Discussion Papers

in

Development Economics and Innovation Studies

Growth and Structural Change in Indian Manufacturing Since Liberalisation: An Interstate Analysis

by

Niharika Sharma

Discussion Paper No. 6

December 2013

Centre for Development Economics and Innovation Studies (CDEIS)
PUNJABI UNIVERSITY

Growth and Structural Change in Indian Manufacturing since Liberalisation: An Interstate Analysis

Niharika Sharma*

Abstract

This paper examines the growth process of manufacturing and structural changes that have unfolded over the period 1993-94 to 2012-13 across 15 major states of India. Growth story of the manufacturing sector shows the ascendancy of the organised sector across states as its growth rate has been faster than that of the unorganized sector over the two decades. Applying the concept of sigma and beta convergence the results of the analysis show that the hypothesis is clearly unsupported for manufacturing as well as registered and unregistered manufacturing. The inter-regional inequality in manufacturing among Indian states was found to increase during 1993-2009, though a slight decline is found since then. Using Panel data regression analysis the study also examines the factors that affect the structural changes in manufacturing across Indian states by revisiting the model developed by Chenery and others. The results show that since liberalization, GSDP per capita explains the largest part of sectoral transformation for the states of India for manufacturing as well as its registered and unregistered segments. The paper concludes that disparities in the extent of industrialization have somewhat increased and this inequitable character is likely to pose a serious threat to its sustainability in the long run.

Keywords: Patterns of structural change, regional disparities, convergence and divergence, manufacturing growth, India

* Doctoral Fellow, Department of Economics, Punjabi University, Patiala and Assistant Professor, GGDSD College, Sector 32, Chandigarh

Introduction

The terms “structure” and “structural change” have become widely used in economic research. Such structural shifts have been seen as mechanisms influencing the pace of growth as well as being the result of growth. This typical pattern of structural change as described by Kuznets in his modern economic growth (Kuznets, 1966) involves initially a shift from an agricultural to an industrial economy through industrialization through the process of an increase in the share of the industrial/secondary sector in output and employment combined with a declining importance of the agriculture/primary sector. The subsequent post industrialization or de-industrialization stage is one whose chief feature is the rising importance of the services/tertiary sector, even at the expense of industry, or the transition to a service economy.

Over the years, India has seen a major jump from agriculture sector growth to service sector growth leaving out the industrial growth. Unlike many other countries, this growth process has not been consistent with the stylized sectoral growth process. A major turning point for the Indian economy was after the reforms of 1991. In 1991, the economy faced a balance of payments crisis and received loans from the IMF and other international organizations. Under pressure from these organizations, the biggest de-licensing episode occurred. Almost all industrial licensing was removed by 1994 when all but 16% of manufacturing output had been de-licensed.

Since the Economic growth and development of a region are closely linked to structural change, the present study analyzes the structure and growth of manufacturing sector in 15 major states of India since 1993-94 to 2012-13, in a comparative framework. It also looks at the performance of organized and unorganized sectors across states.

This study is organized in five sections. An analysis in the changes in the shares of value added of organized, unorganized and the overall manufacturing sector of different states is presented in section first. Second section analyses the average annual growth rates of states for the last two decades. Third section estimates whether this growth of manufacturing across states has shown a converging or a diverging pattern. Fourth section examines the structural change across states and last section presents concluding remarks.

Shares of States in Total, Organized and Unorganized Manufacturing

This section analyzes the Shares of manufacturing sector across 15 major states of India in a comparative framework. It examines the regional dimensions by studying the organized *versus* unorganized segments of the manufacturing sector. The period of study is 1993-94 to 2012-13. ‘Industry’ for the purpose of this study includes only ‘manufacturing’.

The shares have been calculated using GSDP data and sources of data for study are: CSO for Gross State Domestic Product (GSDP) estimates and Directorates of Economics and Statistics (DES) of various states. The study mainly highlights "*manufacturing sector"* for the following reasons. *First*, manufacturing has received much attention of the policy makers in India in terms of financial allocations in planning process. *Second*, during the process of structural transition, manufacturing sector is known to generate employment for both unskilled and skilled labor and the employment potential of manufacturing sector is higher as compared to that of the tertiary sector. *Third*, the growth of manufacturing sector is also necessary for the overall growth of the economy, as it can supply inputs and provide market to other sectors. *Lastly*, it is also viewed as a solution to the agrarian crisis which can be solved by the growth of output and employment of manufacturing sector.

There have been differences in the extent of industrialization and it has been observed as one of the most glaring aspects of the variations in the levels and structures of state economies for the years 1993-94 and 2012-13. Table 1 gives the manufacturing value added or the share of manufacturing in total GSDP of 15 major states of India. This table clearly shows GSDP varies very widely among the Indian states. In terms of this indicator, Gujarat with 27.2 per cent share of manufacturing in GSDP was the most industrialized state among the major states of India in 2012-13.

Other major states which had a higher than the national figure of 15 per cent were Maharashtra (21.4 per cent), Punjab (19.8 per cent), Tamil Nadu (19.5 per cent), Haryana (19.1 per cent), Karnataka (16.9 per cent), Orissa (15.4 per cent). Assam (7.5 per cent) and Kerala (7.5) had the lowest per cent of its SDP originating in manufacturing. West Bengal followed by Bihar, Andhra Pradesh and Madhya Pradesh were other states with low level of industrialization with only 10 to 13 per cent of their SDP originating in manufacturing.

The share of Manufacturing in GSDP ranged between 7.5 per cent in Assam, the least industrialized state to 27.2 per cent in Gujarat, the most industrialized state, in 2012-13. The range of variation seems to have rather increased from 1993-94, when the least industrialized state (Assam) had 8.6 per cent of its SDP originating from manufacturing while in the most Industrialized state (Tamil Nadu) manufacturing contributed 26.6 per cent. Tamil Nadu which was the most industrialized state in 1993-94 came down to the fourth position in 2012-13. Other states which experienced relatively rapid industrialization during the 20 year period, in terms of a significant percentage increase in the share of manufacturing in GSDP are: Orissa (4.1 per cent), Rajasthan (2.7 per cent), Haryana (2.2 per cent), Uttar Pradesh (1.5

per cent), Gujarat and Punjab (1.2). Gujarat, of course, leads the states with the highest manufacturing value added of 27.2 per cent in total GSDP in 2012-13. Tamil Nadu followed by West Bengal and Bihar and Kerala saw a significant and sharpest 'deindustrialization' with a decline of -7.1 per cent, -5.4 per cent, -4.9 per cent and -4.9 per cent respectively (Table 1). Maharashtra, Andhra Pradesh and Madhya Pradesh along with Assam also experienced some decline in the share of manufacturing.

Table 1: Share of Manufacturing in Total GSDP (%) at 2004-05 Prices

S. No.	States	Share of Manufacturing in GSDP (In percentage)		Percentage Change in between 1993-94 to 2012-13
		1993-94	2012-13	
1	Assam	8.6	7.5	-1.1
2	Kerala	12.4	7.5	-4.9
3	West Bengal	15.8	10.4	-5.4
4	Bihar	16.1	11.2	-4.9
5	Andhra Pradesh	14	12.1	-1.9
6	Madhya Pradesh	14.6	12.9	-1.7
7	Uttar Pradesh	12.9	14.4	1.5
8	Rajasthan	12	14.7	2.7
9	Orissa	11.3	15.4	4.1
10	Karnataka	17.7	16.9	-0.8
11	Haryana	16.9	19.1	2.2
12	Tamil Nadu	26.6	19.5	-7.1
13	Punjab	18.6	19.8	1.2
14	Maharashtra	23.7	21.4	-2.3
15	Gujarat	26	27.2	1.2

Source: Author's own calculation

Did structural transformation in favor of manufacturing help in accelerating growth of a state? Here again, Gujarat provides strong positive evidence: the share of manufacturing in its GSDP increased from 26 per cent in 1993-94 to 27.2 per cent in 2012-13 and it also experienced the fastest overall economic growth. Orissa, Rajasthan and Haryana are other states with significantly large increase in the share of manufacturing and both of them have grown reasonably fast. Uttar Pradesh and Punjab have seen moderate increase in the share of manufacturing and relatively low GSDP growth. West Bengal's share of manufacturing declined significantly and it also grew at a relatively slow rate. According to a study by Papola in 2011, positive relation appeared between the increase in the extent of industrialization and the rate of economic growth of the 14 major states. In other words, structural change in favor of manufacturing is more often accompanied by a higher GSDP growth than a change in favor of services. But our data showed that after liberalization, 9 out of 15 states showed a decline in the share of manufacturing in GSDP and thus there was no

structural transformation in favor of manufacturing. The share of the registered and unregistered sector in manufacturing of the states and the percentage difference in the share between 1993-94 and 2012-13 is given in Table 2.

The analysis of Table 2 shows that organized sector contributed a major part to manufacturing GSDP in all the states in 2012-13 except Kerala and West Bengal. A negative growth of registered sector during the 20 year period was experienced only by West Bengal (-12.8 per cent), Bihar (-6.3 per cent) and Assam (-5.2 per cent). The sharpest percentage increase in the contribution of registered sector has been seen in Orissa with 69.8 per cent in 1993-94 to 86.7 per cent in 2012-13 that is an increase of 16.9 per cent which has led to an immense increase in the share of manufacturing in its GSDP (Table 1). In the same year, top five states that had maximum share of registered sector in manufacturing were Orissa (86.7 per cent), Gujarat (81.4 per cent), Madhya Pradesh (77.2 per cent), Andhra Pradesh (76.5 per cent) and Karnataka (76.4 per cent). States of Orissa (4.1 per cent), Rajasthan (2.7 per cent), Haryana (2.2 per cent), Uttar Pradesh (1.5 per cent), Punjab and Gujarat (1.2 per cent) have registered a positive growth in the share of manufacturing in GSDP mainly due to an increase in the share of its organized sector and decrease in the share of its unorganized sector (Table 1).

Table 2: Share (%) of Registered Sector and Unregistered Sector in Manufacturing GSDP at 2004-05 Prices

S. No.	States	Share of Registered Sector in Manufacturing (In percentage)		Share of Unregistered Sector in Manufacturing (In percentage)		Percentage change in Registered and Unregistered Manufacturing between 1993-94 to 2012-13
		1993-94	2012-13	1993-94	2012-13	1993-94 to 2012-13
1	Kerala	36.4	44.2	63.6	55.8	7.8
2	West Bengal	64.8	52.0	35.2	48.0	-12.8
3	Punjab	52.0	59.9	48.0	40.1	7.8
4	Rajasthan	47.1	63.2	52.9	36.8	16.1
5	Uttar Pradesh	57.3	64.2	42.7	35.8	6.8
6	Bihar	71.2	64.9	28.8	35.1	-6.3
7	Assam	71.7	66.4	28.3	33.6	-5.2
8	Haryana	55.7	71.2	44.3	28.8	15.5
9	Tamil Nadu	62.9	71.3	37.1	28.7	8.4
10	Maharashtra	67.5	71.8	32.5	28.2	4.3
11	Karnataka	72.9	76.4	27.1	23.6	3.5
12	Andhra Pradesh	70.0	76.5	30.0	23.5	6.5
13	Madhya Pradesh	68.8	77.2	31.2	22.8	8.4
14	Gujarat	75.5	81.4	24.5	18.6	5.9
15	Orissa	69.8	86.7	30.2	13.3	16.9

Source: Author's own calculation

Note: The signs may be reversed when analysing the decline in the unregistered manufacturing.

While on the other hand Assam (-1.1 per cent), Bihar (-4.9 per cent) and West Bengal (-5.4 per cent) witnessed a decline in the share of manufacturing sector due to a decline in the share of registered sector and an increase in the share of unregistered sector since 1993. There are exceptions like Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Maharashtra, Karnataka and Kerala in which even though the share of registered manufacturing increased but still there was a negative growth in the share of manufacturing to GSDP (Table 1).

On the whole, the manufacturing sector developed across states and the main driver of it seemed to be the organized manufacturing sector, even though it employs less per cent of population but its contribution to GDP is much more than that of unorganized manufacturing. Therefore more focus should be to develop the registered sector across states to reduce the disparities.

Growth of Manufacturing, Registered and Unregistered Across States

In the Indian economy, growth varies tremendously across states resulting in inter-regional disparities. This Inter-regional disparity in the levels of development has always been an important concern of Indian development thinking and policy in India. There have been different periods of increase and decline in disparity; increase in the initial one and a half decades of Independence, a decline during the next two decades and increase again, especially in the post-reforms period. It is particularly interesting to analyse the trends in inter-state disparities in manufacturing since the Indian economy graduated to a higher growth path especially after the economic reforms towards globalisation in 1991. There have been conflicting hypotheses and expectations about inter-regional disparities in the deregulated and globalised economic environment. A high aggregate growth rate is generally accompanied by increasing disparity. A deregulated policy regime can lead, on the one hand, to an increase in disparities as the developed regions have a competitive advantage and government policies favouring poorer regions are no longer in operation, while, on the other hand, disparities may also decline as the regions get opportunities to freely utilise their comparative advantage.

Literature shows that Gini Coefficient of inter-state inequality in per capita SDP increased from 0.152 in 1980-81 to 0.161 in 1987-88 and to 0.225 in 1997-98 (Ahluwalia, 2000). In the period after liberalisation while some of the poorer states have experienced a faster than average growth, growth of some of the developed states has slowed down. As a result, the Gini Coefficient of inequality in per capita income has stood at around 0.24 during

2000-01/2008-09, though it is still much higher than it was before the reforms (Ahluwalia, 2011).

Inter-state variations in rates of GSDP growth are found to be strongly associated with the pace of "Industrial Growth" during the years. All states underwent structural changes in terms of a decline in the share of agriculture, but it did not seem to have been accompanied by a decline in inter-state disparities. But the extent of shift towards manufacturing seems to significantly influence the inter-state variations in income. Large structural shifts away from agriculture in different states are more often associated with faster industrial growth and larger shift to industry than with growth of and shift to the services. Growth rates of manufacturing GSDP have been quite divergent during this period. Growth rates were not necessarily correlated with the initial levels of industrialization during 1981-2001, but during 2001-09 states with higher levels of industrialization have registered high growth in manufacturing and vice versa. Thus industrial growth in recent years has led to increasing divergence contributing to an increase in disparities in growth of GSDP. But, disparities in the extent of industrialization as well as in the share of different states in the national manufacturing GDP have somewhat declined during the longer period 1981-2009 (Papola, 2012). Inter-regional disparity in levels of development and income is a major issue of economic, social and political significance in India. That there are wide disparities across the states is well known and is also recognized as a concern to be addressed through public policy.

This section deals with the average annual growth of manufacturing, registered and unregistered sectors from years 1993 to 2013 across 15 major states of India. The data for gross state domestic product for the period was rebased at 2004-05 prices using implicit price deflators and then the growth rates were calculated. Table 3 shows the average annual growth rates across states for the 20 year period.

The manufacturing sector growth showed large variations across states with the highest growing state of Orissa at 12.7 per cent per annum and the lowest growing state of Madhya Pradesh at 5.8 per cent per annum. Thus the top five states that registered the highest growth rate in manufacturing from 1993 to 2013 were Orissa (12.7 per cent per annum), Gujarat (12.5 per cent per annum), Rajasthan and Haryana (12.1 per cent per annum), Karnataka (10.5 per cent per annum) and in that order. While the lowest growth was registered by Madhya Pradesh (5.8 per cent per annum), Uttar Pradesh (6.6 per cent per

annum), Bihar (7.2 per cent per annum), Kerala (8.3 per cent per annum) and West Bengal (8.4 per cent per annum).

Along with the wide variations, the data also clearly shows that in majority of the states the registered manufacturing has grown at an average which is more than the unregistered manufacturing and these are also the sates in which the registered manufacturing holds a larger share in the overall manufacturing than the unregistered (Table 2).

Table 3: Average Annual Growth Rate of States (1993-94 to 2012-13) at 2004-05 Prices (Percentage)

S No	State	Registered	Unregistered	Manufacturing
1	Assam	7.8	8.7	7.9
2	Kerala	9.3	7.3	8.3
3	West Bengal	7.0	9.9	8.4
4	Bihar	8.5	7.6	7.2
5	Andhra Pradesh	10.5	8.8	10.0
6	Rajasthan	14.6	9.6	12.1
7	Uttar Pradesh	7.7	5.4	6.6
8	Madhya Pradesh	6.8	4.1	5.8
9	Orissa	14.2	7.2	12.7
10	Tamil Nadu	9.9	7.3	8.9
11	Karnataka	11.1	9.8	10.5
12	Haryana	13.4	9.1	12.1
13	Punjab	10.6	8.6	9.3
14	Maharashtra	10.5	9.6	10.2
15	Gujarat	13.2	10.7	12.5

Source: Author's own calculation

Manufacturing: Converging or Diverging?

One of the most important questions of economic growth in literature is this of economic convergence or divergence across different geographical units.

The wide variations across states discussed so far in terms of share and growth of manufacturing can be studied and verified by the "convergence and divergence hypothesis" given by the neoclassical growth framework. In the recent years there has been considerable emphasis on understanding the regional dimensions of economic growth of Indian geographical units within the convergence implications of neoclassical growth paradigm.

The convergence argument refers to a process whereby the less advanced economies achieve higher rates of economic growth compared to the more advanced ones, and as such inequalities are reduced over time. In turn, divergence indicates that the opposite forces are in play sustaining or increasing income disparities between economies. As already noted, the methodological basis used to explore convergence or divergence between economies comes basically from the neoclassical growth paradigm where convergence is set as the null

hypothesis and divergence as the alternative one. Two main concepts of convergence developed in this literature and used in our analysis are: σ-convergence and β-convergence.

The first concept is that of σ-convergence. It does not relate directly to the growth rates of economies. Instead, it focuses attention on the dispersion of per capita outputs over a cross-section of economies at each point of time. Thus, convergence is accepted if the dispersion (measured in terms of the coefficient of variation) of real per capita income among economies falls over time (Barro and Sala-i-Martin, 1995).

The second concept that has been used in literature is that of β-Convergence. The neo-classical theory suggests that if two economies which were similar in terms of parametric specifications, differed only with respect to their per capita output levels at some initial point of time, then at any subsequent point of time, the economy that started off with a higher per capita output should grow at a slower rate. This leads to the hypothesis of absolute beta-convergence, which predicts a negative relationship between the rates of growth enjoyed by a cross-section of economies and the levels of their per capita outputs at a given initial point of time. Thus, the beta convergence measures the speed at which poorer regions catch up with the richer ones.

Some studies have stressed on the importance of σ-convergence over β-convergence since it speaks directly as to whether the distribution of income across economies is becoming more equitable (Quah, 1993a,b). However, β-convergence analysis has dominated the growth literature because it is considered a necessary (though not sufficient) condition for σ-convergence (Barro and Sala-i-Martin, 1995).

The principal force driving convergence in the growth model is the value added per capita or GSDP per capita. Therefore, economies with lower initial values of GSDP per capita in manufacturing, organized and unorganized will have higher marginal products of value added and therefore, tend to grow at higher rates. Our next step in this paper is to first test for σ-convergence amongst Indian states. A homogeneous group of sub-economies, such as regional subgroups within a national economy, are less likely to differ from each other on account of differences in parametric specifications or random causes. Consequently, they are expected to be σ -convergent. This however, is not borne out by the Indian states. Developing states in India have the potential to grow at a faster rate than the developed states because diminishing returns (in particular, to GSDP per capita) aren't as strong as in rich sates. To see whether this hypothesis holds true, this convergence pattern was tested across 15 major Indian states in terms of growth of manufacturing and its organized and the unorganized segments. The data on Gross State Domestic Product (GSDP) per capita in manufacturing,

registered and unregistered across the states for the period 1993 to 2013 was provided by the Economic and Political Weekly Research Foundation (EPWRF) database. The Average Annual Growth rates of registered and unregistered and the overall manufacturing GSDP have been calculated and rebased at 2004-05 prices using implicit price deflators. We begin by calculating the coefficient of variation (CV) of per capita GSDP for manufacturing, organized and unorganized segments at 2004-05 prices across states for each year. The list of the selected states for the analysis and the abbreviations used for these states are given in Table 4.

Table 4: States selected for analysis

States	Abbreviations
Andhra Pradesh	AP
Assam	AS
Bihar	BR
Gujarat	GJ
Haryana	HR
Karnataka	KR
Kerala	KL
Madhya Pradesh	MP
Maharashtra	MH
Orissa	OR
Punjab	PB
Rajasthan	RJ
Tamil Nadu	TN
Uttar Pradesh	UP
West Bengal	WB

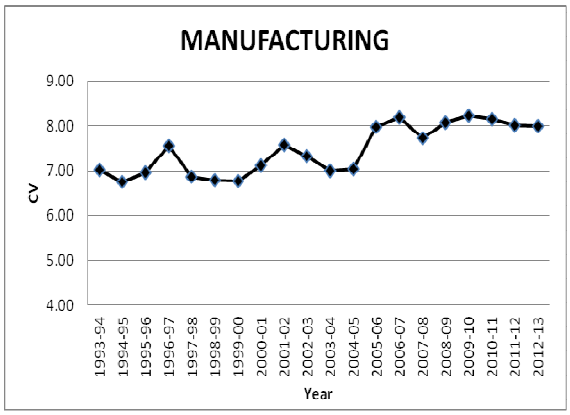
The movement pattern of CVs of per capita manufacturing output among 15 major states of India over a period of 20 years (1993-2013) is illustrated in Figure 1 and for organized and unorganized sector in Figure 2 and Figure 3 respectively.

Since it is already discussed that a major part of the manufacturing sector constitutes the registered manufacturing sector, therefore the graphs of the both the sectors are more or less similar and have been explained together.

An upward trend in CVs can be observed over the time period 1993-94 to 2009-10 and thereafter, the trend has been slowly declining (Figure 1 and 2). However there have been some exceptions where a decline in the CV was observed. The years which exhibit σ-convergence in this period were from 1996-97 to 1999-00, 2001-02 to 2003-04 and 2006-07 to 2007-08. Therefore, it is clearly evident that for the period under review the Indian states did not exhibit sigma convergence in per capita manufacturing and registered manufacturing

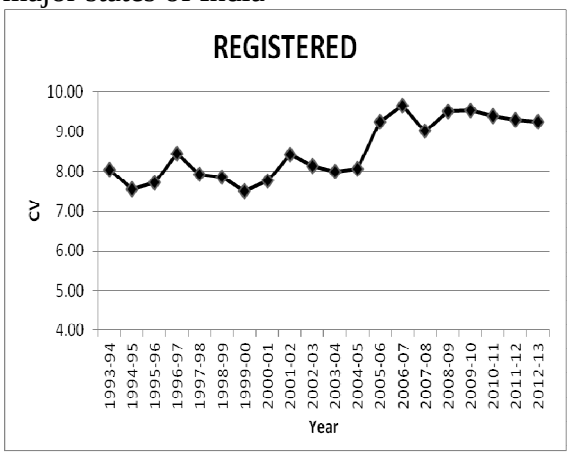
output; on the contrary, a clear divergence was observed till the year 2009-10. A weak convergence has only been observed since 2009-10 when a slight decline in the CVs was observed. As the sigma convergence measures the inter-regional inequality, we may very well infer that the inter-regional inequality among the Indian states in terms per capita manufacturing output and per capita registered manufacturing output had increased during 1993-2009 but since 2009 these inter-regional inequalities are declining slowly.

Figure 1: Coefficients of variation of per capita GSDP in Manufacturing across 15 major states of India



Source: Author's calculation based on EPWRF (2013) and ASI data

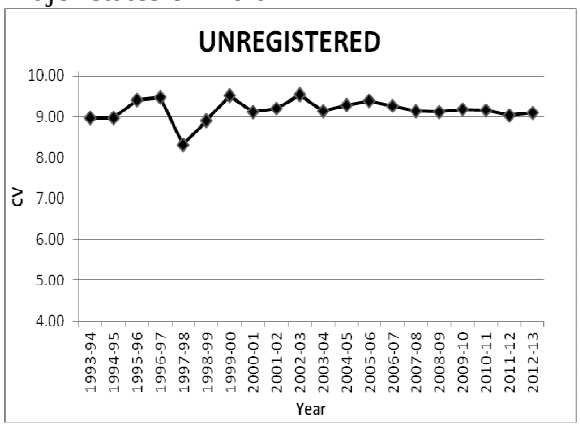
Figure 2: Coefficients of variation of per capita GSDP in Registered Manufacturing across 15 major states of India



Source: Author's calculation based on EPWRF (2013) and ASI data

For the unregistered manufacturing a constant trend in the CVs was observed over the time period 1993-2013 (Figure 3). The only exception was for the year 1996-97 to 1997-98 when the CV declined. Therefore in the unregistered manufacturing sector the states have neither sigma convergence nor divergence.

Figure 3: Coefficients of variation of per capita GSDP in Unregistered Manufacturing across 15 major states of India



Source: Author's calculation based on EPWRF (2013) and ASI data

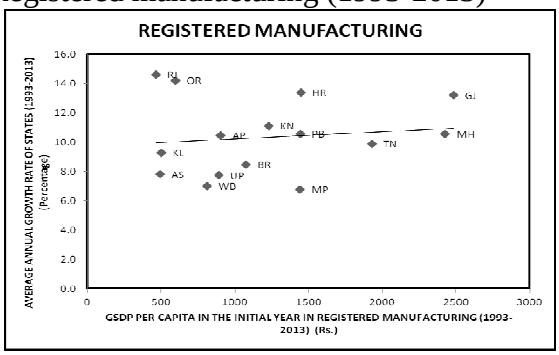
It is clear therefore that for the period under review, the Indian states did not exhibit strong σ-convergence. In other words, there is strong evidence that the Indian states diverged in terms of per capita real SDP in manufacturing over the 20- year period under consideration.

Our next step in this paper is to test for β-convergence amongst Indian states that is whether the poorer states tend to catch up with the richer states over the period or not. Clearly, the results obtained so far lead us to believe that the hypothesis will be rejected. Nevertheless, academic rigour demands that this be actually verified. Whether the states converge or diverge was seen using scatter plot diagrams. We looked at the line of best fit through a scatter of estimated average annual growth rates of different states and their initial per capita income.

The scatter plots in Figure 4, Figure 5 and Figure 6 show the relationship between initial GSDP per capita in registered, unregistered and overall manufacturing and average annual growth rate during the period 1993-94 to 2012-13. A glance at the scatter plot (Figure 4) showed that the states with low initial levels of GSDP per capita in registered manufacturing were at the lower levels of growth rate while the states with high levels of GSDP per capita were at slightly higher levels of growth rate. The only exceptions that held were that of Rajasthan and Orissa which showed a higher level of average annual growth rate (14.6 and 14.2 per cent per annum respectively) with low initial levels of GSDP per capita. Thus the line of best fit through the scatter indicated a slight divergence across states with the poorer states remaining poor and the richer getting rich. However if Rajasthan and Orissa

were dropped out of the analysis the line of best fit would have indicated a clear divergence in terms of growth of growth of registered manufacturing.

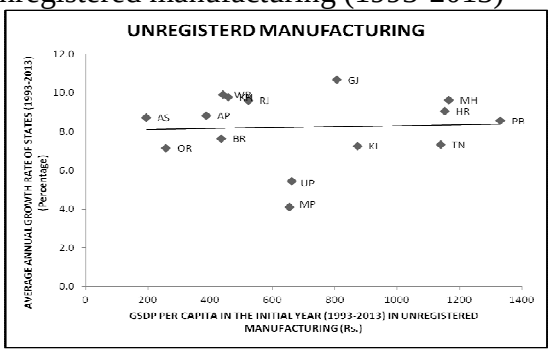
Figure 4: Scatter of states' estimated average annual growth rate and initial GSDP per capita in Registered manufacturing (1993-2013)



Source: Author's own calculation

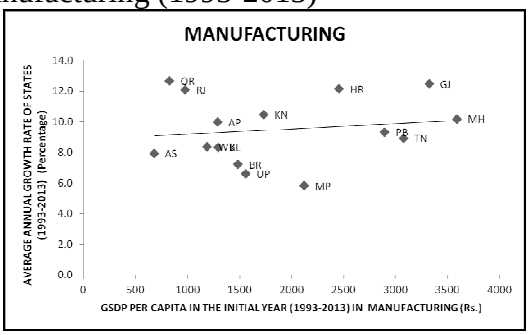
The scatter plot in Figure 5 showed the relationship for the unregistered manufacturing. The line of best fit again exhibited a diverging pattern across states leading to increasing disparities. In unregistered manufacturing the exceptions were West Bengal and Karnataka which at a relatively low level of GSDP per capita in unregistered manufacturing experienced a relatively higher average annual growth rate of 9.9 per cent per annum and 9.8 per cent per annum respectively.

Figure 5: Scatter of states' estimated average annual growth rate and initial GSDP per capita in unregistered manufacturing (1993-2013)



Source: Author's own calculation

Figure 6: Scatter of states' estimated average annual growth rate and initial GSDP per capita in Manufacturing (1993-2013)



Source: Author's own calculation

Finally the overall manufacturing sector in Figure 6 showed that the states like Assam (7.9 per cent per annum), West Bengal (8.4 per cent per annum), Kerala (8.3 per cent per annum), Bihar (7.2 per cent per annum) and Uttar Pradesh (6.6 per cent per annum) with the lowest levels of initial GSDP per capita rather than growing fast were at the lowest levels of average annual growth rate for the time period under review. The exceptions already discussed earlier were that of Rajasthan and Orissa, which had tremendously high growth rate of 14.6 per cent per annum and 14.2 per cent per annum respectively and the main reason for it lied in the fact that the share of registered manufacturing sector had showed the highest increase of 16.1 percent and 16.9 percent in Rajasthan and Orissa respectively over the two decades (Table 2). This could be a probable reason as to why these states have shown an immense increase in the growth of GSDP in manufacturing.

Therefore, it is clearly evident that for the period under review the Indian states exhibited neither sigma convergence nor beta convergence in per capita manufacturing output; on the contrary, a clear divergence was observed. Signs of weak convergence were observed in manufacturing and registered manufacturing only after the year 2009. As the sigma convergence measures the inter-regional inequality, we may very well infer that the inter-regional inequality among the Indian states in manufacturing had increased during 1993-2009, though there has been a slight decline since then.

Structural Changes in Manufacturing

This section discusses the theoretical background of the Chenery's analysis and derives the equation to be estimated in order to obtain an accurate picture of structural transformation of manufacturing across different states (Chenery, 1960). Our methodology builds on Chenery's basic explanation of structural change that the growth of a manufacturing industry depends on: (i) the normal effect of universal factors that are related to the levels of income; (ii) the effect of other general factors such as market size; (iii) the

effects of the country's/state's individual history, its political and social objectives, and the specific policies the government has followed to achieve these (Chenery and Syrquin 1975). Chenery's (1960) model which uses value added per capita for manufacturing industries as a dependent variable, was able to capture the universal effects of income and country size (effects (i) and (ii)).

The authors could not, however, present a full picture of structural transformation at the manufacturing level based on the three aforementioned components and also did not touch upon the registered and the unregistered segments of the manufacturing sector.

Chenery (1960) argued that supply and demand factors embedded in the level of income contribute to different patterns across sectors and thus provide a benchmark of structural transformation. The sectoral growth function contained in Chenery's original work (1960) − based on the general equilibrium model of Walras − estimated the level of production as a function of demand side variables as follows

$$X_i = D_i + W_i + E_i - M_i \quad (1)$$

where X_i is domestic production of product i, D_i is domestic final use of i, W_i is the intermediate use of i by other producers, E_i is the export of i, and M_i is the import of i.

Chenery, however, felt that it was necessary to have a sufficiently large sample size and since each demand component is a function of income level, he later decided to adopt single functions of income and population instead. This viewed the effects of income level and country size by using a linear logarithmic regression equation to estimate the value added level as follows

$$\log V_i = \log \beta_{i0} + \beta_{i1} \log Y_i + \beta_{i2} \log N_i \quad (2)$$

where V_i is per capita value added for manufacturing industry i and β_{i1} and β_{i2} represent growth elasticity and size elasticity, respectively. Equation (2) has since then become the basis for subsequent structural change research and its modifications have been widely used in later studies.

It is worth mentioning the major improvements that this study has contributed to that of Chenery (1960). The first improvement concerns the estimation method applied to our analysis. Instead of using cross-sectional ordinary least squares (OLS) regressions, standard linear-panel data techniques have been applied which are known to be able to control for potential endogeneity problems encountered in OLS regressions. This endogeneity bias may arise from two sources (see a review of all potential sources in Wooldrige 2002). The first one comprises omitted, unobserved country-specific effects which refer to any country characteristic not included in the regression. The second source of endogeneity is attributable

to a reversed causality relationship between GDP per capita in manufacturing and GDP per capita. Therefore, with respect to previous empirical approaches, this methodology is expected to provide consistent and robust results. The second improvement is the addition of registered as well as the unregistered sector to the analysis. This provides for the possibility to more accurately disentangle those factors that influence structural change.

Hence, the panel specification used in the study of equation (2) is re-expressed for the manufacturing sector in the equation (3) below:

$$\log GSDPM_{it} = \beta_0 + \beta_1 \log GSDPPERC_{it} + \beta_2 \log POPULATI_{it} + \varepsilon_{it} \quad (3)$$

with β_0 being a constant term translating any effects common to all years and countries, ε_{it} being the error term specific to each country and year is assumed independent and identically distributed (*iid*) across states and over time and $E(\varepsilon_{it}^2|\mathbf{x}_{it}) = \sigma^2$, for i = 15 major states and t = 20 years for 300 complete observations where x_{it} are the independent variable. Note that this equation deals with only the manufacturing sector. The registered and the unregistered manufacturing will be dealt later.

The study follows Chenery(1960) and uses GSDP per capita in manufacturing (GSDPM) as a dependant variable while the income effect is captured by GSDP per capita (GSDPPERC) and the size effect by population level (POPULATI). β_1 represents the growth elasticity i.e.

$$[\ d(GSDPM_{it})/(GSDPM_{it})\ ]/[\ d(GSDPPERC_{it})/(GSDPPERC_{it})\ ]$$

and β_2 represent size elasticity i.e.

$$[\ d(GSDPM_{it})/(GSDPM_{it})\ ]/[\ d(POPULATI_{it})/(POPULATI_{it})\ ]$$

The two elasticities in these equations include both supply and demand effects. Since factor proportions as well as demands vary with rising income, β_1 was called growth elasticity rather than income elasticity. Similarly, the size elasticity, β_2, represented the effect of larger domestic markets on the cost of production leading to economies of scale (Chenery, 1960). The estimates of the parameters of equation (3) will crucially depend upon whether the coefficients are assumed to be fixed or random effects but the choice between the two is a difficult one. There lies a trade-off between efficiency and consistency in fixed and random effects models. This trade-off provides an empirical basis on which the decision between the two can be made. Hausman provided a method to test whether the bias from random effects model exceeds the gain in efficiency. Higher/lower the value of Hausman FE/RE model is preferred. On that basis, the results of Hausman in the study reject the random effects model for estimating the parameters of all the three sectors.

The parameters estimated from equation (3) for manufacturing for the whole period 1993-2013 are reported in Table 5. The table shows that the estimated parameter β_1 or the growth elasticity is 0.856 which is positive and highly significant while size elasticity (β_2) is 0.325 is also positive but significant at 5 percent level. Therefore the results show that with the increase in income, there is an increase in GSDP per capita in manufacturing while the market size variable has a lesser impact. These results are consistent with that of Chenery's (1960) study where both the parameters were significant and positive except for β_1 (1.44) which was greater than unity.

The structural change of registered and unregistered manufacturing have been studied using the equations (4) and (5) respectively-

$$GSDPR_{it} = \beta_0 + \beta_1 GSDPPERC_{it} + \beta_2 POPULATI_{it} + \varepsilon_{it} \quad (4)$$

$$GSDPU_{it} = \beta_0 + \beta_1 GSDPPERC_{it} + \beta_2 POPULATI_{it} + \varepsilon_{it} \quad (5)$$

Where (GSDPR) is the GSDP per capita in the registered manufacturing and (GSDPU) is the GSDP per capita in the unregistered manufacturing. (GSDPPERC) is the GSDP per capita in the two equations and (POPULATI) is the population level.

Table 5: Results of Panel Regression Estimation of Manufacturing, Registered and Unregistered manufacturing Function (1993-2013) Dependant Variable is GSDPM

	Manufacturing Function	Registered Manufacturing Function	Unregistered Manufacturing Function
Explanatory Variables	Fixed Effects Model	Fixed Effects Model	Fixed Effects Model
GSDPPERC	.856* (26.31)	.895* (19.96)	.695* (24.12)
POPULATI	.325** (2.19)	.410** (2.01)	.363* (2.76)
R-squared	0.923	0.876	0.913
Hausman	18.48	6.49	23.83
N	300	300	300

Notes: 1. Figure in parenthesis are t-values.

2. *, ** statistically significant at 1 per cent and 5 per cent level respectively.

The parameters estimated from equation (4) and (5) which again represent the elasticities are reported in Table 1 only. The results of the registered manufacturing as reported by Table 1 also show a comparatively higher significant impact of income per capita on the GSDP per capita in registered manufacturing. The regression analysis of the unregistered sector (Table 1) reported both the growth and size elasticities to be positive and highly significant.

Thus, from the analysis it can be concluded that since liberalization GSDP per capita has explained the largest part of sectoral transformation for the states of India.

Chenery, however argued that that changes in the composition of demand side factors need not be the main cause of industrial growth. If an economy has an increase in income with no change in comparative advantage, this analysis suggested that only about a third of the normal amount of industrialization will take place. The change in supply side factors were considered more important in explaining the growth of industry than the changes in demand.

Concluding Remarks

This study has presented a description of the process of growth of manufacturing, registered and unregistered sectors and structural change that unfolded over the period 1993-94 to 2012-13 across 15 major states of India.

Analysing the share of manufacturing in GSDP across the states over the 20 year period revealed that the range of variation has rather increased from 1993-94, when the least industrialized state (Assam) had 8.6 per cent of its SDP originating from manufacturing while in the most Industrialized state (Tamil Nadu) manufacturing contributed 26.6 per cent to 7.5 per cent in Assam, the least industrialized state and 27.2 per cent in Gujarat, the most industrialized state, in 2012-13. The top most industrialized states in 1993-94 were Tamil Nadu, Gujarat, Maharashtra, Punjab and Karnataka in that order. In 2012-13, the top most industrialized states were: Gujarat, Maharashtra, Punjab, Tamil Nadu and Haryana, in that order with Gujarat being at the top with 27.2 per cent of its GSDP originating from manufacturing. Orissa has seen the fastest pace of industrialization, followed by Rajasthan and Haryana while Tamil Nadu, West Bengal, Bihar and Kerala experienced a fastest pace of deindustrialization in the share of manufacturing in their respective GSDP. Disparities in the extent of industrialization have somewhat increased during the period under review.

Organized sector has accounted for major share of the GSDP in manufacturing in most states, the highest being in Orissa (86.7 per cent) in 2012-13. West Bengal and Kerala were the only states with unorganized sector contributing the major share; West Bengal, along with Bihar and Assam, also witnessed a decline in the share of organized sector over the period 1993-94 to 2012-13.

The manufacturing sector growth showed large variations across states with the highest growing state of Orissa at 12.7 per cent per annum and the lowest growing state of Madhya Pradesh at 5.8 per cent per annum. Thus the top five states that registered the highest growth rate in manufacturing from 1993 to 2013 were Orissa (12.7 per cent per annum), Gujarat (12.5 per cent per annum), Rajasthan and Haryana (12.1 per cent per annum),

Karnataka (10.5 per cent per annum) and in that order. While the lowest growth was registered by Madhya Pradesh (5.8 per cent per annum), Uttar Pradesh (6.6 per cent per annum), Bihar (7.2 per cent per annum), Kerala (8.3 per cent per annum) and West Bengal (8.4 per cent per annum). Along with the wide variations, the data also clearly shows that in majority of the states the registered manufacturing has grown at an average which is more than the unregistered manufacturing and these are also the sates in which the registered manufacturing holds a larger share in the overall manufacturing than the unregistered.

So the question whether structural transformation in favor of manufacturing has helped in accelerating growth of a state or not, has a positive answer. Here again, Gujarat provides strong evidence: the share of manufacturing in its GSDP increased from 26 per cent in 1993-94 to 27.2 per cent in 2012-13 and it also experienced the fastest overall economic growth. Orissa, Rajasthan and Haryana are other states with significantly large increase in the share of manufacturing and both of them have grown reasonably fast. Uttar Pradesh and Punjab have seen moderate increase in the share of manufacturing and relatively low GSDP growth. West Bengal's share of manufacturing declined significantly and it also grew at a relatively slow rate.

On the whole, growth story of the manufacturing sector is thus characterised by the ascendancy of the organised sector over the decades. Its growth rate has been faster than of the unorganized sector in all the periods. Even though it employs less per cent of population but its contribution to GDP is much more than that of unorganized manufacturing. Therefore more focus should be to develop the registered sector across states to reduce the disparities.

Testing the theoretical framework of the convergence and divergence hypothesis given under the neoclassical growth paradigm, the results clearly rejected the hopthesis because for the period under review the Indian states exhibited neither sigma convergence nor beta convergence in per capita manufacturing output; on the contrary, a clear divergence was observed. Signs of weak convergence were observed in manufacturing and registered manufacturing only after the year 2009. As the sigma convergence measures the inter-regional inequality, we may very well infer that the inter-regional inequality among the Indian states in manufacturing had increased during 1993-2009, though there has been a slight decline since then.

Finally, the study examined the factors that affect the structural changes in manufacturing across Indian states by revisiting the model developed by Chenery and others to obtain an accurate picture of structural transformation of manufacturing across different states. Building on their conceptual framework this paper tried to improve the measure by

taking panel data rather than only cross-section. A linear logarithmic regression equation was derived to estimate the levels value added per capita as a function of income level and country size. The analysis concluded that GSDP per capita had turned out to be highly significant variable in explaining the GSDP per capita in registered manufacturing while regression analysis of the unregistered sector reported both the income and size to be positive and highly significant in explaining GSDP per capita in unregistered manufacturing. But for the overall manufacturing, the analysis showed that, for all states GDP per capita was positive and highly significant in explaining the largest part of sectoral transformation. Thus, from the analysis it can be concluded that since liberalization GSDP per capita has explained the largest part of sectoral transformation for the states of India.

Thus the study concludes that Indian states since the reforms of 1991 have witnessed structural change in favour of the service sector but not in favour of the manufacturing sector.

Introduction of economic reforms in 1991 is seen as the turning point in India's post-Independence economic history, providing a break from the low growth trap in which the country's economy had been caught for four decades. It is emphasised that high rate of growth of GDP that was triggered off by economic reforms and has been sustained over the years has been the most important achievement of the Indian economy in recent years. However, unfortunately, the study found that these rate of growths have not necessarily been higher in states with initially high level of industrialization. Slower growth of poorer states is an important part of the overall story of increasing inequalities because industrial growth in recent years has led to increasing divergence. Therefore, the question whether the growth with the current structural characteristics will at all be sustainable in the medium and long run needs to be addressed carefully because economic growth primarily derived from services may not be sustainable in a developing country without attaining a significant degree of industrialization. This Service-led and globalization induced growth thus is unlikely to be regionally equitable. Hence, in the long run, however, faster growth in the industry across states needs to be induced to sustain a high aggregate growth.

References

Ahluwalia, I.J. (1989) "*Industrial Growth in India: Stagnation since the Mid-sixties*", Oxford University Press, New Delhi.

Ahluwalia, M. S. (2000) "State-Level Performance under Economic Reforms in India", edited by Anne O. Krueger, *Economic Policy Reforms and the Indian Economy*, Oxford University Press: New Delhi: 91-122.

Ahluwalia, M. S. (2011) “Prospects and Policy Changes in the Twelfth Plan”, *Economic and Political Weekly*, May 21, 2011.

Barro, Robert and Sala-i-Martin, Xavier (1995) Economic Growth, McGraw-Hill, New York.

Chenery, H. B. (1960) “Patterns of industrial growth”, *The American Economic Review*, Vol. 50, No. 4 (Sep., 1960): 624-654.

Chenery, H. B. and Syrquin, M. (1975) “Patterns of Development 1950–1970”, Oxford University Press.

Chenery, Hollis and Srinivasan, T.N (1988) “*Handbook of Development Economics: Volume 1*”, edited by Chenery, Hollis, Srinivasan, T.N., Behrman, Richard, Jere: 203-273, Fifth edition North-Holland.

Kuznet, S. (1966) “Modern Economic Growth: Rate, Structure and Spread”, New Haven and London: Yale University Press, New York: 529.

Kuznets, S. (1955) “Economic Growth and Income Inequality”, *The American Economic Review*, Vol. 45, No. 1: 1–28.

Papola, T.S. (2009) “India: Growing Fast, But also needs to Industrialize”, *Indian Journal of Labour Economics*, Vol. 52, No. 1: 57-70.

Papola, T.S. (2012) “Structural Changes in the India Economy: Emerging Patterns and Implications, *Institute for Studies in Industrial Development*, Working Paper No. 2/2012.

Papola, T.S., Maurya, Nitu and Jena, Narendra (2011) A Study Prepared as a Part of a Research Programme- “Structural Changes, Industry and Employment in the Indian Economy: Macro-economic Implications of Emerging Pattern”, Sponsored by *Indian Council of Social Science Research (ICSSR)*, New Delhi.

Quah D. (1993a) “Galton’s Fallacy and Tests of the Convergence Hypothesis”, *Scandinavian Journal of Economics*, Vol. 95(4): 427-443.

Quah D. (1993b) “Empirical Cross-Section Dynamics in Economic Growth”, *European Economic Review*, Vol. 37: 426-434.

Centre for Development Economics and Innovation Studies, Punjabi University, Patiala

All discussion papers are accessible on-line at the following website:
http://www.punjabiuniversity.ac.in/cdeiswebsite/index.html

Discussion papers in Economics

1. **Anita Gill**, "Internationalization of Firms: An Analysis of Korean FDI in India", October, 2013.
2. **Lakhwinder Singh and Kesar Singh Bhangoo**, "The State, Systems of Innovation and Economic Growth: Comparative Perspectives from India and South Korea", October, 2013.
3. **Inderjeet Singh and Lakhwinder Singh**, "Services Sector as an Engine of Economic Growth: Implications for India-South Korea Economic Cooperation, October, 2013.
4. **Sukhwinder Singh and Jaswinder Singh Brar**, "India's Labouring Poor in the Unorganized Sector: Social Security Schemes and Alternatives", October, 2013.
5. **Inderjeet Singh, Lakhwinder Singh and Parmod Kumar**, "Economic and Financial Consequences of Cancer from Patient's Family Perspective: A Case Study of Punjab", October, 2013.
6. **Niharika Sharma**, "Growth and Structural Change in Indian Manufacturing since Liberalisation: An Interstate Analysis", December, 2013.