

DETERMINANTS OF EMPLOYMENT POTENTIAL IN INDUSTRIAL SECTOR: AN INDIAN PERSPECTIVE

Deepak Kumar BEHERA¹

Abstract: The scale and scope of industrial employment is considered as the path of transformation of an economy. But developing countries like India seems to have missed this transformation trajectory where it's share grows in terms of income but not in employment. Albeit, growth of industrial sector income can spur the growth of service sector, the growth of the former is necessary for the latter and both need a commensurate growth of agricultural output. Therefore, the pertinent questions are what is its potential to generate employment? Can it assume as the emerging sector to accommodate the surplus labour? In other words, the paper examines the employment dynamics in both organised and unorganised Industrial sector by empirically estimates the effects of macro-economic variables by using the data from 1972-73 to 2011-12. Considering the Keynesian theoretical explanation about the change in employment that depends on expected output or change in output, the empirical estimations corroborate the view that performance of industrial sector determines the capacity to generate employment in the sector where employment in organised industrial is positively influenced by non-industrial income, lagged industrial output, investment, non-agricultural import and negatively associated with labour productivity and capital-labour ratio. . It is surprising to see that non-agricultural export have shown a positive impact to employment but very minimal. The employment in unorganised industry is positively influenced by non-industry income, lagged output, and gross capital formation. It is negatively influenced by capital-labour ratio, labour productivity, and non-agricultural export.

Keywords: India, Industrial Sector, Employment, Organised Sector, Unorganised Sector, Investment, labour Productivity, Non-agricultural import

JEL classification: C22, E12, J2

1. Introduction

Modern sector's growth is the hallmark of take-off stage of growth and is the most celebrated path of modern development of the society. Manufacturing sector, within the modern sector historically played an important role in accelerating growth, building productive capacity of nations and became backbone of modern developed countries experience. The scale and scope of industrial employment is considered as the path of transformation of an economy. Historically, it is also the experience of most western developed nations in the process of economic development, often described as the structural transformation of the economy [Fisher 1939; Clark, 1940; Kuznet, 1971; Chenery and Syrquin, 1975. According to them, as economy develops, the proportion of output and labour force in the economy moves from the agricultural sector to industry, subsequently to service sector. However, developing countries or the late entrants into development seem to have missed this transformation trajectory as

¹ Assistant Professor, Department of Humanities and Social Sciences, National Institute of Technology Patna, An Institute of National Importance under MHRD, Govt. of India, Ashok Rajpath, Patna, Bihar-800 005, India. E-mail: dkbehera1982@gmail.com , dkb@nitp.ac.in

industrial activity that takes place is highly capital intensive in nature. Therefore, industrial sector share grows in terms of income but not in employment. Albeit, growth of industrial sector income can spur the growth of service sector, the growth of the former is necessary for the latter and both need a commensurate growth of agricultural output.

The latest NSS quinquennial survey (2011-12) by NSSO on employment in India reveals that only 24.6 per cent of work force are engaged in industrial sector which contributes 27.5 per cent of total GDP (compared to services sector which absorbs almost 28 per cent of total work force and accounts for 58 per cent to total GDP). This indicates parochial peculiar path of growth, where growth of the services sector precedes a manufacturing growth in income.

If industrial sector growth is necessary for the growth of service sector to leads the growth process, then the pertinent questions are what is its potential to generate employment? Can we assume it as the emerging sector to accommodate the surplus labour? In other words, the paper examines the employment dynamics in this sector by empirically estimates the effects of macro-economic determining factors.

The outline of the paper follows; the second section deals with the historical background of industrial policy in India, where as third chapter discusses the structure and nature of industrial growth. Fourth section empirically estimates the effects of determining employment factors in industry. Finally, a summary and policy implications of the paper are given in the fifth section.

2. A Brief Historical Background of Industrial Policy in India

India adopted a development strategy based on central planning after Independence with an objective of rapid industrialisation. The Industrial Development (and Regulation) Act 1956 defined the framework of industrial strategy of reservation of industries under schedules A, B & C for public, joint and private investments. The 'Commanding Heights' of public sector was conferred on it to play a complimentary role to private sector by augmenting infrastructure, basic and capital goods, and sectors, where private investments were lacking. The strategy, inspired by the contemporary development models, was exemplified in the Mahalanobis model of growth, Lewis model and Big Push models. The initial performance of industrial growth during 1956-64 was highly successful, which grew at 7.8 per cent per annum, a record which is not yet surpassed. However, the mid-sixties industrial stagnation transpired several policy as well as macroeconomic constraints for industrial growth (Nayyar, 2007). Recognising wage-goods constraint to accumulation, government launched a green revolution strategy in mid sixties – a condition in Lewis model that the food production not to fall with the rise of modern sector to be satisfied. Famines, wars and foreign exchange shortages and political instabilities adversely affected the public investment during the period and thereby the industrial growth. Another stream of thought argued that controls and regulations have caused distortions in resource allocation, encouraged unproductive rent seeking activities that have made the former inefficient (Ahluwalia, 1985). Since eighties, the industrial policy was changed with a cautious and partial liberalisation by diluting some of the provision of IDA 1956. In the

mid eighties, this was further relaxed during Rajiv Gandhi government and “delicensed several industries; increased the ceiling of investment for big business houses; relaxed rules for importation of foreign technology; replaced quantitative trade restrictions with tariffs, and lowered tariff barriers overall, reduced marginal tax rates on personal and corporate income and simplified tax rules; and, finally, announced that public sector reforms was necessary” (Varshney, 2001)². Import of capital goods against replenishment licences was granted to small-scale industries and non small-scale industries (Das, 2003)³. There was also easing of licensing restrictions, particularly with respect to expansion and diversification within the same product group, broad banding (Kathuria, 1995)⁴. The 1980s saw changes in the external and industrial sector in matters pertaining to licensing for scale and technology as well as quantitative restrictions on imports and tariff rates (Das, 2003). Industrial export growth also improved in the second half of the 1980s as import restrictions moved from quotas to tariffs (as a first phase of trade reforms) although at very high levels, and a steady depreciation of the currency in nominal terms. The turn around in industrial output growth in this decade has been variedly attributed to liberalisation, improvement in public investment and public sector performance (Ahluwalia 1992; Nagaraj 1990). A policy of import liberalisation and a liberal external borrowing inspired a revival in industrial growth. The 1991 external crisis led to introduction of ‘reforms by stealth’ that had far reaching implications for the strategy as a whole.

A concrete shift in the policy towards liberalisation has been introduced in 1990-91. Abolition of licensing, near complete import liberalisation (barring agricultural products), rationalisation of tariff structure, opening up major sectors for foreign direct investment, capital market reforms, exchange rate reforms, and financial sector reforms comprised completely a comprehensive framework to mark a shift towards a new industrial policy. This marked policy shift from protectionist, public sector-led, regulated regime to market oriented, pro-business, and liberal regime to promote certain segments of the manufacturing sector [Rani and Unni (2004), Tendulkar and Bhavani (2007), Panagariya (2008)]. The performance of industry in the new changed policy regime after 1991 reforms has not any radically altered the growth rates. The industrial growth rates have in fact decelerated from peak rates of 7.04 per cent during 1983-87 to 5.59 per cent during 1987-94. Even for the period during 1994-00, the growth rate has marginally improved to 6.62 per cent. The growth rates however accelerated towards 9.75 per cent during 2004-08. On a comparative basis, several scholars commented that the long term growth rate of industry which stood at 7.33 per cent during the post-reform period of 1993-08 is comparably much lower than

² Mass Politics of Elite Politics? India’s Economic Reforms in Comparative Perspective’ in Jeffery Sachs, Ashutosh Varshney and Nirupam Bajpai (eds), *India in the Era of Economic Reforms*, Oxford University Press, New Delhi.

³ Manufacturing Productivity under Varying Trade Regimes: India in the 1980s and 1990s’, Working Paper No 107, Indian Council for Research on International Economic Relations, New Delhi.

⁴ Kathuria, Sanjay (1995), “Competitiveness of Indian Industry” in Dilip Mookherjee (ed), *Indian Industry: Policies and Performance*, Oxford University Press, Delhi.

fast growing economies such as China, Brazil, or many East Asian countries, which have clocked a double digit growth. Particularly, when entire gamuts of reforms are aimed at boosting the sector's growth performance, what is witnessed is rather disappointing. We shall discuss the trends in more detailed way in the next section.

3. Structure and Nature of Industrial Growth during 1983–2012

The industrial sector, by activity, which comprises of four sub-sectors, viz, mining and quarrying, manufacturing, electricity, gas and water supply and construction, accounted 24 per cent share of output in GDP in 1983-84 and since then it increased its share to 28 per cent in 2010-11 (see Figure.1). Much of the increase indeed happened only in the last few years since 2004-05. But there is no significant change in share of industrial employment in the country in the last half a century. The share of industrial employment in 1983-84 which used to be 13.78 per cent of total work force has increased to 18.71 per cent during 2004-05 and further to 24.61 per cent during 2011-12. The post-reform period witnessed a low percentage share of industrial employment compared to pre-reform period.

Figure 1: Percentage Share of Output and Employment in Industrial Sector



Source: Income and Employment data are computed from Central Statistical Office and NSSO respectively.

According to the 66th round data of the NSSO, in the year 2011-12 almost 31 million jobs were created in the industrial sector, which added Rs.95560 crore to industrial output compared to 2004–05 period where almost 29 million jobs were added which contributed Rs. 174068 crore. This suggests the growth of industrial output increased from 6.69 per cent during 2004–05 to 8.22 per cent in 2010-11, where the growth of employment has slightly increased from 3.90 per cent in 2004-95 to 4.48 per cent in 2011-12 (see Table-1). It indicates that employment generation in industrial sector is growth driven rather than employment driven.

Looking at the trend, we observe that the rate of growth of productivity in the sector has increased from 3.13 per cent in the pre-reform period to 3.15 per cent in the post-reform period. However, during the first decade of the post-reform period from 1993–12, the productivity grew at a rate of 2.79 per cent per annum but impressively increased to 3.74 per cent in 2011-12. This is due to high output growth that induce to

increase the productivity in later phase. Such a trade-off between productivity and employment is influenced by capital.

In terms of technology, which can displace labour by adding an extra unit of capital into the sector, the post-reform phase has shown a declining growth at a rate of 3.84 per cent over 5.19 per cent in pre-reform period. Such a decline in capital-labour ratio suggests an employment creation in the sector. But second phase of reform period suggests that a steady rise in the capital-labour ratio indicates a labour-displacing capital intensive technological progress taking place in the sector.

Table 1: Output, Employment and Productivity Trends in Industrial Sector

Year	GDP	Employment	Labour Productivity	Capital-Labour Ratio	Elasticity
1983 to 1993-94	6.13	3.00	3.13	5.19	0.49
1993-94 to 2004-05	6.69	3.90	2.79	2.88	0.58
2004-05 to 2011-12	8.22	4.48	3.74	5.8	0.55
1993-94 to 2011-12	7.28	4.13	3.15	3.84	0.57
1983 to 2011-12	6.87	3.72	3.15	4.32	0.54

Source: Same as for Figure 1

Table.2. Output and Employment Trends in Industrial Sector

Year	Percentage Share				Growth				
	1983	1993-94	2004-05	2011-12	1983 to 1993-94	1993-94 to 2004-05	2004-05 to 2011-12	1993-94 to 2011-12	1983 to 2011-12
GDP	26.08	26.80	27.93	27.51	6.13	6.69	8.22	7.28	6.87
<i>Mining</i>	3.09	3.27	2.86	2.06	6.44	5.02	3.51	4.43	5.14
<i>Manufacturing</i>	14.46	14.63	15.25	15.70	5.97	6.70	8.90	7.55	6.98
<i>Electricity</i>	1.61	2.24	2.11	1.88	9.43	5.71	6.72	6.10	7.28
<i>Construction</i>	6.92	6.66	7.70	7.87	5.43	7.71	8.78	8.12	7.15
Employment	13.83	15.01	18.70	24.61	3.00	3.90	4.48	4.13	3.72
<i>Mining</i>	0.60	0.72	0.56	0.55	4.03	-0.46	0.20	-0.20	1.29
<i>Manufacturing</i>	10.70	10.68	12.20	12.96	2.13	3.08	1.33	2.40	2.30
<i>Electricity</i>	0.28	0.37	0.26	0.54	5.04	-1.37	11.52	3.46	4.02
<i>Construction</i>	2.24	3.24	5.68	10.56	5.99	7.18	9.77	8.18	7.39

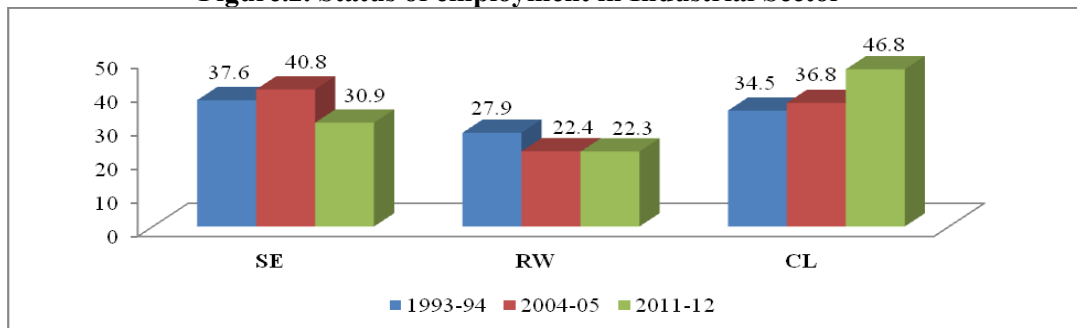
Source: Computed from various National Account Statistics and NSSO report.

Employment elasticity for the period 1983–12, which is a useful measure in economic analysis that indicates the rate of employment creation from a growth of output in agriculture, was 0.54. Compared to the pre-reform period, the employment

elasticity has increased from 0.49 to 0.57 in the post-reform period. However, second phase of post-reform phase shows a declining trend that indicates a slow-down of employment creation during the period. It suggests that the sector which supposes to absorb the surplus labour also facing a declining trends during post-reform phase due to technological progress that replaces labour in the economy.

While looking at the sectoral analysis of industrial sector, the output share of Mining constitutes 2.06 percent, manufacturing holds a lion's share of almost 15.70 per cent, electricity constitutes 1.88 per cent and construction sector, which is one of growth drivers in the economy, contributes close to 8 per cent during 2011-12. Whereas employment share is concerned, manufacturing sector generates 12.96 per cent followed by construction by 10.56 per cent, while in the other two sectors which are supposed labour intensive sectors, increases marginally (See Table-2). Comparing between pre-reform and post reform phase, only construction sector has shown a significant increased percentage point share in terms of both output and employment in post-reform phase. In terms of growth, output and employment of construction sector performed at a high rate during post-reform period. The construction sector employment has actually shown a steady growth in the two decades where as manufacturing sector employment was sluggish during post-reform phase.

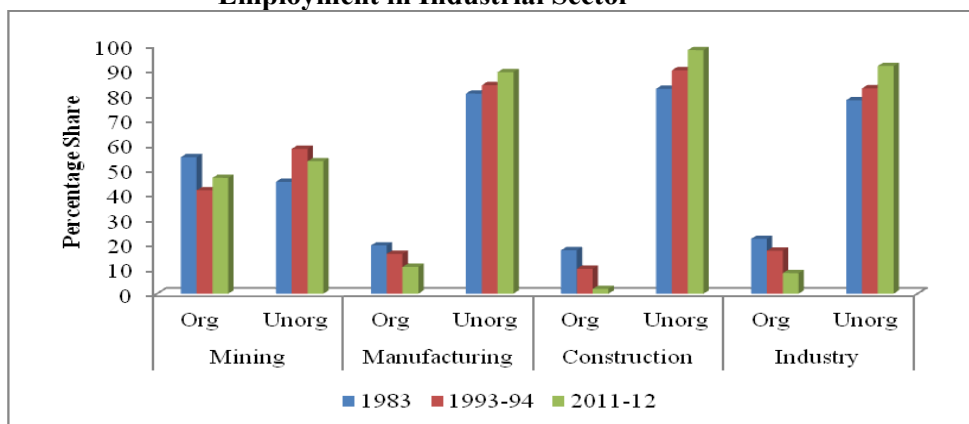
Figure.2. Status of employment in Industrial Sector



Source: Same as for Figure 1.

The composition of employment status in industrial sector is presented in figure-2. It can be observed that an overwhelming majority of 46.8 per cent belong to casual labour category, 30.9 per cent belong to self employed and only 22.3 per cent are regular salaried workers in the Indian industry. Thus the quality of employment in India to an overwhelming majority of workers is disappointing, such that they either live on self-exploitation or daily wages – similar to what exists in agricultural sector.

In terms of quality of employment by nature, the share of unorganised sector workers is found to be 91 per cent in 2011-12, which used to be 78 per cent in 1983 (see Figure-3).

Figure3: Percentage Share of Organised and Unorganised Sector Employment in Industrial Sector

Source: Same as for Figure 1

The manufacturing sector, biggest employer among industry, had its informal worker share rose from 81 to 89 per cent during the same time. Similarly, in construction industry, share of unorganised sector employment has increased from 82.52 per cent in 1983 to 98 per cent in 2011-12. Electricity, gas and water supply sector is the only sector which contributes higher percentage organised employment for being perhaps the public sector undertakings. Another important issue about unorganised workers is the growing informalisation of the formal sector in the industry. The increasing contractualisation in the industry has led the increase in the share of informal workers. It is interesting that in the so called formal sector in the industry, the regular salaried formal workers comprise around 36 per cent and its share is shrinking!

Table 3: Growth of Employment in the Organised and Unorganised Industrial Sector

Year	Mining	Manufacturing	Electricity	Construction	Industry
Total					
1983 to 1993-94	4.03	2.13	5.04	5.99	3.00
1993-94 to 2011-12	-0.20	2.40	3.46	8.18	4.13
1983 to 2011-12	1.29	2.30	4.02	7.39	3.72
Organised Sector					
1983 to 1993-94	1.18	0.20	2.50	0.26	0.52
1993-94 to 2011-12	0.43	0.15	-0.55	-1.37	-0.05
1983 to 2011-12	0.70	0.17	0.52	-0.79	0.15
Unorganised Sector					
1983 to 1993-94	6.76	2.55	16.97	6.91	3.61
1993-94 to 2011-12	-0.69	2.75	8.11	8.70	4.73
1983 to 2011-12	1.90	2.68	11.20	8.06	4.33

Source: computed through residual approach

In terms of growth of employment by nature in the sectors, post-reform period witnessed a negative growth in the organised industrial sector (see table 3). This is due

to negative growth in electricity and construction sector. Though there is a declining growth of employment in mining and manufacturing but constitutes a positive growth compared to other two sectors whose growth rates are negative during post-reform phase. When looked at employment growth in unorganised industrial sector, there is a clear increasing trend in the post-reform period. This is largely accounted by a massive increase in construction sector followed by marginal growth in manufacturing sector. One should remember that much of this employment is in self-employed and casual labour. Thus what one can starkly observe is the fact that the growth of output in industry did produce a growth of employment, but most of it is informal employment, which is poor in terms of quality.

From the above discussion, it can be found that there is a clear trend towards declining labour absorptive capacity of growth in the industrial during the post-reform period. The organised sector absorptive capacity has virtually negative, while for unorganised sector, except construction industry, it has declined in the post-reform period. Further, it has also observed that the labour productivity has been increasing. This would necessitate greater factor substitution to sustain growth, which eventually can erode employment.

4. Employment Determination in Indian Industrial Sector: An Empirical Analysis

We now proceed to estimate the determinants of employment in the industry. We shall survey some of the literatures that justify the set of determinants that we assumed in our model. Bhattacharya, Bhanumurthy, Kar and Sakthivel (2004) suggested that, in a demand and supply equilibrium framework, factors like agricultural output, elasticity use in industry, public investment in industry; and aggregate expenditure determine industrial output. Bhattacharya and Mukherjee (2004) also pointed out that industrial sector output is a function of lagged agricultural output, industrial production at the national level and electricity consumption in industries. Bhanumurthy and Sinha (2004) established a relationship between growth of industrial output and the growth in agriculture, non-food credit, real public expenditure, real imports and real investment; the study did some useful projection for industrial output. Maiti and Rao (1995) have shown that policy variables like government consumption and investment expenditures have played a crucial role in influencing the industrial production in India; besides growth of the agricultural output has a mixed role on demand and supply side for being wage goods. Sachdev and Ghosh (2009) forecasted the industrial output growth through average capital-output ratio. That average ratio is determined through supply side factors such as non-agricultural imports, oil price index and agricultural output and demand side factors such as government consumption. The impact of liberalisation on industrial sectors efficiency is also allowed through the dummy variable. Narayan and Ghose (2009) used vector error correction methodology to estimate the industrial output growth through industrial capital formation, price deflator in industrial sector, dummy for 1991 reforms, money supply, fuel price index, corporate savings, bank rate, budget deficit, non-agricultural export, agricultural output and price deflator in agricultural sector. Kar and Pradhan (2009) formulated industrial output to be function of the productivity in the sector and capacity utilisation. And the

capacity utilisations in the industry are sensitive to change in demand. So the aggregate industrial output growth is determined by capital stock, agricultural output, autonomous expenditure, industrial price, lagged industrial output, partial liberalisation dummy and liberalisation 95 dummy (peak effect of liberalisation in 1995 following large deregulation of the economy in 1994). Bhide and Parida (2009) used OLS technique to estimate the industrial output by categorising specific industry wise analysis. For example in mining and manufacturing industry together, output is determined through capital stock in the sector, foreign direct investment in the sector, capital stock in electricity sector and ratio of compensation to employee by implicit price deflator for overall GDP. In case of construction industry, the determinants of output are depending on capital stock in the sector and electricity sector as well. For the electricity sector, output is driven by capital stock in the sector, foreign direct investment in the electricity sector and the ratio of compensation to employee by implicit price deflator for overall GDP. Murthy and Soumya (2007) examined that influence of real net capital stock, aggregate demand for domestically produced goods (composition of real private absorption, real government consumption expenditure, real aggregate public investment and net export) on manufacturing output and found a statistically significant relationship.

There are some scholars who estimated determinants of employment particularly in organised manufacturing sector. Like Goldar (1987) who examined the employment for the Indian manufacturing industry (for 20 major industries) as a function of wage rate, output, output price index, lagged employment, industrial dummy and year dummy for the period of 1960 to 1977. He found that despite an increase in real wage rate, employment has comedown; still employment has a positive relation with output. Alessandrini's (2009) studied the jobless growth in Indian manufacturing sector for 15 large states for the period 1980-2004, where he examined the relationship between employment in the sector with some explanatory variable such as capital, wage, output and inter-sectoral terms of trade between agriculture and industry. And he found that, *inter alia*, whenever agricultural prices relative to manufacturing prices have fallen, the employment in organised manufacturing has improved. Further, labour demand is elastic to aggregate output growth rather than to increments in registered manufacturing production. The result also shows that in those states where the share of the unregistered manufacturing has risen over time, the jobless growth problem has worsened. Goldar (2011) empirically examined the determinants of growth of employment in organised manufacturing industry during 2003-08 by taking the panel data analysis of pooled OLS method. He found that an increase in industrial sector employment is positively influenced by real gross value added and the labour reforms index in the sector.

From the survey of above literature, we understand that there is evidence on the proposition that employment has a positive association with output growth. Further, industrial output is determined a variety of factors such as autonomous expenditure, agricultural output, capital formation, capacity utilisation, relative price, government expenditure and so on. We shall use some of these in our model which we specify in the below.

$$Y_{OI} = F(NAGIMP, WPI, NIY_{OI}, Y_{OI(t-1)}, GCEXP, LP_{OI}, GCF_{OI}, K / L_{OI}, NAGEXP) \quad (4.7)$$

Putting Y_{OI} component in the equation 4.3, the final equation will be;

$$\begin{aligned} \ln(E_{OI}) = & \alpha + \beta_1 \ln(NAGIMP) + \beta_2 \ln(WPI) + \beta_3 \ln(NIY_{OI}) + \beta_4 \ln(Y_{OI(t-1)}) + \beta_5 \ln(GCEXP) \\ & + \beta_6 \ln(LP_{OI}) + \beta_7 \ln(GCF) + \beta_8 \ln(K / L)_{OI} + \beta_9 \ln(NAGEXP) + \beta_{10} L_{91} + \mu \dots \dots \dots (4.8) \end{aligned}$$

Like wise, for Unorganised Industrial Sector,

$$\ln(E_{UI}) = F[\ln(Y_{UI})] \dots \dots \dots (4.9)$$

Supply of output is given by;

$$Y_{UI}^S = F(NAGIMP, WPI, Y_{UI(t-1)}) \dots \dots \dots (4.10)$$

Demand for output is a function of;

$$Y_{UI}^D = F(NIY_{UI}, LP_{UI}, GCF, K / L_{UI}, NAEXP) \dots \dots \dots (4.11)$$

Equilibrium now requires $S_{UI} = D_{UI}$

$$Y_{UI} = Y_{UI}^S \cong Y_{UI}^D \dots \dots \dots (4.12)$$

$$Y_{UI} = F(NAGIMP, WPI, NIY_{UI}, Y_{UI(t-1)}, LP_{UI}, GCF, K / L_{UI}, NAGEXP) \dots \dots (4.13)$$

Putting Y_{UI} variables in equation 4.9;

$$\begin{aligned} \ln(E_{UI}) = & \alpha + \beta_1 \ln(NAGIMP) + \beta_2 \ln(WPI) + \beta_3 \ln(NIY_{UI}) + \beta_4 \ln(Y_{UI(t-1)}) + \beta_5 \ln(LP)_{UI} \\ & + \beta_6 \ln(GCF)_{UI} + \beta_7 \ln(K / L)_{UI} + \beta_8 \ln(NAGEXP) + \beta_9 L_{91} + \mu \dots \dots \dots (4.14) \end{aligned}$$

Where, NAGIMP=	Non-Agricultural Import
WPI=	Relative Price
NIY=	Non-Industrial Output (addition of agriculture and services output)
$Y_{(t-1)}$ =	Last year Industrial Output
GCEXP=	Government Consumption Expenditure,
NAGEXP=	Non-Agricultural Export
LP=	Labour productivity
GCF=	Gross capital formation
K/L=	Capital-labour ratio

The expected relationships in the above equation are employment to be positively related to imports, prices, income, and capital formation and negatively to labour productivity, and technology.

4.2. Data Sources and Methodology

The data for the estimation is drawn from three different sources. Firstly, the National Account Statistics published by the Central Statistical Organisation (CSO) for output, investment, net fixed capital and government consumption expenditure. Second, data on oil price index, export and import are collected from Handbook of Statistics on Indian Economy published by Reserve Bank of India. And finally, total employment figure are provided by National Sample Survey Organisation (NSSO) and Census Data and for the organised sector, employment data is collected from the Employment Market Information (EMI) series of the Director General of Employment and Training publishing in the Annual Employment Reviews. The residual method to get unorganised sector employment has been used by subtracting the total employment data to organised sector employment data. Then, aggregate Industrial sector were clubbed by adding mining and quarrying; manufacturing; electricity, gas and water supply; and construction sector figure. The data period for covering to estimate the employment determinants are from 1972-73 to 2011-12. The data restricts to 2011-12 as National Sample Survey Office (NSSO) only gathers the employment figures up to the above period. There is no survey conducted after 2011-12 by NSSO (only agencies to collect and estimate the employment figure), hence the present study only captured the data till 2011-12. The data which are collected from NAS are in real value at 1999-00 prices. The data on export and import at 1999-00 prices are derived through GDP deflator.

In order to examine the above model specification equation, simple Ordinary Least Square (OLS) technique is employed. Dicky-Fuller and Augmented Dicky-Fuller test have been used for testing Stationarity of the variables that are to be used in regression.

4.3. Empirical Results

Using the standard unit root test with the help of Dicky Fuller/Augmented Dicky Fuller Test, it is found that all of the variables are of first order, thereby attained Stationarity after taking first difference (see Annexure-1). The estimation results for organised and unorganised sector of determinants of employment growth in the industry are presented in table.4 and 5 respectively.

Organised Industrial Sector Employment

Let's first look at the estimation of organised employment determinants for the industry. The overall estimation is satisfactory with an R-square of 0.70. All the variables have expected signs and eight out of ten explanatory variables are statistically significant. Due to its insignificant value, the variables namely prices and government expenditure are dropped from the final estimation. And we found that industrial lagged output has the highest elasticity of 0.122, followed by non-industrial income i.e. 0.52. Gross Capital formation does have increased by 0.025 per cent to the employment, where elasticity of non-agricultural import is 0.021. It is surprising to see that non-

agricultural export have shown a positive elasticity of 0.008 to employment but it is very minimal. On the negative side, one per cent increase in capital-labour ratio displaces 0.625 per cent decline in employment, where labour productivity and liberalisation policy dummy displaces labour by 0.117 and 0.030 per cent respectively. The overall result suggests that it is the income and investment in organised sector which has some deterministic influence on employment transformation in the economy.

Table.4. Regression Results on Employment Determination in Organised Industrial Sector (Number of observations 35)

<i>Dependent Variable: $\Delta \ln(E)$</i>	Organised Sector		
Independent Variable Name#	Step-I	Step-II	Step-III
Constant	0.049 (6.01)*	0.044 (5.62)*	0.042 (5.32)*
$\Delta \ln(\text{NAGIMP})$	0.023 (2.46)*	0.023 (2.45)*	0.021 (2.23)*
$\Delta \ln(\text{WPIOIL})$	-0.001 (-1.67)	---	---
$\Delta \ln(\text{NIY})_{\text{org}}$	0.058 (2.01)*	0.061 (2.21)*	0.052 (1.96)*
$\Delta \ln(Y_{t-1})_{\text{org}}$	0.104 (3.14)*	0.121 (3.87)*	0.122 (3.91)*
$\Delta \ln(\text{GCEXP})$	-0.052 (-1.76)	-0.036 (-1.32)	---
$\Delta \ln(\text{LP})_{\text{org}}$	-0.106 (-2.87)*	-0.127 (-3.62)*	-0.117 (-3.12)*
$\Delta \ln(\text{GCF})_{\text{Pub}}$	0.018 (1.96)*	0.025 (2.11)*	0.025 (2.10)*
$\Delta \ln(\text{K/L})_{\text{org}}$	-0.655 (-5.99)*	-0.635 (-5.19)*	-0.625 (-4.89)*
$\Delta \ln(\text{NAGEXP})$	0.008 (1.99)*	0.012 (2.14)*	0.008 (1.96)*
L_{91}	-0.027 (-5.01)*	-0.031 (-5.67)*	-0.030 (-5.34)*
R^2	0.70	0.69	0.68
Durbin-Watson (DW) Test	1.74	1.67	1.65
Prob (F-Statistics)	0.000	0.000	0.000

Note: * at 5% significant level, Δ is at first difference

Unorganised Industrial Sector Employment

The results of estimation of determinants of employment of unorganised labour in industry are given in table 5. The estimated equation has a considerable explanatory power, and all the variables have expected signs. Seven out of nine variables have significant coefficients and two did not. The equation performed better when price and non-agricultural import variables are dropped. The employment in unorganised industry is positively influenced by non-industry income, lagged output, and gross capital formation. It is negatively influenced by capital-labour ratio, labour productivity, and non-agricultural export. From the result, we found that first, last year output in industrial sector has the highest and positive elasticity of 0.311. Second, non-industry income has an elasticity of 0.070 and capital formation has an elasticity of 0.025. On the other hand, Capital-labour ratio exhibited largest and negative elasticity of 0.87. Employment has a negative elasticity with respect to labour productivity and non-agricultural export at 0.085 and 0.014 individually. Liberalisation dummy is found to be positive and significant, but the value is very minimal. It is suggested that for employment to grow, the capital formation had to rise faster than rise in productivity and capital-labour ratio.

Table.5. Regression Results on Employment Determination in Unorganised Industrial Sector

Dependent Variable: $\Delta \ln(E)$	Unorganised Sector		
Independent Variable Name#	Step-I	Step-II	Step-III
Constant	0.059 (7.16)*	0.059 (7.17)*	0.061 (7.41)*
$\Delta \ln(\text{NAGIMP})$	0.006 (1.66)	0.006 (1.65)	---
$\Delta \ln(\text{WPIOIL})$	0.000 (1.62)	---	---
$\Delta \ln(\text{NIY})_{\text{Unorg}}$	0.075 (4.03)*	0.073 (3.77)*	0.070 (3.48)*
$\Delta \ln(Y_{\text{unorg}})_{t-1}$	0.302 (5.03)*	0.308 (5.51)*	0.311 (5.73)*
$\Delta \ln(\text{LP})_{\text{unorg}}$	-0.061 (-1.97)*	-0.072 (-2.07)*	-0.085 (-2.29)*
$\Delta \ln(\text{GCF})_{\text{Unorg}}$	0.025 (2.12)*	0.025 (2.12)*	0.025 (2.11)*
$\Delta \ln(\text{K/L})_{\text{Unorg}}$	-0.847 (-8.76)*	-0.867 (-9.21)*	-0.870 (-9.45)*
$\Delta \ln(\text{NAGEXP})$	-0.009 (-2.03)*	-0.011 (2.11)*	-0.014 (-2.19)*
L_{91}	-0.001 (-1.86)*	0.001 (1.96)*	0.001 (1.96)*
R^2	0.79	0.79	0.79
Durbin-Watson (DW) Test	1.52	1.61	1.62
Prob (F-Statistics)	0.000	0.000	0.000
Number of Observation	35	35	35

Note: * at 5% significant level, Δ is at first difference

5. Conclusion and Policy recommendation

In terms of growth, industrial sector only contributes 26 per cent of total GDP in the economy, but provides employment to 19 per cent of the workforce. Though there is some growth of employment in the recent period, the rate of growth of employment in the sector is fluctuating in the medium run and not increasing in the long run. This has reflected in terms of falling employment elasticities. Not only employment elasticities with respect to output are falling, the employment elasticities of investment are turning negative. Thereby, faster growth of output alone can raise employment in the sector. The structure of the employment in the sector is such that 90 per cent of employment is informal. Among these, 80 per cent constitute self-employed and casual labour. It is disheartening to note that even in the so called organised industry, informal labour constitute 60 per cent. Given the preponderance of self-employed and casual labour, the incidence of disguised unemployment could be prevailing in considerable measure, but no estimates are available. Further, we observe that the labour productivity and capital labour ratio in aggregate as well at disaggregate level has been increasing. Capital productivity has been falling. This would necessitate greater factor substitution to sustain growth which eventually can erode employment; the growth of employment then is sustained by an increase in capital accumulation over period.

What we observe at disaggregate level in industry is that between the pre and post-reform period, there has been an increase in employment in the latter. However, all the growth occurred in unregistered sector while in registered sector there has been a decline in employment. Our econometric estimations have lent support to the above surmises that labour productivity and capital labour ratios have negatively influenced the employment creation and employment is driven by demand factors such as income

and capital formation. Our estimations have been robust and the estimated and actual values have remarkable overlapping.

References

- Ahluwalia, I.J. (1985). *Industrial Growth in India: Stagnation since the Mid-Sixties*. Oxford University Press, Delhi.
- Ahluwalia, I.J. (1992). *Productivity and Growth in Indian Manufacturing*. Oxford University Press, Delhi.
- Alessandrini, M. (2009). Jobless Growth in Indian Manufacturing: A Kaldorian Approach. Discussion Paper 99, *Centre for Financial & Management Studies*, SOAS , University of London, November.
- Bhanumurthy, N. R., & Sinha, S. (2004). Industrial Recovery: Can It be Sustained. *Economic and Political Weekly*, January 31, 405-407.
- Bhattacharya, B.B., Bhanumurthy, N.R., Kar, S., & Sakthivel, S. (2004). Forecasting State Domestic Product and Inflation: Macro-econometric Model for A.P, Karnataka and UP. *Economic and Political Weekly*, July 31, 3541-3550.
- Bhattacharya, B.B., & Mukherjee, M. (2004). Forecasting of State Domestic Product through Macro econometric Model: Tamil Nadu. *Discussion Paper Series No. 92/2004*, Institute of Economic Growth, New Delhi.
- Bhide, S., & Parida, P.C. (2009). Impact of External Economic Environment: An Assessment using a Macro-econometric model. Kirit S Parikh (ed) *Macro-Modeling for the Eleventh Five Year Plan of India*, on behalf of Planning Commission, Government of India, Academic Foundation Publication, New Delhi.
- Chenery, J.M., & Syrquim, M. (1975). *Pattern of Development 1950-1970*. Oxford University Press, London.
- Clark, C. (1940). *The Conditions of Economic Progress*. Macmillan, London.
- Das, D.K. (2003). Manufacturing Productivity under Varying Trade Regimes: India in the 1980s and 1990s'. *Working Paper No 107*, July, Indian Council for Research on International Economic Relations, New Delhi.
- Fisher, A.G.P. (1939). Production, Primary, Secondary and Tertiary. *Economic Record*, 15, 24-38.
- Goldar, B. (1987). Employment Growth in Indian Industry. *Indian Journal of Industrial Relations*, January, 22 (3), 271-285.
- Goldar, B. (2011). Organised Manufacturing Employment: Continuing the Debate. *Economic & Political Weekly*, April 2, XLVI (14), 79-80.
- Kar, S., & Pradhan, B.K. (2009). Shocks, Meltdowns, Policy Responses and Feasibility of High Growth in the Indian Economy: A Macro-econometric Approach. Kirit S Parikh (ed) *Macro-Modeling for the Eleventh Five Year Plan of India*, on behalf of

Planning Commission, Government of India, Academic Foundation publication, New Delhi.

Kathuria, S. (1995). Competitiveness of Indian Industry. in Dilip Mookherjee (ed), *Indian Industry: Policies and Performance*, Oxford University Press, Delhi.

Kuznets. S. (1971). *Economic Growth of Nations*. The Belkanap Press of Harvard University Press, Cambridge.

Maiti, P & Rao, R.K. (1995). Demand Side Factors and India's Industrial Growth. *Economic and Political Weekly*, 30 (33), 2070-2073.

Murty, K.N & Soumya, A. (2007). Effects of Public Investment on Growth and Poverty. *Economic and Political Weekly*, January 6, 42 (1). 47-59.

Nagaraj, R. (1990). Industrial Growth: Further Evidence and Towards an Explanation and Issues. *Economic and Political Weekly*, October 13, 2313-2332. .

Narayana, N.S.S., & Ghose, P.P. (2009). Macroeconomic simulations based on VEC Models. Kirit S Parikh (ed) *Macro-Modeling for the Eleventh Five Year Plan of India*, on behalf of Planning Commission, Government of India, Academic Foundation publication, New Delhi.

National Sample Survey Organisation (NSSO), Various Reports and Publications on Survey on Employment and Unemployment in India, Government of India, New Delhi.

Nayyar, D. (2007). Development through Globalisation?. in George Mavrotas and Anthony Shorrockseds (Ed.) *Advancing Development: Core Themes in Global Economics*, Palgrave, London.

Panagariya, A. (2008). *India: The Emerging Giant*, Oxford University Press, USA.

Rani, U., & Unni, J. (2004). Unorganised and Organised Manufacturing in India: Potential for Employment Generating Growth., *Economic and Political Weekly*, October 9, 4568-4580.

Sachdeva, A.S., & Ghose, P.P. (2009). A Macro Consistency Planning Mode. Kirit S Parikh (ed) *Macro-Modeling for the Eleventh Five Year Plan of India*, on behalf of Planning Commission, Government of India, Academic Foundation publication, New Delhi.

Tendulkar, S.D., & Bhavani, T.A. (2007). *Understanding Reform: Post 1991 India*, Oxford University Press.

Annexure-1: Stationarity Test for the Variables used in the Estimation for Industrial Sector: Results of the DF/ADF Unit Root Tests for the Series

Variables Name	Levels	First Differences
E_{OI}	-2.210396	-2.901035
E_{UI}	-0.788497	-3.451508
$Y_{OI(t-1)}$	1.265468	-4.141540
$Y_{UI(t-1)}$	2.739906	-2.621775
NIY_{org}	2.642265	-4.400091
NIY_{unorg}	2.786398	-7.882334
LP_{OI}	3.079173	-2.688128
LP_{UI}	-1.593420	-3.690968
GCF_{PUB}	-1.208890	-4.608675
GCF_{PVT}	1.781855	4.625215
$(K/L)_{OI}$	-1.974195	-3.212519
$(K/L)_{UI}$	-0.037618	-2.969007
$NAGIMP$	1.213086	-5.079812
$NAGEXP$	1.959656	-5.002409
$WPIOIL$	4.339946	-3.063423
$GCEXP$	-0.476992	-4.216950

Note: Critical Values at 10% (-2.614300) ***, 5% (-2.951125) **, and 1% (-3.639407) * significance level.