

**Working Paper**

**13**

**Wages and Wage  
Disparity in Organized  
Manufacturing Industries:  
An Analysis of Post Reforms Era**

**Hansa Jain  
Dileep Singh**

April 2013



**Sardar Patel Institute  
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Social Research**

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## List of Abbreviations

ASI	Annual Survey of Industries
IIP	Index of Industrial Production
GDP	Gross Domestic Product
GNP	Gross National Product
FDI	Foreign Direct Investment
CSO	Central Statistical Organization
NIC	National Industrial Classification
NVA	Net Value Added
D	Dummy Variable
DW	Durbin Watson
OLS	Ordinary Least Square

## **Wages and Wage Disparity in Organized Manufacturing Industries: An Analysis of Post Reforms Era**

Hansa Jain\* Dileep Singh\*\*

### **Abstract**

*The conventional theories have considered labour productivity to be the important factor for determining the wage rate. With the advent of trade liberalization, alongwith the labour productivity, the other factors like market flexibility, increase in competition, technological advancements, decline of trade unions, weakening of the collective bargaining system, etc. have also gained importance. A pertinent question is: whether labour productivity is still the determinant of wage rate? How far high investments, technological advancements and increased competition is responsible for declining wages and widening wage disparities? The study addresses these issues by taking the case of organized manufacturing industries. With the help of industry level data collected from Annual Survey of Industries (ASI) the study examines the structural changes in the manufacturing industries after the trade reforms, links the productivity with wages, finds the industry wise differences in productivity and wage and determines the wage disparity in organized manufacturing industries. A semi-logarithmic regression model is used to note the trend growth rates of the structural variables for period 1991-92 to 2009-10. An econometric model is also constructed to determine the variations in wage share in net value added, average wage and wage disparity.*

*The study finds that trade liberalization and the policy of deregulation has motivated the manufacturing industries to adopt efficiency driven and profit making strategies through labour displacement and wage cuts. As a result the desired gains of increasing the wage rate and decreasing the wage disparity have not yet been realized. The study considers the role of education, training and skill development for getting a decent job in the manufacturing industries. This would, on the one hand, lead to optimal utilization of capital, and on the other, would increase the wages and reduce the wage disparities. The study also emphasizes on revisiting the wage policy that should incorporate labour productivity as well as technological advancement.*

**Key words:** Trade Liberalization, Manufacturing Industries, Organized Sector, Wages, Employment, Regression, Growth Rate

**JEL Classification:** F130, L600, J30, E24, C510, O14

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## I Introduction

Wage rate acts as a motivating factor for the improvement in worker's efficiency. Improvement in efficiency, i.e., productivity is the chief determinant for the expansion of production activities and thus economic growth (Sidhu, 2008). Wage rate is the factor that binds the worker with a particular economic activity and also strengthens the employer-employee relationship. Wage rate along with social security benefits provides the labour a sense of well-being. A decline in the wage rate/absence of long term contract with their employees makes them footloose.

The process of trade liberalization initiated during 1991 aimed at bringing cost reduction by lowering the prices of intermediate inputs and enhancing the competition of final products (Babu, 2009). On the basis of theory of comparative advantage, it was considered that these structural changes would lead to greater labour and product market flexibility and a shift towards labour intensive techniques. As a result, a country richly endowed in labour was likely to specialize in labour intensive industries (Sankaran, Abraham and Joseph, 2010) and hence a rise in employment potential and job availability. The resulting increase in demand for labour in the industrial sectors was expected to push up the real wages in the industrial sector. Besides import liberalization may additionally contribute to higher wages through its productivity enhancing effects (Babu, 1999). Theoretically, it can be argued that developing countries were the main beneficiaries under the liberalized trade regime in terms of employment (Ghose, 2000; Abdi and Edwards, 2002), wages and reduced wage inequalities.

The trade liberalization was focused on import liberalization by reduction in tariff rates and quantitative restrictions. The quantitative restrictions, which accounted for

90 percent of the items in the pre-1991 era, decreased dramatically to 51 percent even as early as 1994-95 and as low as 12 percent in 2011-12 (Economic Survey, Various years). Along with this, there were also substantial reductions in the tariff rate. During 1991 to 2007, the reduction in tariff ranged from 148 percent to 30 percent among various industries in the manufacturing sector. According to the Economic Survey (2011-12), manufacturing sector with a growth rate of 9 percent is contributing about 86 percent to the index of industrial production (IIP). It has about 17 percent share in the total GDP. It contributes a major portion to the Indian exports (53%) and attracts about 79 percent of the foreign direct investment (FDI).

In India, the manufacturing industries have occupied a prime place in the economic reforms package, receiving considerable attention and resources. It was realized that the manufacturing sector offers greater prospects for capital accumulation, technical change and linkages and hence job creation especially for the semi-skilled and poorly educated segment of the labour force, which comprises most of India's working poor (Sen, 2009). Thus, the key to India's future economic growth and poverty reduction was linked to the growth performance of a dynamic outward oriented manufacturing sector which has the capacity of attracting large pool of surplus labour employed in low productivity jobs in agriculture or in other sectors (Vinish Kathuria, et al., 2010). Besides it has the potential to pass on the benefits to other sectors through its strong inter-sectoral linkages.

However, the experiences are disappointing. The studies have shown a decline of manufacturing output during the post reform (Sharma and Abraham, 2005; Kannan and Reveendran, 2009). Many scholars have analysed this issue of jobless growth and arrived at various reasons for it which include but are not limited to, job security



regulations, increased wages, increased labour productivity, increased capital intensity and others. (Goldar, 2000,2002; Nagarj, 2000; Kannan and Raveendran, 2009). Bhalotra (1998), Nath (2008), Ghose (2005), Deshpande et al., (2004) and Pachanan Das (2007) have explained it in terms of labour market flexibility, casualization and weakening of trade union strength. While various studies have found inconsistency between the growth of manufacturing output and employment (Pushpagadan and Shanta, 2008; Bhalotra, 1998; Nath, 2008). According to Rajshri Majumdar (2008), globalization process is leading to further squeezing of the labour market. As regards to trends in real wages, Goldar (2002) shows that the growth in real wages has slowed down appreciably during the post reforms. Nagraj (2004), Unni and Raveendran (2007), Kannan and Raveendran (2009) also explained the sluggishness in growth of real wages. Dickens and Katz (1986), Krueger and Summers (1986), Holzer et al (1988), Murphy, et al (1998), Jean and Nicoletti (2002) and Viren (2005) have empirically established the widening of wage disparities among the workers arising from skill-biased technologies in developing countries. Sidhu (2008) also came out with the similar conclusion for India. Traditional theory gives prime importance to productivity as determinant of wages. With the advent of trade liberalization, the other factors like labour market flexibility, increase in competition, technological advancements, decline of trade unions, weakening of the collective bargaining system, etc. have also gained importance. A pertinent question is: whether labour productivity is still the determinant of wage rate? How far high investments, technological advancements and increased competition is responsible for declining wages and widening wage disparities?

The study addresses these issues by taking the case of organized manufacturing industries. Organized sector generally provides job and income security. The

workers in the organized sector are covered by Labour Laws that provide social security such as provident funds, and pensions, gratuities or severance benefits, medical benefits, etc. The challenge of exposure to global competition drives the manufacturing industries towards adoption of advanced technologies. This increases the demand for skilled and experienced workers that are available at relatively higher payments. As a result, the unskilled and low skilled workers are driven out. Therefore, the changing scenario of industries and its impacts on wage distribution is an important area to be discussed.

The scheme of the rest of the paper is as follows: Section I discusses the data sources and methodology employed in the study. Section II examines the structural changes in the manufacturing industries after the trade reforms. Section III links the productivity with wages. Section IV studies the industry wise differences in productivity and wages. Section V explains the wage disparity in organized manufacturing industries. Section VI estimates the regression model and Section VII concludes the study.

## **II Data Sources and Methodology**

The study is based on the data collected from various issues of Annual Survey of Industries (ASI) published by Central Statistical Organization (CSO) under the Ministry of Statistics and Programme Implementation of the Government of India. The primary unit of enumeration in the ASI is a factory in case of manufacturing industries. The ASI covers all the industrial units registered under the Factories Act, 1948. The ASI records relevant figures on the basis of reporting units. As the number of non-reporting units varies randomly from year to year across states, we normalize the value of gross output and number of workers by the number of reporting units.

The yearly data in the ASI statistics are available at current prices. In order to make the analysis of time series data comparable, the nominal values were deflated with the appropriate price indices after splicing. Industries were arranged as per the latest available industrial classification (NIC-2008) and made comparable through concordance. The estimates at the 2-digit level of industrial classification were obtained by aggregating the relevant 3-digit and 4-digit level industries. Output and net value added (NVA) of the manufacturing industries were obtained by deflating their values with the whole sale price index of manufacturing industries. The nominal value of fixed capital was deflated with price index of machinery and machine tools. Since the wages and emoluments here are related with productivity, they are deflated by wholesale price index. In order to determine the structural changes in organized manufacturing industries after trade liberalization, four structural ratios are used. They are (a) output per worker, (b) fixed capital per unit, (c) employment per unit, and (d) capital intensity. Regarding the methodology for estimating the trend growth rates for the period 1991-92 to 2009-10, a semi-logarithmic regression model is used to get the compound trend growth rate. Further, the relationship between productivity and wages is gauged from NVA per unit, capital productivity, labour productivity, share of wages in NVA and average wage.

### ***Econometric Model***

The econometric model in the present study explains the variations in three dependent variables, viz., wage share ( $Y_1$ ), average wage ( $Y_2$ ) and wage disparity ( $Y_3$ ). Wage share is defined as the ratio of total emoluments to NVA. As per the ASI, emolument means total wages and salaries plus non wage benefits like bonus, provident fund, etc. Average wage refers to ratio of total emoluments to total number

of employees. Employee here means workers and non-workers. The category of non-workers (also known as non-production labourers) includes the managers, supervisors, engineers, product designers, quality inspectors, etc. who are not directly involved in the manufacturing process (ASI). Wage disparity is measured in terms of share of wages in total emoluments. This indicates the differences between the low skilled and high skilled workers.

The variations in the above three variables are determined with the help of following five explanatory variables:

1. Labour Productivity( $X_1$ ): Labour productivity is defined as the ratio of NVA at constant prices to the total number of workers in the industry. Wage is the reward for utilizing worker's services in the economic sector. Higher labour productivity should imply higher rewards. Therefore, a positive sign is hypothesized for wage share and average wage. . If the different units of labour are equally efficient, they should receive equal rewards. Taking into consideration the homogeneous labour units, an increase in labour productivity decreases the wage disparity. Therefore a negative sign for wage disparity is hypothesized. .
2. Capital-labour Ratio ( $X_2$ ): Capital-labour ratio is defined as the ratio between fixed capital at constant prices and total number of persons engaged during a particular point of time. Contributions in the form of value added per capita can be better performance indicators so far as capital productivity is concerned. It is the proxy for technology. An increase in capital improves the labour's efficiency. Therefore it should have a positive impact on wage share and wage rate. But if the capital involves a labour displacing technology, it

should have an adverse effect on wage share and wage rate. Therefore the hypothesis for the relation of capital-labour ratio with wage share and wage rate is open-ended. An increase in advanced technology replaces the services of labour. It also necessitates the recruitment of skilled man power. Therefore, the wage disparity widens. Thus a positive sign is hypothesized for capital-labour ratio and wage disparity.

3. Man-days lost per Employee ( $X_3$ ): It is generally considered, particularly in the Indian organized sector, that the growing labour market rigidities or growing strength of trade unions plays an important role in raising the wage rates (Nagraj, 1994). Lucas (1988) advocates that in wage settlement, the power of unions is reflected in the increased number of man days- lost due to industrial disputes. Therefore the study uses man-days lost due to industrial disputes as a proxy for the strength of trade unions, which is an institutional variable, on the employment decision of the employer. This variable has been computed by dividing the number of man days lost due to industrial disputes by the total number of employees. Nagraj (1994) has also advocated the strength of trade unions in wage settlement decisions. Thus a stronger trade union should be reflected into higher wage rate and less wage disparity. Therefore, a positive sign is hypothesized for the relation between man-days lost per employee, wage share and average wage and a negative sign is hypothesized for man-days lost per employee and wage disparity.
4. Degree of openness ( $X_4$ ): It is measured by percentage of total trade (exports + imports) in gross national product (GNP). When the country opens its trade at the global level, it has to face international competitive pressures, which

may lead to the use of labour saving technologies. But when this trade is related to the import of inputs and technology, the surplus labour can be optimally utilized. This results into expansion of output and increase in exports, wage share and average wage and decrease in wage disparity. Thus the hypothesis is open-ended.

5. Dummy variable (D): It takes time for the system to get attuned to the new policy. In order to determine the impact of the trade liberalization policies implemented in 1991 on wages and wage disparity over a period of time, the data are pooled through dummy variable. The adjustment phase of 1990-91 to 1999-2000 was assigned 0 and the post adjustment phase of 2000-01 to 2009-10 was assigned 1. Trade policies should have positive effect over a period of time 1991-2010. Therefore, a positive coefficient of dummy variable is assumed for wage share and average wage and a negative coefficient is assumed for wage disparity in the overall analysis.

The following model is specified to explain the variations in wage share, average wage and wage disparity:

$$Y_t = \beta_0 + \beta_1 \log X_{1t} + \beta_2 \log X_{2t} + \beta_3 \log X_{3t} + \beta_4 \log X_{4t} + \beta_5 \log X_{5t} + \beta_6 \log X_{6t} + D + u_t$$

When dealing with the time series data, we have to guard against auto-correlation. If there is auto-correlation in the error term, the estimated standard errors and, *ipso facto*, the estimated t-values will be suspect. In the present model, the autocorrelation is checked with Durbin Watson d statistic which is defined as the ratio of the sum of squared differences in successive residuals to the residual sum of squares.

$$d = \frac{\sum_{t=2}^{t=n} (e_t - e_{t-1})^2}{\sum_{t=1}^{t=n} e_t^2}$$

On comparing the computed value of d statistic with its tabulated value at 1 percent critical level, the autocorrelation in the error term for the first and third model were found to be inconclusive as the computed value of d statistic was found to be between dl (lower bound) and du (upper bound). Only the second model has shown no evidence of autocorrelation in the error term. Following Drakopoulos and Theodossiou (1991), since the null hypothesis of no autocorrelation cannot be strictly rejected, the data were treated as though they were having serial correlation of first order of the form  $e_t = \rho e_{t-1} + v_t$ .  $\rho$  (rho) is the coefficient of autocorrelation and it lies in the range of  $-1 < \rho < 1$ . Therefore, Cochrane Orcutt method was applied to improve the fit.

The model was transformed in the following manner:

$$(Y_t - \hat{\rho} Y_{t-1}) = \beta_0(1 - \hat{\rho}) + \beta_1(X_{1t} - \hat{\rho} X_{1t-1}) + \beta_2(X_{2t} - \hat{\rho} X_{2t-1}) + \beta_3(X_{3t} - \hat{\rho} X_{3t-1}) + \beta_4(X_{4t} - \hat{\rho} X_{4t-1}) + \beta_5(X_{5t} - \hat{\rho} X_{5t-1}) + (1 - \hat{\rho})D_t + v_t \quad (1)$$

$\hat{\rho}$  is the estimated value of  $\rho$  and is obtained by

$$\hat{\rho} = \frac{\sum e_t e_{t-1}}{\sum e_{t-1}^2}$$

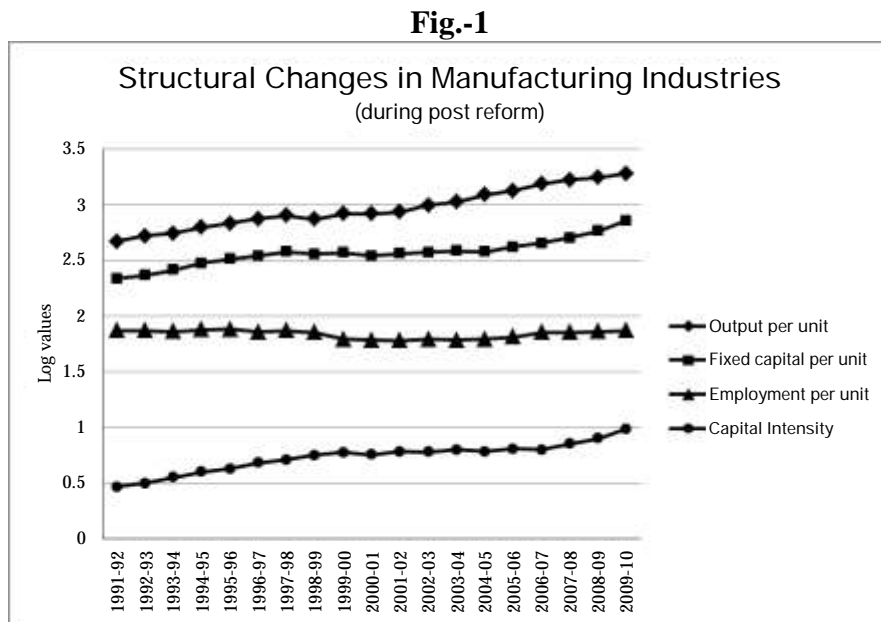
Equation (1) can be rewritten as

$$Y_t^* = \beta_0^* + \beta_1 X_{1t}^* + \beta_2 X_{2t}^* + \beta_3 X_{3t}^* + \beta_4 X_{4t}^* + \beta_5 X_{5t}^* + v_t$$

The transformed model was again tested for autocorrelation by DW d statistic. Now, the results have shown no evidence of autocorrelation. Finally the OLS method was applied to the transformed model.

### III Structural Changes in Organized Manufacturing Industries

The structure of the organized manufacturing industries has undergone considerable change over the period 1991-2010. Fig.-1 shows a change in the trend of four structural variables, viz., output per unit, fixed capital per unit, employment per unit



Source: Various issues, Annual Survey of Industries (ASI) - Summary Results for Factory Sectors, Central Statistical Organization, Government of India.

and capital intensity. All these variables were increasing with a diminishing rate during 1991-2000, and after 2000, they are increasing with an increasing rate. So there is a point of inflexion at the year 2000. For the convenience, it can be said that before 2000, the early period of reforms (1991-2000) was the adjustment phase in response to sudden exposure to new trade regime and 2000-2010 is the period when the manufacturing industries are somewhat attuned to the changes. This could be considered as the post adjustment phase<sup>12</sup>. Therefore, the trend growth rates for both the periods are calculated separately (table-1). The output per unit that was increasing



**Table - 1**  
**Growth Rates of Structural Ratios**

Key variables	1991-2000			2000-2010		
		t-stat	R <sup>2</sup>		t-stat	R <sup>2</sup>
Output per unit	.026	3.97*	.69	.046	15.68*	.97
Fixed Capital per unit	.031	8.19*	.91	.031	6.82*	.85
Employment per unit	-.006	-2.13*	.39	.011	7.60*	.90
Capital intensity	.040	32.04*	.99	.020	4.67*	.73

\*Significant at 5% level

Note: Growth rates are estimated by using semi-logarithmic trend equation:  $Y_t = a + bt$

Source: Various issues, Annual Survey of Industries (ASI) - Summary Results for Factory Sectors, Central Statistical Organization, Government of India.

with a rate of 2.6 per cent per annum during 1991-2000, has accelerated with an average rate of 4.6 per cent per annum during 2000-2010. The fixed capital per unit has followed the same growth trend of 3.1 percent per annum in both the phases. The decrease in employment per unit of factory during the adjustment phase (1991-2000) indicates downsizing of factory size over time. During this phase, the employment per unit of factory decelerated with a rate of 0.6 per cent per annum. This period is indicated as jobless growth or employment squeeze in various studies<sup>13</sup>. Thus a tendency towards gradual substitution of labour by capital is visualized. This shows a tendency of the industries towards capital deepening process. Some signs of improvement in employment per factory are visualized during 2000-2010 as the growth rate of employment per unit is found to be 1.1 percent per annum. The decrease in growth of capital intensity from 4 percent (1991-2000) to 2 percent per annum (2000-2010) indicates increase in the level of employment in relation to capital. However, the low growth rate of output per unit as compared to fixed capital during 1991-2000 indicates the less responsiveness of productivity with respect to increased capital growth. During 2000-2010, the growth rate of output per unit has become greater than the fixed capital per unit. Though the magnitude of the growth

rate of output is very low, still it is reflecting its influence on the growth of output per unit. This should have some positive implications for real wages. All these growth rates are significant at 5 percent levels.

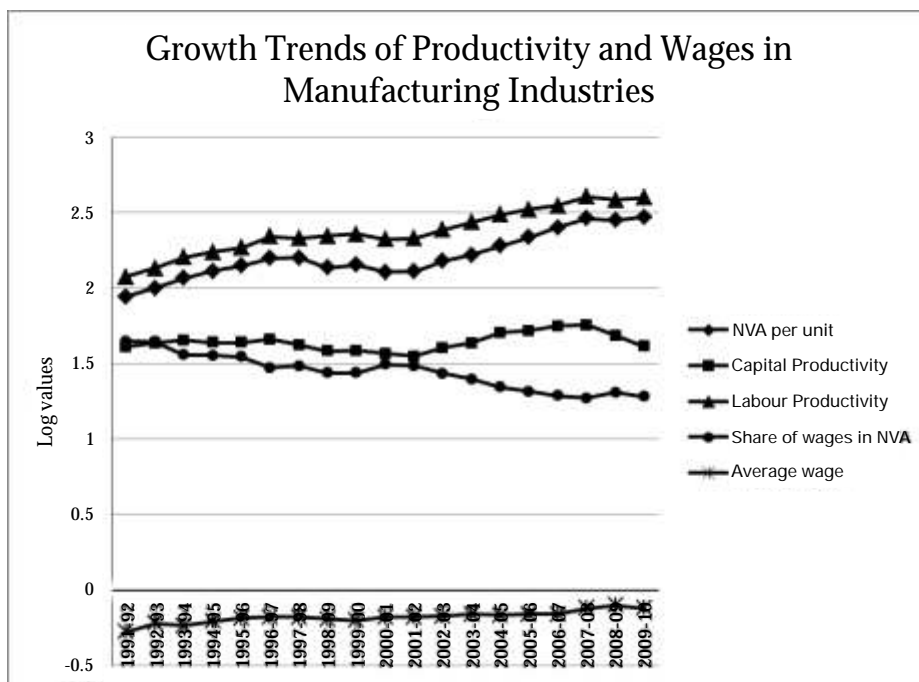
#### **IV Productivity and Wages in Organized Manufacturing Industries**

According to the neo-classical theory of wage determination, a part of the productivity is transformed to workers in the form of wages and salaries and a part of it is retained by the entrepreneurs. Given the impressive productivity growth in the manufacturing industries during the post-reform period, it is therefore important to examine how much of the productivity growth could actually get transformed to the workers.

NVA implies the surplus which is shared between the employees and the employer. Figure-2 shows that there is a continuous increase in net value added per unit after trade liberalization. The growth rate of NVA per unit was 2.6 percent per annum during the early phases of reforms (1991-2000) which has increased to 4.6 percent per annum during 2000-2010 (Table-2). This growth in NVA per unit is attributed to increase in labour productivity. It can be argued that the downsizing of the factories leads to an increase in labour concentration which in turn improves the labour productivity (Sidhu, 2008). Kaldor's (1966) hypothesis also stated that growth in labour productivity in the manufacturing sector is positively related to output growth because of static and dynamic increasing returns to scale. During 1991-2000, labour productivity witnessed a growth of 3.5 percent per annum though there is a marginal decrease of 0.1 percent during 2000-2010. On the other hand, the scenario presented by capital productivity is very disappointing. The capital productivity has declined with a rate of 0.5 percent per annum during 1991-2000. During 2000-2010, the

situation has somewhat improved, but still it is not appreciable as its growth rate is only 1.5 percent per annum, which is approximately half of the growth rate of stock of fixed capital. This indicates the improper utilization of capital over time. Besides, the greater infusion of capital due to liberal trade policies has resulted into decline in capital productivity during this era.

**Fig-2**



Source: Various issues, Annual Survey of Industries (ASI) - Summary Results for Factory Sectors, Central Statistical Organization, Government of India.

Therefore, the sharp increase in capital intensity was accompanied by an increasing labour productivity and falling capital productivity.

The declining trend of share of wages in NVA indicates that the increase in productivity is not transformed into higher wages. Rather there is a departure of wage share from the growth of NVA and labour productivity. This indicates the profit

**Table -2**  
**Average Annual Growth Rates of Productivity and Wages**

Key variables	1991-2000			2000-2010		
		t-stat	R <sup>2</sup>		t-stat	R <sup>2</sup>
NVA per unit	.026	3.97*	.693	.046	15.68*	.97
Capital Productivity	-.005	-1.46	.233	.015	2.21*	.38
Labour Productivity	.036	8.76*	.916	.035	12.27*	.95
Share of Wages in NVA	-.028	-9.89*	.933	-.027	-7.56*	.88
Average Wage	.009	3.15*	.587	.008	5.64*	.80

\*Significant at 5% level

Note: Growth rates are estimated by using semi-logarithmic trend equation:  $Y_t = a + bt$

Source: Various issues, Annual Survey of Industries (ASI) - Summary Results for Factory Sectors, Central Statistical Organization, Government of India.

making strategy of the manufacturing industries. The growth rate of wage share in NVA has shown a decline at the rate of 2.75 percent per annum after trade liberalization. The average wage has also shown a marginal decline of 0.1 percent per annum which is negligible in comparison to the growth rate of labour productivity.. The growth rates for productivity and wages are found to be significant at 5 percent level except capital productivity during 1991-2000. This shows that in order to face the global competition, labour displacing and productivity enhancing technologies were adopted by the manufacturing industries. This was possible only by cutting the overall cost of production in which the wage cut was the preferred option. Minimization of labour costs is often a natural response in such a situation (Panchmukhi, Das and Kumar, 2004). The declining growth rate of share of wages and the poor growth rate of average wage indicates temporary or contract appointment of the workers or sub-contracting of most of the manufacturing activities.

## **V Industry wise Differences in Productivity and Wages**

In order to find whether the productivity enhancing and wage cutting strategy was adopted in all the manufacturing industries, the percentage change in capital intensity, labour productivity and wage share in NVA is calculated for the industries aggregated at 2-digit level for the two periods (adjustment and post adjustment) as shown in table- 3. During 1991-92 to 1999-2000, Repair has the highest growth in capital intensity, high growth in labour productivity and the highest decline in growth of wage share in NVA. Similarly, Motor vehicles, trailers, semi trailers have high growth in capital intensity as well as in labour productivity and the higher growth in average wage. Similar is the case with Beverages. On the other hand, Basic metal has the lowest growth in capital intensity and thus a low share of wages in NVA. During 2000-2010, Coke and refined petroleum products has the highest growth in capital intensity and labour productivity and higher decline in wage share. Pharma industry has high growth of capital intensity and average wage. On the other hand, other non metallic minerals have highest growth of capital intensity and high growth of average wage and poor growth of wage share. Wearing apparel has a poor growth of capital intensity and labour productivity.

The comparison of the two periods indicates that growth rate of capital intensity has decreased in all the industries except basic metal. Labour productivity has increased in 8 industries. Their NIC codes are 17, 18, 19, 21, 23, 25, 27 and 28. Wage share has increased in 11 industries (NIC codes: 11, 12, 14, 15, 20, 21, 26, 29, 30, 32, 33). Average wage has increased in 5 industries (NIC codes: 15, 18, 21, 32, 33).

**Table - 3**  
**Industry wise Differences in Productivity and Wages (% change)**

NIC-2008	Industry Group	19991-92 to 1999-2000				2000-01 to 2009-10			
		Capital Int.	Lab. Pro.	Wage share in NVA	Aver. Wage	Capital Int.	Lab. Prod.	Wage share in NVA	Aver. Wage
10	Food products	243.81	163.8	-19.28	126.22	169.68	126.73	-23.3	102.3
11	Beverages	442.72	287.91	-47.54	137.06	79.92	51.96	21.32	108.65
12	Tobacco prod.	397.6	246.46	-38.31	120.59	165.53	114.5	-21.39	97.51
13	Textiles	444.01	150.6	-22.16	108.62	99.3	112.22	-32.16	72.47
14	Wearing apparel	347.95	93.11	25.84	142	34.88	18.19	61.42	115.15
15	Leather related prod.	237.56	136.61	-16.05	114.14	80.22	62.32	19.04	116.28
16	Wood prod., straw and plaiting except furniture	296.05	167.06	1.95	183.77	202.84	130.06	-27.11	124.15
17	Paper and paper prod.	288.24	78.44	12.4	111.67	97.41	102.24	-17.99	96.01
18	Printing and recorded media	543.11	145.3	-36.6	60.02	119.86	196.6	-36.99	194.36
19	Coke and refined petroleum products	325.6	129.8	-0.03	163.93	277.61	389.44	-58.4	135.17
20	Chemicals and chemical products	259.36	272.32	-39.67	162.03	53.49	89.71	-24.54	80.97
21	Pharma	235.03	164.53	-40.77	75.77	195.63	175.57	-32.64	185.27
22	Rubber and plastic prod.	402.19	238.79	-25.52	168.11	75.44	107.89	-4.03	136.21
23	Other non metallic minerals	291.23	77.26	10.91	110.28	30.6	167.05	-41.52	93.44
24	Basic metals	82.79	219.73	-5.23	195.67	171.3	175.01	-45.77	98.86
25	Fabricated metal products	232.62	154.23	-11.67	150.08	139.15	178.43	-35.36	117.44
26	Computer, electronic and optical products	215.03	170.33	-28.46	116.7	46.15	52.78	24.68	106.67
27	Electrical equipment	423.71	131.63	-12.76	104.81	50.6	167.47	-37.49	103.36
28	Other electrical equipment	262.11	154.31	-16.26	160.47	163.59	226.65	-40.38	157.73
29	Motor vehicles, trailers, semi trailers	921.27	518.72	-35.18	304.26	48.45	101.91	-25.15	77.14
30	Other transport equipment	212.53	193.97	-41.98	114.78	189.02	231.05	-39.8	104.06
31	Furniture	-	-	-	-	153.06	56.72	-8.14	140.15
32	Jewellery	324.39	286.06	-46	128	138.06	51.84	25.19	131.19
33	Repair	2305.9	476.51	-74.69	105.63	59.97	132.68	16.36	226.83
	All manufacturing	291.32	200.76	-31.24	133.7	117.99	143.1	-29.79	110

Source: Annual Survey of Industries, Summary Results for Factory Sector

The correlation coefficients in table- 4 shows that as a whole, the wage share is negatively correlated with capital intensity and labour productivity at 5 percent significance level. But the positive relationship of wage share with capital intensity is not at all significant. The correlation coefficient between wage share and labour productivity is significant only in 1991-2000 at 10 percent level.

**Table - 4**  
**Correlation Coefficients**

Indicators	Capital Intensity		Labour Productivity	
	1991-2000	2000-2010	1991-2000	2000-2010
Wage Share	-.536*	-.514**	-.714*	-.781*
Average Wage	.020	.207	.507**	.233

\*significant at 5% level

\*\*significant at 10% level

Source: Computed

## **VI Wage Disparity in Manufacturing Industries**

Wage disparity arises due to the difference between average wage received by the worker and the average salary paid to employees in the non worker category. Here non-workers refer to the supervisory and managerial level staff that is not directly involved in the production process. With technological advancement, the demand for non-workers increases in the industries. On the other hand, the profit and efficiency driven manufacturing firms recruits the staff on temporary and contractual basis. This should have an implication for wage disparity.

Table-5 shows the wage disparity in terms of share of wages in total emoluments. As a whole, the share of wages in total emoluments has decreased from 66 percent in 1991-92 to around 47 percent in 2009-10 indicating an increasing gap in the distribution of income. The maximum increase in wage disparity is experienced

during the post adjustment phase (1999-2000 to 2009-10). The infusion of foreign capital due to liberal trade policies has decreased the demand for labour, especially low skilled labour in manufacturing industries. Besides, the cost-cutting strategy is highly applicable for the low skilled and contractual workers.

A closer look at table -5 reveals the inter-industry wage disparity. In 2009-10, the wage disparity is high in those industries in which the nature of production

**Table - 5**  
**Wage Disparity in Manufacturing Industries**

NIC-2008	Industry Group	Share of wages in total emoluments		
		1991-92	1999-00	2009-10
10	Food products	63.94	60.19	51.7
11	Beverages	63.17	54.23	47.9
12	Tobacco prod.	88.33	85.58	73.1
13	Textiles	79.84	74.65	62.3
14	Wearing apparel	68.20	68.48	60.7
15	Leather related prod.	71.20	66.04	59.0
16	Wood prod., straw and plaiting except furniture	72.97	70.02	52.4
17	Paper and paper prod.	67.05	63.53	53.8
18	Printing and recorded media	62.77	61.00	38.7
19	Coke and refined petroleum products	63.59	55.35	47.9
20	Chemicals and chemical products	57.54	49.32	39.0
21	Pharma	48.52	43.25	28.1
22	Rubber and plastic prod.	60.54	56.97	48.1
23	Other non metallic minerals	64.71	60.50	48.8
24	Basic metals	63.33	64.89	48.7
25	Fabricated metal products	64.12	57.58	47.7
26	Computer, electronic and optical products	48.68	43.44	40.0
27	Electrical equipment	53.78	53.06	43.6
28	Other electrical equipment	58.51	47.84	36.1
29	Motor vehicles, trailers, semi trailers	56.03	55.59	47.4
30	Other transport equipment	66.12	52.50	51.3
31	Furniture	-	64.22	38.5
32	Jewellery	73.63	67.32	55.4
33	Repair	75.71	53.73	44.5
	All manufacturing	65.70	58.14	47.3

Source: Annual Survey of Industries, Summary Results for Factory Sector



necessitates relatively higher level of supervision. Such industries are Pharma, other electrical equipment, furniture, printing and recorded media, chemical and chemical products, and computer, electronic and optical products. Wage disparity is low in those industries that require relatively less supervision. These industries are tobacco production, textiles, wearing apparel and leather and related products.

## **VII Results of the Estimated Model**

Econometric estimation for the three models is shown in table – 6. In model 1 and 2, labour productivity is found to have a negative impact on wage share significant at 5 percent level. The technology oriented production sector demands more skilled labour and less unskilled labour. This results into downsizing the production sector in terms of employment associated with wage cut. As a result, the wage share and wage rate decreases. The regression results show that an increase in labour productivity by 1 percent causes the wage share to decrease by 1.2 percent and wage rate by 0.16 percent. The negative impact of labour productivity on wage rate indicates the recruitment of even skilled and experienced workers on temporary and contract basis. Contract labour enables the workers to be employed and benefits industry in terms of flexibility. This indicates the poor status of the workers in manufacturing industries. The capital-labour ratio has a positive impact on wage share and wage rate significant at 5 percent critical level. Advanced technology raises the demand for skilled and experienced labour which are available at relatively high payments in the competitive labour market. Man days lost per employee has a positive and significant impact on wage share and wage rate. Man days lost per employee indicates the strength of the labour<sup>14</sup>. A 1 percent increase in the strength of labour increases the wage share by .05 percent and wage rate by .04 percent. Degree of openness has a

positive impact on wage share and wage rate. In model-3, labour productivity has a positive and significant impact on wage disparity. A 1 percent increase in labour productivity increases the wage disparity by 1.8 percent. It is again due to the differences in the payments to unskilled and skilled workers. A skilled worker is considered to be more efficient in handling the technologies and he often receives the high paid jobs. Capital-labour ratio has a negative and significant impact on wage disparity indicating that a 1 percent increase in capital-labour ratio decreases the wage disparity by 1 percent. Also the degree of openness has a negative and significant impact on wage disparity.

**Table - 6**  
**Regression Results**

Variables	coefficients		
	Y <sub>1</sub> (Model 1)	Y <sub>2</sub> (Model 2)	Y <sub>3</sub> (Model 3)
Constant	.141 (13.03)*	-.473 (-2.80)*	.111 (.837)
(X <sub>1</sub> )	.355 (1.75)*	.172 (2.13)*	-1.063 (-4.53)*
(X <sub>2</sub> )	-1.239 (-5.98)*	-.164 (-.883)	1.839 (6.33)*
(X <sub>3</sub> )	.050 (2.02)*	.037 (1.57)**	-.038 (-.478)
(X <sub>4</sub> )	.514 (2.66)*	.381 (1.97)*	-1.451 (-3.03)*
(D)	.014 (.63)	-.019 (-1.47)**	.026 (.50)
R	.910	.952	.968
R <sup>2</sup>	.827	.906	.936
Adj. R <sup>2</sup>	.755	.870	.912
Std. error of est.	.1768	.01453	.04758
DW	2.03	2	1.87
F Ratio	11.492	25.04	19.80

Here Y<sub>1</sub>= wage share, Y<sub>2</sub>= average wage, Y<sub>3</sub>= wage disparity, X<sub>1</sub>= labour productivity, X<sub>2</sub> = capita-labour ratio, X<sub>3</sub> = man days lost per employee, X<sub>4</sub>= degree of openness and D = time dummy

\*represents 5% significance level.

\*\*represents 10% significance level

Source: Computed.

The value of  $R^2$  indicates the strength of the association between the dependent and explanatory variables. The percentage of variation explained by the explanatory variables on the dependent variables in the three models is found to be 76, 87 and 91 percent respectively. The significance of the F statistic strengthens the prediction power of the regression equation. F-statistics in table-6 shows that regression equation for each model is statistically significant at 5 percent level.

On the above basis, it can be said that trade liberalization alongwith the policy of deregulation has motivated the manufacturing industries to adopt efficiency driven and profit making strategies through labour displacement and wage cuts. As a result the desired gains of increasing the wage rates and decreasing the wage disparity have not yet been realized.

### **VIII Conclusion and Suggestions**

The liberal trade policies had focused only on the manufacturing industries by way of substantial reduction in tariffs and quantitative restriction. It has not directly addressed the employment and wages. It was thought that the availability of cheaper inputs, capital and advanced technologies would boost up the manufacturing activities. The benefits of output expansion and product market flexibility were expected to trickle down to labour through the functioning of the labour market. It was thought that the growth promoted by economic reforms would raise labour productivity, employment and wages in the economy, which in turn would contribute significantly towards poverty reduction and human development.

But the policy has faced severe side effects on employment and wages. The increased competition, greater integration with the world economy, lesser public intervention and improved access to foreign technology and imported capital goods has driven the

manufacturing firms towards labour displacing advanced technology. As a result, the labour productivity has increased. But the slower growth rate of output per unit as compared to that of fixed capital indicates the inefficiency of the technology due to lack of skilled workers. This resulted into closure, downsizing in terms of employment, wage cuts, outsourcing and sub-contracting of the production activities. One can say that the economy was trying to adjust according to the exposure it has got from global integration. The data from 2000-2010 has shown some recovery in terms of output, capital productivity and some marginal increase in employment. But the growth rate of wages is not as per the expectation. This shows that most of the employment in the manufacturing industries is not following the stringent Labour Laws. Besides the increasing wage disparity indicates an important role of supervisory and managerial level staff that arises due to advancement of technology. The regression results in the study shows positive and significant impact of capital-labour ratio, man days lost per employee and degree of openness on wage share and wage rate and negative and significant impact of labour productivity. The result also shows negative and significant impact of capital-labour ratio and degree of openness and positive and significant impact of labour productivity on wage disparity. This is the clear indication that the productivity and efficiency driven trade regime demands experienced and skilled workers and there is no room for the unskilled workers. This would have an adverse effect on the aggregate demand in future which puts a question mark on the economic sustainability.

Since the quality of workforce acquires supreme significance in the manufacturing sector, the policy should focus on enhancing the quality of manpower through education, training and skill development of the upcoming job aspirants. This would also lead to optimal utilization of capital. It should be realized that a stock of capital

cannot on its own fulfill the targets of profit maximization if appropriate worker is not available. The frequent mobility of workers is harmful for industrial growth. Thus, instead of leaving the wage determination to market system, a proper wage policy should be framed which encompasses the role of capital and technology. Besides, steps should be taken for unskilled and low skilled workers by engaging them in self employment and networking them to the manufacturing industries.

### **Notes**

- 1 Commodity Trade (COMTRADE) and Trade Analysis Information System (TRAINS), United Nations Conference on Trade and Development (UNCTAD), World Trade Organization.
- 2 The organized (registered) sector is defined as those factories employing 10 or more workers using power; and those employing 20 or more workers without using power.
- 3 Output denotes the value of total output. It represents the value of all products and by-products manufactured by a firm. The total output represents the level of production of a production unit.
- 4 Fixed capital per unit measures the average size of a factory so far as investment is concerned. Fixed capital represents the depreciated value of fixed assets owned by the factory as on the closing day of the accounting year. Fixed assets are those which have a normal productive life of more than one year. The investments in fixed assets cover buildings, plant equipment, furniture, fixtures, transport equipment, etc., which is fixed in the short run. It is also argued that the fixed capital investment improves the productivity and productive capacity. Thus, an investment in plant, machinery and equipment helps to boost the potential of output in the future. In the ASI, apart from land buildings, plant and machinery, other fixed assets such as hospitals, schools which are used for the benefit of the factory personnel are also considered. But we assume that investment in this component would be negligible in the entire fixed capital.
- 5 Employment here refers to the total number of persons engaged in the manufacturing process. Since working proprietors/ owners and supervisory/ managerial staff have a significant influence on the productivity, the number of persons engaged was preferred to the total number of workers. Apart from measuring the factory size in terms of employment, number of workers per factory reflects the concentration of workers in the workplace and also it has an impact on productivity.
- 6 Capital intensity, measured as fixed capital per worker, reflects the mechanization of the production process of a particular industry during a fiscal year. The capital intensity can also be interpreted as cost of creating a job. The capital intensity and average firm size can also influence the labour productivity.
- 7 Also used by Ahluwalia (1985, 1991) and Nagaraj (1997, 2003).
- 8 Net value added is the increment to the value of goods and services that is contributed by the factory and is obtained by deducting the value of total inputs and depreciation from the value of output. Total

value of inputs involves total cost of fuels, materials consumed and expenditures such as (a) cost of materials consumed for repair and maintenance of factory's fixed assets, (2) cost of contract and commission work done by others on materials supplied by factory, (3) inward freight and transport charges, rates and taxes excluding income tax, postage, telex and telephone charges; insurance and banking charges, cost of printing and stationary, etc. Thus, in economic sense, it means the actual contribution made by the factors of production or recourses from the raw materials stage to the finished goods stage in the manufacturing process.

9 The 'ability to pay' hypothesis states the labour productivity is an important determinant of the wage rate. As per the productivity theory, assuming competitive market conditions, the wage rate should be equal to marginal productivity of labour. In the Cobb-Douglas production function, the marginal productivity of labour is proportional to the average productivity of labour. This suggests a linear relation between wage rate and labour productivity.

10 Onaron (2008) mentions that in the analysis of trade-induced employment changes, in order to capture the scale effect of offshoring in labour demand estimation, the appropriate measure is value added rather than output. Since imparting intermediate inputs might decrease the demand for labour for a given level of value added, it would increase through scale effect. Therefore, in the present study, real net value added instead of value of output is used in the estimation.

11 Sankaran et al (2010)

12 Periodization is adopted since these two period follow different trends, wherein the first period (1991-2000) reveals the adjustment process after the economic reforms and the latter shows the post-adjustment process (2000-2010). It is assumed that most of the industries have got adjusted to the new scenario during the first period and have started producing returns during the second period.

13 Goldar, 2000, 2002; Nagraj, 2000; Kannan and Raveendran, 2009; Bhalotra, 1998; Nath, 2008; Ghose, 2005; Deshpande et al., 2004; Pachanan Das, 2007

14 Unionising casual, contractual or temporary workers is more difficult than unionizing permanent workers as the former category of workers are footloose in nature; they frequently move from one job to another in the absence of long-term contract with their employers unlike the permanent workers.

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## Annexures

### A1: Structural Variables of Organized Manufacturing Industries

Years	Output per unit (Rs. in Lakhs)	Fixed capital per unit (Rs. in Lakhs)	Emp per unit (nos.)	Capital-labour Ratio (Rs. in Lakhs)
1991-92	466.49	216.71	74.09	2.92
1992-93	521.26	232.82	73.94	3.15
1993-94	553.49	258.38	72.68	3.55
1994-95	623.58	298.11	75.01	3.97
1995-96	679.74	323.68	75.96	4.26
1996-97	746.65	345.35	71.80	4.81
1997-98	798.89	378.68	74.06	5.11
1998-99	740.75	358.43	71.23	5.61
1999-00	827.31	368.67	62.12	5.93
2000-01	828.70	346.49	60.85	5.69
2001-02	862.86	364.68	60.29	6.05
2002-03	992.13	374.32	62.02	6.04
2003-04	1059.87	386.01	60.97	6.33
2004-05	1226.64	375.75	62.00	6.06
2005-06	1329.64	416.38	65.01	6.40
2006-07	1538.26	449.26	71.37	6.29
2007-08	1672.11	506.43	71.40	7.09
2008-09	1750.10	581.08	72.93	7.97
2009-10	1903.48	720.80	74.23	9.71

Source: Various issues Annual Survey of Industries (ASI) - Summary Results for Factory Sectors, Central Statistical Organization, Government of India.

**A2: Measures of Productivity  
and Wages in Organized Manufacturing Industries**

Years	NVA per unit (Rs. in Lakhs)	Capital Productivity (NVA/fixed capital)	Labour Productivity (NVA/total persons engaged)	Share of wages in NVA (%)	Average wage (Emoluments/total persons engaged)
1991-92	88.42	40.8	119.34	44.65	0.53
1992-93	100.75	43.28	136.25	44.16	0.6
1993-94	116.81	45.21	160.72	36.18	0.58
1994-95	130.64	43.82	174.16	35.85	0.62
1995-96	141.32	43.66	186.04	35.09	0.65
1996-97	158.39	45.86	220.59	29.86	0.66
1997-98	158.99	41.98	214.67	30.64	0.66
1998-99	137.48	38.35	223.08	27.56	0.64
1999-00	142.78	38.73	229.84	27.55	0.63
2000-01	128.41	37.06	211.02	31.38	0.66
2001-02	129.37	35.47	214.57	30.7	0.66
2002-03	151.24	40.4	243.85	27.38	0.67
2003-04	167.08	43.28	274.03	25.05	0.69
2004-05	190.61	50.73	307.45	22.06	0.68
2005-06	217.29	52.19	334.25	20.76	0.69
2006-07	252.74	56.26	354.1	19.41	0.69
2007-08	290.12	57.29	406.3	18.67	0.76
2008-09	282.22	48.57	386.97	20.37	0.79
2009-10	297.59	41.29	400.93	19.08	0.76

Source: Various issues Annual Survey of Industries (ASI) - Summary Results for Factory Sectors, Central Statistical Organization, Government of India.

### A3: Magnitudes of Selected Explanatory Variables

Years	K/L ratio	Labour productivity	Man days lost per employee	Degree of Openness
1991-92	2.92	119.34	19.69	12.89
1992-93	3.15	136.25	24.96	14.71
1993-94	3.55	160.72	21.28	16.42
1994-95	3.97	174.16	24.79	17.73
1995-96	4.26	186.04	16.46	20.30
1996-97	4.81	220.59	21.60	20.23
1997-98	5.11	214.67	17.29	20.49
1998-99	5.54	223.08	17.12	20.28
1999-00	5.93	229.84	20.44	21.51
2000-01	5.69	211.02	20.28	22.31
2001-02	6.05	214.57	34.56	21.34
2002-03	6.04	243.85	24.63	24.13
2003-04	6.33	274.03	16.66	25.01
2004-05	6.06	307.45	11.52	29.49
2005-06	6.40	334.25	10.18	32.85
2006-07	6.29	354.1	11.23	35.57
2007-08	7.09	406.3	37.49	36.72
2008-09	7.97	386.97	11.04	39.00
2009-10	9.71	400.93	8.33	34.57

Source: Various issues Annual Survey of Industries (ASI) - Summary Results for Factory Sectors, Central Statistical Organization, Government of India.

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