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Contents

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An Analysis of Direction of Rice Exports from India: Performance and Concentration

Pinky Bains*

Abstract

The present paper analyses the pattern of state wise production and export of rice in India for the period 2000-01 to 2017-18. The growth and share of rice export and the ratio to total merchandise exports as well as agricultural exports have been a consideration. The changes in the structure of India's exports are analysed by measuring the shares of rice export during the study period 1987-88 to 2017-18. The country-wise growth rates have enabled us to identify the potential countries to export rice from India. The study identifies from the estimates that in the share of rice exports to different countries, Saudi Arabia has the largest share of exports out of all other countries, although Saudi Arabia's share declined from 31.04 per cent in 1990-91 to 11.67 per cent in 2017-18. UAE, UK and USA also have a considerable share in India's export of rice. The analysis shows that the compound growth rate is found to be higher for Yemen (35.48 per cent) followed by Singapore (20.24 per cent), Kuwait (19.21 per cent) and other countries (19.13 per cent) during the period of study. The study also attempts to examine the concentration ratio by using different measures. This analysis shows that rice export to Saudi Arabia is in the top for 20 years, whereas Bangladesh and UAE fall under Concentration Ratio(2) for three years each.

Keywords: Concentration, Export, Growth, Production, Rice

Introduction

In India, agriculture is the main occupation. About 58 per cent of the population depends upon agriculture. It is the backbone of the Indian economy and is the oldest and largest occupation of India. Agriculture is one of the priority sectors of the state's economy, particularly the rural economy. Agriculture has a diminishing share in the state domestic product. Several policies and programmes are being planned and implemented by the government from time to time to improve productivity. Besides enhanced techniques for the development of agriculture and higher agriculture production, timely and sufficient rainfall and weather conditions are also crucial factors (Ramakrishna and Degaonkar, 2016). According to the projections made by the Population Foundation of India, India's population will be 1546 million by the end of 2030, 1695 million by the end of 2040 and 1824 million by the end of 2050. The estimated demand for rice will be 121.2 million tonnes by the year 2030, 129.6 million tonnes by the year 2040 and 137.3 million tonnes

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by the year 2050. The productivity of rice brought to the level of 3.3 tonnes per hectare, i.e., 2.2 tonnes at present, the target to be achieved (Kumar et al., 2014).

Rice being the staple food of India, continues to play a vital role in the national food and livelihood security system. In agriculture, rice is one of the essential food crops of India and second throughout the world. Among the rice-growing countries, India has a significant area under rice cultivation in the world, and in the case of production it is next to China. However, the productivity of India is much lower than that of Egypt, Japan, China, and Vietnam, USA and Indonesia. The reason for low productivity is that the rice grown in the country is under various agro-ecologies, *i.e.* irrigated and rain-fed systems. The states like Uttar Pradesh, Bihar, West Bengal, Orissa, Jharkhand, Chhattisgarh and Assam are having massive potential for rice cultivation, and there is scope to increase productivity in this region, and therefore, under Bringing Green Revolution to Eastern India (BGREI) besides National Food Security Mission (NFSM) programme, under which the states are covered. NFSM programme has been implemented in 194 districts and 25 states to increase rice production. Improvement in Agricultural Productivity has become a necessity due to the limitation in the expansion of cultivated acreage and ever-increasing food demand. The demand for food is seen as continuously rising along with the increase in the world population.

Review of Literature

Several studies have been carried out on Problems and Prospects of Rice Export from India. Nguyen and Baldeo (2006) surveyed the constraints faced by the farmers in rice production and its export for the period 1965 to 2004 in Vietnam. The study found that the agro-ecological obstacles faced by farmers were dependent on monsoon, land/soil problems, environmental pollution, lack of water and small landholdings. Raghuram and Asopa (2008) conducted a study on issues in infrastructure for export of rice from India from 1990-91 to 2001-02 and concluded that the Government should promote the Indian basmati rice brand in the international market. The farmers switch between basmati rice and non-basmati rice. Non-basmati rice is preferred over basmati since the yield in basmati rice production is low as compared to non-basmati rice due to lack of irrigation facilities, lack of access to information on basmati rice export potential and price trends etc. Another study conducted by Kaur and Dhami (2013) about the export performance of agro-based industries in Punjab, especially the rice industry from 1996-97 to 2009-10. The results of the study found that the agro and industrial policy of the government of Punjab is very supportive and promoting agro units as well as Agro infrastructure-related projects. Spielman et al. (2013) initiated a study on the prospects for hybrid rice in India. They examined the technical challenges, market opportunities, and policy constraints relating to hybrid rice in India and identified the role of various organizations in advancing hybrid rice development. Ramakrishna and Chaya (2016) analysed a study on rice exports from India trends, problems and prospects. The study found that a good market for Indian rice varieties, especially Basmati rice in the world market. India faced the challenge of low productivity and competition from the Basmati rice from Pakistan. Adhikari et al. (2016) examined the growth performance and identified the determinants of rice export from India with particular reference to basmati rice during the period 1980-81 to 2012-13. The study revealed that Indian

rice export had a fabulous performance during the study period. Paramalakshmi and Kalabarani (2016) focused on problems & prospects of rice (basmati and non-basmati) production and exports in India. The study concluded that India is facing stiff competition in the world markets for the shipping of rice.

The study aims to analyse the state-wise productivity of rice in India, to evaluate the direction of rice export of India to different destinations and to find out the various measures of concentration ratio in India's rice export.

Data Sources and Methodology

The present study uses secondary data, and also it conducts a detailed analysis of the role of rice export in total merchandise exports as well as agricultural exports from India. The data is from Directorate General of Commercial Intelligence and Statistics (DGCIS) published by *Reserve Bank of India (2017-18)* for the period 1987-88 to 2017-18. Due to the availability of data, state-wise data on production starts from the year of 2000-01 to 2016-17. The present study has examined the pattern of growth, structure, concentration and instability of Rice export from India (both commodity wise and geographical).

Growth Rates for Exports

The compound growth rates calculated for the period 1987-88 to 2017-18 and decade wise *i.e.,* 1991-92 to 2000-01 and 2001-02 to 2010-11 is carried to study the growth pattern of exports (destination wise). The growth rates calculated by fitting the exponential function is as shown below:

$$Y_t = ab^{out}$$

Transforming the equation in linear form

$$\text{Log } Y_t = \log a + t \log b + U \log e \qquad \ldots 1$$

Where Y_t = value of exports in year t

t = trend variable

u = disturbance term

a, b are constants.

From the estimated values of the regression coefficient 'b' the compound rate of growth 'r' is calculated as follows:

$$r = (\text{antilog } \hat{b} - 1) \times 100$$

Where, $\hat{b}$ = estimated value of b.

Concentration Ratio

Low, Olarreaga and Suarez (1998) used different concentration indices, namely Herfindal-Hirschman concentration index, Theil-entropy coefficient and Mean Logarithm deviation to investigate if globalization has affected the concentration indices. Appropriateness of the estimate depends on the use of the concentration measure and the nature of the data on which the estimate is based (Erlat and Akyuz, 2001; Bailey and Boyle, 1971; Togan, 1994). The present study uses five concentration measures based on the shares of individual commodity wise category in India's total exports for every year of the study period. Let Q_{it} represents the export of i^{th} country at time t. Then the sum of Q_{it} from 1 to m will be Q_t and the share of each country in rice export of India for the year t, would be expressed as:

$$P_{it} = Q_{it}/Q_t$$

i = 1……m and t = 1…….T

In our study, m is equal to 11 for major-countries of the study. The measure is as follows:

Concentration Ratio (CR) – It shows the total share of k Country, which has the largest shares in total exports of India. It means it considers the share of the first few countries to access the concentration levels of the export sector.

It is denoted by CR (k) and calculated as:

$$CR\ (k)_t = \sum P_{it}$$

here k is less than the total number of export commodities m.

The measure ranges from 0-1. It the CR is close 0 it means that the largest X country is earning a small share of the rice export earnings. A CR is close to 1 or unity; this means that the largest X country is responsible for almost the entire export earnings showing a high concentration. The present study used CR (2) and CR (4) but there is no rule for the determination of the value of k, so Concentration ratio is rather an arbitrary decision.

Hirschman-Herfindahl (HH) – The Square of export shares of all rice exporting Countries is calculated by the Hirschman-Herfindahl method. It simply consists of the sum of Pit's weighted by themselves and calculated as:

$$HHI_t = \Sigma\ P_{it}^2$$

This index gives higher weight to the more massive exporting country and reaches a value of unity when the export of only one country (high concentration).

Rosenbluth-Hall-Tideman (RHT) – under this P_{it}'s are arranged in descending order as P_{it} is weighted by its ranks i.

$$RHT_t = 1 / [\ 2\Sigma(i\ Pi\ ) - 1\ ]$$

Where $1/(2m-1) \leq RHT_i \leq 1$

Entropy (E) – here Pit's are weighted by the natural logs of the inverse of the Pit's:

$$E_t = \Sigma\ P_{it}\ \ln(1/P_{it})$$

Therefore, here, the weighting factor is the logarithm of the inverse of the share. When an export country has a monopoly in export earnings, then the weighting factor becomes zero, which means the entropy index will be showing a monopoly. Small values of entropy measure of reflecting high concentration, as opposed to the previous three measures. In order to make it comparable with other measures, the inverse of antilog of E_t is used and called H_t

$$H_t = 1/\ \text{antilog}\ (E_t)$$

Comprehensive Measure of Concentration Index (CCI) – As with the Hall-Tideman, the CCI requires the export share Pi to sort in descending order. However, this index's main focus is on the largest Pi, the share of export to a particular country. The remaining P_{it}'s are used to adjust P_{lt} according to this formula:

$CCI_t = P_{it} + \Sigma\ P_{it}^2\ [1+ (1-P_{it})]$

This index also produces a value of unity in the case of high concentration.

Empirical Analysis

States wise production of rice for the period 2000-01 to 2017-18 depicts in Table-1. The analysis indicates above 10 per cent share in case of Andhra Pradesh followed

by West Bengal, Uttar Pradesh and Punjab, while above five per cent includes Tamil Naidu and Bihar for the overall study period. Whereas less than 1 per cent share of production observed in the case of Arunachal Pradesh, Chandigarh, Himachal Pradesh, Kerala, Manipur, Meghalaya, Mizoram and Tripura.

Table-1: State-Wise Share of Production of Rice in India (percentage)

	Andhra Pradesh	Arunachal Pradesh	Assam	Bihar	Chhattis-garh	Goa	Gujarat	Haryana	Himachal Pradesh	J&K
2000-01	14.68	0.16	4.71	6.41	0	0.17	0.56	3.18	0.15	0.49
2001-02	12.22	0.14	4.14	5.58	5.44	0.14	1.12	2.93	0.15	0.45
2002-03	10.22	0.21	5.21	7.09	3.68	0.19	0.76	3.44	0.12	0.59
2003-04	10.13	0.17	4.39	6.16	6.3	0.19	1.44	3.16	0.14	0.57
2004-05	11.57	0.16	4.18	2.98	5.28	0.17	1.49	3.64	0.15	0.59
2005-06	12.77	0.16	3.88	3.81	5.47	0.16	1.42	3.5	0.12	0.61
2006-07	12.74	0.16	3.13	5.35	5.41	0.14	1.49	3.62	0.13	0.59
2007-08	13.8	0.16	3.44	4.58	5.62	0.13	1.53	3.74	0.13	0.58
2008-09	14.38	0.17	4.05	5.64	4.43	0.12	1.32	3.33	0.12	0.57
2009-10	11.84	0.24	4.87	4.05	4.62	0.11	1.45	4.07	0.12	0.56
2010-11	15.04	0.24	4.94	3.24	6.43	0.12	1.56	3.62	0.13	0.53
2011-12	12.26	0.24	4.29	6.81	5.73	0.12	1.7	3.57	0.13	0.52
2012-13	10.95	0.25	4.88	7.16	6.29	0.12	1.47	3.78	0.12	0.78
2013-14	11.95	0.26	4.63	5.17	6.31	0.12	1.54	3.75	0.11	0.57
2014-15	10.84	0.27	4.56	5.98	5.64	0.13	1.53	3.76	0.11	0.43
2015-16	7.01	0.26	4.79	6.36	5.42	0.13	1.59	3.88	0.12	0.6
2016-17	6.94	0.27	4.4	7.67	7.49	0.14	1.8	4.14	0.14	0.53
2017-18	7.52	0.28	4.75	7.28	4.35	0.14	1.88	4.16	0.11	0.56

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS)

Table-1(cont.): State-Wise Share of Production of Rice in India (percentage)

	Jharkhand	Karnataka	Kerala	MP	Maharashtra	Manipur	Meghalaya	Meghalaya	Mizoram	Nagaland
2000-01	0	4.53	0.89	1.16	2.27	0.45	0.21	0.12	0.27	0
2001-02	1.95	3.47	0.75	1.82	2.85	0.42	0.2	0.11	0.25	1.95
2002-03	1.93	3.33	0.96	1.44	2.59	0.46	0.27	0.15	0.31	1.93
2003-04	2.61	2.89	0.64	1.98	3.21	0.43	0.23	0.13	0.28	2.61
2004-05	2.02	4.27	0.8	1.41	2.61	0.53	0.23	0.13	0.31	2.02
2005-06	1.7	6.27	0.69	1.81	2.94	0.42	0.17	0.11	0.29	1.7
2006-07	3.18	3.7	0.68	1.47	2.76	0.41	0.21	0.03	0.28	3.18
2007-08	3.46	3.85	0.55	1.51	3.1	0.42	0.21	0.02	0.3	3.46
2008-09	3.45	3.84	0.6	1.57	2.31	0.4	0.21	0.05	0.35	3.45
2009-10	1.73	4.15	0.67	1.42	2.45	0.36	0.23	0.05	0.27	1.73
2010-11	1.16	4.37	0.55	1.85	2.81	0.54	0.22	0.05	0.4	1.16
2011-12	2.98	3.76	0.54	2.12	2.7	0.56	0.21	0.05	0.36	2.98
2012-13	3.01	3.2	0.48	2.64	2.91	0.25	0.22	0.03	0.39	3.01
2013-14	2.64	3.35	0.48	2.67	2.93	0.37	0.26	0.06	0.4	2.64
2014-15	3.11	3.43	0.52	3.4	2.74	0.38	0.27	0.03	0.41	3.11
2015-16	2.7	2.83	0.51	3.32	2.43	0.39	0.26	0.05	0.42	2.7
2016-17	3.58	2.42	0.41	3.93	2.89	0.40	0.28	0.06	0.45	3.58
2017-18	3.75	2.58	0.46	3.79	2.49	0.42	0.29	0.08	0.47	3.75

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS)

Table-1 (cont.): State-Wise Share of Production of Rice in India (percentage)

	Odisha	Punjab	Rajasthan	Sikkim	Tamil	Telangu	Triputra	UP	Uttara-kandh	WB
2000-01	5.44	10.79	0.18	0.03	8.68	-	0.61	13.76	-	14.65
2001-02	7.67	9.46	0.19	0.02	7.06	-	0.63	13.79	0.66	16.37
2002-03	4.57	12.39	0.09	0.03	4.99	-	0.84	13.38	0.67	20.07
2003-04	7.62	10.92	0.19	0.02	3.65	-	0.58	14.73	0.64	16.59
2004-05	7.79	12.58	0.18	0.03	6.1	-	0.66	11.51	0.69	17.93
2005-06	7.48	11.12	0.17	0.02	5.7	-	0.6	12.15	0.64	15.83
2006-07	7.32	10.88	0.18	0.02	7.09	-	0.67	11.93	0.6	15.82
2007-08	7.81	10.86	0.27	0.02	5.22	-	0.65	12.2	0.61	15.24
2008-09	6.88	11.11	0.24	0.02	5.23	-	0.63	13.22	0.59	15.18
2009-10	7.78	12.63	0.26	0.03	6.37	-	0.72	12.15	0.68	16.12
2010-11	7.12	11.31	0.28	0.02	6.04	-	0.73	12.51	0.57	13.61
2011-12	5.52	10.02	0.24	0.02	7.09	-	0.68	13.33	0.56	13.88
2012-13	6.94	10.82	0.21	0.02	3.85	-	0.68	13.71	0.55	14.29
2013-14	7.15	10.58	0.29	0.02	5.02	-	0.67	13.74	0.54	14.43
2014-15	7.77	10.41	0.34	0.03	5.47	-	0.68	11.46	0.57	13.79
2015-16	5.5	11.06	0.35	0.02	7.03	2.77	0.68	11.69	0.6	14.92
2016-17	7.75	10.78	0.42	0.04	2.21	4.82	0.67	12.80	0.59	14.24
2017-18	6.00	12.31	0.41	0.05	6.69	5.75	0.69	12.20	0.6	13.76

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS)

Graphical presentation of state-wise productivity of initial period (2000-01) and for a recent period (2017-18) shown in Figure-1 and 2.

Figure-1: State-Wise Share of Production of Rice in India for the Year 2000-01

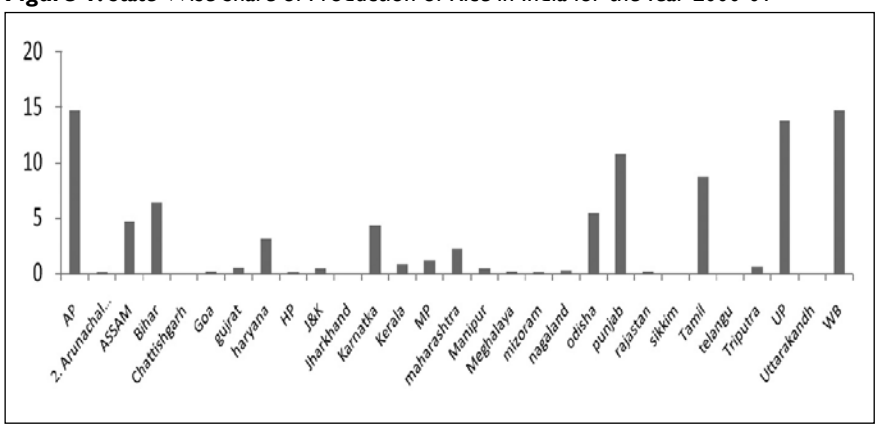


Figure-2: State Wise Share of Production of Rice in India for the Year 2017-18

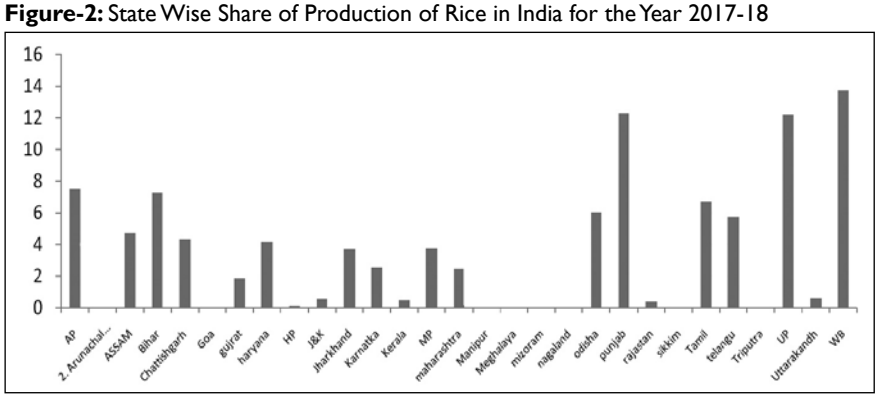


Table-2: Structure of Rice export in Total Merchandise Exports, Agricultural Exports and Rice Export from India

Commodity / Year	Rice Export	Total Exports	Agriculture and Allied Products	Share of Rice in Total exports	Share of Rice in Agriculture
1987-88	338.6	15673.7	3320.1	2.16	10.2
1988-89	331.4	20231.5	3500.6	1.64	9.47
1989-90	426.5	27658.4	4749.6	1.54	8.98
1990-91	461.6	32557.6	6018.7	1.42	7.67
1991-92	755.6	44041.8	7894.8	1.72	9.57
1992-93	975.6	53688.3	9082.7	1.82	10.74
1993-94	1286.7	69751.4	12632.6	1.84	10.19
1994-95	1205.8	82674.1	13269.4	1.46	9.09
1995-96	4568.1	106353.3	20344.0	4.30	22.45
1996-97	3172.4	118817.1	24362.6	2.67	13.02
1997-98	3371.0	130100.6	24626.2	2.59	13.69
1998-99	6280.8	139753.1	25387.3	4.49	24.74
1999-00	3125.9	159561.4	24301.2	1.96	12.86
2000-01	2932.2	203571.0	27288.2	1.44	10.75
2001-02	3174.1	209018.0	28144.0	1.52	11.28
2002-03	5831.2	255137.3	32473.3	2.29	17.96
2003-04	4168.0	293366.8	34615.7	1.42	12.04
2004-05	6768.9	375339.5	38078.1	1.80	17.78
2005-06	6221.3	456417.9	45220.1	1.36	13.76
2006-07	7035.9	571779.3	57392.1	1.23	12.26
2007-08	11754.6	655863.5	74209.3	1.79	15.84
2008-09	11164.4	840755.1	80648.9	1.33	13.84
2009-10	11254.9	845533.6	84136.3	1.33	13.38
2010-11	11586.06	1142922.0	110296.1	1.01	10.50
2011-12	24108.73	1465959	179582.8	1.64	13.42
2012-13	33808.21	1634318	221129.9	2.07	15.29
2013-14	47087.03	1905011	248790.9	2.47	18.93
2014-15	48028.25	1896445	257543.5	2.53	18.65
2015-16	38201.99	1716384	278643.9	2.23	13.71
2016-17	38442.79	1849434	298654.7	2.08	12.87
2017-18	49837.99	1955541	329857.9	2.55	15.11
1991-92 to 2000-01	25.2979	21.20673	19.68185	—	—
2001-02 to 2010-11	19.47564	16.19321	18.78688	—	—
1987-88 to 2017-18	17.7661	17.82337	16.02344	—	—

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS)

Figure-3: Structure of Rice export in Total Merchandise Exports, Agricultural Exports and Rice Export from India

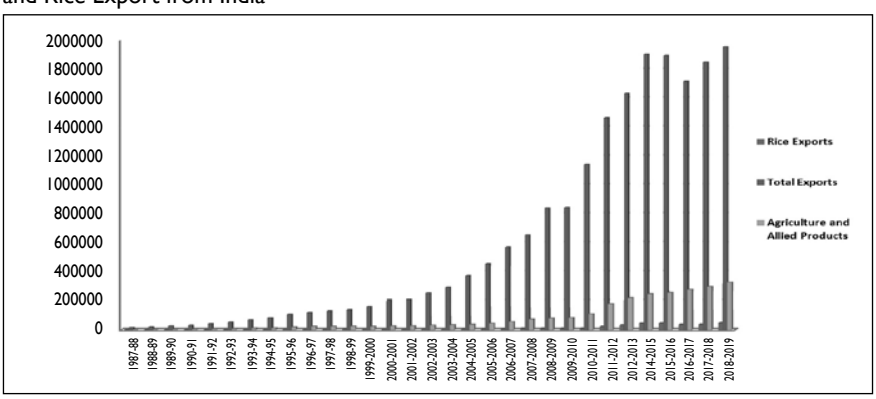


Table-2 depicts the share of rice export in total agricultural commodities as well as total merchandise exports from India. Rice export of India experienced a continuous increase, i.e. 338.6 crores in 1987-88 to 49837.99 crores in 2017-18. Total merchandise exports from India have also increased during the study period, i.e. (from 15673.7 crores to 1955541 crores). As far as the agricultural export of India is concerned, it had grown from 3320.1 crores in 1987-88 to 329857.9 crores in 2017-18. The share of rice export in total exports of India has been observed as the highest in two periods, i.e. 1995-96 (4.30 per cent) and 1999-00 (4.49 per cent).

On the whole, more than one per cent share of rice export in total exports observed for all the years of study. The ratio of rice to total agricultural exports has 10 per cent for the study period except for the years 1989-90 (8.98 per cent), 1990-91 (7.69 per cent) and 1994-95 (9.09 per cent). Figure-2 shows the actual value in terms of rupees in crores of rice export in total merchandise exports, agricultural exports from India.

Table-3: Share of Direction of Rice Export from India

Countries / Years	Bangla-desh	France	Kuwait	Saudi Arabia	Singa-pore	South Africa	U.A.E.	The U.K.	U.S.A	Yemen	Others	Total
1990-91	0.00	0.52	2.84	31.04	0.24	0.00	5.57	8.32	4.31	0.06	47.12	100
1991-92	0.26	0.82	2.50	36.77	1.56	0.00	7.42	11.18	5.61	0.00	33.88	100
1992-93	0.00	1.36	6.60	48.40	0.15	0.00	9.64	8.58	4.77	0.00	20.49	100
1993-94	0.00	0.71	6.68	53.98	0.65	0.08	11.28	7.67	3.19	0.00	15.77	100
1994-95	7.37	1.13	10.58	43.05	0.92	0.30	8.51	7.00	3.29	0.02	17.83	100
1995-96	20.84	0.56	1.96	10.77	0.18	6.81	4.00	2.62	2.24	0.60	49.43	100
1996-97	4.58	0.33	3.76	28.24	0.29	6.21	4.78	3.16	10.04	0.66	37.96	100
1997-98	10.70	0.95	6.13	31.76	0.67	7.35	4.22	5.05	3.82	1.66	27.69	100
1998-99	35.83	0.45	1.60	24.25	0.42	8.61	2.47	2.68	0.34	0.68	22.68	100
1999-00	11.71	1.09	4.52	40.62	0.97	5.14	4.78	5.56	2.34	1.82	21.46	100
2000-01	10.15	1.98	8.14	44.66	1.12	2.30	3.86	10.44	4.61	1.14	11.61	100
2001-02	2.55	0.81	6.57	39.22	1.61	7.68	2.64	6.18	3.26	1.55	27.91	100
2002-03	9.69	0.61	3.12	18.83	1.57	12.16	2.41	3.58	2.57	0.82	44.63	100
2003-04	21.70	0.82	3.66	29.65	0.94	5.24	5.67	5.36	2.54	1.66	22.76	100
2004-05	12.36	0.58	3.93	27.96	0.57	7.62	5.44	4.20	1.49	2.27	33.57	100
2005-06	8.88	0.45	4.27	30.12	1.05	5.13	6.43	3.67	2.19	2.26	37.80	100
2006-07	6.95	0.20	4.77	20.38	0.80	6.49	7.71	3.25	2.13	2.43	44.89	100
2007-08	22.53	0.17	4.02	20.85	0.58	3.05	12.92	2.75	1.83	1.97	29.31	100
2008-09	8.85	0.03	6.58	27.82	0.49	0.38	26.00	3.90	2.46	1.58	21.91	100
2009-10	0.00	0.02	9.17	29.73	0.51	0.14	27.87	1.79	1.53	2.69	26.56	100
2010-11	0.10	0.36	9.42	27.09	0.32	0.52	24.55	3.04	2.18	2.57	29.85	100
2011-12	1.13	0.32	5.90	15.18	0.88	1.88	16.31	2.88	2.39	2.40	50.73	100
2012-13	0.25	0.28	3.50	12.10	1.20	2.93	6.12	2.68	1.91	3.04	65.99	100
2013-14	3.30	0.28	3.44	15.38	0.97	2.26	4.02	1.85	2.14	2.86	63.50	100
2014-15	5.77	0.24	3.45	16.47	1.25	1.85	5.62	2.00	1.97	3.11	58.27	100
2015-16	2.28	0.29	3.91	15.71	1.14	1.70	10.1	2.62	2.83	2.66	56.76	100
2016-17	0.55	0.34	2.94	12.81	0.95	1.76	10.51	1.91	2.44	2.13	63.67	100
2017-18	10.86	0.26	2.59	11.67	0.66	0.92	7.59	2.16	2.36	2.76	58.18	100
1991-92 to 2000-01	100.32	27.34	27.08	24.64	34.56	81.58	16.88	14.51	12.27	98.09	25.56	29.20
2001-02 to 2010-11	-21.1	-26.47	19.31	12.40	3.51	-15.30	52.08	2.36	7.63	26.86	21.19	17.00
Overall period	-0.91	5.47	19.21	13.55	20.24	13.79	23.46	13.29	13.59	35.48	19.13	17.15

Source: Author's Calculations

Table-3 depicts the growth performance and shares of India's rice export to different countries during the period 1990-91 to 2017-18. India mainly exports rice to Bangladesh, Kuwait, France, Saudi Arabia, Singapore, South Africa, UAE, UK and USA and Yemen. The share of rice export to different countries shows that Saudi Arabia has experienced the largest share of exports out of all other countries, although its share declined from 31.04 per cent in 1990-91 to 11.67 per cent in 2017-18. UAE, UK and USA countries also have a considerable percentage of India's exports of rice. This analysis shows high fluctuations in the share of exports in the case of Bangladesh, especially from 1995-96 to 2007-08. The annual growth rate was found to be higher for Yemen (35.48 per cent) followed by Singapore (20.24 per cent), Kuwait (19.21 per cent) and other countries (19.13 per cent) during the period of study. Decade wise analysis shows high growth rates of rice export to most of the export markets during the first decade except UAE. The growth rate of rice export to Bangladesh was 100.32 per cent, to Yemen, 98.09 per cent and to South Africa 81.58 per cent. However, these growth rates significantly declined during the second decade of 2001-02 to 2010-11. Other countries rice export increased from 47.12 per cent in 1990-91 to 65.99 per cent 2012-13. The share of exports of rice to Saudi Arabia declined from 31.04 per cent in 1990-91 to 11.67 per cent in 2017-18, but still, Saudi Arabia and other countries constituted a higher share of rice export during the study period. India's exports of rice to France, Singapore and Yemen constituted relatively lower shares in rice export during 1990-91 to 2017-18. Figure-3, 4 and 5 also show the percentage of India's rice export to different countries for three periods.

Figure-4: Share of Direction of Rice Export in 1990-91

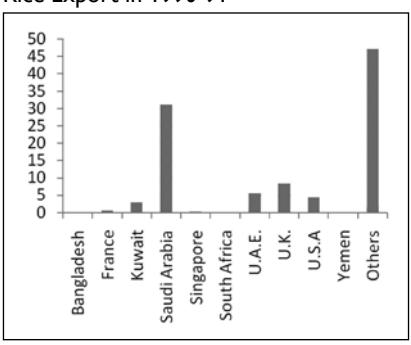


Figure-5: Share of Direction of Rice Export in 2000-01

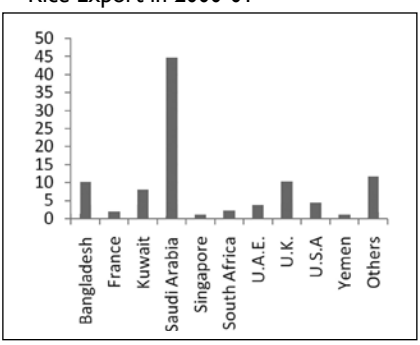


Figure-6: Share of Direction of Rice Export in 2017-18

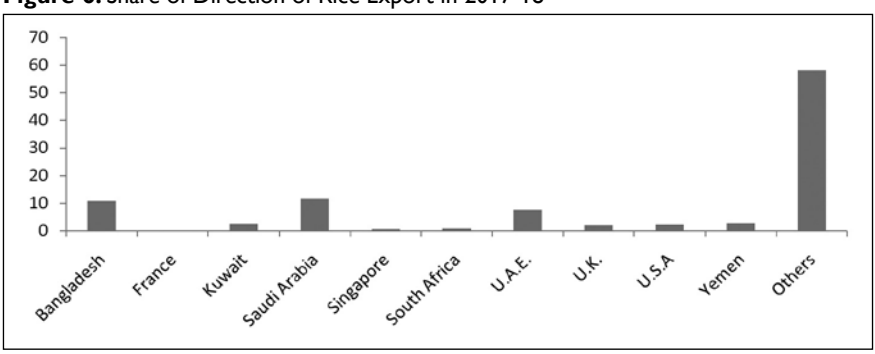


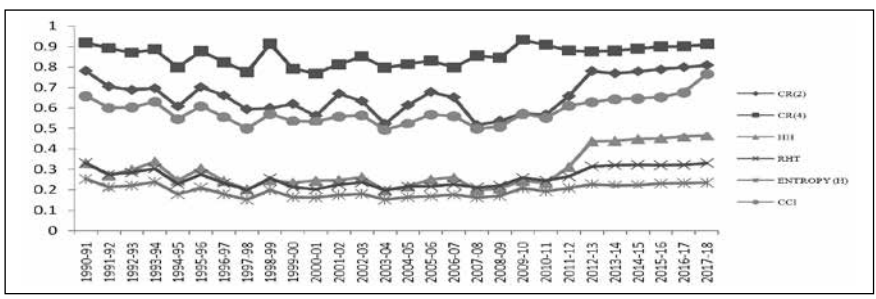
Table-4: Geographical Concentration of Rice Export

Years / Concentration	CR(2)	CR(4)	HH	RHT	ENTROPY (H)	CCI
1990-91	0.782	0.92	0.331	0.331	0.254	0.659
1991-92	0.706	0.893	0.272	0.277	0.213	0.601
1992-93	0.689	0.871	0.300	0.286	0.222	0.604
1993-94	0.697	0.887	0.340	0.306	0.239	0.632
1994-95	0.609	0.800	0.247	0.23	0.179	0.546
1995-96	0.703	0.878	0.307	0.277	0.211	0.609
1996-97	0.662	0.825	0.245	0.233	0.18	0.557
1997-98	0.595	0.775	0.204	0.199	0.153	0.501
1998-99	0.601	0.914	0.248	0.258	0.199	0.570
1999-00	0.621	0.793	0.236	0.214	0.165	0.536
2000-01	0.563	0.769	0.246	0.204	0.163	0.534
2001-02	0.671	0.814	0.249	0.225	0.175	0.559
2002-03	0.635	0.853	0.263	0.237	0.182	0.564
2003-04	0.524	0.798	0.198	0.200	0.154	0.494
2004-05	0.615	0.815	0.219	0.217	0.165	0.524
2005-06	0.679	0.832	0.253	0.217	0.170	0.569
2006-07	0.653	0.799	0.262	0.228	0.178	0.561
2007-08	0.518	0.856	0.201	0.212	0.163	0.500
2008-09	0.538	0.846	0.208	0.222	0.171	0.509
2009-10	0.576	0.933	0.246	0.26	0.21	0.572
2010-11	0.569	0.909	0.234	0.246	0.194	0.552
2011-12	0.659	0.881	0.313	0.266	0.210	0.611
2012-13	0.781	0.877	0.438	0.316	0.227	0.630
2013-14	0.77	0.88	0.44	0.321	0.221	0.643
2014-15	0.78	0.890	0.45	0.324	0.224	0.647
2015-16	0.789	0.90	0.453	0.321	0.231	0.654
2016-17	0.80	0.901	0.462	0.323	0.233	0.676
2017-18	0.81	0.913	0.467	0.332	0.236	0.767

Source: Author's Calculations

The value of geographical concentration ranges from 0 to 1. The level of rice export for all the years during the study period is shown in Table-4. The CR (2) measure provides values higher than 0.51 for the study period, and high costs have been found for the years 1990-91 and 1991-92 (*i.e.* 0.782 and 0.706 respectively). The rice export to other countries and Saudi Arabia are in the top 2 countries for 20 years each, whereas Bangladesh and UAE fall under CR (2) for three years each. CR (4) gives concentration values higher than 0.76 for all the years during the study period, and high value is 0.92 for the year 1990-91. India's rice export to other countries and Saudi Arabia are in top 4 exporting countries for all the years, whereas UAE and Bangladesh are for 15 years and 12 years respectively.

Figure-7: Geographical Concentration of Rice Export



The HH concentration measure gives values higher than 0.33 for all the years and high concentration value of 0.467 for the year 2017-18. The RHT concentration measure gives the costs higher than 0.20 and lower than 0.33. The concentration measure H gives shallow amounts as compared to other means. It ranges from 0.15 to 0.27 throughout the study period. The concentration values given by CCI are higher than 0.50 for all the years except 2003-04 (*i.e.* 0.49) and, even higher than 0.70 for the year 2012-13. Here also, most of the measures of rice concentration show slightly increasing values during the period of study. The time-series plot of rice concentration values of different steps shown in Figure-6. All the rules provide similar movements for concentration over the period under review. CR (4) gives huge benefits of attention, but it has declined after 2009-10, while other measures have shown increased benefits. The benefits of RHT, ENTROPY (H) and HH measures are very close in magnitude and give lower costs of concentration. All the steps have shown a slight increase in intensity during the study period except the rule of CR (4).

Conclusion

India is one of the important countries in the world in the export of rice. Indian rice exports reach first place in the world markets. This study has analysed the trends and variability of rice export, assess the prospects of rice export from India to various countries in the world. The study is based on secondary data. The time-series data collected from Directorate General of Commercial Intelligence and Statistics (DGCIS) published by Reserve Bank of India (2017-18) on the export of rice from India for the period 1987-88 to 2017-18. Due to the availability of data, state-wise data on production starts from the year of 2000-01 to 2016-17**.** The share of rice export to different countries shows that Saudi Arabia has a significant share of exports out of all other countries in the study, although its share declined from 31.04 per cent in 1990-91 to 11.67 per cent in 2017-18. UAE, UK and USA countries also have a considerable share in India's exports of rice. The compound growth rate is found to be higher for Yemen (35.48 per cent) followed by Singapore (20.24 per cent), Kuwait (19.21 per cent) and other countries (19.13 per cent) during the period of study. The reasons for the low productivity of rice in India is may be due to less mechanisation, more area under traditional varieties of cropping and more dependence on rain. If we desire to increase our exports share in the world rice market, the production growth rate should be an adequate surplus in the country. The requirement is a careful analysis of the low productivity of rice in the country. The breeding programme may be initiated to develop high yielding export quality rice to enable the exporters to sustain their export in future. Extension activities may be strengthened to educate the cultivators for production of quality rice to match the standards of international markets; Low-cost production technology may be developed to bring down the cost of production to enable the exporters to compete with competing countries in the global markets. Proper arrangements are made for procurement and processing of rice export purpose as per the requirement of global markets (Ramakrishna and Degaonkar, 2016). In India, good monsoon season and healthy rice stocks create export opportunities for rice. Lower prices and favourable currency movements make Indian rice export more competitive. However, there is a strong demand for the premium quality of rice.

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Temporal and Spatial Variations in Institutional Credit and Its Impact on Agricultural Production in India

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Abstract

Institutional credit to agriculture has played a pivotal role in supporting farm production in India. The study analyses trends in rural credit and finds that direct institutional credit has been rising in the post-2000 period. The paper also examines regional variations by calculating Coefficient of Variation (CV), which suggests that spatial heterogeneity in the credit disbursement across states has fallen during the post reform period, and has shown declining trend. Further, the study attempts to assess the impact of institutional credit on agricultural production (at all India level) by estimating Cobb Douglas production function, the result suggests positive and significant impact. However, agriculture is typically a localized economic activity and its aggregation over country level may hide the spatial heterogeneity. Therefore, the study examines further by drilling down the model to state level by carrying out panel-regression analysis. The findings of the model validate the hypothesis that direct institutional credit to agriculture has positive and statistically significant impact on agricultural output and its effect is immediate. Random Effect Model (REM) is used to estimate regional variation across states, with slope dummy for credit. However, the result is statistically insignificant. It means that credit has uniform pattern in affecting output and does not affect agricultural production differently across regions of India.

To conclude, the study suggests that concerted effort is needed to augment the flow of rural institutional credit, alongside exploring innovations in product design, targeted delivery, enhanced use of technology and simplification of the cumbersome procedure for improved access to agricultural credit of small land-holders and less-educated or illiterate farmers. Finally, the study also urges to enhance investment credit in the total credit for holistic rural development.

Keywords: Agricultural Output, Dummy Variables, Economic Reforms, GDP, Hausman-Specification Test, Institutional Credit, Regression Analysis

Introduction and Motivation

The Indian economy has been experiencing high growth rate especially after the various reform measures adopted by the successive governments. The sustainability of the growth momentum however critically depends on the performance of the agriculture sector. Because a large proportion of the population in India is rural based and depends on agriculture for a living. Agriculture sector in India still provides livelihood to more than half of of the country's population. However,

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the share of agriculture sector in the Gross Domestic Product (GDP) has declined considerably over the period.

Das, Senapati, John (2009) suggested that three main factors that contribute to agricultural growth are increased use of agricultural inputs, technological change and technical efficiency. With savings being negligible among the small farmers, agricultural credit appears to be an essential input along with modern technology for higher productivity. An important aspect that has emerged in last three decades is that the credit is not only obtained by the small and marginal farmers for survival but also by the large farmers for enhancing their income. Hence, since independence, credit has been occupying an important place in the strategy for development of agriculture. It has always been maintained that the availability of concessional credit would help the farmer to adopt new technology, encourage investment in machinery and irrigation and augment the use of quality inputs to increase agricultural productivity. However, this policy has not been successful, specifically in terms of allocation of resources, cost effectiveness and access to credit for different categories of (Sahu and Rajasekhar, 2005). Under the priority sector lending norms, commercials banks are mandated to provide concessional loans. However, it is often seen that these financial bodies are reluctant to provide credit to this sector. One of the important arguments they advance is the increasing Non-Performing Assets (NPAs) in the rural sector under the obligations of priority sector lending. In this context, Gaur and Mohapatra (2019) examined the data from 2013-2017 and found that priority sector lending has a proportionately higher share in NPA portfolio of banks.

Undeniably, credit plays a significant role in promoting modern production technologies and private investments on the farms by making available adequate funds for the agricultural sector. However, it also acts like a double-edged weapon; if used productively it raises productivity and production, but if used irrationally on unproductive activities, it leads to the problem of indebtedness and ultimately deterioration in crop output. Therefore, mere increase in supply of credit is not going to address the problem of productivity, unless it is accompanied by investments in other support services. For this reason, the increased credit flow to agriculture has not resulted in the commensurate increase in production.

The financial sector reforms after 1991 systematically undermined the institutional credit arrangements for agriculture. This is a clear sign of non-agricultural biasness. However, there has been revival of agricultural credit in the 2000s as against the gloomy agricultural credit scenario during 1990s. In addition, the share of investment credit in total agricultural credit has been declining continuously. Ramakumar and Chavan (2007) examined that even as direct lending to agriculture has increased from 2000s onwards, there has been a sharp increase in the share of large-sized advances for financing agri-business-oriented enterprises, rather than for small and marginal farmers. Hence the changed official policy increasingly favours the growth of a capital and export-oriented production pattern in agriculture.

India has systematically followed a supply side approach to increase agricultural credit. The objectives of leading a supply side approach have been to replace moneylenders, relief farmers of indebtedness and to achieve higher levels of agricultural credit, investment and agricultural output. Therefore, going through literature on this issue we find that ensuring the access to rural credit and improving the efficiency of the rural credit delivery system for promoting

agricultural production has been an area of constant focus in the planning process in our country.

A large Number of agencies including Co-operatives, Regional Rural Banks (RRBs), Scheduled Commercial Banks (SCBs), Non-Banking Financial Corporations (NBFCs), Self Help Groups (SHGs) and well spread informal credit market together constitute Indian Agricultural credit delivery system. According to all India, debt and investment survey the share of non-institutional credit for agriculture sector was around 92.7% during year 1950-51, which decreased to 38.9% during 2001-02 and the share of institutional credit increased from 7.3% during 1950-51 to 61.1% during 2001-02. The findings of the National Sample Survey Organisation (NSSO) 59th round (2003) revealed that only 27% of the total number of cultivated households received credit from formal sources while 22% received credit from informal sources. The remaining households comprising mainly small and marginal farmers had no credit outstanding. Hence, all these evidences apparently point to the fact that flow of institutional credit to agriculture has not translated into commensurate increase in agricultural output.

Literature Review

Among earlier studies, Binswanger and Khandker (1992) found that the institutional growth and higher lending lead to positive but modest increase in aggregate agricultural output.

Kochar (1997**)** examined whether the production decisions of Indian farm households are affected by lack of access to formal credit through examining the impact of formal credit on household transactions in the rental market for farmland. The thrust of the paper is that households are constrained in their production decisions by their lack of access to formal credit.

Puhazhendhi and Jayaraman (1999) describe the performance of the rural credit delivery system in three focus areas of the rural credit markets, viz, agricultural, non-farm sector activities and poverty alleviation. They suggested that credit acts as an enabling input as optimum use of material inputs especially irrigation and fertilizers are necessary condition for improving the production and productivity of the crops. However, it is difficult to establish a direct relationship between credit and output as the former facilitates the adoption of technology and the levels of inputs usage, which in turn directly influence the production performance.

Sahu and Rajasekhar (2005) analysed the trends in credit flow to Indian agriculture by scheduled commercial banks during the period 1981 to 2000. The authors argued that the credit flow to agriculture even in proportionate terms declined during the reform period, which is a clear bias towards the non-agricultural sector. However, they have not much talked about agricultural credit and production/productivity relations.

Vaidyanathan (2006) examined in detail capital formation in agriculture and the type of current investments being made in agriculture in the context of farmer suicides. The author suggested that increased credit supply may not lead to increase in agricultural productivity. In addition, if credit is not appropriately directed, it might lead to deep indebtedness and distress. This paper also does not indicate any direct relationship between investments and productivity.

In a detailed paper, Mohan (2006) examined the overall growth of agriculture and the role of institutional credit. The author argued that the overall supply of

credit to agriculture as a percentage of total disbursal of credit is going down, he argued that this should not be a cause for worry as the share of formal credit as a part of the agricultural GDP is growing. Mohan concluded by examining the data that while credit is increasing, it has not really made an impact on value of output figures which points out the limitations of credit. Based on the observations from the paper, it can be inferred that formal credit cannot have significant impact on agricultural production/productivity unless other support variables are strengthened because of various backward and forward linkages.

Satish (2007) examined agriculture credit scenario in the post reform era. He argued that there has been negative policy on credit for agriculture and other priority sectors, which has been prevalent since the beginning of post-reform era. The financial sector reforms after 1991 systematically undermined the institutional credit arrangements for agriculture, which is a clear sign of non-agricultural biasness. It can be understood from the paper that the credit policies followed by banks have caused disincentives to small and marginal farmers and ultimately their production and productivity levels have deteriorated with the onset of economic reforms.

Khan, Tewari and Shukla (2007) examined the effects of liberalization on institutional agricultural credit flow and its relationship with average cost of cultivation in Indian agriculture. The thrust of the paper is to examine firstly, the nature and extent of inter-state disparities in per hectare flow of short-term institutional credit to agriculture and secondly, its relationship with average cost of cultivation across states. The authors showed that during the post-liberalization era (1991-91 to 2001-02), the inter-regional disparities in the flow of short-term institutional credit to agriculture decreased across the states. However, in this context, the authors have not mentioned whether reduction in inter-regional disparities have affected agricultural production/productivity during the post-reform period taken under consideration. As far as second part is concerned, authors argue that farmers use short-term credit to purchase inputs such as seed, fertilizer, plant protection chemicals, etc. for raising the crop. Therefore, cost of cultivation of any crop is expected to have strong relationship with short-term credit.

Ramkumar and Chavan (2007) analysed that there has been revival of agricultural credit in the 2000s as against the gloomy agricultural credit scenario during 1990s. They viewed that agricultural credits in the 1990s have been reversed in the period after 2000. They make an important argument that the revival of agricultural credit had begun after the year 2000 itself. This is contrary to the general perception that the revival in the 2000s was owing to the government's announcement in 2004 to double the supply of credit to agriculture. Finally, based on the empirical studies performed, the authors deny the association between the sharp growth of agricultural credit in the 2000s and the growth of agricultural output and agricultural employment. The rates of growth of GDP from agriculture were lower in the 2000s over the 1990s.

Golait (2007) made an attempt to analyse the issues in agricultural credit in India. The analysis reveals that the credit delivery to the agriculture sector continues to be inadequate. It appears that the banking system is still reluctant to cater the credit needs to small and marginal farmers. The growing disparities between marginal, small and large farmers continue to be a cause for concern. The study suggests that facilitating credit through processors, input dealers, NGOs, SHGs, MFIs, contract

farming, etc., that were vertically integrated with the farmers could increase the credit flow to agriculture significantly.

Sriram (2007) examined the causality of credit-agricultural productivity. The author has argued that increased supply and administered pricing of credit help in the increase in agricultural productivity and the well-being of agriculturists as credit is a sub-component of the total investments made in agriculture. However, he further viewed that the diversity in cropping patterns, holding sizes, productivity, regional variations make it difficult to establish causality for agriculture or rural sector as a whole, even if one had data. Finally, he argued that mere increase in supply of credit is not going to address the problem of productivity, unless it is accompanied by investments in other support services.

Sidhu, Vatta and Kaur (2008) employed a simultaneous (four) equation model to estimate the contribution of institutional credit towards use of production inputs, private investments and agricultural growth for the state of Punjab. Institutional agricultural credit has played a significant role in the fast and widespread adoption of modern production technologies and promotion of private investments on farms through its wide reach as well as cheap supply. The relationship between use of variable inputs and production credit disbursement has been found highly significant.

Das, Senapati, John (2009) examined the role of direct and indirect agricultural credit in the agricultural production taking care of the regional disparities in agriculture, credit disbursement and agriculture production in an econometric framework using panel data at districts level. The empirical findings of the study suggest that the direct agriculture credit amount has a positive and statistically significant impact on agriculture output and its effects is immediate. Indirect agriculture credit also has a positive significant impact on agricultural output, but with a year lag. Thus, the authors have established positive and significant linkages between institutional credit and agricultural output. However, they argued that the increased credit flow to agriculture has not resulted in the commensurate increase in production.

In the light of above discussion the study aims to analyse the trends and pattern, spatial heterogeneity and assessment of progress in the flow of institutional credit for agriculture and allied activities of India across states. The study also aims to determine the impact of institutional credit on agricultural production at all India level and also across 20 major states of India.

Methodology and Data

A cobb-douglas production function has estimated hypothesising that the institutional credit has positive impact on agricultural output. In order to judge the hypothesis at all India level, the study has comprehensively made use of descriptive statistics, Ordinary Least Squares (OLS) regression method taking into consideration the time-series data from the period 1980-2005 of concerning variables. The study is making use of regression equations to identify and estimate the factors which affect agricultural production in India. The study makes efforts an effort to understand whether institutional credit plays the role of an enabling input in raising agricultural production. As far as state level analysis is concerned, the study has necessitated the use of descriptive statistics, Fixed Effect Model

(FEM) and Random Effect Model (REM) taking into consideration panel data from the period 2000-2006 of concerning variables. In addition, to access regional variation across space slope dummy for credit is also used. The use of deflator has been made in order to contain inflationary pressures and the variables namely institutional credit and private investment have been converted at a constant base of 1999-2000.

Analysis of Trends and Pattern of Agricultural Credit

Available data suggests that agricultural credit has been rising in recent years as a share of both the value of inputs and the value of output. At the same time the share of agricultural GDP in total GDP is falling. In India, the share of agriculture in the gross domestic product has registered a steady decline from 36.4 per cent in 1982-83 to 18.5 per cent in 2006-07. Agriculture growth has remained lower than the growth rates witnessed in the industrial and services sectors. The gap between the growth of agriculture and non-agriculture sector began to widen since 1981-82, and more particularly since 1996-97, because of acceleration in the growth of industry and service sectors. In order to uplift the agricultural sector in India, in 2004, the government announced its intent to double the flow of credit to agriculture over a period of three years. From the very beginning, the actual disbursement exceeded the targets for each of the last four years. However, the increased credit flow to agriculture has not resulted in the commensurate increase in production. The average rate of growth of foodgrains production decelerated to 1.2 per cent during 1990-2007, lower than annual rate of growth of population, averaging 1.9 per cent (Quoted from Das, Senapati, John (2009).

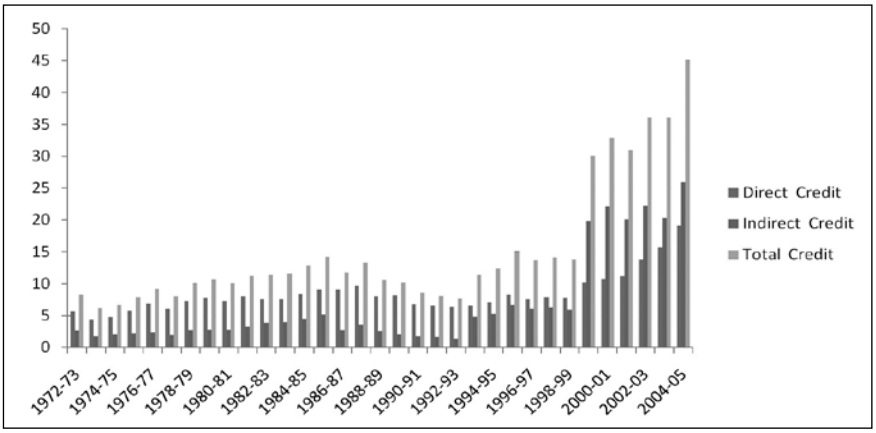
Further, empirical evidence suggests that overall flow of institutional credit to Indian agriculture has not been satisfactory, particularly from the period of economic reforms of 1990 to 2003, there is gloomy picture of rural credit. The next table shows the growth rate of nominal institutional credit to agricultural sector for different time periods. Growth rate of direct institutional credit during 1971-80 was 16.7%, which decreased to 13.9% during 1981-90 and again to 12.8%. During the period 2001-05, there was some improvement in the growth rate of nominal direct institutional credit (18.4%). Growth rate of nominal indirect institutional credit was highest during 70's (11.4%) and lowest during 1980's. During the reforms period, growth rate of indirect institutional credit was more or less 9 %, which was better than the 1980's. Total nominal institutional credit (Direct + indirect) grows fastest during 70's and slowest during the 90's. Hence, various reform measures adopted by the successive Governments to liberalize the economy have retarded the growth rate of agricultural credit.

Table-1: Annual Average Growth Rate of Agricultural Credit

Period	Direct Institutional Credit (%)	Indirect Institutional Credit (%)	Total Institutional Credit (%)
1971-80	16.7	11.4	16.5
1981-90	13.9	4.7	13.5
1991-00	12.8	9.5	12.7
2001-05	18.4	8.6	13.6
1971-05	**15.1**	**8.3**	**14.1**

Source: Handbook of statistics on Indian Economy (2009-10)

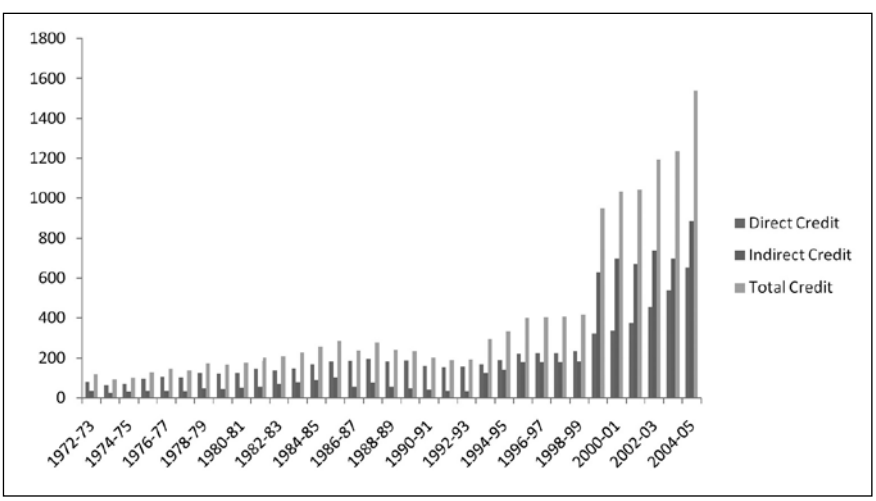
Figure-1: Agricultural Credit as Percentage of Agricultural GDP



Source: Handbook of Statistics on Indian Economy (2009-10)

Figure-2 depicts the behaviour of institutional credit as percentage of agricultural gross domestic Product (AGDP) over the period 1972-2005. Direct institutional credit as percentage of agricultural GDP was 5.66%, which increases to 9.03% in 1985-86. It decreased to 6.76% in 1990-91. From 1990-91 to 1999-2000, flow of institutional credit was almost constant, with slight fluctuations of around 7% only. From 2000 onwards, there has been continuous surge of flow of institutional credit from 10.20% in 1999-00 to 19.60% in 2004-05. The indirect institutional credit as percentage of agricultural GDP was around 2 to 3 percent during seventies, which increases during 80's and it was 5.17% in 1985-86. After 1985-86, it decreases continuously and it was 1.37% in 1992-93. After 1993-94 indirect institutional credit as percentage of agricultural GDP increases continuously and it was 65.95% in 1998-99 and 25.94% in 2004-05.

Figure-2. Agricultural Credit in Rs Crore Per Net Sown Area (Million Hectares)



Source: Handbook of statistics on Indian Economy (2009-10)

The above shown figure depicts agricultural credit in Rs crore per net sown area (million hectares). Direct institutional credit per net sown area in million hectares was 80.66 crore in 1972-73, which increased to 202.33 in 1987-88. After it started declining till mid 1990s. From 1996 onwards, it has shown continuous increase. Finally direct credit per net sown area increased to 653 crore. Indirect institutional credit per net sown area was 37.40 crore, which increased to 104.54 crore in 1985-86. From 1986 onwards, it started declining and fell to 34 crore in 1993. However, from 1994 onwards, there has been continuous increase. Finally it has gone up by 887.38 crore.

As far as spatial heterogeneity in the institutional credit disbursement across states is concerned, we can see wide regional disparities in the flow of institutional credit to agriculture and allied activities across states, that are depicted in Table-2:

Table-2: State-Wise Per Hectare Flow of Short-Term Institutional Credit to Agriculture (in Rs)

State	Pre-Liberalization Period			Post- Liberalization Period		
	1980-81	1985-86	1990-91	1991-92	1995-96	2001-02
Northern Region						
Haryana	218	317	311	435	1193	2964
Himachal Pradesh	87	166	157	163	412	2555
Jammu & Kashmir	51	101	171	189	253	764
Punjab	300	526	461	602	1468	5352
Rajasthan	53	82	73	72	176	667
North-Eastern Region						
Assam	4	8	7	6	9	311
Eastern Region						
Orissa	103	74	73	82	228	479
Bihar	38	97	167	171	173	1075
West Bengal	63	87	97	106	253	1708
Central Region						
Madhya Pradesh	53	71	110	109	134	698
Uttar Pradesh	75	111	127	120	373	1529
Western-Region						
Gujarat	121	299	440	426	1132	2809
Maharashtra	112	216	341	417	756	1352
Southern-Region						
Andhra Pradesh	160	510	645	739	1537	4604
Karnataka	123	277	222	215	900	3432
Kerala	458	1715	2296	2703	5101	7666
Tamil Nadu	181	911	1478	1668	4468	9403
CV(%)	**83.4**	**124.8**	**135.9**	**139.3**	**130.5**	**91.3**

There are wide regional disparities in the disbursement of agricultural credit particularly by scheduled commercial banks *(Das, Senapati, John (2009)*. The data given in the above table shows that the magnitude of Coefficient of Variation (CV) for inter-state variations in the per hectare flow of short-term institutional credit to agriculture was 83.4 per cent in 1980-81, which increased gradually to 124.8 per cent in 1985-86 and further to 135.92 per cent in 1990-91. During the pre-liberalization period, the inter-state disparities in the flow of short-term institutional credit to agriculture increased across states. In the post liberalization period, the magnitude of CV, which was 139.3 per cent in 1991-92 declined to 130.5 per cent in 1995-96 and further to 91.3 per cent in 2001-02 *(Khan, Tewari and Shukla (2007)*. Thus, during the post-liberalization period the inter-state disparities in the flow of short-term institutional credit to agriculture decreased across the states.

Empirical Analysis: All India Level

The study attempts to access the impact of institutional credit on agricultural production in India using time series data from 1980-2005. To investigate the impact of institutional credit on aggregate agricultural production we have used OLS regression analysis, with agricultural gross domestic product (GDPA) as dependent variable and Institutional credit for agriculture sector as one of the independent variables. Institutional credit includes direct credit to agriculture sector. Other explanatory variables included in the study to estimate the model besides institutional credit are private gross capital formation (PVGCF), net irrigated area (NIA), and consumption of fertilizers (NPK). Selection of the explanatory variables has been made on the basis of literature surveyed. There are some other important determinants of agricultural production like use of pesticides, use of electricity, use of machinery etc. However, these variables are not included in the model because they can be purchased with the availability of credit. Institutional credit has been directly introduced in the model. In addition, some variables like agricultural labour force (ALF), rainfall, agricultural terms of trade were dropped because of the problem of multicollinearity.

Agricultural production function shows the technical relationship between agricultural output and various determinants of agricultural output. We have included agricultural gross domestic product (GDPA) as dependent variable and explanatory variables are institutional credit to agriculture sector, net irrigated area, private investment and consumption of fertilizers. All the variables are transformed to per net sown area in million hectares.

To estimate the model, all the variables are transformed to natural logarithmic form.

The model used in the study is

$$LGDPA = \beta 0 + \beta_1 LCREDIT + \beta_2 LPVGCF + \beta_3 LNPK ++ \beta_4 LNIA$$

Where,

LGDPA = Natural Logarithm of agricultural gross domestic product per net sown area in Million Hectares

LCREDIT = Natural Logarithm of institutional credit per net sown area in Million Hectares

LPVGCF = Natural Logarithm of private investment per net sown area in Million Hectares

LNIA = Natural Logarithm of net irrigated area in Million Hectares

LNPK = Natural Logarithm of consumption of fertilizers per net sown area in Million Hectares

Results and Discussion

To overcome the problem of Multicollinearity all the variables are transformed to per net sown area in million hectares. In original form, some of the variables are highly multicollinear, in transformed model variables are not highly correlated although some degree of multicollinearity is still present in the model. As there are only few options before us to reduce the problem of multicollinearity we will accept moderate degree of multicollinearity among variables.

Table-3: OLS Regression Estimates at All-India Level

Dependent Variable: LGDPA		
Time Period	**1980-2005**	
Variables	**Coefficients**	**P-values**
Constant	16.768***	0.000
LCREDIT	0.070**	0.024
LPVGCF	0.074*	0.061
LNPK	0.124*	0.069
LNIA	0.955***	0.000
N	26	
Adjusted R-squared	0.9366	

Note: ***, ** and* denote 1, 5 and 10 percent level of significance respectively.

The model has been estimated to assess the impact of institutional credit on agricultural production for the period 1980-2005. All the coefficients of the model are positive and statistically significant, which satisfies our purpose of credit-production linkages. The coefficient of the variable LCREDIT is 0.070, which implies that for a percent change in institutional credit per net sown area in million hectares causes agricultural GDP per net sown area in million hectares to increase by 0.070%. Adjusted R-squared for the model is very high (0.9366), which means log of the variables included in the model explains 93% variation of the log of agricultural production.

Empirical Analysis: Across States

Before explaining the results of the regression model, association in terms of correlation between agriculture credit and output based on the state level data for the period 2000-2006 is assessed. Then, we discuss the empirical results of the panel regression applying Fixed effect model (FEM) and Random effect model (REM) using state-level panel data for 20 major states of India for the period 2000-06.

Association Between Agriculture Credit and Output: Some Empirical Assessment

With a view to analyze the association between agriculture credit and output, The (Pearson's) correlation coefficients for the states have been derived to indicate the direction and extent of relationship between GSDP from agriculture (GSDP_AG) and Agricultural Credit (AG_C). The correlation coefficients of GSDP and bank credit in respect of agriculture for the states Andhra Pradesh, Assam, Haryana, Maharashtra, Rajasthan, are positive and statistically significant at 1% level. Chhattisgarh, Gujarat and Jharkhand are positive and statistically significant at 5% level. Madhya Pradesh, Tamil Nadu, Uttaranchal. However, the correlation coefficients were not found significant for the states like Bihar, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Orissa, Punjab, Uttar Pradesh, and West Bengal. As far as all India figure is concerned we find positive and statistically significant correlation at 1 percent level with a coefficient of 0.58.

Table-4: Correlation Between Agricultural GDP and Agricultural Credit across States: 2000-2006

States	Correlation (GSDP_AG,AG_C)	Level of Significance
1	2	3
Andhra Pradesh	0.8924	***
Assam	0.9346	***
Bihar	-0.2147	_
Chhattisgarh	0.8570	**
Gujarat	0.8599	**
Haryana	0.9285	***
Himachal Pradesh	0.5361	_
Jammu and Kashmir	0.0684	_
Jharkhand	0.8552	**
Karnataka	0.5932	_
Kerala	0.5640	_
Madhya Pradesh	0.7158	*
Maharashtra	0.9435	***
Orissa	0.4474	_
Punjab	0.3277	_
Rajasthan	0.9810	***
Tamil Nadu	0.7858	*
Uttar Pradesh	0.8210	_
Uttaranchal	0.9315	*
West Bengal	0.9259	_
TOTAL	**0.5802**	***

Note: ***, ** and* denote 1, 5 and 10 percent level of significance respectively.

Aggregate Analysis using State-Level Panel Data

Agriculture is typically a localized regional economic activity and, therefore, its aggregation over country level may hide the spatial heterogeneity. In order to establish a clear picture of the impact of agriculture credit on agriculture output, we examined further by drilling down to state level. With the objective of identifying the role of bank credit in agriculture growth, the panel data regression with instrumental variables is performed with state agriculture output (LGSDPA) as the dependant variable and agriculture credit (LCREDIT), consumption of fertilizers (LNPK), Net irrigated area (LNIA) as the regressors. In this section, 20 major states in India are included in the analysis for a period from 2000-2006. The period of study is confined to the above mentioned time period mainly due the restricted data availability. All the variables are standardized using net sown area per thousand hectares. The variables used in the study are mentioned below as follows.

$LGSDPA = \beta 0 + \beta_1 LCREDIT + \beta_2 LNPK + \beta_3 LNIA$

Where,

LGSDPA = Natural Logarithm of agricultural gross state domestic product per net sown area in thousand hectares

LCREDIT = Natural Logarithm of institutional credit per net sown area in thousand hectares

LNPK = Natural Logarithm of consumption of fertilizers per net sown area in thousand hectares

LPESTCIDES = Natural Logarithm of consumption of pesticides per net sown area in thousand hectares

LNIA = Natural Logarithm of net irrigated area in thousand hectares

Results and Discussion

We saw that at all India level, while establishing credit-output linkages, there existed the problem of multicollinearity, since we had little options left to overcome this problem at all India level so lower degree of multicollinearity was accepted in the model. Whereas, at state level analysis, multicollinearity problem was addressed by dropping some of the variables. To curtail the problem of Hetroscedasticity, generalised least square (GLS) method is used. In this context, the paper analysed the role of direct agriculture credit in the agriculture production in an econometric framework using panel data analysis (the analysis of data over time), applying Fixed Effect Model (FEM) and Random Effect model (REM) regression analysis. After examining results from FEM and REM models, Hausman-specification test was conducted to choose the appropriate model and REM model passes this test.

Table-5: REM Estimates for the State level Regression Equation

	Dependent Variable: LGSDPA	
Time Period	**2000-2006**	
Variables	**Coefficients**	**P-values**
Constant	15.88***	0.000
LCREDIT	.1449***	0.003
LNPK	.0098	0.684
LNIA	-.0737	0.161
N	111	
R-squared	0.3593	

Note: ***, ** and* denote 1, 5 and 10 percent level of significance respectively.

The model has been estimated to assess the impact of institutional credit on agricultural production across 20 major states of India for the period 2000-06. Random effect model (REM) for this period suggests that LCREDIT has positive and statistically significant impact on agricultural production at 1% level. The value of the coefficient of LCREDIT is 0.15, which means that 1 percent change in institutional credit causes gross state domestic product from agriculture to increase by 15%.

To access regional variation across space slope dummy for credit is also used. The scope of the study is limited to twenty major states of India only. Selections of the states were made based on literature survey and comparability across states. All the states are divided into six zones.

Table-6: Classification of States across Six Regions

Northern Region	Eastern Region	Central Region	Western Region	Southern Region	North-Eastern Region
Haryana	Bihar	Madhya Pradesh	Gujarat	Andhra Pradesh	Assam
Himachal Pradesh	Jharkhand	Chhattisgarh	Maharashtra	Karnataka	
Jammu and Kashmir	Orissa	Uttar Pradesh		Kerala	
Punjab	West Bengal	Uttaranchal		Tamil Nadu	
Rajasthan					

Note: North East regions have been dropped due to problem of singularity and five dummies are used with six regions.

Table-7: REM Estimates for the State level Regression Equation using Slope Dummy for Credit

Dependent Variable: LGSDPA		
Time Period	**2000-2006**	
Variables	**Coefficients**	**P-values**
Constant	15.6497***	0.000
LCREDIT	.2004***	0.002
LPESTICIDES	.0118	0.635
LNPK	.0118	0.603
LNIA	-.1351***	0.018
NORTH	-.0043	0.883
EAST	.0177	0.569
CENTRAL	-.0342	0.249
WEST	-.0349	0.297
SOUTH	-.0139	0.654
N	111	
R-squared	0.53	

Note: ***, ** and* denote 1, 5 and 10 percent level of significance respectively.

Table-7 depicts the estimated model using Random Effect Model (REM) with slope dummy for credit. North East regions have been dropped due to problem of

singularity and five dummies are used with six regions. All the 20 states taken into study have been divided into six zones. LCREDIT has positive and statistically significant impact on LGSDPA at 1% level, with coefficient value 0.2004. North, Central, West and South regions have negative coefficients, but these variables are statistically insignificant. The coefficient of the East region is positive but insignificant. The table clearly shows credit has positive and significant impact on agriculture output. Credit has uniform pattern in affecting output. It does not affect agricultural production differently across regions of India.

Concluding Observations

The findings of this study are relevant for the design of rural institutional credit policies and programs in India. After reviewing the literature on rural credit, the paper starts with analysing the trends and pattern, spatial heterogeneity and assessment of progress in the flow of institutional credit for agriculture and allied activities in India and across states. Over the years, there has been a significant increase in the access of rural cultivators to institutional credit and, simultaneously, the role of informal agencies, including moneylenders, as a source of credit has declined. Available data suggest that agricultural credit has been rising in recent years. Among the striking features of the agricultural credit in India are the wide regional disparities in the disbursement of agricultural credit by scheduled commercial banks. However, regional disparities have shown declining trends during the post reform era.

The findings of the study suggest that the overall supply of credit to agriculture as a percentage of total disbursal of credit is going down but this should not be a cause for worry as the share of formal credit as a part of the agricultural GDP is growing. In this context this paper further examines the role of direct agriculture credit in the agriculture production taking care of the regional disparities in agriculture credit disbursement and agriculture production in an econometric framework. This is done using time series data (1980-2005) at all India level, applying OLS regression method. Agriculture is typically a localized regional economic activity and, therefore, its aggregation over country level may hide the spatial heterogeneity *(Das, Senapati, John (2009)*. In order to establish a clear picture of the impact of agriculture credit on agriculture output, we examined further by drilling down the model to state level. The analysis at both (country and state level) suggests that the direct agriculture credit amount has a positive and statistically significant impact on agriculture output and its effect is immediate.

These findings, therefore, clearly portray a picture that even though there are several gaps in the present institutional credit delivery system like inadequate provisions of credit to small and marginal farmers, paucity of medium and long-term lending and so on, agriculture credit is still playing a critical role in supporting agriculture production in India. Credit seems therefore to be an enabling input but its effectiveness is marred by low technical efficiency and productivity. The study further suggests that concerted effort is needed to augment the flow of rural institutional credit, alongside exploring innovations in product design, targeted delivery, diversified credit-disbursal agencies, enhanced use of technology and simplification of the cumbersome procedure for improved access to agricultural

credit of smallholders and less-educated/illiterate farmers. Finally, the study also urges to enhance investment credit in the total credit for holistic rural development.

The findings of this study are relevant for the design of rural institutional credit policies and programs in India. The paper calls for raising institutional credit to the agricultural sector. The findings of the study suggest that rural credit delivery from formal sources frees the farmers from the exploitative grips of the moneylenders and raises production/income. There are wide regional disparities in the disbursement of agricultural credit by scheduled commercial banks. Understanding the nature and extent of disparities in credit disbursement under Priority Sector Lending (PSL) can help better policy targeting in those regions, it strengthens the role of PSL across developing and emerging societies.

As suggested by Mohan (2006), the role of institutional credit can be further enhanced by much greater financial inclusion by involving of region-specific market participants, and of private sector suppliers in all these activities, and credit suppliers ranging from public sector banks, co-operative banks, the new private sector banks and micro-credit suppliers, especially self-help groups. The findings of the study reveal that there are several gaps in the present institutional credit delivery system like inadequate provisions of credit to small and marginal farmers, paucity of medium and long-term lending, lacunae in priority sector lending and so on, agriculture credit plays a dominant role in supporting farm production in India. Therefore, institutional credit acts as an enabling input but its effectiveness is marred by low technical efficiency and productivity.

India in particular and developing world in general are often credit starved in the agricultutral sector. In developing societies, understanding the role and necessity of institutional credit in raising farm production, productivity and income can lead to better negotiations with developed countries and on the platform of multilateral institutions like WTO. Further, it can strengthen India's stand in particular and developing world in general.

The study suggests that concerted effort is needed to augment the flow of rural institutional credit, alongside exploring innovations in product design, targeted delivery, enhanced use of technology and simplification of the cumbersome procedure for improved access to agricultural credit of small land holders and less-educated or illiterate farmers. Finally, the study also urges to enhance investment credit in the total credit. These findings of the research study can be incorporated and applied in public policy framing for holistic development of the rural sector.

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Appendix

Table-8: Data Definition and Sources

Variables	Definition	Sources
LCREDIT	Log of Institutional credit in rupees	Reserve Bank of India, NABARD publications, Various official reports and articles
LPVGCF	Log of Private Gross Capital Formation in rupees	Ministry of Agriculture, Govt. of India
LGDPA	Log of Agricultural Output in rupees	Central Statistical Organisation
LNIA	Log of Net irrigated Area in Million Hectares for India and Thousand Hectares for state level	Agricultural Statistics at a Glance
LNPK	Log of Consumption of Fertilizers in Lakh tonnes for India and million tonnes for states	Department of Agriculture and Cooperation, Govt. of India
LPESTICIDES	Log of Consumption of Pesticides in million tonnes	Ministry of Statistics and Programme Implementation
NSA	Net Sown Area in Million Hectares for India and thousand hectares across states	Directorate of Economics and Statistics, Department of Agriculture and Cooperation

Notes

The data regarding Credit, PVGCF, and GDPA have been taken at a constant price of 1999-2000. The data on agriculture is taken to represent agriculture and allied activities. Institutional credit data includes flow of credit from Co-operatives, state governments, scheduled commercial banks and RRBs to agriculture and allied activities.

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Growth and Employment in India's Organized Manufacturing: A Kaldorian Perspective

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Abstract

Economic growth and employment trends in India have registered many peculiar patterns over the years. While most economies in their early phases of growth were highly dependent on their Industrial sector as the main driver of growth, in the case of India, the Industrialization phase was quite short-lived. Kaldor (1967), based on the experience of most developed economies, suggested that the growth of the manufacturing sector is very crucial to an economy's growth. He further asserted that empirical data provides evidence that the fastest-growing economies were the ones where growth was led by the manufacturing industries while the countries where the services sector emerged as the leading industry grew relatively slowly. The early development strategies adopted by Indian policymakers in the 1960s and the Second Five Year Plan laid great importance on the growth of the industrial sector to promote overall economic growth, however, very soon it was the services sector that replaced the agriculture sector as the main driver of growth. Even though the services sector emerged as the main driver of growth, it could not generate adequate employment opportunities. One of the reasons is that the area is characterized by the need for skilled and semi-skilled labourers, while the unskilled workforce dominates the Indian employment landscape. In light of the above, this paper attempts to explore the sector-wise linkages between growth and employment and discusses the inherent constraints in the Indian economy that stalled the growth of manufacturing sector.

Keywords: Employment, Economic Growth, Manufacturing

Introduction

As India approaches its demographic dividend, with its working-age population forecasted to peak in 2030, this poses both an opportunity as well as a challenge for our policymakers. The opportunity lies in forcing into action the tremendous potential that agents in their prime working-age possess, spurring production activity and discovering new horizons for growth. The challenge, on the other hand, entails keeping up with required structural changes such as investments in infrastructure, education and not compromising on environmental concerns etc., which are a must while attempting to tap potential growth and make it sustainable.

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Given the vast amount of disguised labour force in our agricultural sector and a pool of large unskilled labour force the manufacturing industry appears to be next resort to generate ample employment opportunities but even this sector has its inherent contradictions. India witnessed a rapid phase of Industrialization starting in the 1960s, which was soon replaced by a services-led growth in the 1990s, and even the periods of high industrial growth was not always accompanied by adequate employment generation. Nicholas Kaldor, in his book Strategic Factors of Economic Development, argued that high rates of growth of most economies sustained by a high standard of their Industrial sector. While his hypothesis has proven to be true in case of most economies, India happens to be one peculiar case. This paper discusses the industrial growth and employment situation in India on these Kaldorian lines and stresses on the inherent constraints created in the Indian economy which have led to a situation where despite high economic growth our country has not been able to generate adequate employment opportunities.

Literature Review

The work Strategic Factors of Economic Development,[1] written by Nicholas Kaldor, is based upon the inaugural lectures that he delivered in Cambridge. The paper published in 1967 underlines the importance of the manufacturing sector based upon econometric and empirical evidence from the year 1953-54 to 1963-64 for twelve O.E.C.D economies[2]. The first part of this book talks about the industry of the economy that is capable of leading the path to higher economic growth. Kaldor identifies this sector as the manufacturing / industrial sector and asserts that it is so, as this sector is subject to static and dynamic Increasing Returns to scale. In the 17th century almost all countries lived at about a subsistent level, this scenario registered a change in the 18th century when some countries in Western Europe faced much higher annual rate of growths with their production outpacing the growth of population and culminating in much higher standards of living. In the period of study, there were substantial differences in the rate of growth of even developed countries. Two highly developed countries U.S. and U.K. grew at a rate of 3 per cent or less while Japan grew at a rate of 10 per cent per year. Some countries like West Germany, Italy, France and Austria experienced a growth rate of about 5 to 6 per cent Other less developed economies like the Latin American economies first witnessed a high standard of growth followed by a massive deceleration while some like India and Pakistan failed to keep pace as their population growth outstripped their production. The author asserts that these differences can explain the different economic constraints that operate at various stages of development. He points out that even when sociological and political factors prevailed, the main explanations lie in economic theory, at least for the developed nations. Kaldor[3] argued that the high rates of growth in all developed economies could explain the high standards of growth of their Industrial Sector. Kaldor asserts that as the demand for products of the manufacturing sector

1. The book has been published by Chicago University Press and is a compilation of Kaldor's Inaugural lectures at Cambridge.
2. The following countries are included : Japan, U.S.A, U.K., France, Italy, West Germany, Austria, Denmark, Netherlands, Belgium, Norway and Canada.
3. Nicholar Kaldor in his book Strategic Factors of Economic Development (1967).

expands, the manufacturing sector will expand by producing more goods for which it will draw labour from the areas of the economy which have surplus labour. It will lead to higher overall productivity and rising per capita incomes, which will further create a demand for manufactured products. Inspired from Allyn Young's (1928) arguments he proposes that it is the speed of this chain reaction which determines the rate of economic growth, the more the demand increases for those goods for which there is a positive supply response the faster will be the speed of this process. For most countries, the observation was that there was a decline in the employment of the agriculture workforce while that in the manufacturing and services sectors increased. The economies that grew the fastest had a more substantial increase in the labour force employed in the manufacturing industry as compared to the services and the opposite held for slow-growing economies. For these slow-growing economies, it is possible that employment growth in services was a reflection of the lower absorption in manufacturing due to the instability of labour demand in production. His hypothesis turned out to be valid in case of most economies except for India, which started its industrialization phase in the 1960s.

Kaldor argues that the main culprit for the slow growth in developing economies is their backwardness in agriculture. The development of secondary and tertiary sectors depends upon the ability of the agricultural industry to generate sufficient food surplus. The agrarian surplus is essential for two reasons; Firstly in any growing economy, the growth depends upon the rate of growth of marketed food else its progress could mar by violent inflation episodes and second that it is necessary to provide the purchasing power for sustaining the industrial production. The initial stimulus to the development of most underdeveloped countries came from the growth of exports of plantation agriculture or mining. For developing countries, the comparative advantage lies in cheap labour, but this advantage is often offset by low productivity. He argues that the development of industries in these countries depends a lot upon providing adequate protection in the initial stages. But he also points out that Import duties and other protective measures will prove to be effective only if there is a scope of creating an internal demand for home manufactured goods which will act as substitutes for the imported goods. Thus the process of industrialization in these countries might be stalled as there is extent up to which import substitution will be possible and to sustain the growth of domestic industry an increasing purchasing power is required which will only come from the agriculture sector.

India suffers from the duality in its production sector in terms of the presence of a large informal sector, and due to the lack of availability of data on this informal sector, most studies analyze the trends in the periods manufacturing segment only. Following Kaldor's view, there was a transfer of surplus labour away from agriculture in India; however, it accompanied an almost equal increase in energy in both the manufacturing and the services sector. India has a vast pool of unskilled labour, but much absorption of this labour has not been possible in its manufacturing sector. Various arguments have been put forward for the lack of labour absorption in this sector such as stringent labour reforms (Goldar, 2000), increase in man-days per worker (Nagraj, 1994), the increase in real wages and availability of cheaper capital (Sen & Das, 2015), skewed income distribution (Nayyar, 1978) etc. Even though all these issues have remained debatable over the years, various factors in the Indian context have played a role in impeding

the growth of the labour-intensive industries of the manufacturing sector. Further, in recent years, the manufacturing sector[4] has been subject to a new issue of rising capital intensities (Kannan K., 2009). The process of trade liberalization is expected to have boosted the exports of low skilled and labour-intensive goods in developing countries, but this comparative advantage argument has not found support in case of India (Vashisht, 2015). In light of the above, the paper discusses the employment scenario and various factors constraining employment generation in the Indian context.

Discussion

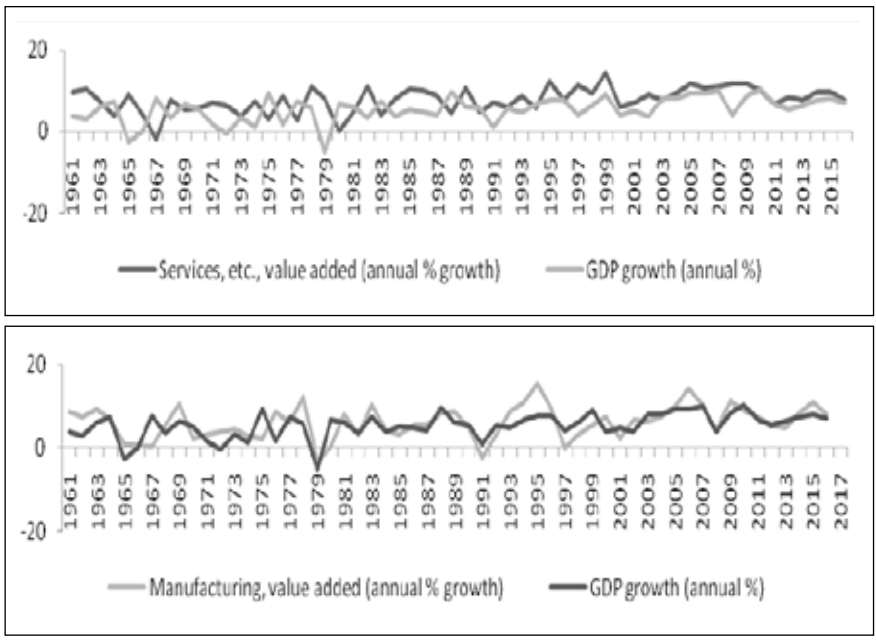
Manufacturing as An Engine of Growth

Most of the fastest-growing economies have entered into a phase of rapid growth through a higher rate of growth of their Industrial Sector. Kaldor (1967) using data from twelve O.E.C.D countries[5] from 1953-54 to 1963-64, proves empirically that the fastest-growing economies were the ones that experienced rapid growth in their industrial sector. India has been a peculiar case in these terms where no such trend was observed, the high industrial growth at the beginning of the 1960s was marked by a sharp deceleration, and since then the average growth of the manufacturing has either remained stagnant or has shown a declining trend in the recent years. Kaldor asserted that the manufacturing sector is the main engine for growth of an economy as it is subject to both static and dynamic increasing returns to scale (Young, 1928) as a result of which this sector experiences much higher productivity as compared to the other areas of the economy such as agriculture and services. As per Kaldor (1967), the agricultural sector's growth is limited by the limited availability of land as a result of which, economic progress would imply a transfer of labour away from agriculture and towards the other high productivity sectors. Kaldor noted that the manufacturing sector's productivity is higher than that of the services sector because while the manufacturing industry is charactered by increasing returns to scale, the services are charactered by diminishing returns to scale. Hence if the surplus labour from agriculture goes to the manufacturing sector, the economy is expected to grow faster. In the case of India, especially after the 1990s, the services sector emerged as the main driving force for economic growth. Figure-1 plots the rate of growth of the manufacturing industry and the services sector with the rate of growth of the GDP. For most of the years, the price of growth of services exceeds that of the overall rate of growth, the kind of relationship that should have existed between the manufacturing sector and the GDP if we go by Kaldor's theory[6]. Figure-2 presents a similar picture of the rate of growth of productivity in the Services and manufacturing sector. As the Figure dictates even if we took into account the problem with measuring the productivity

4. India's Manufacturing Sector is characterized with the presence of a formal and a large informal sector. This paper refers only to the organized Manufacturing Sector in the Indian economy due to lack of availability of data for the informal segment.
5. The following countries are included : Japan, U.S.A, U.K., France, Italy, West Germany, Austria, Denmark, Netherlands, Belgium, Norway and Canada.
6. Kaldor proves that empirically both the services and the Manufacturing sector had a positive and significant relationship with the GDP growth. While he regarded the Manufacturing as the main driver of growth, for the services sector he pointed out that the causality runs the other way round i.e. from a high overall growth leading to a high growth in services.

growth as such, it would not be safe to conclude that the manufacturing sector has witnessed higher rate of growth of productivity unambiguously over the years in case of India. Even though there is some ambiguity in comparing the productivity growth rates of the manufacturing and services, agriculture mainly characterized as one of the sectors with the lowest productivity. Thus the observed trends indicate that while conforming to Kaldor's laws there has been a transfer of labour from the small productivity agriculture sector to the high productivity non-agricultural sector but this transfer of job has been absorbed almost equally by both the manufacturing and services sector.

Figure-1: Rate of Growth of GDP, Manufacturing Sector and the Services



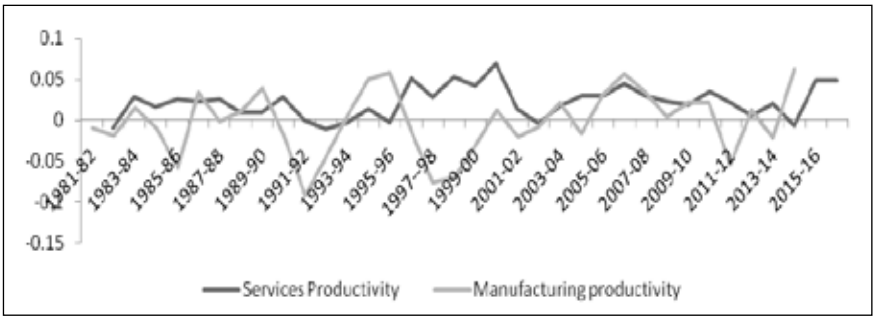
Source: Constructed by the author based upon data from the World Bank database

Figure-3 presents the share of employment as a percentage of the total employment post in the 1990s. While the share of jobs in the agriculture sector registered a decline in the job, it increased across both the non-agriculture sectors with the percentage of services sector being marginally higher than that of the industries[7] for almost all the years.

Hence the overall trends indicate that the services sector emerged as the key driver of growth and registered again in its employment; however, industry seems to have registered stagnation both in terms of the output and the employment share. However, one of the particular observations in the case of India is that the agricultural sector contributing to the least share in GDP still employs more than 40 per cent of the total workforce. It indicates that even though there has been a transfer of labour away from agriculture in recent decades, India continues to have a large surplus of energy that has not to be transferred and remains unutilized.

7. Here the industries includes mining and quarrying, manufacturing, construction and public utilities (electricity, as etc.)

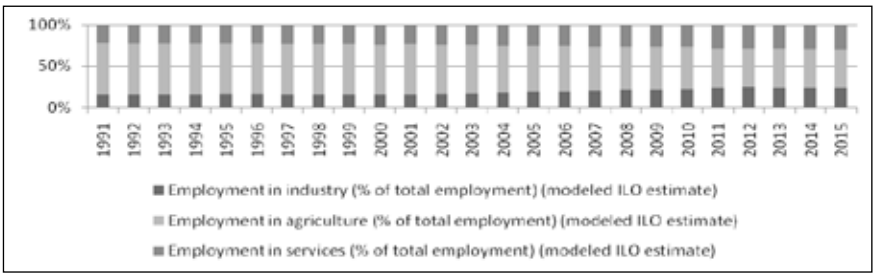
Figure-2: Rate of Growth of Productivity Across the Services and Manufacturing Sectors



Source: Constructed by the author based upon data from the KLEMS dataset published by RBI

The absorption of labour in both the services and the manufacturing sector has constrained due to a variety of factors. One of the significant problems with the growth of the services industry is that it does not serve as a potential source for employing the unskilled and semi-skilled labour that our country has in abundance. Banga (2005) points out that the significant sectors within the services have registered smaller increases in their employment due to reasons such as higher productivity etc. It's also pointed out that the growth within services has increased in sectors that are more skill-intensive and have high labour productivity (Gordon & Gupta, 2004). Given the massive base of the unskilled and semi-skilled labour force in India and accordance with Kaldor's propositions, the manufacturing sector seems to be one of the most potential areas to generate ample opportunities for a large working-age population, but even this sector is characterized by several inherent contradictions.

Figure-3: Share of Employment as A Percentage of the Total Employment



Source: Constructed by the author based upon data from the World Bank database

Figure-4: GDP and Employment Share of the Three Sectors of the Economy

Source: Constructed by the author based upon data from the World Bank database

Employment Scenario

India experienced much early deindustrialisation when compared to the developed nations. While the process of Industrialization began only in the 1960s and India experienced fast growth in its industrial segment, this growth spurt short-lived, and the services sectors replaced the Industrial sector as the driver of growth from the beginning of the 1990s. The relationship between its growth and employment generation for the manufacturing industry has remained ambiguous. The overall trends in the employment growth and rate of growth of manufacturing summary is shown in Table-1. Before the 1980's the growth in manufacturing was on average, accompanied by an adequate increase in employment. It's noteworthy that the period from 1965-1982 if subdivided into groups, then some of these subgroups have not experienced a rapid employment generation (Seth & Seth, 1991) but the employment in this period has been much higher as compared to the recent phases. The 1980's mainly witnessed acceleration in the gross value added by the manufacturing sector along with stagnation of employment which many scholars also refer to as the jobless growth in the industrial sector. The sharp deceleration in the employment growth in the 1980s attributed to the stringent labour laws that were introduced in the 1970s and gained strength in the 1980s. However this view has been contested by many on the grounds of considerable evasion of law (Papola, 1994), econometric studies have shown no impact of labour regulations on the growth of employment (Roy, 1998) etc. The other set of arguments regarding the slackness in employment generation has pointed towards the increase in real wages. For the period the 1980s to 1990s, Goldar (2000) proves that the growth in real wages in this period negatively and significantly impacted employment growth and the decline in the real wages in the 1990s was the prime factor leading to the higher employment generation in that period. However for the same time period it was pointed out that the rate of growth of productivity was higher than the rate of growth of real wages, the labour unions witnessed falling bargaining power (Nagraj, 1994), there was decline in the food products and textiles industries due to closure of mills (Papola, 1994) etc. and hence it is not safe to conclude that a spike in real wages could lead to a fall in the employment. The liberalization phase in the 1990s marked a respite in terms of employment generation, which was rather short-lived and turned during 2000s. The 2000s marked the onset of another problem. The decline in the price of the capital goods relative to the wages of the workers as a result of the trade reforms in the 1990s marked a substitution of capital for labour (Sen & Das, 2015). Thus apart from the stringent labour regulations, the debate on the divergence in productivity and real wages etc. the 2000's witnessed yet another issue for rising capital intensive industry.

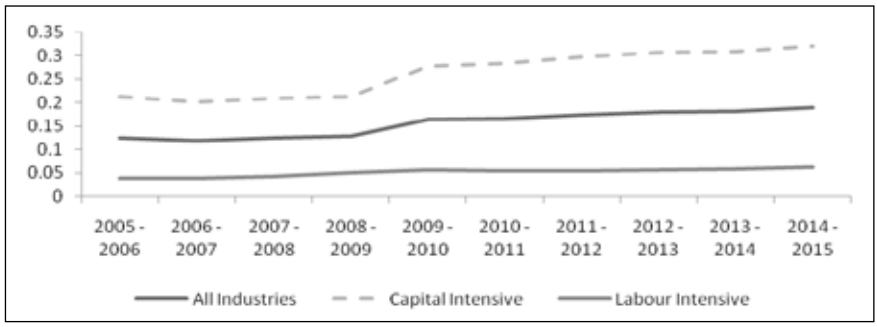
Table-1: Rate of Growth in Gross Value Added and Employment in the Manufacturing Sector

	Growth in Value Added	Growth in Employment	Employment Elasticity
1965-1979	5.00	3.5[8]	0.70
1980-1990	8.66	0.53	0.06
1990-2000	6.70	1.81	0.27
Post 2000's	8.49	0.41	0.05

Source: Constructed by the author using data from the Annual Survey of Industries Database

Note: Figures in the first two columns are in percentages

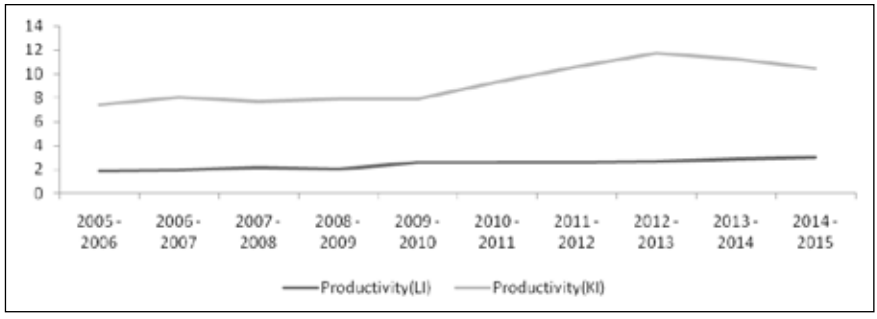
Figure-5: Trend in Capital Intensity Across Manufacturing Industries



Source: Constructed by the author based on EPRWF Time series data from the Annual Survey of Industries

With increased competitiveness and the adoption of new technology, there is a change in the very structure of the manufacturing industries in India. One can observe that over the last decade the capital intensity of all registered manufacturing industries seems to be on an upswing. Figure-5 depicts the capital to labour ratio[9] of all manufacturing industries in the Annual Survey of Industries has been increasing continuously, especially after 2008. The capital intensity has been rising across both these capital and labour-intensive industries, and the rise in the capital is often associated with enhanced labour productivity. Figure-6 depicts the productivity levels across the two sets of productions. Productivity referred to as the ratio of output to labour[10]. While the productivity registers an increase across both the capital and labour-intensive industries, it has been much higher for the money intensive ones throughout the decade.

Figure-6: Trend in Productivity Across the Capital and Labour Intensive Industries



Source: Constructed by the author based upon data from the World Bank database. (LI) refers to the labour intensive and (KI) refers to the Capital intensive industries.

8. The growth rate in value added and the employment growth for this period have been taken from Goldar (2000) and the elasticity has been calculated as the percentage change in employment to the percentage change in gross value added.
9. The capital to labour ratio has been calculated using the ratio of the real fixed capital to the total persons engaged using ASI dataset. As the dataset provides fixed capital in nominal terms It was deflated using the wholesale price index for machinery and equipment.
10. Productivity was calculated as the ratio of the gross value added to the total persons engaged in the ASI dataset.

Table-2 lists seven industries that were found to have the highest labour intensity. While these industries in Table-2 constitute the labour-intensive industries which use more units of labour for every unit of output they produce, the total share of workers[11] employed in these industries together was only 24 per cent[12] in 2014-15 attributing to the fact that the overall percentage of output produced by the labour-intensive industries was only 33.35 per cent[13] while that of the capital intensive ones was around 66.65 per cent the highlighted two features of the labour intensive sectors are; one is that most of these industries such as Food Products & Beverages, Tobacco products, textiles, Wood Products etc. are agro-based industries. It hints towards the importance of the agriculture and industry linkages. While the productivity and growth of the agriculture sector are essential for the provision of raw materials to these industries, an increase in these labour intensive industries will also stimulate the demand for agriculture products. However there has been a marked shift away from these agro based industries lately (Jha, 2010). Secondly, most of these also employ a more significant percentage of women. Figure-7 depicts the percentage of women used across these industries. As per the data of the Annual Survey of Industries 2014-15, out of the total workers that were directly employed only about 19 per cent were women. Out of this small percentage about 75 per cent of the women (in 2014-15) are concentrated just in five industries which are : Manufacture of Wearing Apparel, Manufacture of food products, Manufacture of textiles, Manufacture of leather and related products and Manufacture of Tobacco products with the highest proportion of women being employed in the Apparel sector. The apparel sector alone contributes to the highest percentage of women employed, and all other industries apart from the ones mentioned above add to only 25 per cent of the total industrial female workforce. However, these industries not only generate adequate employment but also promote working women is growing relatively slow when compared to the other more capital intensive industries. In the year 2014-15 about 54 per cent of the total gross value added was contributed by 24 - manufacture of chemical products, 23 - Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel, 27 - Manufacture of Basic Metals, 15 - Manufacture of Food Products and Beverages, 34 - Manufacture of Motor Vehicles, Trailers and Semi-Trailers[14] out of which except for food products all are capital intensive industries. For the sectors identified above the Textiles had a share of 6 per cent of the gross value added, while the shares of apparel and leather was just 1.5 per cent and 0.7 per cent respectively. Over the last decade the percentage of these industries has marginally declined, and on average the total share contributed by textile and apparel has stagnated around 3 per cent while that of leather and related products averaged around 0.6 per cent. The same trends hold for most of the labour intensive industries expect for Manufacture of food products that have contributed to about 7 per cent of the total gross value added, but even for this industry, this share has not grown substantially. Apparel and leather products have also been identified as one of the

11. Total share of labour is the number of total persons engaged in that industry.
12. Proportion of labour employed in these industries as a fraction of the total persons employed across Manufacturing.
13. Calculations based on ASI dataset.
14. The numbers indicate the industry code as per the EPRWF concordance series of the ASI dataset.

critical areas of focus by the Economic Survey 2016-17. In 1990s rising wage levels in China cited as one of the significant reasons why India could replace China in the world's exports of apparel and footwear by producing cheap commodities. But this space is being taken over by Bangladesh and Vietnam instead. The Apparel and Leather sectors face a set of common challenges: logistics, labour regulations, and tax & tariff policy, and disadvantages emanating from the international trading environment compared to competitor countries (Economic Survey, 2016-17).

Table-2: Industries with the Highest Labour to Output Ratios

Industry Codes and Industries[15]
16 Manufacture of Tobacco Products
18 Manufacture of Wearing Apparel Dressing and Dyeing of Fur
19 Tanning and Dressing of Leather Manufacture of Luggage, Handbags, Saddlery, Harness and Footwear
14 Other Mining and Quarrying
17 Manufacture of Textiles
20 Manufacture of wood products and cork except for furniture, production of articles of straw and plating products
15 Manufacture of Food Products and Beverages

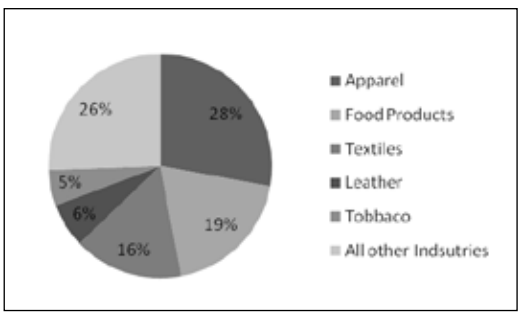
Source: Constructed by the author

On the whole it can be argued that due to the various constraints discussed above the labour intensive industries in India could not generate enough growth. These labour intensive industries are not only crucial from the view of creating employment as a whole but also from the perspective of promoting employment for women and the growth of agro-based industries.

Constraints in Industrial Growth

Kaldor points out that the main hindrance in the progress of developing economies is the backwardness in agriculture. Further due to the low productivity of the developing economies as compared to the developed world the developing countries must begin their industrialization process with necessary protection from the developed countries exports that would promote the setting up industries in the first place. But due to a constrained domestic market, the developing countries must rely on exports to the other advanced economies.

Figure-7: Percentage of Women Employed Across All Industries



Source: Constructed by the author using data from the Annual Survey of Industries

15. The table lists the top seven labour intensive after sorting on the basis of high to low labour intensity.

Agricultural Growth and Demand Side Constraint

Kaldor does not regard the growth of the industrial sector to be exogenously determined. Instead, he asserts that with the process of industrialization, the increase in per capita incomes of the population stimulates the demand for industrial goods and hence leads to a further expansion of the industrial goods sector. It is followed by absorption of labour into this highly productive sector, further stimulating higher productivity and per capita incomes in the economy (Figure-8). Further, the agriculture sector, apart from providing surplus labour for industrialization process also provides the necessary wage goods for the economy, the power of purchasing required for the industrial products and raw materials for agro-based industries. In India the agricultural sector stalled the growth of the manufacturing sector due to lack of wage good surpluses (Kannan, Sengupta, & Ravendran, 2008). The agriculture sector in India has overwhelming importance due to the vast majority of people depending on it for occupations even today. Kaldor asserted that the creation of agricultural surplus is essential for industrial growth in developing economies. However, Nayar (1978) has pointed out that agriculture growth might be necessary but is not a sufficient condition for industrial development. He asserts that even when the terms of trade shift in favour of agriculture, the benefits will be appropriated by the large landlords and unless incomes accrue to the poor the demand for industrial goods cannot revive. It brings us to the income distribution pattern and demand-side constraints. Kaldor (1967) explains how consumption patterns change with the change in per capita incomes: At low levels of per capita income the demand for essential commodities like food is of utmost importance, as per capita incomes increase people start demanding industrial goods, and it is this intermediate stage of development that is most conducive for industrial development. As per capita incomes rise further there is a shift away from industrial goods towards services. India has been a peculiar case with high degree of inequality between the poor and rich. While the incomes at the top bracket have grown substantially over the years generating demand for services that of the poor and middle segment stagnated leading to a greater dependence on agricultural products and preventing the shift towards the industrial goods. One of the hypotheses in the Indian context asserts that the severe inequality in agriculture led to the rural poor not having enough purchasing power for buying industrial goods, and hence the Industrial growth stagnated as a result of the stagnation in agriculture. Industrial growth in India is demand constraint from agriculture; the significant growth has been in semi-luxury and luxury commodities consumed by the middle class which is only a narrow segment of the total population (Bhattacharyya, Abraham, & D'Costa, 2013).

Trade Openness

The comparative advantage of developing economies lies in the availability of cheap labour, but the benefit of affordable energy in developing economies can often be offset by the low productivity in these countries. Ideally, because of the availability of cheap work in India, it should have been able to export labour-intensive commodities that use relatively unskilled labour to the world. Figure-6 shows that the productivity in energy-intensive industries is much less than of the capital intensive and thus it is possible that even though these products can manufacture with cheaply available labour, the lower productivity in our labour-

intensive sector curtails the competitiveness of our labour-intensive goods. Further trade openness has an ambiguous impact on employment generation, Vivarelli (2002) shows that introduction of new technology in developing economies can have adverse effects on employment generation through increased factor productivities and this effect is more pronounced in case of economies with supply-side constraints such as inefficient labour markets, poor infrastructure etc. Table-3 depicts the percentage share of India's exports of engineering goods and electronic goods which are also capital intensive rather than our labour-intensive products constitute a larger share of our total exports.

Figure-8: Demand for Industrial Goods and Growth

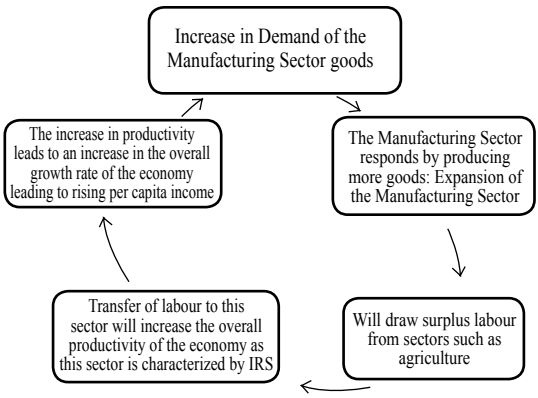


Table-3: Percentage Share of Exports of Selected Industries

Sector	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Total Manufacturing Exports	57.5	57.2	57.7	61.9	67.3	68.2
As a percentage of Total Exports						
Leather	1.5	1.6	1.8	1.9	2.1	1.9
Apparel	9.9	9.9	10.9	11.6	13.4	12.9
Electronic and Engineering Goods	22.6	22.4	22.8	25.6	25.3	26.4
Gems & Jewellery	26.4	25.0	22.8	21.5	22.3	23.1
As a percentage of Manufacturing Exports						
Leather	2.7	2.8	3.1	3.1	3.1	2.7
Apparel	17.2	17.2	18.9	18.7	19.9	18.9
Electronic and Engineering Goods	39.3	39.2	39.6	41.3	37.6	38.8
Gems & Jewellery	15.1	14.3	13.1	13.3	15.0	15.7

Source: Constructed by the author based upon data for exports from economic survey 2016-17

The only labour-intensive sector that has a large share in exports has been gems and jewellery followed by Apparel and Leather. India's share of exports has not reflected a bias towards labour-intensive thus creating a problem for absorbing our unskilled labour force. Before the trade liberalization, India's exports were dominated by low skill-intensive products whose share has fallen drastically to 28 per cent by 2013-14 from 57 per cent at the time of liberalization while the percentage of high skilled labour-intensive products has increased (Vashisht, 2015). Further most of India's labour-intensive goods like Apparel and Leather face stiff competition from the other developing economies. Thus on the domestic front, the lower productivity in our labour-intensive sector is eroding the advantage of lower wages while on the other hand, the small cost goods from other competing developing economies render our products less competitive.

Overall this has contributed to a smaller share of exports for our labour-intensive sector and hence also proves to be a drag on the employment opportunities in our country. Thus one can argue that due to the presence of income inequalities and a skewed demand for products, the industrial sector has not been able to generate an adequate demand for its industrial goods from the home market. Secondly, even though liberalization and opening up of trade did lead to an expanding market to overcome this domestic market constraint, the demands for goods was biased towards more capital intensive ones. Hence even though the opening up of trade helped in increased growth rates it could not translate into generating ample job opportunities due to the less emphasis on our labour-intensive goods.

Conclusion

Since the beginning of the 1990s, the services sector emerged as the critical driver of growth in the Indian context instead of the industrial or manufacturing sector. This service-led increase often criticized the grounds of being sustainable and not generating enough employment opportunities. The types of services that have witnessed high growth in India are more skill labour intensive while India's population is dominated by a vast pool of unskilled labour. Given this backdrop, the manufacturing sector appears to be the next resort to provide employment opportunities to these ignorant masses, but even this sector has had its inherent contradictions. The relationship between employment growth and industrial growth remained ambiguous across decades. In the backdrop of infrastructural issues, stringent labour laws, the availability of cheap capital as a result of the trade liberalization and the rising capital intensities in production due to which our labour-intensive industries have suffered the most. Most of these labour-intensive industries are agro-based and employ a significant percentage of women thus growth in these industries will not only stimulate the growth of employment but also foster the agriculture and industry linkages and tilt the gender composition of jobs in sectors towards women. Overall industrial growth has faced constraints both in the domestic and foreign markets. The highly skewed income distribution and inequality in India that led to stagnating incomes at the bottom curtailed the demand for industrial products hence impeding the growth of the industrial sector. The opening up of trade did offer some respite in terms of providing a broader market for industrial products, but here again the labour-intensive products have been at the losing end. The lower wages are an offset due to lower productivity, and stiff competitions from the other developing economies further pose a constraint in promoting our labour-intensive industries.

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Estimation, Comparison and Association of Realized Return with Calculated Returns (Capital Asset Pricing Model): A Case of Pharmaceutical Sector in India

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Abstract

Pharmaceutical Industry is one of the vital industries of the Indian economy, and is ranked 4th in the world with regard to the volume of sale and is considered as one of the biggest producers of API (Active Pharmaceutical Ingredients) in the international arena. The growth rate of the industry is also increasing at a remarkable rate. A set of 9 companies from the pharmaceutical sector that are traded on the Bombay Stock Exchange of India are considered for the present study. Daily closing prices of the scrip are collected for the period of 19 years, i.e., (2000-2019). The review of literature suggested the usage of the CAPM model to arrive at the expected returns. From the CAPM computations, it is found that all the selected companies are overvalued in the market. The risks and returns are calculated, and the beta values of the individual companies are shown in the graph. Regression and Correlation of the realized return CAPM return explains a positive correlation for all the collected scrips. To examine the relation between beta value and market returns, correlation and regression are done. The profits of the company are then expressed as a function of individual factors like Current Ratio, Quick Ratio, Debt-Equity Ratio, and Price - Earnings Ratio, Price to Book Ratio, EPS, Market Capitalization, Sales and Profit after Tax. The most significant factors for this study are found to be Debt-Equity Ratio, Price-Book Ratio, Market Capitalization, Sales and Profit after Tax.

Keywords: CAPM Return, Correlation, Indian Pharma Sector, Realized Return

Introduction

The Pharmaceutical Industry (The Pharma industry) is an integral part of the healthcare system in every country. The sector consists of companies licensed to research, develop, market and distribute medicine for the prevention, treatment, and cure of diseases and other health conditions.

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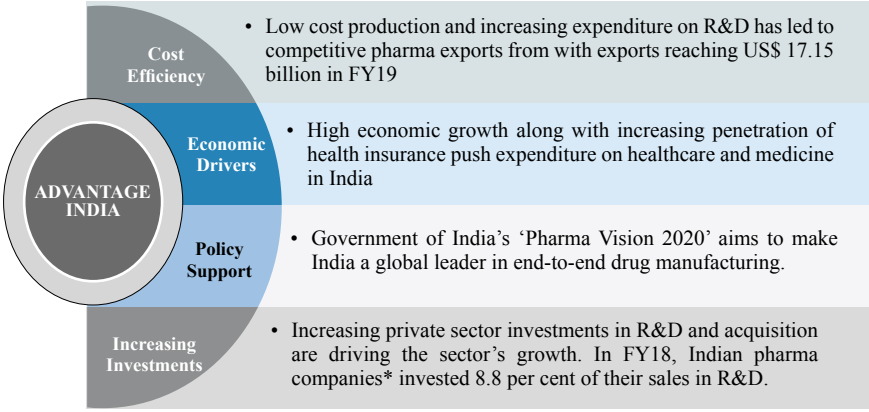
Globally India is the largest provider of generic drugs. Indian pharmaceutical industry supplies over 50 per cent of global demand for various vaccines, 40 per cent of generic demand in the US and 25 per cent of all medicine in the UK.

India enjoys a prominent position in the global pharmaceuticals sector. The country also has a large pool of scientists and engineers who have the potential to steer the industry ahead to an even higher level – the pharmaceutical sector valued at US$ 33 billion in 2017. The country's pharmaceutical industry is expected to expand at a CAGR of 22.4 per cent over 2015-20 to reach US$ 55 billion.

The Government of India unveiled 'Pharma Vision 2020' aimed at making India a global leader in end-to-end drug manufacture. Approval time for new facilities has been reduced to boost investments.

Spending on medicine in India is projected to grow 9-12 per cent over the next five years, leading India to become one of the top 10 countries in terms of medical spending. The Indian government has taken many steps to reduce costs and bring down healthcare expenses. Speedy introduction of generic drugs into the market has remained in focus and is expected to benefit the Indian pharmaceutical companies. Also, the thrust on rural health programs, lifesaving drugs, and preventive vaccines augurs well for pharmaceutical companies.

Figure-1: Advantage India



*Note: * Top 10 companies as per research by HDFC Securities, R&D - Research & Development*

Source: Pharamceuticals-https://www.ibef.org/industry/pharmaceutical-india.aspx

The above factors are the main reasons behind the selection of Pharmaceutical Industry, and it stands imperative to study the pharmaceutical sector from the period 2000-01 to 2018-19 and to analyze how the stocks of the pharmaceutical industry are performing.

Literature Survey

Lintner (1965) estimated the efficiency of 301 stocks quoted at NYSE for the period 1954-63 by regressing yearly return of individual stock's against the S&P Industrial stock price index return. The results from this analysis accepted that the CAPM, i.e., Beta can explain the changes in security return to the majority

of scripts. Fama and French (1992, 1993) find that three variables, market equity, the ratio of market equity to book equity, and leverage capture much of the cross-section of average stock returns. In the presence of these three variables, market beta does not have any explaining power over the performances. Sharpe and Cooper (1972) examined whether the higher return was associated with a higher risk. Various strategies are selected and return and beta for each plan is calculated and showed that a higher yield was related to high Beta and that they were linearly related. They further showed that intercept is higher than riskless rate and hence, it supported the two-factor model of CAPM.

Tinic & West (1984) tested the two factor model of CAPM on the NYSE monthly data between 1935 – 1982. They observed that the risk-return relation existed only during January and there is no evidence during the rest 11 months. Barua, S. K., & Raghunathan, V (1990) in their paper studied 23 leading companies' stock prices. They calculated P/E ratio based on fundamental analysis and compared them with actual P/E data. The results indicated that, on average, shares are overvalued in the Bombay Stock Exchange.

Srinivasan (1988) by using quarterly share price of 85 stocks traded in the Calcutta Stock Exchange and BSE, and the Economic Times Index of ordinary shares, tested whether CAPM was held in the Indian stock market. The evidence from the test showed strong support in favor of CAPM in the Indian stock market. Rao (1988) tested the efficiency level in the Indian capital market. The sample consists of weekend prices of 10 Blue Chip companies in the Bombay Stock Exchange adjusted for bonus and rights issue for the period July 1982 to June 1987. The results of the above studies support the hypothesis that the Indian capital market is at least weakly efficient.

Yalawar (1988) tested the CAPM by using monthly stock returns of 122 companies traded in the Bombay Stock Exchange for the period 1963-1982. By employing excess Risk Premium Form, he found that the market index was an important variable to explain price variation of stock. Hence the BSE follows the CAPM pricing of shares. Roll (1977) in his paper asserted that it is not possible to test CAPM empirically.

Data and Methodology

The period of study is 19 years, i.e. (2000-2019). Selected pharmaceutical companies (in total 9) that are traded in the Bombay Stock Exchange of India are considered.

The share prices of the pharmaceutical scrip are taken from Yahoo finance. BSE website is the source for SENSEX closing prices. The Indian Govt. Treasury bill rates are sourced from RBI database. Best of the data is taken from CMIE Prowess database.

Following the review of the literature, the CAPM model is employed to arrive at the expected returns of each of the nine pharmaceutical companies for 19 years. Regression and Correlation are carried using R studio for measuring the correlation between two sets of parameters. (Realized returns with CAPM returns and Beta values with Market returns). Panel regression was estimated to check the significant factors affecting the realised returns.

Estimated Model and Emperical Analysis

Daily closing prices of stocks of the selected companies tabulated from 2000 to 2019. Annual Return of the companies as well as for the Sensex are calculated. Beta (β) obtained by calculating regression with market returns as the independent variable and corresponding company returns as the dependent variable. CAPM was calculated by using the formula: $R_i=R_f+ (R_m-R_f)*\beta$

Where R_m is Market return, β is Slope, and R_f value is Risk-Free Return.

A share is underpriced if expected return as calculated with the CAPM model is lesser than the realized profit and vice versa. Based on CAPM for 19 years, the companies' performance is given in the below Table-1.

Table-1: CAPM Returns vs Realized Returns

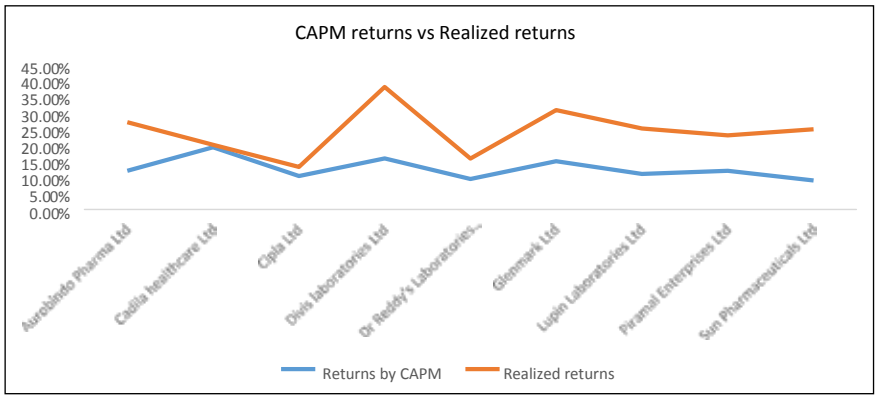
Company	Returns by CAPM	Realized Returns	CAPM vs Realized Returns
Aurobindo Pharma Ltd	11.98%	27.13%	Over Valued
Cadila healthcare Ltd	19.33%	20.13%	Over Valued
Cipla Ltd	10.36%	13.25%	Over Valued
Divis laboratories Ltd	15.81%	38.10%	Over Valued
Dr Reddy's Laboratories Ltd	9.45%	15.82%	Over Valued
Glenmark Ltd	15.00%	30.95%	Over Valued
Lupin Laboratories Ltd	11.00%	25.23%	Over Valued
Piramal Enterprises Ltd	12.00%	23.05%	Over Valued
Sun Pharmaceuticals Ltd	9.00%	24.93%	Over Valued

Table-1, shows that the company – Cadila Healthcare Ltd., has highest CAPM return (19.33%) correspondingly the realized return is 20.13%. It can be said that Cadila Healthcare scrip is overpriced in the market. Cipla Ltd has the lowest realized gain in the given study period. It is reported at 10.36% with CAPM return and achieved a return of 13.25%. With these figures, it's concluded that scrip is overpriced and compared to sample companies, the profit generated is low. Aurobindo Pharma Ltd yielded a return of 27.13 % for the period 2000- 01 to 2018-19 who's CAPM return is 11.98% which shows that the scrip is overpriced. Divis Laboratories Ltd has the highest yield in the study period with a realized gain of 38.10%. The corresponding CAPM returns are 15.81% which indicates the scrip is overpriced.

Dr Reddy's Laboratories Ltd has the realized return of 15.82% whose CAPM returns is 9.45% which shows the scrip is overpriced or overvalued. Glenmark yielded a return of 30.95% when compared to the CAPM returns of 15.00%. With these values, it's concluded that the scrip is overvalued.

Lupin Laboratories Ltd recorded a realized return of 25.23% which is more than two times the returns obtained by CAPM of 11.00% indicating the scrip is overvalued. Piramal Enterprises Ltd yielded a return of 23.05% for the period 2000-01 to 2018-19, whose CAPM return is 12.00% which shows the scrip is exceeded. Sun Pharmaceuticals has the lowest CAPM returns of 9.00% with the realized gains of 24.93%, which indicates the scrip is Overvalued.

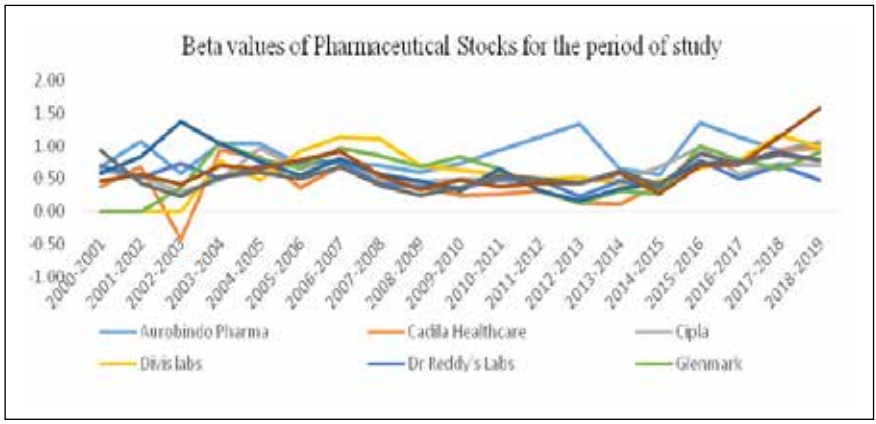
Figure-2: CAPM Returns vs. Realized Returns for the Period of Study



Beta Values of Pharmaceutical Sector Stocks

The beta calculation is used to help investors understand whether a stock moves in the same direction as the rest of the market, and how volatile or risky it is compared to the market.

Figure-3: Beta Values for the Period of the Study



Throughout the study, Cadila Healthcare Ltd has the lowest beta value of -0.42 in the year 2002-2003. The highest beta value is observed at 1.57 by Piramal Enterprises Ltd in the year 2018-2019. Most of the beta values are distributed between the range of 0 and 1.

Only in a few cases, beta values are recorded to be above 1. Aurobindo Pharma Ltd recorded beta values of 1.07, 1.04, 1.04, 1.13, 1.33, 1.35, 1.13 and 1.06 in 2001-02, 2003-04, 2004-05, 2011-12, 2012-13, 2015-16, 2016-17 and 2018-19 respectively.

Divis Laboratories Ltd also recorded beta values of 1.14, 1.10 and 1.17 in the years 2006-07, 2007-08 and 2017-18 respectively. Glenmark Ltd has beta values of 1.06 and 1.01 in the year 2003-04 and 2015-16, respectively.

Lupin Laboratories Ltd recorded beta values of 1.37 and 1.05 in the years 2002-03 to 2003-04 respectively. Piramal Enterprises Ltd has beta values of 1.13 and 1.57 in the years 2017-18 and 2018-19, respectively.

CAGR based on Sales

Figure-4: CAGR based on sales for the period of the study

Lupin Laboratories Ltd has the highest growth rate of 30.28% as far as Sales is considered. Glenmark Ltd stands at the second place followed by Divis Laboratories Ltd with growth rates of 22.08% and 18.19%. Piramal Enterprises Ltd has the lowest growth rate of 7.79% for the period of study. Sun Pharmaceuticals Ltd and Dr Reddy's Laboratories growth rates are 15.97% and 16.74% respectively. Cipla Ltd, Cadila Healthcare Ltd, and Aurobindo Pharma Ltd have growth rates close to 15%, and the values are 15.25%, 14.42%, and 14.82% respectively.

CAGR based on Market Capitalization

Figure-5: CAGR based on Market Capitalization for the period of the study

Divis Laboratories Ltd has the highest growth rate of 34.82% when Market capitalization is considered. Glenmark Ltd stands at the second place followed by Lupin Laboratories Ltd with growth rates of 30.22% and 26.74%. Cipla Ltd has the lowest growth rate of 10.88% for the period of study. Sun Pharmaceuticals Ltd and Piramal Enterprises Ltd growth rates are 22.25% and 22.67% respectively. Dr Reddy's Laboratories Ltd, Cadila Healthcare Ltd, and Aurobindo Pharma Ltd have growth rates of 13.82%, 22.40%, and 25.78% respectively.

Regression and Correlation between Realized returns and CAPM Returns

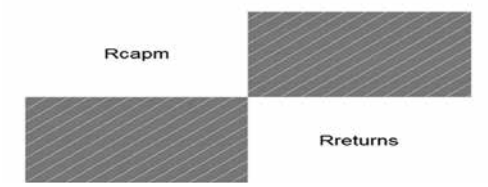
Regression and Correlation are estimated to know the levels of association between Realized returns and CAPM returns for a set of 9 pharma companies.

For the Set of 9 scrips (Pharmaceutical Companies)

The Realized returns and Returns by CAPM showed in Table-1 for the study.

For pharmaceutical companies, on examining the association between the Realized returns and CAPM returns, it is noted that a moderate positive correlation of 0.3835 exists between Rcapm and Returns

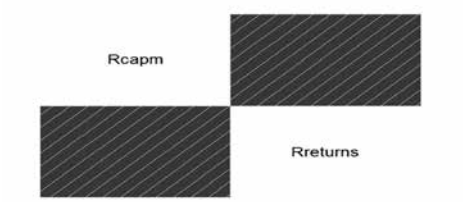
Figure-6: Correlation for Pharmaceutical Companies Considered as A Set for the Period of Study



For Aurobindo Pharma Ltd

For Aurobindo Pharma Ltd, on examining the association between the realized returns and CAPM returns, it is noted that a strong positive correlation of 0.6851 exists between Rcapm and Returns.

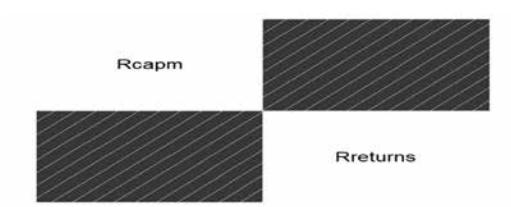
Figure-7: Correlation for Aurobindo Pharma for the Period of Study



For Cadila Healthcare Ltd

For Cadila Healthcare Ltd, on examining the association between the tealized returns and CAPM returns, it is noted that a strong positive correlation of 0.6280 exists between Rcapm and R returns.

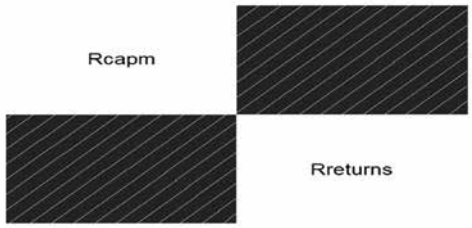
Figure-8: Correlation for Cadila Healthcare for the Period of Study



For Cipla Ltd

For Cipla Ltd, on examining the association between the realized returns and CAPM returns, it is noted that a strong positive correlation of 0.7492 exists between Rcapm and R returns.

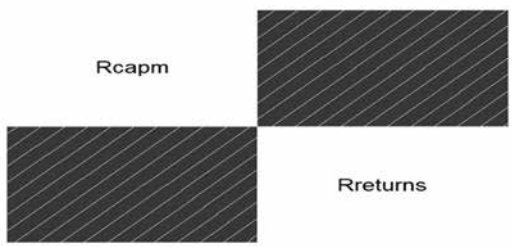
Figure-9: Correlation for Cipla for the Period of Study



For Divis Labs Ltd

For Divis Labs Ltd, on examining the association between the realized returns and CAPM returns, it is noted that a strong positive correlation of 0.6785 exists between Rcapm and R returns.

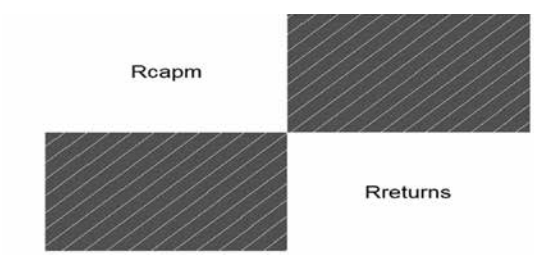
Figure-10: Correlation for Divis Labs for the Period of Study



For Dr Reddy's Labs Ltd

For Dr Reddy's Labs Ltd, on examining the association between the realized returns and CAPM returns, it is noted that a moderate positive correlation of 0.4963 exists between Rcapm and R returns.

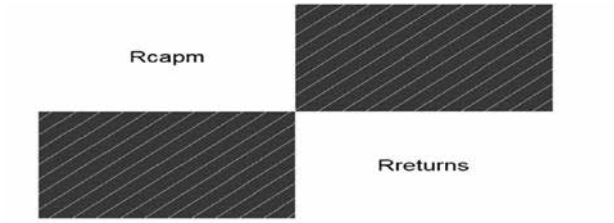
Figure-11: Correlation for Dr Reddy's Labs for the Period of Study



For Glenmark Ltd

For Glenmark Ltd, on examining the association between the realized returns and CAPM returns, it is noted that a strong positive correlation of 0.66795 exists between Rcapm and R returns.

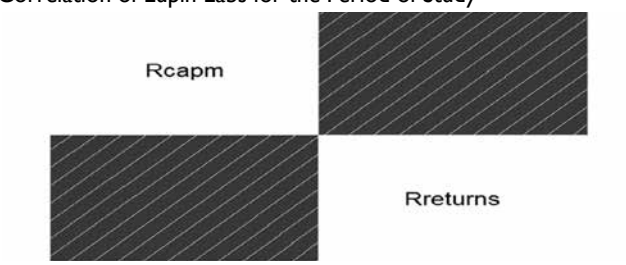
Figure-12: Correlation for Glenmark for the Period of Study



For Lupin Labs Ltd

For Lupin Labs Ltd, on examining the association between the realized returns and CAPM returns, it is noted that a strong positive correlation of 0.65680 exists between Rcapm and Returns.

Figure-13: Correlation of Lupin Labs for the Period of Study



For Piramal Enterprises Ltd

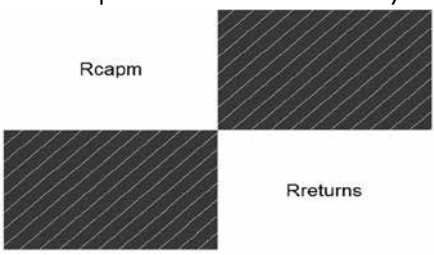
For Piramal Enterprises Ltd, on examining the association between the realized returns and CAPM returns, it is noted that a strong positive correlation of 0.7555 exists between Rcapm and R returns.

Figure-14: Correlation of Piramal Enterprises for the Period of Study

For SunPharma Ltd

For Sunpharma Ltd, on examining the association between the realized returns and CAPM returns, it is noted that a strong positive correlation of 0.5806 exists between Rcapm and R returns.

Figure-15: Correlation of Sunpharma for the Period of Study.



Correlation between Beta Value and Market Returns (R_m)

The correlation is done to know the level of association between Beta value and market returns (R_m) of the individual scrip.

Aurobindo Pharma Ltd

For Aurobindo Pharma Ltd, on examining the association between the Beta value and market returns (R_m), it is noted that a very low negative correlation of -0.0305 exists between Beta and R_m

Figure-16: Correlation of Beta and Market Returns of Aurobindo Pharma

Cadila Healthcare Ltd

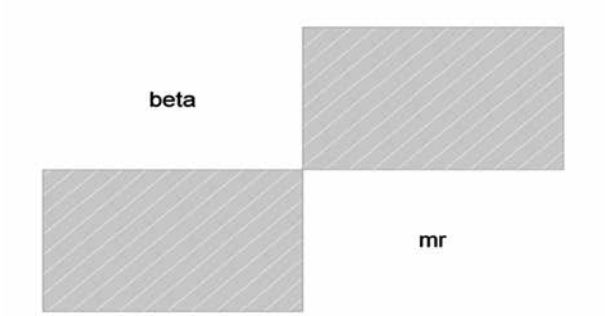
For Cadila Healthcare Ltd, on examining the association between the Beta value and market returns (R_m), it is noted that a moderate positive correlation of 0.2095 exists between Beta and R_m

Figure-17: Correlation of Beta and Market Returns of Cadila Healthcare

Cipla Ltd

For Cipla Ltd, on examining the association between the Beta value and market returns (R_m), it is noted that a very low positive correlation of 0.0138 exists between Beta and R_m

Figure-18: Correlation of Beta and Market Returns of Cipla



Divis Laboratories Ltd

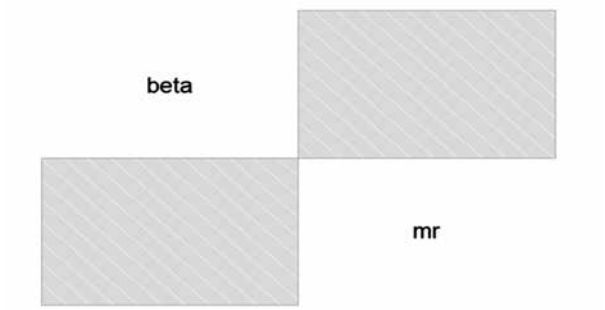
For Divis Labs Ltd, on examining the association between the Beta value and market returns (R_m), it's noted that a moderate positive correlation of 0.1497 exists between Beta and $R_{m.}$

Figure-19: Correlation of Beta and Market Returns of Divis Labs

Dr Reddy's Laboratories Ltd

For Dr Reddy's Labs Ltd, on examining the association between the Beta value and m\market returns (R_m), it is noted that a moderate negative correlation of -0.1271 exists between Beta and R_m

Figure-20: Correlation of Beta and Market Returns of Dr Reddy's Labs

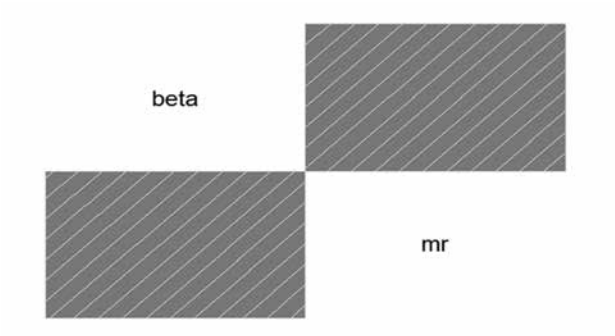


Glenmark Ltd

For Glenmark Ltd, on examining the association between the Beta value and

market returns (R_m), it is noted that a moderate positive correlation of 0.2971 exists between Beta and R_m

Figure-21: Correlation of Beta and market Returns of Glenmark



Lupin Laboratories Ltd

For Lupin Laboratories Ltd, on examining the association between the Beta value and market returns (R_m), it is noted that a very low negative correlation of -0.0446 exists between Beta and R_m

Figure-22: Correlation of Beta and Market Returns of Lupin Labs

Piramal Enterprises Ltd

For Piramal Enterprises Ltd, on examining the association between the Beta value and market returns (R_m), it is noted that a moderate positive correlation of 0.2120 exists between Beta and R_m

Figure-23: Correlation of Beta and Market Returns of Piramal Enterprises

Sun Pharmaceuticals Ltd

For Sun Pharmaceuticals Ltd, on examining the association between the Beta value and market returns (R_m), it is noted that a moderate negative correlation of -0.1045 exists between Beta and R_m

Figure-24: Correlation of Beta and Market Returns of Sun Pharma

Fundamental Factor Analysis of Pharmaceutical Companies

In this study, many factors like Current Ratio, Quick Ratio, Debt-Equity Ratio, EPS, P/E, P/B, Market Capitalization, Sales, PAT and Annual Returns of individual scrips were chosen. Any change in the above factors will affect the company's performance directly or indirectly, which affects the share price.

So to determine the level of association, a function on annual returns is constructed considering all the factors.

Annual returns = F (Current ratio, Quick Ratio, Debt-Equity Ratio, Price-Earnings Ratio,

Price to Book Ratio, EPS, Market Capitalization, Sales, Profit after Tax)

Table-2: Regression using SPSS

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.709[a]	.503	.471	.35417

a. Predictors: (Constant), PAT, PB, PE, EPS, Current Ratio, DE, Sales, Market Cap, Quick Ratio

The R^2 for the above model is 0.503, which indicates the model is a good fit for the data.

Regression performed and the co-efficient values tabulated along with the significant benefits.

A numerical expression can be generated using this data

Annual Returns = -0.390(Current Ratio)-0.395(Quick Ratio) +0.329(Debt-Equity Ratio)-0.053(Price-Earnings Ratio)-0.551(Price-Book Ratio) +0.117(Earnings per Share) +1.332(Market Capitalization)-0.711(Sales)-0.603(Profit after Tax).

Table-3: Coefficients of the Regression using SPSS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	.359	.367		.978	330
	Current Ratio	.157	.092	.390	1.707	.090
	Quick Ratio	.204	.117	-.395	-1.737	.084
	DE	.322	.074	.329	4.329	.000
	PE	.000	.000	-.053	-.834	.405
	PB	-.100	.013	-.551	-7.565	.000
	EPS	.003	.001	.117	1.887	.061
	Market Cap	.500	.050	1.332	9.962	.000
	Sales	-.360	.066	-.711	-5.502	.000
	PAT	-.249	.060	-.603	-4.126	.000

a. Dependent Variable: Annual Returns

It is noted that on analysis of data that the Debt-Equity Ratio, Price-Book Ratio, Market Capitalization, Sales and Profit after Tax are significant, indicating that these variables can determine Actual returns.

Conclusion

The highest CAPM returns achieved by Cadila Healthcare Ltd were 19.33%, and the lowest CAPM returns made by Cipla Ltd with 10.36%. The highest Realized Returns recorded by Divis Laboratories Ltd and the smallest are filed by Dr Reddy's Laboratories with 38.10% and 15.82 respectively. The scrip in the set of 9 pharmaceutical companies overvalued as Realized returns is more than Returns by CAPM.

Regression and Correlation are performed between the Realized Returns and Returns by CAPM throughout the study. All the regression equations are noted. A moderate positive correlation of 0.3835 is observed when all the companies chosen as a set and regression is performed. When individually correlation is done, all the scrips exhibited a robust positive correlation ranging between 0.4963 and 0.7555.

Regression and Correlation are also done between Beta values of individual scrip and Market Returns. Aurobindo Pharma Ltd, Dr. Reddy's Labs Ltd, Lupin Laboratories Ltd, and Sun Pharmaceuticals Ltd showed a negative correlation and remaining scrip have shown a moderate positive correlation.

Regression is done on the panel data, and the R^2 value of 0.503 indicated that the assumed model for the panel data is a good fit. The numerical regression equation is:

Annual Returns = -0.390(Current Ratio)-0.395(Quick Ratio) +0.329(Debt-Equity Ratio)-0.053(Price-Earnings Ratio)-0.551(Price-Book Ratio) +0.117(Earnings per Share) +1.332(Market Capitalization)-0.711(Sales)-0.603(Profit after Tax)

On analysis of the panel data, it is noted that Debt-Equity Ratio, Price-Book Ratio, Market Capitalization, Sales and Profit after Tax are significant, indicating that these variables can determine Actual returns.

Annexures

Table-4: Beta Values

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	0.70	0.37	0.62		0.70		0.59	0.47	0.94
2001-02	1.07	0.69	0.53		0.51		0.84	0.57	0.44
2002-03	0.60	-0.42	0.30		0.74	0.38	1.37	0.41	0.23
2003-04	1.04	0.93	0.48	0.77	0.50	1.06	1.05	0.69	0.54
2004-05	1.04	0.83	0.96	0.48	0.69	0.81	0.77	0.65	0.61
2005-06	0.72	0.37	0.65	0.91	0.77	0.67	0.56	0.78	0.50
2006-07	0.78	0.68	0.81	1.14	0.74	0.97	0.81	0.92	0.69
2007-08	0.71	0.44	0.48	1.10	0.42	0.85	0.58	0.55	0.40
2008-09	0.61	0.37	0.45	0.70	0.38	0.68	0.48	0.33	0.24
2009-10	0.73	0.25	0.50	0.64	0.37	0.83	0.33	0.48	0.37
2010-11	0.93	0.27	0.48	0.57	0.49	0.65	0.66	0.38	0.55
2011-12	1.13	0.32	0.47	0.51	0.49	0.33	0.32	0.42	0.50
2012-13	1.33	0.13	0.51	0.51	0.23	0.13	0.17	0.42	0.44
2013-14	0.65	0.11	0.46	0.43	0.47	0.32	0.36	0.57	0.62
2014-15	0.57	0.41	0.68	0.47	0.36	0.27	0.44	0.28	0.40
2015-16	1.35	0.72	0.98	0.67	0.78	1.01	0.74	0.70	0.90
2016-17	1.13	0.73	0.56	0.79	0.50	0.78	0.76	0.71	0.74
2017-18	0.94	0.93	0.72	1.17	0.69	0.65	0.90	1.13	0.87
2018-19	1.06	0.96	0.70	0.99	0.48	0.90	0.79	1.57	0.79

Source: Calculated based on the data collected by CIME Prowess

Table-5: Market Returns (R_m)

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	-0.281	-0.281	-0.281	-0.281	-0.281	-0.281	-0.281	-0.281	-0.281
2001-02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2002-03	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125
2003-04	0.620	0.620	0.620	0.620	0.620	0.620	0.620	0.620	0.620
2004-05	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151
2005-06	0.549	0.549	0.549	0.549	0.549	0.549	0.549	0.549	0.549
2006-07	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160
2007-08	0.273	0.273	0.273	0.273	0.273	0.273	0.273	0.273	0.273
2008-09	-0.380	-0.380	-0.380	-0.380	-0.380	-0.380	-0.380	-0.380	-0.380
2009-10	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615
2010-11	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110
2011-12	-0.089	-0.089	-0.089	-0.089	-0.089	-0.089	-0.089	-0.089	-0.089
2012-13	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
2013-14	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186
2014-15	0.229	0.229	0.229	0.229	0.229	0.229	0.229	0.229	0.229
2015-16	-0.095	-0.095	-0.095	-0.095	-0.095	-0.095	-0.095	-0.095	-0.095
2016-17	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
2017-18	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102
2018-19	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155

Source: Calculated based on the data collected by CIME Prowess

Table-6: Risk-Free Returns (R_f)

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
2001-02	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2002-03	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2003-04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
2004-05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
2005-06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2006-07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
2007-08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
2008-09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
2009-10	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
2010-11	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2011-12	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
2012-13	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
2013-14	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
2014-15	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
2015-16	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
2016-17	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2017-18	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2018-19	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Source: Calculated based on the data collected by CIME Prowess

Table-7: Returns by CAPM

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	-0.17	-0.05	-0.14		-0.17		-0.13	-0.08	-0.26
2001-02	0.00	0.02	0.03		0.03		0.01	0.03	0.03
2002-03	-0.05	0.13	0.00		-0.08	-0.01	-0.19	-0.02	0.01
2003-04	0.64	0.58	0.32	0.49	0.33	0.65	0.65	0.44	0.36
2004-05	0.15	0.13	0.15	0.10	0.12	0.13	0.13	0.11	0.11
2005-06	0.41	0.24	0.38	0.51	0.44	0.39	0.33	0.44	0.30
2006-07	0.14	0.13	0.14	0.17	0.14	0.16	0.14	0.15	0.13
2007-08	0.21	0.16	0.17	0.29	0.15	0.24	0.19	0.18	0.15
2008-09	-0.21	-0.10	-0.13	-0.24	-0.10	-0.24	-0.15	-0.08	-0.04
2009-10	0.46	0.18	0.32	0.40	0.25	0.52	0.22	0.31	0.25
2010-11	0.11	0.07	0.08	0.09	0.08	0.09	0.09	0.08	0.09
2011-12	-0.11	0.03	0.00	0.00	0.00	0.03	0.03	0.01	0.00
2012-13	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
2013-14	0.15	0.10	0.13	0.13	0.13	0.12	0.12	0.14	0.15
2014-15	0.17	0.14	0.18	0.15	0.14	0.12	0.15	0.12	0.14
2015-16	-0.15	-0.05	-0.09	-0.04	-0.06	-0.10	-0.05	-0.04	-0.08
2016-17	0.18	0.14	0.12	0.14	0.11	0.14	0.14	0.14	0.14
2017-18	0.10	0.10	0.09	0.11	0.09	0.09	0.10	0.11	0.10
2018-19	0.16	0.15	0.13	0.15	0.11	0.15	0.14	0.21	0.14
Average	0.12	0.12	0.10	0.16	0.09	0.15	0.11	0.12	0.09

Source: Calculated based on the data collected by CIME Prowess

Table-8: Realized Returns of Individual Companies

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	-0.352	-0.563	-0.040		-0.038		-0.388	-0.515	0.199
2001-02	-0.107	0.318	0.107		0.733		0.159	-0.060	0.371
2002-03	-0.008	-0.540	-0.340		-0.132	-0.186	0.182	-0.241	-0.224
2003-04	1.401	1.438	0.550	2.025	0.152	1.397	1.769	1.378	0.945
2004-05	-0.150	0.055	0.143	-0.322	-0.233	1.417	-0.077	0.354	0.396
2005-06	0.932	0.408	0.979	0.696	0.698	0.121	0.630	0.317	0.653
2006-07	0.053	0.047	-0.095	0.575	0.068	0.816	0.215	0.000	0.240
2007-08	-0.755	-0.201	0.039	0.900	-0.145	0.609	-0.155	0.332	0.335
2008-09	-0.240	0.243	0.064	-0.118	-0.100	-0.788	0.448	-0.333	0.002
2009-10	1.758	1.172	0.491	0.435	1.029	0.675	0.963	0.874	0.575
2010-11	0.096	0.392	-0.025	0.011	0.287	0.113	0.290	0.041	0.236
2011-12	-0.389	-0.015	-0.025	0.125	0.108	0.098	0.272	0.145	0.277
2012-13	0.332	0.019	0.231	0.282	0.031	0.461	0.178	0.299	0.372
2013-14	1.314	0.360	0.024	0.354	0.367	0.234	0.427	-0.048	0.385
2014-15	0.898	0.572	0.657	0.311	0.323	0.349	0.778	0.520	0.613
2015-16	0.250	-0.061	-0.288	0.126	-0.097	0.072	-0.263	0.215	-0.211
2016-17	-0.035	0.386	0.166	-0.390	-0.096	0.107	0.017	0.658	-0.140
2017-18	-0.153	-0.117	-0.057	0.621	-0.237	-0.442	-0.621	0.282	-0.286
2018-19	0.310	-0.091	-0.064	0.465	0.286	0.210	-0.029	0.165	-0.002
Average	0.271	0.201	0.132	0.381	0.158	0.310	0.252	0.231	0.249

Source: Calculated based on the data collected by CIME Prowess

Table-9: Annual Market Risk

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331
2001-02	0.237	0.237	0.237	0.237	0.237	0.237	0.237	0.237	0.237
2002-03	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207
2003-04	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
2004-05	0.239	0.239	0.239	0.239	0.239	0.239	0.239	0.239	0.239
2005-06	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163
2006-07	0.275	0.275	0.275	0.275	0.275	0.275	0.275	0.275	0.275
2007-08	0.302	0.302	0.302	0.302	0.302	0.302	0.302	0.302	0.302
2008-09	0.438	0.438	0.438	0.438	0.438	0.438	0.438	0.438	0.438
2009-10	0.281	0.281	0.281	0.281	0.281	0.281	0.281	0.281	0.281
2010-11	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174
2011-12	0.201	0.201	0.201	0.201	0.201	0.201	0.201	0.201	0.201
2012-13	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
2013-14	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173
2014-15	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
2015-16	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
2016-17	0.121	0.121	0.121	0.121	0.121	0.121	0.121	0.121	0.121
2017-18	0.098	0.098	0.098	0.098	0.098	0.098	0.098	0.098	0.098
2018-19	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120

Source: Calculated based on the data collected by CIME Prowess

Table-10: Annual Individual Risk of Companies

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	0.581	0.974	0.487		0.453		0.538	0.361	0.640
2001-02	0.588	0.306	0.348		0.428		0.750	0.285	0.367
2002-03	0.250	0.530	0.223		0.294	0.282	0.480	0.237	0.233
2003-04	0.527	0.512	0.343	0.593	0.414	0.574	0.553	0.442	0.401
2004-05	0.453	0.367	0.350	0.382	0.310	0.514	0.392	0.383	0.377
2005-06	0.375	0.248	0.295	0.343	0.318	0.364	0.315	0.368	0.256
2006-07	0.359	0.351	0.340	0.471	0.358	0.571	0.405	0.436	0.297
2007-08	0.432	0.349	0.360	0.561	0.283	0.458	0.338	0.462	0.355
2008-09	0.638	0.422	0.352	0.532	0.434	0.771	0.445	0.519	0.398
2009-10	0.459	0.356	0.341	0.382	0.333	0.535	0.355	0.428	0.333
2010-11	0.372	0.255	0.243	0.228	0.239	0.357	0.278	0.336	0.253
2011-12	0.468	0.263	0.231	0.213	0.221	0.309	0.249	0.249	0.249
2012-13	0.412	0.246	0.214	0.249	0.178	0.295	0.209	0.267	0.189
2013-14	0.443	0.247	0.224	0.261	0.237	0.293	0.256	0.340	0.291
2014-15	0.378	0.297	0.264	0.236	0.247	0.294	0.220	0.305	0.261
2015-16	0.380	0.345	0.274	0.272	0.324	0.358	0.335	0.313	0.351
2016-17	0.298	0.361	0.218	0.405	0.233	0.231	0.249	0.344	0.249
2017-18	0.309	0.291	0.237	0.381	0.282	0.289	0.292	0.299	0.314
2018-19	0.312	0.300	0.240	0.317	0.295	0.270	0.277	0.393	0.353

Source: Calculated based on the data collected by CIME Prowess

Table-11: Current Ratio

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	1.58	3.24	1.75	1.11	1.2	4.92	0.94	2.39	1.41
2001-02	1.55	1.86	1.82	1.08	1.24	1.64	1.01	1.58	2.42
2002-03	1.57	0.84	1.78	1.67	4.19	1.55	1.03	0.66	3.34
2003-04	1.09	1.08	1.55	1.31	3.8	1.57	1.01	1.3	3.02
2004-05	1.05	1.11	1.23	1.58	2.52	1.55	0.91	1.13	1.28
2005-06	1.09	1.11	1.43	1.76	3.31	3.83	0.85	0.81	5.13
2006-07	1.21	1.23	1.2	1.39	0.86	1.63	1.9	1.13	4.61
2007-08	1.67	1.12	2.14	2.07	3.1	1.03	2.13	0.73	4.19
2008-09	1.71	1.48	1.74	2.63	1.78	1.5	2.27	0.68	2.37
2009-10	1.39	1.15	1.15	4.15	1.82	0.59	1.25	0.62	3.45
2010-11	1.21	1.38	2.11	4.55	1.43	0.53	1.71	0.79	4.83
2011-12	1.19	1.62	2.56	3.71	1.15	0.44	1.37	1.96	5.49
2012-13	1.11	1.11	3.8	3.12	1.34	1.17	1.49	0.81	3.56
2013-14	1.29	1.02	2.82	3.32	1.44	0.85	2.01	0.74	2.67
2014-15	1.51	1.17	1.99	3.59	1.99	1.26	3.46	0.24	1.29
2015-16	1.59	1.23	1.75	3.53	2.07	1.41	3.88	0.86	0.44
2016-17	1.4	1.3	2	5.74	2.17	1.53	3.59	0.34	0.54
2017-18	1.47	0.65	2.26	6.02	1.86	2.31	3.48	0.46	0.52
2018-19	1.47	1.13	2.65	6.78	1.76	2.11	3.4	0.41	0.47

Source: Tabulated based on the data collected by CIME Prowess

Table-12: Quick Ratio

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	0.94	2.8	0.9	0.26	0.83	3.89	0.7	1.51	0.72
2001-02	0.88	0.99	0.94	0.35	0.82	1	0.7	0.92	1.18
2002-03	1.18	0.39	0.96	0.92	3.55	1.1	0.75	0.37	1.92
2003-04	0.75	0.51	0.76	0.61	3.21	1.17	0.77	0.74	1.95
2004-05	0.7	0.63	0.69	0.73	2.04	0.97	0.5	0.61	0.74
2005-06	0.65	0.46	0.75	0.78	2.75	2.78	0.44	0.33	4.42
2006-07	0.82	0.59	0.65	0.56	0.57	1.2	1.38	0.64	3.94
2007-08	1.15	0.49	1.3	0.94	2.64	0.69	1.49	0.48	3.56
2008-09	1.11	0.72	1.12	1.32	1.37	1.09	1.32	0.48	2.02
2009-10	0.91	0.63	0.8	2.25	1.4	0.48	0.63	0.44	2.96
2010-11	0.7	0.81	1.46	2.71	1.06	0.38	1.08	0.56	4.06
2011-12	0.63	0.95	1.28	2.32	0.84	0.24	0.89	1.9	4.37
2012-13	0.62	0.68	2.12	1.86	1.02	0.7	0.88	0.76	2.89
2013-14	0.75	0.63	1.73	1.78	1.04	0.6	1.24	0.7	1.89
2014-15	0.97	0.74	0.88	2.1	1.58	1.02	2.46	0.18	1.06
2015-16	1.02	0.85	0.77	2.04	1.68	1.04	2.78	0.44	0.24
2016-17	0.93	1.03	0.91	3.44	1.71	1.17	2.51	0.15	0.28
2017-18	0.89	0.33	1.13	4.05	1.41	1.84	2.58	0.3	0.29
2018-19	0.86	0.62	1.45	4.72	1.34	1.67	2.39	0.36	0.27

Source: Tabulated based on the data collected by CIME Prowess

Table-13: Debt-Equity Ratio

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	0.71	0.47	0.03	0.88	0.46	0.02	1.22	0.3	0.31
2001-02	0.82	0.1	0.03	0.56	0.84	0.73	1.81	0.26	0.16
2002-03	0.96	0.48	0.04	0.42	0.02	0.77	1.9	1.34	0.02
2003-04	0.98	1.01	0.09	0.26	0.02	0.96	1.7	0.82	0.04
2004-05	0.78	0.77	0.17	0.29	0.03	0.55	0.84	1	0.39
2005-06	1.01	0.61	0.12	0.23	0.14	1.71	0.88	0.83	1.64
2006-07	1.33	0.59	0.24	0.44	0.41	2.5	1.42	0.27	1.19
2007-08	2.13	0.51	0.04	0.28	0.08	2.02	0.97	0.42	0.44
2008-09	1.44	0.7	0.14	0.1	0.1	0.51	0.73	0.5	0.02
2009-10	1.6	0.66	0.22	0.04	0.12	0.86	0.69	0.82	0
2010-11	1.02	0.37	0.01	0.02	0.1	0.43	0.36	0.44	0.01
2011-12	0.9	0.27	0.07	0.01	0.24	0.58	0.31	0.02	0.01
2012-13	1.12	0.5	0.01	0.03	0.23	0.22	0.29	0.12	0.01
2013-14	0.95	0.61	0.11	0.01	0.27	0.23	0.14	0.44	0.01
2014-15	0.73	0.44	0.09	0.01	0.29	0.12	0.02	0.65	0.33
2015-16	0.61	0.32	0.13	0.01	0.29	0.08	0.01	0.34	0.3
2016-17	0.61	0.2	0.09	0.01	0.26	0.11	0.03	1.13	0.27
2017-18	0.36	0.45	0.03	0.01	0.2	0.29	0.04	0.8	0.29
2018-19	0.37	0.37	0.01	0.01	0.22	0.29	0	1.29	0.35

Source: Tabulated based on the data collected by CIME Prowess

Table-14: Price-Earnings Ratio

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	6.73	14.22	16.96		39.89	4.96	0	18.31	22.49
2001-02	10.2	10.71	26.72		16.79	12.8	4.09	12.08	18.16
2002-03	5.39	9.37	17.35	5.14	17.94	6.16	6.44	5.19	11.06
2003-04	15.03	20.7	22.19	25.41	26.05	20.31	17.4	16.69	23.43
2004-05	43.67	22.1	18.72	19.15	96.1	52.78	25.82	57.29	29.16
2005-06	59.71	25.45	37.96	34.36	66.42	58.31	22.62	34.98	34.96
2006-07	21	22.2	28.24	35.24	14.1	83.91	22.82	28.26	34.64
2007-08	5.49	13.82	24.45	24.39	21.14	34.41	12.23	22.28	25.16
2008-09	8.22	13.77	21.95	14.57	14.81	18.07	13.64	14.47	18.26
2009-10	10.47	22.31	27.78	26.08	25.89	55.56	22.04	20.06	41.27
2010-11	9.59	27.41	27.01	20.58	32.6	36.12	22.75	0	33.12
2011-12	19.43	26.88	23.66	20.11	36.2	45.1	29.43	51.72	36.95
2012-13	7.45	36.87	19.46	20.31	26.88	28.07	20.26		56.3
2013-14	12.91	23.74	22.52	22.97	23.03	35.36	18.04		2474.48
2014-15	23.48	28.09	48.57	28.1	35.13	18.09	37.94	21.53	
2015-16	26.79	15.92	28.68	23.57	37.46	15.09	23.84	19.27	
2016-17	23.21	68.5	37.82	15.77	31.35	10.18	21.37	54.51	
2017-18	16.68	29.38	28.14	33.45	55.65	10.74	22.01	191.23	283.64
2018-19	33.65	22.41	27.94	34.51	36.8	14.93	20.78	67.66	408.41

Source: Tabulated based on the data collected by CIME Prowess

Table-15: EPS (Earnings per Share)

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	43.77	9	58.91	N	31.26	24.08	N	16.41	24.06
2001-02	21.03	11.97	38.1	N	65.38	19.01	28.61	22.43	36.89
2002-03	39.26	13.18	41.19	42.73	51.09	34.29	19.44	39.75	24.45
2003-04	25.09	21.94	52.73	57.01	37.38	7.1	37.36	44.56	27.73
2004-05	6.57	20.95	13.61	51.99	7.69	5.35	21.42	3.88	16.17
2005-06	11.43	26.54	17.44	54.48	21.38	5.39	45.03	7.43	24.78
2006-07	32.34	15.11	8.35	87.35	51.59	7.27	26.54	8.69	30.43
2007-08	53.05	18.43	8.99	52.03	27.95	14.26	40.38	13.61	48.94
2008-09	23.09	19.77	10.01	65.45	33	8.73	50.54	13.43	60.91
2009-10	91.58	36.97	12.13	26.04	49.32	4.79	73.69	21.13	43.36
2010-11	20.42	28.86	11.89	32.85	50.26	7.85	18.26	-191.09	13.34
2011-12	6.12	28.28	12.87	38.12	48.58	6.82	18	9.07	15.41
2012-13	19.59	20.11	19.51	48.43	65.71	16.48	31.05	-6.38	14.53
2013-14	39.56	43.23	17.04	59.61	111.21	16	51.87	-22.16	0.23
2014-15	51.97	61.93	14.64	63.71	99.27	43.45	52.9	40.37	-7.13
2015-16	27.81	19.91	17.86	41.78	81.02	52.63	62.08	53.75	-4.23
2016-17	29.08	6.47	15.66	39.57	83.96	84.28	67.59	34.9	-1.08
2017-18	33.4	12.89	19.31	32.57	37.42	49.09	33.45	12.76	1.75
2018-19	23.36	15.46	18.95	49.36	75.38	43.23	35.56	40.72	1.17

Source: Tabulated based on the data collected by CIME Prowess

Table-16: Price to Book Ratio (P/B)

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	4.39		11.9		9.81	2.45		5.58	8.56
2001-02	2.03	1.37	6.75		7.56	1		2.51	5.7
2002-03	1.33	1.28	5.61		5.48	1.81	1.15	2.24	5.51
2003-04	0.92	1.6	4.04	1.68	3.88	1.51	1.32	2.15	3.71
2004-05	2.53	5.29	5.6	8.1	3.64	3.8	5.82	7.23	7.14
2005-06	1.85	4.73	4.95	4.5	2.73	12.55	4.44	8.57	7.92
2006-07	4.02	5.76	10.06	7.04	4.82	12.49	6.35	5.93	11
2007-08	3.42	4.64	5.6	9.21	2.91	17.37	6	4.77	8.34
2008-09	1.28	3.04	4.56	9.37	2.07	11.87	3.08	6.23	6.06
2009-10	0.77	3.01	3.93	4.89	1.57	3.21	4.15	3.41	4.47
2010-11	2.79	6.94	4.58	5.82	3.64	4.05	5.71	5.9	6.48
2011-12	2.22	7.75	3.9	4.9	4.61	3.87	5.88	0.6	6.85
2012-13	1.42	5.97	3.29	4.71	4.44	3.97	6.38	0.68	7.46
2013-14	1.5	5.38	3.47	5.01	3.94	5.04	5.79	0.95	9.84
2014-15	3.71	5.79	3.06	5.99	4.67	5.28	6.01	1.03	16.03
2015-16	6.65	7.87	5.15	6.67	5.59	4.31	9.99	1.31	9.31
2016-17	6.35	5.17	3.43	6	4.29	3.04	5.6	1.4	9.01
2017-18	4.69	6.86	3.72	3.06	3.76	2.56	4.41	2.28	7.85
2018-19	3.28	5.19	3.11	4.81	2.88	1.45	2.1	2.66	5.76

Source: Tabulated based on the data collected by CIME Prowess

Table-17: Market Capitalization in Million Indian rupees

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr. Reddy's Labs	Glenmark	Lupin	Piramal Enter-prises	Sun Pharma
2000-01	5894.59	7618.32	59900.38	N	39399.11	1206.86	N	10473.39	25304.63
2001-02	4433.72	7633.2	61048.85	N	84003.03	2464.91	4696.51	10295.07	31319.85
2002-03	4920.86	7353.36	42847.24	2815.63	70142.17	2149.85	5029.68	7838.16	25216.76
2003-04	19140.29	28526.87	70164.65	18571.09	74525.63	8543.21	26091.74	28261.08	60281.92
2004-05	14578.61	29079.57	76406.94	12763.58	56555.16	33480.82	22200.05	42202.55	87450.05
2005-06	36370.09	42419.75	198499.1	23992.76	108929.3	37308	40887.76	54301.61	160917.89
2006-07	36231.73	42143.4	183207.57	39748.45	122156.11	73211.43	48660.69	51344.08	202934.82
2007-08	15664.51	31987.53	170809.78	81922.96	99381.68	122049.73	40539.75	63372.79	255043.12
2008-09	10210.02	37141.38	170809.78	61753.25	82322.27	39532.02	57079.23	40600.8	230385.92
2009-10	53432.81	112611.69	270664.79	89732.48	215581.79	71844.25	144493.7	88590.22	370655.49
2010-11	57030.66	162017.5	257777.9	89621.03	277329.06	76649.15	185329.66	70004.2	457520.11
2011-12	34614.32	155629.35	244529.7	101760.74	298197.3	83230.25	236563.77	80932.09	589763.92
2012-13	42487.73	151790.32	304909.39	130570.72	299982.17	125283.36	281518.43	105332.52	847468.49
2013-14	148890.82	210153.88	308080.92	181713.24	435614.79	153485.47	419634.91	94021.01	1187501.83
2014-15	356276.77	356119.1	571065.46	237614.29	594195.83	213237.52	902145.56	149957.33	2117247.31
2015-16	435951.34	324475.22	411493.43	261499.82	517777.17	224118.22	666975.44	178784	1972193.67
2016-17	395558.51	453773.91	476511.32	165692.21	436315.06	242029.74	652438.26	328249.53	1649992.55
2017-18	326497.02	387640.14	437380.99	289228.02	345501.17	148744.94	332913.81	439957.9	1188624.7
2018-19	460529.67	354829.19	426457.68	452146.09	460691.85	182153.65	334438.09	508096.07	1149881.28

Source: Tabulated based on the data collected by CIME Prowess

Table-18: Sales

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr Reddy's Labs	Glenmark	Lupin	Piramal Enterprises	Sun Pharma
2000-01	7457.7	4490.2	7716.5	1604.2	4946.1	1453.5	662.6	4897.1	4769.3
2001-02	10006.4	4858.7	10637.2	1966.6	9972.8	1928.7	8108.3	5746.3	5594.4
2002-03	10384.7	5545	14007.2	2197.9	16113.3	2613.6	8782.5	9608	6955.7
2003-04	11927.4	9860	15729.8	2602.7	16070	3336.5	10084.9	11539.2	7898.3
2004-05	13413.7	11369	20556.6	3203.1	17551.5	3814.2	11973	14445.1	8928.9
2005-06	11618.3	11520	24011.7	3682.2	16379.5	5381.3	12185.8	13096.1	10443.7
2006-07	14757.3	13390	31038.1	3942.1	21541.8	6208.3	17174.3	15084.6	13530.2
2007-08	19910.3	15384	36579.5	7404.1	41966.9	8387.6	20517	17087.9	17221.3
2008-09	24092.8	17585	42952.4	10475.5	36154	14087.1	26616.2	20013.2	24273.5
2009-10	28852.5	17817	53091.3	12038.2	45315	8737.9	29938.5	23870.6	28336.5
2010-11	33196	19646	56786.2	9444.8	48826	10345.5	37284.1	27117.7	18686.5
2011-12	42299.9	23597	64003.8	13290.6	57779	12216.4	45018	8270.5	20046.4
2012-13	43787.3	27474	70775.6	18627.4	67802	16336.7	54105.2	11633.4	24882.1
2013-14	55695	30943	82973.8	21444.3	83946	20478.7	71507.8	13332.9	24522.3
2014-15	72699.7	36916	95587.2	25329.5	98100	24387.1	89775.7	15429.6	29958.8
2015-16	82583.5	49721	102277.9	31115.1	100939	52860.3	98447.1	17390.2	82663.5
2016-17	93227.6	67123	121191.3	37516.2	102919	62030.8	112438.7	18904.4	77537.8
2017-18	97812.1	32608	109761.8	40668	97198	80955.1	127480.2	21380.7	78122.4
2018-19	103031.5	58226	114462	38395.4	93593	64318.9	100862.4	20379	79659

Source: Tabulated based on the data collected by CIME Prowess

Table-19: Profit After Tax (PAT)

Period	Aurobindo Pharma	Cadila Health-care	Cipla	Divis Labs	Dr Reddy's Labs	Glenmark	Lupin	Piramal Enter-prises	Sun Pharma
2000-01	746	376.9	1330.6	161.5	603.2	216.8	94.9	469.8	836.6
2001-02	683.1	655.7	1790.7	262.8	1444.7	170.9	519.7	664.6	1351.8
2002-03	685.1	671	2076.3	365.7	4596.5	227.8	721.8	482.3	1686.4
2003-04	1031.4	766	2477.4	549	3920.9	331.9	730.7	1181.1	2314.1
2004-05	1270.3	1429	2955.9	728.4	2832	420	950.9	1880.1	2406
2005-06	350.8	1314	4096.1	660.3	654.6	634.8	822.9	1695.7	3064.6
2006-07	693.8	1649	6076.4	704.7	2111.2	673	1790	1703.5	4612.9
2007-08	2290.8	2047	6680.3	1917.5	11768.6	1348	2979.8	1882.8	6289.3
2008-09	2907.8	2362	7014.3	3535.6	4753	3890.2	4433.8	3014.8	10140. 4
2009-10	1285.4	2659	7768.1	4244.6	5609	2179.3	4169.7	2753.2	12652. 9
2010-11	5257.6	5033	10814. 9	3442	8461	1284.6	6489.3	4432.2	8986.5
2011-12	5938	6104	9603.9	4355.7	8934	2121.8	8099.8	128969.1	13838
2012-13	-426.1	6575	11239. 6	5459.6	9124	2653	8043.7	1307.2	16991. 1
2013-14	4959.9	4986	15071. 1	6114.2	12659	3943.8	12604. 3	-2315.6	5165.5
2014-15	11720.9	9036	13883.4	7917.2	19330	4338.2	23546.4	-3700	-28285.2
2015-16	15163.5	12711	11810.9	8470.6	16807	10075.3	23973.5	3727.4	-14741.3
2016-17	16267	20375	14623	11108.4	13743	14842.7	28308.7	9957	-10875.1
2017-18	17067.6	6619	9749.4	10532.7	13841	21406.1	31413. 3	7767.8	-228.4
2018-19	18127.7	10908	14685.2	8695.8	5669	10143.5	13446. 6	5184.7	-4945.9

Source: Tabulated based on the data collected by CIME Prowess

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Public Expenditure and Economic Development of Indian States: A Panel Data Analysis

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Abstract

Public expenditure plays a crucial role in the process of economic development of a vast country like India. It also leads to the growth of progress, efficiency, equity and stability. It plays a vital role in the allocation of resources by providing various public goods and merit goods. Developing countries like India are known for sharp inequalities and backwardness due to illiteracy, poverty and poor health care. The objective of the paper is to examine the impact of public expenditure on economic development of selected significant states in India during 1990-2010. The article is based on calculating the association between federal spending and economic growth and the relative significance of the revenue and capital expenditure, for which panel data regression model has been used. The panel data set consist of time acute data over the twenty years. The paper concludes that capital expenditure influences the growth rate of middle income and low-income states, but the co-efficient is comparatively lesser than that of revenue expenditure.

Keywords: Co-efficient, Economic Development, GSDP, Public Expenditure

Introduction

Public expenditure plays a crucial role in the process of economic development of developed and more particularly, developing countries like India. It is by expanding economic infrastructure such as roads, power, food, shelter, health, education, employment opportunity, transport and other sectoral development. Further, it raises the standard of living of the people and promotes social, economic and human development.

Public expenditure also leads to growth and development, efficiency, equity and stability. On the efficiency front, public spending plays a vital role in the allocation of resources by providing various public goods and merit goods. It addresses externalities by regulating markets to engage in competition. Federal spending

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could also be designed to influence income redistribution. Developing countries like India are known for sharp inequalities and backwardness characterized by illiteracy, poverty and poor health care. Public expenditure programmes could effectively address such underlying human problems in society. Moreover, public expenditure could also address macroeconomic concerns of growth and stability. The link between public expenditure and economic development has been well established both by the theoretical and empirical literature. In recent years, however, debates have emerged about the role of public expenditure in a mixed economy where the appropriate compositions of federal spending into revenue and capital components have become controversial. Similarly, the trade-off between efficiency and equity continues to be controversial in designing relevant expenditure policies and programmes.

The aim of this study is to examine the impact of public expenditure on economic development of selected significant states in India and to analyze the relative significance of revenue and capital expenditures and their effect on the growth of Gross State Domestic Product in the study area.

Literature Review

Several empirical studies (Gupta, 1967; Bird, 1971) have been undertaken to test the hypothesis of Wagner (1956), Peacock-Wiseman (1967) since the early 1950s. These studies can be classified into (a) expenditure-determining studies and (b) expenditure-determined studies. In the expenditure-determining studies (Gupta, 1967; Bird, 1971), one or more independent variables have been used to study the growth and pattern of public expenditure, the latter being the dependent variables. The most frequently used variables are (a) the level of economic development, (b) the shift in the public expenditure during major social upheavals such as war and economic depressions and (c) the type of financial system. A vast number of studies by Gupta (1967), Bird (1971) and Peacock-Wiseman (1967) have been made to relate the pattern and growth of public expenditure to the level of economic development. But in a very few studies Peacock-Wiseman (1961), Pryor (1968) have used to show a shift in public expenditure and financial system as independent variables. Peacock-Wiseman (1961) have used the change in the government expenditure as an independent variable in their study, while Pryor (1968) has made a pioneering study by analyzing the public expense of a group of nations with different economic systems.

In the expenditure-determined studies (Sahni, 1972; Bird, 1970), specific components or an aggregate measure of public expenditure constitute the independent variable. Sahni (1972) has noted that "these studies attempt to determine the effect of public expenditure in terms of some measures of efficiency". Bird (1970) has pointed out that 'the positive theory of public expenditure', for the present purposes may be considered to encompass a study of the following subjects: (a) the determinants of the volume of public investment; (b) the determinants of the composition of public expenditure- what types of goods and services is getting financed through the public sector and how the mix of expenditure changes over time; and (c) such behavioral properties of public expenditure as centralization and stability.

Agriculture makes the most substantial contribution to economic growth in many developing countries. There are functional relationships between agricultural

development and government spending in this sector. It is one of the essential tools for promoting economic growth. Public expenditure in the agrarian sector is directly influenced by the process of growth (Jothi Sivagnanam, 2006).

Overall, almost all the studies mentioned above have failed to make any disaggregate analysis of the public expenditure based on functions. The impact of government expenditure on economic development can be comprehended in a better way if such feature-based categorisation is made. Therefore, the present study is an attempt to bridge the gap in the existing studies of public expenditure by incorporating the function-based disaggregates analysis.

Database and Methodology

The study mainly depends on secondary data. The area selected for the study was selected significant states in India, which include Gujarat, Haryana, Maharashtra, Punjab, Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, West Bengal, Bihar, Madhya Pradesh, Odisha, Rajasthan and Uttar Pradesh. The data for the study collected from the Reserve Bank of India, State Budget Documents, various Policy Notes, Union Budget Documents, Economic Surveys, Ministry of Agriculture, National and State Human Development Reports, Planning Commission Reports, Ministry of Education and Human Resources Development Reports, and Census of India. The data relating to Gross Domestic Product has been collected from the Central Statistical Organization.

To examine the association between public expenditure, economic growth, the relative significance of the revenue expenditure and capital expenditure, a panel data of regression model has been used. The panel data sets consist of time series data over the twenty years and cross-section data across fourteen significant states for the select variables which include GSDP as the dependent variable and various public expenditure components and various other determinants of growth.

Results and Discussion

The role of revenue and capital expenditure is analysed and understood through determining growth using panel data model. The logarithmic value of Gross State Domestic Product (GSDP) during 1990-2010 is the dependent variable. The various independent variables included in the model are revenue and capital components of government expenditure and other variables such as foreign direct investment, number of state government employees, agriculture output, literacy ratio, enrollment ratio, infrastructure index, per cent of outstanding liabilities and per cent of population growth rate. Further, all the expenditure variables and GSDP is converted into logarithmic values.

First, the panel data model pertains to examining the impact of revenue and capital expenditures of major states on economic growth. The simple panel data models have been specifically used for the states with three different income levels of the states to perform the analysis. The panel data equation is of the form:

Fixed-effects Model

The panel data equation is of the form:

$$\ln GSDP_{it} = \beta_0 + \beta_1 \ln RE_{it} + \beta_2 \ln CE_{it} + \beta_3 \ln FDI_{it} + \beta_4 \ln NSGE_{it} + \beta_5 \ln AO_{it} + \beta_6 LR_{it} + \beta_7 ER_{it} + \beta_8 II_{it} + \beta_9 OS_{it} + \beta_{10} PGR_{it} + n_i + e_{it}$$

Where ln $GSDP_{it}$ expresses the logarithmic value of Gross State Domestic Product in the three different income levels of states (i) at the time (t)

- Ln RE is logarithmic value of Revenue Expenditure.
- Ln CE is the logarithmic value of Capital Expenditure.
- Ln FDI is the logarithmic value of Foreign Direct Investment.
- Ln NSGE is the logarithmic value of Number of State Government Employees.
- Ln AO is the logarithmic value of Agriculture Output.
- LR is the Literacy Ratio.
- ER is the Enrollment Ratio (6-11 Years).
- II is the Infrastructure Index.
- OS is the per cent of Outstanding Liabilities.
- PGR is the per cent of Population Growth Rate.
- n_i in order to avoid an omitted variable bias in the model.

Random-effects Model

The specifications of the panel data models estimated to examine random-effects are as follows:

$$\ln GSDP_{it} = \beta_{0i} + \beta_1 \ln RE_{it} + \beta_2 \ln CE_{it} + \beta_3 \ln FDI_{it} + \beta_4 \ln NSGE_{it} + \beta_5 \ln AO_{it} + \beta_6 LR_{it} + \beta_7 ER_{it} + \beta_8 II_{it} + \beta_9 OS_{it} + \beta_{10} PGR_{it} + e_{it}$$

Where $\beta_{0i} = \beta_{0+}\mu_i$

Thus, instead of treating the state-effect, β_{0i} as fixed, the Random Effect Model (REM) assumes that each is a random variable with a mean value of β_0 and error term, μ_i with mean zero and variance σ^2. In other words, there is a common mean value for the intercept and the individual differences in the intercept values of each state reflected in the error term μ_i. Thus, the REM model can be rewritten as

$$\ln GSDP_{it} = \beta_0 + \beta_1 \ln RE_{it} + \beta_2 \ln CE_{it} + \beta_3 \ln FDI_{it} + \beta_4 \ln NSGE_{it} + \beta_5 \ln AO_{it} + \beta_6 LR_{it} + \beta_7 ER_{it} + \beta_8 II_{it} + \beta_9 OS_{it} + \beta_{10} PGR_{it} + w_{it}$$

Where $w_{it} = e_{it} + \mu_i$

Importantly, since μ_i is a latent variable, the REM assumes that μ_i and other explanatory variables are not correlated. A central assumption in random-effects estimation is the assumption that the random-effects are uncorrelated with the explanatory variables. One common method for testing this assumption is to employ a Hausman (1978) test to compare the fixed and random-effects estimates of coefficients. The Hausman test is used frequently to choose between the fixed-effects and random-effects specification. The Hausman test results presented in Table (1 and 2). Based on the Hausman test, the null hypothesis rejected at the 1 per cent level of significance. However, this outcome suggests that fixed-effects models are more appropriate for the tables.

Table-1 presents the impact of government expenditure on the principal states on the GSDP growth rate during 1990-2010. Its found that the size of government expenditure varies significantly with the GSDP rate at significant state level in India. Revenue expenditure has positively substantial relations with the GSDP growth rates of the low, middle and high-income states at 1 percent and 10 percent level of significance respectively. The coefficient results of the fixed-effects model show that one per cent increase in revenue spending leads to 0.75 per cent, 0.55 per cent and 0.14 per cent growth in GSDP of middle, low and high-income

states respectively implying that the middle and low-income states have relatively higher positive contributions to the GSDP than that of the top income group of states.

Further, the results also show that the government allocates a more significant share of the resources to revenue expenditure to fill the more significant gap in the social sectors like literacy, health, social security and social welfare, this would have helped accelerate growth by promoting human development and hence, the overall productivity of these states. Capital expenditure of middle and low income states is having positively significant relation with GSDP rate at 1 percent and 5 percent level respectively. It is evident from the fixed-effects model that one per cent increase in capital expenditure causes 0.11 per cent, 0.10 per cent and 0.10 per cent growth in GSDP of middle, low-income states and major states.

Even though the size of revenue expenditure coefficients at the middle, low and high-income states level is 0.75 per cent, 0.55 per cent and 0.14 per cent, which are significant and more elevated than 0.11 per cent, 0.10 per cent and 0.04 per cent respectively estimating for the capital expenditure of the states. The size of revenue expenditure coefficients is larger than the ratios of capital expenditure of three types of states.

The panel regression results show that revenue expenditure has a high level of positive impact on the growth of GSDP than the capital expenditure of three groups of states classified by income. And it can be inferred from this result that in the Indian states, public spending on social infrastructure is more growth stimulating than that of the federal spending on economic infrastructure.

However, the results also reveal that many other variables have a significant influence on GSDP rates. We find from the study that the coefficient of foreign direct investment of middle-income states is substantial at a 10 per cent level with a positive sign. Additionally, it reveals that the coefficient of the number of state government employees belonging to middle and high-income states is significant at one and five per cent with a positive sign.

Next, there is also a positive relationship between the agricultural output and the GSDP growth rate of high and low income states at 1 percent level. It is interesting to note that the coefficients on GSDP growth rate and the percentage of outstanding liabilities of high and low income states are statistically significant with a negative sign at 1 and 5 per cent level. It implies that outstanding liabilities and GSDP growth rate do not have a significant impact on the economic development of major states is possible because higher the outstanding liability, higher will be the interest payments, which in turn would have reduced the level of public expenditure and hence growth.

Table-1: Determinants of Economic Growth in the Major States, 1990-91 to 2009-10

The different Income States	***The Low Income States***		***Middle Income States***		***The high Income States***		***Major States***	
Explanatory Variables	FE	RE	FE	RE	FE	RE	FE	RE
Constant	2.30***	1.63***	3.39***	3.07***	2.79***	2.88*	1.99****	1.70***
	(0.80)	(0.64)	(0.43)	(0.42)	(0.79)	(0.87)	(0.37)	(0.35)
	[2.87]	[2.54]	[7.85]	[7.26]	[3.53]	[3.29]	[5.31]	[4.90]
Ln R E	0.55***	0.48***	0.75***	0.76***	0.14*	0.20**	0.46***	0.46***
	(0.07)	(0.07)	(0.05)	(0.05)	(0.07)	(0.08)	(0.04)	(0.04)
	[7.57]	[6.95]	[14.99]	[16.20]	[1.90]	[2.39]	[10.33]	[10.48]

The different Income States	The Low Income States		Middle Income States		The high Income States		Major States	
Ln C E	0.10**	0.15***	0.11***	0.05*	0.04	0.08	0. 10***	0.11***
	(0.05)	(0.04)	(0.03)	(0.03)	(0.05)	(0.05)	(0.03)	(0.03)
	[2.31]	[3.36]	[3.32]	[1.87]	[0.76]	[1.46]	[3.44]	[4.12]
Ln FDI (Rs. in Millions)	-0.002	0.006	0.008*	0.008*	-0.0004	0.004	0.003	0.007**
	(0.005)	(0.005)	(0.004)	(0.005)	(0.007)	(0.008)	(0.004)	(0.003)
	[-0.38]	[1.16]	[1.78]	[1.68]	[-0.05]	[0.51]	[0.87]	[2.02]
Ln No. of State Government Employees	0.007	0.001	0.02***	0.02***	0.02**	0.02**	0.02***	0.01***
	(0.006)	(0.006)	(0.003)	(0.003)	(0.006)	(0.007)	(0.003)	(0.003)
	[1.17]	[0.16]	[5.92]	[5.21]	[2.95]	[3.01]	[5.20]	[4.61]
Ln Agriculture Output	0.27***	0.34***	0.03	0.05	0.55***	0.53***	0.37***	0.39***
	(0.08)	(0.06)	(0.05)	(0.04)	(0.08)	(0.09)	(0.04)	(0.04)
	[3.50]	[5.35]	[0.74]	[1.04]	[6.90]	[6.05]	[8.51]	[9.49]
Literacy Ratio	0.01***	0.01	-0.004	0.001	0.03***	0.02**	0.01***	0.009***
	(0.005)	(0.004)	(0.003)	(0.002)	(0.008)	(0.009)	(0.003)	(0.002)
	[2.64]	[3.19]	[-1.19]	[0.70]	[3.82]	[2.03]	[3.44]	[5.13]
Enrollment Ratio (6-11 Years)	0.0004	0.001	-0.0003	0.0001	0.001	0.004**	0.0003	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	[0.37]	[-0.28]	[-0.54]	[0.23]	[1.01]	[3.08]	[0.43]	[1.21]
Infrastructure Index	0.0003	-0.001	0.001	0.001*	-0.001	-0.002*	0.001	0.0004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	[0.08]	[-0.62]	[1.57]	[1.64]	[-1.02]	[-1.66]	[1.47]	[0.81]
Per cent of Outstanding Liabilities	-0.004**	-0.005***	0.001	0.0005	-0.02***	-0.007**	-0.006***	-0.008***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)	(0.001)
	[-2.14]	[-3.77]	[0.48]	[0.21]	[-4.12]	[-2.30]	[-3.74]	[-6.10]
Population Growth Rate (in Millions)	-0.003	0.001	0.001	0.005***	0.02***	0.004*	0.001	0.001**
	(0.002)	(0.001)	(0.003)	(0.001)	(0.006)	(0.002)	(0.002)	(0.001)
	[-1.37]	[0.55]	[0.25]	[5.69]	[3.60]	[2.63]	[0.28]	[1.99]
R Square	0.72	0.77	0.69	0.73	0.73	0.74	0.66	0.62
Hausman Test Chi-Sq.	NA	53.97	NA	21.17	NA	49.38	NA	22.99

Note: The value in the brackets refers to the standard error and those in the square brackets refer to the t-value). *** 1 percent, ** 5 percent, * 10 percent respectively. NA refer Not Applicable
RE- Revenue Expenditure, CE- Capital Expenditure, FE- Fixed Effect, RE- Random Effect

Sector-wise Public Expenditure

This section primarily deals with sector-wise public expenditure and how they impacted on the growth of GSDP of selected states. The second sets of panel data models are estimated to examine the sector-wise, expenditures on the growth of the GSDP. The effect of different sectoral expenditure on the economic growth of the three income levels of states in India estimated by keeping both the revenue and capital expenditure as independent variables.

Fixed-effects Model

Model specification for panel data is:

$$\ln GSDP_{it} = \beta_0 + \beta_1 \ln RAE + \beta_2 \ln REE + \beta_3 \ln RHE + \beta_4 \ln RIE + \beta_5 \ln RTE + \beta_6 \ln RND + \beta_7 \ln CAE + \beta_8 \ln CEE + \beta_9 \ln CHE + \beta_{10} \ln CIE + \beta_{11} \ln CTE + \beta_{12} \ln CND + n_i + e_{it}$$

Where $\ln GSDP_{it}$ expresses the logarithmic value of Gross State Domestic Product in the three different income levels of states (i) at the time (t),

- ln RAE is the logarithmic value of Revenue Agriculture Expenditure.
- Ln REE is the logarithmic value of Revenue Educational Expenditure.
- Ln RHE is logarithmic value of Revenue Health Expenditure.
- Ln RIE is the logarithmic value of Revenue Industrial Expenditure.
- Ln RTE is logarithmic value of Revenue Transport Expenditure.
- Ln RND is the logarithmic value of Revenue Non-development Activities.
- Ln CAE is the logarithmic value of Capital Agriculture Expenditure
- ln CEE is the logarithmic value of Capital Educational Expenditure
- ln CHE is the logarithmic value of Capital Health Expenditure
- ln CIE is the logarithmic value of Capital Industrial Expenditure
- ln CTE is the logarithmic value of Capital Transport Expenditure
- Ln CND is the logarithmic value of Capital Non-development Activities.

Random-effects Model

The specifications of the panel data model estimated to examine the random-effects model are as follows:

$$\ln GSDP_{it} = \beta_{0i} + \beta_1 \ln RAE + \beta_2 \ln REE + \beta_3 \ln RHE + \beta_4 \ln RIE + \beta_5 \ln RTE + \beta_6 \ln RND + \beta_7 \ln CAE + \beta_8 \ln CEE + \beta_9 \ln CHE + \beta_{10} \ln CIE + \beta_{11} \ln CTE + \beta_{12} \ln CND + e_{it}$$

In order to examine the sectoral impact of government expenditure in the three groups of states categorized using income levels, a panel model has been applied for the period 1990 to 2010 in Table-4. The functional relationship between revenue expenditure on the educational sector and GDSP growth rate of the high and low income States are positively significant at 1.0 percent level, respectively. The coefficient results of the fixed-effects model show that a 1-per cent increase in revenue expenditure on the educational sector in the high and low income States leads to a rise of 0.91 per cent and 0.41 per cent in the GSDP growth rates, respectively.

On the contrary, the capital spending on the education sector creates a negative impact on the GSDP growth rate at 10.0 percent level in the low and high-income States, respectively. The coefficients estimated in the fixed-effects model suggest that a 1-per cent increase in capital expenditure on the educational sector of small and high-income States results in a decline in the growth rate of GSDP by -0.03 percent and -0.05 percent level, respectively.

The analysis has also found that there is a significant relationship between revenue allocation to the industrial sector and GSDP growth rate of the high-income States at 10 percent level. The estimated coefficients suggest that one per cent increase in revenue allocation to the industrial area of top income States results in an increase in the growth rate of GSDP by 0.06 per cent, indicating that the States such as Gujarat, Maharashtra, Punjab, Tamil Nadu, Karnataka and West Bengal have performed well in industrial development. The industrial sector has been given a high priority as special economic zones, trade centres, and industrial units within the different States, especially in the High-income States.

Table-2: Impact of Sectoral Spending on Gross State Domestic Product in the Major States: 1990-91 to 2009-10

The different Income States	*The Low Income States*		*Middle Income States*		*The high Income States*		*Major States*	
Explanatory Variables	FE	RE	FE	RE	FE	RE	FE	RE
Constant	5.22***	5.51***	4.27***	3.28***	8.16***	6.33***	5.70***	5.49***
	(0.53)	(0.52)	(0.52)	(0.51)	(0.60)	(0.48)	(0.30)	(0.31)
	[9.89]	[10.57]	[8.25]	[6.47]	[13.56]	[13.12]	[19.18]	[17.68]
Ln Revenue Spending on Agriculture Sector	0.01	0.01	0.06	0.03	-0.20	0.03	0.01	-0.08*
	(0.06)	(0.04)	(0.07)	(0.07)	(0.16)	(0.11)	(0.05)	(0.05)
	[0.16]	[0.18]	[0.84]	[0.47]	[-1.27]	[0.24]	[0.18]	[-1.69]
Ln Revenue Spending on Education Sector	0.41***	-0.21*	0.23	-0.04	0.91***	0.58***	0.35***	0.57***
	(0.13)	(0.13)	(0.22)	(0.21)	(0.26)	(0.20)	(0.11)	(0.10)
	[3.15]	[-1.70]	[1.06]	[-0.17]	[3.55]	[2.86]	[3.23]	[5.61]
Ln Revenue Spending on Health Sector	0.25**	0.70***	0.10	0.62***	-0.45	-0.07	0.09	0.13
	(0.12)	(0.12)	(0.18)	(0.15)	(0.29)	(0.18)	(0.11)	(0.11)
	[2.10]	[5.76]	[0.57]	[4.10]	[-1.56]	[-0.37]	[0.81]	[1.26]
Ln Revenue Spending on Industrial Sector	-0.05	0.001	0.06	0.09**	0.06*	0.09**	0.09***	0.08***
	(0.04)	(0.05)	(0.04)	(0.04)	(0.03)	(0.04)	(0.02)	(0.02)
	[-1.40]	[0.03]	[1.42]	[2.14]	[1.74]	[2.32]	[4.03]	[3.56]
Ln Revenue Spending on Transport Sector	-0.04*	0.02	0.03	0.03	0.04	0.03	0.04***	0.08***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
	[-1.69]	[0.54]	[0.98]	[0.77]	[1.65]	[0.93]	[2.71]	[4.65]
Ln Revenue Non-development Activities	0.19***	0.29***	0.43***	0.37***	0.03	-0.003	0.22***	0.002
	(0.06)	(0.07)	(0.07)	(0.08)	(0..06)	(0.01)	(0.03)	(0.01)
	[3.39]	[4.08]	[5.74]	[4.55]	[0.53]	[-0.43]	[6.75]	[0.27]
Ln Capital Spending on Agriculture Sector	0.01	0.01	-0.01	-0.03	-0.03	-0.02	-0.01	-0.005
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.005)	(0.01)
	[0.82]	[1.48]	[-0.61]	[-1.43]	[-1.21]	[-0.85]	[-1.11]	[-0.84]
Ln Capital Spending on Education Sector	-0.03*	-0.02	0.01	0.001	-0.05*	-0.05*	-0.02	-0.03***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.01)	(0.01)
	[-1.87]	[-0.93]	[0.81]	[0.06]	[-1.67]	[-1.69]	[-1.62]	[-2.75]
Ln Capital Spending on Health Sector	0.03	0.04	-0.05**	-0.04**	0.03	0.01	0.02	0.003
	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.01)	(0.01)
	[1.31]	[1.43]	[-2.49]	[-2.38]	[1.09]	[0.42]	[1.17]	[0.22]
Ln Capital Spending on Industrial Sector	-0.001	-0.01	0.01	-0.002	-0.05***	-0.04***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
	[-0.07]	[-0.63]	[0.44]	[-0.22]	[-3.52]	[-2.46]	[-4.25]	[-3.88]
Ln Capital Spending on Transport Sector	0.02	0.01	0.07**	-0.03	0.15***	0.14***	0.04***	0.05***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.01)	(0.01)
	[0.97	[0.61]	[1.96]	[-1.00]	[4.06]	[3.48]	[3.23]	[3.35]
Ln Capital Non-development Activities	0.09***	0.10***	0.02	0.09***	0.20***	0.15***	0.10***	0.12***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)	(0.02)	(0.02)
	[3.28]	[3.20]	[0.70]	[3.13]	[3.56]	[2.52]	[4.86]	[5.72]
R Square	0.63	0.65	0.66	0.67	0.65	0.63	0.61	0.63
H-Test Chi-Square Test	NA	165.89	NA	40.1	NA	32.36	NA	128.94

Note: The values in the brackets refer to the standard error, and those in the square brackets refer to the t-value, RE- Random Effect, FE- Fixed Effect *** 1 per cent, ** 5 per cent, * 10 per cent.

On the other hand, the coefficients of fixed-effects results show that a 1 percent increase in capital expenditure on industrial sector leads to a growth rate of GSDP in the high-income States at -0.05 percent. Thus capital expenditure on the industrial sector has a negative relation to growth at 1 percent level.

The functional relationship between capital expenditure on transport sector and GSDP rate in the high and middle Income States is positively significant at 1 percent and 5 percent level respectively. The results also suggest that a 1 percent increase in capital expenditure leads to a rise in economic growth equivalent to 0.15 percent and 0.07 percent in the high and middle income States, respectively. The government expenditure in the upper and middle-income States is also supported by a corresponding growth of the state economy.

The coefficients of revenue expenditure on non-development activities in the low and middle-income States are positively significant with the GSDP growth rate at 1.0 percent level, respectively. The fixed-effects model suggested that a 1-per cent increase in public expenditure on non-development activities has led to the rise in the GSDP growth rate at 0.43 per cent and 0.19 per cent, in the middle and low income States, respectively. It indicates that the number of salary earners' size, the salary package, financial services, public administrative services and pension services has increased due to the implementation of the Fifth and Sixth Pay Commissions' recommendations. The salaries to government employees, pensioners and interest payments have increased many times over the last twenty years is indicated. All these would have had a positive impact on growth by increased spending and consequent demand generated in the economy.

The coefficient estimates suggest that a 1.0 per cent increase in capital allocation to non-development activities in the high and low income States has increased the GSDP rates by 0.20 per cent and 0.09 per cent, respectively. The government capital expenditure on non-development activities in the high and low income states has been relatively more senior in terms of spending than the allotment to the states. As a result, one half of the increase in the total expenditure of the states has been due to non-development expenditure. One of the reasons attributed to the fiscal challenges of the sovereign States during the recent period has been the sudden jump in the non-development investment following an upward revision of pay and pensions of the State Government and local body employees. But given its positive impact on growth, the state government should focus more on their revenue effort and put pressure on the Union Government to get more federal transfers to meet their increased expenditure commitments for providing adequate social and economic infrastructure in the liberalized economic environment.

Summary and Conclusions

Revenue expenditure is one of the factors influencing the GSDP growth of significant states. This expenditure has a positively meaningful relationship with GSDP growth rate of three categories states like low, middle and high-income States. The results of the fixed-effects model show that the middle and low income States have responded more positively than the top income States.

Capital expenditure influences the growth rate of middle and low income group of States, but the co-efficient is comparatively lesser than that of the revenue expenditure. It is also evident from the fixed-effects model that the coefficient values of middle and low income States are higher than that of major States of India. The middle and low-income States have been spending more than the top income group of States to attain faster economic growth has also come in the notice.

Thus the result as a whole indicates that the size of revenue expenditure coefficients is larger than the capital expenditure of three income groups of states.

The panel regression results show that the revenue expenditure has a higher level of positive impact on the growth of GSDP than the capital expenditure of all the states.

The estimated values show that revenue expenditure on educational services in the low and high-income States to the growth of the GSDP are positively related. On the contrary, the capital expenditure on education in the small and high-income States is GSDP rate is negatively correlated. The results show that there is a positive relationship between revenue expenditure on the health sector and the growth rate of GSDP in the low income States.

The fixed-effects estimation suggests that revenue expenditure on industrial services in the high-income States with the growth rate of GSDP is related positively, indicates upper and middle income states such as Gujarat, Maharashtra, Punjab, Tamil Nadu, Karnataka and West Bengal having better performances in industrial development, and they have also widely improved during the economic policy reforms period. The industrial sector has been given high priority as special economic zones, trade centres and industrial units for the development of the industry are created. On the contrary, the capital allocation to the industrial growth with GSDP growth of the high-income States is in negative correlation.

The functional relationship between capital expenditure on transport sector is positively related to the GSDP of the growth rate of high and middle-income States. The higher positive co-efficient for an upper and middle-income group of States also indicates that these states are already spending more to meet the expanding infrastructure requirements due to their higher FDI and private investment flow during the post-liberalization era.

The coefficients of revenue expenditure on non-development activities in the low and middle income States are positively significant with GSDP growth. It indicates that the number of salary earners, size, the salary package, financial services, public administrative services and pension services have increased due to the implementation of Fifth and Sixth Pay Commissions' recommendations. It would have generated a higher demand in the economy, which in turn would have influenced the growth positively. Further, a growing economy would also require the support of a growing and efficient administration.

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Socio-economic Development Disparities Across Indian States: A Principal Component Analysis

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Abstract

In the context of sustainable development of a country, the socio-economic progress of people and regions are of a broad relevance. And, it is particularly significant for a populous developing country like India. The socio-economic development is a means of having excellent employment opportunities, a way out to fight with poverty and inequality, and a strategy for improving the quality of life of people. In this context, this paper examines the pattern of socio-economic development across 20 Indian States at four-time points – 1981, 1991, 2001 and 2011. The findings of the study provide evidence of the existence of spatial-temporal inequality in the levels of socio-economic development across the Indian States. This finding is significant for the policymakers striving to achieve balanced regional development. Skill formation among young adults and appropriate infrastructural developments along with sound governance system can go a long way in contributing to the process of socio-economic development of backward regions / states of India.

Keywords: Composite Index, Indian States, Inequality, PCA, Socio-economic Development

Introduction

Socio-economic development has been considered as an essential aspect of the overall development of a region/nation. It is a multi-dimensional process which is closely associated with the improvements in the quality of life of people (Mishra, 2017). Improvement in quality of life has been observed to be associated with the advances in the conditions of health, education, housing, sanitation, urbanization, population structure, infrastructure, and like. Thus, socio-economic development of a region is mapped for improvements in these dimensions of well-being. Therefore, economists including Dreze & Sen (1999), Deaton & Dreze (2002), Dreze & Sen (2002), Sen (2003), Deaton (2003), and Dreze & Sen (2013) emphasized on these dimensions of human well-being for assessing the level of socio-economic development of an area/region/nation. The consideration of socio-economic development in such a multi-dimensional framework is significant for evaluating the degree of disparity in the level of development across regions, thereby enabling formulation of plans and policies for achieving balanced regional development.

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India is a country of diversity in many aspects, including economic, social, political, cultural, and environmental. The most trivial among these is the disparities in the levels of socio-economic development across the Indian States. In spite of the productive efforts of government of India to achieve balanced regional development through its five year plans over a period of more than six decades, some States have made fast growth while others have languished (Dholakia, 1985; Sachs *et al*., 2002; Somasekharan *et al.*, 2011; Mishra *et al*. 2016). Dreze & Sen (2013) observed that the States like Tamil Nadu and Himachal Pradesh have stepped up in the ladders of socio-economic development to be among the top performers in socio-economic progress while the traditionally backward States (like Bihar, Uttar Pradesh, Madhya Pradesh, etc.) have retained their positions among the worst-performing States.

This regional disparity in the levels of growth of Indian States is a significant challenge for policymakers and planners, as it produces a serious threat to the socio-political harmony of the nation (Agarwalla & Pangotra, 2011). Number of studies have shared the widespread perception of increased disparity level across the Indian States and firmly supported by the available statistical indicators (Ahluwalia, 2002; Nagaraj *et al*. 1998; Bhattacharya & Sakthivel, 2004; Kar & Sakthivel, 2007; Narain *et al.* 2007; Nayyar, 2008; Ghosh, 2008, 2010, 2012, 2013; Kalra & Sodsriwiboon, 2010; Bandyopadhyay, 2011; Kaur & Dhillon, 2015; Mishra *et al*. 2016; Mishra, 2017). Although several indicators have been taken up in these studies, there remain some other critical indicators which can explain the inequalities in the socio-economic development of Indian States in a better manner.

In this context, this paper is an attempt to re-examine the issue of regional disparities in the levels of socio-economic development by taking into account some more indicators not yet included in previous studies such as gross fiscal deficit, credit-deposit ratio, percentage of SC& ST population, effective couple protection rate, road density and average population per bank.

Data and Methodology

In line with the objective of the study, first, the trends in economic inequality across the Indian States is analysed in terms of per capita net state domestic product at constant prices, and substantiated by employing σ-convergence test of Barro & Sala-i-Martin (1992). Then the regional development disparity is examined by constructing the composite index of socio-economic development applying Principal Component Analysis (PCA). Also, the taxonomy of the socio-economic development of States is prepared by following the fractile classification technique as suggested by Narain *et al*. (2007).

For this purpose, twenty-six socio-economic indicators including share of agriculture, share of manufacturing, share of services, gross fiscal deficit, credit-deposit ratio, population growth, population density, percentage of the urban population, percentage of SC&ST population, sex ratio and percentage of people below poverty line, work participation rate, female literacy rate, gross primary enrolment ratio, primary dropout rate, primary pupil-teacher ratio, crude birth rate, crude death rate, infant mortality rate, effective couple protection rate, percentage of households having access to electricity, percentage of households having access to safe drinking water, percentage of households having toilet facilities in the premises, per capita electricity consumption, average population per bank and road density have been considered. The data on above mentioned socio-economic

indicators were compiled from various sources including CSO, Census of India, Economic Survey, EPW Research Foundation database, CMIE database on the States of India, and the Handbook of Statistics on the India States of RBI.

The analysis has been undertaken in the context of 20 States of India, viz., Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal for the time points 1981, 1991, 2001 and 2011.

The principal component analysis is a statistical approach that can be used to analyse the interrelationship among a large number of variables such that the information contained in several original variables is condensed into a smaller set of variates/factors with minimum loss of information (Devkota *et al*. 2014). In mathematical terms, from an initial set of *n* correlated variables, PCA creates uncorrelated indices or components, where each element is a linear weighted combination of the primary variables (Vyas & Kumaranayake, 2016). The most crucial point is that PCA is suitable for analysis of Census data. For example, Salmond & Crampton (2002) developed the New Zealand (NZDep) index where a PCA applied to a set of pre-selected variables from the New Zealand census data, and the index weights based on the first principal component. Similarly, Messer *et al*. (2006) created an index based on the first primary component of a PCA that applied to American census data based on a set of pre-selected variables. In our data set, most of the indicators are from the Census of India, and thus, PCA is considered suitable for the construction of the Socio-Economic Development Index (SEDI).

If the set of values of the p-selected indicators for i^{th} State is $X_{i1}, X_{i2}, ...X_{ip}$, then the composite indices obtained for each State through the first principal component is given by the linear combination of the standardized variables of original variables: $Y_i = a_{11}x_{i1} + a_{12}x_{i2} + ... + a_{1p}x_{ip}$, where $a_{11}, a_{12}, ...a_1$ are weights of each indicator such that their sum of squares is one, Y is the composite index, and $x_{i1}, x_{i2}, ...x_{ip}$ are the standardised values of the *p*-selected indicators. The first principal component calculated is such that it accounts for the highest possible variance in the data set. Finally, the obtained composite index is normalized by the Max-Min method to get the socio-economic development index given by:

$$SEDI = \frac{Y_i - Min\{Y_i\}}{Max\{Y_i\} - Min\{Y_i\}}$$

For computations, the standard statistical software STATA.12 was used. In the end, the following taxonomy of States is created on the base of their socio-economic development in terms of a fractile classification from the assumed distribution of the mean of SEDI.

Table-1: Fractile Classification of Socio-economic Development

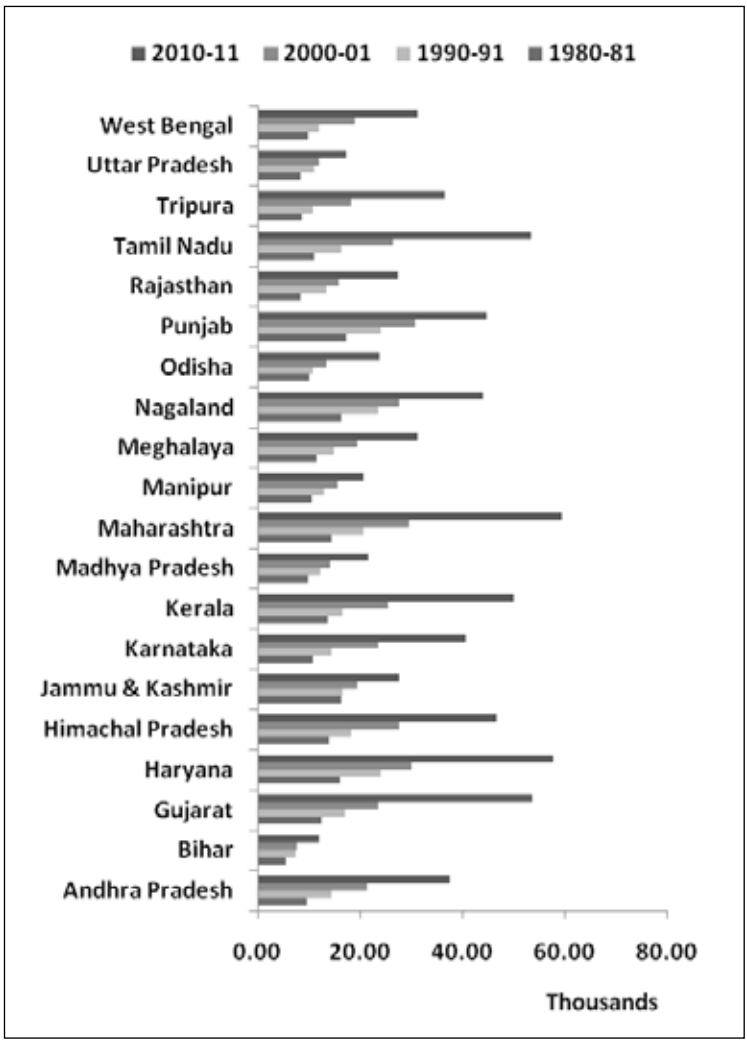
Criteria of Classification	Category of development
SEDI greater than or equal to Mean + S.D.	High
SEDI in between Mean and Mean + S.D.	High middle
SEDI in between Mean – S.D. and Mean	Low middle
SEDI less than or equal to Mean – S.D.	Low

Source: Narain et al. (2007)

Findings and Discussion

In the development literature, the economic inequality across regions have been analysed with the help of disparities in terms of real per capita income. Thus, we have taken per capita net state domestic product at factor cost and at constant prices of 2004-05 for 20 Indian States for the years 1980-81, 1990-91, 2000-01 and 2010-11 to see whether income disparity is persistent in India. Figure-1 plots the data. It reveals that though the real per capita income has increased in each State over decades, this increase is not uniform across States, which indicate the presence of income disparity in India. The real per capita income/output has substantially increased in States of Tamil Nadu, Punjab, Maharashtra, Kerala, Haryana and Gujarat. But it is at a deficient level in Bihar, Madhya Pradesh, and Uttar Pradesh.

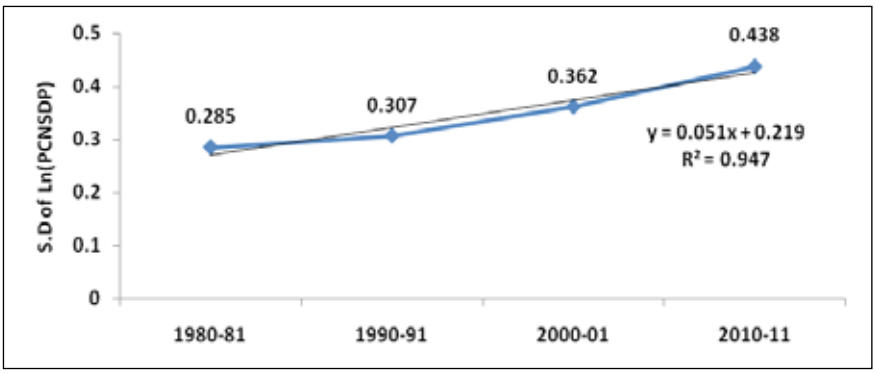
Figure-1: Real Per Capita NSDP, Indian States



Source: Author's Plot

The existence of this income inequality across the Indian States is substantiated through the σ-convergence test. It requires the examination of the linear trend in the standard deviations of the natural logarithm of real per capita income/output across States and overtime. If we find a negative slope, then it would mean decline in income disparity and a positive slope indicates the rising nature of income inequality. Figure-2 depicts the linear trend in required standard deviations. The linear trend line having a positive slope of 0.051, with R-squared value of 0.947 is revealed. It is sufficient to conclude about the persistence of income inequality across the Indian States during 1980-81 to 2010-11.

Figure-2: σ–Convergence Test of Income Inequality Across the Indian States



Source: Author's Plot

However, this income inequality does not reveal the existence of any socio-economic disparity across regions (Porter, Stern & Loria 2013) though it is not the sufficient condition of such divergence. The reason is that socio-economic development being a complex multi-dimensional process is challenging to capture through a single income indicator (Mishra, 2017). Thus, a composite Socio-Economic Development Index is constructed for each State and for each time point under consideration by employing the Principal Component Analysis elaborated earlier. The values of SEDI are presented in Table-2. Greater the SEDI, higher is the level of socio-economic development and vice-versa.

The Table-2 reveals the existence of spatial-temporal socio-economic disparities across the Indian States. The Kerala State of India has been consistently ranked one based on SEDI in all the four-time points. Next to Kerala are Himachal Pradesh, Punjab and Tamil Nadu in the top positions in terms of socio-economic development. Contrary to this, Bihar, Uttar Pradesh and Rajasthan are in bottom areas in terms of socio-economic development. It infers us the fact that in India socio-economic spatial inequalities exist across States. The relative variation as revealed by coefficient of variation (C.V.) of socio-economic development indices being higher for 1991 and 2001 has been observed. The level of variation first increased from 1981 to 1991 and then declined through 2001 and 2011. It, on the one hand, indicates the presence of regional disparity in the socio-economic development across Indian States over the years, and on the other hand, suggests a move towards gradual decline in the levels of regional inequalities. This finding is critical for the policymakers targeting the achievement of balanced regional development in India.

Table-2: Socio-Economic Development Index

States of India	1981	Rank	1991	Rank	2001	Rank	2011	Rank
Andhra Pradesh	0.4072	12	0.2086	15	0.8147	7	0.6702	7
Bihar	0.1914	19	0.0000	20	0.5059	13	0.0000	20
Gujarat	0.6042	7	0.4249	8	0.8592	5	0.6594	8
Haryana	0.6523	4	0.5673	5	0.8220	6	0.5999	9
Himachal Pradesh	0.7769	3	0.7449	2	0.9430	2	0.7638	4
Jammu & Kashmir	0.6492	6	0.4025	10	0.2694	15	0.4932	12
Karnataka	0.5784	8	0.3234	12	0.8794	4	0.7096	5
Kerala	1.0000	1	1.0000	1	1.0000	1	1.0000	1
Madhya Pradesh	0.3070	16	0.2786	14	0.6440	11	0.3915	16
Maharashtra	0.5418	9	0.5172	6	0.7789	8	0.7689	3
Manipur	0.0000	20	0.3684	11	0.0787	18	0.3986	14
Meghalaya	0.3120	15	0.1973	17	0.0285	19	0.2593	18
Nagaland	0.4267	11	0.4448	7	0.1409	17	0.4442	13
Odisha	0.2751	17	0.2025	16	0.4743	14	0.3975	15
Punjab	0.7832	2	0.6535	3	0.6717	10	0.6798	6
Rajasthan	0.3196	14	0.1243	19	0.5550	12	0.3474	17
Tamil Nadu	0.6497	5	0.5695	4	0.9023	3	0.9023	2
Tripura	0.4566	10	0.3119	13	0.2260	16	0.5370	11
Uttar Pradesh	0.2268	18	0.1871	18	0.0000	20	0.2207	19
West Bengal	0.3614	13	0.4144	9	0.7080	9	0.5954	10
Mean	**0.4760**		**0.3971**		**0.5651**		**0.5419**	
S.D.	0.2398		0.2344		0.3309		0.2422	
Mean – S.D.	**0.2362**		**0.1627**		**0.2341**		**0.2997**	
Mean + S.D.	**0.7158**		**0.6314**		**0.8961**		**0.7841**	
CV (%)	**50.378**		**59.028**		**58.556**		**44.695**	

Source: Author's Calculation

Although the ranking method is simple to interpret, it does not infer the classification of the States according to their levels of socio-economic development. For policy purposes, it is thus, essential to group different States according to their levels of socio-economic development. The development literature suggests using a fractile classification of States based on their socio-economic development (Narain *et al*. 2007). According to this, there can be four levels of socio-economic development, viz., high, high middle, low middle, and low. The classification presented in Table-3 reveals that Kerala is the only State which is in high developed category in all the four-time points. Himachal Pradesh continued to be in the high developed class up to 2001 and then declined to high middle level in 2011. Similarly, Punjab, which was in the high developed class up to 1991, later replaced by Tamil Nadu in 2001 and 2011.

Table-3: Classification of Indian States, 1981 to 2011

Criteria of Classification	States in Different Time Periods
High Level Development $SEDI \geq Mean + SD$	**1981** - Himachal Pradesh, Kerala, Punjab **1991** - Himachal Pradesh, Kerala, Punjab **2001** - Himachal Pradesh, Kerala, Tamil Nadu **2011** - Kerala, Tamil Nadu
High Middle Level Development $Mean < SEDI < Mean + SD$	**1981** - Gujarat, Haryana, J&K, Karnataka, Maharashtra, Tamil Nadu **1991** - Gujarat, Haryana, J&K, Maharashtra, Nagaland, Tamil Nadu, West Bengal **2001** - Andhra Pradesh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, West Bengal **2011** - Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Maharashtra, Punjab, West Bengal
Low Middle Level Development $Mean - SD < SEDI < Mean$	**1981** - Andhra Pradesh, Madhya Pradesh, Meghalaya, Nagaland, Odisha, Rajasthan, Tripura, West Bengal **1991** - Andhra Pradesh, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Odisha, Tripura, Uttar Pradesh **2001** - Bihar, J&K, Odisha, Rajasthan **2011** - J&K, Madhya Pradesh, Manipur, Nagaland, Odisha, Rajasthan, Tripura
Low Level Development $SEDI \leq Mean - SD$	**1981** - Bihar, Manipur, Uttar Pradesh **1991** - Bihar, Rajasthan **2001** - Manipur, Meghalaya, Nagaland, Tripura, Uttar Pradesh **2011** - Bihar, Meghalaya, Uttar Pradesh

Source: Author's Classification

In the low level of development, Bihar and Uttar Pradesh remained for all the periods except for a one-time point (Bihar in 2001 and UP in 1991). It follows that the high performing States remained at the high levels of socio-economic development and the low performing States remained at the low levels of socio-economic development. The States of Gujarat, Haryana, Karnataka, Maharashtra, and West Bengal are found to be better performing as compared to other States. The low performing States include Odisha, Madhya Pradesh, Rajasthan, and North-Eastern States which needs particular attention for further development. Besides, this study identifies Bihar and Uttar Pradesh as the most lagging or backward States of India. Special policy attention needs to be given for their development. Better policy framework for infrastructural development to attract private capital from within and outside the country may be recommended for the socio-economic progress of these States. Efficient governance system is also warranted to maintain law and order, and attract industrial investment in these States. The necessity is also to provide for better human capital formation through improvements in health, education, housing and sanitation. In short, a comprehensive development strategy which combines infrastructure, basic amenities and social development may be coined and implemented in collaboration with major private partners for the socio-economic progress of the lagging States.

Conclusion

In the policy circle, the emphasis is laid on socio-economic development for the reduction of regional imbalances, poverty alleviation and improving the quality of life of people. And, it is particularly relevant in a high populous and developing country like India. In this context, the paper examines the pattern of socio-

economic development across Indian States from 1981 till 2011. The empirical evidence found in favour of the persistence of socio-economic disparity across States over the years with an indication of the falling levels of spatial-temporal inequalities. The pattern of this inequality is such that Bihar and Uttar Pradesh remained as the low performing States whereas Kerala, Himachal Pradesh, Punjab, and Tamil Nadu levelled as the better performing States. Therefore, the development challenge before policymakers is to make the lagging States upward-moving in the ladders of socio-economic progress. In this context, it is suggested to focus on the improvement of the governance system such that current laws and regulations create an enabling environment to attract new growth opportunities and enhance the living standards of people. Amiable rules and regulations can make it easier for private investment to create employment opportunities at equitable wages. Furthermore, it is very much essential to put in place appropriate infrastructure facilities to encourage new entrepreneurial activities having better job and earning opportunities which ultimately contribute to the human capital formation. As a long-term measure for creating better development opportunities, the skill formation at the level of young adults especially in case of vulnerable groups of the society should be emphasized. All these would certainly go a long way in reducing socio-economic disparities across Indian States thereby making the economic and social development of the nation robust.

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