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Can Industrialization Scale up Employment?

Reflections on Indian Manufacturing

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Abstract

Strict labour regulations are usually said to be the primary cause of reduced employment outcome, particularly in the organised manufacturing sector. Using the data from 1983-2022 for different two-digit groups of industries three different methods have been adopted to reflect on the wage and growth elasticity of employment. The standard econometric approach suggesting a considerable overlap between the OLS and 2SLS estimates, highlights that in a large number of industries, whether capital or labour intensive, the growth elasticity of employment is statistically significant. However, the wage elasticity of employment is negative and significant only in a few cases, implying that the wage sensitivity of employment is rather negligible. Based on the time series results similar findings are replicated: while value added variance accounts for a significant part of the employment variance, the wage variance, with a few exceptions, does not comprise a noticeable part of the employment variance. Hence, the wage flexibility is less likely to be effective in raising the employment growth. As a policy implication, support mechanisms for exploration of larger markets without compromising with the wage income may offer possibilities of growth with employment generation.

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1. Introduction

If we refer to the historical pattern of growth experience of the developed spaces in the world, industrialization strategy figures in as the most fundamental one for materializing structural transformation both in terms of value added and work force. United Nations Industrial Development Organization (UNIDO) champions the cause of inclusive and sustainable industrialization (as reflected in Sustainable Development Goal 9: "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation"). Of course industrialization can happen without much benefit in terms of employment creation, particularly if the nature of technology adopted is highly capital intensive. So, industrialization of just value added is not the right criteria, rather the industrialization of the work force must be pursued for benefits of growth to percolate down to the commoners. Nevertheless industrialization of value added even without adequate impact on employment generation is the second best outcome or at least much better an upshot compared to deindustrialization or “no industrialization”. This is because big investment pursuits and backward and forward linkages between several spectra of activities can always generate positive outcomes indirectly in terms of livelihood opportunities even when the industries do not create employment directly.

It is a general belief that the Indian labour laws for a long time remained pro-employee and thus, the employers were demotivated from adopting employment intensive ventures. With strict regulations in favour of the workers there will be an urge to encourage insecure employment. On the other hand, with less restrictions the employers will not find a plea to adopt indirect means of engaging labour through contractors or subcontracting the business to the smaller enterprises through the intermediaries. Rather regular wage employment can increase with employment conditions being less stringent. So, if labour laws are not pro-employee, the adoption of capital intensive technology is expected to be less prevalent; thus, industrialization of value added and employment both can happen hand in hand. On the other hand, with pro-employee regulations industrial value added may grow with the adoption of capital intensive technology while the industrialization of work force may lag behind. However, as mentioned above, the inter-sectoral linkages may generate employment indirectly in other sectors/sub-sectors. So the worst outcome is associated with the phenomenon of ‘no industrialization even in terms of value added.

Industry-versus-services-led growth has been a long standing debate in the literature. But what is important from a practical point of view is that both high productivity industry and services are important for growth and employment creation to happen simultaneously. The depressing outcome emerges when neither high productivity industry nor high productivity services could be the engine of growth. In such situations decent employment generation on a large scale is far-fetched. .

The effect of output expansion on employment is not positive always. Depending upon the type of technology used by the entrepreneurs the relationship between output and employment can be ascertained. For example, with the adoption of capital intensive technology output may increase but employment will not. From the reverse side, with an increase in factor input (employment), output is expected to rise. The demand linkage is positive as with enhanced employment effective demand may increase leading to expansion in output. But the counter argument is that the meagre wages may not lead to any acceleration in demand notwithstanding employment expansion, thus, affecting output growth adversely in the long run. With the redundancy of labour the output response may be nil.

With the adoption of capital intensive technology output expansion will not be matched by employment growth. With its adverse effect on demand a deceleration may reduce the economic growth. Thus, output expansion will be only a short term phenomenon. When we talk about advanced methods of raising productivity with labour saving techniques, we must realise that such productivity augmenting strategies will not necessarily be sustainable. The benefits of productivity increase may cater to a few stakeholders such as those who are at the top of the skill ladder and the entrepreneurs with enhanced incomes. But the rise in demand originating from the increase in income in these few hands cannot compensate the fall in mass demand due to reduced employment and wages. The linkages between economic growth and employment growth need to be understood in the right perspective for drawing the appropriate policy initiatives. Employment loss resulting in a deceleration in demand can actually retard economic growth.

In the backdrop of this conceptualisation the current study aims at estimating the employment elasticity in various sub-sectors of the organised manufacturing in India. The database of the study is drawn from the Annual Survey of Industries. The quantitative analysis is carried out both in terms of the standard econometric framework and time series framework. The rest of the paper is structured as follows: section 2 presents a brief review of the studies, section 3 estimates the employment elasticity of growth and wages and section 4 delineates the growth-employment-wage relationship on the basis of time series analysis. Finally, section 5 concludes.

2. Literature Review

Employment elasticity has long been used as a summary indicator to assess the extent to which economic growth translates into employment generation. In the context of developing economies, this measure is particularly relevant as growth is often accompanied by structural transformation and technological change which can weaken the employment output relationship. In case of India the organised manufacturing sector has been a focal point of this debate given its expected role in providing stable and productive employment.

Following the lines of Kuznets (1966), Szirmai (2012) focused on three important arguments, highlighting the potential importance of manufacturing in the context of growth and employment generation: the transfer of resources from manufacturing to services provides a structural change burden in the form of Baumol's disease; the transfer of resources from agriculture to manufacturing provides a structural change bonus, since the manufacturing sector is assumed to be more dynamic; and the empirical correlation between the degree of industrialization and per capita income is evident in developing countries. Szirmai and Verspagen (2015) further, organized the literature into a list of six arguments on the importance of the manufacturing sector: (i) productivity is relatively high in the manufacturing sector (Fei and Ranis, 1964); (ii) the manufacturing sector is assumed to favour capital accumulation (Rowthorn and Coutts, 2004); (iii) the manufacturing sector offers opportunities for economies of scale (Kaldor, 1966, 1967); (iv) higher rates of technological progress are seen in the manufacturing sector (Cornwall, 1977); (v) linkage and spill-over effects are stronger in the manufacturing sector than in agriculture and services (Hirschman, 1958); and (vi) demand effects associated with Engel's law points to the growth of the manufacturing sector.

Early evidence on organised manufacturing points to a declining capacity of the sector to absorb labour. Goldar (2000) showed that the number of jobs in organised manufacturing failed to increase substantially during the 1980s while production levels rose slightly: this indicated that industrial expansion depended more on productivity gains than on hiring new workers. Mazumdar and Sarkar (2004) conducted an extensive study to determine how

employment rates changed within India's manufacturing sector that operated under organised systems. The study found that employment elasticity rates between different time periods showed significant changes: the late 1970s had high elasticity which then decreased during the 1980s and after the reform period. In addition, it demonstrated that output growth became less connected to employment creation because of three main factors such as rising labor productivity, wage share adjustments and rising market competition.

Upender's (2006) research showed how employment growth in India reacted to national economic performance during the pre-1991 and post-1991 time frames. It found a sharp contrast between sectors after liberalisation. The private organised sector experienced better employment elasticity in its manufacturing, trade and financial services because their growth rates created more job opportunities. The public sector experienced an opposite employment trend compared to the private sector as the units lost workers despite output growth. Aggregating these trends, the study concluded that post-reform economic growth in the organised sector as a whole became less labour-intensive. Indian economic reforms created output expansion but did not establish enough connection between output growth and job creation.

As emphasised by Mazumdar and Sarkar (2007), employment elasticity in the organised manufacturing depends on macroeconomic factors together with institutional aspects instead of depending solely on output expansion. Krishna et.al (2016) showed that Indian employment growth between 1980 and 2011 shifted from manufacturing to construction and service industries. The study revealed that technological advancements together with production process transformations led to decreased employment needs which resulted in low employment elasticity even when output grew. Chakravarty and Mitra (2009) showed that the organised manufacturing increasingly created fewer new jobs over time because companies started using more machines and they used informal workers within their official operations. Thus, the industrial growth caused manufacturing operations to lose their direct workforce with increased contractualisation. In fact, though the employment growth in non-agricultural sectors became significant, according to Basu and Das (2016), the organised manufacturing failed to enhance its workforce recruitment capabilities. Roy et al. (2020) also attributed this pattern to improvements in labour market flexibility in the organised manufacturing sector. The authors argued that institutional changes as such do not create conditions for employment growth on their own.

Kathuria and Natarajan (2013) studied the role of the manufacturing sector in GDP growth for the Indian states in the post-1990 period by regressing state-level domestic product growth rates on growth rates of manufacturing. They found that states with faster growing manufacturing sectors also grew relatively fast. Erumban et al. (2019) took a similar position. The study hypothesized that a large expansion of the informal segment in developing countries is a potential consequence of this deindustrialization. The implication is that sluggish industrialisation reduces the pace of employment generation particularly from the point of view of the productive absorption of the unskilled and semi-skilled workers.

Interestingly, Singh and Tare (2024) based on their analysis of state-level data from 1998–2023 showed that employment in the Indian organised manufacturing sector had grown positively when working capital had become available. The researchers noted that the sector showed limited employment response to output expansion but better working capital availability led to increased employment. This is quite contrary to the belief that significant trade-offs exist between capital and labour. Rather the availability of investible resources and ability to acquire working capital leading to expansion of the sector may result in employment growth. The research findings have rendered importance to the financial aspects

in explaining employment rates being insensitive to changes in the labour market through capital usage and workplace rules

3. Econometric Estimation

Two important determinants of employment (Emp) are identified in the standard textbook: output (VA) and wage rate (Wage), yielding growth and wage elasticity of employment. In a double log (ln) specification,

$\ln Emp = \beta_0 + \beta_1 \ln VA + \beta_2 \ln Wage + \varepsilon$ …..(A)

β_1 and β_2 give the growth and wage elasticity respectively and ε is the regression error.

In estimating the equation directly by OLS one important problem is usually highlighted, i.e. the endogeneity issue relating to value added, making OLS estimates inconsistent. Besides, capital which is also a determinant of employment is not considered in the model. However, the indirect effect of capital which determines value added directly, is present. So in addressing the issue of endogeneity of value added we are able to address the issue of the effect of capital on employment. Thus, the alternative method to estimate the employment equation could be 2SLS in reference to the following two- equation-structural-system where VA is a function of capital (K) and Emp and Emp is a function of VA and Wage:

$\ln VA = \alpha_0 + \alpha_1 \ln K + \alpha_2 \ln Emp + €$ (1)

$\ln Emp = \beta_0 + \beta_1 \ln VA + \beta_2 \ln Wage + \varepsilon$ (2)

The reduced form equations are as follows:

$\ln VA = \Upsilon_0 + \Upsilon_1 \ln K + \Upsilon_2 \ln Wage + \mu$ (3)

$\ln Emp = \sigma_0 + \sigma_1 \ln K + \sigma_2 \ln Wage + \theta$ (4)

After estimating the reduced form equations, the predicted magnitudes of the value added and employment can be obtained. Substituting the predicted values of value added in the structural equation for employment (2), consistent estimates of the parameters (growth and wage elasticity estimates) can be obtained.

The study uses annual data for All-India two-digit manufacturing industries obtained from the Annual Survey of Industries (ASI) for the period 1980–2022. The key variables are constructed as follows.

Gross Value Added (GVA) is taken in current prices and converted into real terms using the Wholesale Price Index (WPI, base year 2011–12 = 100). The natural logarithm of real GVA (ln GVA) is computed by taking the natural log of GVA at constant prices.

For capital stock the proxy is taken in terms of gross fixed capital. Capital at constant prices is obtained by deflating nominal fixed capital using the GFCF deflator for the entire manufacturing sector. The logarithmic transformation of real capital (ln K) is obtained by taking the natural log of capital at constant prices.

Employment is measured by total persons engaged, including both workers and employees. The variable ln Emp is calculated as the natural logarithm of total persons engaged. This captures the scale effect of labour input in the production process.

Wages and salaries are measured as total emoluments paid. Real wages and salaries are computed by deflating the nominal values by the WPI (base year 2011–12 = 100). Wages and salaries per worker are calculated by dividing total wages and salaries by total persons

engaged. The logarithmic transformation of real wages and salaries per worker (Ln Wage) is obtained by taking the natural log of the variable.

Interpretation of the results

As per a priori expectation, while the growth elasticity is supposed to be positive, the wage elasticity is likely to be negative.

In general, growth elasticity is positive and significant in many cases while wage elasticity is insignificant in many cases. Among the industry groups with positive and significant growth elasticity the following reported a high magnitude of at least 0.4: 10, 14, 15, 16, 17, 18, 21, 22, 25, 28, 29, 30, 31, 32 and Others (as per OLS estimate: Table 1) and 10, 15, 17, 18, 19, 20, 21, 22, 25, 28, 29, 31, 32 and Others (as per 2SLS estimates: Table 2).

Negative and significant wage elasticity is noted only in the case of six industry groups (Table 1) though the commonality of the results from both OLS and 2SLS estimates could be established for five groups only (Table 3). The OLS estimates show that only the industry groups 10, 12, 16, 31, 58 and others have a negative and statistically significant wage elasticity (Table 1). The magnitude of elasticity is also seen to be considerably high. On the other hand, the four other industry groups: 11, 15, 21 and 32 (OLS estimate; Table 1) and six industry groups: 11, 13, 15, 21, 23, 27 (2SLS estimate, Table 2) show a positive elasticity (moderate to high), which is counter intuitive because with increase in wage rate labour demand is expected to decline. These industry groups have possibly experienced rapid productivity growth a part of which is transferred to the workers and employees in terms of rise in wages and salaries per head. In the rest of the industry groups the wage elasticity is statistically insignificant. So, on the whole, for a very large number of industry groups wage rate is not seen to be a major driver of employment (Table 3). Even if we presume that wages were set at a very high level, and through significant labour market reforms wages can be reduced, their impact on employment rather seems to be weak. The nature of technology is such that it does not require labour on a large scale and hence, labour reforms do not hold prospects for employment generation.

Table 1: Employment Elasticity (OLS estimates)

Dep Variable: Ln Emp	Explanatory Variables				
Code	Intercept	Ln GVA	Ln Wage	Adjusted R-square	No. of Observations
10	6.64 (7.48)*	0.43 (5.15)*	-0.36 (-2.78)*	0.79	43
11	1.03 (3.15)*	0.24 (5.74)*	0.41 (4.01)*	0.96	43
12	11.55 (26.63)*	0.31 (5.51)*	-0.61 (-4.33)*	0.47	43
13	10.81 (14.28)*	0.09 (1.40)	0.10 (0.76)	0.30	42
14	-6.08	0.69	0.16	0.98	43

	(-12.13)	(15.54)*	(1.33)		
15	4.42 (6.62)*	0.49 (11.56)*	0.34 (3.42)*	0.97	43
16	4.25 (5.54)*	0.64 (6.57)*	-0.75 (-4.86)*	0.67	43
17	3.31 (8.05)*	0.4 (6.20)*	-0.08 (-0.57)	0.92	43
18	2.37 (3.44)*	0.42 (10.61)*	-0.09 (-0.07)	0.92	43
19	3.84 (5.71)*	0.18 (3.06)*	0.24 (1.55)	0.79	43
20	-19.95 (-3.64)*	1.37 (1.81)	-0.81 (-0.44)	0.38	43
21	-3.25 (-8.36)*	0.45 (29.12)*	0.38 (6.57)*	0.98	43
22	-2.57 (-5.96)*	0.53 (12.14)*	0.16 (1.30)	0.98	43
23	3.71 (7.05)*	0.27 (4.67)*	0.24 (1.65)	0.89	43
24	7.06 (9.88)*	0.21 (3.29)*	0.07 (0.47)	0.66	43
25	1.5 (4.03)*	0.45 (9.59)*	-0.01 (-0.10)	0.95	43
26	6.4 (1.46)	-0.24 (-0.56)	0.45 (0.45)	-0.04	43
27	1.39 (2.16)*	0.32 (5.19)*	0.28 (1.81)	0.88	43
28	4.66 (7.28)*	0.45 (4.85)*	-0.30 (-1.36)	0.82	43
29	-0.59 (-0.44)	0.64 (9.68)*	-0.28 (-1.14)	0.94	43
30	11.47 (7.31)*	-0.12 (-0.68)	0.37 (0.79)	-0.03	43
31	1.58 (1.82)	0.65 (17.15)*	-0.54 (-4.47)*	0.92	43
32	-7.09 (-7.15)*	0.51 (9.39)*	0.57 (2.96)*	0.97	43
58	25.58 (7.52)*	0.20 (1.33)	-1.75 (-8.79)*	0.65	43
Others	3.75 (1.26)	1.12 (6.03)*	-1.83 (-3.95)*	0.47	43

Note: Ln: natural logarithm, VA: value added, Emp: employment, WS: wages and salaries per person engaged

*Significance at 1 per cent level

Table 2: Employment Elasticity (2SLS Estimates)

Dep Variable: Ln Emp	Explanatory Variables

Code	Intercept	Ln GVA	Ln Wage	Adjusted R-square (it is from the regression on estimated LnVA)	No. of Observations
10	5.70 (6.23)*	0.52 (6.23)*	-0.50 (-3.72)*	0.82	43
11	1.08 (3.11)*	0.29 (5.09)*	0.30 (2.19)*	0.96	43
12	11.56 (22.02)*	0.28 (2.87)*	-0.55 (-2.27)*	0.22	43
13	11.34 (14.45)*	-0.03 (-0.24)	0.32 (2.32)*	0.32	42
14	-5.89 (-19.16)*	0.29 (26.76)*	-0.09 (1.24)	0.99	43
15	4.74 (5.28)*	0.51 (10.33)*	0.30 (2.57)*	0.97	43
16	8.54 (2.63)*	0.02 (0.04)	0.21 (0.29)	0.33	43
17	3.18 (6.98)*	0.56 (5.02)*	-0.45 (-1.83)	0.90	43
18	2.25 (2.47)*	0.40 (7.16)*	-0.05 (-0.26)	0.87	43
19	6.08 (10.14)*	0.94 (7.41)*	-1.66 (-5.21)*	0.89	43
20	-20.44 (-3.91)*	2.25 (2.73)*	-2.88 (-1.44)	0.44	43
21	-3.22 (-8.51)*	0.45 (29.91)*	0.37 (6.56)*	0.98	43
22	-2.43 (-5.38)*	0.57 (11.64)*	0.05 (0.40)	0.97	43
23	3.76 (5.92)*	0.14 (1.53)	0.55 (2.48)*	0.84	43
24	6.66 (10.05)*	0.37 (4.65)*	-0.27 (-1.52)		43
25	1.56 (3.16)*	0.41 (5.96)*	0.07 (0.49)	0.92	43
26	6.35 (1.35)	-0.20 (-0.43)	0.36 (0.34)	-0.04	43
27	1.36 (1.76)	0.22 (2.49)*	0.51 (2.34)*	0.80	43
28	4.66 (6.84)*	0.45 (4.02)*	-0.29 (-1.10)	0.79	43
29	-0.52 (-0.26)	0.65 (5.94)*	-0.30 (-0.75)	0.89	43
30	12.10 (7.05)*	0.8 (0.29)	-0.14 (-0.20)	-0.04	43
31	1.64 (1.50)	0.66 (13.07)*	-0.57 (-3.63)*	0.87	43
32	-5.23	0.65	0.09	0.98	43

	(-6.30)*	(13.36)*	(0.53)		
58	35.19 (9.02)*	-0.33 (-1.79)	-1.48 (-7.21)*	0.67	43
Others	2.92 (1.08)	1.34 (7.29)*	-2.28 (-5.11)*	0.56	43

Note: Ln: natural logarithm, VA: value added, Emp: employment, WS: wages and salaries per person engaged

*Significance at 1 per cent

Table 3: Summary Table: Comparison of OLS and 2SLS Estimates

	Positive and Significant Growth Elasticity	Insignificant Growth Elasticity	Negative and Significant Wage Elasticity	Positive and Significant Wage Elasticity	Insignificant Wage Elasticity
OLS	The rest	13, 20, 30, 58	10, 12, 16, 31, 58 and Others	11, 15, 21, 32	The rest
2SLS	The rest	13, 16, 23, 26, 30, 58	10, 12, 19, 31, 58 and Others	11, 13, 15, 21, 23, 27	The rest

4. Time Series Analysis

The regression based estimates of growth and wage elasticity of employment rests on the fundamental condition that the co-integration exists, without which these results are spurious. As we conduct the co-integration tests on employment, value added and wages and salaries per person engaged, only four industry groups (10, 19, 21 and 27) show the existence of at least one co-integrating vector (Table 4). The rest of the industry groups do not have a single co-integrating vector as per the Johansen's test. Hence, for the industry groups without co-integration a VAR (vector auto-regression) model was pursued. For the four industry groups with co-integration, a VECM (vector error correction model) had to be estimated as the co-integrating equation may be valid only in the long run. Since the coefficients of the VAR or the VECM model are not directly interpretable the variance decomposition results are presented in Table 4.

The critical question in this context is whether wage variance comprises a significant part of employment variance? Very few industries indicate so, from which it may be inferred that the sensitivity of employment to wages is rather low. These are the following industries where the wage variance accounts for at least 5 percent of the employment variance either in the short to medium run (by the end of the 3rd period) or in the long run (by the end of the 10th period) or both: 10, 21, 24, 29, 30, 31 and 58 (Table 4).

However, employment variance comprises some part of wage variance – at least the number of industries in this case is greater than the number of industries where wage variance explains part of the employment variance (range). We may deduce that the volatility in wages is partly due to the variations in employment though the employment variations are least

explained by the variations in wages. A drastic decline in wages is less likely to encourage employment growth.

Value added variance comprises a significant part of the employment variance. Several of the industry groups -10, 12, 13, 14, 15, 16, 17. 18, 19, 21, 22, 25, 27, 28, 29, 30, 31, 32, 58 and Others - unravel an output share in the employment variance in double digit terms, and in some of the industry groups the share is as high 50 to 70 percent. This is indicative of the fact that a positive or negative shock in output can raise or reduce the employment significantly. However, employment variance also explains some part of the output variance though to a much lesser extent and in a much lesser number of industries. This tends to suggest that a reduction in employment can have its adverse impact on output due to deceleration in demand. The impact of this reverse causality running from employment to output is further substantiated by the fact that wage variances capture part of the output variance at least in some of the industries. In other words, output decline can get aggravated by wage decline, and output rise can be strengthened by wage shoot-ups.

Further, that the share of output variance in wage variance is not absolutely negligible, suggests that the benefits of output growth can contribute to increases in wage. However, the fact that output variance does not explain a significant component of the wage variance is reflective of the serious inequality involved in the process of sharing of the beneficial effects of growth between the owners and the workers. With a positive shock in value added originating from productivity hike, for example, does not get transferred to the workers proportionately.

Looking at the type of industries (names in the appendix) and the growth effect and the wage effect on employment in terms of variance decomposition interesting observations may be made. Whether we consider some of the labour intensive industries like 12, 13 or more capital intensive sectors like 26, 27, 28 value added comprises a noticeable part of the employment variance, implying that value added growth can result in escalation in employment irrespective of the nature of technology used in the production process. One standard deviation shock in output impacts on employment in these industries though in the very long run the impact disappears except in the industry group 27 (see the graphs below). On the other hand, most of the industries whether labour intensive or capital intensive, wage decline does not seem to be having a strong effect on employment growth as wage variance accounts for a very small percentage of the employment variance (Table 4). On the whole, the scale effect seems promising rather than the labour regulation related variables.

Table 4: Co-integration Results of ln value added (GVA), ln employment (Emp), and ln Wages and Salaries) per person engaged (Wages) and Variance Decomposition Results from VAR/VECM

Code	Johansen's Co-integration Test: Trace Statistic	Outcome	Variance Decomposition of ln GVA		Variance Decomposition of ln EMP		Variance Decomposition of ln WAGES	
			ln GVA, ln Emp, ln Wages (by the 3rd period)	ln GVA, ln Emp, ln Wages (by the 10th periond)	ln GVA, ln Emp, ln Wages (by the 3rd period)	ln GVA, ln Emp, ln Wages (by the 10th period)	ln GVA, ln Emp, ln Wages (by the 3rd period)	ln GVA, ln Emp, ln Wages (by the 10th period)
10	40.31*	VECM	93.3	89.1	13.4	15.7	9.3	19.6

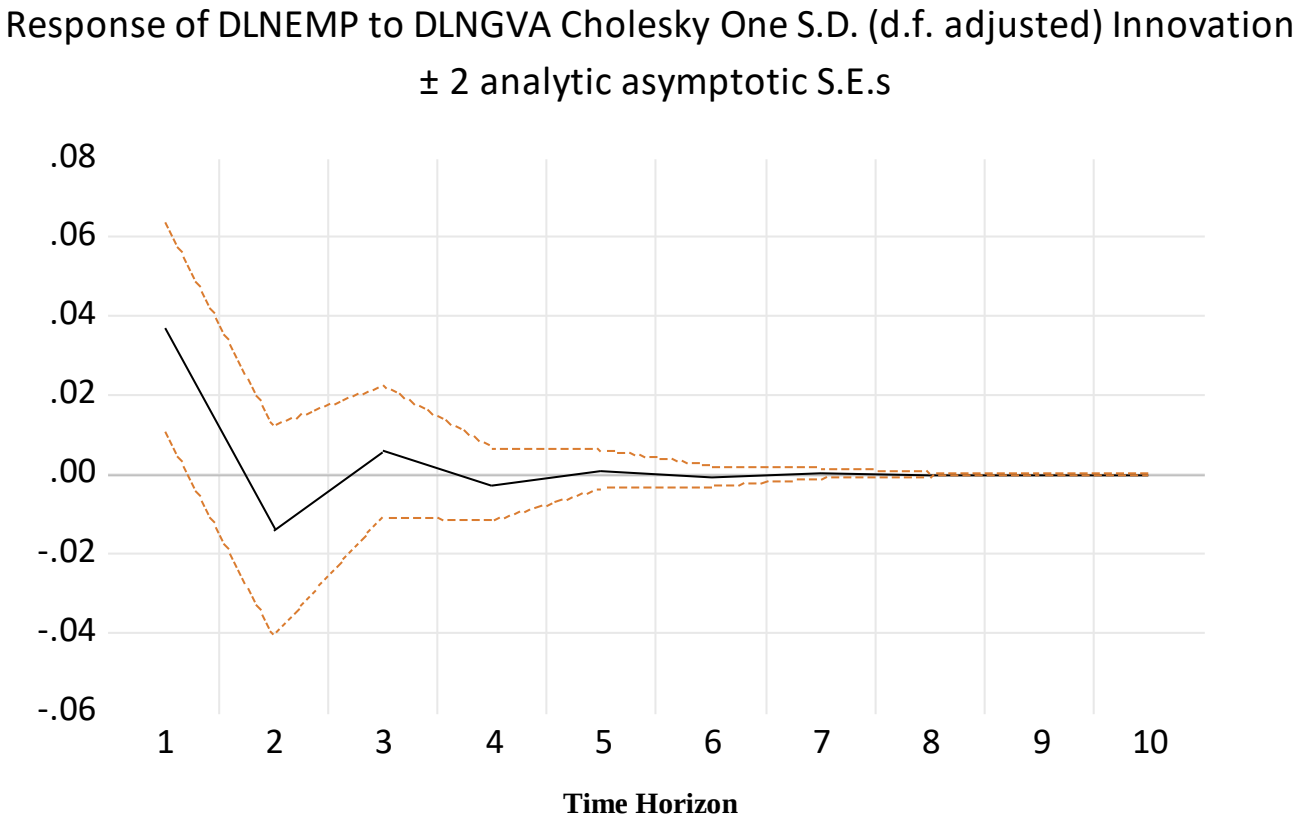
			6.3 0.4	9.5 1.3	86.0 0.6	68.5 15.7	7.5 83.2	30.0 50.4
11	25.85	VAR	90.2 0.6 9.2	90.2 0.6 9.2	9.2 87.7 3.1	9.3 87.6 3.1	4.7 12.0 83.2	4.8 12.1 83.1
12	24.65	VAR	99.9 0.1 0.0	99.9 0.1 0.0	19.6 80.4 0.0	19.7 80.3 0.0	13.3 14.7 71.9	13.4 14.7 71.9
13	25.68	VAR	95.7 2.4 1.9	95.2 2.7 2.0	14.5 83.8 1.7	14.6 83.4 2.0	0.6 26.5 72.9	0.7 26.8 72.5
14	17.74	VAR	98.9 1.1 0.0	98.9 1.1 0.0	59.0 40.7 0.3	59.0 40.7 0.3	0.5 2.8 96.7	0.5 2.8 96.6
15	26.88	VAR	89.7 0.5 9.8	89.2 0.5 10.3	14.0 85.4 0.5	14.1 85.3 0.6	5.4 0.1 94.5	5.6 0.1 94.3
16	16.10	VAR	97.5 0.7 1.8	96.0 1.2 2.7	31.9 68.0 0.1	32.1 67.7 0.1	30.8 5.7 63.5	31.5 5.9 62.6
17	23.57	VAR	97.0 0.9 2.0	97.0 0.9 2.0	11.6 86.8 1.5	11.6 86.8 1.5	4.4 42.5 53.0	4.4 42.5 53.0
18	21.46	VAR	90.5 2.9 6.6	90.5 2.9 6.5	67.0 32.1 0.9	67.0 32.1 0.9	17.7 2.3 80.0	17.8 2.4 79.8
19	31.68*	VECM	98.1 1.6 0.3	94.8 1.3 3.8	47.2 51.9 0.9	76.1 22.1 1.7	2.6 11.7 85.6	7.3 7.5 85.1
20	28.69	VAR	99.4 0.2 0.4	99.4 0.2 0.4	5.3 90.9 3.8	5.3 90.9 3.8	0.3 29.3 70.4	0.3 29.3 70.4
21	35.52*	VECM	93.3 6.6 0.0	89.4 10.5 0.0	24.9 68.6 6.4	33.4 55.0 11.6	2.1 34.0 63.8	2.1 49.5 48.4
22	23.31	VAR	97.6 2.0 0.4	97.5 2.0 0.4	10.1 88.0 1.9	10.1 88.0 1.9	10.9 19.8 69.3	11.0 19.9 69.0
23	22.57	VAR	97.2 0.2 2.5	97.2 0.2 2.5	7.8 91.8 0.4	7.8 91.8 0.4	5.8 14.6 79.5	5.8 14.7 79.5
24	18.77	VAR	97.3 1.5 1.2	97.3 1.5 1.2	7.3 83.7 9.0	7.3 83.7 9.0	2.7 1.4 95.9	2.7 1.4 95.9
25	22.09	VAR	95.5 0.0 4.4	95.5 0.0 4.4	69.9 25.7 4.4	69.9 25.7 4.4	10.4 0.0 89.5	10.4 0.0 89.5
26	17.55	VAR	99.5 0.5 0.0	99.5 0.5 0.0	7.3 91.9 0.8	7.3 91.9 0.8	4.6 33.7 61.6	4.7 33.7 61.6
27	41.81*	VECM	99.8 0.0 0.2	99.4 0.3 0.2	55.7 43.4 0.8	58.0 41.5 0.4	9.0 3.1 87.9	70.0 15.7 14.3
28	18.51	VAR	95.2 2.8 1.9	95.1 2.9 1.9	18.0 81.9 0.0	18.1 81.9 0.0	15.1 68.4 16.4	15.1 68.5 16.4
29	39.73*	VECM	98.0 1.7 0.3	98.5 1.3 0.2	36.9 57.5 5.6	29.5 56.0 14.5	31.1 20.0 48.8	53.0 14.1 32.8
30	18.18	VAR	84.2	83.2	46.5	46.4	10.6	11.3

			1.1 14.6	1.1 15.6	46.5 7.0	46.1 7.4	4.0 85.4	4.0 84.7
31	21.18	VAR	86.9 3.6 9.5	86.4 3.6 10.0	23.8 67.5 8.7	23.8 67.3 8.9	56.8 9.2 34.0	56.8 9.3 33.9
32	26.54	VAR	91.9 5.8 2.3	91.0 6.3 2.7	9.9 88.8 1.3	10.2 88.2 1.5	0.7 12.4 86.9	0.7 12.4 86.9
58	21.01	VAR	97.9 0.0 2.0	97.8 0.0 2.2	40.3 54.1 5.6	44.7 48.9 6.3	2.6 0.7 96.6	2.7 0.8 96.5
Others	20.25	VAR	85.8 14.0 0.2	85.6 14.2 0.2	76.0 23.6 0.4	75.9 23.6 0.4	27.0 15.7 57.3	27.1 16.2 56.7

Note: *Significance at 5 per cent;

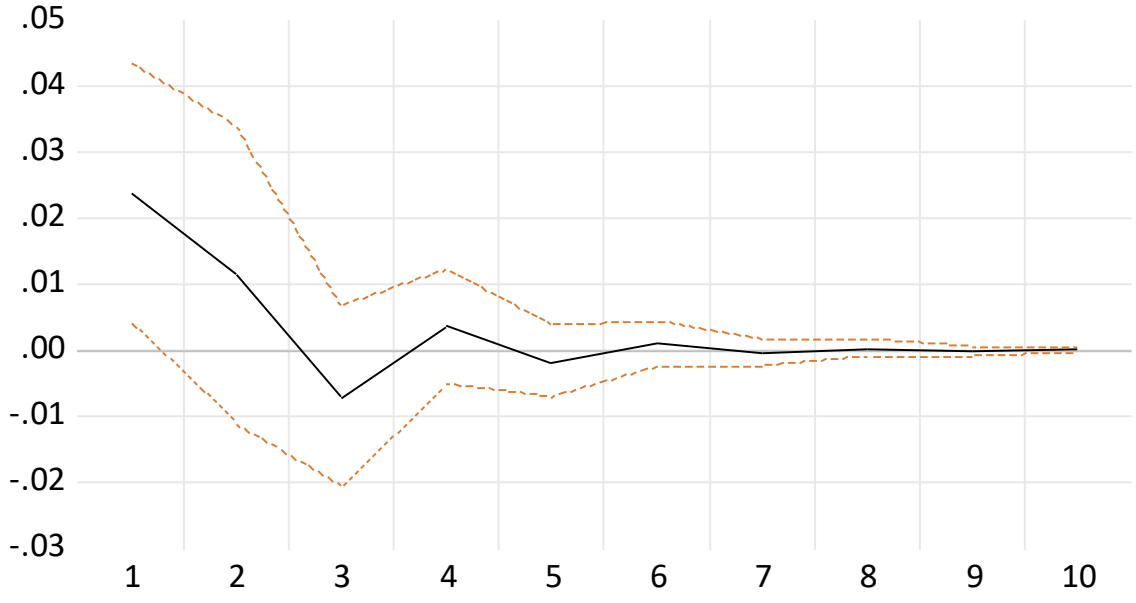
Variance decomposition of a variable is in terms of the variable itself and the two other variables in the sequence, as indicated in the column within every cell.

Industry- 12



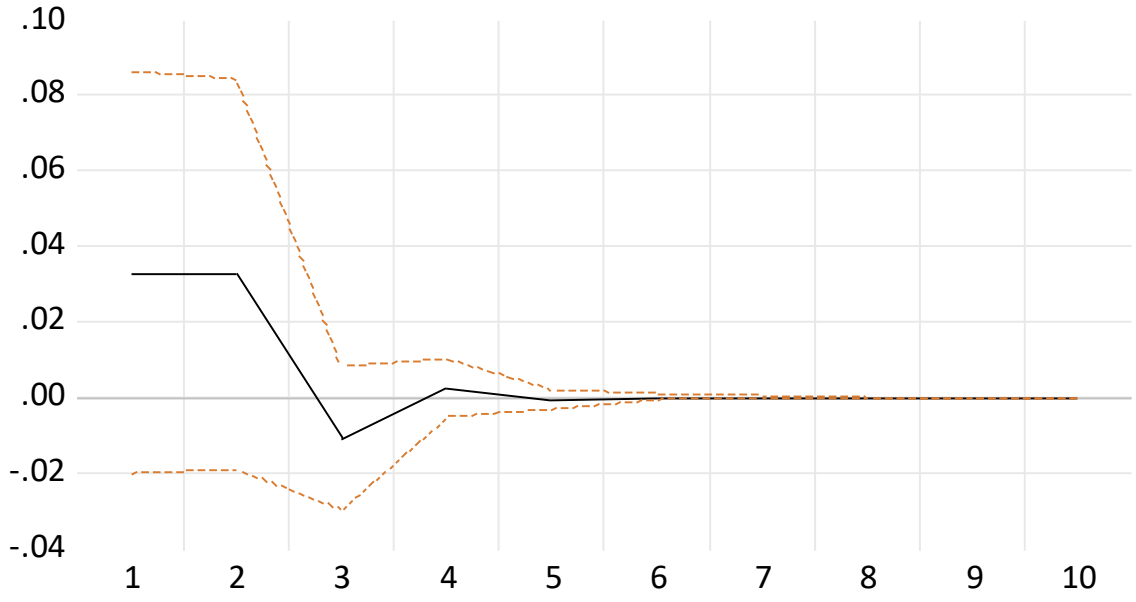
Industry-13

Response of DLNEMP to DLNGVA Cholesky One S.D. (d.f. adjusted) Innovation
± 2 analytic asymptotic S.E.s



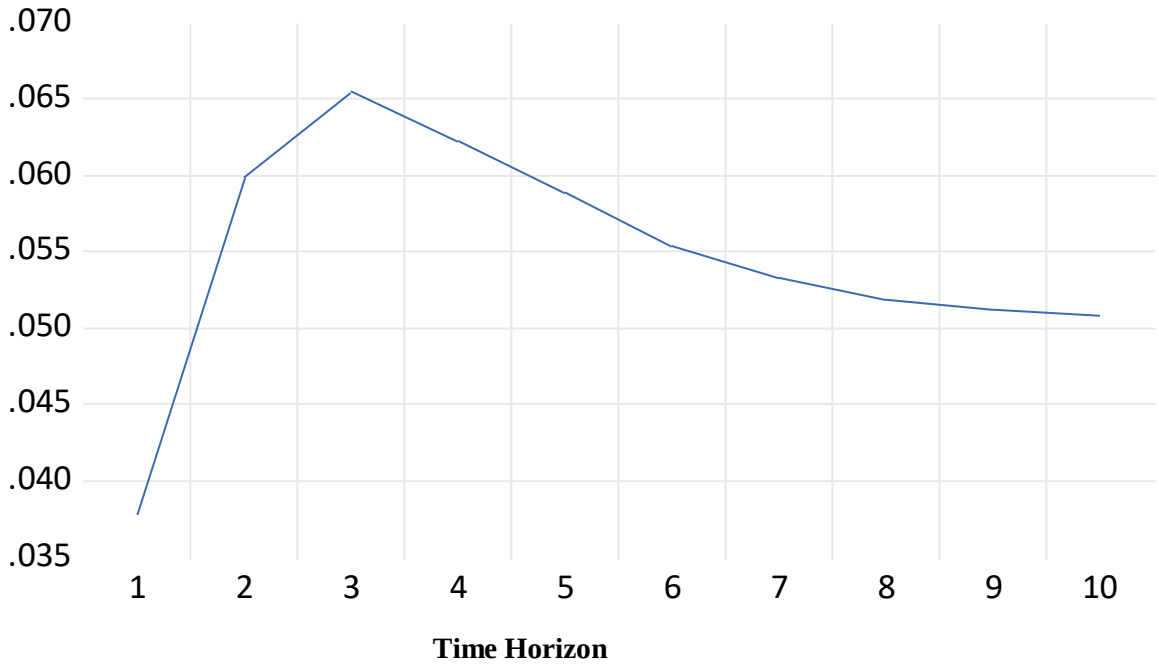
Industry-26

Response of DLNEMP to DLNGVA Cholesky One S.D. (d.f. adjusted) Innovation
± 2 analytic asymptotic S.E.s



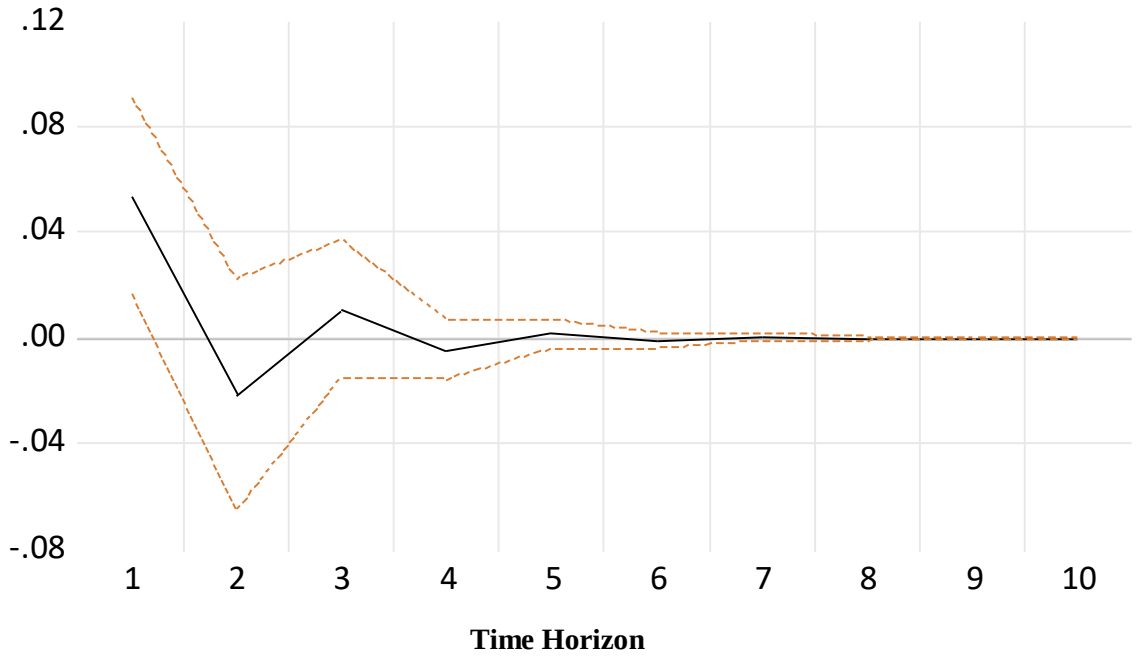
Industry-27

Response of LN_EMP to LN_GVA Cholesky One S.D. (d.f. adjusted) Innovation



Industry-28

Response of DLNEMP to DLNGVA Cholesky One S.D. (d.f. adjusted) Innovation
± 2 analytic asymptotic S.E.s



5. Conclusion

Strict labour regulations are usually said to reduce employment significantly. They motivate employers to adopt capital intensive technology which may result in rapid value added growth but not employment. As a matter of illustration this study aimed at focusing on the wage elasticity of employment other than the growth elasticity, in the Indian manufacturing sector for each of the two-digit groups of the industries.

Three different methods have been adopted to pursue the analysis. First, OLS estimates of growth and wage elasticity of employment are estimated considering a single equation with employment as a function of value added and wage rate. Since value added involves endogeneity bias a-two-equation system has been proposed and the equations are estimated by 2SLS. The estimates are compared from both the methods and the conclusions are drawn accordingly. As co-integration test suggests, not even a single co-integrating vector exists in most of the cases (industry groups), the estimation of these equation(s) is not justified. Alternately, the time series framework has been adopted as a third approach. A vector auto-regression model has been attempted (and vector error correction model for the groups with at least one co-integrating vector) and the variance decomposition analysis has been carried out to reflect on the impact of wages and value added on employment.

The econometric approach suggests that there is a considerable overlap between the estimates obtained from OLS and 2SLS methods. In a large number of cases, whether capital or labour intensive, the growth elasticity of employment is statistically significant. However, the wage elasticity of employment is negative and significant only in a few cases. In other words, rapid growth through its scale effect is able to raise the quantum of employment while the wage sensitivity of employment is rather negligible. Looking at the time series results similar findings get substantiated with strong evidence. While value added variance accounts for a significant part of the employment variance, the wage variance, with a few exceptions, does not comprise a noticeable part of the employment variance. Hence, the wage flexibility is less likely to be effective in raising the employment growth. The technological configurations are such that human capital is required less; even with significant reductions in wages, employment is unlikely to shoot up. On the other hand, rapid expansion in the production can impact employment positively notwithstanding the adoption of the capital-intensive technology. These patterns are evident in the case of both capital and labour intensive industries.

Another important finding relates to the fact that employment variance comprises an important component of value added variance. Any negative shock in employment can affect value added growth drastically through the deceleration in demand. Similarly, wage fall can also affect growth adversely. Hence, the wage flexibility argument needs to be interpreted carefully as any attempt to reduce wages with a view to raising the employment may actually cut down production. The overall finding of the study suggests that instead of experimenting with wage-cuts expansion in production is more likely to restore employment. As a policy implication, support for exploration of larger markets and expansion in production would be effective in generating growth with employment. Without compromising with the wage income possibilities of growth are promising which in turn due to the scale effect can impact employment positively.

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Appendix: Name of the Industry Groups

10 - manufacture of food products, 11 - manufacture of beverages, 12 - manufacture of tobacco products, 13 - manufacture of textiles, 14 - manufacture of wearing apparel, 15 - manufacture of leather and related products, 16 - manufacture of wood and of products of wood and cork,except furniture; manufacture of articles of straw and plaiting materials, 17 - manufacture of paper and paper products, 18 - printing and reproduction of recorded media (this division excludes publishing activities), 19 - manufacture of coke and refined petroleum products, 20 - manufacture of chemicals and chemical products, 21 - manufacture of pharmaceuticals, medicinal chemical and botanical products, 22 - manufacture of rubber and plastics products, 23 - manufacture of other non-metallic mineral products, 24 - manufacture of basic metals, 25 - manufacture of fabricated metal products, except machinery and equipment, 26 - manufacture of computer, electronic and optical products, 27 - manufacture of electrical equipment, 28 - manufacture of machinery and equipment n.e.c, 29 - manufacture of motor vehicles, trailers and semi-trailers, 30 - manufacture of other transport equipment, 31 - manufacture of furniture, 32 - other manufacturing, 58 - publishing activities and Others