WAGE – PRODUCTIVITY LINKAGES IN ODISHA MANUFACTURING SECTOR

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Abstract

This paper investigates the long run relationship between labour productivity and real wages of odisha manufacturing sector at aggregate level covering the period from 1981-82 to 2005-06. In order to clearly understand the links between wages and productivity, the study had used a simple step-wise regression model. Based on the results obtained, it is evident that there is a strong association between wage rate and labour productivity of Odisha Manufacturing sector.

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Introduction

Industrialisation is considered as a sine-qua-non of economic development as it would be helpful to combat many economic ills. Odisha, since its formation in 1936 has remained as one of the highly economically backward state in India. Industrial development is also found at lower rank despites its vast natural resources. Therefore the industrial scenario of Odisha is full of paradoxes. According to **Dholkia (1994)** Odisha started off as high growth state, but experienced considerable deceleration and as a result of which it is now a low growing state. However, during the post reform period, Odisha has become a major destination for industrial development. The promotional efforts and conducive investment climate have attracted the entrepreneurs to set up major industries in Steel, Cement, Power, Alumina and Aluminum, Chemical and Petrochemical sectors (**Government of Odisha 2011**). Odisha has already signed MoU with 89 companies in different sectors which intera lia covers Steel (50), Aluminum (03), Power (30), Cement (03), Auto Component (01), Oil refinery (01) and Titanium dioxide (01) plant with an investment of Rs. 4, 61, 182, 74 crores. Out of 50 Steel companies whose MoU$_s$ are in force, 30 companies have commenced partial commercial production. Besides one Aluminum, one Auto Ancillary and one cement have also commenced partial commercial production. The rest of projects are in different stages of progress and will be in operation soon. As per the data provided by the Reserve Bank of India in its Website, the secondary sector of Odisha contributed only 14.16 per cent to the GSDP in the year 1981-82 and the share went up to 21.83 per cent in the year1990-91 and further up to 24.86 per cent in the year2007-08 and after that it has gone down marginally to 23.52 per cent in the year 2009-10. Within secondary sector, the share of manufacturing sector has gone up substantially and its weight is 65.4 per cent of total industrial sector in 2009-10(Economic Survey of Odisha in 2010-11).

Despite a steady growth over the several decades, Odisha manufacturing faces stiff competition both in domestic as well as global market. The important requisite which is needed for competitiveness is enhancement of productivity. Being a labour abundant state, Odisha could boost the productivity by employment generation, higher wages to employees, innovation and technology. Thus to understand the behavior of Odisha manufacturing sector from a labour market point of view, it is crucial to examine the dynamic relationship between labour

productivity and wage shares. The rest of the paper is organized as follows. Section 2 provides some earlier studies relating to wage share and labour productivity. Section 3 briefly outlines the methodological framework and data source. Selection of variables to examine the wage-productivity linkages are stated in section 4. Section 5 deals with the results of step- wise regression model and the final section concludes with the main findings.

2. Earlier studies on wage-productivity linkages

Several studies have been conducted to empirically test the relationship between wages and productivity at international, national and state level. The number of these studies is so large that, it is very difficult to list them all. In this section, an attempt has been made to briefly describe a few significant studies conducted in India and Odisha on link between wages & productivity. Most of studies confirm the existence of close relationship between the two.

Jose (1994) investigates the association between the index number of real earnings & productivity for 19 two-digit manufacturing of India and concludes that there is a high degree of correlation between the two in most industries. **Nagraj (1994)** provided evidence to suggest that the wage rate and earning per worker did increase disproportionately. **Bhattacharya and Mitra (1994)** have estimated wage function for public & private manufacturing for the period 1970-71 to 1990-91. The regression analysis shows that labour do not get full compensation for increase in labour productivity and prices in private manufacturing, whereas in public enterprises wage rate is fully adjusted to prices and only partial adjusted to labour productivity. **Aggarwal (1998)** while examining the wage-productivity nexus in selected public sector enterprises in India concluded that the real wage increase has been generally slower than the increase in their labour productivity. **Balakrishnan and Babu (2003)** find that the growth rate of labour productivity and employment in the 1990s has risen compared to the 1980s. But at the same time time, the growth rate of money wage, product wage and real wage has declined in the post reform period as compared to pre reform period, consistent with the finding of **Unel (2003)** and **Gangopadhyay and Wadhwa (1998)**. **Manonmani (2012)** examines wage-productivity linkages in rural, urban and aggregate industries of India covering the period from 1998-99 to 2007-08 and concludes that the relationship between wage rate and labour productivity is

positive and statistically significant in rural, urban and aggregate industries. These are few empirical evidence pertaining to wage productivity linkages in India. So far Odisha is concerned, **Mohapatra (1984)** pointed out that higher productivity does not always mean higher wage. Wage increase may or may not have any relationship with the increase in the general level of productivity. Further he observed that productivity linked wage settlement is almost absent in Odisha except few units like Indian Aluminum company, Hirakud. **Sahoo (1985)** made a critical analysis of some of the important aspects of industrial economics such as wages, price, productivity and industrial planning. **Nayak and Patra (2013)** analysed wage- labour productivity relationship of Odisha manufacturing sector covering the period from 1998-99 to 2008-09. They found positive correlation between wage and labour productivity of Odisha manufacturing sector.

Most of the studies relating to wage share and labour productivity of Odisha manufacturing sector are very old and is not clear. Against this backdrop the present study endeavors to fill this void.

3. Methodological Framework and Data Source

The study uses the data compiled from Odisha Economic Survey and Annual Survey of industries (ASI) published by Central Statistical Organisation (CSO), government of India covering the period from 1981-82 to 2005-06. The time period is long enough to record the relationship between wage share and labour productivity of Odisha manufacturing sector. The year 2005-06 is chosen as the terminal year of the study as the required data is available up to the said year.

In order to examine the Wage- productivity linkages of Odisha manufacturing sector, the study has used a simple step-wise regression model (used by Laxmi Narayan, 2003). As various measures of productivity affect wages differently, the models were so designed to include one or more measure of productivity. The analysis was based on the wage rate (W) as dependent variable and labour productivity(LP), Capital intensity(K/L), Consumer price index for industrial

workers(CPIIW), Net value added(V), Total factor productivity(TFPT) and Trend variable(t) as explanatory variables. The variables included and the models estimated are:

Model I : $W = A\, e^{u}\, (LP)^{\alpha}$

Model II : $W = A\, e^{\lambda t + u}(LP)^{\alpha}$

Model III : $W = A\, e^{\lambda t + u}(LP)^{\alpha}\, (V)^{\beta}$

Model IV : $W = A\, e^{\lambda t + u}(LP)^{\alpha}\, (V)^{\beta}\, (K/L)^{\delta}$

Model V : $W = A\, e^{\lambda t + u}(LP)^{\alpha}\, (V)^{\beta}\, (K/L)^{\delta}\, (CPIIW)^{\lambda}$

Model VI : $W = A\, e^{\lambda t + u}(LP)^{\alpha}\, (TFPT)^{\beta}\, (K/L)^{\delta}\, (CPIIW)^{\lambda}$

Model VII : $W = A\, e^{u}\, (LP)^{\alpha}(V)^{\beta}$

Model VIII : $W = A\, e^{u}\, (LP)^{\alpha}(V)^{\beta}\, (K/L)^{\delta}$

Model IX : $W = A\, e^{u}\, (LP)^{\alpha`}(TFPI)^{\beta}\, (K/L)^{\delta}$

4. Selection of Variables

To examine the wage-productivity linkages, the following variables were selected.

Net Value Added (V) was taken as output, since the trends are not affected significantly by the use of net value added. Also ambiguity in the calculation of depreciation can be overcome if net value added is taken as a measure of output. The capacity to pay may be one more variable or a factor determining wages. Expansion of output (Value added) may be taken as the measure of the industry's capacity to pay and a positive relationship between real earnings and value added is expected.

Labour productivity (LP) is measured as the ratio of value added to total number of persons employed (V/L). The movement in real wages based on the movement in labour productivity was examined and a positive relationship between wage rate and labour productivity was expected.

Capital Intensity (K/L) is another variable which is theoretically and empirically taken to be a factor determining wages. In the present study, Capital-Labour ratio was taken as a measure of capital intensity. It is argued that the availability of higher per capital wage requires more skilled

manpower and therefore workers are paid higher wages. Moreover capital intensity which increases labour productivity leads to higher wages and a higher wages may induce a substitution of capital for labour. Therefore, a positive relationship is expected between changes in capital intensity and changes in wages.

Total factor productivity (TFP) is measured by combining the effects of all the resources used in the production of goods and services. The present study uses total factor productivity based on translog model.

Consumer price index for industrial workers (CPIIW) Real wages of workers should not be allowed to be whittled down by the price increase. The correction method adopted to neutralize the fall in value of money so as to keep the workers real wage constant at a given level is based on consumer price index. Generally, any increase in the price of consumer goods depresses the real wages. Thus a negative relationship between consumer price index and changes in real earning can be visualized.

5. RESULTS

The results of regression analysis for functions explaining wage-productivity relationship is presented in the table below.

| Model No. | Constant | Explanatory Variables | | | | | | R^2 | DW statistics |
		LP	V	K/L	CPIIW	TFPT	Time		
1	-1.079	0.19*** (1.97)	-	-	-	-		0.14	0.366
2	-1.292	0.07 (1.45)	-	-	-	-	0.02* (9.01)	0.81	1.456
3	0.633	0.23** (2.02)	-0.16 (-1.54)	-	-	-	0..01* (8.74)	0.83	1.670
4	0.290	0.20 (1.60)	-0.12 (-1.06)	-0.07 (-0.65)	-	-	0.02* (2.82)	0.84	1.765
5	2.020	0.04 (0.35)	-0.05 (-0.47)	0.13 (0.97)	-0.79** (-2.24)	-	0.07* (3.18)	0.87	1.725
6	-0.565	-2.48 (-1.42)	-	2.03 (1.50)	0.66***	2.49 (1.41)	0.05* (2.32)	0.88	1.942

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544

		(-1.92)						
7	3.179	0.54** (2.36)	-0.35 (-1.67)	-	-	-	-	0.24	0.439
8	1.925	0.35** (2.73)	-0.28** (-2.42)	0.22* (7.08)	-	-	-	0.77	1.210
9	-4.60	-5.28* (-4.28)	-	4.17* (4.60)	-	5.37* (4.34)	-	0.84	1.901

Notes: 1. the value in parenthesis indicates respective t-value of estimates

    2. * Significant at 1% level of significance

    3. ** Significant at 5% level of significance

    4. *** Significant at 10% level of significance

It is evident from the above that, there is a strong association between Wage rate and labour productivity in 5 out of 9 models. Model-1 revealed that, there is a positive and statistically significant association between Wage rate and labour productivity. Elasticity of real wage rate with respect to labour productivity was equal to 0.194. But this model suffered from low explaining power, indicating that there are factors other than labour productivity that influenced real wage rate in the state. Introduction of trend variable in Model-II had increased the explanatory power, but it has reduced the value and significance of labour productivity. Inclusion of net value added in Model-III has increased the coefficient of labour productivity and explanatory power of the function. However, the influence of net value added on wage rate was negative and statistically insignificant. Introduction of capital intensity (K/L) in Model-IV had further improved slightly the explanatory power of the model ($R^2 = 0.840$), but the coefficient of labour productivity has slightly reduced. In model V, consumer price index for industrial workers (CPIIW) took negative sign and was statistically significant indicating that increase in consumer price had reduced the real earnings of the workers. Introduction of total factor productivity index in pace of value added in model-VI changes the coefficient of labour productivity into negative and statistically insignificant. Coefficient of TFPT is positive & insignificant. Coefficient of capital intensity is also positive & insignificant. Screening of other models excluding trend variables showed that coefficient of labour productivity was showing

mixed trends. No significant improvements were obtained, when we estimated the models – VII, VIII & IX.

The model that seems to be best fit to describe the relationship between real wage rate and other variable is given by the following regression equation:

$$Ln\ (Rw) = 2.020 + 0.04\ Ln\ (LP) - 0.05\ Ln\ (V) + 0.13\ Ln\ (K/L) -$$

$$(0.35) \qquad (-0.47) \qquad (0.97)$$

$$0.79^{**}\ Ln\ (CPIIW) + 0.07^{*}t$$

$$(-2.24) \qquad\qquad (3.18)$$

$$R^2 = 0.87 \qquad D.W = 1.72$$

The model shows that wage rate is positively related to labour productivity and the association between the two is not statistically significant. On the contrary, the association between wage rate and Capital intensity is positive and significant. The consumer price index is negatively related to real wages indicating that the increase in consumer prices significantly reduces real wages.

6. Conclusion

The Manufacturing sector plays a significant role in Odisha economic growth. Manufacturing exports have been increasing in recent years due to the entry of large multinationals, imported technology and the sheer size of Odisha market. Given the competitive nature of the industry, understanding the nexus between productivity-real wages has important policy significance in this globalised market.

We investigate labour productivity-real wages of odisha manufacturing sector at aggregate level covering the period from 1981-82 to 2005-06. Our findings suggest that the relationships between productivity-real wages is positive. Another important conclusion that emerges from our analysis is that productivity of capital and total factor productivity may be taken into account along with labour productivity while granting wage increases so that it may not be of inflationary character or depresses rate of return on capital.

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546

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