ISSN 0972-1185

ARTHA BEEKSHAN

JOURNAL OF BANGIYA ARTHANITI PARISHAD
(Bengal Economic Association)
ASSOCIATE MEMBER OF THE INTERNATIONAL ECONOMIC ASSOCIATION

Vol. 28, No. 3

December 2019

Sponsored by :

ICSSR

ARTHA BEEKSHAN

(Journal of the Bengal Economic Association)
Reg. No. 53099/92

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BANGIYA ARTHANITI PARISHAD
(Bengal Economic Association)
[Associate Member — International Economic Association]

Office :
Bangiya Arthaniti Parishad, 87/277, Raja S. C. Mallick Road,
Ganguly Bagan, Kolkata - 700 047.

Artha Beekshan, Volume 28, No. 3, December 2019

Publication of ***Artha Beekshan***, the quarterly referred journal of Bangiya Arthaniti Parishad, that is, the Bengal Economic Association, is one of the most important academic activities of the Association. The present volume, **Volume 28, No. 3** of the Journal, is published containing the selected papers contributed by scholars . We are thankful to the authors and members who have helped in one way or other in the preparation of this volume.

The publication of this issue of Artha Beekshan is helped by grant from **ICSSR.**

I would like to extend my whole-hearted thanks to the Editorial team, the Publisher, and all who have helped in the publication process, and especially the office bearers of Bangiya Athaniti Parishad for their kind endeavours to make this issue of **Artha Beekshan** viable and **Kolkata Mudran** for bringing out the present issue.

Editor in Chief

Certificate of Registration

1.	**Name of the Journal**	**:**	**ARTHA BEEKSHAN (Journal of Bengal Economic Association)**
2.	**Registration Number**	**:**	**53099/92**
3.	**Language**	**:**	**English**
4.	**Periodicity**	**:**	**Quarterly**
5.	**Retail Selling Price**	**:**	**Complementary for Members**
6.	**Publisher**	**:**	**Secretary, Bangiya Arthaniti Parishad**
a.	**Nationality**	**:**	**Indian**
b.	**Address**	**:**	**87/277, Raja S. C. Mallick Road, Ganguly Bagan, Kolkata - 700 047.**
7.	**Editor in Chief**	**:**	**President, Bangiya Arthaniti Parishad**
	a. Nationality	**:**	**Indian**
	b. Address	**:**	**87/277, Raja S. C. Mallick Road, Ganguly Bagan, Kolkata - 700 047.**
8.	**Printing where printing is conducted**	**:**	**Kolkata Mudran, 12, Biplabi Pulin Das Street, Kolkata -700009, Phone: 033-2354-6891.**
9.	**Place of Publication**	**:**	**Ganguly Bagan, Kolkata – 700 032.**

We gratefully acknowledge the support from ICSSR towards publication of this issue of the Journal, Artha Beekshan.

Artha Beekshan, Volume 28, No. 3, December 2019

ECONOMIC GROWTH, STRUCTURAL CHANGE AND SECTORAL CONCENTRATION IN INDIA: A STATE-LEVEL SECTORAL ANALYSIS[2]

Purba Roy Choudhury[1]

Abstract

This paper examines the relationship between economic growth, sectoral concentration and regional inequality for 16 major Indian states using time series for six major sectors for the period of 1970-2014. As far as economic growth is concerned, growth performance in India improved during the post-reform period mainly because of the high growth in the services sector. The paper constructs indices of structural change with the Krugman's sectoral concentration index where AGR and FIRB are the most concentrated sector. The paper further constructs a measure of sectoral regional disparity through an Entropy measure the Theil index. Annual growth rate of inequality has been highest in banking insurance, and financial sector, followed by agriculture followed by services as a whole, followed by Net State Domestic Product followed by transport, storage and communication. Only the inequality in industry and community, social and personal services has been decreasing over time. The paper finally attempts to evaluate the long run causal relationship between economic growth, concentration index, and measure of inequality in each sector. In the agricultural sector, no relationship could be established as all the variables were not integrated of the same order. In the industrial sector there was a bidirectional causal relationship between growth and sectoral concentration and again a bidirectional relationship between growth and inequality. In the services sector, no causal relationship between growth and sectoral concentration and growth and inequality could be established. But there was a causal relationship between sectoral concentration and inequality in the services sector. Therefore, the results show that the different sectors show different levels of causality between growth, concentration index and inequality and this is highly likely because the production pattern of these sectors are different. The paper therefore cannot ensure that higher economic growth leads to more regional disparity across sectors.

Keywords: Economic Growth, Regional Specialisation, Concentration Index, Service Sector, India

JEL Classification: O10, C23

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[2]This paper has been presented at the 39th Annual Conference of the Bengal Economic Association at Jadavpur University, Kolkata in March, 2019. The author gratefully acknowledges the support provided by the Minor Research Project titled "The Service Sector in India's Economic Growth: A State-level Investigation" of the University Grants Commission.

I. Introduction

India's services growth has generated a lot of interest among academics and policy makers and there has been considerable research trying to explain the "services revolution" in the country (Hansda 2002a, 2002b; Gordon and Gupta2004; Salgado 2003; Banga 2005; Verma 2006; Eichengreen and Gupta 2009;Mitra 1988; Bhattacharya and Mitra 1990; Arunachalam and Kumar 2002). India's success story in the services sector is well documented at the national level. However, similar literature does not exist for India's states. Chakravarty (2005) in her study used is an inter-sectoral analysis of state domestic product data to understand the determinants of the services sector growth in India. All these studies, however, look at the performance of services at the national level, there is not much literature exploring the services phenomenon at the sub-national or state level in India. Despite India's recent strong growth performance, there is a growing concern that the benefits of growth have been concentrated in India's richer states, leaving the poorer states lagging further and further behind. In general, trade, hotels and restaurants; real estate and business; and construction services have been the traditional big contributors to services sector in terms of value added over time across a majority of Indian states. Hence, the structure has been fairly similar across regions as well as over time. The 1990s witnessed the rising importance of banking and insurance, while communication services have gained significance in the years since 2000. This paper from a development paradigm looks into the distributional aspect of growth in terms of reduction in regional disparity across states.

This paper focuses on examining growth as well as the regional disparity in the Indian economy with special reference to the service sector. In light of the wide range of evidence, this paper seeks to shed some light on the debate by answering three related research questions of whether regional disparity in the states reduced over time, what is the pattern of sectoral concentration in India and finally whether a long run relationship between sector-wise growth, inequality and concentration index exists. In other words, this paper tries to provide an analytical view on the measurement of growth and regional disparity and sectoral concentration in India and its relationship.

II. Survey of Literature

It is generally accepted that economic growth is a main driving force for reduction in poverty and inequality. But despite India's recent strong growth performance especially in the service sector, there is a growing concern that the benefits of growth have not been able to reduce regional disparity. As India's poorest states are also most populous, the concern is that unless these states begin to share in the benefits of growth, an increasing proportion of the population will be left in poverty and that rising inequality will lead to social, political, and economic difficulties. Moreover, as many policy makers perceive that globalisation and

economic liberalisation have contributed to this state of enormous GDP growth in India, economic divergence could erode support for economic reform and for further opening of the Indian economy.

There is a rich literature using regional data to test whether growth in regions within India has converged or diverged over time. However, the results are contradictory in most of the cases. For example, Cashin and Sahay (1996) and Aiyar (2001) have found evidence of convergence after controlling for differences in initial economic conditions, but Rao, Shand, and Kalirajan (1999), and Bajpai and Sachs (1996) have found divergence. Bhattacharya and Sakthivel (2004) and Kumar (2004) assert that the reforms of the 1990s exacerbated the gap between richer and poorer states, while Ahluwalia (2002) asserts that these reforms helped to reduce the gap. Further, other studies find that external demand is an important determinant of services value added in a number of states, and that this demand emanates from all over the country. This suggests that the benefits from services growth are being distributed more widely than is perceived to be the case.

III. Macroeconomic view

The objective of this paper is not to test the growth convergence hypothesis of neoclassical type as such, but to locate the structural dynamics of regional disparity in India during 1970-2015. The population size as well as income level of different regions marked by the state boundaries in India differ enormously. In analysing the regional growth pattern, state level data on domestic product and its sectoral components are obtained from the National Accounts division of the Central Statistical Office (CSO), under the ministry of Statistics and Programme Implementation, Government of India. The electronic version of the data base of EPWRF covers the period from 1960-61 to 2014-15.

As a share of NSDP, there seems to be a clear demarcation, transport services especially railways have been driving demand in low income states, while higher income states have been focusing on communication, financial and other business services. Trade, hotels and restaurant services have been important in both low and high income states. When it comes to growth rates, one or the other low income states seem to be "catching-up" with the high income states across sub-sectors.

Growth of agriculture, industry and services in some major states

Growth performance in India improved during the post-reform period mainly because of the high growth in the services sector (Table 1). But the data for regional shares of national income indicate that economic growth across Indian states has been highly uneven. Economic growth rate varies from 3.4 percent in Assam to 7.2 percent in Gujarat during the post-reform period. Leading states in terms of national shares of domestic product grew at faster

rates compared to the others. The fast-growing states (Gujarat, Haryana, Andhra Pradesh, Karnataka and Maharashtra) grew more than double as fast as the slow-growing state like Assam. Some states (Himachal Pradesh, West Bengal, Tamil Nadu and Kerala) with per capita income closer to national average grew at rates higher than the national average growth rate, while some other states, namely Uttar Pradesh (including Uttaranchal) and Madhya Pradesh (including Chhattisgarh), with per capita incomes lower than the national average, grew slowly during 1991-2015.

Table 1: Regional Growth rates of NSDP and its Sectoral Components

	NSDP		Agriculture		Industry		Services	
	1970-1990	1991-2015	1970-1990	1991-2015	1970-1990	1991-2015	1970-1990	1991-2015
Andhra Pradesh	3.7	6.3	2.2	3.6	5.8	5.4	4.8	7.7
Assam	3.6	3.4	2.4	1.2	4.3	2.5	4.4	5.2
Bihar	3.3	5.2	1.6	3.4	6.3	5.7	3.8	6.4
Gujarat	4.2	7.2	2.3	3.8	5.3	7.6	4.7	8.4
Haryana	5.4	6.9	3.7	2.2	8.3	6.3	6.7	10.0
Himachal Pradesh	3.4	6.6	2.6	3.3	6.3	8.5	5.1	7.7
Karnataka	3.9	6.8	2.6	2.2	6.3	6.2	4.5	9.1
Kerala	2.7	6.1	1.1	0.8	4.5	3.9	1.6	7.7
Madhya Pradesh	3.1	4.7	2.2	1.8	5.5	5.6	3.6	5.5
Maharashtra	4.2	6.8	2.3	4.1	5.2	5.4	4.6	8.1
Orissa	2.9	5.4	1.8	1.3	2.9	8.3	4.4	7.4
Punjab	5.0	4.7	4.1	2.0	8.0	5.5	4.6	5.4
Rajasthan	3.9	5.5	3.3	2.5	2.8	6.0	4.4	6.5
Tamil Nadu	3.0	6.2	0.8	1.3	4.7	4.4	3.0	4.1
Uttar Pradesh	3.4	4.3	2.4	1.9	6.2	3.5	3.8	5.1
West Bengal	3.0	6.2	3.2	2.8	1.4	6.2	3.7	7.6
All India	**3.7**	**5.7**	**2.4**	**2.4**	**5.1**	**5.7**	**4.2**	**6.9**

Note: Bihar includes Jharkhand, Madhya Pradesh includes Chhattisgarh, and Uttar Pradesh includes Uttaranchal.

Source: National Accounts Statistics, Central Statistical Organistaion (2011)

Economic and Political Weekly Research Foundation (2011): Domestic products of states of India,

Reserve Bank of India (2011): Handbook of Statistics on Indian Economy.

In Kerala, West Bengal and Tamil Nadu the growth rate increased by more than twice in the post-reform era as compared to the pre-reform period. Again, the growth rate has not increased significantly in Uttar Pradesh and Madhya Pradesh, and indeed it declined in Punjab and Assam after the initiation of economic reforms. The output growth in agriculture declined in most of the agriculture led states during the post-reform period and it varied from less than 1 percent in Kerala to just above 4 percent in Maharashtra in that period. In manufacturing, the growth rate had fallen in some fast growing states, while in other states it improved very slowly. Orissa and West Bengal, on the other hand, exhibited significant growth improvement in manufacturing, particularly unregistered manufacturing, after reforms. The services sector grew at a faster rate than manufacturing during the same period and it varied from around 4 percent in Tamil Nadu to 10 percent in Haryana. Banking services, hotels and restaurants, trade and community services have been the leaders in accelerating the growth of the services sector in India during the post-reform period. The IT sector has grown at a very fast rate since the mid-1990s, but its contribution to GDP is still very low (less than 1 per cent of GDP).

Growth of specialised services in some major states

Since this paper tries to comprehend the influence of service sector growth in particular, the disparity in growth rates of subsector of services NSDP is evaluated in Table 2. The states of Maharashtra, Kerala, Karnataka, Madhya Pradesh, Himachal Pradesh, Rajasthan, Tamil Nadu and West Bengal have doubled in growth rate in transport, storage and communication from 1970-1990 to 1991-2000. This is mainly due to communication and information technology (IT) and IT enabled services (ITES). However, states like Rajasthan and Himachal Pradesh registered a high growth rate in transportation. Gujarat showed a remarkable growth rate in transport, storage and communication.

Table 2: Regional Growth rates of subsector of services NSDP in India and states

.	Trade, Hotels and Restaurants		Transport Storage and Communication		Banking, Insurance, Real Estate and Financial Services		Community, Social and Personal Services	
	1970-1990	1991-2010	1970-1990	1991-2010	1970-1990	1991-2010	1970-1910	1991-2010
Andhra Pradesh	7.19	6.80	5.62	9.49	8.75	7.74	6.08	6.69
Assam	3.98	4.58	5.70	5.23	5.19	7.04	5.35	6.36
Bihar	11.79	9.52	2.27	10.64	4.75	9.41	4.81	8.71
Gujarat	6.77	9.28	10.51	9.64	6.57	7.77	4.67	6.83
Haryana	9.91	10.81	8.64	11.51	8.29	11.56	6.20	7.43
Himachal Pradesh	7.80	8.95	4.08	14.18	7.14	6.05	6.04	6.07
Karnataka	5.70	8.23	5.84	13.39	6.78	9.17	5.36	6.03
Kerala	2.54	6.18	6.52	15.33	5.60	9.49	4.90	6.66
Madhya Pradesh	3.01	6.69	4.92	12.12	7.67	7.31	7.34	7.92
Maharashtra	5.34	7.62	5.82	9.80	7.36	11.31	5.86	6.62
Orissa	3.96	8.62	6.73	10.75	6.07	6.20	5.69	5.07
Punjab	5.37	4.67	7.23	11.57	6.72	6.25	5.54	4.97
Rajasthan	8.88	6.29	4.60	9.92	7.72	7.66	5.66	6.91
Tamil Nadu	3.85	9.16	4.99	9.74	7.08	9.60	4.79	6.39
Uttar Pradesh	3.66	5.41	5.45	8.06	7.21	6.06	5.46	5.99
West Bengal	3.34	7.29	4.17	9.87	9.58	9.84	4.96	6.05

Note: Bihar includes Jharkhand, Madhya Pradesh includes Chhattisgarh, and Uttar Pradesh includes Uttaranchal.

Source: National Accounts Statistics, Central Statistical Organistaion (2011)

Economic and Political Weekly Research Foundation (2011): Domestic products of States of India,

Reserve Bank of India (2011): Handbook of Statistics on Indian Economy.

Calculation of the growth rates in the pre-reforms and post reform period in India reveals growth in post reforms India has been more in mostly the FIRB and TSC sectors,

while the growth in THR is increasing, but the CSP sector has not shown much of a huge change in post reforms. States like Gujarat, Haryana, Kerala, Karnataka, Maharashtra, Tamil Nadu and West Bengal, have shown a massive increases in growth of all the sectors of services NSDP. These states have shown a huge growth mainly in the dynamic sector of services namely transport, storage and communication and financing, insurance, real estate and banking sectors. However, states with low per capita income like Assam, Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh have also shown an increase in THR and TSC sectors. As a part of sectoral services growth rates in NSDP, services especially railways have been driving demand in low income states, while higher income states have been focusing on communication, financial and other business services. Trade, hotels and restaurant services have been important in both low and high income states. It is also seen that with growth rates, one or the other low income states seem to be "catching-up" with the high income states across sub-sectors.

There has been a proliferation of studies showing unabated rise in regional disparity in India. The patterns of distribution of the service sector across the regions provide the key to the cause of rising or falling regional disparity is the primary concern of this chapter. Regional disparity is not merely a subject of scholarly interest; rather it is a matter of everybody's concern. There is on-going and increasing debate in understanding the level, causes and development of regional disparity. A dominant view in post-World War II development circles was that high regional disparity facilitated the growth process. Additionally, growth itself could be expected to lead to greater regional disparity. Contrary to this there are reasons to believe that high levels of regional disparity may adversely impact future growth and development prospects. A political economy consideration is that high levels of regional disparity may lead to pressures to redistribute. Redistribution, in turn, may lower growth because it is executed through distortionary mechanisms. A principal motivation for regional disparity measurement is normative, to guide policy. Thus, if it can be shown that regional disparity has been increasing, economists argue that there is an immediate need for some policy prescriptions.

IV. Measure of Regional Disparity

The rise in regional disparity among the regions and the growing divide between the richer states and poorer states deserve the immediate attention of policy makers and public. Rising regional disparity matters not only because it raises basic issue of equity and fairness but also because it affects our economic and political system in adverse manner. Moreover, the concept of regional distribution of income is extremely relevant in the economic development of India too. In this context, it is important to examine whether regional disparities across states in India have been increasing over the years.

Many measures of inequality including some of the earliest and most widely used ones like Gini coefficient are understood as primarily descriptive are used to measure regional disparity. There are at least two potential uses for descriptive measures of inequality as explanatory variable and as dependent variable in understanding economic relationship (Kaplow, 2002). But what counts as a good measure depends on the economic theory and empirical facts in particular contexts and not necessarily on the properties and axioms that have generally been proposed for measures of inequality.

The question of which one is the most appropriate measure of inequality for a particular purpose needs to be answered by a combination of theory and empirical testing. Undoubtedly, there can be no presumption that there exists an ideal descriptive measure. Cowell (1995) shows that any measure that satisfies all of these axioms is a member of the Generalized Entropy (GE) class of inequality measures.

1. *The Pigou-Dalton Transfer Principle:* This axiom requires that an income transfer from a poorer person to a richer person should register as a rise (or at least not as a fall) in inequality and an income transfer from a richer to a poorer person should register as a fall (or at least not as an increase) in inequality. Most measures in the literature, including the Generalized Entropy class, the Atkinson class and the Gini coefficient, satisfy this principle, with the main exception of the Logarithmic Variance and the Variance of Logarithms.

2. *Income Scale Independence:* According to this axiom, the inequality measure should be invariant to uniform proportional changes. If each individual's income changes by the same proportion then inequality should not change.

3. *Principle of Population:* The population principle requires inequality measures to be invariant to replications of the population. Merging two identical distributions should not alter inequality.

4. *Anonymity/Symmetry:* This axiom requires that the inequality measure should be independent of any characteristic of individuals other than their income (or the welfare indicator whose distribution is being measured). Therefore the inequality index depends only on the income values used to construct it and not additional information such as who the person is with a particular income.

5. *Decomposability:* This axiom requires overall inequality to be related consistently to constituent parts of the distribution, such as population sub-groups. For example, if inequality is seen to rise amongst each sub-group of the population then it is expected that overall inequality is likely to increase. Some measures, such as the Generalised Entropy class of measures, are easily decomposed into intuitively appealing components of within-group inequality and between-group inequality. Other measures, such as the Atkinson set of inequality

measures, can be decomposed but the two components of within- and between-group inequality do not sum to total inequality. The Gini coefficient is only decomposable if the partitions are non-overlapping, that is the sub-groups of the population do not overlap in the vector of incomes (Litchfield, 1999)

Undoubtedly, there can be no presumption that there exists an ideal descriptive measure. In addition, whether a measure satisfies one or another set of axioms that seem aesthetically appealing is not likely to be particularly important. Thus, no measure of inequality can be said, in a vacuum, to be the best. Some economists use the Gini coefficient drawn from Lorenz curve; some prefer indicators of dispersion, such as Entropy index; some offer axiomatic derivations of inequality indexes; and still others advocate the use of normative measures derived from social welfare functions.

In the present paper, Theil Entropy index measure of inequality is selected for the purpose of measuring regional disparity which satisfies all the five axioms discussed earlier. The levels and trends in regional disparity in India for income as well as for various components of income like agriculture, industry and services along with the subsector of services are analysed. The Theil or entropy measure of inequality often called "entropy", E_x, is defined as follows:

$$E_x = \sum_{i=1}^{n} x_i \ln (x_i/p_i) \qquad 1$$

where x_i is an indicator such NSDP, agriculture, industry, services, trade hotel and restaurants, transport, storage and communication, banking, insurance and financial services, community, social and personal services, i stands for the region/state, p_i is the region i's share in the total population and x_i is the region i's share in various economic activities like NSDP, agriculture, industry, services and the sub sector of services. The entropy index E_x is estimated using interregional data on Net State Domestic Products as provided by Central Statistical Organisation.

The results are shown in the Table 3. It can be seen that regional disparity increased over time, especially in the post- globalisation era. Table 3 projects the Theil entropy measures for the 16 major states as a whole for the period 1970-71 to 2013-14. It needs to be mentioned that components of GDP in India in this paper actually includes the components of NSDP of the 16 major states clubbed together. The regional disparity is found to be high in the service sector as well as NSDP.

Table 3: Entropy Estimates of NSDP and sectoral components for 16 states

Year	AGR	IND	SER	NSDP	THR	TSC	FIRB	CSP
1970-71	4.01	15.26	5.18	1.97	9.99	11.50	8.85	5.95
1971-72	3.90	15.53	5.11	2.34	10.56	10.83	8.93	5.94
1972-73	4.43	15.13	5.25	2.24	11.21	10.82	8.95	5.91
1973-74	4.21	14.52	5.38	2.56	10.28	10.96	8.71	6.05
1974-75	3.99	15.37	5.36	2.60	11.40	11.16	8.46	5.87
1975-76	3.52	15.13	5.08	2.54	9.75	10.73	9.53	5.97
1976-77	3.51	15.40	5.32	3.07	9.43	10.54	8.60	6.64
1977-78	3.12	15.41	5.40	2.78	8.41	10.05	9.15	6.72
1978-79	4.01	16.29	5.55	3.20	7.88	11.29	9.55	6.77
1979-80	5.66	17.70	5.48	4.74	8.99	10.83	8.12	6.97
1980-81	4.15	15.46	5.13	3.92	8.27	10.73	7.99	7.40
1981-82	4.91	14.57	5.14	4.15	7.35	11.32	8.17	7.84
1982-83	5.33	13.64	5.22	4.03	7.61	12.48	8.60	7.09
1983-84	4.60	14.33	5.32	3.80	6.94	12.23	9.20	6.46
1984-85	4.25	14.72	5.25	4.11	6.81	12.11	9.23	6.38
1985-86	4.85	15.94	5.57	4.43	6.71	12.06	9.69	6.09
1986-87	5.10	16.24	5.15	4.27	6.04	11.42	9.91	6.03
1987-88	5.24	14.31	4.91	4.31	5.78	11.49	7.99	5.80
1988-89	5.01	14.40	4.78	4.39	5.51	11.48	9.08	5.51
1989-90	5.27	14.55	5.32	5.26	6.45	12.25	9.72	5.33
1990-91	4.40	14.87	5.47	4.96	6.64	11.57	10.20	5.10
1991-92	5.78	14.58	6.13	5.34	5.67	11.94	14.09	5.41
1992-93	5.45	16.83	6.97	6.58	6.39	12.17	16.53	5.45
1993-94	5.11	11.40	7.15	5.32	5.83	10.26	19.95	4.11
1994-95	4.54	11.25	7.18	5.26	5.91	10.75	19.33	3.96

1995-96	5.25	12.56	8.27	6.16	7.90	11.62	19.72	3.85
1996-97	4.89	12.87	7.48	6.00	7.59	11.49	14.87	4.15
1997-98	5.25	11.44	7.99	5.97	8.66	12.89	13.75	4.55
1998-99	4.89	11.50	8.48	6.23	7.65	13.07	17.26	4.95
1999-00	5.32	11.44	9.54	6.66	8.69	12.56	19.63	5.71
2000-01	5.41	11.07	9.36	6.64	8.70	13.48	18.77	5.41
2001-02	4.98	10.65	9.73	6.79	8.90	14.25	19.99	5.37
2002-02	5.31	10.70	10.43	7.27	9.78	13.85	20.69	5.91
2003-04	6.04	11.24	10.70	7.55	10.25	14.75	22.02	5.37
2004-05	5.37	10.32	11.45	7.75	10.99	15.13	23.90	5.26
2005-06	5.55	12.86	12.62	9.23	12.48	15.72	25.14	5.71
2006-07	4.76	13.38	13.29	9.72	13.01	16.11	25.71	6.34
2007-08	5.71	13.24	13.66	10.17	13.05	15.72	26.82	6.46
2008-09	5.36	13.06	13.18	9.61	12.12	15.51	27.50	5.91
2009-10	5.44	14.90	13.07	10.10	13.06	15.45	26.27	5.71
2010-11	5.71	15.46	13.68	10.10	13.82	15.06	26.33	6.63
2011-12	5.02	15.51	13.83	10.81	13.92	15.06	26.23	7.09
2012-13	4.75	16.54	13.68	10.69	13.84	15.27	25.86	6.78
2013-14	4.52	15.02	13.16	10.64	13.51	15.65	25.76	5.13

Note: Bihar includes Jharkhand, Madhya Pradesh includes Chhattisgarh, and Uttar Pradesh includes Uttaranchal.

Source: National Accounts Statistics, Central Statistical Organisation (2011)

Economic and Political Weekly Research Foundation (2011): Domestic products of states of India,

Reserve Bank of India (2011): Handbook of Statistics on Indian Economy.

Structural indicators

The growth of regional disparity in almost all sectors has been increasing over time. In connection with rising regional disparity, it will be important to know how integrated India is affecting its sectoral specialisation and to what degree it is stimulating structural changes in the state economies. It will also be important to monitor, how the sectoral specialisation and structural changes will influence economic performance. In an attempt to compare the situation in the states and aggregate Indian economy, the possible approaches to analyse the structural changes by means of some statistical mathematical method the Krugman Specialisation Index, the Concentration Index, etc. is applied.

The first step in any concentration and specialisation empirical analysis consists of computing the concentration and specialisation ratios:

$$g_{ij}^{C} = \frac{E_{ij}}{\sum_{i=1}^{n} E_{ij}} = \frac{E_{ij}}{E_j} \qquad 2$$

where:

g_{ij}^{C} is the concentration ratio: the share of the region i in Gross Value Added of industry j;

E_{ij} is the Gross Value Added in industry j in the region i;

E_j is the Gross Value Added in sector j;

i – region; *j*- sector.

Although these ratios are used mainly as a basis for many of the more complex and sophisticated measures of concentration and specialisation, they can by themselves offer valuable information by depicting the general image of the spatial distribution of industries and by detecting spatial irregularities.[3] A well-known indicator is the Krugman Dissimilarity Index used for measuring either the concentration (K_j^C) or specialisation level (K_i^S)

$$K_j^C = \sum_{i=1}^{n} |g_{ij}^{C} - g_i| \qquad 3$$

where $g_i = \frac{X_i}{X}$ and $g_j = \frac{X_j}{X}$ and X stands for the total (national) Gross Value Added.

The Krugman Index is a relative measure of concentration which compares one region with the overall economy. Its values range from 0 (when all territorial/sectoral structures are identical) to 2 (for totally different structures).Essentially two distributions and summing the vertical differences between them is compared. The Krugman Index will always lie between

the values of 0 (indicating that the two distributions are the same) and 2 (where the two distributions have nothing in common). Because the index is higher the more dissimilar are the two distributions, the measure is sometimes said to be an "Index of Dissimilarity". If the index is falling (rising) over time it indicates that the two regions are becoming more (less) alike.

Table 4: Krugman's Concentration Indices of Sectoral components for 16 states

	Agriculture	Industry	Services	THR	TSC	FIRB	CSP
1970-71	0.23	0.32	0.17	0.27	0.41	0.22	0.18
1971-72	0.22	0.30	0.17	0.26	0.39	0.20	0.18
1972-73	0.25	0.32	0.15	0.26	0.38	0.24	0.14
1973-74	0.22	0.29	0.16	0.25	0.38	0.21	0.18
1974-75	0.24	0.33	0.15	0.27	0.35	0.21	0.17
1975-76	0.21	0.29	0.15	0.25	0.37	0.22	0.17
1976-77	0.21	0.28	0.13	0.23	0.36	0.18	0.17
1977-78	0.21	0.27	0.13	0.23	0.36	0.19	0.18
1978-79	0.22	0.28	0.13	0.22	0.35	0.18	0.18
1979-80	0.21	0.28	0.11	0.21	0.34	0.15	0.16
1980-81	0.23	0.30	0.11	0.20	0.34	0.16	0.20
1981-82	0.23	0.28	0.12	0.18	0.35	0.16	0.22

1982-83	0.24	0.28	0.12	0.18	0.35	0.17	0.22
1983-84	0.23	0.29	0.13	0.19	0.33	0.19	0.19
1984-85	0.22	0.29	0.11	0.19	0.31	0.18	0.17
1985-86	0.24	0.30	0.12	0.16	0.31	0.20	0.15
1986-87	0.25	0.30	0.12	0.15	0.31	0.20	0.17
1987-88	0.25	0.29	0.10	0.13	0.30	0.15	0.17
1988-89	0.21	0.28	0.10	0.13	0.29	0.19	0.18
1989-90	0.21	0.25	0.10	0.13	0.29	0.19	0.17
1990-91	0.23	0.26	0.10	0.12	0.29	0.19	0.17
1991-92	0.25	0.24	0.10	0.13	0.28	0.25	0.15
1992-93	0.23	0.24	0.11	0.13	0.29	0.25	0.17
1993-94	0.25	0.21	0.11	0.12	0.26	0.29	0.17
1994-95	0.23	0.19	0.12	0.11	0.27	0.28	0.17
1995-96	0.27	0.21	0.11	0.11	0.26	0.26	0.17
1996-97	0.23	0.20	0.11	0.10	0.26	0.22	0.17

1997-98	0.26	0.20	0.11	0.11	0.26	0.21	0.15
1998-99	0.24	0.19	0.12	0.09	0.25	0.25	0.16
1999-00	0.28	0.20	0.12	0.10	0.21	0.25	0.11
2000-01	0.27	0.18	0.11	0.09	0.21	0.24	0.12
2001-02	0.26	0.16	0.11	0.09	0.21	0.27	0.12
2002-02	0.28	0.17	0.11	0.10	0.19	0.26	0.12
2003-04	0.30	0.16	0.13	0.10	0.19	0.29	0.13
2004-05	0.29	0.14	0.12	0.13	0.20	0.30	0.14
2005-06	0.28	0.14	0.12	0.11	0.20	0.29	0.16
2006-07	0.29	0.14	0.12	0.12	0.21	0.29	0.17
2007-08	0.29	0.14	0.11	0.12	0.22	0.29	0.18
2008-09	0.32	0.15	0.11	0.13	0.22	0.31	0.19
2009-10	0.33	0.16	0.10	0.13	0.17	0.30	0.21
2010-11	0.33	0.14	0.10	0.14	0.14	0.29	0.22
2011-12	0.33	0.14	0.11	0.13	0.14	0.30	0.22
2012-13	0.37	0.16	0.10	0.14	0.13	0.30	0.21
2013-14	0.35	0.15	0.10	0.15	0.14	0.30	0.22

Note: Bihar includes Jharkhand, Madhya Pradesh includes Chhattisgarh, and Uttar Pradesh includes Uttaranchal.

Source: National Accounts Statistics, Central Statistical Organisation (2011)

Economic and Political Weekly Research Foundation (2011): Domestic products of States of India,

Reserve Bank of India (2011): Handbook of Statistics on Indian Economy.

The Krugman's concentration index, however, expresses the view of an economy's sectoral specialisation from the other side. This index reflects the share of a sector in the respective state in India's sector's output, in relation to the share of its whole state in the output of the country. A highly concentrated sector will have a very large part located in a small number of regions.

Calculations of the concentration index in the states for sectors on average for the period 1970– 2014 indicate that in 1970, the output of the states in comparison with the India is highly concentrated in TSC followed by industry, agriculture and financial services. However, in 2014, concentration is highest in agriculture followed by FIRB followed by CSP. For services and the specialised services like THR and TSC sectors have shown a decline in sectoral concentration. For the other two specialised services, FIRB and CSP has shown to have increase in sectoral concentration overtime. The concentration is relatively high in FIRB and conversely, the lowest concentration was seen in services as a whole and CSP in particular. The increase in the degree of concentration in most branches is accompanied by the rise in regional dissimilarities.

In light of the wide range of evidence of growth, regional inequality and sectoral concentration, this paper further seeks to shed some light on the debate by answering whether a long run relationship between sector-wise growth, inequality and concentration index exists. In other words, this paper tries to provide a detailed view on the measurement of growth and regional disparity and sectoral concentration in India and its relationship.

V. Econometric Methodology and Empirical Results

Econometric modelling has also been extensively used in most of the recent empirical studies. Empirical investigation for causality between three variables in a time series context is usually conducted in **four** steps.

1. Order of integration of the variables is tested using the unit root tests.
2. If integration of order one is found for all the variables, use cointegration analysis to investigate the existence of a long-run relationship between the set of integrated variables in question.

3. If not estimate the model in VAR in difference
4. Employ causality tests in order to evaluate the short-run and long-run direction of causality between the variables examined.
5. VECM model for the Indian economy is employed in order to assess the impact of economic growth, sectoral concentration and disparity on each other in each sector

Sector-wise Analysis

In this section the impact of sectoral growth, sector concentration and regional disparity on each other in each sector like agriculture, industry, services, trade, hotels and restaurants, transport, storage and communication, banking insurance and financial services and community, social and personal services. For the agricultural sector, no relationship could be established as all the variables like economic growth, concentration index and regional disparity in this sector are not I(1). The next step is that the relationship between the variables for all the sectors is discussed one by one.

INDUSTRY

At the outset of any cointegration exercise, the stationary of variables under consideration are tested with the help of the standard ADF and PP test. The following table gives the unit root test of the variables.

Table 5: Tests of Unit Root Hypothesis (Industry)

Test statistic value				
Log of Series	Level		First difference	
	ADF	PP	ADF	PP
Industry	-2.750222	-2.495002	-5.235406*	-5.208998*
Industry CI	-2.516229	-2.342551	-5.694544*	-8.621502*
Industry T	-2.201678	-2.201678	-7.630713*	-8.249520*

Note: * indicates that the corresponding test statistic value is significant at 1% level of significance.

However, both ADP and PP tests suggests that all the three series are I(1) i.e they are non-stationary at levels and stationary at first difference. The next test would be to apply the test to determine if there is any cointegration between the variables through the Trace Test and Maximum Eigenvalue test. Applying both the Trace and Max-eigen Value test, there is no cointegration about the variables. The following table gives the results of the cointegration test.

Table 6: Results of the Cointegration tests (Industry)

Eigen value (λ_i)	Null hypothesis	Test statistic value	
		λ_{trace}	$\lambda_{\max}$
0.164731	$r = 0$	12.49726	7.560072
0.110765	$r = 1$	4.937184	4.930520
0.000159	$r = 2$	0.006664	0.006664

Note: * indicate significant values at 5% levels of significance, respectively. Critical values have been taken from Osterwald -Lenum (1992, Table 2*, p. 469) and Johansen (1995b). The lag order has been taken to be 1.

Since the presence of cointegration is negated through both the Trace test and Maximum Eigen Value test, the unrestricted Vector Autoregressive Model in first difference is applied. The results of the model are illustrated here.

Table 7: Vector Autoregressive Estimates (Industry)

	D(IND)	D(INDCI)	D(INDT)
D(IND(-1))	0.186082	**-0.545474***	-0.129363
	(0.17074)	**(0.27000)**	(0.38158)
	[1.08986]	**[-2.02030]**	[-0.33902]
D(IND(-2))	-0.100587	**0.545093***	**0.784230***
	(0.16633)	**(0.26302)**	**(0.37173)**
	[-0.60474]	**[2.07243]**	**[2.10970]**
D(INDCI(-1))	**-0.253837***	**-0.321849***	-0.048176
	(0.10990)	**(0.17379)**	(0.24561)
	[-2.30973]	**[-1.85199]**	[-0.19615]
D(INDCI(-2))	-0.062694	-0.234222	-0.244061
	(0.11604)	(0.18350)	(0.25934)
	[-0.54027]	[-1.27641]	[-0.94109]

D(INDT(-1))	0.095121	0.069458	-0.253010
	(0.07896)	(0.12486)	(0.17647)
	[1.20466]	[0.55628]	[-1.43374]
D(INDT(-2))	0.023492	-0.020706	-0.122966
	(0.08005)	(0.12659)	(0.17890)
	[0.29346]	[-0.16358]	[-0.68733]
C	**0.048261***	-0.027565	-0.043316
	(0.01354)	(0.02141)	(0.03026)
	[3.56396]	[-1.28728]	[-1.43130]

Note: The * implies at 5% level of significance. Standard errors in ( ) & t-statistics in [ ]

Based on the results of the Vector Autoregressive Model, there is bidirectional causality between growth and sectoral concentration and again a unidirectional causality between growth and inequality. Therefore, both industrial growth and industrial sectoral concentration cause each other. However, growth causes inequality in the industrial sector. Furthermore, Pairwise Causality tests are performed to evaluate the pairwise causality between the variables. The results are demonstrated below.

Table 8: Pairwise Granger Causality

Null Hypothesis:	Obs	F-Statistic	Prob.
INDUSTRYCI does not Granger Cause INDUSTRY	42	2.16679	0.1289
INDUSTRY does not Granger Cause INDUSTRYCI		2.25094	0.1195
INDUSTRYT does not Granger Cause INDUSTRY	42	0.26299	0.7702
INDUSTRY does not Granger Cause INDUSTRYT		0.02547	0.9749
INDUSTRYT does not Granger Cause INDUSTRYCI	42	1.41997	0.2546
INDUSTRYCI does not Granger Cause INDUSTRYT		0.06346	0.9386

Note: * implies at 5% level of significance.

But pairwise Granger Causality tests shows that no pairwise causality between industrial growth, industrial concentration and industrial disparity.

SERVICES

The same analysis is applied to all the sectors. Therefore, in the service sector, the relationship between growth, concentration and inequality in that sector is ascertained. Both ADP and PP tests suggests that all the three series are I(1) i.e they are non-stationary at levels and stationary at first difference. The test is reported here:

Table 9: Tests of Unit Root Hypothesis (Services)

Test statistic value				
Log of Series	**Level**		**First difference**	
	ADF	**PP**	**ADF**	**PP**
Services	**-2.276190**	**-2.235612**	**-5.376130***	**-5.279045***
Services CI	**-2.940294**	**-2.797317**	**-9.170695***	**-9.344249***
Services T	**-1.861176**	**-1.869882**	**-6.027929**	**-6.027929**

Note: * indicates that the corresponding test statistic value is significant at 1% level of significance.

With the unit root behavior of the variables the next step towards the established of a co-movement between the variable is ascertained by applying the tests of cointegration. Applying both the Trace and Max-eigen Value test, there is no cointegration about the variables. The results of the cointegration test are illustrated here.

Table 10: Results of the Cointegration tests (Services)

Eigen value (λ_i)	Null hypothesis	Test statistic value	
		λ_{trace}	$\lambda_{\max}$
0.346849	$r = 0$	28.11571	17.88978
0.158055	$r = 1$	10.22593	7.225689
0.068943	$r = 2$	3.000243	3.000243

Note: * indicate significant values at 5% levels of significance, respectively. Critical values have been taken from Osterwald -Lenum (1992, Table 2*, p. 469) and Johansen (1995b). The lag order has been taken to be 1.

Since there is no presence of cointegration among the variables, the unrestricted VAR model in first difference is applied. The results in bold shows that these are the values that are significant. The results are depicted below in Table 11. Based on the Vector Autoregressive estimates, there is no causality between growth and sectoral concentration and growth and inequality. But there is a relationship between sectoral concentration and regional disparity.

Table 11: Vector Autoregressive Estimates (Services)

	D(SERVICES)	D(SERVICESCI)	D(SERVICEST)
D(SERVICES(-1))	0.275966 (0.16695) [1.65294]	-0.077868 (0.07182) [-1.08423]	-1.963250 (3.72942) [-0.52642]
D(SERVICES(-2))	0.146788 (0.16296) [0.90075]	0.012175 (0.07010) [0.17367]	5.189989 (3.64022) [1.42573]
D(SERVICESCI(-1))	-0.212533 (0.39273) [-0.54117]	**-0.421941*** **(0.16894)** **[-2.49756]**	12.40744 (8.77278) [1.41431]
D(SERVICESCI(-2))	0.078875 (0.39226) [0.20108]	-0.131306 (0.16874) [-0.77816]	-4.639238 (8.76226) [-0.52946]
D(SERVICEST(-1))	0.005064 (0.00804) [0.62981]	**0.006053*** **(0.00346)** **[1.74979]**	0.105679 (0.17962) [0.58835]

D(SERVICEST(-2))	0.010038 (0.00802) [1.25134]	0.000902 (0.00345) [0.26147]	0.005187 (0.17919) [0.02894]
C	**0.036240*** **(0.01140)** **[3.17854]**	0.000778 (0.00490) [0.15857]	-0.024148 (0.25468) [-0.09482]

Note: The * implies at 5% level of significance. Standard errors in ( ) & t-statistics in [ ]

Further, a pairwise Granger Causality test is performed.

Table 12: Pairwise Granger Causality (Services)

Null Hypothesis:	Obs	F-Statistic	Prob.
SERVICESCI does not Granger Cause SERVICES	42	0.44506	0.6442
SERVICES does not Granger Cause SERVICESCI		1.94902	0.1568
SERVICEST does not Granger Cause SERVICES	42	0.20949	0.8120
SERVICES does not Granger Cause SERVICEST		1.91043	0.1623
SERVICEST does not Granger Cause SERVICESCI	42	1.51154	0.2339
SERVICESCI does not Granger Cause SERVICEST		2.81476	0.0728

But Pairwise Granger Causality tests do not show any pairwise causality except that concentration index Granger causes regional disparity in the aggregate service sector in India. The next step in this analysis is to analyse how the subsectors of services namely,

trade, hotels and restaurants (THR), transport, storage and communication (TSC), banking, insurance and financial services (FIRB) and community, social and personal services (CSP).

TRADE, HOTELS AND RESTAURANTS

As the first step of any cointegration exercise, the tests for checking the stationarity of the data are of prime importance. Applying the same tests, both ADP and PP tests suggests that all the three series of value added, sectoral concentration and inequality are I(1). The unit root test for the three variables under consideration are illustrated here.

Table 13: Tests of Unit Root Hypothesis (Trade, hotel and restaurants)

Test statistic value				
Log of Series	Level		First difference	
	ADF	PP	ADF	PP
THR	-2.370535	-2.383307	-6.352757*	-6.352757*
THRCI	-0.287185	-0.061506	-8.158006*	-8.112092*
THRT	-1.319298	-1.168576	-8.516856*	-8.605490*

Note: * indicates that the corresponding test statistic value is significant at 1% level of significance.

The presence of unit root at levels and its absence at the first difference implies the next step as usual which involves the confirmatory tests for the presence of cointegration. Applying both the Trace and Max-eigen Value test, there is no cointegration about the variables.

Table 14: Results of the Cointegration tests (Trade, hotel and restaurants)

Eigen value (λ_i)	Null hypothesis	Test statistic value	
		λ_{trace}	$\lambda_{\max}$
0.386433	$r = 0$	27.49150	20.51560
0.152976	$r = 1$	6.975902	6.973122
6.62E-05	$r = 2$	0.002780	0.002780

Note: * indicate significant values at 5% levels of significance, respectively. Critical values have been taken from Osterwald -Lenum (1992, Table 2*, p. 469) and Johansen (1995b). The lag order has been taken to be 1.

With the Trace and the Max-Eigenvalue test negating the presence of cointegration, the unrestricted VAR in first difference is applied to evaluate the direction of causality. Since the VAR model can only be applied when the times data are stationary, the VAR model at first difference is applied. The test however gives an idea in terms of the growth of the

variables. The Autoregressive Model estimates are tabulated here in Table 5.19. As per the results of the VAR model, there is bidirectional causality between growth and inequality growth and a unidirectional causality between inequality growth and sectoral concentration growth. Therefore, growth leads to inequality and inequality also leads to growth. This is no way to confirm whether sectoral concentration causes inequality or the other way round.

Table 15: Vector Autoregressive Estimates (Trade, hotel and restaurants)

	D(THR)	D(THRCI)	D(THRT)
D(THR(-1))	0.125052	0.042755	**7.966883***
	(0.15649)	(0.06199)	**(4.24751)**
	[0.79912]	[0.68969]	**[1.87566]**
D(THR(-2))	0.085425	0.038305	4.695944
	(0.15484)	(0.06134)	(4.20281)
	[0.55169]	[0.62448]	[1.11733]
D(THRCI(-1))	0.010770	-0.072252	12.64259
	(0.44588)	(0.17663)	(12.1023)
	[0.02415]	[-0.40906]	[1.04464]
D(THRCI(-2))	0.576576	0.119450	7.619565
	(0.44914)	(0.17792)	(12.1908)
	[1.28374]	[0.67137]	[0.62503]
D(THRT(-1))	**0.014297***	-0.000358	-0.292007
	(0.00657)	(0.00260)	(0.17820)
	[2.17772]	[-0.13772]	[-1.63869]
D(THRT(-2))	-0.003258	**0.004166***	0.002741
	(0.00656)	**(0.00260)**	(0.17801)
	[-0.49679]	**[1.60372]**	[0.01540]
C	**0.048511***	**-0.007546***	**-0.582509***
	(0.01184)	**(0.00469)**	**(0.32128)**
	[4.09830]	**[-1.60932]**	**[-1.81306]**

Note: The * implies at 5% level of significance. Standard errors in ( ) & t-statistics in [ ]

However, the Pairwise Granger causality is listed below.

Table 16: Pairwise Granger Causality (Trade, hotel and restaurants)

Null Hypothesis:	Obs	F-Statistic	Prob.
THRCI does not Granger Cause THR	42	0.98187	0.3842
THR does not Granger Cause THRCI		2.04970	0.1431
THRT does not Granger Cause THR	42	2.68742	0.0813
THR does not Granger Cause THRT		4.76812	0.0144
THRT does not Granger Cause THRCI	42	4.52610	0.0174
THRCI does not Granger Cause THRT		4.21059	0.0225

The pairwise Granger Causality tests reveal that there is bidirectional causality between growth and inequality and also between sectoral concentration and growth in the trade, hotels and restaurants sector. Therefore in the trade, hotels and restaurants sector, this is a vicious cycle of growth causing inequality and sectoral concentration; again inequality causing growth and sectoral concentration; again sectoral concentration causing growth and inequality.

TRANSPORT STORAGE AND COMMUNICATION

The same steps applied so far are applied here. Both ADP and PP tests suggests that all the three series are I(1) i.e they are non-stationary at levels and stationary at first difference. The results are reported here.

Table 17: Tests of Unit Root Hypothesis (Transport, Storage and Communication)

Test statistic value				
Log of Series	**Level**		**First difference**	
	ADF	**PP**	**ADF**	**PP**
TSC	**-1.092001**	**-1.092073**	**-6.034875***	**-6.036408***
TSCCI	**-2.179247**	**-2.179247**	**-6.101387***	**-6.829578***
TSCT	**-2.917744**	**-2.929952**	**-7.674778***	**-7.857715***

Note: *** indicates that the corresponding test statistic value is significant at 1% level of significance**

Since the variables are I(1), the next step, however, is to apply both the Trace and Max-eigen Value test to ensure the presence of cointegration. If the presence of cointegration is

verified, the Vector Error Correction model is applied. This implies that there is a long run movement between the variables. The results of the test of cointegration is reported here.

Table 18: Results of the Cointegration tests (Transport, Storage and Communication)

Eigen value (λ_i)	Null hypothesis	Test statistic value	
		λ_{trace}	$\lambda_{\max}$
0.318865	$r = 0$	**37.50215***	**16.12778**
0.301637	$r = 1$	**21.37436***	**15.07870**
0.139203	$r = 2$	**6.295660***	**6.295660**

Note: * indicate significant values at 5% levels of significance, respectively. Critical values have been taken from Osterwald -Lenum (1992, Table 2*, p. 469) and Johansen (1995b). The lag order has been taken to be 1.

The Trace Test shows that there are three cointegrating relationship between the variables. However the Maximum Eigen Value Test shows that there is no cointegrating relationship. Though both the tests do not ensure the presence of cointegration, based on the Trace test, the Vector Error Correction Model is applied. The VECM long run and short run results are evaluated here. There is a positive co-movement between growth and sectoral concentration but there is a negative co-movement between growth and inequality. The long run results ensure that in the transport, storage and communication sector, more growth leads to lesser inequality in the long run.

The long run estimates are given by

The results of the VECM are as follows:

Table 19: VECM results (Transport, Storage and Communication)

Error Correction:	D(TSC)	D(TSCCI)	D(TSCT)
CointEq1	**-0.063029***	**-0.047492***	-0.554736
	(0.03114)	**(0.01515)**	(0.76494)
	[-2.02405]	**[-3.13414]**	[-0.72520]
D(TSC(-1))	0.239917	**0.142557***	1.562050
	(0.16468)	**(0.08014)**	(4.04540)
	[1.45683]	**[1.77891]**	[0.38613]
D(TSC(-2))	0.279597	**-0.172865***	0.471017
	(0.16260)	**(0.07912)**	(3.99420)
	[1.71953]	**[-2.18478]**	[0.11793]
D(TSCCI(-1))	0.480265	0.264182	4.144737
	(0.37478)	(0.18237)	(9.20635)
	[1.28145]	[1.44859]	[0.45020]
D(TSCCI(-2))	0.168498	0.233966	-0.153628
	(0.35200)	(0.17129)	(8.64670)
	[0.47869]	[1.36594]	[-0.01777]
D(TSCT(-1))	-0.007053	**-0.007421***	-0.263415
	(0.00798)	**(0.00388)**	(0.19601)
	[-0.88388]	**[-1.91122]**	[-1.34385]
D(TSCT(-2))	0.000175	**-0.006651***	-0.210841
	(0.00798)	**(0.00388)**	(0.19594)
	[0.02195]	**[-1.71363]**	[-1.07604]
C	**0.042532***	0.000915	0.039135
	(0.01453)	(0.00707)	(0.35694)
	[2.92704]	[0.12941]	[0.10964]

Note: The * implies at 5% level of significance. Standard errors in ( ) & t-statistics in [ ]

The VECM long run results shows that there is a long run positive relationship between growth and sectoral concentration and negative relationship between growth and regional disparity. However, the short run results show that there is unidirectional causal relationship between inequality and sectoral concentration and growth in the transport, storage and communication sector. Moreover, the Pairwise Granger Causality tests are evaluated here.

Table 20: Pairwise Granger Causality (Transport, Storage and Communication)

Null Hypothesis:	Obs	F-Statistic	Prob.
TSCCI does not Granger Cause TSC	42	1.64693	0.2064
TSC does not Granger Cause TSCCI		8.42591	0.0010
TSCT does not Granger Cause TSC	42	0.01656	0.9836
TSC does not Granger Cause TSCT		3.09040	0.0574
TSCT does not Granger Cause TSCCI	42	1.23810	0.3017
TSCCI does not Granger Cause TSCT		3.39069	0.0445

The pairwise Ganger causality shows that concentration index Granger causes inequality and also growth Granger causes inequality in this sector.

BANKING, INSURANCE AND FINANCIAL SERVICES

In the banking and insurance sector, the same econometric exercise of finding the presence of unit root, then confirming the presence of cointegration, and finally the test of a VECM or VAR at first difference, depending on the nature of the stationary and the presence of cointegration. Both ADP and PP tests suggests that all the three series are I(1) i.e they are non-stationary at levels and stationary at first difference.

Table 21: Tests of Unit Root Hypothesis (Banking, Insurance and Financial Services)

Test statistic value				
Log of Series	**Level**		**First difference**	
	ADF	**PP**	**ADF**	**PP**
FIRB	**-2.052384**	**-2.064423**	**-5.861879***	**-5.903628***
FIRBCI	**-3.047385**	**-2.953155**	**-8.418987***	**-8.376725***
FIRRBT	**-2.750497**	**-2.460398**	**-5.463510***	**-5.467732***

Note: * indicates that the corresponding test statistic value is significant at 1% level of significance

With the variables being I(1), both the Trace and Max-eigen Value test are applied to test for the presence of cointegration. The test of cointegration for the banking, insurance and financial services sector are reported here.

Table 22: Results of the Cointegration tests (Banking, Insurance and Financial Services)

Eigen value (λ_i)	Null hypothesis	Test statistic value	
		λ_{trace}	$\lambda_{\max}$
0.285593	$r = 0$	24.77959	14.12470
0.173941	$r = 1$	10.65490	8.025730
0.060680	$r = 2$	2.629165	2.629165

Note: * indicate significant values at 5% levels of significance, respectively. Critical values have been taken from Osterwald -Lenum (1992, Table 2*, p. 469) and Johansen (1995b). The lag order has been taken to be 1.

Both the Trace and Max-eigen Value test reveals that there is no cointegration present in the variables under consideration. Therefore, the Vector Error Correction Model can not be applied. As a result, the unrestricted VAR in first difference is applied. The vector Autoregressive estimates for the financial sector are evaluated here.

Table 23: Vector Autoregressive Estimates (Banking, Insurance and Financial Services)

	D(FIRB)	D(FIRBCI)	D(FIRBT)
D(FIRB(-1))	0.176313 (0.16871) [1.04505]	-0.194965 (0.11826) [-1.64855]	-15.44485 (8.14732) [-1.89570]
D(FIRB(-2))	0.154930 (0.17253) [0.89800]	**0.301099*** **(0.12094)** **[2.48967]**	**19.94994*** **(8.33161)** **[2.39449]**
D(FIRBCI(-1))	-0.428214 (0.38389) [-1.11545]	**-0.502011*** **(0.26910)** **[-1.86549]**	-2.520012 (18.5388) [-0.13593]
D(FIRBCI(-2))	**-0.829920*** **(0.35163)** **[-2.36021]**	-0.103903 (0.24649) [-0.42153]	6.212017 (16.9806) [0.36583]
D(FIRBT(-1))	0.007461 (0.00600) [1.24373]	**0.007671*** **(0.00420)** **[1.82427]**	**0.454112*** **(0.28968)** **[1.56766]**
D(FIRBT(-2))	0.004404 (0.00514) [0.85733]	-0.003290 (0.00360) [-0.91355]	-0.328595 (0.24807) [-1.32458]
C	**0.049263*** **(0.01538)** **[3.20234]**	-0.006866 (0.01078) [-0.63667]	0.033424 (0.74288) [0.04499]

Note: The * implies at 5% level of significance. Standard errors in ( ) & t-statistics in [ ]

There is a unidirectional relationship between growth and inequality. There is a bidirectional relationship between growth and concentration. But there is a unidirectional relationship between sectoral concentration and inequality. Finally, the pairwise Granger causality are reported here.

Table 24: Pairwise Granger Causality(Banking, Insurance and Financial Services)

Null Hypothesis:	Obs	F-Statistic	Prob.
FIRBCI does not Granger Cause FIRB	42	0.84034	0.4396
FIRB does not Granger Cause FIRBCI		3.77523	0.0322
FIRBT does not Granger Cause FIRB	42	0.65377	0.5260
FIRB does not Granger Cause FIRBT		6.34707	0.0043
FIRBT does not Granger Cause FIRBCI	42	2.26812	0.1177
FIRBCI does not Granger Cause FIRBT		0.45622	0.6372

The Pairwise Granger Causality Tests show that there is a causality running from inequality to growth as well as sectoral concentration to growth.

COMMUNITY, SOCIAL AND PERSONAL SERVICES

For the community, social and personal services, both ADP and PP tests suggests that all the three series are I(1) i.e they are non-stationary at levels and stationary at first difference as usual. Therefore, the prerequisite of determining the presence of cointegration is met.

Table 25: Tests of Unit Root Hypothesis (Community, Social and Personal Services)

Test statistic value				
Log of Series	**Level**		**First difference**	
	ADF	**PP**	**ADF**	**PP**
CSP	**-2.735724**	**-2.481231**	**-5.197948***	**-5.182244***
CSPCI	**-1.679913**	**-1.568236**	**-7.632945***	**-7.571722***
CSPT	**-1.828802**	**-2.008239**	**-4.213719***	**-3.726593***

Note: * indicates that the corresponding test statistic value is significant at 1% level of significance

Next, to confirm the presence of cointegration, both the Trace and Max-eigen Value tests are applied to check for the presence of cointegration among the variables. The results of the cointegration tests are reported here.

Table 26: Results of the Cointegration tests (Community, Social and Personal Services)

Eigen value (λ_i)	Null hypothesis	Test statistic value	
		λ_{trace}	$\lambda_{\max}$
0.245004	$r = 0$	18.23647	11.80382
0.098514	$r = 1$	6.432643	4.355838
0.048245	$r = 2$	2.076805	2.076805

Note: * indicate significant values at 5% levels of significance, respectively. Critical values have been taken from Osterwald -Lenum (1992, Table 2*, p. 469) and Johansen (1995b). The lag order has been taken to be 1.

Since both the tests fail to check for the presence of cointegration, the standard VECM model cannot be applied. In fact, the unrestricted VAR in first difference is applied. This test shows the relation between all the variables concerned in growth and not at levels. However, the situation of sectoral concentration of this sector is not much because the sector have seen its process of growth due to some government policies. The Vector Autoregressive scheme for this sector is reported here.

Table 27: Vector Autoregressive Estimates (Community, Social and Personal Services)

	D(CSP)	D(CSPCI)	D(CSPT)
D(CSP(-1))	**0.317665***	-0.468313	0.104339
	(0.17725)	(0.70595)	(0.62403)
	[1.79223]	[-0.66338]	[0.16720]
D(CSP(-2))	-0.217447	-0.927981	0.888954
	(0.17249)	(0.68700)	(0.60728)
	[-1.26065]	[-1.35078]	[1.46382]
D(CSPCI(-1))	0.037374	-0.181537	0.026892
	(0.03859)	(0.15369)	(0.13585)
	[0.96857]	[-1.18120]	[0.19795]

D(CSPCI(-2))	0.025618	0.175337	0.014832
	(0.03898)	(0.15524)	(0.13723)
	[0.65725]	[1.12944]	[0.10808]
D(CSPT(-1))	0.054962	0.049027	0.282301
	(0.05459)	(0.21743)	(0.19220)
	[1.00680]	[0.22548]	[1.46878]
D(CSPT(-2))	0.003099	-0.045779	-0.244792
	(0.05523)	(0.21997)	(0.19445)
	[0.05611]	[-0.20812]	[-1.25892]
C	**0.052762***	**0.091473***	-0.060560
	(0.01241)	**(0.04943)**	(0.04370)
	[4.25122]	**[1.85049]**	[-1.38595]

Note: The * implies at 5% level of significance. Standard errors in ( ) & t-statistics in [ ]

The VAR model reveals that there is a no causal relationship between growth and sectoral concentration and inequality. The Pairwise Granger causality results are as follows.

Table 28: Pairwise Granger Causality

Null Hypothesis:	Obs	F-Statistic	Prob.
CSP01 does not Granger Cause CSP	42	0.62540	0.5406
CSP does not Granger Cause CSP01		0.12507	0.8828
CSPCI does not Granger Cause CSP	42	0.07517	0.9277
CSP does not Granger Cause CSPCI		1.50348	0.2356
CSPCI does not Granger Cause CSP01	42	0.75232	0.4783
CSP01 does not Granger Cause CSPCI		0.48407	0.6201

VI. Conclusion

This paper examines the relationship between economic growth, sectoral concentration and regional inequlaity for 16 major Indian states using time series for six major sectors for the period of 1970-2014. As far as economic growth is concerned, growth performance in India improved during the post-reform period mainly because of the high growth in the services sector.

The paper further constructs indices of structural change with the Krugman's sectoral concentration index where AGR and FIRB are the most concentrated sector. For industry and services concentration has reduced over time. The sectors THR and TSC has shown a decline over time. AGR, FIRB and CSP has shown to have an increase in sectoral concentration over time.

The paper furthermore constructs a measure of sectoral regional disparity through an Entropy measure the Theil index. Annual growth rate of inequality has been highest in banking insurance, and financial sector, followed by agriculture followed by services as a whole, followed by Net State Domestic Product followed by transport, storage and communication. Only the inequality in industry and community, social and personal services has been decreasing over time.

The paper finally attempts to evaluate the long run causal relationship between economic growth, concentration index, and measure of inequality in each sector. In the agricultural sector, no relationship could be established as all the variables were not integrated of the same order. In the industrial sector there was seen a bidirectional causal relationship between growth and sectoral concentration and again a bidirectional relationship between growth and inequality through the VAR model. But Pairwise Granger Causality tests show that no pairwise causality. In the services sector, no causal relationship between growth and sectoral concentration and growth and inequality could be established. But there was a causal relationship between sectoral concentration and inequality in the services sector. But Pairwise Granger Causality tests shows no pairwise causality between growth, concentration index and inequality in the services sector.The paper further attempts to analyse the long run relationship between economic, concentration index and measure of inequality in subcomponents of the service sector. In the trade, hotels and restaurants sector, there is a unidirectional causal relationship between growth and inequality but not with sectoral concentration. There is a unidirectional relationship between sectoral concentration and inequality in this sector. The pairwise Granger Causality tests show that bidirectional causality between growth and inequality and also between inequality and sectoral concentration. In the transport, storage and communication sector, there can be found a long run co-movement among the variables. The VECM results indicate that there is a unidirectional causal

relationship between sectoral concentration and growth and between inequality and sectoral concentration and growth. The pairwise Ganger causality shows that concentration index Granger causes inequality and also growth Granger causes inequality in this sector. In the banking, insurance and financial services, there is a unidirectional relationship between growth and inequality and a unidirectional relationship between sectoral concentration and inequality. There is bidirectional relationship between growth and concentration in this sector. The Pairwise Granger Causality Tests show that there is a causality running from inequality to growth as well as sectoral concentration to growth in the banking, insurance and financial services sector. Finally in the community, social and personal services sector, no causal relationship between growth and sectoral concentration and inequality could be established. The pairwise Granger causality shows that there is no causality between any two of the three variables concerned in this sector. Therefore, the results show that the different sectors show different levels of causality between growth, concentration index and inequality and this is highly likely because the production pattern of these sectors are different. The paper therefore cannot ensure that higher economic growth leads to more regional disparity across sectors.

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Artha Beekshan, Volume 28, No. 3, December 2019

A Comparative Study of Quality Differential between Vendor Water and Open Access Sources: Evidences from Kolkata

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Abstract:

In the cities of the developing nations water stress primarily affect the poor and the marginally located citizens, who are vulnerable due to their location in the zones beyond the formal supply areas. The gap between demand and supply to these areas which are systematically ignored by the urban service providers is filled in by informal suppliers. These informal suppliers are broadly defined as those individuals or groups operating from outside the organised or formal system of water management in an area. The informal suppliers ranging from water vendors, resellers, private water tankers etc., commonly known as Small-Scale Water Provider (SSWP), are widely operating in several urban areas of Asia, Latin America and Africa providing services to millions of urban citizens. They are an integralpart of the water sector of the developing world, though seldom receiving formal recognition for their contribution.

The current paper is a part of a broader study on such informal water vendors of Kolkata and originates from the need to interrogate the quality issues of the water supplied by the water vendors. It tries to assess the quality of the water supplied by the vendors in comparison to open access sources in the areas they function. The study focuses on a comparative analysis of different water sources done by testing water samples collected from varied sources. The findings are put forward to explain the dependency on vendor water in certain parts of Kolkata in spite of availability of other sources free of cost. The paper aims to focuson the quality gap between the open access sources and vendor water as the primary reasoninitiating demand for vendor water in fringe areas of Kolkata.

Keywords: Informal Water Vendors, Kolkata, Water quality, Municipal Water, Open access water sources

JEL Classification Codes :O 53, Q25,Q53

I. INTRODUCTION

Water is a unique resource. It not only sustains life, it is also absolutely necessary for public health and hygiene. The urge to cater this basic human need to the expanding global population has resulted in an immense pressure on available fresh water resources. Lowered water tables, reduced natural flows, complex pollution and quality problems, affect people's access

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to water for sustenance as well as agricultural sectors need and conditions of the ecosystems. Demographic trends of increasing population density, migration and urbanisation further complicates the scenario leading to an ever changing pattern of competition for fresh water (Grçnwall, 2008)

In 2000 the Member States of United Nations signed the Millennium Development Goals (MGDs). Goal 7, to ensure environmental sustainability, included a target that challenged the global community to halve the proportion of people without sustainable access to safe drinking water by the year 2015. The global MGD target was met in the year 2010, and 2.6 billion people have gained access to improved drinking water source since 1990. This progress in terms of water access to millions across the globe is definitely encouraging; however, the challenges are still significant. In 2015, it is estimated, that 663 million people worldwide still use unimproved drinking water sources, including unprotected wells and springs and surface water. The majority of them now live in two developing regions of the globe. Nearly half of all people using unimproved drinking water sources live in Sub-Saharan Africa; while one fifth live in South Asia (UNICEF and WHO, 2015). By 2025, it is predicted that half of world population will be living in water-stressed areas

It is essential at this point to conceptualise the notions of water scarcity and water stress**.** Water scarcity, by definition, occurs where the readily available water resources are inadequate in relation to what is demanded. It is more of a quantitative concept and is commonly discussed in terms of absolute availability of the resource. There is no absolute shortage or scarcity of fresh water on earth in relation to its population. The resources are however not evenly distributed across the globe creating varied actual availability. There are very few regions where the resource is actually scarce. Yet 663 million people lack safe access to water for drinking. This is because absolute availability of required quantity of water is not a guarantee for its accessibility. Water stress on the other hand indicates a situation where the available resources are not being accessed by the population according to their need due to locational, institutional or socio-economic constraints. Water scarcity, is concentrated to few geographical areas of the world; however water stress is a global phenomenon especially in the warm tropics and equatorial nations which in actual terms have abundant water resources. Water stress is thus a function of physical and economical inaccessibility of water even when water is actually available.Thus the greater challenge in terms of water supply lies in providing universal access to the resource.

In urban areas the issue of access is further complicated due to ever-changing demographic profiles, extending city limits and sub-urban layouts. Most urban centres of the developing world suffers from peri-urbanisation and unclear boundaries; both decisive for possibilities to claim right of access to safe water and for issues of legal regulation and control. Thus zones of water stress are created in these fringe areas where formal supply is

inadequate or fractured. In the cities of the developing nations water stress primarily affect the poor and the citizens of the fringe areas, who are vulnerable due to their location in the zones beyond the formal supply areas. The gap between demand and supply to these areas which are systematically ignored by the urban service providers is filled in by local,independent, unauthorisedsuppliers. These informal suppliers are broadly defined as those individuals or groups operating from outside the legal framework of water management in an area. The informal suppliers ranging from water vendors, resellers, private water tankers etc., commonly known as Small-Scale Water Provider (SSWP), are widely operating in poor urban areas of Asia, Latin America and Africa providing services to millions of urban poor. They are an important component of the water sector of the developing world, often in the face of strong official discouragement (Kejellen and McGranahan, 2006). Mostlyunregulated and untaxed, they belong to thenon-formal sector of the economy(Collignon and Vézina, 2000).

The current paper is a part of a broader study on such informal water vendors of Kolkata and originates from the need to interrogate the quality issues of the water supplied by the water vendors. The paper aims to highlight the quality differential between the open access sources and vendor water as the unique trigger for mushrooming of such practices in Kolkata.

II. OBJECTIVES

The broad objectives of this study are follows-

1. To interrogate the hygiene practises of the vendors and its implication on the quality of water supplied by the vendors.

2. To assess the quality of the water supplied by the vendors.

3. To compare the water supplied by the vendors to the water available from open access sources.

III. STUDY AREA

Kolkata the largest urban agglomeration of eastern India is geographically placed in the humid tropical region, bestowed with abundant rainfall (1647 mm/year). The location of the city on the banks of a perennial and large river like Hugli adds to its situational advantage from the perspective of water availability.

The city started supplying filtered surface water to its citizens way back in 1890.But the ever expanding population especially with the huge refugee influx post 1970's posed a major challenge to the existing water supply infrastructure. As a crisis response, the state took to supply of ground water alongside filtered water to the old town in areas of crisis and exclusive ground water to the fringe areas of south, south-east and south-west where the

distribution network was yet to reach.

The supply of ground water, which started as an interim measure continues to be an integral part of the city's formal supply system in spite of significant expansion of filtered water supply network.

At present the city with its 144 wards and a population of 6.2 million (2011) is served by five water treatment plants at Palta Water Works (260 mgd), Garden Reach Water Works (120mgd), Watgunge Water Works (05 mgd), Jorabagan Water Works (08 mgd) and Jai Hind Water Works (30 mgd). Ground water is supplied from 439 big diameter (300 mm) tube wells and 1050 small diameter (40 mm) tube wells. The intermittent supply of 8 hours / day provides 271 mgd of filtered water 25 mgd of ground water to 245019 house connections and 17,000 stand posts. Domestic water comes without any charge in Kolkata, but commercial connections for bulk supply are chargeable. The city boasts of a supply of 160 lpcd which is much higher than most metros of the country

These information, however, do not reflect the ground realities in their entirety. Like in all urban areas across the developing world, water supply statistics do not match the water access situation on the ground. This is even truer for the marginal or fringe areas of the urban centres which merges with peri-urban layouts. In Kolkata such zones bordering the south-eastern limits of the city's boundary are worst affected by fragmented, inconsistent and poor quality of supply. These distal areas of ward 108,109 and 110, of borough XII, though within the perimeter of Kolkata Municipal Corporation (KMC) area and facing large scale urbanisation are outside the surface water network of KMC. They are supplied largely by ground water. It is in these areas that the city otherwise well-endowed with water is facing acute shortage of acceptable quality of water. The result is a steady growth of informal water providers who are sourcing water from corporation surface water supply to adjoining wards and supplying it to these pockets, mainly to the urban poor.

The current paper tries to assess the quality of water that is being supplied in these areas comparing it to the filtered surface water sold by vendors. It is an exploratory, micro level study, restricted to the fringe areas of ward 109 of KMC and does not claim to be statistically representative. The ward lying in the extreme south-eastern corner of the city is spread on both sides of the E M Bypass. The greater part of the ward lies to the east of the bypass. It is interesting to note that piped filter water network covers the part of the ward lying on the western side of the bypass which houses upscale apartment blocks and upper-middleclass residential areas. The larger eastern part of the ward extending into rural fringes is not connected to the formal supply network. It is in this part mainly, where the informal suppliers are functioning. The unique disposition of the ward in terms of its water accessibility was the reason for selecting this ward for the current study.

IV. DATA SOURCE AND METHODOLOGY

The data for the current paper was collected in two parts.

This paper is a part of a larger study on the informal water vendors of Kolkata. For understanding the modalities of informal water provision practices and its underlying social and economic implications a questionnaire survey of 45 distributing vendors[1] and 5 wholesale vendors working in and around ward 109 of Kolkata Municipal Corporation was conducted between February 2015 to December 2015. For the first part of this paper, only the section pertaining to the hygiene practices of the vendors have been analysed.

The respondents of the vendor survey were selected at will and there was no formal sampling frame. The reason behind this was that the vendors are not licensed or registered. One could have gone out as I did, and just listed the vendors. But to actually find all vendors functioning in the area appeared impossible, partly because they work at different times and partly because they were not under any one forum or listed under any organisation. As Kjellén (2006) puts it, "one can also imagine sampling from different geographical points from which the first, second or third vendor that appeared would be approached for an interview". In a sense, this was done, but in a non-formalized manner.

For the second part of the analysis aimed to investigate how different or superior the quality of water that is being sold by the vendors was from the water that is being supplied, or was naturally available in these parts of the city water samples were collected from four different sources and tested for various drinking water parameters to compare the quality. The testing was done by one NABL accredited and another ISO 9001:2008 certified environmental testing laboratory. Both the laboratories were government recognised.

10 samples of vendor water, 2 samples of water supplied from stand posts, 2 samples of tube well water and 2 samples of local pond water used for daily chores were collected and tested. Out of the 10 vendor water, 5 were taken from consumers and 5 were collected from vendors before being supplied. All the samples were collected from ward 109.The testing was done according to IS 10500:2012 Indian Standard Drinking Water –Specification (Second Revised) Parameters (BIS, 2012). The samples were tested for 11 parameters including colour, odour, pH, total dissolved solids (TDS), turbidity, dissolved oxygen, total hardness, residual chlorine, total coliform, total arsenic and total iron.

V. FINDINGS AND DISCUSSION

a) Hygiene practices of the Vendors

The vendor response on hygiene practices and on causes of dependency of consumers on vendor water elicited interesting insights. The distributing vendors collected and distributed

water in 20 litre jerry cans which they plied to the houses of consumers in cycle /motorized vans. To access the vendor's perception on the cause of people's reliance on such informal services they were asked about the reason for people buying water from them. In response 87% of the vendors said that the consumers wanted good quality water, followed by 12% who said that people bought water as they had no house connection and 21% said that they bought water as supply was inadequate. But interestingly when the vendors were asked if their water was actually of superior quality, 17% said they did not know, but 83% did think that they supplied water which was superior to the local supply.

While interrogating the vendors on their hygiene practices it was found that the vendors seldom adhered to proper hygiene practices and their cleaning routine was found to be grossly inadequate and could lead to contamination of water which was being sold. Most vendors (67%) washed their jerry cans once a week and the other 25% washed it occasionally, which could be anything between fifteen days to a month. The washing was rarely (17%) done by soap and water. The preferred method was the use of sand (50%) and in some cases acid and bleaching powder (54%) was used. Around 4% of the vendors said that they never washed their cans.

b) Quality Comparison on Vendor Water and Open Access Sources

In almost all areas of the global south where informal vendors provide water to the non-connected urban dwellers, it is the inadequacy of potable water that sustains such trade. In Kolkata, however, it was interesting to note that such services were flourishing in areas where the municipal corporation was supplying ground water. The vendor survey indicated that the general notion of the residents of this part of the city was that the quality of filtered water supplied by the municipal corporation to the adjoining wards was of better quality than the water supplied here or from water of open access sources.The reports corroborated with the perception of the consumers. Test results revealed that water available from stand posts, tube well and ponds were of poor quality compared to vendor water. The main complaint of the consumer was of hardness of water and high iron content. There was also complaint about taste of water and recurrent gastro enteric problems due to consumption of supplied water. It was found that the stand post water (table 3) and tube well water (table 4) indeed had very high hardness ranging from 800 – 1000 mg/l, which is much higher than acceptable limit of 200 mg/l, and considerably higher than the permissible limit of 600mg/l. All stand posts and tube well water samples showed very high TDS ranging from 1500 – 3000mg/l compared to the acceptable limit of 500mg/l and permissible limit of 1000mg/l.

Iron in water was also a major complaint from consumers, which gave an unpleasant taste to water and stained containers and clothes. But it was found that iron was high in the tube well samples away beyond the permissible limit of 0.3 mg/l , but for stand post water it was within permissible limit.

Turbidity, colour and odour was also a major issue for tube well, water, all of which recorded values higher than acceptable limit. But for pH, DO, arsenic and residual chlorine, the stand post and tube well water was within acceptable limit. Total coliform was also found to be high in (17 and 5) in stand post water.

Pond water from two commonly used pond of the study area was tested for seven parameters including colour, odour, pH, total dissolved solids, dissolved oxygen, iron and arsenic (Table 5). It was found that the water had low TDS content compared to stand post and tube well water. There was no iron or arsenic in the samples and the pH was within limits. Dissolved oxygen was high in one pond while in the other it was not detectable. One must clarify here the both the ponds were used for bathing and washing of clothes and utensils. Total hardness and residual chlorine was not applicable for surface water and was therefore not tested. Turbidity was also not tested as pond water would naturally have high turbidity.

Table 1: QUALITY OF WATER SOLD BY VENDORS (COLLECTED FROM VENDORS)

Sl. No.	Parameter	Acceptable Limit	Permissible Limit *	VW1	VW 2	VW 3	VW 4	VW 5
1	Colour	Colourless (5)	Colourless (15)	C	C	C	C	C
2	Odour	Agreeable	Agreeable	A	A	A	A	A
3	pH	6.5 – 8.5	No relaxation	7.01	7.06	7.02	7.65	7.19
4	TDS (mg/I)	500	2000	29.2	221.5	245.0	236.5	238.4
5	Turbidity (NTU)	1	5	< 1	< 1	< 1	ND	ND
6	Dissolved Oxygen(mg/l)	3	>3	4.9	5.2	3.3	8.33	9.806
7	Total Hardness (mg/I)	200	600	11.9	165.7	168.3	195.3	165.0
8	Residual Chlorine (mg/l)	0.2	1	<0.1	<0.1	<0.1	Nil	Nil

9	Total Coliform (MPN/100 ml)	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample	6	18	4	9	<2
10	Total Arsenic (mg/I)	0.01	0.05	0.01	<0.01	<0.01	0.028	0.045
11	Iron (mg/l)	0.3	No relaxation	0.09	0.06	0.12	0.57	0.24

Source: Analysis of samples collected by author

* In absence of alternate source, VW: Vendor water; A: Agreeable; C: Colourless; ND: Not Detectable

Table 2: QUALITY OF WATER SOLD BY VENDORS (COLLECTED FROM CONSUMERS)

Sl. No.	Parameter	Acceptable Limit	Permissible Limit *	VW 6	VW 7	VW 8	VW 9	VW 10
1	Colour	Colourless (5)	Colourless (15)	C	C	C	C	C
2	Odour	Agreeable	Agreeable	A	A	A	A	A
3	pH	6.5 – 8.5	No relaxation	7.02	7.04	7.05	6.99	7.03
4	TDS (mg/I)	500	2000	288.5	264.5	196.0	249.0	195.5
5	Turbidity (NTU)	1	5	<1	<1	<1	<1	<1 ND
6	Dissolved Oxygen(mg/l)	3	>3	5.6	3.8	4.0	4.0	5.5
7	Total Hardness (mg/I)	200	600	176.1	173.5	160.5	168.3	178.7

8	Residual Chlorine (mg/l)	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
9	Total Coliform (MPN/100 ml)	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample	14	2	13	ND	4.5
10	Total Arsenic (mg/I)	0.01	0.05	0.01	<0.01	<0.01	<0.01	<0.01
11	Iron (mg/l)	0.3	No relaxation	0.10	0.44	0.08	0.07	0.09

Source: Analysis of samples collected by author

* In absence of alternate source, VW: Vendor water; A: Agreeable; C: Colourless; ND: Not Detectable

This brings us to the question of superiority of vendor water compared to water from three other sources available free of cost. The water testing results does not corroborate with such a claim in its entirety. The ten samples tested for eleven parameters show that water sold by vendors had less hardness and iron (all samples within acceptable limit), compared to available sources. They also had acceptable colour, odour, TDS, turbidity, residual chlorine, arsenic and dissolved solids. But all samples recorded high total coliform count. The high coliform count does indicate towards probable contamination due to lack of adequate cleaning of cans, which was commonly not done as highlighted previously.

Table 3: QUALITY OF STAND POST WATER

Sl. No.	Parameter	Acceptable Limit	Permissible Limit *	SPW 1	SPW 2
1	Colour	Colourless (5)	Colourless (15)	C	C
2	Odour	Agreeable	Agreeable	A	A
3	pH	6.5 – 8.5	No relaxation	6.50	6.53

4	TDS (mg/I)	500	2000	2022.0	1706.0
5	Turbidity (NTU)	1	5	ND	ND
6	Dissolved Oxygen (mg/l)	3	>3	2.094	2.047
7	Total Hardness (mg/I)	200	600	905.6	807.8
8	Residual Chlorine (mg/l)	0.2	1	NIL	NIL
9	Total Coliform (MPN/100 ml)	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample	17	5
10	Total Arsenic (mg/I)	0.01	0.05	<0.01	<0.016
11	Iron (mg/l)	0.3	No relaxation	0.15	0.10

Source: Analysis of samples collected by author

* In absence of alternate source, SPW: Stand Post Water; A: Agreeable; C: Colourless; ND: Not Detectable

High total coliform can lead to gastro-enteric ailments, more so as the water purchased from the vendors are stored without any purification. Stored water has a greater chance of increase of the coliform count. Thus the potability of the water does not confirm all requisite parameter.

Table 4: QUALITY OF TUBE WELL WATER

Sl. No.	Parameter	Acceptable Limit	Permissible Limit *	TW 1	TW 2
1	Colour	Colourless (5)	Colourless (15)	C	Brownish
2	Odour	Agreeable	Agreeable	A	Muddy
3	pH	6.5 – 8.5	No relaxation	6.59	6.69
4	TDS (mg/I)	500	2000	1540.0	2815.0
5	Turbidity (NTU)	1	5	2.0	>100 (highly turbid)
6	Dissolved Oxygen (mg/l)	3	>3	1.571	0.428
7	Total Hardness (mg/I)	200	600	844.0	1050.2
8	Residual Chlorine (mg/l)	0.2	1	NA	NA
9	Total Coliform (MPN/100 ml)	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample	NA	NA
10	Total Arsenic (mg/I)	0.01	0.05	<0.01	0.02
11	Iron (mg/l)	0.3	No relaxation	0.46	7.16

*Source: Analysis of samples collected by author.** In absence of alternate source, TW: Tube Well water; A: Agreeable; C: Colourless; ND: Not Detectable; NA: Not Applicable

Table 5: QUALITY OF POND WATER

Sl. No.	Parameter	Acceptable Limit	Permissible Limit *	PW 1	PW 2
1	Colour	Colourless (5)	Colourless (15)	Pale Yellow	C
2	Odour	Agreeable	Agreeable	A	A
3	pH	6.5 – 8.5	No relaxation	6.92	7.19
4	TDS (mg/I)	500	2000	1000.0	465.2
5	Turbidity (NTU)	1	5	NA	NA
6	Dissolved Oxygen (mg/l)	3	>3	ND	3.903
7	Total Hardness (mg/I)	200	600	NA	NA
8	Residual Chlorine (mg/l)	0.2	1	NA	NA
9	Total Coliform (MPN/100 ml)	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample	NA	NA
10	Total Arsenic (mg/I)	0.01	0.05	<0.01	0.036
11	Iron (mg/l)	0.3	No relaxation	0.38	0.25

*Source: Analysis of samples collected by author** In absence of alternate source, PW: Pond water; A: Agreeable; C: Colourless; ND: Not Detectable

The quality tests thus reveal that vendor water does provide a better alternative in terms of hardness and iron. However it does not guarantee the supply of water with absolute acceptable quality. Thus it brings forth the contradiction of perception and reality. It is evident that the consumer especially the poor are purchasing water at a higher cost without knowing the complete reality.

It highlights deprivation at two levels, firstly as they pay more for water than the connected households and secondly as they unknowingly consume water which might be better but not completely safe. But such an observation comes with a caveat that the conclusions on the quality of water is based on a restricted number of samples which could be tested keeping in mind the micro scale of the study. Bias in the number of samples might influence the findings. But the study definitely highlights a gap in the quality concerns of the water that is sold by the informal providers.

VI. CONCLUSION

Informal water vending is a reality of the urban centres of the developing world. It draws attention to the deficiencies of public utilities in such cities and emphasises the failure of these utilities to meet the water needs of the population. Informal water vendors are also an unique example of private entity with profit motive delivering a public service (Pangare and Pangare, 2008). The Kolkata story is no different. The metropolis with its almost 150 years old mammoth water supply infrastructure is unable to provide water to all and keep pace with the ever expanding limits of the city. The resultant service failure is a reality which needs immediate redressal. But for a utility under the state government jurisdiction, and controlled by the municipal corporation, the available funds are inadequate to change the scenario at an impressible pace. The long wait for the service to reach every consumer of the city, for a resource as essential as water, is unacceptable. In such a scenario one is inclined to acknowledge the services of the informal vendors as they not only serve as a significant link between the consumer and the utility, their service also brings about an appreciable change in the wellbeing of the citizens of the fringe area.

Kolkata, however, has a unique trigger for mushrooming of such practices. The areas which are catered to by informal suppliers in Kolkata are not completely beyond the city's supply network. It is the quality of water that is of major concern in this city. People's perception of superiority of filtered surface water in comparison to ground water supplied by the Corporation in this part of the city, both to connected households and stand post consumers has led to the development and spread of this trade. It is also is a response to dissatisfaction with quality of water served through open access sources like stand post, tube wells or ponds. Although quality of water is the main cause for the inception and growth of this phenomenon, the informal suppliers are not conscious of quality control and maintenance of

hygiene standards required for supply of potable water. The study revealed that the quality of water provided by the vendors was of relatively superior quality compared to the open access resources of the area. But quality could be improved upon by maintaining certain basic hygiene practices. Water from open access sources were found to be of poor quality. All samples tested showed that they had very high iron content and hardness. However the water from open-access sources was found suitable for other domestic usage apart from drinking.The quality of water available locally from open-access sources could be improved by easy indigenous methods like use of alum etc. Spreading of awareness about such methods could discourage the poor to spend on purchased water and use water available free of cost.

Acknowledgement

The Minor Research Project grant support provided by the University Grants Commission for conducting the study is gratefully acknowledged. The paper presents partial findings from the project.

A version of this paper was presented at Xth IGU International Thematic Conference on Urbanization, Health & Well Being and Sustainable Development Goals, Hyderabad, 17 to 19 March, 2017.

Notes :

1 Informal water vending practised across nations have been aggregated into three sub types by Whittington et.al. (1989b):

i) Whole Sale Vendors: obtaining water from a source and selling it to distributing vendors.

ii) Distributing Vendors: obtaining water from a source or from whole sale vendors and selling it to consumer door-to door.

iii) Direct Vending: selling water to consumers coming to the source to purchase.

In Kolkata we find the presence of only whole sale and distributing vendors organising the trade. Direct vending popular in countries of Africa and Latin America is not practised in Kolkata.

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Artha Beekshan, Volume 28, No. 3, December 2019

FACTORS INFLUENCING TOTAL FACTOR PRODUCTIVITY GROWTH OF INDIAN INDUSTRIES: AN ANALYTICAL OVERVIEW

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Abstract

The present study discusses an analytical overview of the factors influencing total factor productivity growth of Indian Industries. It highlights the factors like impact of (i)imported input and R&D, (ii)foreign direct investment,(iii) exports, imports and of net exports, (iv) cost inefficiency of the firms , (v) impact of economic reforms and the policy variables, (vi) ownership of the firm , (vii) firm size, (viii) age of the firm , (ix) advertising , (x) concentration ratio, (xi) capital-labour ratio, (xii) non production employee per production worker, (xiii) real wage rate and or change in real wage rate , (xiv) infrastructure facilities , (xv) inter linkages between different sectors of the economy and of the demand factors in explaining the movement in TFPG , as revealed from the existing literature. Some policy suggestions are made to foster total factor productivity growth.

Key Words:Total factor productivity growth, Manufacturing Sector, Supply factor and Demand factors , Indian Economy

JEL Classifications:D24, L6, D2, E1, E2, O50.

I.Introduction

Good performance of the industrialsector needs to enhance its cost-competitiveness by fostering Total Factor Productivity Growth (TFPG). TFPG measures the amount of increase in total output, which is not accounted for the increase in total inputs and thus measures shift in output due to the shift in the production over time, holding all inputs constant. Thus the analysis of the factors influencing TFPG is very important. TFPG can be measured either by growth accounting approach or by parametric or non-parametric parametric approach. An extremely detaileddiscussions about these approaches can be found in BarroSala-i-Martin(2004), Caves, Chrisensen and Diuewert (1982),KhumbhakarandLovell(2000) and Ray (2004).

Manufacturing industries in developing countries rely heavily on imported intermediate inputs and sophisticated technology. Availability of both these factors plays a crucial role in

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#An earlier version of this paper was presented as Keynote address in the 39th Annual Conference of Bangiya Arthaniti Parishad, Kolkata, March 10, 2019.

the variation in productivity of concerned industry. In early phases of industrialisation, the productivity in Indian manufacturing sector was limited by the Government policies, such as, the reservation of production (a large amount of production items for small scale sector), high custom tariff–distorting resource allocation and prohibiting Indian industry's ability to compete in the international market, shutting down industries in response to normal competitive market forces. Also various types of distortions created by the structure of domestic trade taxes and excise duties. The situation is gradually changing since 1991 due to the introduction of trade- and import-liberalisation policies by Government of India and through various industrial policy reform programmes. Several measures were undertaken by them for boosting-up the industrial productivity. Tariff rates have considerably been brought down; quantitative restrictions on imported goods have been removed to a great extent.

Under these circumstances, there emerges a need for measurement of TFPG and identification of the factors that account for such changes. Specifically, finding the relationship between the appropriate relationship between trade-related factors (such as, import-substitution, effective rate of protection, non-tariff barriers, effective exchange rate etc.) and TFPG is very important in the context of different policies of reforms. The variation in TFPG across different industry groups will depend on the factors like firms characteristics, firm size, degrees of concentration, technological variables, strategic variables like R&D expenditure, advertising expenditure, foreign direct investment, degree of openness like exports, imports, and net exports of the firm etc along with trade policy variables. Further, there were changes in technology-import policy, foreign direct investment (FDI) policy, to make Indian industrial sector more efficient and productive, technologically sounder and an able-competitor in front of world market. Thus the analysis of impact of TFPG requires the inclusion of all these factors to a possible extent.

For the post reform era,different studies are available on TFPG on Indian industries,(Rao (1996), Ray (1997), Gangopadhyay and Wadhva (1998), Pradhan and Barik (1998), Mitra (1999), Srivastava (2000), Balakrishnan and Puspangadan (1994), Balakrishnan, , Pushpangadan, and Babu (2000), Trivedi, Prakash and Sinate (2000), Soo (2008), Das et al., (2010), Ghose and Roy Biswas (2012), Ghose and Roy Biswas (2014), Kim and Muthusamy (2012)., Goldar (2014) The estimated results showing the performance of TFPG after liberalization vary among different studies; some of them supporting the decline in TFPG in the post reform era. There is thus a need to understand the factors influencing TFPG .

The rest of the paper is organized as follows. The sections 2 to 16 discusses the factors like impact of : (i)imported input and R&D, (ii)foreign direct Investment,(iii) exports, imports and of net exports, (iv) cost inefficiency, (v) impact of economic reforms and the policy variables, (vi) ownership of the firm , (vii) firm size, (viii) ageof the firm , (ix) advertising,

(x) concentration ratio, (xi) capital-labour ratio, (xii) non production employee per production worker, (xiii) real wage rate and or change in real wage rate, (xiv) infrastructure facilities , (xv) inter linkages between sectors and of the demand factorsin explaining the movement in TFPG . Section 17 presents the concluding observations and some policy suggestions to foster total factor productivity growth.

II. Impact of Imported Input and R&D

Imported inputs are considered one of the key sources of the transmission and adoption of new technologies, according to the growth and development literature (Romer 1987; Grossman &Helpman 1991; Coe &Helpman 1995; Frankel &Romer 1999). This channel is particularly important for developing economies, where new technologies are relatively scarce, mainly due to low levels of per capita capital, lack of skills and training, and poor quality of institutions, especially in higher education and research. Speciûcally, in a globalized competitive world, ûrms in developing countries are highly dependent on high-quality, imported intermediate goods. Through the adoption and simulation of technologies via imports, developing countries can take advantage of R&D of the developed countries to improve the efûciency of domestic production. Grossman and Helpman (1991) and others have argued that ûrms' outputs are crucially reliant not only on the superior quality of intermediates inputs, but also on the wide variety of inputs available. Consequently, accessing a variety of imported inputs can potentially improve the productivity of ûrms. This channel could be vital in sectors requiring a large variety of specialized inputs in the production process. Imported inputs may also enhance the productivity of domestic ûrms by providing access to advanced technologies that are not available domestically (Lawrence & Weinstein 1999).Trade in general and imports in particular stimulate productivity growth .Evidence suggests that the imported intermediary good is an important channel through which technological diffusion takes place (Tybout, 2000); this may affect productivity favorably. However, to import quality raw material, a firm has to pay more. If the proportionate returns from its usages are more, it improves the production efficiency of the firms. If on the other hand, the cost of imported raw material exceeds the benefit in terms of the value of output, the efficiency of a firm may fall

Technological change through R&D activities is also a well-recognized channel of productivity enhancement in the growth models (e.g., Solow 1957; Grossman &Helpman 1990). The relationship between imports and R&D efforts could be substitutive or complementary. Technology and knowledge spillovers are key mechanisms that link international trade and endogenous growth. Grossman and Helpman (1991) illustrated how imports can increase domestic innovative efforts by transmitting technological information, intensifying competition and entrepreneurial efforts, and expanding the size of the market.

However, imports can also adversely inûuence R&D efforts as ûrms may rely on foreign sources for accessing technology.

The recent theoretical models of endogenous growth emphasize that R&D expenditures of individual firms contribute to sustained long run growth of an economy through their industry-wide spillover effect (Grossman and Helpman, 1990a; 1990b; Romer, 1986). According to this view, individual firms invest in R&D for private knowledge that enhances their productivity and profit. Private knowledge of individual firms then spills over to the rest of the industry and becomes social knowledge which acts as external effects in enhancing the productivity of the firms. With positive spill-over effect of R&D, a constant or decreasing returns to scale aggregate production function may exhibit increasing returns to scale and thus may lead to sustained long run growth (Romer, 1986).

Cohen and Levinthal (1989) and others argue that while knowledge from private R&D capital spills over to create social or public domain knowledge, a firm must invest in R&D to acquire the technical capability needed to make use of the public domain knowledge to enhance its productivity and efficiency. Implication of this later view is that industry-wide knowledge will not contribute to productivity gains unless the firm invests in R&D. The technological capabilities approach emphasizes that the firm level technological capabilities in developing countries are created through minor innovations which include :(incremental modifications in the plants and machineries, efficiently using technologies, imitation, absorption and adaptation of imported technologies etc. These minor modifications are largely generated by firms' in-house R&D efforts and the development of human resources and skills, notably on job training (Lall, 2000).

Many of the ensuing studies in the international literature examined R&D as the determinants of productivity and or efficiency at an aggregate country level, or by sector, although some research took the firm as the unit of analysis. [Clark and Griliche (1982), Higon and Anon (2003), Mate-Garcia and RodriguezFernandez (2008); Goedhuys, Janz, and Mohnen (2008); Kumbhakar et al. (2009)].

Some studies are available linking the R&D activities and productivity of the firm for Indian industry. [Ferrantino (1992), Raut (1995), Hasan (2000), Kathuria (2001), Driffed and Kambhampti (2003), Patibandla and Sanyal (2005) and Reikard (2011) Ghose and Chakraborti (2013) among others.]The studies vary with respect to the specific industries that they are considering and also with respect to the effect of R&D activity including the positive effect of R&D.

III. Impact of Foreign Direct Investment

Foreign Direct Investment (FDI) is believed to bring positive spillovers to domestic firms because since the MNEs usually use newly specialized intermediate inputs, whereas the

domestic firms use local intermediate goods, the productivity of the latter can be raised through the technology know-how of the foreign firms. The outcome of the technology spillover impact of FDI on host economies has two linked steps. The first step involves the MNCs parents' transfer of technology which is supposed to be superior to the prevailing technology of the subsidiary firms and industries of the host country. The second step involves the subsequent spread of this technology to domestic firms - a technology spillover effect.

FDI not only brings capital, but also introduces advanced technology that can enhance the technological capability of the host country firms, thereby generating long-term and sustainable economic growth (Kohpaiboon, 2006) and should have positive effects on domestic firms productivity.However, the positive technology spillover from FDI is subject to the country-specific factors and the nature of trade policy regime. The domestic firms may failto gain from spill over or may even negatively affected by the presence of foreign firms.

A key hypothesis arising from the literature (usually referred as the Bhagwati hypothesis) is that technology spillover is likely to be far less or even negative under an import substitution (IS) regime, compared with a policy regime referred to export promotion (EP).

In the Indian context, there is evidence that domestic firms in Indian manufacturing industries could be benefited from the knowledge spillovers from the presence of foreign-owned firms, provided they have significant technological capabilities to decode the spilled knowledge.(Kathuria (2002)). Franco and Sasidharan (2010)'s finding with firm level data for India (1994-2006)suggests that in-house R&D is more relevant than other external sources of technological knowledge, such as disembodied technology imports to fully internalize the positive spillover effect emanating from MNEs. Also FDI may lead to export diversification in the host country through spillover effects, i.e., the presence of FDI in an industry may increase the export intensity of domestic firms.(Banga (2006))Using a two-equation model facilitating the link between labor productivity and foreign presence (Behera (2015) suggests that foreign presence plays an important role in the diffusion of technology from foreign firms to domestic firms, provided the recipient firms have the capacity to absorb and adopt the foreign technology. Furthermore, the results suggest that industries experiencing decline in the tariff cost exhibit stronger growth in labor productivity. Finally, they find that large domestic market size and highly productive domestic sectors, are likely to attract more FDI from abroad. The empirical results fail to reject the Bhagwati hypothesis

IV.Impact of Exports, Imports and of Net Exports

On the theoretical front, there is a common opinion that international trade in general and export in particular enhances economic growth and improves the productivity of involved firms (see Balassa, 1988). Similarly, advocates of endogenous growth theory believe that export plays a crucial role by improving productivity through innovation (Grossman and

Helpman, 1991) and technology transfer (Barro and Sala-iMartin, 1995). Broadly, productivity growth can occur as a result of many factors such as capital accumulation, the adoption of new technologies, research and development (R&D), changes in the organization of firms and through export participation. One of the key factors in favour of the export-led hypothesis is the impact economic openness has on the efficiency with which resources are used in an economy. In theories, there are at least four explanations of how export expansion improve the efficiency of industry and tend to promote economic growth :

(a) Export expansion 'can lead to economies of scale'. An increase in exports represents an expansion of markets. International demand determines higher capacity utilization and allows the exploitation of economies of scale which tends to require and facilitate expanding of the scale of production and the achievement of economies of scale. Outward orientation may result in efficiency gains for firms, due to the exploitation of economies of scale (Clerides et al., 1998; World Bank, 1993)).

(b) 'Exporters might learn from their presence in international markets associated with knowledge spillovers from international contacts' (Clerides et al., 1998; World Bank, 1993). International contacts with buyers and customers are likely to foster knowledge and technology spillovers, such as access to technical expertise, including new product designs and new production methods.

(c) Exports intensify market competition in both overseas and domestic markets, and tend to force enterprises to be more efficient through the rationalization of management and the 'adoption of new technologies' (Balassa, 1988; Chen and Tang, 1996; Greenaway, 1986; Greenaway and Sapsford, 1994; Kwon, 1986).

(d) 'There are spill-over effects, such as technology diffusion, from export-oriented industries to non-export oriented industries, and from foreign-invested enterprises to domestic firms' (Feder, 1982; O'hUallachain, 1984).

The evidence suggests that export entrants become more productive once they start exportingLoecker (2007). The productivity gap between exporters and their domestic counterparts increases further over time. These results also hold at the industry level. Mention may be made of the other studies like Sun et al. (1999), Mok, Yeung, Han, and Li (2010), Chen, Tang (1987) and Walujadi (2004).

Indian firms also have to do a lot of imports. A large part of imports is essential to carry out the R&D activity. Apart from R&D, some basic imports are essential for the firms to carry out its production. .which technological diffusion takes place (see Tybout, 2000); this may affect productivity favourably. Imports allow countries to take advantage of other country's technology embodied in imported inputs. In this context, theories of import-led

growth due to Grossman and Helpman (1991) may be referred. However, to import quality raw material, a firm has to pay more. If the proportionate returns from its usages are more, it improves the production efficiency of the firms. If on the other hand, the cost of imported raw material exceeds the benefit in terms of the value of output, the efficiency of a firm may fall. For many industry , Indian firms re-engineer the imported technology and learn about new designs, product and process. World Bank (1993, 1997) talked about the firm's import for foreign technology and its positive impact on its efficiency and productivity. Such activities enable firms to build up their internal production capabilities and competency. All these may positively affect the productivity of the firms. Lawrence and Weinstein (2001) argue that imports, not exports, contribute importantly to productivity growth of Japan and Korea. The removal of quantitative restrictions on imports and lowering of customs duties in the post liberalization era in India should have improved access to imported raw materials, and capital goods. Imports of materials embodying latest technologies should foster the productivity and efficiency of the firms. In the Indian context a positive relationship between technical efficiency and imports is reported by Goldar et al. (2004) and Mazumder, Rajeev and Ray (2010).

The above discussion reveals that both exports and imports promote productivity growth. Since both exports and imports affect productivity growth, it may be interesting to find out the relative role of exports vis á vis imports in fostering productivity. The major shortcoming of many of the empirical studies is their inability to separate the impact of exports and imports. Some focus on the one and neglect the other. The other major problem for the Indian industry is that in many cases Indian firms re-engineer the imported technology and then re-export the product in which case the export and import data are likely to be correlated. Thus one cannot take both export and import data in a single regression. It may be relevant to mention here that in trade-growth literature, to take into account the total effect of export and imports on economic growth some studies used sum of exports and imports to estimate the relationship between trade and economic growth (Frank and Romer, 1999; Harision, 1996). 'But the limitation of total trade measure is that it embodies an underlying assumption that exports and imports contribute equally to the promotion of economic growth'. (Also it assumes import-intensity of exports to be zero). Zhang, Ondrich and Richardson (2003), while evaluating how cross country differences in export and import openness in 1990 affected the level of real per capita income, used net exports (exports minus imports), 'which in turn imply distinct exports and imports effects'. Their results support the conjecture that income is associated with net trade.

The literature thus justified the role of net trade in fostering productivity.. Arvas and Uyar (2014) in their study while explaining firm productivity in Turkish manufacturing sector estimated the relationship between productivity and net-export by fixed-effects panel data method. Results show that, productivity level for net-exporters is lesser than the level for

net-importers indicating that industries are more prone to import and more competitive on import markets.Ghose and Chakraborty (2013) finding the determinant of total factor productivity growth of Indian biopharmaceutical firms has taken net export has an explanatory variables. The major problem with Indian biopharmaceutical firms re-engineer the imported technology and then re-export the product in which case the export and import data are likely to be correlated. Thus one cannot take both export and import data in a single regression. A second stage panel regression reveals that net exports have positive role in explaining total factor productivity of the firms, assigning greater role to exports as compared to imports in fostering productivity.

V.Impact of Cost Inefficiency

Ray (2009**)** shows the presence of considerable cost inefficiency in a majority of the states for the Indian manufacturing sector. Further, hefinds that Indian firms are too small and produces below the optimal scale. The only exception is Goa, where the average firm size is too large even though firms are cost efficient at their existing scale. Consolidating them to attain the optimal scale would further enhance efficiency and lower average cost. The findings of Ray (2009) are for the country as a whole, cost efficiency is quite low and the average cost can be reduced by about 23% if the existing firms can attain full cost efficiency. Among the individual states, Bihar and Gujarat are the worst performers. At the other end, firms in Jharkhand, Delhi, and Goa show no inefficiency. Of the remaining states, only Chhattisgarh and Maharashtra achieve efficiency over 80%.Because of differences in input prices, the average cost at the efficient scale (i.e., the minimum average cost) does vary considerably from a low of 50.9 paise per rupee in Assam to a high of 62.4paise per rupee in Delhi. By contrast, the efficient production scale itself shows little variation across the states. This suggests that input price differences are scale neutral so far as the average cost is concerned.

VI.Impact of Economic Reforms and the Policy Variables

Fikkert and Hasan (1998) using a restricted cost function approach found that large number of firms operating with increasing returns to scale, in the pre liberalization period from 1976 to 1985, but the results suggested that most of them were operating close to constant returns to scale. They suggested that there might not be significant gains in scale efficiency from the tentative steps in economic liberalization in the 1980s. Pattnayak and Thangavelu (2005) studied the effects of liberalization on the economic efficiency of the Indian manufacturing industries in terms of economies of scale and biased technical changes using a cost function framework. They captured the long-term effects of the economic reform using a three-digit panel industry level data and estimated the scale economies, biased technological change, and dual TFP growth in a unifying framework of the flexible cost function. Their results support the evidence that there are economies of scale (only moderately)

in the Indian manufacturing industries, after the key economic reforms in 1991. Most of the industries reveal biased technological change, and majority of the industries have experience capital using technological change. Results suggests that the New Economic Policies , which has led to greater capacity utilization and investment in capital goods, will in turn have a positive impact on the productive performance of the industries, provided the price of capital does not increase substantially.

Ghose and RoyBiswas(2014) estimated TFPG using Malmquist Productivity Index (MPI), using non-parametric Data-Envelopment-Analysis, assuming variable returns to scale and constructing the frontier at three-digit level industries data, collected from Annual Survey of Industries over the period 1980-81 to 2001-02 and supported the role of trade policy variables in explaining TFPG Estimation results support lowering of tariff and relative adjustment of real-effective-exchange-rate has contributed positively to productivity growth. Out of fourteen industries favourable effects of effective-protection, import penetration-ratio and real-effective-exchange-rate were felt on productivity growth of two, three and three industries respectively. They further highlighted that decomposition of productivity index into technical change, efficiency change and scale efficiency change confirms technical change is the prime source of productivity increase.

VII. Impact of Ownership of the Firm

The relevant question is whether ownership of the firm matters?

Mahajan, Nauriyal and Singh(2014) finds that for pharmaceutical industry, mean overall technical efficiency scores of private Indian and private foreign are higher than Group-owned firms, suggesting that type of ownership affects the performance of a given firm. The slack analysis highlights that foreign firms were found to have minimum slacks in inputs, evidently owing to their superior technology, better engineering skills and managerial practices. Private Indian and Group-owned firms have maximum slacks, as compared to Private Foreign. Further, maximum slacks are observed in regard of advertisement & marketing, along with noteworthy slacks in salary & wages and capital usage inputs. Therefore, proper utilization of inputs may result in significant improvement in the efficiency of the firms and improve their efficiency. Interestingly, no slacks are found in case of raw material inputs. The private foreign firms, probably for their access to the latest production technology and best management practices, are observed to have least slacks in inputs and output and therefore are able to utilize the resources efficiently as compared to private Indian and group-owned firms.Mazumder (1998) finds performance differences between governments owned, mixed sector. He estimated slacks in resource utilization in Indian and foreign enterprises using DEA and observed significant slacks in inputs utilization in Indian state-owned and domestic firms as compared to foreign firms. The results establish that enterprises owned by the central

government and state governments are less efficient than private sector. There have, however, been inter-temporal efûciency gains for the sector as a whole, perhaps resulting from reforms undertaken towards improving government-owned enterprises' performance.Sinha(1993) shows positive and significant relationship between foreign equity participation and technical efficiency.

VIII.Impact of Firm Size

The relationship between firm size and productivity of the firm is a debated issue in the literature. A large firm may have an easier access to cheaper and superior quality of inputs which helps to enhance its productivity. Moreover, it is easier for such firms to exploit economies of scale, widen scope of production and obtain the necessary approvals. All these aspects, by making its operation more effective, allow it to perform better, relative to smaller firms (Penrose, 1959). Studies are available in the literature with respect to the firm size and their productivity. The studies vary both with respect to the measure of firm size as well as conclusions. While some of the studies found positive relation between firm size and productivity, the other postulated a negative relation. Also, different measure of firm size are adopted , like number of worker (Mukherjee, 1963), capital stock per factory (Ahluwalia, 1991), log value of sales (Majumder, 1997), amount of intermediate inputs (Lundvall and Battese, 2000), asset of firms (Biesebroeck, 2005; Palangkaraya, Stierwald and Yong, 2005; Urata and Kawai, 2002). Ghose and Chakraborty (2013) supported that the firm size has something to do with productivity. Taking two alternative measures of firm size, sales and asset of the Indian Bio-Pharmaceutical firms, they have found that firms with greater sales or asset are more productive than those with lower sales or asset.Ghose and Roy Biswas (2014) using Annual Survey of Industries over the period 1980-81 to 2001-02, and fourteen industry groups estimated Malmquist Productivity Index(MPI)with Data Envelopment Analysis (DEA) and showed that there is a positive relationship with firm size and productivity.MuraliPatibandla (1998) showed that large firms in the Indian industry, despite their relative advantages in higher access to better technologies and information, are not the ones that can determine the most efficient technology frontier. The organizational inefficiency of large firms has been a more dominant factor than their relative advantages through the technology gap. Structural imperfections are the major explanatory factors for their low level of organizational efficiency irrespective of which they can remain large for sustained periods. The labor market segmentation in the Indian industry is also a major source of lower technical efficiency of large firms. Low technical efficiency (TE) levels in very small firms can be attributed to outdated technology and low labor skills. Small firms that can adopt the right kind of organizational behavior in relation to the structural conditions they face are the ones that are in a position to realize higher levels of TE and grow into the middle scale. The movement of better trained labor into medium-size firms, caused by segmentation in the labor market, can also be one of the major explanatory factors for higher levels of TE in middle-size firms. But

the ability of these firms to move into the large size group would be restricted by mobility barriers arising from capital market imperfections and high market transaction costs.

IX. Impact of Age of the firm

The age of the firm is also taken as an important explanatory variable explaining the productivity of the firm. However, the relationship is not clear in the literature. One argument goes in favor of old experienced firms calling them more productive, while on the other view argues that young firms are more productive as they are more flexible to adopt new sophisticated technologies. The conclusions of the different studies thus vary.

Huergo and Jaumandreu (2004) enquired directly at the impact of firms' age and process innovations on productivity growth. The analysis show that firms entering the market experience high productivity growth and that above-average growth rates tend to last for many years, but also that productivity growth of surviving firms converges. Established firms show on average a positive growth rate, but whether this growth rate is related to the specific age of these firms is not well established in their study. Kok al. (2006) examined the relationship between the age of firms and their productivity growth, for establishes firms, where establishes firms are defined as firms of at least 10 years of age.

Ayyagari et al. (2011) in their cross country study of 99 countries found that young firms have higher productivity growth provided they are large. This study tries to examine the role of age in explaining the productivity of the bio pharmaceutical companies. Ghose and Chakraborty (2013) supported that for the Indian Bio-Pharmaceutical Firms, productivity increases with age of the firms.The relationship between technical efficiency and the age of the firm canalso be found in Mengistae (1995, 1998), Walujadi (2004), Berghall (2006), Bhandari and Maity (2007, 2012). But the relationships are not uniform across these studies. Walujadi (2004), found inverse but insignificant relationship between age and technical efficiency of the firms. Bhandari and Maity (2007) observed an significant inverse relationship between firms age and technical efficiency, whereas in Bhandari and Maity (2012) no such clear relationship can be found. The role of firm's age turned out to be insignificant for explaining technical change and efficiency also in Berghall (2006). Mengistae (1995, 1998) postulated that there are age-size effects in the firm level efficiency whereby older firm are efficient given size and bigger firms are efficient given age. Further, direction of causation is not from firm age or size to efficiency, but the other way round. It is not the case that some firms are more efficient than other because they are bigger or older but the firms are bigger or longer lived than others because they are efficient

X. Impact of Advertising :

Advertising, a phenomenon associated with imperfectly competitive market, is used as a means to reduce scope and effectiveness of price competition by creating product

differentiation among firms in the consumer goods industry.

Syverson (2003) explores the influence of product substitutability in an industry on the disparity of productivity level. When consumers can easily switch between producers, relatively inefficient (high-cost) producers cannot profitably operate. Thus high-substitutability industries should exhibit less productivity dispersion and have higher average productivity levels. He demonstrated this mechanism in a simple industry equilibrium model and tested it empirically using producer-level data from 443 U.S. manufacturing industries and tested for the effect of higher advertising intensity on substitutability and hence on the dispersion of productivity. Advertising expenditure can also affect efficiency of the industry, efficiency level being a component of productivity, productivity level will also be affected. Carod and Blasco (2004) studied the linkages between advertising intensity and technical efficiency for the Spanish manufacturing firms. Goldar et al. (2004) studied the linkages between advertising intensity and technical efficiency for the Indian Engineering goods Ray (2006) did not find any impact of product differentiation on technical efficiency in the Indian Manufacturing sector.

Ghose and Chakraborty(2013) considered that product differentiation will be reflected by differences in advertisement activity and find out a positive relation between advertisement activity and productivity, for Indian Bio Pharmaceutical Industry. Advertising activity is measured by advertisement intensity which is defined by Advertising expenditure as a ratio to total sales.

XI. Impact of Concentration Ratio

Concentration ratio(CR) of a particular industry group captures the effect of market structure on TFPG. A negative relation between CR and TFPG is expected by some researchers because competition may lead to cost-consciousness and drive for technological advancement. Others may point out the advantages of big size, secured market and expect a positive association between CR and TFPG. The conclusion from the empirical literature also varies and does not provide us a single answer (Katz 1969; Kendrick 1973). To compute industrial CR the present paper uses Gini-Hirschman coefficient, captured by the formula: $GH = \sqrt{\sum_{i=1}^{n} Y_{it}^{2}}$,

where Y_{it} = market share of ith firm in the industry in period t.

XII. Impact of Capital-labour Ratio

It serves as a technological variable and gives an idea about the relative degree of mechanization. A positive relationship between capital-labour ratio and TFPG is normally expected.

XIII.Impact of (Non-production) Employees per production Worker

A (Non-production) employees per production worker (NP)is also a technological variable and is related to the composition of work force. A higher number of employees per worker generally signify a higher degree of bureaucratic control within the firm that can hinder productivity. Besides, recruitment of non-production employees is quite often a response to the political pressure by the party in power to provide employment of its party cadres. These political employees are more likely to hinder productivity. Such a line of reasoning postulated a negative relation between NP and TFPG[1]. On the other hand, a positive relation between NP and TFPG indicates that the combination of work force is just right to operate efficiently and to promote TFPG in different industries.

XIV.Impact of Real Wage Rate and change in Real Wage Rate

If Real wage rate (W) is sufficiently high for any industry group then skilled workers can be attracted towards that industry and considering skill as a positive determinant of TFPG , it can be argued that as W increases, through the involvement of skilled workers in the production process, productivity can increase. It may also be possible that TFPG is associated with changes in real wage rate, justifying the inclusion of lnW or ΔWwhere, lnW and ΔW represents log natural value of W and changes in W respectively. However, W and lnW or ΔW is not included simultaneously in a single regression.

Ghose and RoyBiswas(2014) supported that Increase in firm size, real wage and or increase in rate of real wage and lowering of number of employees per worker have also a positive and statistically significant effect on TFPG. The concentration variable is also significant in some of the industries. Their study highlighted considerable differences in TFPG and the factors explaining such differences among industry groups.They thus recommended that there is a need for undertaking industry-specific policies for promoting TFPG is thus highlighted

XV.Impact of infrastructure Facilities

If infrastructure tends to generate spillover externalities, as has been the assumption in much of the development literature, one may reasonably look for evidence of such indirect effects in the accounts of manufacturing industries. In what are now classics in the theoretical literature on growth and economic development, infrastructure investments are associated with significant spillover externalities, with benefits that accrue outside the target area of the investment (Young 1928; Rosenstein Rodan 1943; Hirschman 1958). This view also fits well with endogenous growth theory that sees externalities as the source of endogenous feedback effects on output growth (Romer 1986; Lucas 1988; Barro 1990). Empirical support for the existence of significant infrastructure externalities has, however, been far from unanimous. Aschauer's estimates (1989a, 1989b) of the macro effects of infrastructure investment support

the hypothesis of significant spillovers. Not so the estimates of the infrastructure effects based on a growth-accounting model. In that model, spillovers from infrastructure should show up as increases in total factor productivity. Young (1992, 1995) found only a limited role for total factor productivity as a source of growth in four East Asian economies, implicitly limiting the role of infrastructure spillovers operating through increased productive efficiency. Other studies, however, have found significant total factor productivity effects for Japan (Nishimizu and Hulten 1978) and East Asia (Hsieh 1999). None of these growth-accounting studies links infrastructure explicitly to growth externalities. This step was taken by Hulten and Schwab (1984, 1991, 2000) in their studies of regional total factor productivity in U.S. manufacturing. Modifying the conventional growth-accounting model to isolate the effect of infrastructure externalities on growth, they found no evidence of externalities in explaining the growth of total factor productivity of U.S. manufacturing industry. However, Hulten, Bennathan, and Srinivasan (2006) by applying Hulten–Schwab framework ofwith Indian Annual Survey of Industries (ASI) data, reveals substantial externality effects from the states' infrastructure to manufacturing productivity. The analysis separates the direct effects of roads and electricity, as mediated by the infrastructure services purchased by manufacturing industries along with other intermediate inputs, from the indirect effects, as measured by the impact of infrastructure capacity on the Solow productivity residual. In the 20 years from 1972 to 1992, growth of road and electricity-generating capacity seems to have accounted for nearly half the growth of the productivity residual of India's registered manufacturing.

XVI. Impact of Inter linkages between sectors and the Demand factor

From a primary agro-based economy during 1970s, Indian economy has emerged as predominant in the service sector since the 1990s. At the same time the growing integration with the rest of the world in the post-reform period (post 1991 period) and the recent spurt of service sector led growth have significant impact on the linkages between the agriculture and industry. This structural change and uneven pattern of growth of agriculture, industry and services sector in the post reforms period implies substantial changes in the production and demand linkages among various sectors, and in turn, could have significant implication for the growth and development process of the economy. This has triggered a renewed interest in studying the interrelationship between agriculture and industry.

Production linkages arise from the interdependence between agriculture and industry through the use of productive inputs. Agriculture draws some raw materials, like chemical fertilizers, pesticides, electric power, agricultural machinery and implements, etc., from the industry.Agriculture not only provided raw material and food to the other sectors but also generate *demand* for the goods and services produced by these sectors. Increased income of *agricultural* sector also created *demand* for durable and nondurable *industrial* products such as clothes, bulbs, soaps etc.

In the theory and empirical literature, the inter-relationship between agriculture and industry has been discussed from different channels. First, agriculture supplies food grains to industry to facilitate absorption of labour in the industry .Secondly, agriculture gives the inputs like raw cotton, jute, tea, coffee etc. for agro-based industries. Thirdly, industry supplies industrial inputs like fertilizer, pesticides, machinery etc. to agriculture .Fourthly, agriculture influences the output of industrial consumer goods through demand. Fifthly, agriculture generates surpluses of savings, which can be mobilized for investment in industry, and other sectors of the economy. Sixthly, fluctuations in agricultural production may affect private corporate investment decisions through the impact of the terms of trade on profitability (Ahluwalia, 1986, Rangarajan 1982). Some of these channels emphasize the "agriculture-industry linkage on the supply side or production side, others stress the linkages through the demand side.

The production linkages basically arise from the interdependence of the sectors for meeting the needs of their productive inputs, whereas the demand linkage arises from the interdependence of the sectors for meeting final consumption. Further, the linkages between the two sectors can also be categorized into two groups based on the direction of interdependence. One is the backward linkage, which identifies how a sector depends on others for their input supplies and the other is the forward linkage, which identifies how the sector distributes its outputs to the remaining economy. More importantly, these two linkages can indicate a sector's economic pull and push, because the direction and level of such linkages present the potential capacity of each sector to stimulate other sectors and then reflect the role of this sector accordingly. The demand for industrial products from agriculture sector is influenced either by agricultural output changes or the terms of trade between agriculture and industrial output. Unlike agriculture, industry has two-way linkages with the services sector and the level of linkage is much higher than that of in case of agriculture (Singh, 2007 and Gordon and Gupta, 2004).

Services sector has stronger backward linkages compared to forward linkages with both agriculture and industry. Hansda (2001) applied the input-output analysis at a much disaggregated level (115 activities - 22 in agriculture, 80 in industry and 13 in services) for 1993-94 and confirmed that the Indian economy is quite service-intensive and industry is the most service-intensive sector.Banga and Goldar (2004) found that services input contributed for about 25% of output growth of registered manufacturing during 1990s (as against 1% during 1980s), and that increasing use of services in manufacturing has significant favorable impact in TFPG of organised manufacturing sector. Using input-output matrices for four time points (1968-69, 1979-80, 1989-90 and 1993-94), Sastry et al. (2003) observed that over the years agricultural production became more industry- and services-intensive, whereas industrial production became less agriculture-intensive and more services-intensive. These

observations, in turn, imply that excluding the services sector from the analysis understates the agriculture-industry linkages.

Given these linkages and the recent services sector boom, the apparent question is how to interlink the services sector with agriculture and industry, and how it is going to impact the "agriculture-industry linkages.Saikia (2011) examined the trends of interlinkages between the two sectors from a three sectoral perspectives (agriculture, industry and services) for the pre- and post-reforms periods in India. The study observed that "agriculture-industry" linkage has been deteriorating over the years and there has been directional change in the inter-linkages between the two sectors. Both the production and demand linkages were primarily from the industry to agriculture sector in the pre-reform period, which changed to from agriculture to industry in the post-reform period. Further, while the linkage was primarily through the production channel in the 1960s through 1980s, it translates primarily through the demand channel since 1990s.In the pre and early post-independence period, the industry sector had a close relationship with agriculture due to the agro-based industrial structure (Satyasai and Viswanathan, 1997).

However, the industrial sector witnessed a slow growth, followed by stagnation since the mid-1960s, which was largely attributed to the stunned agricultural growth and favourable agricultural terms of trade , among other factors (Patnaik, 1972, Nayyar, 1978, Bathla 2003). In fact the interdependence between the two sectors has found to be weakened during the 1980s and 1990s (Bhattacharya and Mitra, 1989; Satyasai and Viswanathan, 1997). Sastry et al. (2003), for 1981-82 to 1999-2000, found that the forward production linkage between agriculture and industry has declined, whereas backward production linkage has increased, the impact of agricultural output on industrial output is significant. The agriculture's demand linkage to industry has declined, while that of from industry to agriculture has increased. Agriculture's dependence on industry has increased from greater demand for modern agricultural inputs like fertiliser, electricity, diesel, tractors etc., since 1980's. But industry's dependence on agriculture for meeting the input demand has declined.Also service sector has strong production linkages with industry and the linages are in both way.On the other hand service sector linkages with agriculture are not stronger from any side and becomes weaker in the post reform period. Agriculture purchase of final consumption good has increased considerably over the years, while that of intermediate consumption good has increased marginally, suggesting strong role of demand linages between agriculture and industry, both the production and demand linkages from agriculture to industry have increased during both the pre- and post-reform periods,whereas both the production and demand linkages from industry to agriculture have declined for both the periods. Also agriculture's income elasticity to industrial goods has been considerably increased, while of industry to agriculture has been weakened at the same time. The production of white goods like refrigerators, washing

machines, air conditioners etc expanded substantially along with the other luxury products. But the production of commodities for mass consumption has recorded a slow growth rate.

Das (2010) for each of the industrial sector following KLEMS methodology of Jorgenson et al.(1987) incorporates contributions of labour-quantity and quality and capital-ICT and non ICT assets in its measurements. The evidence of service sector led productivity growth in the Indian economy of factor accumulation in accounting for the sources of growth for the Indian economy and its various sectors as well as of industries.is supported.

XVII. Conclusions

The present discussions give an overview of the factors influencing TFPG of the Indian manufacturing sector. In this context, the relationship between TFPG and the strategic variables of the firm like R&D intensity, advertisement intensity, foreign direct investment, exports, imports andthe net exports of the firm , the firm characteristics like ownership of the firms, concentration ratio, capital labour ratio, nonproduction employee per production worker, firm's age, firm size, nature of ownership, the prevailing real wage and or changes in real wage rate etc. the prevailing infrastructure facilities , interlinkages between different sectors of the economy and the demand factors are highlighted. The discussion suggests that first of all, the methodology of productivity index varies over the studies. Secondly, apart from explaining the factors influencing productivity growth, some studies tried to find out the role of different components of productivity growth namely the rate of technical change, the rate of technical efficiency change and the rate of scale efficiency in determining the productivity. The empirical evidences suggest that the role of all these components are important, however the extent varies over the studies and also among different industries and firm level. Thirdly, cost inefficiency also affects the productivity of the firms. Fourthly, Apart from the strategic variables, the total factor productivity the firm also depends on firm characteristics like firm size and age of the firm, concentration ratio, degree of mechanization as measured by capital labour ratio, The studies vary both with respect to the measure of firm size as well as conclusions. While some of the studies found positive relation between firm size and productivity, the other postulated a negative relation. Also, different measure of firm size are adopted , like number of worker , capital stock per factory, log value of sales , amount of intermediate inputs. The conclusions of the study also vary regarding the relationship between productivity and the age of firm. Further, the effect of real wages and or changes in real wage rate on total factor productivity is supported by some of the studies. Fifthly, some studies highlighted the role of infrastructure in explaining total factor productivity growth. Sixthly, the role of the economic reform and the trade policy variable in explaining total factor productivity growth are supported by some studies. Finally, the empirical evidences

also support the role of inter linkages between sectors and the role of demand factors causing the growth of the industries. In this context the positive role of the service sector in explaining total factor productivity growth is being supported.

Regarding policy measures, it can be said that, to spread to be competitive in the global market, the reduction of R&D cost is very important. Tax incentives to key sectors have played a central role in R&D. Since R&D activity is mainly dependent on imported inputs, facilitated imports will also boost up the R&D activity which in turn will improve productivity of the firms. But since import of the goods is not a permanent solution for the sustained growth of the firms and hence of industries, at the same time indigenous measures of development should be generated to develop R&D skill of the firm, so that in the long run one can minimize the import requirements for R&D activity. The fiscal incentives and support measures presently available include exemption of import duties on key R&D expenditure, customs duty exemption on capital equipment, spares, accessories and consumables imported for Research and Development by approved institutions, weighted tax deduction for sponsored research and on in-house Research and Development expenditure, custom duty exemption on imports for R&D projects supported by Government, an excise duty waiver on indigenous items purchased by approved institution for Research and Development. These measures be carried out and strengthened. The Government should promote R&D activities and at the same time Government should facilitate import activities of the firms which basically foster R&D.

The firms on their part have to invest more on R&D and at the same time they have to carry on their advertising activity, keeping in mind that R&D and advertisement activity have positive impact on productivity. At the same time the firm will try to foster export growth and will try to improve the quality of export, because the empirical evidences suggest that the quality of exports is one of the main determinants of exports. This in turn suggests greater role of R&D expenditure because sustained R&D expenditure will in turn help to improve the quality of the product.

The discussion observe that infrastructural development has a positive role on total factor productivity growth and hence recommend the greater role on the part of the government to develop infrastructural facilitates. India is backward in respect of its infrastructural facilities and it is an important impediment towards the industrialization of the country. Thus in the absence of proper transportation (rail and road) and communication facilities in many parts of the country, industrial development could not be attained inthose regions in spite of having huge developmental potentials in those areas.Further, since service sector growth and the demand factors have afavorable impact on total factor productivity growth, any policy measure accentuating service sector growth and the aggregate demand for goods and services will in turn alsopromote higher TFPG.

Relevantly, it may be noted that empirical literature supports the evidence of jobless growth in case of Indian economy. At the same time the existing literature supports the evidence of skill shortages in existing firms especially for IT sectors and management among others. The vacancy falling within skill shortages is sensitive to the nature of vacancy, wage, and years of existence and location(Murti, and Bino (2014**)).** The positive role of better trained worker on TE is also highlighted by existing studies. For example, as already pointed out Patibandla (1998) supported that the movement of better trained labor into medium-size firms, caused by segmentation in the labor market, can also be one of the major explanatory factors for higher levels of technical efficiency in middle-size firms. Thus there is an urgent need to develop skill formation of the employable youth to foster TFPG

It can also be mentioned about a recent study thatwhile explaining total factor productivity growth taking the data from twenty OECD countries finds a positive linkages between total factor productivity growth and entrepreneurships(Erken, Donselaar and Thurik (2018)). Hence, more emphasis should be given to the formation of entrepreneurships development for enhancement of TFPG.

The above discussions also motivate the future directions of research.That most of the studies in India have followed the traditional "two-sector" model in a closed economy. India has been becoming more and more open since the reforms of 1990s, and since then (or even before), the growth of the economy has been led by the services sector. Any sectoral linkages analysis which circumvents the services sector does not provide comprehensive empirical findings. Given the growing importance of the service sector in explaining the growth and the total factor productivity growth of the industries, there is a thus need for construction of a macro-economic theoretical framework that could measure the potential direct and indirect impact of growth of different sectors of the economy considering the inter linkages between these three sectors: agriculture, industry and services in an open economy framework and after taking into account both the demand as well supply side factors as discussed above toa possible extent for explaining total factor productivity growth. At the same time empirical validation is necessary that can account for measurement and determinants of total factor productivity growth of Indian industries.

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Artha Beekshan, Volume 28, No. 3, December 2019

Learning, Not Only Schooling, For Development And Technological Advancement

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Abstract

Failure to provide basic learning,a better word for schooling,ultimately translates into severe shortcomings in the skills of the workforce. Lack of skills reduces job quality, earnings, and labour mobility.Students cannot leapfrog foundational skills.Emerging data on student achievement show that, for millions, schooling is producing little learning in crucial early grades.Poverty most consistently predicts failing to complete schooling,Also most education systems do not attract teachers with strong backgrounds(like in India).Successful education systems should combine both alignment and coherence, based on correct information and execution, often compromised due to contradictory vested interests. This calls for the need to tackle the stubborn technical and political barriers to improve quality of education, which forms the crux of development and technical progress of economies.

Key words: Focus on learning, to combat skill shortage,strong foundation skills required,need to tackle technical and political barriers .

JEL Codes:E24,I2,I3,N3,P36,P46,Q01.

I. Introduction

Education in every sense, is one of the fundamental factors to development and growth.Education raises productivity of people, knowledge ,creativity, and promotes entrepreneurship and technological advances. It is not only the quantitative expansion of educational opportunities but also qualitative improvement of the type of education imparted to the labour force that holds the key to economic development.However, as the World Development Report (WDR) 2018 disconcertedly observes ,many countries are failing to provide even basic learning ,a better word than schooling, for all.Ultimately, the learning crisis translates into severe shortcomings in the skills of the workforce. Lack of skills reduces job quality, earnings, and labour mobility(Step skill survey World Bank 2014).

The skills needed in labour markets are multidimensional, so systems need to equip students with far more than just reading, writing, and math—but students cannot leapfrog these foundational skills. Whether as workers or members of society, people also need higher-

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order cognitive skills such as problem-solving. In addition, they need socioemotional skills—sometimes called soft or noncognitive skills—such as conscientiousness. Finally, they need technical skills to perform a specific job. That said, the foundational cognitive skills are essential, and systems cannot bypass the challenges of developing them as they target higher-order skills.

However in the context of rural India in 2016, the WDR 2018 observes that less than only 28 percent of students in grade 3 could master double-digit subtraction. Emerging data on student achievement show that, for millions, schooling is producing little learning in crucial early grades (Spaull and Kotze 2015,UNESCO 2016). Millions complete primary education without acquiring the basic competencies needed for further learning.In rural India in 2016, only half of grade 5 students could fluently read text at the level of the grade 2 curriculum, which included sentences (in the local language) such as "It was the month of rains" and "There were black clouds in the sky." These severe shortfalls constitute a learning crisis.

The ultimate barrier to learning is no schooling at all—yet hundreds of millions of youth remain out ofschool (UNESCO 2016).Poverty most consistently predicts failing to complete schooling, but other characteristics such as gender, disability, caste, and ethnicity also frequently contribute to school participation shortfalls.

The lack of basic competency is systematically lower for students from poorer families and also severe deprivations—whether in terms of nutrition, unhealthy environments, or lack of nurture by caregivers—have long-lasting effects because they impair infants' brain development (Coe and Lubach 2007, Garner et al 2012, Nelson 2016).In Andhra Pradesh, India, testing the same set of students each year reveals that this gap increases every year (Muralidharan and Zieleniak 2013).

Chronic malnutrition, illness, the cumulative effects of material deprivation, low parental support, and the unpredictable, chaotic, or violent environments that can be associated with poverty all undermine early childhood development learning

disadvantaged children arrive at school late and unprepared to benefit fully from learning opportunities. As these children get older, it becomes harder and harder for them to break out of lower learning trajectories.

On the other end of the spectrum, teachers, the most important factors affecting learning in schools,need the skills or motivation to be effective. In developing countries, teacher quality can matter even more than in wealthier countries (Bau and Das 2017) But most education systems do not attract applicants with strong backgroundslike in India where despite the recommendations of successive pay commissions that boosted salaries of teachers substantially beyond levels imaginable only few decades ago(Sen and Dreze 2013).

Thus it is not surprising that the WDR 2018 found that in Bihar, India only 10.5% teachers of tested public school teachers are able to solve a three-digit by one-digit division problem and show the steps correctly (Sinha et al 2016) .The problem is compounded by problems with teacher absenteeism, lack of inputs, and weak management, which are typically severest in communities that serve the poorest students(Bloom et al 2015). According to data from WDR 2018,in 1,300 villages in India, nearly 24 percent of teachers were absent during unannounced visits, at an associated fiscal cost of US$1.5 billion a year . Reducing absenteeism in these schools would be over 10 times more costeffective at increasing student-teacher contact time than hiring additional teachers.Sen and Dreze(2013) thus stress on teacher accountability at different levels like promotion rules, grievance redressal, which cant suffice on their own but together can make a big difference.

Commenting on the typical features of the Indian education system,Sen and Dreze(2013) observe that teachers tend to focus mainly on the bright ones.No wonder that so many Indians are successful abroad and Indian firms continue to handle crores worth of outsourced business from Europe and America sometimes involving complex technical problems programmes designs. In this regard education systems also make general divide between the privileged and the restand individuals already disadvantaged in society— whether because of poverty, location, ethnicity, gender, or disability—learn the least. But it is possible to perform far better than income levels would predict, thanks to a sustained focus on learning with equity.

On the other hand,legislations such as the Right to Education Act 2010 guaranteeing automatic promotion irrespective of learning and prohibition of board exams till class 8 (Sen and Dreze 2013) do not help. If there are standardised tests then it can be easier to find what kinds of help or attention is required before being sent up for the board examinations. Lack of data in this regard means that Governments can ignore or obscure the poor quality of education, especially for disadvantaged groups.

Successful education systems combine both alignment and coherence. Alignment means that learning is the goal of the various components of the system. Coherence means that the components reinforce each other in achieving whatever goals the system has set for them. When systems achieve both, they are much more likely to promote student learning. Too much misalignment or incoherence leads to failure to achieve learning.

However, the potential beneficiaries of better foundational learning—such as students, parents, and employers— often lack the organization, information, or shortterm incentive to press for change.As Grindle (2004) points out, parents are usually not organized to participate in debates at the system level, and they may lack knowledge of the potential gains from different policies to improve learning. They also may worry about the potential ramifications

for their children or themselves of opposing interests such as teachers, bureaucrats, or politicians. Students have even less power—except sometimes in higher education, where they can threaten demonstrations—and, like parents, they may be unaware of how little they are learning until they start looking for work.

Lack of information means teachers may find it hard to judge to what extent students understand what is being taught. Without clear information on what students do not know, how can schools improve instruction?Particularly true in low-income countries, where teachers face large classrooms that mix students of very different abilities. For example, a study from Delhi, India, found that the same grade may contain students whose achievement level spans the equivalent of five to six grades(Muralidharan et al 2016).

Finally, the business community, even if it suffers from a shortage of skilled graduates to hire, often fails to advocate for quality education, instead lobbying for lower taxes and spending. As a result, many systems are stuck in low learning traps, characterized by low accountability and high inequality.

II. Importance of foundation skills

Foundation skills are imperative for development and technical progress. In the past, most empirical research equated education with schooling—whether measured by school enrolment, number of years of schooling, or degrees acquired—in part because of lack of other good measures of education. But as the focus on learning has grown, some studies have explored the effects of the skills that students acquire. The results confirm the intuition: skills matters. Because brain malleability is much greater earlier in life and brain development is sequential and cumulative, establishing sound foundations can lead to a virtuous cycle of skill acquisition. Moreover, investment in experiences and environmental inputs that foster learning at the very earliest stages increases the impact of investments at later stages: skills beget skills (Cunha and Heckman 2007) and gaps are cumulative.

Low skills continue to undermine career opportunities—and earnings—long after students leave school. Gaps in foundational skills affect not only the starting points of new workers entering the labour market but also their growth trajectories. Capacity to make up for lost skills shrinks over time: second-chance adult education programs have limited success, and on-the-job training usually favours workers with more education and skills (Di Gropello 2011).

Technology affects the demand for skill and the progress in meeting global development goals will be limited as long as the dimensions of this problem, its origins, and its implications remain unrecognized.What is important is learner preparation, teacher skills and motivation,

the availability of relevant inputs, and the school management and governance that bring these together.

Students entering the workforce need better critical thinking and socioemotional skills. The ability to use technology is one way for them to take advantage of technological advancement. But another is to excel at those skills that technology carries out less well. Those include higher-order cognitive skills and interpersonal, socioemotional skills(World Bank 2015).

It is not enough to train learners to use computers: to navigate a rapidly changing world, they have to interact effectively with others, think creatively, and solve problems. All of those skills that help individuals succeed in rapidly changing economies are built on the same foundations of literacy and numeracy. It may be tempting to divert resources from the development of foundational skills into the technological skills, higher-order cognitive skills, and socioemotional skills needed in the 21st century, which seem more novel and exciting. But these are complements to foundational skills, not substitutes for them—they can only be built on a solid foundation. Workers can search effectively for digital information or create digital content only if they have strong literacy skills. They can program new online applications only if they have confident numeracy skills. Socioemotional skills like grit, which are most malleable in childhood, can be practiced and strengthened in the service of gaining strong foundational skills. Higher-order cognitive skills involve consuming information using literacy and numeracy skills and combining it in new ways. Innovations in developing 21st-century skills are much needed, but these skills work best in conjunction with strong foundational abilities. The World Development Report 2018 reiterates that all of those skills that help individuals succeed in rapidly changing economies are built on the same foundations of literacy and numeracy.

III. Vital need of the hour: State action

State action is the main basis of educational transformation in Europe and America in the nineteenth Century matched by the success of Japan and great success in East Asian countries according to (Sen and Dreze 2013).It is possible to perform far better than income levels would predict, thanks to a sustained focus on learning with equity.The lesson, then, is that better interventions at the school and student levels will sustainably improve learning only if countries tackle the stubborn systemlevel technical and political barriers to change. Technical barriers include the complexity of the system, the large number of actors, the interdependence of reforms, and the slow pace of change in education systems. Political barriers include the competing interests of different players and the difficulty of moving out of a low-quality equilibrium, especially in low-trust environments where risks predominate. All of these barriers pull actors away from learning,

Countries that have sustained rapid growth over decades have typically shown a strong public commitment to expanding education(Sen and Dreze 2013).Although the relationship flows the other way as well—in that rapid growth allows greater investment in education—but the fact that human development in general and school education in particular are first and foremost allies of the poor rather than the rich and affluent has been the Japanese strategy of economic development through its entire modern history later on South Korea,Taiwan,Singapore ,Hong Kong and China followed similar routes and firmly focussed on basic education largely delivered by state.

Oddly enough, despite strong pro educational rhetoric in Indian Nationalist movement,expansion of school education has been remarkably slow in India who failed to learn. Research on the East Asian miracle countries in particular flags education and human capital as factors in their rapid growth (World Bank 1993). Countries such as the Republic of Korea reaped the benefits of their "progressive universalism" approach to education, in which they ensured high-quality basic education for all children early on, followed by expansion of high-quality secondary and tertiary opportunities. These cases reinforce the idea that strong foundational skills drive growth early in development, but also that as countries approach the global technological frontier, they need to invest more in higher education and in research and development(Aghion and Howitt 2006,Chakraborty and Krishnankutty 2012). Also, the focus should be on whether students are learning—not just on how well schools are equipped or even how long students stay in school.

If the focus is not on learning, information even when available is often ignored, especially if it is complex or provides unwelcome news(Loewenstein et al 2014) Because learning is missing from official education management data, it is missing from the agendas of politicians and bureaucrats. This is evident in how politicians often talk about education only in terms of inputs—number of schools, number of teachers, teacher salaries, school grants— but rarely in terms of actual learning.

Education systems involve many stakeholders with multiple, often contradictory, interests. These systems are not just about students, teachers, or principals. They also involve politicians, bureaucrats, the judiciary, private players, and more. Participants linked to these institutions have a vested interest in how the system works, including its structure and funding. Gaming might take the form of candidates hiring test takers, parents facilitating cheating, teachers misreporting student test scores, or government officials encouraging teachers to modify test scores.Data can be manipulated. Even when indicators track meaningful variables, data quality may be compromised. Data on outcomes can be gamed; decisions on who collects data and how often are made using subjective criteria.official statistics sometimes exaggerating progress.

Teachers, bureaucrats, judges, or politicians who fail to cooperate with the status quo are likely to put themselves at considerable professional risk. The system leaves them little choice but to conform. The problem is not limited to specific individuals, but arises from the multiple interests of actors and the underlying incentives in education systems. The accountability needed to ensure student learning becomes secondary. In the Vyapam case in Madhya Pradesh, India, several bureaucrats, fearing adverse career repercussions, allegedly joined the scam, making it much worse than otherwise possible. Then others joined—with middlemen purportedly profiting off the connections made between the various players. What started out as a small-time operation allegedly became institutionalized (albeit informally) as people began to believe they would lose out if they questioned the status quo.

In the present scenario in India, partnerships between some state governments and Pratham, an NGO that seeks to improve education quality, have designed interventions to address the problems identified by the Annual Status of Education Report (ASER) assessment. Moreover, the government of India now holds its National Achievement Survey annually (rather than once every three years) to track learning more frequently.While the assessment results have led to action in some cases, the link to improved learning is not automatic. Over the short period that the ASER in India has been operating, their assessment results do not show any clear overall pattern of increases in learning (R4D 2015).At the same time, some Indian states have shown significant improvements in grade 3 reading levels between ASER 2010 and 2016ASER 2016.It is imperative now to continue the sustained and relentless efforts to increase the quality of education in the country , which forms the foundation to development and technical progress of the country.

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Artha Beekshan, Volume 28, No. 3, December 2019

Diaspora Remittances Inflows from Migrants and India's Industrialization: Is There Any Nexus?

Subhajit Majumder* & Dr. Asim K. Karmakar**

Abstract

Remittances are a tangible reflection of migration. These are financial transfers sent by migrant workers to their country of origin— to their families and dependents back home.They are private flows in which individuals voluntarily send funds to their personal choice of beneficiaries. They should not be classed as aid or directed into official coffers.A share of remittances is invested in education, housing, and other long term investments like setting up industrial units.

According to the World Bank (2013) remittances act positively in reduction of the level and extremity of poverty, thus leading to positive effects on higher human capital accumulation, improve health and educational spending, improve access to information and communication technologies, enhancing small business investment, better preparedness for adverse shocks such as natural disasters and also contributing to a reduction in child labour.

It is interesting to note that India remained a top remittance recipient country in 2018, followed by China ($67 billion), Mexico ($36 billion), the Philippines ($34 billion), and Egypt ($29 billion) with remittance inflows peaking at all-time high at US$78.6 billion (The World Bank , April,2019).

On the other handIndustrialisation is defined as a socio-economic process of rapid transformation insignificant manufacturing activity in relation to other forms of production and workundertaken within a respective economy.It entails the increase in value addition of the manufacturing sector in relation to the overall size of the economy. This entails that a significant development of the manufacturing sector, compared with other sectors, will lead to a faster attainment of any country's industrialisation (GuiDiby &Renard, 2015).

We have attempted to examine here whether the inflow of remittances have any significant effect on Industrialisation of India or not? So this study intends to include remittances as one of the determinant factors of Industrialisation in case of India. This study therefore, attempts to investigate the short run as well as long run relationship of the foreign remittances inflow with industrial growth of India.

Keywords: Remittances, industrialization, Unit Root Test,ADF test , Phillips-Perron test,Stability test

Jel Code: C32, F2, F22, F24

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I.Introduction

Remittances are a tangible reflection of migration. These are financial transfers sent by migrant workers to their country of origin— to their families and dependents back home.They are private flows in which individuals voluntarily send funds to their personal choice of beneficiaries. They should not be classed as aid or directed into official coffers.A share of remittances is invested in education, housing, and other long term investments like setting up industrial units.

According to the World Bank (2013) remittances act positively in reduction of the level and extremity of poverty, thus leading to positive effects on higher human capital accumulation, improve health and educational spending, improve access to information and communication technologies, enhancing small business investment, better preparedness for adverse shocks such as natural disasters and also contributing to a reduction in child labour.So there can be no doubt that remittances are real blessings, not only for the migrants' families at a micro level but also for the economy at a macro level. Available evidence suggests that remittances, in the aggregate as also per capita, from unskilled and semi-skilled migrants are significantly higher than remittances from others. These remittances also provide resources for investment in the rural sector, particularly agriculture, or help acquire assets for self-employment in the urban sector. In sum, such remittances create consumption possibilities and income opportunities for the poor or the less well-endowed.

It is interesting to note that India remained a top remittance recipient country in 2018 to the tune of nearly $78 billion followed by China ($67 billion), Mexico ($36 billion), the Philippines ($34 billion), and Egypt ($29 billion) with remittance inflows peaking at all-time high at US$78.6 billion in 2014, as according to the latest official sources of the World Bank.The net remittances by Indians employed overseas increased by 12.4 per cent in 2018-19 as compared to 11.5 per cent in 2017-18 and 10.6 per cent in 2016-17in 2018-19 , possibly due to improved income conditions in the Gulf countries along with rise in oil prices.

On the other hand, Industrialisation is defined as a stage of development— a socio-economic process of rapid transformation insignificant manufacturing activity in relation to other forms of production and workundertaken within a respective economy.It entails the increase in value addition of the manufacturing sector in relation to the overall size of the economy. This entails that a significant development of the manufacturing sector, compared with other sectors, will lead to a faster attainment of any country's industrialisation and development (GuiDiby& Renard, 2015).In Mexico, remittances are now being utilized for augmenting microenterprises.

II. Objective of the Study

The possible effects of remittances inflow on the domestic economy has emerged as area of research. So it is an important matter to investigate the significance of the macroeconomic impacts of these inflows (net private transfers) on the Indian economy. We have attempted to examine here whether the inflows of remittances to India have any significant effect on Industrialisation of the country or not?—so that the remittances can be an effective aid for industrial development in the upcoming future. So this study therefore, intends to include remittances as one of the determinant factors of Industrialisation in case of India. This study also in this context attempts to investigate the short run as well as long run relationship of the foreign remittances inflow and industrial growth of India.

III.Review of Literature

There exists large rich literatures which postulates different channels through which remittances can affect industrialisation; either directly or indirectly. Woodruff and Zentano (2001) have found that 27% of firms in Mexico were reliant onremittances from abroad to finance their liquidity and that remittances represented 20% of thecapital invested for business development. and Parrado (1994), earlier, concluded that start-up capital for 21 percent ofbusinesses in Mexico required remittances from working in the USA. Woodruff and Zenteno (2007) also associated Mexican enterprise growth and expansion to international migration (Mexico-to-US). Another direct channel through which remittance inflow promotes industrialisation is skill and technology transfer, and improved market-oriented production. Brinkerhoff (2006) presents an explicit analysis of how migrants promote skill transfer within the homelands of Peoples Republic of China (PRC), Philippines, and Afghanistan. Syed and Miyazako (2013) have found remittance to be an important source of investment in agriculture particularly for a shift from subsistence agriculture to market-oriented production.

An indirect channel through which remittances inflow affect industrialisation is the exchange rate, which will definitely affect the manufacturing sector's performance. Remittance inflow can affect the relative growth of traded and non-traded manufacturing sectors. Its impact on the traded manufacturing sector is principally affected by its role on the country's real exchange rate (Rajan & Subramanian, 2005; Selaya& Thiele, 2010). Since remittances affect the exchange rate of countries as a result of the demand for and supply of foreign exchange, the value of tradable manufacturing goods will most likely be affected, which will in turn influences the performance of the manufacturing sector.

IV. Variables, Data and Methodology

The study is empirical in nature. The data are being collected— annual set of data— for a period from1980-81to 2016-17, obtained from World Bank and CSO, MoSPI,

Government of India. The data are time series in nature and hence we have to check the stationarity of data. Other information is being referenced through different newspapers, magazines, books, journals, conference proceedings, Government reports and websites. Relevant statistical and econometrical tools and techniques, for example, Augmented Dickey-Fuller and the Phillips and Perron test etc., will be used for the purpose of analyzing the data. The variables and representation is being portrayed in Table 1.

Table 1: Variables and Representation

Variables	Representation	Source
Growth of Manufacturing Industry Production in India	MAN_G_t	CSO
Real Effective Exchange Rate	$REER_t$	World Bank
Remittances Inflow	REM_t	World Bank
FDI as a share of GDP	FDI_t	World Bank

Source: Representation made by Researchers.

The study has incorporated the following models for the purpose of analyzing the dynamics of the relationship between the Remittances Inflows and Growth of ManufacturingIndustrial Production;

$$MAN\_G_t = \alpha_0 + \alpha_1 MAN\_G + \alpha_2 FDI_t + \alpha_3 REER_t + \alpha_4 REM_t + \varepsilon_t \text{-------- (1)}$$

The study used time series econometric techniques as methodology.Before doing any estimation, we perform several transformations on our data. First, Remittances inflow is transformed in real terms by dividing the variables with theCPI (base 2010). After that, the real terms of Remittances Inflow and REER are taken in natural logarithm. The real and log and only log values of the variables are renamed with an "LR_" and an "L_" sign at the front respectively.Then the stationarity of the variables are assessed by testing the presence of unit roots by using the Augmented Dickey-1981;ADF,henceforth) and the Phillips and Perron(1988). The augmented Dickey-Fuller(1981;ADF,henceforth) test has been used on the basis of following regression:

$$\Delta Y_t = \alpha + \beta_t + \gamma_i Y_{t-1} + \Sigma^{n}_{i=1} \lambda_i \Delta Y_{t-1} + \varepsilon_t$$

Where Y_t is the variable under consideration, Δ is the first difference operator and α, β, γ, λ are the parameters to be estimated. The test of unit root involves testing $\lambda=0$. The null hypothesis is that the variables have a unit root.

While analyzing the result of ADF(1981) and the Phillips and Perron (1988;PP, henceforth) test of stationarity, the test reveals that the selected variables are stationary at different order of integration i.e. I (0) and I (1). In this situation, to assess the presence of long-run relation among the selected variables and their dynamics methodology suggests to

apply the ARDL bound test approach of cointegration followed by the ECM-ARDL model, which is introduced by Pesaran, Shine, and Smith (2001).The estimable form of ECM-ARDL model is stated below:

$$\Delta MAN\_G_t = \alpha + \Sigma^{n}_{i=0} \beta_i \Delta MAN\_G_{t-i} + \Sigma^{n}_{i=0} \gamma_i \Delta FDI_{t-i} + \Sigma^{n}_{i=0} \theta_i \Delta L\_REER_{t-i} + \Sigma^{n}_{i=0} \pi_i \Delta LR\_REM_{t-i} + \mu_1 MAN\_G_t + \mu_2 FDI_t + \mu_3 L\_REER_t + \mu_4 LR\_REM_t + \lambda\, ecm_{t-1} + \varepsilon_t$$

Where the parameter λ indicates error correction term or speed of adjustment to restore equilibrium, and 'n' is the optimum lag-length(s) chosen for the estimation. The parameters β_i, γ_i, θ_i and π_i indicate short-run multiplier, while parameters μ_1, μ_2, μ_3 and μ_4 stand for long-run multiplier. In this model the null hypothesis of no cointegration implies $\mu_1 = \mu_2 = \mu_3 = \mu_4 = 0$ and alternative hypothesis of cointegrating relation implies μ_1 `'" $\mu_2$ `d μ_3 `d $\mu_4$ `d0.

V.Empirical Results and Analysis

This section is divided into four sub-sections. These are: A. Unit Root Test, B. ARDL Bounds Test for Cointegration, C. Short-Run Error Correction Model and D. Estimated Long Run Coefficients.

A. Unit Root Test

In order to examine the integrating level of variables, Dickey and Fuller (1979) and Phillips and Perron (1988) are employed in this study.In most literature, Dickey and Fuller (1979) and Phillips and Perron (1988) tests have been used extensively in order to find out the order of integration. However, the results of Unit Root Test are as follows:

Table 2: Results of Augmented Dickey Fuller (ADF) Unit Root Test

Variables and Specifications	Level		First Difference		Order of Integration
	Statistic	Prob.	Statistic	Prob.	
MAN_G	-3.100.00				**I(0)**
FDI	-2.98	0.14	-7.29	0.00	**I(1)**
L_REER	-0.47	0.98	-4.05	0.01	**I(1)**
LR_REM	-1.67	0.74	-7.12	0.00	**I(1)**

Source: Author's' own estimate by using E-Views Software.

Note: Test Critical Value has been checked at 1%, 5% and 10% level of significance respectively.

Table 3: Results of Phillips-Perron (PP) Unit Root Test

Variables and Specifications	Level		First Difference		Order of Integration
	Statistic	Prob.	Statistic	Prob.	
MAN_G	-3.17 0.03				**I(0)**
FDI	-2.980.14		-6.82	0.00	**I(1)**
L_REER	-0.770.95		-3.98	0.01	**I(1)**
LR_REM	-1.800.68		-6.98	0.00	**I(1)**

Source: Authors" own estimate by using E-Views Software.

Note: Test Critical Value has been checked at 1%, 5% and 10% level of significance respectively.

Table2 and 3 both show that under ADF and PP unit root tests, Growth of Manufacturing Industry Production (MAN_G_t) is stationary at levels i.e.I(0) while FDI Inflows (FDI_t), Real Effective Exchange Rate ($REER_t$), Remittances Inflow (REM_t) become stationary after first difference i.e. I(1). That impliesboth tests have given the same results.

The variables considered in this study are a mix of I(0) and I(1) series. The cointegration test methods based on Johansen (1991; 1995) and the Johansen-Juselius (1990) require that all the variables be of equal degree of integration, i.e., I(1). Therefore, these methods of cointegration are not appropriate and cannot be employed. That is why, hence, we have adopted the ARDL modelling approach for cointegration analysis in this study.

A. ARDL Bounds Test for Cointegration

A team of work led by Pesaran and Shin (1996), Pesaran and Shin (1998) and Pesaran *et al.(2001)* has introduced an alternative cointegration technique known as the 'Autoregressive Distributed Lag' or ARDL bound test. It is argued that ARDL has a number of advantages over conventional Johansen cointegration techniques. To start with, the ARDL is a more statistically significant approach for determining cointegrating relationships in small samples (Ghatak and Siddiki, 2001), while the Johansen co-integration techniques still require large data samples for the purposes of validity. As stated above, a further advantage of the ARDL is that while other cointegration techniques require all of the regress to be integrated of the same order, the ARDL can be applied whether the regressors are I (1) and/or I (0). This means that it avoids the pre-testing problems associated with standard cointegration, which requires that variables are already classified I(1) or I(0) (Pesaran et al., 2001).

However, since this study aims to detect the short-run as well as the long-run relationship between manufacturingindustrial growth and Remittancesinflows, we make use ofthe already well-known though relatively new cointegration techniques of ARDL. The results of bound test based on models (1) are as follows:

Table 4: Result of Autoregressive Distributed Lag Bound Test

(Model 1: Dependent variable is MAN_G)

Regressor		**Coefficient**		**T-Ratio[Prob]**
dL_REER		-5.62		-1.87(0.70)
dLR_REM		-8.60		-2.13(0.04)
dFDI		0.75		0.61(0.54)
ecm(-1)		-0.49		-3.00(0.00)
Testing for existence of a level relationship among the variables in the ARDL model				
F-statistic 6.60	**95% Lower Bound 3.59**	**95% Upper Bound 4.89**	90% Lower Bound 2.93	90% Upper Bound 4.07
W-statistic 20.45	95% Lower Bound 14.04	95% Upper Bound 19.23	90% Lower Bound 11.19	90% Upper Bound 14.51
If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.				

Source: Authors' own estimate by using Microfit 4.1 Software.

The results of the bound test indicate that the calculated F statistics 6.60 (Table 4) in case of model (1) exits the upper bound critical value 4.89and the null hypotheses of no cointegrationare rejected. It meansthat there are long-term equilibriums among the considered variables, in the examined period.Table 4 shows that the error correction coefficientsfor the models are negative and statistically significant, which demonstrates the long-run relationships between the variables. This confirms once again, the existence of the cointegration relationship among the variables of the model. The coefficients of ECM (-1) are equal to (-0.49) for models (1). This means that the adjustment takes place relatively quickly, i.e. the speed of adjustment is relatively high. The values indicate rapid adjustment processes, with almost the whole disequilibrium of the previous year's shock adjusting back to the long-run equilibrium in the current year. As ECM is working in these models, the long run relationships must be there.

B. Short-Run Error Correction Model

As the bound test has given the green signal, we have applied short-run error correction mechanism or model (ECM) under ARDL framework. The error correction term indicates the speed of the adjustment which restores equilibrium in the dynamic model. The ECM coefficient shows how quickly variables return to equilibrium and it should have a statistically significant coefficient with a negative sign. Bannerjee et al. (1998) holds that a highly significant

error correction term is further proof of the existence of a stable long-term relationship. Table 5 reports the short-run coefficient estimates obtained from the ECM version of the ARDL model which give the causal relationship among the variables.

Table 5: Short-Run Error Correction Elasticity Estimates

(ARDL (1, 0, 1, 0) selected based on Schwarz Bayesian Criterion)

Regressor	Coefficient	T-Ratio[Prob]
dL_REER	-5.62	-1.87[0.07]
dLR_REM	-8.60	-2.13[0.04]
dLR_REM(-1)	-7.04	-1.87[0.07]
dFDI	0.75	3.13[0.05]
INPT	**-1.30**	**-6.07[0.04]**

Source: *Authors' own estimate by using Microfit 4.1 Software.*

Table 5 shows that the Growth of Manufacturing Industrial Production is explained by the Remittances Inflow and also by FDI Inflow. The Table also indicates that in short run the Growth of Manufacturing Industrial Production is positively influenced by FDI inflow at 5% level of significance respectively, whereas as the Remittances Inflow is giving a negative trust to Growth of Manufacturing Industrial Production with coefficient value (-) 8.60 at 5% level of significance. The Table also highlights the intercept term are significant at 5% level of significance.

C. Estimated Long Run Coefficients

We have estimated the long run equilibrium relationship between the variables for the modeland reported the necessary results in following Table (Table 6):

Table 6:Estimated Long Run Coefficients using the ARDL Approach

(ARDL (1, 0, 1, 0) selected based on Schwarz Bayesian Criterion)

Dependent variable is MAN_G		
Regressor	**Coefficient**	**T-Ratio[Prob]**
MAN_G(-1)	5.05	3.07[0.00]
L_REER	-5.62	-1.87[0.07]
LR_REM	-6.86	3.47[0.01]
LR_REM(-1)	-7.86	-1.07[0.14]
FDI	0.88	3.02[0.00\
INPT	-3.47	-5.44[0.00]

Source: Researchers' own estimate by using Microfit4.1 Software.

The estimation results from both the models reveal that Remittances Inflow as well as the FDI Inflow has significant implications for industrial growth for manufacturing sector in long run also**.**Table 6 give us the same view as the short run that in long run also Remittances may affect the Growth of Manufacturing sector negatively with coefficient value -6.86 at 1% level of significance.

D. Stability Tests

To analyze the stability of the long-run coefficients together with the short-run dynamics, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUM) are applied here. A graphical representation of CUSUM and CUSUMQ statistics are shown in Figure 1 and 2.

Figure 1: Plot of Cumulative Sum of Recursive Residuals

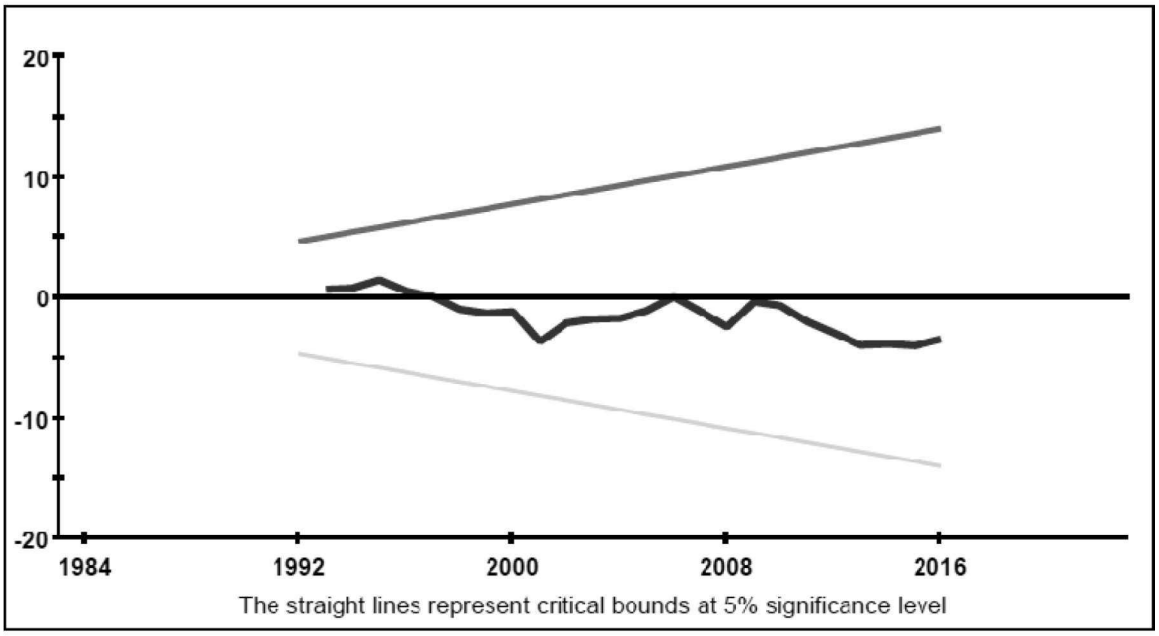
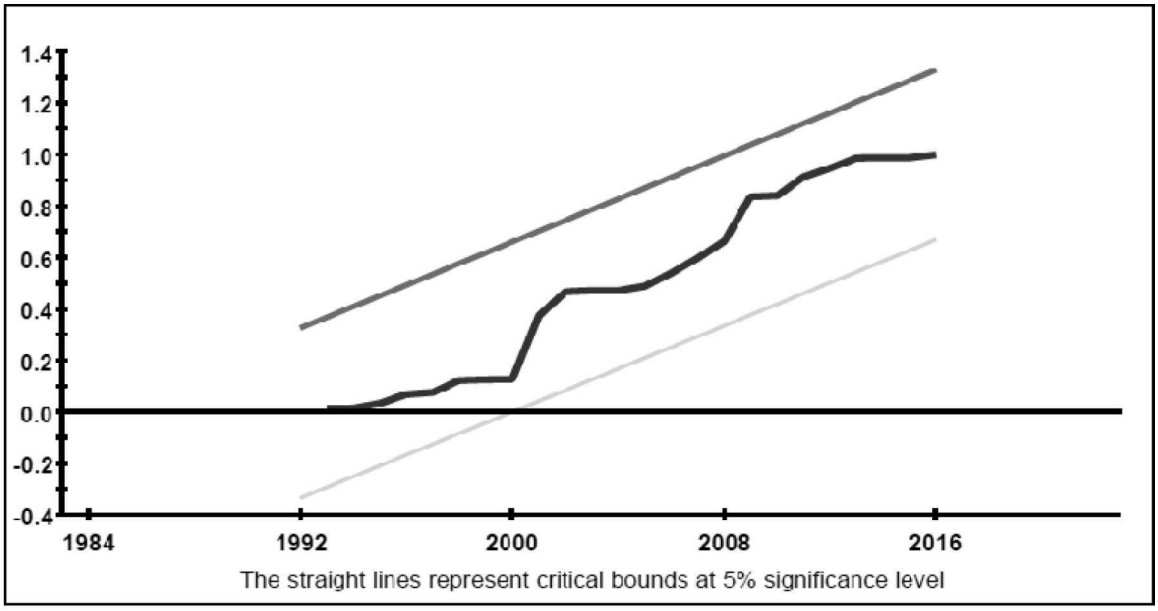


Figure 2: Plot of Cumulative Sum of Squares of Recursive Residuals



It can be clearly said from Fig. 1 and 2 thatthe plots of both the CUSUM and the CUSUMQ are within the boundaries and by that, these statistics confirm the long-run relationships among variables and thus show the stability of the long-run coefficients of the industrial growth function in models 1 and 2.

VI. Conclusion

What follows from our empirical estimation is the fact that the Growth of Manufacturing Industrial Production can be explained by the Remittances Inflow and also by FDI Inflow. The empirical result also indicates that in short run the Growth of Manufacturing Industrial Production is positively influenced by FDI inflow at 5% level of significance, whereas the Remittances Inflow is giving a negative thrust to Growth of Manufacturing Industrial Production with negative coefficient value (-) 8.60 at 5% level of significance.

From the estimated value it appears that's both in the short run and long run, the impact of remittances flow Remittances on the Growth of Indian Manufacturing sector is negative uptill now. So far so, it's true in Indian case. But this does not however mean that this negative nexus between remittances flow and industrial development will continue in the upcoming future. We have before us the case of Mexico and other countries of the globe where the positive nexus between this two exists. We are hopeful that in the upcoming future, this negative relation will be turned out positive in case of India when the remittances received by the Indian residents will utilize and enhance it for the country's industrialization

by setting up Micro, Small and Medium Enterprises (MSMEs) as well as service enterprises for country's onward march for fruitful industrialization.

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Artha Beekshan, Volume 28, No. 3, December 2019

Economic Growth vs. Employment – Challenges for India

Hrishita Ghosh

Abstract

India has been on a path of stellar economic growth over the past decade and half, with the GDP growing annually, on an average, by over 6% for quite a few years now. However, the employment growth has not been able to keep up with this rate of growth of the GDP and has always lagged behind. Unemployment continues to be a major problem for the Indian economy and India seems to continue to face this problem of unemployment inspite of a rapid economic growth.

The purpose of this paper is to look into the reasons for this problem that the Indian economy faces through some basic statistical tools and a regression analysis. The paper proposes a few possible remedies from the insights drawn through the analysis.

Keywords: Economic Growth, Employment, Sectoral Growth in GDP, Sectoral Productivity

JEL Classification Codes: O11, O15, I31, I32, I38.

I. Introduction

The latest Economic Survey reports that annual employment growth in India was only 0.5 percent during the period 2004-12, while labor force growth was 2.9 percent.India was able to add 1,35,000 jobs in eight labor-intensive sectors as surveyed by the Labor Bureau in 2015. On the other hand, the number of people working or looking for jobs or the 'labor force' grew by over 10 million. India's Gross Domestic Product (GDP) has been growing annually, on an average, by over 6% for quite a few years now. But alternative calculations show employment growth at 1.2% and labor force growth at 2.8% annually.

All of these numbers together point to a clear case of *jobless growth*. It is commonly known that a large proportion of the employed, especially in agriculture, are actually under-employed. To fully employ the labor force gainfully and productively, India will probably have to create millions of new jobs over the coming few years.

If output grows much faster than employment, then we know that the output per worker, commonly known as labor productivity, rises rapidly. This can happen mainly due to the following reasons:

- technical or technological progress in individual sectors,

· growth enhancing 'structural change', which implies that the relatively productive sectors expand their share in national employment at the expense of other sectors.

In order to understand what has caused this in India, we will study the sectoral growth of the GDP viz. a viz. the sectoral employment.

II.Sectoral Growth of the GDP in India and the Sectoral Employment for the period 1999-00 to 2009-10

The following table shows the sectoral growth in GDP in India for the period 1999-00 to 2011-12.

Table1 : Sectoral Growth in GDP for the period 1999-00 to 2011-12

Financial Year	Forestry&Fishing Share to Total GDP	Agriculture - Share to Total GDP	Electricity,Gas, Water Supply & Construction	Mining and Quarrying - Share to Total GDP	Manufacturing - Share to Total GDP	Services - Share to Total GDP
1999-2K	3.59	19.68	8.78	3.02	15.07	49.85
2000-01	3.56	18.76	8.85	2.97	15.50	50.37
2001-02	3.49	18.92	8.68	2.86	15.02	51.02
2002-03	3.42	16.72	8.97	2.98	15.44	52.48
2003-04	3.17	17.15	9.17	2.84	15.19	52.48
2004-05	2.99	16.04	9.81	2.86	15.25	53.05
2005-06	2.81	15.46	10.00	2.65	15.34	53.74
2006-07	2.68	14.69	10.05	2.60	16.00	53.98
2007-08	2.52	14.29	10.14	2.46	16.14	54.45
2008-09	2.41	13.36	9.99	2.36	15.78	56.11
2009-10	2.29	12.35	9.80	2.30	16.17	57.09
2010-11	2.16	12.29	9.79	2.21	16.23	57.32
2011-12	2.08	12.02	9.75	2.06	15.70	58.39

Source : Planning Commission Data (data.gov.in)

From the data shown in Table1, we see that the share of agriculture in the GDP has fallen over the years, that of manufacturing has remained more or less the same while that of services has increased considerably. This is consistent with the pattern of structural change experienced by the Indian economy

We now move to portray the sectoral employment in India's subsectors. The following table shows the sectoral employment in the years 1999-00, 2004-05 and 2009-10.

Table 2 : Sectoral Employment in the Years 1999-00, 2004-05 and 2009-10.(in lakhs)

Sectors	Employment across various sectors 1999-00	Employment across various sectors 2004-05	Employment across various sectors 2009-10
Agriculture	**237.67**	**258.93**	**244.85**
Manufacturing	**44.05**	**55.77**	**50.74**
Mining and quarrying	**2.17**	**2.64**	**2.95**
Electricity, gas and water supply	**1.13**	**1.30**	**1.25**
Construction	**17.54**	**26.02**	**44.08**
Services	**94.20**	**112.81**	**116.34**
Total	**396.76**	**457.46**	**460.22**

Source : Planning Commission(data.gov.in)

The percentage contribution of the different sectors to the total employment in the years 1999-00, 2004-05 and 2009-10 is given in table 3 below.

Table 3 :Percentage contribution of the different sectors to the total employment in the years 1999-00, 2004-05 and 2009-10.

Financial Year	Agriculture	Manufacturing	Mining and quarrying	Electricity, gas and water supply & Construction	Services
1999-00	59.90	11.10	0.55	4.71	23.74
2004-05	56.60	12.19	0.58	5.97	24.66
2009-10	53.20	11.03	0.64	9.85	25.28

Source : Planning Commission (data.gov.in)

Thus from the above tables we see that agriculture employs major proportion of the work force followed by the services. While the percentage of the employment by agriculture is going down, that of services is increasing. The contribution of manufacturing and mining is more or less stable. The contribution by electricity, gas, water supply and construction is increasing, but the contribution by this sector is insignificant.The following figures describe the sectoral comparison in contribution to GDP and Employment in the Years 1999-00, 2004-05 and 2009-10.

Fig 1 : Sectoral Contribution in GDP in the Years 1999-00, 2004-05 and 2009-10. (Source : Planning Commission)

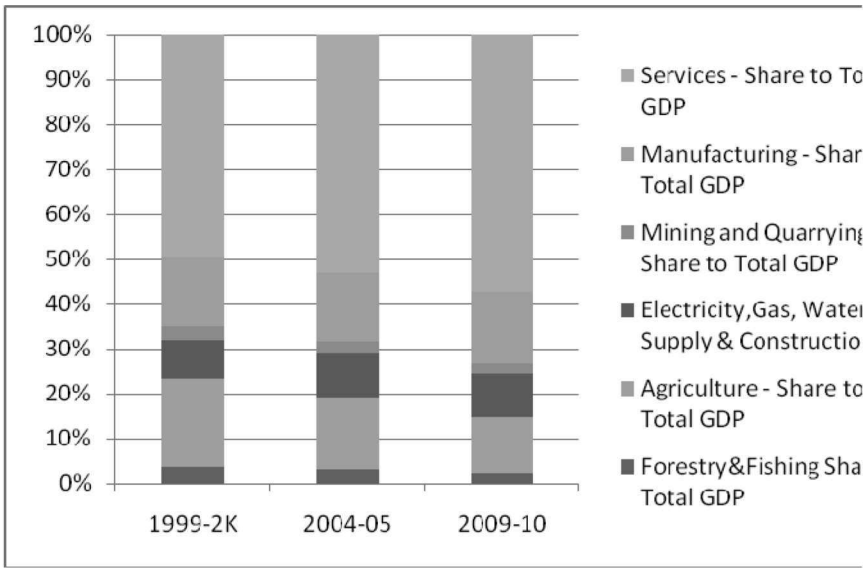


Fig 2: Sectoral Contribution in Employment in the Years 1999-00, 2004-05 and 2009-10(Source : Planning Commission)

From Fig 1, we see that the services contribution in GDP has increased manifold from the year 1999-00 to 2009-10 and has gone well above 55%, while that of agriculture has decreased and has gone well below 20%. The contribution by manufacturing and mining and quarrying has more or less remained constant. The contribution by electricity, gas, water supply and construction has increased but is still insignificant.

From Fig 2, we see that agriculture, in spite of having a lower share in GDP still employs the majority of the workforce (more than 50%), while services, in spite of having the major share in GDP (more than 50%) employs only about 25% of the work force. Among the other sectors, though electricity, gas, water supply and construction shows an increasing absorption of work force, its contribution in GDP being insignificant, does not play a major role in employment.

The above analysis seems to imply that India's problem of unemployment is due to a growth enhancing 'structural change', which implies that the relatively productive sectors are expanding their share in national employment at the expense of other sectors.

II. Regression Analysis – the Relation Between Employment and Sectoral Productivity

The Model

Assumptions –

1) It is assumed that the sectoral productivity is constant over the period of study, i.e. 1999-00 to 2009-10.

2) The output of a sector, Xi, is given as $Xi = KiLi$, where Ki is productivity of sector i and Li is the labour employed in sector i.

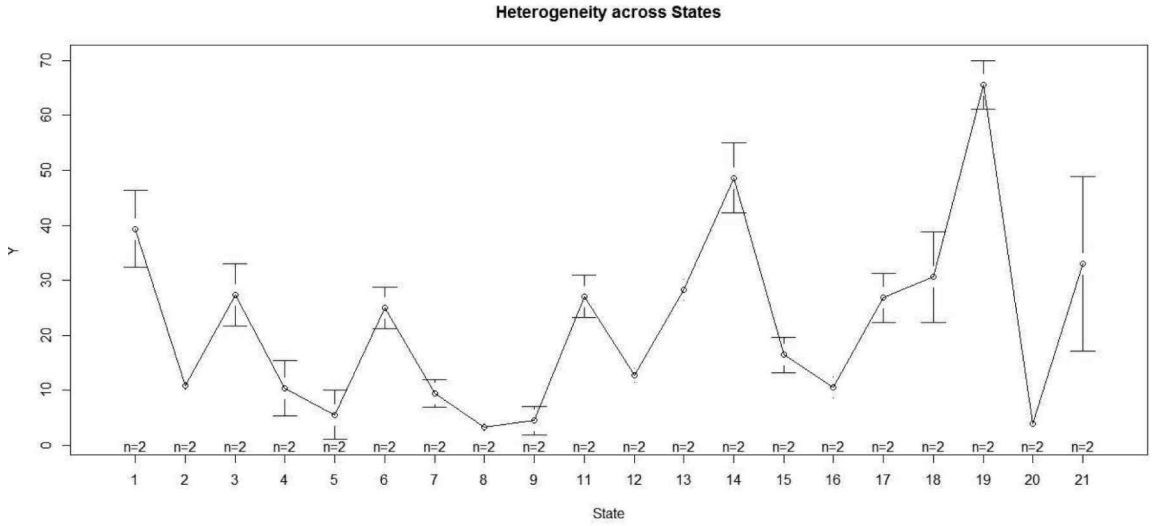
Hence,
$Xi = KiLi$
Or, $Li = Ki'Xi$, where $Ki' = 1/Ki$, i.e. the inverse of the sectoral productivity.
Hence, the total labour employment is given as
$L = \sum Li = \sum Ki'Xi$
Hence, the structural equation is given as :
$Y = \beta 1X1 + \beta 2X2 + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + \beta kXk + u$
Here, Y is the total employment, Xi is the GDP of sector i, βi,the partial effect of Xi on Y, is the inverse of the sectoral productivity, $\beta i = Ki'$.

The Regression

In order to estimate the above structural equation, we use panel data of states across time periods 2004-05 and 2009-10. The dataset is given in Appendix 1. We do this in R.

First, we try to see the heterogeneity across the states. This is evaluated as follows:

Fig. 3: 95% Confidence Interval around the Mean Employment across the States



Next, we do OLS regression with the pooled data as follows:

>ols<-lm(Y ~ X1+X2+X3+X4+X5+X6, data=Panel)

> summary(ols)

Call:
lm(formula = Y ~ X1 + X2 + X3 + X4 + X5 + X6, data = Panel)

Residuals:

Min	1Q	Median	3Q	Max
-12.9371	-2.5111	-0.5151	3.2561	12.5305

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	0.50532	2.11797	0.239	0.813	
X1	0.61304	0.09391	6.528	2.06e-07	***
X2	0.59914	0.66159	0.906	0.372	
X3	-0.01533	0.07785	-0.197	0.845	
X4	0.14071	0.46121	0.305	0.762	
X5	-0.11345	0.14643	-0.775	0.444	
X6	0.06073	0.03766	1.613	0.116	

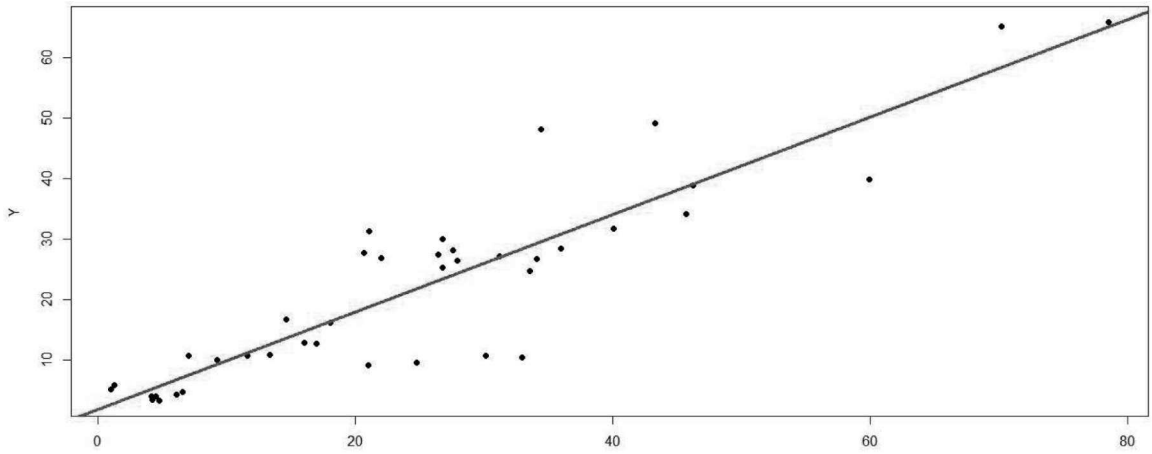
—

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
 Residual standard error: 6.599 on 33 degrees of freedom
Multiple R-squared:  0.8603,    Adjusted R-squared:  0.8349
F-statistic: 33.87 on 6 and 33 DF,  p-value: 9.606e-13
```

From the above regression, we see that only X1, i.e. GDP from Agriculture is statistically significant at 5% level of significance, i.e. only X1 significantly impacts Y, the total employment. A plot of the fitted values of Y against X1 is obtained as below:

```
>Yhat<-ols$fitted

>plot(Panel$X1,Panel$Y,pch=19,xlab="X1",ylab="Y")

>abline(lm(Panel$Y~Panel$X1),lwd=3,col="red")
```

Fig 4: Fitted Values of Y against Agricultural Output X1



The slope of the above graph shows that Agricultural Output, X1, significantly affects total employment, Y.

Now, OLS regression does not consider heterogeneity across states or time. Hence, we also use the Least Squares Dummy Variable model of regression as follows:

```
>fixed.dum<-lm(Y ~ X1+X2+X3+X4+X5+X6+ factor(Year)-1,data=Panel)
> summary(fixed.dum)

Call:
lm(formula = Y ~ X1 + X2 + X3 + X4 + X5 + X6 + factor(Year) -
    1, data = Panel)
```

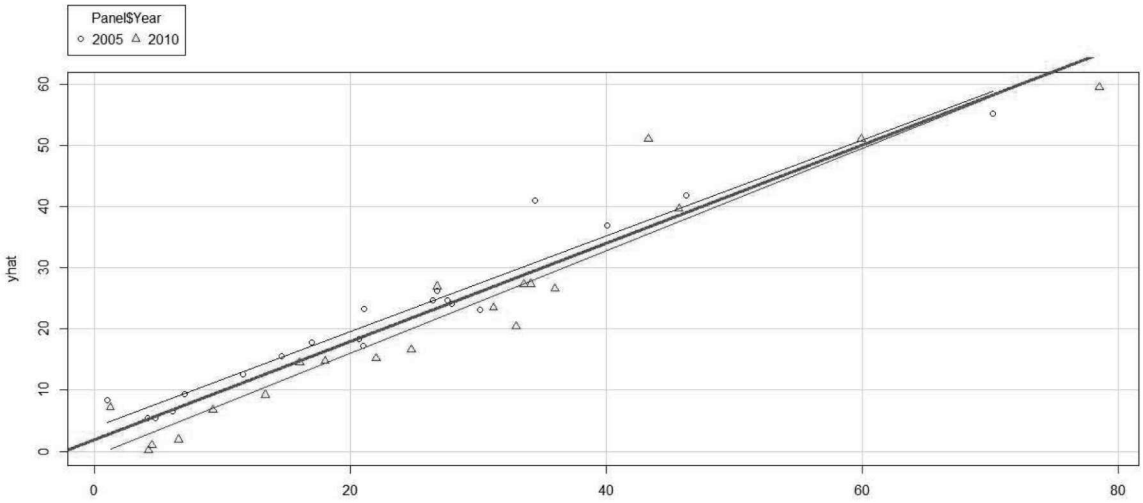
```
Residuals:
    Min      1Q  Median      3Q     Max
-12.4219  -2.7624   0.2981   3.0931  11.6627

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
X1               0.62184    0.08749   7.107  4.6e-08 ***
X2               0.22147    0.63464   0.349   0.7294
X3              -0.03806    0.07305  -0.521   0.6059
X4               0.35212    0.43782   0.804   0.4272
X5              -0.02669    0.14078  -0.190   0.8508
X6               0.07472    0.03551   2.104   0.0433 *
factor(Year)2005  1.76966    2.03722   0.869   0.3915
factor(Year)2010 -3.57363    2.57366  -1.389   0.1746
—

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
Residual standard error: 6.144 on 32 degrees of freedom
Multiple R-squared:  0.9592,    Adjusted R-squared:  0.949
F-statistic: 94.07 on 8 and 32 DF,  p-value: < 2.2e-16
```

In this regression, we see that both X1 and X6, i.e. both Agriculture Output and Services Output are statistically significant, i.e. they impact the total employment. The partial effect of Agriculture Output is more than that of the Services Output.

We obtain a plot of the fitted values of Y against X1 for the two time periods as well as for the pooled data as follows:

```
yhat<- fixed.dum$fitted
> library(car)
> scatterplot(yhat~Panel$X1|Panel$Year,boxplots=FALSE,xlab=”X1",ylab=”yhat”,smooth=FALSE)
>abline(lm(Panel$Y~Panel$X1),lwd=3,col=”red”)
```

Fig 5: Fitted Values of Employment against Agricultural Output



In order to account for unobserved effects, we also use the Fixed Effects Panel Data regression model as follows:

```
> library(plm)
> fixed <- plm(Y ~ X1+X2+X3+X4+X5+X6 ,data=Panel, index=c("State","Year"),model="within")
> summary(fixed)
Oneway (individual) effect Within Model

Call:
plm(formula = Y ~ X1 + X2 + X3 + X4 + X5 + X6, data = Panel, model = "within", index = c("State", Year"))
Balanced Panel: n=21, T=2, N=42

Residuals :
      Min.    1st Qu.     Median    3rd Qu.       Max.
-8.8486e-01 -2.2349e-01 -7.6111e-16  2.2349e-01  8.8486e-01

Coefficients :
    Estimate Std. Error t-value Pr(>|t|)
X1 -0.0685609  0.0988327 -0.6937  0.49847
X2  0.4143985  0.4341956  0.9544  0.35501
X3 -0.0339591  0.0240224 -1.4136  0.17788
X4  0.1049895  0.1690356  0.6211  0.54385
X5 -0.0216035  0.0232651 -0.9286  0.36781
X6  0.0193067  0.0097387  1.9825  0.06605 .
```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Total Sum of Squares: 8.58
Residual Sum of Squares: 5.6038
R-Squared: 0.34687
Adj. R-Squared: -0.78521

In this regression, we see that only X6, i.e. Services Output is statistically significant at 10% level of significance. In order to test whether to use the Fixed Effects model or the OLS (pooled data) model, we use the following test.

>pFtest(fixed,ols)
F test for individual effects
data: Y ~ X1 + X2 + X3 + X4 + X5 + X6
F = 192.25, df1 = 20, df2 = 15, p-value = 1.36e-14
alternative hypothesis: significant effects

III. Conclusions

The partial effects of the various sectors and the corresponding productivities for the period 2004-05 to 2009-10 are shown in the following table.

Table 4: Partial Effects of the Sectoral Outputs on Employment and the Corresponding Productivities.

Setor	Partial Effect on Employment	Productivity
Agriculture	-0.07	
Forestry and fishing	0.41	2.41
Manufacturing	-0.03	
Mining and quarrying	0.10	9.52
Electricity,gas, water supply and construction	-0.02	
Services	0.02	51.80

With the above results, the conclusions are as follows:

a) Only Services Output has significant impact on employment. This is because thissector

hasa significant contribution to the GDP. However, the productivity of this sector being very high, it generates little employment compared to the available workforce.

b) The partial effect of Agriculture on employment is negative. This is because agriculture has disguised unemployment and there is movement of people out of agriculture to other sectors in search for productive and gainful employment.

c) The partial effects of manufacturing and electricity, gas, water supply and construction are also negative indicating movement of people out of these sectors in search of gainful and productive employment.

d) The productivity of the Services Sector is very high. Therefore, the labour force displaced from the Agriculture sector cannot be absorbed in the services sector causing large scale unemployment.

e) The productivity of the forestry and fishing are moderate, indicating that this sector is labour intensive.However, this sectoris very small not having much effect in total employment. This sector can be grown to absorb the displaced labour from agriculture.

f) The productivity of the mining and quarrying sector is moderately high, higher than forestry and fishing, although this sector is also very small in order to have a meaningful impact on employment.This sector can also be grown to absorb labour displaced from agriculture as well as the manufacturing sectors.

g) The manufacturing and the electricity, gas, water supply and construction sectors themselves should be further developed and additional capacity should be created in these sectors to generate useful employment and for these sectors to have a meaningful impact on employment.

IV.Recommendations

1) **Government Protection:** Government should provide some protection to large employment generation sectors from free market competition, e.g. agriculture. As the employment in agriculture will continue to shrink, the government can focus on promoting value added industries in this sector like the food-processing industry. The Government should adopt a creative and aggressive international trade policy which allows India to trade our agricultural produce abroad. In this respect, the Government should focus on facilitating logistic infrastructure for their export.

2) **Forestry & Fishing**: As seen above, the forestry and fishing has moderate productivity.This sectorhas to be grown in order to absorb the displaced labour force from the agricultural sector and thus causing an impact on the employment generation in the country.The domestic demand for this sector being limited, the government

should again focus on promoting value added industries in this sector and in aggressively promoting the exports.

3) **Mining and Quarrying**: The mining and the quarrying sector can be further grown, by increasing the capacity of the existing mines and/or by establishing new mines wherever possible in order to absorb the labour displaced from the agriculture as well as the manufacturing sectors.

4) **Manufacturing**: As seen above, the main contributor to India's stellar growth performance over the last decade and a half is the services sector comprising financial, retail and business services including information technology-enabled services.Its high productivity means that it adds a significant amount to the GDP. Unfortunately, only a tiny proportion of India's labour force can meet the skill and education requirements of this sector.

Since bringing the majority of the population to that level of education might take a long time, in the short and medium term, it is labour-intensive manufacturing that will need to grow to absorb India's growing labour force at reasonably high productivity levels.Historically almost all nations - except very small ones like Singapore, have achieved the transition to a developed nation riding on growth fueled by manufacturing - UK, US, Germany, France, Japan even China.In this respect, India seems to have given manufacturing a complete miss.

The Government has a significant role to play in policy making that catalyzes an explosive growth in supply side efficiencies, i.e. availability of power, transportation and logistic infrastructure, communication infrastructure.

5) **Manufacturing for Exports:** In the presence of rapid technological progress (which includes automation but is not restricted to it), which means less labour is needed to produce a given amount of output, it is difficult for the manufacturing sector to rapidly expand its employment. The demand for the products of this sector does not expand fast because many of these products fall into the category of necessities, whose share in total expenditure falls with income growth. The only solution to this problem is to find external markets to export to. Exporting removes the domestic demand constraint.

6) **Reforms of Labour Laws:** Indian manufacturing industries use more capital-intensive techniques and produce more capital-intensive products than countries at the same stage in their development or even compared to China, whose per capita income is currently roughly double that of India's. The high capital intensity is a response to India's labour regulations that make labour (adjusted for its productivity) more

expensive, forcing firms to substitute away from it into capital. Thus India is unable to exploit its labour-abundance based comparative advantage to export labour-intensive products. As a consequence, manufacturing employment remains relatively small.

There are several steps the government can take for reforms of labour laws. Rajasthan has set an example in this respect for other states to follow -

- It has raised the threshold firm employment size for seeking permission for laying off workers from 100 to 300 workers under the Industrial Disputes Act.
- It has also raised employment thresholds for the enforcement of some of the restrictive provisions of the Factories Act.
- The minimum membership for the registration of a labor union has been raised from 15 to 30 percent of the firm's employment, addressing the problem of the multiplicity of unions.

7) Encouraging Entrepreneurship: The Governemnt needs to play a significant role in encouraging people's entrepreneurial instincts — whether they create mom-and-pop undertakings countrywide, or deliver results under the Startup India or Stand-up India missions. These will generate sustainable outcomes.

8) Revamp of The Education System: The education system needs to be revamped to create the desired skill-sets. At present, the education system is failing miserably in delivering to produce adequate number of high skilled labour that can meet the demands of the services and the high tech. manufacturing sectors.

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Appendices

Appendix 1

			Employment (millions)	Agriculture (Rs.1000 crores)	Forestry and fishing (Rs.1000 crores)	Manufacturing (Rs.1000 crores)	Mining and quarrying (Rs.1000 crores)	Electricity, gas, water supply and construction (Rs.1000 crores)	Services (Rs.1000 crores)
State Name	State	Year	Y	X1	X2	X3	X4	X5	X6
Andhra Pradesh	1	2005	38.8	46.25	10.09	27.33	6.27	20.96	113.81
Andhra Pradesh	1	2010	39.9	59.92	12.34	42.36	9.90	34.18	183.87
Assam	2	2005	10.8	11.59	2.07	5.62	4.68	4.41	25.04
Assam	2	2010	10.9	13.34	2.66	5.62	4.34	6.65	37.19
Bihar	3	2005	27.8	20.67	3.86	4.38	0.04	6.29	42.55
Bihar	3	2010	26.9	21.99	3.72	6.27	0.09	15.17	65.92
Chhattisgarh	4	2005	10.8	7.06	3.10	10.48	5.37	5.38	16.48
Chhattisgarh	4	2010	10	9.27	3.52	13.27	7.58	11.44	26.26
Delhi	5	2005	5.2	1.02	0.08	7.33	1.42	9.76	80.73
Delhi	5	2010	5.9	1.23	0.08	9.43	0.00	14.03	143.87
Gujarat	6	2005	25.3	26.75	5.96	55.44	7.03	18.88	89.32
Gujarat	6	2010	24.7	33.54	6.50	102.53	6.95	36.55	148.06

Haryana	7	2005	9.2	20.97	1.15	20.46	0.20	10.87	42.15
Haryana	7	2010	9.6	24.77	1.42	29.58	0.17	16.16	80.38
Himachal	8	2005	3.3	4.75	1.39	2.77	0.06	6.40	8.70
Himachal	8	2010	3.4	4.23	1.98	6.19	0.14	9.21	14.17
Jammu and Kashmir	9	2005	4.3	6.10	1.56	1.67	0.03	6.01	11.94
Jammu and Kashmir	9	2010	4.7	6.58	1.49	2.82	0.08	7.02	18.24
Karnataka	11	2005	27.4	26.46	4.74	30.60	1.93	17.96	85.07
Karnataka	11	2010	26.8	34.06	5.77	44.31	2.45	26.78	134.21
Kerala	12	2005	12.7	16.98	3.86	10.22	0.46	16.67	71.07
Kerala	12	2010	12.9	16.04	4.30	13.49	0.81	59.25	119.79
Madhya Pradesh	13	2005	28.2	27.54	3.70	12.56	5.45	12.65	51.03
Madhya Pradesh	13	2010	28.5	35.99	3.99	22.77	7.33	20.36	77.14
Maharashtra	14	2005	48.1	34.42	10.50	85.48	3.49	34.06	247.53
Maharashtra	14	2010	49.1	43.29	11.07	141.19	3.76	55.29	412.35
Orissa	15	2005	16.7	14.60	3.65	9.37	5.86	11.29	32.95
Orissa	15	2010	16.2	18.01	4.08	17.11	9.13	13.52	54.00
Punjab	16	2005	10.7	30.14	1.47	14.66	0.02	9.30	41.25
Punjab	16	2010	10.4	32.93	1.74	27.88	0.03	14.88	61.18
Rajasthan	17	2005	26.5	27.92	4.81	15.98	2.72	20.34	55.98
Rajasthan	17	2010	27.2	31.16	5.20	28.32	4.89	27.45	89.21
Tamil Nadu	18	2005	31.3	21.03	3.34	43.43	1.63	24.25	125.33
Tamil Nadu	18	2010	30	26.74	4.30	76.13	1.76	32.44	215.26
Uttar Pradesh	19	2005	65.2	70.17	7.40	35.19	2.74	22.73	122.61

Uttar Pradesh	19	2010	65.9	78.50	8.52	51.66	3.09	35.16	190.49
Uttarakhand	20	2005	4	4.11	1.41	3.16	0.30	3.54	12.27
Uttarakhand	20	2010	4	4.47	1.56	12.87	0.27	4.60	26.83
West Bengal	21	2005	31.7	40.02	9.92	23.26	2.85	19.08	113.53
West Bengal	21	2010	34.2	45.66	12.16	32.42	2.67	23.35	175.70

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Vol. 28 , No. 3
December 2019

ARTHA BEEKSHAN

RNI NO.53099/92

Sponsored by :

INDIAN COUNCIL OF SOCIAL SCIENCE RESEARCH

Published by Secretary, Bangiya Arthaniti Parishad, 87/277, Raja S. C. Mallick Road,
Ganguly Bagan, Kolkata - 700 047.
Printed by Tamojit Bhattacharya, Kolkata Mudran, 12, Biplabi Pulin Das Street,
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