



REGIONAL CONVERGENCE IN AGRICULTURE GROWTH IN INDIA: A STATE LEVEL ANALYSIS

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ABSTRACT

This paper is an attempt to investigate the regional convergence of agriculture growth in India. The consequences model states that regional divergence at initial level of growth and convergence took place later on when the economy reached to the maturity. Being an agrarian economy, it become essential to see whether this growth is as agriculture is conversing on this time among the state in India or not. In this paper has been measured among the state in term of agriculture production and productivity of agriculture major food grain crops. This study is based on secondary data. Data have been taken from Ministry of Agriculture Government of India. For the purpose growth model and sigma convergence model has been applied, it found the regional divergence has taken place in growth of agriculture in India.

KEY WORDS: Agriculture, Growth and Convergence

INTRODUCTION

India is an agrarian state where about seventy percent of the population depends on agriculture and allied activities. India is the first in the world in the production of milk, pulses, jute and jute-like fibres; second in rice, wheat, sugarcane, groundnut, vegetables, fruits and cotton production. The overall GDP of the country, the contribution of the primary sector (which comprises agriculture, forestry and fishing) has come decreased substantially over the years, and, it recorded for 13.7 percent as of 2012-13. During 1950-51, the primary sector was contributing 51.9 percent of the country's GDP which declined to 29.5 percent by 1990-91 and has declined further to 13.7 percent by 2012-13. The shares of 'agriculture' were recorded at a low of 11.6 percent in 2012-13, from a much higher share (in GDP) of 41.8 Percent during 1950-51.

The average annual growth of 11th Five Year Plan (2007-12) was 3.6 per cent in the gross domestic product (GDP) from agriculture and allied sector. Agricultural growth has always been an important factor for inclusiveness. During the period agriculture food grain production has increased. The 12th Plan target growth rate for agriculture is 4 percent with food grains growth at about 2 percent and non-food grains sector (horticulture, livestock and fisheries) growing at about 5-6 percent. Several studies such as Rao (1975), Mehra (1981), Desai and Hazell, 1982, etc. have pointed out that the new strategy of agricultural production based on High Yielding Varieties (HYV) seed ,fertilizer and technology has contributed to the growth in production and productivity in India. Bhalla and Singh (2009) showed that a marked acceleration took place in both the output and yield growth rate in agriculture during 1980-83 to 1992-95. In this paper we attempted trend of agriculture growth in India and disparities in production and productivity in major food grain crop in India. This paper is divided into four sections. 2 section showed with data sources and research methodology used in this study. Section 3 showed the results in this study in respect of growth rates of production and productivity of major food grain and cash crops in India during the period and the convergence results showed. Section 4 showed the conclusion.

OBJECTIVES OF THE STUDY

1. To identify the trend of agriculture growth in India.
2. Disparities in production and productivity in major food grain crops over the years in India.

REVIEW OF LITERATURE

Thakur (2010) studied inter –regional disparities in a comparative study of agricultural development in each zone state. This paper focused on some key issues-like use of fertilizer by the UP, Andhra, Bihar and Gujarat states. Regional imbalance in fertilizer is state wise consuming about 22 percent,

of total fertilizer consumption of India followed by Andhra Pradesh, Bihar and Gujarat come lower consuming states in comparison northern and southern zone.

Somasekhar et. (2011) examined the convergence hypothesis in per capita agricultural output and food grains productivity across the major 15 states of India. Indian states have showed sigma divergence in per capita agricultural output during 1971-2007. The study on the association between initial food grain output and growth rates has shown a pattern of divergence rather than convergence during 1971-1988. This study used the sigma convergence and beta convergence over this period (1971-98). The sigma convergence measures the inter-regional inequality. This study found the inter- regional inequality among the Indian states had increased over this period.

Ghosh (2012) examined regional economic growth and inequality in India. In this paper evaluates the economic performance of 15 major states in India during the period 1960/61–2006/07. This study used one convergent and two non-convergent. The regional divergence and club convergence are explained in terms of interstate variations in physical and social infrastructures, state-level policy reforms, foreign direct investment flows and economic structure. This study found the growth performance of the states has improved in the post-reform period, since 1991 the states have diverged in per capita income. Those states are poorly performing could improve their relative economic position by undertaking investments in physical and social infrastructures, and speeding up the reform process by liberalizing investment and infrastructure policies.

Siddaraju (2013) analyzed growth of agriculture sector in India. This study was based on secondary data which were taken from Ministry of Agriculture Government of India. This study suggested the national plans for improvement and extension of agro-processing technology at farm, traditional small industry and modern industry levels should be prepared.

Pfitzner and Steven D. Lang (2014) examined economic convergence of per capita incomes across the counties in North and South Carolina. This study used census data on per capita income for the 46 counties of South Carolina. For fulfill the objectives of this study used sigma and beta convergence. This study found beta convergence was statistically significant divergence of per capita incomes across both North and South Carolina counties in the decade of the 1980s.

Chatterjee (2014) analysed spatial convergence and growth in Indian agriculture. The main objectives of this study was to explore the nature of growth of per capita income in India from 1967-68 to 2011 and identified the drivers of agriculture growth so that policies with maximum returns can be introduced. This study was based on secondary data which were taken from Economic Survey Government of India. In this paper, convergence in income in Indian agriculture was analysed through two commonly used approaches namely, sigma and beta convergence. Sigma convergence

approach measures the standard deviation of logarithm of income across states at various time points. Beta convergence estimation approach was also used to test convergence in income from Indian agriculture. Global and local Moran's tests found statistically significant spatial dependence across states.

RESEARCH METHODOLOGY

This study is based on secondary data which were taken from Ministry of Agriculture Government of India during the period 2001 to 2012.

DATA ANALYSIS

Growth model has been used to estimate the state wise growth rate of production and productivity of major crops in India. And sigma convergence, used for coefficient of variation of production and productivity over time. This study deals with the total cash crop production as sum of total cotton, rapeseed & mustard, oilseeds and sugarcane. And productivity under major crops also includes the same crops.

SIGMA CONVERGENCE

This study deals with σ -convergence if the dispersion production and productivity over the state decreases over time. This study is based on calculating the Standard Deviation (SD) across twenty eight states of India for each year from 2001 to 2012. As the sigma convergence measures the inter-regional inequality, we may very well infer that the inter-regional inequality among the districts have increased during the given time period. When the dispersion of production and productivity across states falls over time, there is σ -convergence. The model is

$$SD_t = \alpha + \tau t + \mu_t$$

Here, SD = Standard Deviation (Area, Production and Productivity)

α = Intercept, τ = Slope coefficient, μ = Error term, t = time (2001 to 2012)

ANALYSIS AND RESULT

Growth rate of total production of major food grains crops state-wise

Table-1 Growth rate of total production of major food grains crops state-wise										
States	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Jammu & Kashmir	35.48	5.42	17.98	-1.28	3.11	6.33	2.08	-1.33	-4.44	-
Himachal Pradesh	-25.39	4.84	30.71	-6.34	-14.38	0.93	2.81	-44.92	11.06	-7.01
Punjab	-4.11	-3.48	0.43	-1.44	5.24	4.79	-4.43	-3.53	1.33	5.46
Haryana	4.45	-1.69	-2.22	-2.23	13.71	-1.77	-12.37	1.16	4.05	15.79
Rajasthan	-17.00	52.23	3.32	2.09	8.42	-4.32	7.24	-14.71	35.24	7.67
Uttar Pradesh	-1.57	-1.64	-5.92	5.80	12.44	-4.77	-6.18	-2.46	9.70	6.68
Bihar	-7.50	-1.42	-26.06	11.74	32.48	-13.49	16.53	-6.27	-6.09	18.34
Nagaland	10.56	16.22	4.71	10.92	4.78	7.17	-0.95	0.42	4.10	3.36
Manipur	-10.06	9.47	15.68	-12.47	-0.94	7.81	1.09	4.60	2.47	1.38
Tripura	2.62	-13.56	5.40	1.36	8.91	1.07	-0.03	-0.09	0.70	0.16
Meghalaya	0.76	3.14	-3.41	-18.91	26.86	-1.10	2.59	0.81	-0.31	0.99
Assam	-4.47	4.33	-10.18	0.30	-8.90	8.05	17.35	-4.03	19.02	-
West Bengal	-8.86	3.27	-1.03	-1.48	1.75	0.84	2.15	-0.38	-15.92	17.42
Jarkhand	6.74	-17.46	52.82	-20.63	-8.20	79.24	12.68	6.99	-45.40	-9.99
Orissa	-47.17	85.58	-3.04	9.34	-11.23	22.40	-12.51	3.16	-1.94	-9.69
Chhattisgarh	14.29	-44.15	99.30	-22.26	14.58	1.90	8.19	-17.20	-5.82	44.12
Madhya Pradesh	-23.26	54.45	-6.71	2.03	8.15	-4.70	11.06	4.14	4.01	14.17
Gujarat	-5.91	37.21	-1.87	17.63	5.32	8.53	-10.52	-3.83	16.39	8.65
Utrakhand	2.51	-3.63	4.77	-12.6	-5.67	1.03	22.09	-23.30	-6.60	22.12
Sikkim	-2.18	0.22	2.89	-0.22	1.52	12.15	-1.14	5.58	-3.46	6.04
Maharashtra	12.43	-29.86	-15.76	65.75	81.78	16.07	-31.51	-5.82	44.03	-0.80
Andhra Pradesh	-23.39	10.11	6.92	13.43	10.23	9.73	-12.71	-20.82	29.27	-1.33
Karnataka	-4.41	-44.96	3.05	30.44	27.27	-3.26	-10.01	8.19	39.27	0.91
Goa	0.85	16.05	-6.78	-1.39	-1.57	-4.16	-0.31	-1.22	0.11	3.28
Kerala	-4.09	1.04	-12.03	7.31	60.85	-28.77	-28.10	13.84	-14.70	-9.47
Tamil Nadu	-29.99	-22.71	35.01	39.79	17.78	-9.43	-11.86	3.34	4.06	13.67
Arunachal Pradesh	9.14	-1.81	-9.10	5.05	9.28	5.49	0.56	1.67	1.94	-0.08
Mizoram	18.68	24.83	1.62	24.17	-12.25	-2.72	-9.95	2.15	0.78	3.51

Sources: Ministries of agriculture, government of India

Table 1 shows grains growth rate of total production of major food crops state-wise. growth rate of total production of major food grains crops J&K, was positive in 2002-03 after that it was decreased and negative during the period 2011-12. During 2002-03 growth rate of production was positive in J&K, Haryana, Nagaland, Tripura, Meghalaya, Chhattisgarh, Utrakhand, Maharashtra & Karnataka. Growth rate of total production in major food grain crops in Haryana was increased between 2002-03 to 2011-12. Growth rate of Chhattisgarh was higher with 44.12 %. During 2011-12, growth rate of total production of major food crops was negative in J &K, H.P, Assam, Jharkhand, Orissa, Maharashtra, Andhra Pradesh ,Kerala and Arunachal Pradesh.

States	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Himachal Pradesh	-29.31	25.49	10.93	-9.97	-0.97	11.89	-8.38	-26.17	37.73	6.93
Punjab	-5.25	2.65	2.81	-1.33	0.76	5.92	-0.56	-2.05	3.29	1.94
Haryana	-0.78	-1.14	0.76	-1.51	11.43	0.79	-0.97	-0.12	4.24	10.01
Rajasthan	-20.52	47.76	-21.73	-8.79	21.71	5.47	7.03	-26.33	34.30	7.88
Uttar Pradesh	-7.79	9.85	-10.53	4.92	-0.04	7.25	7.23	-5.48	6.72	4.69
Bihar	-5.78	2.09	25.53	10.00	26.28	-6.66	14.26	-13.36	-3.35	41.46
Nagaland	13.35	-0.25	1.08	2.36	-8.23	5.75	15.59	-30.68	51.45	0.95
Manipur	-3.83	6.21	2.61	-7.26	0.00	2.50	-2.67	-19.68	24.95	6.80
Tripura	-0.98	-7.35	2.73	0.70	9.36	6.83	-1.46	0.75	1.68	1.25
Meghalaya	1.14	2.80	-4.88	-11.71	23.68	-1.48	0.56	1.43	-0.34	3.88
Assam	-3.00	3.89	-4.53	0.79	-9.19	7.18	12.56	7.17	6.03	-3.31
West Bengal	-2.08	2.00	2.39	-2.28	3.62	0.58	-1.26	1.13	3.16	1.67
Jharkhand	-12.15	41.44	-17.13	-13.07	44.40	10.33	0.65	-22.70	-5.47	43.04
Orissa	-48.82	85.53	-2.13	3.75	0.77	9.15	-8.11	2.48	2.53	-9.06
Chhattisgarh	-41.79	89.08	-20.44	13.41	3.38	7.79	-15.88	-3.18	4.24	-2.80
Madhya Pradesh	-17.84	32.26	-9.37	-0.08	3.31	-8.40	9.24	10.06	-9.57	29.93
Gujarat	-21.22	46.23	-13.34	9.89	-8.29	28.72	-12.90	-2.23	18.20	1.65
Utrakhand	-13.40	10.86	1.46	-8.87	13.70	1.46	-3.92	3.77	3.41	5.69

Sikkim	3.55	4.57	0.77	-3.73	0.00	1.79	-1.98	10.79	-3.24	3.27
Maharashtra	-3.23	1.64	-2.73	13.40	-0.87	22.37	-12.98	3.81	13.90	-2.38
Andhra Pradesh	-19.43	18.79	6.23	10.63	-5.66	17.12	5.01	-16.38	10.26	-0.42
Karnataka	-21.72	0.50	45.53	27.97	-27.40	20.10	-2.39	-8.87	22.31	-3.29
Goa	3.86	20.30	-14.30	2.15	-10.16	-7.23	6.70	-10.79	13.76	0.34
Kerala	2.60	-10.06	17.76	-2.58	5.02	-4.71	9.86	1.22	-2.83	12.30
Tamil Nadu	-27.03	-4.53	21.79	-1.42	41.28	18.58	4.71	11.30	-3.38	32.15
Arunachal Pradesh	6.26	4.17	-7.77	2.91	0.33	2.00	0.17	23.90	6.93	6.21
Mizoram	-2.66	-0.64	1.84	-7.09	-53.14	-7.09	21.43	16.36	19.38	10.87

Sources: Ministries of agriculture, government of India

Table 2 shows growth rate of total productivity of major food grains crops state-wise. In 2002-03 growth rate of total of total productivity was positive in J&K, Nagaland, Meghalaya, Sikkim, Goa, Kerala and Arunachal Pradesh with 0.20 %, 13.35%, 1.14%, 3.55, 3.86%, 2.60% and 6.26 % respectively. Growth rate of total productivity were increased over the states during 2003-04. During 2003-04 Nagaland and Kerala growth was negatively which was positive in 2002-03 and Arunachal Pradesh growth rate was decreased 6.26 % to 4.17 % during the same period.

SIGMA CONVERGENCE

σ - Convergence is concerned with dispersion of production and productivity of food grain crops and it holds if the dispersion of production across regions decreases over time. σ -Convergence is to estimate the trend in some measure of dispersion of production across regions. The S.D of production and productivity across the states has been computed for each year during the period. The estimated S.D presented in Figure 1 and 2.

	Intercept	Growth coefficient	R ²
Production	1299.068(0.000)	42.088(0.010)	0.536
Productivity	667.92(0.000)	6.886(0.001)	0.687

Table 3 shows that sigma convergence in production and productivity in India. Coefficient of determination is higher in production comparison to productivity and figures 1 and 2 shows that S.D in production and productivity in India during 2001 to 2012.

Figure 1: Standard Deviation of production across 28 districts of India during 2001-2012

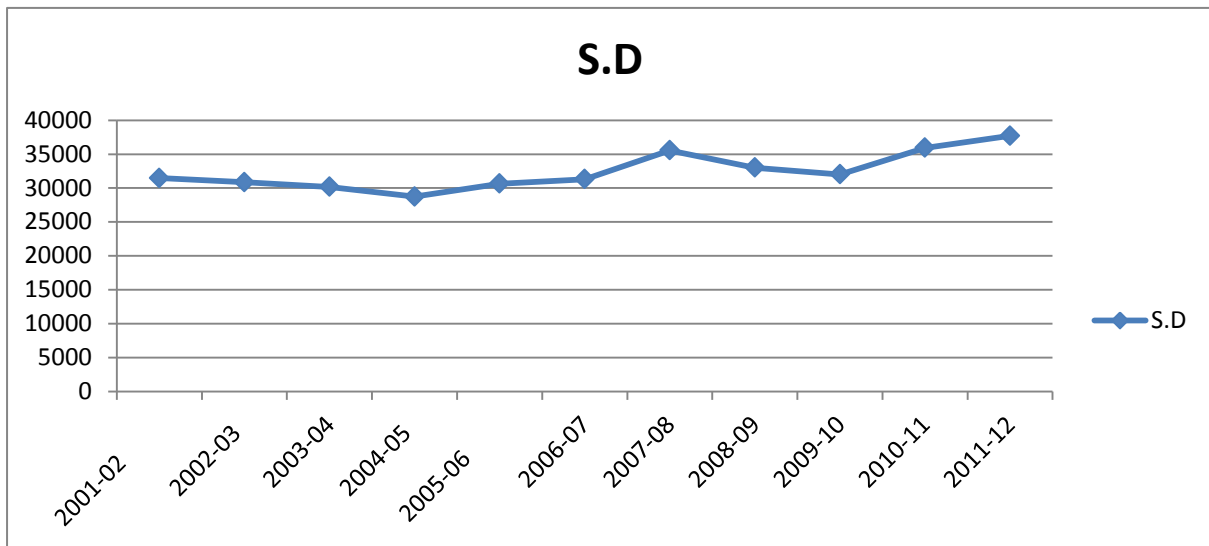


Figure 1 shows Standard Deviation of production across 28 districts of India during 2001-2012. S.D is increased over the time period there is sigma divergence in production of food grain crops.

Figure 2: Standard Deviation of productivity across 28 districts of India during 2001-2012

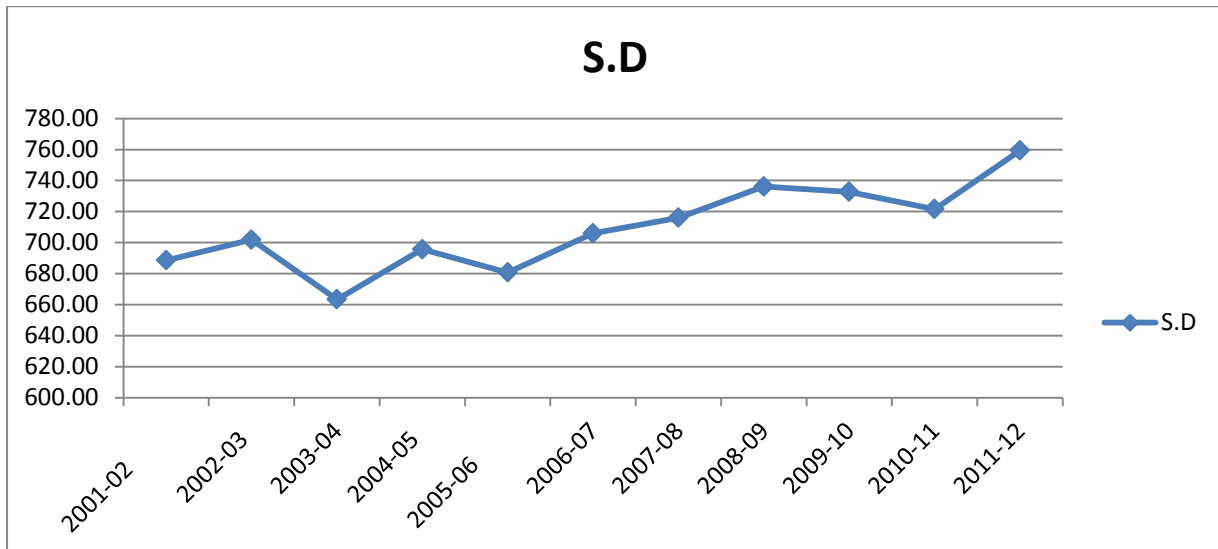


Figure 2 shows Standard Deviation of productivity across 28 districts of India during 2001-2012. S.D is increased over the time period there is sigma divergence in productivity of food grain crops.

CONCLUSION

Growth rate of total production of major food grains crops J&K, was positive in 2002-03 after that it was decreased and negative during the period 2011-12. . During 2002-03 growth rate of total of total productivity was positive in J&K, Nagaland, Meghalaya, Sikkim, Goa, Kerala and Arunachal Pradesh with 0.20 %, 13.35%, 1.14%, 3.55, 3.86%, 2.60% and 6.26 % respectively. Growth rate of total productivity were increased over the states during 2003-04.

Standard Deviation is higher in production comparison to productivity .It is increased over the time period in production and productivity of food grain crops which shows there is sigma divergence.

REFERENCES

- Bhalla and Gurmail Singh (1997), "Recent Development in Indian Agriculture: A state Level Analysis", *Economic and Political Weekly*, March 29.
- Chatterjee, Tripura (2014), "Spatial Convergence and Growth in Indian Agriculture: 1967-2012. *Indira Gandhi Institute of Development and Research*, Mumbai.
- Economic Survey, Ministry of Finance, Govt. of India, New Delhi, 2011.
- Mahendra Dev. S (2007), "Inclusive Growth in India- Agriculture, Poverty and Human Development", *Oxford University Press*, New Delhi
- Ghosh, M. (2010), " Structural breaks and performance in Indian agriculture, *Indian Journal of Agricultural Economics*," 65(1), pp. 59–79
- Ghosh, M. (2012), " Regional economic growth and inequality in India during the pre and post reform period in India," *Oxford Development Studies*, Vol. 40, No. 2, 190–212,
- C. Barry Pfitzner and Steven D. Lang (2014), "Economic Convergence: Evidence from countries of Carolinas," *The Coastal Business Journal*, spring, vol. 14, No.1, ISSN: 2163-9280.
- Somasekhar, Prasad and Roy (2011), "Convergence Hypothesis: Some Dynamics and Explanations of Agricultural Growth across Indian States," *Agricultural Economics Research Review*, Vol. 24 July-December 2011 pp 211-216
- Siddaraju, V.G (2013), "Growth of Agriculture Sector in India-A Time for New Think," *Gra - Global Research Analysis* vol.2, Issue: 7, ISSN No. 2277-8160.
- Thakur, N.K (2010), "Inter- Regional Disparities in India: A Comparative Study of Agricultural Development in each Zonal State", *Disparities' in India*, pp. 471-485.
- Vijay Paul Sharma (2011), "India's Agricultural Development under the New Economic Regime: Policy Perspective and Strategy for the 12th Five Year Plan", *Indian Institute of Management*, Ahmadabad, W.P. No. 2011-11-01.