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Panchanan Das

For additional information please contact:

Name: Panchanan Das
Affiliation: Government of West Bengal, India

Email Address: daspanchanan@ymail.com

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Structural Dynamics, Growth and Regional Inequality: Incidence of Industrial Development in India

Panchanan Das

[Reader in Economics, Goenka College of Commerce & B. A., Government of West Bengal, India, daspanchanan@ymail.com]

This paper re-examines the contradiction of capitalist development by analysing growth, structural dynamics and regional inequality with Indian data for the past four decades. The induced growth of labour productivity achieved by means of industrial growth leads to the polarisation of economic growth in some regions with higher proportional shares of manufacturing output in India. Growth performance in India improved during the post-reform period mainly because of the high growth in the services sector, but the data for regional shares of national income indicate that economic growth across Indian states has been highly uneven. Regional inequality has been the highest in output from manufacturing throughout the period. Although the contribution of services sector's income inequality was the highest to overall income inequality in India, the regional variation in manufacturing output plays a significant role in regional growth differential in states' total income. The study reveals that manufacturing growth in India is characterised by increasing returns with labour-saving technology supporting the Verdoorn's law influencing significantly the regional growth differential in India.

JEL Classification Numbers: R11, O41, C23, O53,
Keywords: Regional Growth, Kaldor's Theory, Panel data, India

1. Introduction

The process of capital accumulation in any form under capitalism originating in the extraction of surplus from the working class brings out uneven regional development (Brenner 1977). Kaldor (1966) theorised about the growth patterns of mature industrialised as well as underdeveloped economies and elucidated the causes of growth differentials between advanced capitalist countries roughly at similar stages of development. According to him, the regional disparities in growth have been strongly associated with unequal incidence of industrial development. The less developed regions tried to industrialise, but the more developed part would prevent it by using their greater political power. The process of capitalist development

inherits not only to uneven development by countries, but by regions within a particular country as well. This paper seeks to address a set of interrelated issues on structural dynamics of economic growth to look into the pattern of development after reforms with Indian macroeconomic time series data.

One of the major facts indicating India's economic backwardness until very recently was its slow industrial growth. There has also been strong evidence of deindustrialisation, particularly in the sense of negative employment growth in the registered manufacturing sector, in most of the states in India since the early 1990s. But, the country experienced faster economic growth, as conventionally measured, during the 1990s and thereafter. The phase of high economic growth has been accompanied by significant inter-sectoral, inter-regional and the inter-class imbalances. The more developed regions capture more physical, human, and financial capital, often at the cost of peripheral and rural regions through the process of cumulative causation. The presence of sunk-capital, particularly in manufacturing, has a significant contribution to regional uneven development within a national boundary. In the process of economic reforms, governments at the regional level have tried to attract more private capital in a badly manner by offering different kinds of tax concessions and other benefits to the capitalists at the cost of social sector development. The process of economic growth under neo liberal reforms in India has led to the concentration of income and wealth by affecting badly the peasants and workers.

The present day economic liberalisation or globalisation is an inherently uneven process benefiting mostly the capital and in virtue of the way it intensifies the tendency to unevenness. Higher productivity and income per capita are extremely important for development in an economy guided by the market fundamentals through the process of division of labour and expansion of trade. As productivity grew at a higher proportional rate than the growth in wage rate, capitalists' surplus or profit rate moves up. The surplus normally transfers towards the areas with more capital and skilled labour. The productivity of workers with better technology in the developed regions is higher and thus wages are also higher compared to those in less developed regions using inferior technology in producing the same commodity. The more developed regions capture much of the new physical, human, and financial capital, often at the cost of

peripheral and rural regions through the process of cumulative causation of Hirschman (1958) and Myrdal (1957).

The paper re-examines the contradiction of capitalist development by analysing growth, structural dynamics and regional inequality with Indian data for the past four decades. Productivity growth in manufacturing may be crucial for economic progress, enabling the low income regions to catch up with their high income counterparts within a finite time horizon (Kaldor 1966). We have hypothesised that the productivity growth is demand-driven in the sense that increases in demand for industrial goods lead to faster growth of output, which in turn results in higher productivity. The induced growth of labour productivity achieved by means of industrial growth leads to the polarisation of economic growth in some regions with higher proportional shares of manufacturing output in India. Section 2 deals with the data used in this study. Section 3 discusses the pattern of regional growth disparities by the major sectors in India. The objective is not to test the growth convergence hypothesis of neoclassical type as such, but to locate some stylised facts in terms of the estimation of trend growth rates separately for the pre- and post-reform period. Section 4 examines the structural dynamics in explaining regional inequality in India. For this purpose ARIMA (1, 0, 0) model has been estimated with Gini inequality index of sectoral incomes. As manufacturing is conventionally treated as the leading sector in explaining regional growth differentials in the growth literature, section 5 revisits the role of manufacturing growth in explaining regional growth differential in India by estimating panel data model. The registered sector of manufacturing has been taken into account for this purpose. Section 6 concludes.

2. Data

In analysing the regional growth pattern, we need state level data on domestic product and its sectoral components. The National Accounts division of the Central Statistical Organisation (CSO), under the ministry of Statistics and Programme Implementation, Government of India, has been compiling the data base after receiving from the state agencies. This study utilises the data on state domestic product published by Economic and Political Weekly Research

Foundation (EPWRF) in 2008. The electronic version of the data base of EPWRF covers the period from 1960-61 to 2007-08. The data for years after that period have been collected from the *Hand Book of Statistics* on the Indian Economy 2009-10 published by the Reserve Bank of India. The latest series of net state domestic product (NSDP) are available at 2004-05 prices. The series is based on the United Nations system of national account (SNA 1993). As different series based on different base years are not comparable, we have constructed a consistent chain linked time series of NSDP by extending the 2004-05 series backwards to convert the old series to the series based on the new base year (2004-05) following the splicing method recommended by the CSO (2001).

In India, the estimation of state income was initiated first in Bihar, Uttar Pradesh and West Bengal in 1948-49. However, the National Income Committee, appointed by the Government of India in 1949, laid the foundation for the present series of the National Account Statistics (NAS). The estimates of national income of the country have been revised by the CSO from time to time. Initially, there were some conceptual and methodological problems in estimating state income. The Working Group on State Income was set up by the CSO in 1957 to formulate some standard concepts, definitions and methods of estimation of state domestic product (SDP). The Group examined the estimates prepared by the states to make it comparable. Despite the formulation of uniform methodology by the Working Group in estimating state domestic product in 1976, there are serious differences in methodologies adopted by the states. To improve the system of regional accounts, the Regional Accounts Committee recommended three consolidated accounts relating to production, income and capital finance in September, 1976. The National Statistical Commission, headed by C. Rangarajan, advised the state Directorates of Economics and Statistics to construct primary tables on state domestic product and related aggregates by following the guidelines of CSO on National Accounts. But the response became very poor and even no state government attempted to prepare consolidated accounts of the nation or household accounts. As a result the state estimates are not strictly comparable even today.

There are also some conceptual problems in regional accounts of income and we have to bear them in analysing regional pattern of growth with this data. Although the estimates of income accruing to a state may serve as a broad measure of the economic welfare of the residents of that

state, the estimation of state income is based on the income originating within the state boundaries. Thus the inferences drawn from the analysis of this data series have to be considered as the outcome of income generation, not income accrual, within the geographical boundaries of the states. Also, the free movement of capital, labour and commodities between the geographical boundaries of states create some problems in defining regional income properly.

In the rest of the paper we also utilise data on registered manufacturing provided by the *Annual Survey of Industries* (ASI), the main source of information about the industry published by the CSO. However, there are problems of both coverage and intertemporal comparability of the ASI data. All firms registered under sections 2m(i) and 2m(ii) of the Factories Act 1948 are supposed to supply relevant information mentioned in the ASI schedules; but many of them have failed to supply them frequently. Hence in any given year there may be a larger number of factories than is reported by the ASI. Since the definition of industry is set by the Factories Act, certain types of establishments such as software manufacturers are not covered by the ASI.

The ASI distinguishes between the census sector which corresponds to the larger units and the sample sector which consists of units below the size that qualifies a factory as a member of the census sector. The coverage of the factory units in ASI under census sector was changed in 1997-98. Previously, factories employing 100 or more workers were included in the census sector and the rest in the sample sector, but since 1997-98 factories employing 200 or more workers have been covered on census basis and the remaining factories on sample basis. Also, all public sector undertakings (PSUs), irrespective of the numbers of their employees were included in the census sector. The rest was covered in the sample sector by the usual formula of determination of sample size at a given value of the precision of the estimates with at least 99 per cent chance. As a result, for any industry one finds a smaller number of units in the census sector since 1997-98. It leads to a bias in the results on size distribution, ownership pattern and forms of business organization. The census sector covers over 80 per cent of the formal sector of Indian industry and is considered to be more reliable than the sample sector.

As the data in annual ASI's are constructed from a probability sample, with large firms enumerated every year but smaller firms included according to a sampling probability, the time series constructed from the ASI does not necessarily represent the same firms over time, and

year-to year sampling variation can introduce volatility. Though the ASI data are collected at a smaller scale, they have never been made available at the block or district level in annual time series.

The ASI data are in current prices and therefore require deflation to convert them in real terms. The methods of deflation have been hotly debated. In this paper we have deflated the values of gross output and fixed capital by the appropriate wholesale price indices with base year 1970-71. The wages and salaries are deflated by the consumer price index for industrial workers. Thus the time series of different variables used in this study are in real terms over the period 1970-2008. We have used two distinct types of labour inputs, namely, unskilled and skilled labour. The numbers of workers and of employees are recorded separately in the ASI. In annexure IV of the ASI, workers are defined to include all persons engaged directly or indirectly in the production process. Employees, on the other hand, include all workers defined above and other persons engaged in supervisory and managerial activities. We treat the former group of employees as unskilled labour and the latter group as skilled labour. Thus figures for skilled labour can be obtained by subtracting the number of workers from total employees engaged in a factory.

3. Regional growth disparities by sectors

Analyses of inter-regional and inter-country differences in growth and level of income are largely based on neo-classical growth paradigms (Baumol, 1986; Delong, 1988; Barro and Sala i-Martin, 1995). As for regional dimensions of growth, neoclassical theory (Solow, 1956, 2001) predicts that higher the initial level of per capita income of a regional economy, the lower is its growth rate due to diminishing returns to reproducible capital, under the assumptions that different regions are similar with respect to their tastes and preferences, and technology. Studies on regional growth convergence or divergence have been growing since the publication of Barro's work (1991) on similar issue and most of them have followed the neo-classical tradition. A number of studies made similar type of empirical exercise with Indian data to analyse convergence or divergence of income levels across major states of the country. By using

different samples of states over different time periods they arrived at conflicting conclusions (Marjit et al. 1996, Dasgupta et al. 2000, Dholakia 2003, Bhattacharya et al. 2004, Nayar 2008).

The objective of this study is not to test the growth convergence hypothesis of neoclassical type as such, but to locate the structural dynamics of regional inequality in India during 1960-2009. The population size as well as income level of different regions marked by the state boundaries in India differs enormously. In 2009-10, the population size of the major states in India ranges from a low of 70,67,058 for Himachal Pradesh to a high of 12,50,00,000 for Uttar Pradesh and income level from a low of 28,75,586 (lakh rupees) for Himachal Pradesh to a high of 6,34,82,862 (lakh rupees) for Maharashtra. The average income per capita level for the 17 major states in India in 2009-10 at 2004-05 prices is Rs.35, 705 with a low of Rs.17, 169 for Bihar and a high of Rs.57, 458 for Maharashtra.

Growth performance in India improved during the post-reform period mainly because of the high growth in the services sector (Table 1). But the data for regional shares of national income indicate that economic growth across Indian states has been highly uneven. Economic growth rate varies from 3.4 percent in Assam to 7.2 percent in Gujarat during the post-reform period. Leading states in terms of national shares of domestic product grew at faster rates compared to the others. The fast-growing states (Gujarat, Haryana, Andhra Pradesh, Karnataka and Maharashtra) grew more than double as fast as the slow-growing state like Assam. Some states (Himachal Pradesh, West Bengal, Tamil Nadu and Kerala) with per capita income closer to national average grew at rates higher than the national average growth rate, while some other states, namely Uttar Pradesh (including Uttaranchal) and Madhya Pradesh (including Chattisgadh), with per capita incomes lower than the national average, grew slowly during 1991-2009.

In Kerala, West Bengal and Tamil Nadu the growth rate increased by more than double in the post-reform era as compared to the pre-reform period, and the rate of improvement was much better than the leading states like Gujarat and Maharashtra. On the other hand, the growth rate was not increased significantly in Uttar Pradesh and Madhya Pradesh, and indeed it declined in Punjab and Assam after the initiation of economic reforms. The output growth in agriculture declined in most of the agriculture led states during the post-reform period and it varied from less

than 1 percent in Kerala to just above 4 percent in Maharashtra in that period. In manufacturing also the growth rate had fallen in some fast growing states, while in other states it improved very slowly. Orissa and West Bengal, on the other hand, exhibited significant growth improvement in manufacturing, particularly unregistered manufacturing, after reforms. The services sector grew at a faster rate than manufacturing during the same period and it varied from around 4 percent in Tamil Nadu to 10 percent in Haryana. Banking services, hotels and restaurants, trading and community services have been the leaders in accelerating the growth of the services sector in India during the post-reform period. The IT sector has grown at a very fast rate since the mid 1990s, but its contribution to GDP is still very low (less than 1 per cent of GDP).

Table 1 Regional growth rates of NSDP and its sectoral components in India

	NSDP		Agriculture		Manufacturing		Services	
	1960-1990	1991-2009	1960-1990	1991-2009	1960-1990	1991-2009	1960-1990	1991-2009
Andhra Pradesh	3.7	6.3	2.2	3.6	5.8	5.4	4.8	7.7
Assam	3.6	3.4	2.4	1.2	4.3	2.5	4.4	5.2
Bihar	3.3	5.2	1.6	3.4	6.3	5.7	3.8	6.4
Gujarat	4.2	7.2	2.3	3.8	5.3	7.6	4.7	8.4
Haryana	5.4	6.9	3.7	2.2	8.3	6.3	6.7	10.0
Himachal Pradesh	3.4	6.6	2.6	3.3	6.3	8.5	5.1	7.7
Jammu &Kashmir	3.8	4.6	2.6	3.3	4.4	5.8	4.8	5.8
Karnataka	3.9	6.8	2.6	2.2	6.3	6.2	4.5	9.1
Kerala	2.7	6.1	1.1	0.8	4.5	3.9	1.6	7.7
Madhya Pradesh	3.1	4.7	2.2	1.8	5.5	5.6	3.6	5.5
Maharashtra	4.2	6.8	2.3	4.1	5.2	5.4	4.6	8.1
Orissa	2.9	5.4	1.8	1.3	2.9	8.3	4.4	7.4
Punjab	5.0	4.7	4.1	2.0	8.0	5.5	4.6	5.4
Rajasthan	3.9	5.5	3.3	2.5	2.8	6.0	4.4	6.5
Tamil Nadu	3.0	6.2	0.8	1.3	4.7	4.4	3.0	4.1
Uttar Pradesh	3.4	4.3	2.4	1.9	6.2	3.5	3.8	5.1
West Bengal	3.0	6.2	3.2	2.8	1.4	6.2	3.7	7.6
All India	**3.7**	**5.7**	**2.4**	**2.4**	**5.1**	**5.7**	**4.2**	**6.9**

Note: Bihar includes Jharkhand, Madhya Pradesh includes Chattisgarh, and Uttar Pradesh includes Uttaranchal; growth rates are calculated by estimating log linear trend; all estimated coefficients are statistically significant at less than one percent level.

Source: Economic and Political Weekly Research Foundation (2009): *Domestic Product of States of India*, Reserve Bank of India (2009): *Hand Book of Statistics in the Indian Economy*

4. Structural dynamics of regional inequality

The simplest way to measure regional inequality and to test σ convergence[1] is based on standard deviation or coefficient of variation of income per capita (Barro and Sala-i-Martin, 1995). Cashin et al. (1996) found that the dispersion of per capita income in India increased from 0.29 in 1961 to 0.33 in 1991, contradicting σ convergence. Rao et al (1999) also observed increasing trend in standard deviation of per capita NSDP between the mid-1960s and mid-1990s. Ahluwalia (2000) found that the inter-state inequality in terms of population-weighted Gini coefficient based on per capita GSDP remained at 0.15 till the mid-1980s, it went up at 0.17 in the late 1980s and touched at 0.23 in 1998-99.

One can hypothesise that the differences in structural change by regions are indeed the major cause of uneven economic development. In order to understand the dynamics of trends in regional inequality in India, this study examines the role of structural changes in bringing about changes in the level of regional inequality during 1960-2009. We have decomposed the structure of total economy into three major sectors, namely, agriculture, industry and services. Gini coefficient of NSDP and its sectoral components at constant prices with base year 2004-05 is used as a measure of regional inequality[2]. Figure 1 displays the trends in Gini coefficients of

[1] The notion of σ convergence in the neo-classical literature measures cross sectional dispersion of income over time.

[2] The Gini coefficient is defined as the fraction of the area between the equivalence line L(p) = p and the Lorenz curve:

sectoral incomes. There has been a significant income gap between richer and poorer states in India simply because of growth differentials across states as stated above. The regional income disparity widened over time and we can relate it to the changing pattern of sectoral growth.

Figure 1 Regional disparity in NSDP

$$G = 2\int_0^1 (p - L(p))dp$$

or

$$G = 1 - 2\int_0^1 L(p)dp$$

If the area between the line of perfect equality and Lorenz curve is A, and the area under the Lorenz curve is B, then the Gini coefficient is A/(A+B). Since A+B = 0.5, the Gini coefficient, G = A/(0.5) = 2A = 1-2B.

The classical definition of G appears in the notation of the theory of relative mean difference:

$$G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\left|x_i - x_j\right|}{2n^2\bar{x}}$$

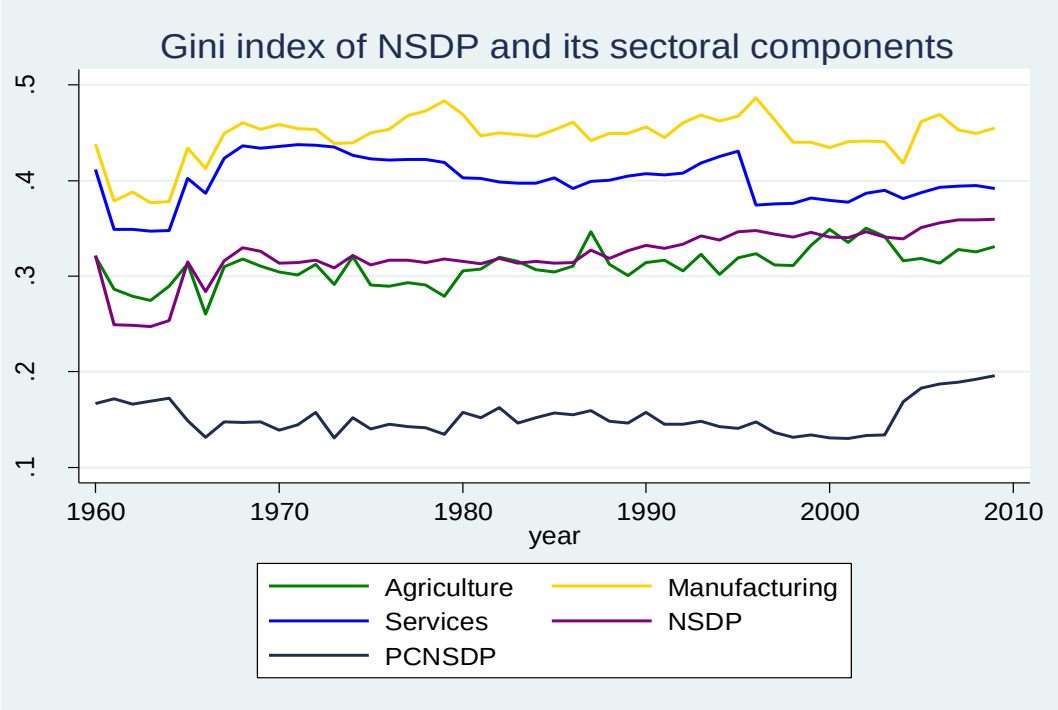
where x is an observed value, n is the number of values observed and $\bar{x}$ is the mean value.

If the x values are first placed in ascending order, such that each x has rank i, the some of the comparisons above can be avoided and computation is quicker:

$$G = \frac{2}{n^2\bar{x}}\sum_{i=1}^{n} i(x_i - \bar{x})$$

or

$$G = \frac{\sum_{i=1}^{n}(2i - n - 1)x_i}{n\sum_{i=1}^{n} x_i}$$



Source: Author's calculation based on data as for Table 1

As is found in Figure 1, India's regional income disparity rose rapidly in the late 1960s because of increasing dispersion in income from manufacturing and services. After that, regional inequality in state's total output increased consistently at a slower rate. But the dispersion of income by states increased markedly since the early 2000s largely because of increasing uneven growth of manufacturing (Figure 1). Regional inequality has been the highest in output from manufacturing throughout the period. It may be simply not because of differences in factor endowments needed for manufacturing in different regions but because of different motivations of the state governments to create infrastructure for more investment and translate growth into more jobs and less poverty. During the second half of the 1990s the Gini index for both manufacturing and services declined, but inequality in state's total output was continuing to rise due to increasing disparity in agricultural output.

In the light of the wide range of evidences portraying regional divergence in per capita real income in India, this paper seeks to shed light on the debate by considering the issue why

certain states have performed better than others. This study tries to locate some macroeconomic parameters likely to have significance in determining the rate of growth of per capita real income and hence behave as the endogenous sources of regional divergence of growth performance with state level data in India for the period 1960-2010. To find out how regional inequality is explained by the inequalities in sectoral incomes, a multivariate ARIMA (1, 0, 0) model with Gini index of NSDP (G_{nsdp}) as a dependent variable and the Gini indices of incomes generated from the three major sectors as explanatory variables is estimated. After examining the data generating process (DGP) of the time series, the econometric model has been specified as

$$G_{nsdp,t} = c + \beta_1 G_{agri,t} + \beta_2 G_{manu,t} + \beta_3 G_{serv,t} + \varepsilon_t$$
$$\varepsilon_t = \alpha + \gamma \varepsilon_{t-1} \qquad (1)$$

The nature of the stochastic behaviour of the time series is examined by looking at the pattern of ACF and PACF, and carrying out ADF unit root test with min SIC.

The estimated results are shown in Table 2. The AR(1) component describes the dynamics of regional inequality as explained by the relationship between inequality in states' total income and the inequalities in income originated from agriculture, manufacturing and services. As the inverse root of the AR polynomial lies inside the unit circle, the ARIMA model is stationary. The lowermost panel of Table 2 describes the goodness of fit of the estimated model. As we come across in Table 2, the regional inequality is explained significantly by the inequalities in income from all of the three major sectors, but not at the same rate. The contribution of services sector's income inequality was the highest to overall income inequality in India. In Das et al (1996)[3], the manufacturing sector had no significant contribution to the dispersion in states' income during the period 1972-1992. But, by using the extended sample period, both backward and forward as used in our study, it is revealed that the regional variation in manufacturing output plays a significant role in regional growth differential in states' total income. The impact of the dispersion of agricultural growth on overall regional inequality has

[3] Das and Barua (1996), by measuring inequality in terms of Theil index and using simple regression model, found that the inequalities in income from agriculture and services sector explain significantly the inequality in states' income, while the impact of inequality in income from manufacturing is statistically insignificant during the period between 1970 and 1992.

been the least. As per Kuznet's (1966) perception of modern economic growth, agriculture loses its share both in terms of value added and work force in the process of economic growth.

Table 2 Estimated coefficients of the ARIMA (1,0,0) model

Dependent Variable: G_{nsdp} Sample period: 1961 2009			
Independent variables	Coefficient	t-Statistic	Prob.
C	-0.06	-1.043	0.3024
G_{agri}	0.31	5.463	0.0000
G_{manu}	0.34	5.247	0.0000
G_{serv}	0.42	5.702	0.0000
AR(1)	0.97	18.391	0.0000
R^2	0.946	D-W stat	2.057
Adjusted R^2	0.941	F-stat	195.786
		Prob(F-stat)	0.000

Source: As for Figure 1

5. Contribution of registered manufacturing to regional growth differential

While the services sector contributed more to domestic product, the direction of causality goes from overall growth to the services sector growth, as was found in Gujarat (Das, 2011). The overall economic growth determines the growth rate of income originated from of services rather than the other way round. Conventionally, manufacturing is treated as the leading sector in explaining regional growth differentials in the growth literature. Productivity growth in manufacturing may be crucial for economic progress, enabling the low income regions to catch up with their high income counterparts within a finite time horizon (Kaldor 1966). In formulating the effects of demand factors in economic growth, Kaldor put forward a series of hypotheses in the late 1960s (Kaldor, 1966; 1967; 1968). The expansion of the manufacturing sector pulls the

overall rate of growth up partly because of its influence on the rate of growth of productivity in this sector itself and partly because of its indirect effect in raising the rate of productivity growth in other sectors. However, the underdeveloped economies were dominated by low-productivity agricultural sectors at least in terms of employment share and their limited purchasing power inhibited their industrial expansion (Kaldor, 1967).

Factory sector growth in India has been highly uneven (Table 3). In 2008-09, roughly one-fourth of the total factories were concentrated in two Western region states, namely Gujarat and Maharashtra, contributing more than one-third to the gross value added and generating one-fourth of total employment in the registered manufacturing sector. Tamil Nadu and Andhra Pradesh together in the South also shared 29 percent of the country's factory units and more than 25 percent of the factory employment, but just about 15 percent of the gross value added in that period. In the Northern part, Uttar Pradesh had a contribution of above 10 percent of gross value added with less than 9 percent of total factories and total employment in that sector. In the Eastern region, the contribution of West Bengal was very miserable in 2008-09. While the factory sector grew at a considerable rate in both of Tamil Nadu and Andhra Pradesh, it had fallen sharply in all dimensions as displayed in Table 3 in West Bengal during 1970-2008. Indeed, the industrial recession in West Bengal was the most severe and long-lasting (Bagchi, 1998). The shares had also been declining in Maharashtra during this period.

Table 3 Shares of number of factories, value added and employment in the registered manufacturing sector

	Number of factories		Gross value added		Employment	
	1970-71	2008-09	1970-71	2008-09	1970-71	2008-09
Andhra Pradesh	8.7	11.5	4.2	7.0	6.4	10.1
Assam	2.4	1.5	1.5	0.6	1.8	1.4
Bihar	4.1	2.5	5.9	3.4	5.2	2.2
Gujarat	11.3	10.1	9.1	12.8	9.3	10.4
Haryana	1.7	3.0	2.2	4.1	2.0	5.6
Himachal Pradesh	0.2	0.9	0.4	2.5	0.3	1.0
Jammu & Kashmir	0.3	0.4	0.1	0.6	0.3	0.5
Karnataka	5.6	5.7	5.7	8.4	4.9	7.1
Kerala	3.7	4.0	2.9	1.5	3.9	3.5
Madhya Pradesh	4.3	3.6	4.1	6.1	4.0	4.1
Maharashtra	18.8	13.9	26.2	21.9	19.7	13.7
Orissa	1.9	1.3	2.6	3.3	1.8	2.0

Punjab	6.5	6.8	2.3	2.5	2.7	5.0
Rajasthan	2.1	4.3	2.2	3.3	2.2	3.2
Tamil Nadu	11.0	17.7	10.1	8.4	11.2	16.3
Uttar Pradesh	7.2	8.7	6.8	10.2	7.7	8.9
West Bengal	10.2	4.2	13.7	3.3	16.6	5.1

Source: Author's estimation based on *Annual Survey of Industries time series data*, Central Statistical Organisation

The changes in structural ratios in registered manufacturing industries in India during 1970-2008 are presented in Table 4. The structural change took place in favour of capital by displacing labour. The higher capital-intensity is not simply because of higher investment in plants and machinery but because of the gradual displacement of workers with the given plant size, particularly in the post-reform period. Capital labour ratio was the highest in Orissa and the lowest in Kerala in 2008-09. Capital intensity was very high in Himachal Pradesh, Gujarat, Bihar and Maharashtra during this period. The increase in capital intensity, however, did not favour in rising profit rate in the factory sector (Table 4). The factory owners use unskilled labour wastefully because it is so cheap. In most of the states roughly 80 percent and even more of total employees were unskilled or ordinary workers and the share remained unaltered during 1970-2008. Thus unskilled workers affected badly more as compared to office staff and supervisors by this kind of job destroying structural change in the registered manufacturing sector in India.

Table 4 Structural ratios in the registered manufacturing sector

	Capital labour ratio		Profitability		Worker employee ratio	
	1970	2008	1970	2008	1970	2008
Andhra Pradesh	0.15	0.52	0.87	0.18	0.83	0.83
Assam	0.20	0.48	0.88	0.09	0.81	0.85
Bihar	0.26	1.07	0.88	0.21	0.77	0.78
Gujarat	0.12	1.16	0.88	0.14	0.84	0.77
Haryana	0.21	0.46	0.88	0.15	0.80	0.62
Himachal Pradesh	0.12	1.51	0.90	0.33	0.82	0.77
Jammu & Kashmir	0.24	0.34	0.87	0.24	0.71	0.83
Karnataka	0.17	0.85	0.89	0.20	0.79	0.78
Kerala	0.10	0.24	0.88	0.11	0.85	0.87
Madhya Pradesh	0.14	0.91	0.88	0.20	0.80	0.69
Maharashtra	0.26	0.96	0.88	0.20	0.77	0.74

Orissa	0.46	1.95	0.90	0.26	0.77	0.82
Punjab	0.19	0.37	0.87	0.13	0.78	0.79
Rajasthan	0.27	0.75	0.89	0.20	0.77	0.79
Tamil Nadu	0.16	0.42	0.88	0.14	0.82	0.82
Uttar Pradesh	0.25	0.66	0.88	0.19	0.84	0.77
West Bengal	0.12	0.57	0.88	0.12	0.83	0.82

Note: Profitability is defined as the ratio of operating surplus to gross value of total output. Operating surplus is the difference between gross value added and emoluments.

Source: As for Table 3

Manufacturing growth is characterised by increasing returns with labour-saving technology, while primary and service sector activities are subject to constant or diminishing returns (Kaldor, 1966). The role of manufacturing in describing regional growth differential is based on the dynamic increasing returns to scale associated with invention and innovation in manufacturing industries. The presence of increasing returns to scale in manufacturing activities was investigated by P. J. Verdoorn (1949) and the dynamic relationship between productivity growth and the output growth is generally known as Verdoorn's Law. According to this law, the higher rate of growth of manufacturing output leads to higher rates of productivity growth, but not a faster rate of growth of manufacturing employment. In Verdoorn's law, causality runs primarily from output growth to productivity growth or employment growth in the manufacturing sector which accounts for cumulative causation. The relationship can be expressed either in the form of regression of productivity growth (g_{pt}) on output growth (g_{yt}) or of employment growth (g_{et}) on output growth (g_{yt}) - one is a mirror image of the other:

$$g_{pt} = a + bg_{yt} \qquad (2)$$

or

$$g_{et} = g_{yt} - g_{pt} = -a + (1-b)g_{yt} \qquad (3)$$

Coefficient b in equation (2) or (3) is the Verdoorn coefficient and its value more than 0.5 signifies the existence of substantial increasing returns. One extreme value of the coefficient (b

= 1) indicates no variation of employment growth and the other extreme value (b=0) gives no response of productivity growth due to the change in output growth.

McCombie and De Ridder (1984) and McCombie(1985) studied the pattern of regional growth of the US and found substantial increasing returns to scale in manufacturing with positive effects on productivity and output growth. Fingleton and McCombie(1998) tested Verdoorn's law in the European Union regions and found evidence for increasing returns to scale. There has been a limited attempt to estimate the relationship between employment growth and output growth with Indian data. Das (2007) carried out tests on Kaldor's growth hypotheses in VAR approach with ASI data disaggregating at two-digit level to explain divergence of growth rates of two regional economies in India, namely, the states of West Bengal and Gujarat. It was found that manufacturing industries did not play any significant role in the growth process in West Bengal, while it contributed considerably to the overall growth in Gujarat[4].

The specification of the Verdoorn's Law shown above ignores the contribution of capital to the growth of labour productivity. To calculate the degree of increasing returns after incorporating the contribution of capital, we have specified the relationship similar to Cobb-Douglas production function:

$$g_{yt} = A + b_1 g_{et} + b_2 g_{kt} \qquad (4)$$

where A is exogenous technical progress, g_{et} and g_{kt} represent growth rates of labour and capital; b_1 and b_2 are the elasticities of output with respect to labour and capital, respectively. After a simple manipulation, the relationship used in this study is expressed as

$$g_{et} = \alpha + \beta_1 g_{yt} + \beta_2 g_{kt} \qquad (5)$$

Here,

$$\alpha = -\frac{A}{b_1}, \beta_1 = \frac{1}{b_1}, \beta_2 = -\frac{b_2}{b_1}$$

[4] See Das (2007), for a detailed analysis of the contribution of manufacturing growth to overall economic growth and employment growth in manufacturing industries in West Bengal and Gujarat.

Table 6 Estimated coefficients of growth rates of employment, output and fixed capital

Dependent Variable: employment growth
Sample: 1971 2008
Included observations: 38
Cross-sections included: 17
Total pool (balanced) observations: 646

Variable	Coefficient	t-Statistic	Prob.
Constant	0.013	4.327	0.000
Output growth	0.090	4.404	0.000
Capital growth	0.140	9.143	0.000

R^2	0.210	F-statistic	9.286
Adj R^2	0.187	Prob(F-statistic)	0.000
D-W stat	2.134		

Source: As for Table 3

The OLS estimates of the coefficients in the relationship as specified in equation (5) are shown in Table 5. The estimate is based on panel data for 17 major states over 38 years (1971-2008) obtained from the ASI. The use of panel data permits the control of unobservable heterogeneity between states in India. The estimated coefficients for output growth and capital growth suggest that one percentage point increase in their growth rates are associated with the respective increment of 0.09 and 0.14 in employment growth. The values of technical progress parameter (A) and output elasticity of capital are negative (-0.14 and -1.55 respectively) implying negative contributions of technology and capital growth to output growth. The output elasticity of labour, on the other hand, is estimated at 11.1. Thus, although the structural change took place in favour of capital, the output growth in the factory sector is mainly labour driven. The sum of output elasticities is 9.5, implying the presence of substantial increasing returns to scale in process of growth in registered manufacturing in India.

6. Conclusions

This paper explores the structural factors mostly responsible for growth differentials as observed in the regional economies in India during the past four decades. India experienced a substantial regional disparity in income per capita and also in industrial growth. Growth

performance in India improved during the post-reform period mainly because of the high growth in the services sector, but the data for regional shares of national income indicate that economic growth across Indian states has been highly uneven. Regional inequality has been the highest in output from manufacturing throughout the period. Although the contribution of services sector's income inequality was the highest to overall income inequality in India, the regional variation in manufacturing output plays a significant role in regional growth differential in states' total income. The study reveals that manufacturing growth in India is characterised by increasing returns with labour-saving technology supporting the Verdoorn's law influencing significantly the regional growth differential in India

According to Kaldor (1966), the overall economic growth of an economy is positively connected with the growth of output in the manufacturing sector through the labour transfers to the manufacturing sector from the land based activities. But the data of National Sample Survey (NSS) rounds on employment and unemployment situation in India reveal that no significant proportion of labour has been transferred from low productive land based activities or informal activities to large scale registered manufacturing (Das 2008). There are, however, some inherent problems in transferring workers from land based low productive sector to high productive manufacturing activities and thus in exploiting the effects of increasing returns to improve employment and output through an ambitious growth plan in an economy in which most of the manufacturing units are owned by the private sector (Bagchi 1970). A peculiar disarticulation of labour has been observed in the process of manufacturing growth everywhere in India.

As is observed in this study, the structural dynamics of growth in underdeveloped economies like India under neo-liberal capitalism has been significantly different from that of the matured economies of the 20th century capitalism. Industrial growth, in Kaldor's sense, is demand determined, and the major source of demand for industrial goods comes from agriculture. Since production in agriculture is subject to diminishing returns, successive investments in agriculture will reduce its productivity and reduce the growth rate of agricultural output. Thus the demand for industrial goods will slow down unless land-saving innovations in the primary goods sector offset the diminishing returns. In Kaldor's theory, a binding land

constraint and ‘surplus labour’ with zero marginal product in the agricultural sector of developing countries resulted in asymmetric effects of diminishing returns in agriculture.

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