Concentration, and Price-Cost Margins: Results on Indian Industries," Journal of Industrial Economics, Vol. 21, No. 2 (April 1973), pp. 152-155.


The C variable also remains significant when included with PP or U but becomes statistically insignificant when DO is introduced. These results are not presented here, but are available from the author.

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**TABLE 1** Regression Results; Absolute Wage Change Equations

(N = 29)

<table>
<thead>
<tr>
<th>Equation Number</th>
<th>Constant</th>
<th>DNPV</th>
<th>DO</th>
<th>PP</th>
<th>C</th>
<th>U</th>
<th>OW</th>
<th>DW</th>
<th>R²</th>
<th>R²*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-479</td>
<td>271**</td>
<td>0.47**</td>
<td>0.031</td>
<td>0.054**</td>
<td>0.039**</td>
<td>0.022</td>
<td>0.82</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-269</td>
<td>233**</td>
<td>0.47**</td>
<td>0.031</td>
<td>0.034**</td>
<td>0.031**</td>
<td>0.022</td>
<td>0.82</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1.014</td>
<td>-0.09**</td>
<td>0.54**</td>
<td>0.034</td>
<td>-0.014</td>
<td>-0.044</td>
<td>0.022</td>
<td>0.82</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5.44</td>
<td>278**</td>
<td>0.08**</td>
<td>0.031</td>
<td>0.016</td>
<td>0.016</td>
<td>0.022</td>
<td>0.82</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>282</td>
<td>224**</td>
<td>0.031</td>
<td>0.031</td>
<td>0.031</td>
<td>0.031</td>
<td>0.022</td>
<td>0.82</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>-629</td>
<td>215**</td>
<td>0.05**</td>
<td>0.031</td>
<td>0.026</td>
<td>0.026</td>
<td>0.022</td>
<td>0.82</td>
<td>0.86</td>
<td></td>
</tr>
</tbody>
</table>

Two asterisks (***) indicate significant at the 0.05 level or better according to the one-tailed 't-test,' and one asterisk (*) at the 0.10 level. Figures in parentheses are 't-values' of the regression coefficients. R² values of all the equations are statistically significant at the 0.01 level.

NVP stands for net value productivity; O for output; PP for past rate of profit; C for degree of concentration; U for degree of internationalization; and OW for original level of wages.

**TABLE 2** Regression Results; Percentage Wage Change Equations

(N = 29)

<table>
<thead>
<tr>
<th>Equation Number</th>
<th>Constant</th>
<th>DNPV</th>
<th>DO</th>
<th>PP</th>
<th>C</th>
<th>U</th>
<th>OW</th>
<th>DW</th>
<th>R²</th>
<th>R²*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15.819</td>
<td>489**</td>
<td>1.16**</td>
<td>1.73**</td>
<td>0.98</td>
<td>0.37**</td>
<td>-0.45**</td>
<td>0.59</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5.616</td>
<td>484**</td>
<td>1.29**</td>
<td>0.65**</td>
<td>0.53**</td>
<td>-0.29**</td>
<td>-0.45**</td>
<td>0.59</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>25.364</td>
<td>587**</td>
<td>1.23**</td>
<td>2.69**</td>
<td>2.16**</td>
<td>-1.77**</td>
<td>-0.44**</td>
<td>0.59</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>19.162</td>
<td>475**</td>
<td>1.15**</td>
<td>2.37**</td>
<td>1.68</td>
<td>-0.44**</td>
<td>0.59**</td>
<td>0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5.018</td>
<td>472**</td>
<td>1.44**</td>
<td>0.76**</td>
<td>0.53**</td>
<td>-0.42**</td>
<td>-0.39**</td>
<td>0.60</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>13.906</td>
<td>439**</td>
<td>1.15**</td>
<td>0.66**</td>
<td>0.53**</td>
<td>-0.28**</td>
<td>-0.56**</td>
<td>0.54</td>
<td>0.60</td>
<td></td>
</tr>
</tbody>
</table>

Two asterisks (***) indicate significant at the 0.05 level or better according to the one-tailed 't-test,' and one asterisk (*) at the 0.10 level. Figures in parentheses are 't-values' of the regression coefficients. R² values of all the equations are statistically significant at the 0.01 level.

NVP stands for net value productivity; O for output; PP for past rate of profit; C for degree of concentration; U for degree of internationalization; and OW for original level of wages.
TABLE 3 Additional Regression Results
(N = 29)

<table>
<thead>
<tr>
<th>Eq.</th>
<th>Constant</th>
<th>DONY</th>
<th>DY</th>
<th>PP</th>
<th>P</th>
<th>C</th>
<th>U</th>
<th>OW</th>
<th>C x U</th>
<th>S</th>
<th>UT</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>-0.703</td>
<td>0.214**</td>
<td>0.088**</td>
<td>0.209*</td>
<td>0.004</td>
<td>0.024*</td>
<td>0.097</td>
<td>-0.001</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.818</td>
</tr>
<tr>
<td>1b</td>
<td>-3.649</td>
<td>0.314**</td>
<td>0.379*</td>
<td>0.450*</td>
<td>0.826**</td>
<td>0.427</td>
<td>0.340</td>
<td>0.010*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.637</td>
</tr>
<tr>
<td>2a</td>
<td>-0.182</td>
<td>0.217**</td>
<td>0.308**</td>
<td>0.039</td>
<td>0.002</td>
<td>0.031</td>
<td>0.212</td>
<td>0.003</td>
<td>0.003</td>
<td>0.012</td>
<td>0.817</td>
<td></td>
</tr>
<tr>
<td>2b</td>
<td>4.600</td>
<td>0.528**</td>
<td>0.165**</td>
<td>0.682*</td>
<td>0.527*</td>
<td>1.005</td>
<td>-2.215</td>
<td>0.011</td>
<td>-0.066</td>
<td>0.322</td>
<td>0.703</td>
<td></td>
</tr>
<tr>
<td>3a</td>
<td>0.139</td>
<td>0.264**</td>
<td>0.008**</td>
<td>0.012</td>
<td>0.070</td>
<td>-0.013</td>
<td>-</td>
<td>-</td>
<td>-0.183</td>
<td>-</td>
<td>0.747</td>
<td></td>
</tr>
<tr>
<td>3b</td>
<td>8.342</td>
<td>0.489**</td>
<td>0.502**</td>
<td>0.346</td>
<td>0.024</td>
<td>0.368</td>
<td>0.194</td>
<td>-0.247</td>
<td>0.141</td>
<td>0.543</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a</td>
<td>0.016</td>
<td>0.276**</td>
<td>0.513**</td>
<td>0.023</td>
<td>0.013</td>
<td>0.013</td>
<td>0.054</td>
<td>-0.213</td>
<td>0.243</td>
<td>0.281</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4b</td>
<td>9.334</td>
<td>0.482**</td>
<td>0.515**</td>
<td>0.329</td>
<td>0.037</td>
<td>0.223</td>
<td>0.114</td>
<td>0.194</td>
<td>0.348</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Two asterisks (**) indicate significant at the 0.1 level or better according to the two-tailed test, and one asterisk (*) at the 0.5 level. Figures in parentheses are t-values of the regression coefficients. "P-values" of all the equations are statistically significant at the 0.1 level.

ANOVA stands for the net productivity; O for output; PP for past rates of profit; C for degree of concentration; U for degree of unevenness; OW for original level of wages; C x U for the mathematical product of C and U; S for plant size; and UT for the degree of capital utilization.

Equations 1a, 2a, 3a, and 4a refer to absolute wage changes, and 1b, 2b, 3b, and 4b refer to percentage wage changes.

The foregoing regression analysis indicates that four variables, namely, changes in net value productivity, changes in output, past rates of profit, and degree of concentration, are key determinants of both absolute and relative variations in the interindustry wage structure of Indian manufacturing. Additional factors such as plant size, degree of unemployment (or underutilized capacity) and changes in employment, also may exert significant influences. Or it is possible that the four variables found to be the key ones may be capturing the effects of these omitted factors. Insofar as changes in output and changes in employment are likely to be highly correlated, the former should also act as proxy for the latter, and to that extent the effect of output changes may be described as the combined output and employment change effect. Whether plant size or degree of capital utilization exercises any independent effect is examined by constructing two additional variables: (1) the degree of plant size (S), which measures the percentage of an industry’s employment in units employing 250 or more workers, and (2) the capacity utilization variable (UT), which measures the actual output produced in an industry as percentage of its “installed capacity.”

The plant size variable is considered because of the existence of “dualism” within industries; certain industries consist predominantly of large plants, others of small plants. According to theoretical arguments advanced for plant size in the wage determination literature, one would expect higher wage gains in industries with a greater proportion of workers employed in large plants (i.e., those employing 250 or more workers), than industries whose employment is largely concentrated in smaller plants.32 Degree of capacity utilization, on the other hand, is added as proxy for unemployment among industries in a specific labor market and expected to be positively related to wage changes, i.e., the greater the degree of capacity utilization, the lower is likely to be the rate of unemployment, and therefore the greater will be the pressure for higher wage increases, and conversely.

Regression results of equations including these two additional variables, namely, plant size and capacity utilization, are also summarized in Table 3. Both these variables do not seem to exert an independent effect on either absolute wage changes, or relative changes, once the effect of all remaining variables is taken into account; regression coefficients of both plant size and capacity utilization are statistically not significant (Equations 5...).
tions 2a and 2b). Intercorrelations of each of the two with the remaining variables reveal close relationships with many. As a result, the only equation in which plant size is statistically significant is the one which restricts itself to NVP and DO as the two explanatory variables (Equations 3a and 3b) and capacity utilization is statistically significant only in that equation in which NVP is the only other variable (Equations 4a and 4b).

Once any, or all, of the other variables are added, S and U/T no longer remain significant factors. On the basis of these results, it appears that neither plant size itself nor capacity utilization itself is an important factor in the determination of either the absolute wage changes or percentage changes. Plant size seems to reflect some of the effect captured by either unionization, concentration, past rates of profit, or original level of wages; capacity utilization in addition to these, also partially reflects the effect of changes in output. Moreover, plant size and capacity utilization are highly correlated with each other (r = .55). In any event, the introduction of either plant size, or capacity utilization, or the two together, does not alter the proportions of the already explained variance (Equations 2a and 2b, compared to Equations 1a and 1b, respectively).

The four key variables, namely, changes in net value productivity, past rates of profit, changes in output and degree of concentration, by explaining so high a proportion of the variance demonstrate that economic forces play a dominant role in the determination of interindustry wage structure variations in Indian manufacturing industries. By inference, such a high degree of explanation indicates that whatever administrative and legislative arrangements the government has introduced into the wage determination process have reinforced economic forces rather than working against them. In addition, the finding that rapidly expanding industries pay higher wage increases suggests that the hypothesis of an "unlimited" supply of labor does not hold true in the manufacturing sector of India.

III. The Underlying Forces

Of the four key variables, the role of changes in NVP and that of past rates of profit can be considered as compatible with both the competitive and noncompetitive models of wage determination. For theoretical as well as policy purposes, it is of interest to examine, to the extent possible, whether the effect of each of these two variables on wage changes is the result of underlying competitive or noncompetitive forces. So far as the DO and U/V variables are concerned, the former is an indicator of competition for labor among industries, and the latter is a noncompetitive force in the labor market.

In order to be consistent with the competitive demand model, the effect of changes in NVP on changes in wages requires a positive relationship between changes in NVP and changes in output. In fact, the correlation observed between the two provides some support for the competitive model, but the degree of relationship observed is somewhat weak (r = .31) in the case of absolute changes in NVP, and r = .22 in the case of percentage changes in NVP). The weak relationship, however, is not entirely unexpected. Increased demand for labor due to increased NVP in different industries may involve different time lags before it can be realized as actual increases in output, and therefore, the use of DO as a surrogate for the demand for labor results in a weaker correlation between the two. Inadequate data made it impossible to assign different time lags to different industries.

Contrary to the competitive hypothesis, it can be argued that the observed relationship between changes in wages and changes in net value productivity may be due to the latter's relationship with degree of concentration through product price changes. The value of r between absolute NVP changes and degree of concentration is .22, and between percentage NVP changes and degree of concentration is .15. This suggests no systematic relationship between the two. On the basis of these simple tests, it appears that the important role of the NVP variable in determining changes in the interindustry wage structure in India's case is more consistent with the competitive model that it is with the noncompetitive model.

According to the competitive demand hypothesis, past rates of profit are an important factor in the determination of interindustry wage structure variations, because industries which had higher profits in the past (either due to cost- and/or product demand conditions) will be most strongly induced to expand, thus causing higher than average wage increases in such industries. The observed correlation between the two variables is positive, but statistically not significant (r = -.11). On the other hand, the profit rate is significantly related to the degree of concentration (r = -.33), which indicates that the effect of profit rates on wage changes is compatible with the noncompetitive model of wage determination. However, it can be argued that the insignificant relationship between expansion of output and past rates of profit may be due to a less than perfect correlation between changes in employment and changes in output and/or due to different time lags needed in order to realize the desired changes in output. In view of the lack of information on these factors, the evidence presented here seems to be inconclusive in its ability to determine whether the effect of the

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2See, for example, Hochheiser's earlier examination of wage changes among Indian industries, in terms of productivity changes in the plant, and his final argument which reports the conclusion of this paper that surplus variable costs are used as a basis for wage determination. He does make an appreciable difference in the determination of interindustry wage structure variations. However, contrary to her findings, the results presented here reveal that size of plant is not an important variable, and that the most important other variables, play a significant role in the wage determination process in India. (For details, see Hochheiser, "Wage Determination in a Labor Surplus Economy," Indian Economic Review, 1965.)

3This is an indirect inference, since a change in NVP is the composite result of changes in physical productivity and in product prices, and changes in unit cost of outside purchases. It is, therefore, not possible to infer from the above correlation a statistically significant relationship between changes in price and degree of concentration. All we can infer is that degree of concentration does not significantly affect changes in NVP through changes in product prices. The correlation between degree of concentration and price changes is not examined for want of separate data on price changes in different industries, as pointed out earlier in footnote 14.

4Contrary to earlier findings, only the comparability of these two variables with the competitive and the noncompetitive models observed. However, changes in 1973-74 did not result in the determination of these variables. Also, the purpose not to argue whether the competitive or noncompetitive forces play dominant role but to see if the underlying reasoning for a given variable
IV. A Comparison of the Results With the U.S. Studies

This section provides comparisons of the results on Indian manufacturing industries with those reported by similar studies of U.S. manufacturing to show the similarities in the factors operating on interindustry wage structure variations of the two countries, one developing and the other highly developed. Although the comparisons are based mainly on simple correlation analysis, regression results are also used wherever available. The use of simple correlations is used because earlier U.S. studies generally used only simple correlations in their analysis of interindustry wage structure variations; only a few recent U.S. studies also use multiple regressions. This needs to be mentioned at the outset that the purpose here is to determine which hypothesis gets empirical support in both countries, and not to determine the differences in the degrees of explanation or differences in the magnitudes of the regression coefficients.

Table 4 presents the simple correlation coefficients between wage changes and each of the explanatory variables.

### Table 4: Simple Correlation Coefficients of Interindustry Wage Structure Changes Between 1953-55 and 1963-65 and Each of the Explanatory Variables (N = 29)

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Absolute Wage Change</th>
<th>Wage Change Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in NVP</td>
<td>.76**</td>
<td>.56**</td>
</tr>
<tr>
<td>Changes in Outputs</td>
<td>.59**</td>
<td>.57**</td>
</tr>
<tr>
<td>Rate of Profits</td>
<td>-.46**</td>
<td>-.31**</td>
</tr>
<tr>
<td>Degree of Concentration</td>
<td>.44**</td>
<td>.36**</td>
</tr>
<tr>
<td>Degree of Utilization</td>
<td>.56**</td>
<td>.33**</td>
</tr>
<tr>
<td>Original Level of Wages</td>
<td>.62**</td>
<td>.37**</td>
</tr>
</tbody>
</table>
| Two sectors (**) indicate significant at the 0.1 level or better according to the one-tailed "t-test," and one sector (*) at the 0.05 level.

The evidence found for Indian industries shows a significant relationship between productivity changes and wage changes. However, while Dunlop and Garbarino found physical productivity changes positively related to wage changes in U.S. manufacturing, Meyers and Bowley, Eisenman, and Levinson did not. Earlier, Perlman had tried to reconcile the divergent results on the relationship between changes in physical productivity and changes in wages among U.S. industries by showing that at the interindustry level the important factor is not the physical productivity change but the increase in the value of output per man-hour.

The concept of net value productivity improves upon Perlman's measure of the standard output value of output per man-hour. The former not only reflects the composite effect of changes in product prices and in the use of labor per unit of output, but also incorporates variations in the unit cost of purchases from outside firms, due either to changes in their prices, or use product unit output, or both.

The results of a multiple regression presented in Section II reveal that the change in net value productivity variable is an important determinant of both absolute and relative wage changes in the Indian case, even after the effect of the other factors has been accounted for. Similar findings also were reported for the United States.

Likewise, the finding of a close relationship between changes in wages and past rates of profit in Indian manufacturing is in line with the results of Bowen and Levinson who examined the correlations between the two variables in U.S. industries, as well as with the results of Lewis, and of Sawhney and Herrnstadt who used the multiple regression analysis.

For the change in output variable, our findings, though similar to the ones noted by Eisenman, Ross and Goldner, and Ostry for U.S. and Canadian manufacturing, are different from that reported by Lewis and Sawhney and Herrnstadt, who found statistically insignificant effects of the change in the output employment variable in the explanation of interindustry wage structure variations in the U.S. Although, this is not the place to reconcile these differences, the results of the last two studies seem to be due to the terminal year used in them, being one of high unemployment and recession in U.S. manufacturing. In the face of high unemployment, it is unlikely that rapid expansion of output causes a greater average increase in wages because of the case in which employers can meet their demand for additional labor. As a matter of fact, it reduces the need for increased wages. The unemployment rate of the United States, 1939-1947, pp. 445-460; and M. Ross and W. Ostry, "Interindustry Wage Structure Variation," Quarterly Journal of Economics, Vol. 64, November 1950, pp. 395-412, "Interindustry Earnings Differentials in Canada, 1947-1958, pp. 401-412; and "Interindustry Wage Structure Variation in Manufacturing," Quarterly Journal of Economics, 1953, pp. 401-412, "Interindustry Wage Structure Variation in Manufacturing," Q.J.E., 1952, 15, 205-214.

In the Indian case also there was a longer period of depression between 1953-55 and 1963-65. However, over the longer period, the expected similarity of wage and output movements in the Indian case is not necessarily greater than the U.S. This is also evident from the fact that the correlation coefficient between the wage and output increases is much weaker because the force of competition is much weaker in Indian industries and wages increases, thereby depressing the relative wage increases in such industries and resulting in a weaker relationship between the two variables.

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*Note Lewis, Unionization and Relative Wages in the United States, pp. 177-178; and Sawhney and Herrnstadt, "Interindustry Wage Structure Variation in Manufacturing," pp. 411-412.*
fact, the unemployment rate was found to be inversely related with wage changes among U.S. industries. In contrast, the period of wage change for the Indian industries considered here was characterized by rapid expansion of output, accompanied by relative shortages of skilled and semi-skilled labor needed for industrial expansion. It may be emphasized that the hypothesis of an unlim- ited supply of labor does not hold true economically in the organized manufacturing sector of India. This is further supported by the evidence that not only has the level of manufacturing wages as a whole risen relative to the rest of the economy, but differential rates of growth of various industries, among other factors, have resulted in a widening of the interstate wage structure.

As in U.S. manufacturing, the wage change determination process in Indian manufacturing is also found to be influenced on the supply side by unions. The significant and positive effect of degree of unionization observed here corresponds to the findings of Ross and Goldner, Garbarino, and Bowen, who examined the simple correlations, and to the results of the studies by Lewis, and Sawhney and Horstow, who, after taking into account the other factors, found a significant effect of degree of unionization on wage changes among U.S. manufacturing.

The results for the remaining two variables, namely degree of concentration and original level of wages, are not conclusive because of their high correlations with other explanatory variables. As noted in Section II, degree of concentration becomes statistically insignificant with the introduction of expansion of output variables, while the original level of wages becomes statistically insignificant due to its close relationship with degree of unionization. Interestingly enough, these interrelationships also correspond to the ones observed by similar studies of wage changes in U.S. manufacturing.

V. Summary and Conclusions

This study shows that the major determinants of changes in the interstate wage structure in India are economic variables, similar to the ones operating in interstate wage structure variations in U.S. manufacturing. Changes in net value productivity, past rates of profit, expansion of output, and degree of unionization together explained 66 percent of the variation in absolute and 68 percent in percentage wage increases. The relatively smaller proportion of the variance explained for percentage changes is consistent with the phenomenon of the widespread prevalence of flat-rate, rather than percent-wage increases, while the original level of wages becomes statistically insignificant due to its close relationship with the degree of unionization.

Interestingly enough, these interrelationships also correspond to the ones observed by similar studies of wage changes in U.S. manufacturing.

The role of changes in net value productivity in affecting wage increases seemed to be more consistent with the competitive demand model of wage determination, than the noncompetitive model. For the profit variable, the available evidence was inconclusive to determine whether its effect was due to competitive forces or imperfections in the product market. The relative growth of different industries, among other things, resulted in the widening of the wage structure. This reflected the shortages of skilled and semi-skilled labor needed for industrial expansion. The findings of this paper contradict the assumption that surplus labor is available at institutionalized wage rate, which results in the widening of the wage structure. High-wage industries experienced higher wage increases than low-wage industries, but this was the result of the bargaining strength of unions. The evidence found on the interaction of unionization and concentration indicated its absence for absolute wage changes; for percentage wage changes, it was inconclusive due to the presence of strong multicollinearity. Plant size and capacity utilization did not exert any independent effect on wage changes.

For example, Ross and Goldner in the case of the U.S. noted that "from an analytical standpoint, the difficulty is that these three influences [unionization, employment change, and expected market structure] have been operating in substantially the same group of industries." See Ross and Goldner, "Factors Affecting the Interstate Wage Structure," 240, and also Sawhney and Horstow, "Interstate Wage Structure Variations in Manufacturing."