CONTRACTUALISTAION OF WORKERS IN INDIAN MANUFACTURING INDUSTRIES: ANALYSIS OF SOME IMPORTANT DETERMINANTS

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Abstract: It has been observed in several studies that proportion of contractual/casual workers is increasing in India not only in manufacturing industries but in other economic activities too. Relative increase in employment of contractual workers vis-a-vis the directly employed workers may be an important indicator as well as strategy to increase labour market flexibility and reduction in labour costs by a firm or industry. To study the phenomena of contractualization of workers, the Annual Survey of Industry data has been used for the period 1984-85 to 2005-06. In the present paper the incidence of contractualization of workers has been measured as a ratio between number of contractual workers (CW) and directly employed workers (DW) which is an outcome variable (CW/DW). The different explanatory variables which are expected to explain inter-temporal and inter-industry variations in the CW/DW ratio and which have been used in this study are capital intensity (K/L), ratio of Provident Fund and other social security benefits to wages (PFS/W), ratio of pay rolls to gross value added (TE/GVA) and average size of the organization which has been measured as the ratio of total employment to number of factories (L/F). Further, a dummy variable (D) has been used to find whether the change in outcome variable (CW/DW) is explained by economic reforms or not. The study has observed that the two most important factors that have explained changes in the contract intensity (CW/DW) in the Indian manufacturing industry are physical capital intensity (K/L) and proportion of PF and other social security benefits to wages (PFS/W). The other hypothesized explanatory variables have influenced the outcome variable only in few industries. There is no evidence to suggest that the process of economic reforms (Dummy variable) has specifically impacted the process of contractualization of workforce in Indian manufacturing sector.

Key Words: Contractualization, Contract Workers, Directly Employed Workers, Capital-Labour Ratio, Wages, Provident Fund, Factories, Dummy Variable.

I. INTRODUCTION

Broadly speaking, there are two important components of the workforce in any enterprise so far as the status of their employment is concerned viz. directly employed

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workers and those employed through contractors which are known as contractual workers. The directly employed workers are mostly in the nature of regular or permanent employment whereas those employed through contractors are in the nature of casual or irregular form of employment who are often paid lower wages/salary than the permanent employees and are also deprived of several social security benefits. Relative increase in employment of contractual workers vis-a-vis the directly employed workers may be an important indicator as well as strategy to increase labour market flexibility and reduction in labour costs by a firm or industry. These are the most vulnerable section of the employees as they are not only under paid but are deprived of several social security benefits and can be hired and fired any time by the employers flouting in most cases the relevant labour laws. It is believed that this process of contractulization has increased during post liberalization era in India (July, 1991). In the present paper an attempt has been made to identify and analyze some important determinants of contractualization in Indian manufacturing industry.

In the present paper the incidence of contractualization of manpower has been measured as a ratio between contractual workers (CW) and directly employed workers (DW) using ASI data for the period 1984-85 to 2005-06. The different explanatory variables which are expected to explain inter-temporal and inter-industry variations in the CW/DW ratio and which have been used in this study are capital intensity (K/L), ratio of Provident Fund and other social security benefits to wages (PFS/W), ratio of pay rolls to gross value added (TE/GVA) and average size of the organization which has been measured as the ratio of total employment to number of factories (L/F). Thus, CW/DW is the outcome variable in this paper. The K/L has been computed as a ratio of fixed capital to total employees. TE/GVA is the ratio of total emoluments to gross value added and L/F is the ratio of total employees to total number of factories in the ASI manufacturing at 2- digit level. Further, a dummy variable (D) has been used to find whether the change in outcome variable (CW/DW) is explained by economic reforms or not. The ratio of PF and other social security benefits to the wages has been computed by simply dividing the value of PF and other social security benefits by the wages of the workers. This has been done because the PF and other social security benefits are paid mainly to permanent and regular workers, though contractual workers are also entitled to these benefits but employers largely flout the rules and regulations related to payment of these benefits. It is presumed that employers desist from employing permanent workers in order to avoid such perennial nature of labour cost. Thus, it appears logical to examine whether ratio of PF and other social security benefits to wages has any impact on the relative employment of the contractual workers. The main objective of this paper is to discuss different variables which are likely to influence the composition of contractual and directly employed workers in Indian manufacturing sector. In order to achieve above objective some important hypotheses have been formulated and discussed in the following section. Section III of the paper discusses the results of a multiple correlation coefficient which has been computed and reported in table 1. Further section IV discusses the regression results,

the results have been further summarized in section – V and section – VI has produced the final summary and conclusion of the findings of the study.

II. THE HYPOTHESES

The important hypotheses formulated regarding the relationship between the dependent variable (CW/DW) and different independent or explanatory variables mentioned above are as follows:

 (i) Capital Intensity (K/L): In the present study K/L has also been used as a proxy of technological progress. It is expected that different measures adopted to liberalize and globalize Indian economy since 1991, have resulted into increased competitive pressure in industrial sector. In order to face competition the firms adopt several measures related to efficiency enhancement and cost minimization. Use of labour displacing and capital intensive technology increase tremendously in this process. Further, the recruitments in capital intensive industries are mostly on a contractual basis (Sen and Dasgupta, 2008). Firms generally hesitate to employ workers having permanent contract and fixed age of retirement in order to minimize hire and fire and other associated labour costs. Such recruitment practices provide the employers two important benefits viz. employment flexibility and wage flexibility (Bhandari and Heshmati, 2005). Thus, the increased capital intensity in an industry may facilitate adoption of more flexible employment practice in that industry. In other words, flexible employment practices by an industry may encourage adoption of more capital intensive technology by that industry.

  Therefore, it is Hypothesized in this study that K/L and CW/DW are positively related or there exists a complementary relationship between physical capital intensity and contractualization of workforce in an industry.

 (ii) Ratio of PF and other Social Security Benefits to Wages (PFS/W): It is expected that due to increased competition, the firms always seek to minimize their cost of production particularly the labour cost. Further, in order to absorb the business shocks easily, the firms desist from employing permanent workers and instead prefer casual and contractual workers who are deprived of PF, gratuity and other social security benefits from the employers (Das and Pandey, 2004; Rajeev, 2006 and Barrientos, Mathur and Sood, 2010).

  Therefore, it is hypothesized that the industries or firms whose proportion of these benefits to the wages are high are likely to employ more of the contractual workers. In other words, PFS/W and the CW/DW ratio are positively related.

 (iii) Ratio of Payrolls to Gross Value Added (TE/GVA): The ratio of payrolls to gross value added is an indirect measure of labour intensity of an industry (Seth

and Aggarwal, 2004). TE/GVA would be higher in labour intensive industries and lower in capital intensive industries. The labour intensive industries proportionately use more of directly employed workers and less of contract workers unlike the capital intensive industries (Sen and Dasgupta, 2008). Such labour market behaviour of labour intensive industries is mainly because of two reasons viz. one, low level of outsourcing and subcontracting and two, a high level of unionization in these industries. It is presumed that low level of outsourcing and subcontracting in an industry may limit the relative employment of contractual workers in that industry. Further, the unions resist the employment of contract workers in their organizations which is also a limiting factor for the relative employment of the contractual workers. In some studies however, the employment of contractual/casual workers has been found to increase even in labour intensive industries when union power declined (Gooptu, 2007).

In the light of the above arguments it may be hypothesized that unlike capital intensive industries, the labour intensive industries may be using proportionately lesser number of contractual workers.

In other words, there may exist a negative relationship between TE/GVA and the CW/DW in an industry.

(iv) *Average Size of Organization* (L/F): In the present study, the size of an organization has been measured by the average employees per factory (L/F). This is because when organization size is measured by capital employed per factory it may reflect, apart from size effect, the effect of mechanization also. It is intended to test the hypothesis in this paper that there exists a negative relationship between the size of an organization and the relative employment of the contractual workers in that organization. The large organizations are able to generate different kinds of the economies of scale in their production process. They are capable to employ and sustain a relatively larger size of the permanent employees who mainly belong to the core group of workforce. Moreover, these firms are better equipped to absorb the shocks of business cycles. Further, an increasingly substantial portion of their production process is outsourced or subcontracted as the size of the organization increases. On the other hand, smaller firms are devoid of such capabilities, so they depend largely on the contractual workforce to maintain their line of production.

Such kind of production and employment behaviour on the part of the organizations tends us to believe and hypothesize that there may exist an inverse relationship between the size of an organization (L/F) and the relative employment of the contractual workers (CW/DW).

(v) *Dummy Variable* (D): In order to capture the effect of economic reforms after 1990-91 on the composition of contractual and directly employed workers in

Indian manufacturing industries the dummy variable has been used in the present analysis. The dummy variable takes the value of zero for the period from 1984-85 to 1990-91 and one for the period from 1991-92 to 2005-06.

It is expected that the process of economic reforms has positively and significantly influenced the relative employment of contractual workers in the Indian organized manufacturing sector.

III. CORRELATION ANALYSIS

Before proceeding to study various determinants of relative employment of the contractual and directly employed workers in Indian manufacturing industries it has been considered relevant to observe the nature and degree of correlation between CW/DW (dependent variable) on the one hand and its different explanatory variables on the other. The said correlation coefficients have been computed and presented in table 1.

Table 1
Correlation between CW/DW and Explanatory Variables (1984-85 to 2005-06)[1]

S. No.	Dependent Variable:CW / DW	Explanatory Variables			
		K/L	PFS/W	TE/GVA	L/F
	All Manufacturing Industries	0.857***	0.737***	-0.793***	-0.693***
1.	Food Products, Beverages, Tobacco and Tobacco Products	0.756***	0.606***	-0.460**	0.514**
2.	Textile and Textile Products	0.615***	0.629***	-0.565***	-0.527**
3.	Leather and Leather Products	0.506**	0.354	0.120	0.072
4.	Wood and Wood Products	0.260	0.165	-0.212	0.106
5.	Paper and Paper Products	0.687***	0.706***	-0.764***	-0.505**
6.	Chemical and Chemical Products	0.883***	0.737***	-0.690***	-0.725***
7.	Rubber and Plastic Products	0.800***	0.598***	-0.726***	-0.523**
8.	Non-Metallic Mineral Products	0.563***	0.435**	-0.537***	-0.525**
9.	Basic Metal, Alloys and Metal Products	0.811***	0.191	-0.653***	-0.700***
10.	Machinery and Machine Tools	0.741***	0.677***	-0.656***	-0.642***
11.	Transport Equipment and Parts	0.766***	0.781***	-0.850***	-0.720***
12.	Other Misc Manufacturing n.e.c.	0.716***	0.819***	-0.525**	0.886***

*** indicates significance at 1% level
** indicates significance at 5% level

It can be observed from table 1 that the correlation coefficient (0.857) is significant at 1% level in *aggregate manufacturing industry* as well as ten out of twelve individual industry groups. One industry group related to leather shows correlation at 5% level. For industry related to *wood and wood products* the correlation coefficient between K/L and CW/DW is not only the lowest but it is non-significant also. The *chemical industry group* depicts the highest value of correlation coefficient (0.883) which is significant at 1% level. Thus the correlation results of 11 out of 12 industry groups as well as *aggregate*

manufacturing industry significantly support our hypothesis i) of a positive association between K/L and CW/DW. The PFS/W is positively correlated to CW/DW for the aggregate manufacturing industry (0.737) as well as eight other industry groups at 1% level of significance. The correlation results in 9 out of 12 industry groups as well as the *aggregate manufacturing industry* have significantly supported our hypothesis ii) regarding the existence of a positive association between PFS/W and CW/DW. As regards the association between TE/GVA and CW/DW, all individual industry groups as well as the *aggregate manufacturing industry* except, the one related to leather and leather products have depicted negative correlation. Thus, the correlation results in 10 out of 12 industry groups as well as the *aggregate manufacturing industry* have significantly supported our hypothesis iii) of the present study regarding an inverse relationship between TE/GVA and CW/DW. Here it should be noted that the two variables have depicted a negative association in most of the industries irrespective of the nature of that industry with respect its factor intensity.[2] The association between L/F and CW/DW is also negative for most of the individual industry groups as well as the *aggregate manufacturing industry*. The correlation results in 8 out of 12 industry groups as well as the *aggregate manufacturing industry* have significantly supported our hypothesis that there exists an inverse relationship between L/F and CW/DW.

IV. ANALYSIS OF REGRESSION RESULTS

The simple correlation analysis as discussed above merely tells us the degree of association between CW/DW ratio on the one hand and K/L, PFS/W, TE/GVA and L/F on the other. It does not reveal as to what extent K/L, PFS/W, TE/GVA and L/F (explanatory variables) explain the variation in the CW/DW in different industries over time. This objective is fulfilled by undertaking the exercise of regression analysis.

The regression model in the present paper has been expressed in logarithmic form (ln) as it has an added advantage that the beta coefficients can be interpreted as elasticity coefficients of CW/DW ratio with respect to its different explanatory variables. It shows the percentage change in CW/DW ratio in response to a percentage change in the explanatory variables. As a matter of fact, β_2 can be interpreted as the coefficients of elasticity of substitution between contractual workers and directly employed workers that is, a measure of the proportionate change in the ratio of contractual to directly employed workers induced by a given proportional change in the relative wages of the two inputs.[3]

Regresion Model: $\ln(CW/DW)_t = \alpha_1 + \beta_1 \ln(K/L)_t + \beta_2 \ln(PFS/W)_t + \beta_3 \ln(TE/GVA)_t + \beta_4 \ln(L/F)_t + \alpha_2 D + U_t$

Where,

$(CW/DW)_t$ = Ratio of contractual to directly employed workers (Contractualization index)

$(K/L)_t$ = Ratio of capital to labor (Capital intensity)

$(PFS/W)_t$ = Ratio of PF and other social security benefits to wages of workers

$(TE/GVA)_t$ = Ratio of total emoluments to the gross value added

$(L/F)_t$ = Ratio of total employees to total factories (Size of organization)

D   = 0 for pre-reform period (1984-85 to 1990-1991)

         = 1 for post-reform period (1991-92 to 2005-06).

In the present regression model, it has been observed that for *aggregate manufacturing industry,* capital intensity $\ln(K/L)$ appears to be the only explanatory variable for the changes in the relative employment of the contractual workers $\ln(CW/DW)$. The â coefficient of $\ln(K/L)$ is 0.493 which is highly significant (1% level). It implies that relative employment of contractual workers increases by 0.493 per cent for one per cent increase in the capital labour ratio.

As far as individual industries are concerned, in *food products, beverages and tobacco* related industries, $\ln(CW/DW)$ has been depicted to be positively influenced by two explanatory variables viz. $\ln(K/L)$ and $\ln(TE/GVA)$. The b coefficients for the two variables are 0.547 and 1.420 which are significant at 1% and 10% level respectively. The â coefficient of $\ln(K/L)$ has supported hypothesis i) while that of $\ln(TE/GVA)$ has contradicted hypothesis iii) of the study. Other explanatory variables including the dummy variable have failed to explain changes in $\ln(CW/DW)$. In *textile industry,* the â coefficient of $\ln(PFS/W)$ has positively explained $\ln(CW/DW)$ at 1% level of significance supporting hypothesis ii) of the study. In *leather and leather products industry,* the changes in dependent variable has been positively explained by two explanatory variables viz. $\ln(K/L)$ and $\ln(TE/GVA)$. The elasticity coefficients are 1.005 and 1.583, supporting and contradicting hypothesis i) and iii) respectively at 1% level of significance each. It can be noted with regard to *wood industry* that changes in $\ln(CW/DW)$ is not explained by any of the variables.

In *paper industry* the changes in dependent variable has been explained by $\ln(K/L)$ and $\ln(TE/GVA)$. The b coefficients are 0.263 and -1.807 which are significant at 10% and 1% level supporting hypothesis i) and iii). In *chemical and chemical products industry* the said dependent variable is influenced by $\ln(K/L)$ only. The b coefficient is 0.1.039 which is significant at 1% level supporting hypothesis i). In *rubber and plastic products industry* the changes in $\ln(CW/DW)$ has been explained by $\ln(K/L)$ and $\ln(TE/GVA)$; the corresponding elasticity coefficients are 0.540 and -0.920 being significant at 1% and 5% level respectively which satisfy hypotheses i) and iii) of the study.

The variation in $\ln(CW/DW)$ in *non-metallic mineral products* industry has been negatively explained by three independent variables viz. $\ln(TE/GVA)$, $\ln(L/F)$ and dummy whose respective elasticity coefficients are -1.074 (5% level), -2.393 (1% level) and -0.529 (5% level). The first two outputs have supported hypothesis iii) and iv) while output of dummy has rejected hypothesis v) of the study. In industry related to *basic metal, alloys and metal products* ln (CW/DW) has been explained by two of the stipulated explanatory variables viz. $\ln(TE/GVA)$ and $\ln(L/F)$. The b coefficients of ln

(TE/GVA) and ln(L/F) are -0.739 and -2.896 which corroborate hypotheses iii) and iv) at 1% level each.

The variation in ln(CW/DW) in *machinery and machine tools industry* is influenced by three explanatory variables viz ln(K/L), ln(TE/GVA) and ln(L/F). The ln(K/L) influences positively while ln(TE/GVA) and ln(L/F) influence negatively the outcome variable. The b coefficients of ln(K/L), ln(TE/GVA) and ln(L/F) are 0.404, -2.182 and -2.516 supporting hypothesis i), iii) and iv) at 10% , 1% and 5% levels of significance respectively. The ln(CW/DW) in industry related to *transport equipments and parts* is determined both by ln(K/L) and ln(TE/GVA). Their b coefficients are 0.792 and -1.456; both supporting the hypotheses i) and iii) 1% level of significance each. In *other miscellaneous manufacturing n.e.c. industry* the outcome variable is determined by ln (L/F) and dummy. The values of coefficients of ln(L/F) is 1.685 and that of dummy is 0.725 with level of significance being 1% each. The result of ln(L/F) has contradicted while that of dummy has supported our hypotheses iv) and v).

Table 2
Summary Results of Regression Model

S. No.	Dependent Variable: $ln(CW/DW)_t$	Explanatory Variables				
		$ln(K/L)_t$	$ln(PFS/W)_t$	$ln(TE/GVA)_t$	$ln(L/F)_t$	Dummy
	All Manufacturing Industry	(+)***	—	—	—	—
1.	Food Products, Beverages, Tobacco and Tobacco Products	(+)***	—	(+)*	—	—
2.	Textile and Textile Products	—	(+)***	—	—	—
3.	Leather and Leather Products	(+)***	—	(+)***	—	—
4.	Wood and Wood Products	—	—	—	—	—
5.	Paper and Paper Products	(+)*	—	(-)***	—	—
6.	Chemical and Chemical Products	(+)***	—	—	—	—
7.	Rubber and Plastic Products	(+)***	—	(-)**	—	—
8.	Non-Metallic Mineral Products	—	—	(-)**	(-)***	(-)**
9.	Basic Metal, Alloys and Metal Products	—	—	(-)***	(-)***	—
10.	Machinery and Machine Tools	(+)*	—	(-)***	(-)**	—
11.	Transport Equipment and Parts	(+)***	—	(-)***	—	—
12.	Other Misc Manufacturing n.e.c.	—	—	—	(+)***	(+)***
	Total (+)	**7/12**	**1/12**	**2/12**	**1/12**	**1/12**
	(-)	**Nil**	**Nil**	**6/12**	**3/12**	**1/12**

*** indicates significance at 1% level
** indicates significance at 5% level

V. SUMMARY AND CONCLUSION OF MODEL

The analysis of the results of regression model may be summarized as follows:

(i) The elasticity of relative employment of the contractual workers ln (CW/DW) in *aggregate manufacturing industries* is positively and significantly influenced by capital intensity (K/L) alone at 1% level. The result has

supported our hypothesis i). Other independent variables have failed to explain the changes in the dependent variable.

(ii) As far as individual industries are concerned, the explanatory variable ln(K/L) has positively and significantly influenced ln(CW/DW) in five industry groups at 1% level. These industries are related to *food, beverages and tobacco; leather; chemical; rubber and plastics* and *transport equipment and parts.* The results of all these industries have supported hypothesis i) of our study. Two more industry groups namely, *paper; and machinery and machine tools* have also depicted positive coefficients of change supporting hypothesis i) at 10% level of significance. Thus, the results in 7 out of 12 industry groups have supported hypothesis i) of the study.

(iii) ln(PFS/W) influences changes in ln(CW/DW) only in one industry i.e. *textiles*. However, the result is positive and significant at 1% level which supports hypothesis ii) of the study. This result is similar to the result in model I.

(iv) ln (TE/GVA) has positively explained changes in ln(CW/DW) in two industry groups i.e. *food, beverages and tobacco;* and *leather* at 10% and 1% level respectively contradicting our hypothesis iii). ln(CW/DW) in six industries have been influenced negatively supporting hypothesis iii) of the study at different levels of significance. For example *paper; basic metal and alloys; machinery and machine tools;* and *transport equipment and parts* industries have 1% level of significance while *rubber and plastics;* and *non-metallic mineral products* industries have 5% level of significance.

(v) The explanatory variable ln(L/F) has influenced changes in ln(CW/DW) in four industries. ln(CW/DW) in case of industries related to *non-metallic mineral products; basic metal and alloys;* has been influenced negatively by L/F at 1% level each and *machinery and machine tools* at 5% level of significance supporting our hypothesis iv). The same explanatory variable has influenced the outcome variable in *other miscellaneous manufacturing* industry positively at 1% level contrasting hypothesis iv) of the study. Thus, hypothesis iv) has been supported in case of 3 out of 12 industry groups.

(vi) Dummy has shown its influence only in two industry groups namely, *non-metallic mineral products* and *other miscellaneous manufacturing industry*. The former has contradicted while latter has supported hypothesis v) of the study at 5% and 1% significance levels respectively. The hypothesis that the process of economic reforms may have particularly accelerated the process of contractualization in Indian manufacturing industry is not supported by the evidence in the present context.

(vii) Thus, the hypotheses formulated in the present paper have been strongly corroborated by the behavior of ln(K/L) and ln(TE/GVA), moderately with

regard to ln(L/F) and poorly with regard to ln(PFS/W). Further, dummy has poorly explained the changes in ln(CW/DW) after the economic reforms. Thus, the hypothesis that the process of economic reforms may have particularly accelerated the process of contractualization in Indian manufacturing industries is not supported by the evidences in the present study.

VI. FINAL SUMMARY AND CONCLUSION

The main objective of this paper was to discuss different variables which were likely to be associated with and in turn influence the composition of *contractual and directly employed workers* in Indian manufacturing sector. In order to the achieve above objective, five important hypotheses were formulated, tested and discussed with reference to the aggregate manufacturing industry and each individual industry groups at the 2-digit level. The importance of different explanatory variables was also examined in explaining the changes in contract intensity *(CW/DW)*.

The different explanatory variables which were expected to explain inter-temporal and inter-industry variations in the CW/DW ratio and which have been used in this study are *capital intensity (K/L), ratio of PF and other social security benefits to wages (PFS/W), ratio of pay rolls to gross value added (TE/GVA) and average size of the organization (L/F)*. In order to examine the role of economic reforms in explaining changes in the composition of manpower in terms of CW/DW in Indian manufacturing industry a *dummy variable* was also used, taking value 0 and 1 for the period before and after reforms respectively. C*orrelation coefficient* was also computed to examine the degree of association between the CW/DW on the one hand and its different explanatory variables on the other.

A regression model was formulated for this paper to estimate and analyze the coefficients of different explanatory variables. The outcome variable in the model was the relative employment of contractual and directly employed workers e.g. *ln(CW/DW)t*.

In the present study the five hypotheses formulated were:

i)   K/L was considered as a proxy of technological progress. It was Hypothesized that *K/L and CW/DW are positively related* or there exists a complementary relationship between physical capital intensity and contract intensity in an industry.

ii)   It was Hypothesized that *PFS/W and the CW/DW ratio are positively related*. The industries or firms whose proportion of these benefits to the wages is high are likely to employ more of the contractual workers.

iii) The ratio of payrolls to gross value added *(TE/GVA) and CW/DW ratio are inversely related* in an industry.

iv)   In the present study, the size of an organization was measured by the average employees per factory (L/F). It was hypothesized that there exists

an *inverse relationship between the size of an organization (L/F) and the relative employment of workers (CW/DW)* in that organization.

v) It was expected that the process of economic reforms has *positively and significantly influenced the relative employment of contractual workers* in the Indian organised manufacturing sector.

The important points that emerged regarding the determinants of relative employment of contractual workers (CW/DW) in different manufacturing industries are presented as follows:

i) Hypothesis i) stating positive association between K/L and CW/DW was significantly supported by the results of the correlation in *11 out of 12 industry groups* as well as *aggregate manufacturing industry.*

ii) Hypothesis ii) stating positive association between PFS/W and CW/DW was significantly supported by the results of the correlation in *9 out of 12 industry groups* as well as *aggregate manufacturing industry.*

iii) Hypothesis iii) of a negative association between TE/GVA and CW/DW was significantly supported by the results of the correlation in *10 out of 12 industry groups* as well as *aggregate manufacturing industry.* These two variables were negatively associated irrespective of the degree of factor intensity in that industry.

iv) Hypothesis iv) of a negative association between L/F and CW/DW has been significantly supported by the results of the correlation in *8 out of 12 industry groups* as well as *aggregate manufacturing industry.*

v) For *aggregate manufacturing industry,* the K/L was depicted to be positively and significantly determining the relative employment of the contractual workers.

To conclude, it may be stated that the two most important factors that have explained changes in the contract intensity (CW/DW) in the Indian manufacturing industry are physical capital intensity (K/L) and proportion of PF and other social security benefits to wages i.e. ln(PFS/W). The other Hypothesized explanatory variables have influenced the outcome variable only in few industries. There was no evidence to suggest that the process of economic reforms has specifically impacted the process of contractualization of workforce in Indian manufacturing sector.

Notes

1. No correlation was found significant at 10% level.
2. In labour intensive industries TE/GVA is supposed to be relatively high which may be associated with low CW/DW ratio and in capital intensive industries the TE/GVA is supposed to be low associated with high CW/DW ratio.

3. This argument was put forward by Gujarati (1972:664) in the context of non-production and production workers which has been used in present paper also.

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