STUDY OF STRUCTURAL CHANGES IN AGRICULTURAL GDP IN INDIA

THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIRMENTS FOR THE DEGREE OF

Master of Science (Agriculture)
In
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Supervisor
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Submitted By
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CERTIFICATE

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Dear Sir,

I have great pleasure in forwarding the thesis entitled **"STUDY OF STRUCTURAL CHANGES IN AGRICULTURAL GDP IN INDIA"** submitted by **Mr. Avdhesh Sharma**, **I.D. No. E-15024,** in partial fulfilment of the requirements for the degree of **Master of Science (Agriculture)** in **Agricultural Economics**, of the Banaras Hindu University and placing on record that she has completed the requisite requirements as contained in the statutes of the university.

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STUDY OF STRUCTURAL CHANGES IN AGRICULTURAL GDP IN INDIA

Submitted By

AVDHESH SHARMA

Thesis submitted in partial fulfilment of the requirements for the degree of "**MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS**" Department of AGRICULTURAL ECONOMICS, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi.

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I humbly bow my head with Lord ***Baba Vishwanath*** *and great reverence in the pious feet of Late* ***Mahamana Pandit Madan Mohan Malviya*** *a man of great vision and founder of the Banaras Hindu University, Varanasi, India, whose euphoria and desire was to serve the mankind.*

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LIST OF SYMBOL AND ABBREVIATION

%	-	Percentage
1^{st}	-	First
2^{nd}	-	Second
3^{rd}	-	Third
CAGR	-	Compound Annual Growth Rate
CSO	-	Central Statistics Organization
EEI	-	Economic Efficiency Index
ESI	-	Ecological Security Index
GCA	-	Gross Cultivated Area
GDP	-	Gross Domestic Product
GNI	-	Gross National Income
GNP	-	Gross National Product
GSDP	-	Gross State Domestic Product
MOSPI	-	Ministry of Statistics and Programme Implementation
NNP	-	Net National Product
NSDP	-	Net State Domestic Product
OECD	-	Organisation for Economic Co-operation and Development
PCAGSDP	-	Per Capita Agriculture Gross Domestic Product
PCI	-	Per Capita Income
PCNSDP	-	Per Capita Net State Domestic Product
PKVY	-	Pradhanmantri Krishi Vikas Yojana
PPP	-	Purchasing Power Parity
R^2	-	Coefficient of determination
SEI	-	Social Equity Index
WTO	-	World Trade Organization

A developed India by 2020, or even earlier, is not a dream. It need not be a mere vision in the minds of many Indians. It is a mission we can all take up – and succeed.

- *Sir A. P. J. Abdul Kalam*

ABSTRACT

Name- Avdhesh Sharma Supervisor- Prof. P. S. Badal

Agriculture is the backbone of India from dates back to the era of Indus civilization. Today it is the main occupation of large part of population. It is most important contributor to the economy of India. Measurement of national income is done by several methods, from which GDP is important one. In India three sector are total contributes in total GDP, Agriculture sector, Industry sector and Service sector. In agriculture sector total four subsectors are added, those are crop production, livestock, forestry and fisheries including with aquaculture.

In 1950-1951 the contribution of agriculture sector in total Gross Domestic Product (GDP) of India was 55.28 percent and it is continuously declining. The contribution is picked up by service sector. In economy of India the divergence of productivity of labour is more and so the difference between the share of labour in agriculture and the share of agricultural. In agriculture, economic growth has shifted consumer demands away from cereals, pulses, and oilseeds towards horticulture and livestock products that have much higher income elasticities.

Growth of agriculture sector in India is 4.1 percent in 2016. Growth rate of Telangana state is much higher than compare to other states i.e. 12.3 percent and the contribution in total Gross State Domestic Product (GSDP) from agriculture sector is found higher in Arunachal Pradesh i.e. 39.46 percent. States are diverging in the case of agriculture Gross Domestic Product (GDP). Per Capita Agriculture Gross State Domestic Product (PCAGSDP) of different States are diverging.

Keywords: Agriculture, India, States, Growth rate, Divergence, GDP and GSDP

CHAPTER 1

INTRODUCTION

India is a vast country where agriculture has been a major occupation since time unknown. India's history of agriculture dates back to the era of Indus civilization and even some archaeologist believe that practice of agriculture in India is much older than we know. This is proved by the artefacts which are found in the excavation of the archaeological sites like Indus civilization, even today the main occupation of large part of population is agriculture.

Great leader Mahatma Gandhi believed that "India lives in villages and agriculture is the soul of Indian economy". Agriculture, with its allied sectors (livestock, forestry & fisheries) is undoubtedly the largest livelihood provider in India, much more in the vast rural areas. Also contributes a significant figure to the Gross Domestic Product (GDP). For holistic rural development, sustainable agriculture is essential like as rural employment, food security and environmentally sustainable technologies such as soil conservation, sustainable natural resource management and biodiversity protection. Indian agriculture and allied activities have witnessed a green revolution, a white revolution, a yellow revolution and a blue revolution.

Agriculture is one of the most important contributors to the economy of India. For almost 60 percent of employed class agriculture is the only means of living. This sector has occupied almost 43 percent of India's geographical area. Even after a decline the share of agriculture in GDP of India, it is still a largest contributor to India's GDP.

Share of agriculture in the GDP has registered a steady decline yet this sector provides direct employment to more than 50 percent of total workforce in the country and a most of the population depends on agro-based industries and the trade of agriculture products. Agriculture is also the source of raw material in industries. It is also the demand for many industrial products related to it i.e. fertilizers, pesticides,

agricultural implements etc. However, the growth of agriculture over a period of time remained lower than the growth in non-agricultural sectors.

India was largely dependent upon food imports, but the agriculture sector of Indian economy has made it self-sufficing in grain production. In the world some countries are rich, some are not rich and some countries are in between. Under such circumstances, it would difficult to evaluate the performance of an economy. Measurement of national income is an important task for future measurement of economy. This is indicates standards of living of the people's. Income of a country can measure by some indicators, those are as follows:-

1. Gross National Product (GNP)
2. Gross Domestic Product (GDP)
3. Gross National Income (GNI)
4. Net National Product (NNP)
5. Net National Income (NNI).

GDP (Gross Domestic Product) is a major measurement of a country's overall economic activity. It is the economic value of all finished goods and services produced in a country's border with in a given year excluding the income from abroad.

GSDP (Gross State Domestic Product) is the same thing like GDP; it is a measure of the volume of all goods and services those are produced in the boundaries of state during a specific year, without any duplication.

The economy of India is the 9th largest economy of world with US $ 2048517 million measured by nominal GDP and 3rd largest economy by PPP (Purchasing Power Parity) point of view. India's economy is the fastest growing economy. Among Asian countries India is on 3rd position with US $ 1861802 million.

Maharashtra has the highest contributing states in total GDP at 2011-12 prices among 29 Indian States and 7 Union Territories which is 14.49 percent of total GDP in India. India's largest state population point of view Uttar Pradesh with 8.17 percent has 2nd position. Largest state from geographical point of view Rajasthan is on 7th

position and poorest state Bihar is on 14th position. Capital Delhi is on 12th position contributing in total GDP of India.

The contribution of primary sector or agriculture sector is 1687064 crore rupees which is 13.9 percent of total GDP and Industrial sector contributing 3475643 crore rupees and tertiary sector also known as service sector contributing a large part as 6005607 crore rupees in total GDP of India according to 2011-12 base prices in 2016-17.

Nearly 55 percent of the population is engaged in agriculture and allied activities (Census 2011). The agriculture sector including with allied sectors is likely to show 17.4 percent in Gross Value Added of country during 2016. In total agricultural GDP crops including with fruits and vegetables account for 61 percent (maximum) and livestock along with fisheries and forestry sector account around 39 percent of total agricultural GDP. Combined growth of forestry and fishing sector is near about 5 percent in 2015-2016. (Source: - Ministry of statistical and programme implementation, Department of Economic Affairs, India, Central statistical organization).

Government of India took several steps for sustainable development of agriculture. Several steps are taken by Government of India i.e. soil health card scheme, to provide improved access to irrigation and increase water use efficiency through Pradhan Mantri Gram Sinchai Yojana (PKVY) etc. In India the agro industries are divided in few sub segments i.e. canned, processed, dairy, frozen food to fisheries, meat, poultry and food grains. The Department of Agriculture and Cooperation which is doing the work under the Ministry of Agriculture is responsible for the development of agriculture sector in India.

Contribution of the primary sector in 2011 GDP is only 14.11 percent (at 2004-05 prices). Due to the base effect the contribution of agriculture sector in total GDP is 13.9 percent (at 2011-12 prices) up to the end of the December 2016. (Source: - MOSPI, GOI).

Classification of agriculture sector:-

- Crop production
- Livestock
- Forestry
- Fisheries and aquaculture

Agriculture sector includes Agriculture (Agriculture proper & Livestock), Forestry & Logging, Fishing and related activities. At 2011-12 prices, composition of Agriculture sector is 13.9 percent.

According to the school of thought, agriculture alone was productive because it yielded net income and all other non-agricultural occupations were ‘sterile’ as they just recouped the cost incurred on them.

According to Sarda Gopal Krishanan and K. Jothi Sivagnanam, agriculture and allied sector's share in GDP shows a decreasing trend 13.95 percent in 2012-13. The share of agriculture in 'Agriculture and allied' sector remains more or less the same but the share of forestry and logging in 'Agriculture and Allied' sector shows a declining trend. In contrary, the share of fisheries sector in 'Agriculture and Allied' sector shows an increasing trend.

Structural change permits viable growth to occur and growth and provides the material for subsequent structural change (Uphoff and Ilchman, 1972). According to structuralists the process of economic development proceeds, the share of agricultural sector in national income and employment, which is typically high in the early stages of development, begins to decline and that of non- agricultural sectors experience a rise (Fisher, 1935; Clark, 1960; Kuznets, 1966, 1969, 1972; Chenery and Syrquin, 1970). This has become almost a universal phenomenon and holds true in case of all the countries which experienced or are experiencing economic development.

Understand the source of India’s growth is important. The role of agriculture in in India’s growth is very important. Fundamental difficulty is that in India, as well as in most developing economies, a large proportion of the income of an agricultural household comes from the combination of mainly three factors land, labour and

capital rather than from wage income. This implies that there is no explicit observable individual wage, excepting a small and highly selective sample of agricultural workers. If the wage data is absent then the possibility to measure the income is highly different from the original income.

At the time of presenting Union Budget of the year of 2016-17, the Union Finance Minister Arun Jaitely mentioned in budget is that one of the objectives of the Government of India is to double the income of farmers' by the year 2022.

According to S. Chandrasekhar and Nirupam Mehrotra, all states increase in average income in real terms except Bihar and West Bengal. They believe that focusing only on income from cultivation for facilitating doubling of income will prove to be inadequate. Policy measures aimed at increasing net income of households from animal farming will be the key driver of incomes in agricultural households.

In non-agricultural economy and the agricultural sector, the divergence of productivity of labour is more and so the difference between the share of labour in agriculture and the share of agricultural output in the economy.

In agriculture, economic growth has shifted consumer demands away from cereals, pulses, and oilseeds towards horticulture and livestock products that have much higher income elasticities. We briefly review these national trends and then extend this analysis to the state level. .

The hypothesis that poorer economies' income per capita will tend to increase at faster rate than richer economies. All economies should be eventually converging in terms of per capita income. Now days developing countries have the potential to grow at a faster rate than developed countries because diminishing return are not as strong as in capital – rich countries. Furthermore, poorer countries can replicate the production methods, technologies, and institutions of developed countries.

Basically convergences have two basic types:-

1. Sigma convergence (reduction in the dispersion of levels of income across economies.)

2. Beta convergence (when poor economies grow faster than rich ones.)

   Beta convergence is known as catch up theory.

The share of livestock in production has increased since 1971 while horticulture production has increased since 1990. From the last of 1960s the shares of pulses and oilseeds and of other crops have declined steadily as well. Until around 1996 the share of cereals was the highest at around 35 percent but has declined rapidly since then as a consequence of the accelerating income growth.

The objectives of the present study are following:

- To study convergence in agricultural Gross State Domestic Product (GSDP) across different states in India.
- Calculate growth rate of agricultural GSDP in India and Forecast the GSDP up to 2021-22.
- To study about the total GSDP and agricultural GSDP comparatively of different states in India.

CHAPTER 2

REVIEW OF LITERATURE

A comprehensive review and literature is an essential part of any scientific investigation. Its main function, apart from determining the work then before is to provide an insight in to the method and producers adopted by researchers to suggest changes therein. As such, an attempt has been made to present in brief of the available literature in relation to the present study.

2.1 To study convergence in agricultural Gross State Domestic Product (GSDP) across different states in India.

2.2 Calculate growth rate of agricultural GSDP in India and Forecast the GSDP up to 2021-22.

2.3 To study about the total GSDP and agricultural GSDP comparatively of different states in India.

2.1 Convergence in agricultural Gross State Domestic Product (GSDP)

Baumol (1986) observed that the historically unprecedented growth in productivity, gross domestic product per capita and exports and the remarkable convergence of productivities of industrialized market economies, with convergence apparently shared by planned economies but not less developed countries. Productivity lag's relation to "deindustrialization," unemployment, and balance of payments was examined. The data in that paper are shown to suggest a tempered view of the slowdown in U.S. productivity growth and its lag behind other countries. He outlined some implications of the available long-period data on productivity and related variables-some tentative, some previously noted by economic historians, and some throwing a somewhat surprising light on developments among industrialized nations since World War II. Among the main observations that will emerge is the remarkable convergence of output per labour hour among industrialized nations. Almost all of the leading free enterprise economies have moved closer to the

leader, and there is a strong inverse correlation between a country's productivity standing in 1870 and its average rate of productivity growth since then. Only the poorer less developed countries show no such trend.

Barro *et al.* (1991) found that the long-run elasticity of employment to the initial innovation is a bit above unity. In the case of the North Central regions, however, the dynamic response suggests no long-run effect of the innovation in personal income on employment, something that only happens in the formal model if the underlying relative technology and demand shocks have no permanent component. There appears to be not only three basic convergence but also convergence of output per capita across U.S. states. The distribution of relative outputs per capita seems to be converging toward a stable stochastic steady state distribution and a crucial element appears to be labour mobility in response to state-specific production and demand shocks. What remains on the agenda was a better identification of the adjustment process, of the change in the basket of goods being produced, and of the role of returns to scale and of capital and labour mobility. Through this study the use of both the time-series and cross-section aspects of the regional data set that since income from agriculture was largely dependent upon the productivity of the land, differences in agricultural income would not converge. However, the increased importance of manufacturing over the sample period tended to equilibrate income levels.

Barro *et al*. (1992) Find out the evidence of convergence for a sample of 98 countries from 1960 to 1985 in a conditional sense, he cleared that if constant variable are hold such as initial school enrolment rates and the ratio of government consumption to GDP. Then the constant variables interpret as proxies for steady state value of output per effective worker and the rate of technological progress and if the additional variables are hold constant then the estimated rates of convergence are only slightly smaller than those found for the U.S. states. If technologies are the same, then the introduction of a global capital market tends to speed up the convergence for output but to slow down the convergence for income. The empirical result for the U.S. states indicate that the speed of convergence for output was only slightly faster than that for income. He argued that the findings with the theory only, if we include

elements of capital market imperfection. Other elements of an open economy tend to speed up the predicted rate of convergence.

Quah (1993) studied about the criticize standard cross-section regression tests of the convergence hypothesis. By drawing an analogy of these regression tests with those of the classical Galton's fallacy, and then extending the reasoning for dynamics, he shown why these cross-section tests are misleading for the hypothesis of interest. In this study the alternative, more direct tests described the evidence against the convergence hypothesis, which show, instead, a world with economies tending - in the long run - towards either the very rich or very poor, with the middle-income classes vanishing. The rich-poor income disparity, in addition, appears to be widening. He suggests mainly two steps, for escapes the strictures of the classical Galton's fallacy. First, the theoretical growth models that generate predictions for the dynamics of the entire cross-economy distribution, not just for those of a single economy and second, there was scope for studying time heterogeneity in these evolving distributions, in ways that are richer than simply breaks in trend or unit-root non stationary.

Marjit and Mitra (1996) presented a summary and a critique of the 'convergence hypothesis quite popular these days in the literature on endogenous growth. They presented certain figures for the Indian states for the last 30 years and showed that they behaved differently from the regions within the US, Japan and the OECD nations. They admit a couple of limitations regarding the data set. They tried to look at the 30-year period preceding the phase of on-going liberalisation and found some reasons to question the application of the standard theory observed that a full-fledged econometric exercise to precisely show the pattern of 'divergence', after correcting the data with state-level deflators and they analyse whether allocation of developmental assistance by the central government had anything to do with such pattern. A series of alternative measures of per capita growth rates would be attempted as well as some analysis would be done on convergence or divergence at the sectorial level, i e, in agriculture, manufacturing, etc. All said and done and they feel that focusing on per capita income levels was itself a narrow objective. It would be nice if a massive effort was put in to construct human development index for each state and the evolution of such indices over time.

Ahluwalia (2000) examined the growth rate of the combined GSDP of all the 14 states and present it as State Level Performance under Economic Reforms in India at the Centre for Research on Economic Development and Policy, Stanford. He concluded that states taken together increased from 5.2 percent in the pre-reform period to 5.9 percent in the post-reform period. This study acceleration in the combined GSDP was similar to the picture that emerges from the national accounts, except that the post-reforms acceleration of GDP in the national accounts was much sharper. GDP grew at 5.5 percent per year in the first period, which was only marginally faster than the 5.2 percent growth recorded by the combined GDP of the 14 states. However, GDP growth accelerated to 6.5 percent in the second period, which was much faster than the 5.9 percent growth in the combined GSDP. The faster growth recorded in the national accounts probably reflects the impact of the revision in the national accounts GDP series introduced from 1993-94 onwards. It was possible that if the GSDP data were revised similarly, the growth rates of GSDP of the different states in the second period would be correspondingly higher and Ahluvalia note that if such a revision were to affect some states more than others, it could also alter the assessment of the relative performance of states, but in the absence of specific information that might have guided us on this issue, he assumed that the adjustment would adjust growth rates upward across all states, leaving relative performance unaffected. There was variation in growth performance across states in both periods, with some states growing faster than others, but the degree of dispersion in growth rates increased very significantly in the 1990s. The coefficient of variation of the growth rates increased from 0.15 in the first period to 0.27 in the second.

Shepherd (2001) examined the differences in the findings of absolute and conditional convergence. Absolute divergence was consistent with conditional convergence in the context of India. Once omitted variable bias along with determinants of steady state such as per capita investment, population growth rate and human capital are accounted for across 14 major states of India from, 1976-2000, there has been evidence of conditional convergence at the rate 12 per cent per five-year period. It would take around 6 years for a state to close the half way gap between the initial level of per capita real income and its steady state level.

Meliciani and Peracchi (2006) analysed convergence in per-capita GDP across European regions using a very standard model (a deterministic linear trend model with AR(1) errors) but trying to overcome some of the problems arising with previous empirical studies that have ignored the regional heterogeneity in the model parameters and the short time series dimension of the available data. He found that, for more than half of the European regions considered, the value of the median unbiased estimator was equal to one, implying no convergence to a steady-state level of per-capita GDP. The mean rate of convergence across regions using median unbiased estimators was about .18, less than half the value found using conventional estimators. These results suggest that there are serious problems in estimating the rate of convergence from short time series without properly taking into account the downward bias in the conventional estimates of the autoregressive parameter.

Sharma (2011) found that the share in national Gross Domestic Product has declined in recent years. Rapid growth of the non-agriculture sectors, particularly services, in post-reforms period had failed to accelerate agricultural growth or poverty reduction. During the last two decades Indian agriculture has been facing major challenges like deceleration in growth rate, degradation of natural resources, inter-sectorial, inter-regional equity, declining input efficiency, etc. However, the 11th Plan had some success in reversing the deceleration of agricultural growth witnessed during the 9th and 10th Plan. The growth in agriculture in the 11th Plan is likely to be around 3.2 percent per year, which was higher than 10th Plan growth rate but lower than the target for 11th Plan. 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. However, looking at the growth in agricultural sector in general and high-value agriculture, particularly, horticulture, fisheries, dairy and meat sector during the 11th Plan, there is a need to put additional efforts to achieve between 4 and 4.5 percent growth in agriculture. The failure to achieve targeted growth in agriculture sector has resulted from the inadequacies of the provision of the critical public goods on which agricultural growth thrives. There is a need to address some of these inadequacies which would also have large multiplier effect of the higher farm incomes on demand for other sectors of the economy. The slowdown in agriculture growth could be attributed to the supply side

factors such as public investment, irrigation water management, rural credit, technology, land management, agricultural research and development including extension services, rural infrastructure like roads, electricity, marketing, post-harvest management and so on. Reforms are needed to address these issues in order to achieve 4 - 4.5 percent growth in agriculture, equity in terms of higher growth in disadvantageous regions like rainfed and tribal areas, small and marginal farmers and women and sustainability.

Papola (2012) presented a highlight on the major structural aspect of India's economic growth from past three decades, based primarily on the findings of a number of studies undertaken as part of a larger programme, he review the trend in sectoral pattern of GDP growth, employment, trends and interregional and inter class disparities and brings out some implication of these trends for a sustainable and equitable growth. They conclude that attainment of a reasonably high GDP growth may not be problem in the medium term, its inequitable character is likely to pose a serious threat to its sustainability in the long run.

Kumar *et al.* (2014) investigated convergence of per hectare NSDP agriculture and catch-up among Indian states during pre-WTO, post-WTO, and whole period (1980-81 to 2000-10) and examined the role of agricultural conditions in this process. The growth of per hectare NSDP agricultural experience in post-reform period was very different than that of the previous decade. He showed that the growth experience during post-reform period favoured agriculturally underdeveloped states more than the other states. It turned adverse for most of the states. The growth analysis further deciphers that in both periods, the growth rate of per hectare NSDP agriculture in most of low productivity states was much lower than national average but in post-reform period, the growth rate of per hectare NSDP agriculture in most of low productivity states was higher than that of pre-reform period but also turned out to lower than the national average. Unconditional convergence shows evidence of falling regional disparities in India after WTO in 2004-05, and more so in the initial years of reforms. The tendency of divergence was stronger in pre-reform period as compared to whole period but post-reform period discerned convergence. This study confirms that growth in per hectare NSDP agriculture of most agriculturally advanced states decelerated considerably and the agriculturally poor states also deciphered

substantial improvement in their growth after initiation of economic reforms process. The evidence of absolute β—convergence in per hectare NSDP agriculture levels across Indian states reveals tendency of states to converge to identical steady states level. While framing policy and designing development programmes, all these variables should be essential ingredients as policy inputs for getting desired policy outcome. Finally, the outcome of study affirms that the benefits of economic reforms started by the Government of India have shown visible impact on the convergence process of per ha NSDP agriculture among Indian states.

Aggarwal and Moudgil (2015) examined the structural change and performance of agriculture sector in Haryana. The economy of Haryana has undergone the process of structural transformation at a faster rate, leading to higher growth rates of the various sectors. But the declining share of agriculture in GSDP without a corresponding fall in the labour share is a matter of concern and it needs serious attention on the part of policy makers for innovations in agriculture in Haryana. The study suggests strongly the increased role of government. There is urgent need for farm innovations and diversification of crops and allied activities. All the indicators of structural change in Haryana prove that the state economy has undergone structural change, accelerating the economic growth rate, but reducing the significance of agriculture in the development process.

Subramanian *et al.* (2017) reported that the poorer countries are catching up with richer countries, the poorer Chinese provinces are catching up with the richer ones, but in India the less developed States are not catching up; instead they are, on average, falling behind the richer States. Since 1980 this long-term trend was reversed and poorer countries started catching up with richer ones. In stark contrast, there continues to be divergence within India or an aggravation of regional inequality. In the 1990s, convergence patterns were not dissimilar across the world, China and India with either weak convergence or divergence. But things really changed for both the world and China in the 2000s; however they did not change for India. This was despite the promise that less developed States such as Bihar, Madhya Pradesh and Chhattisgarh had started improving their relative performance. The evidence so far suggests that in India, catch-up remains elusive. Convergence happens essentially through trade and through mobility of factors of production. If a State/country is poor,

the returns to capital must be high and should be able to attract capital and labour, thereby raising its productivity and enabling catch-up with richer States/countries.

2.2 Growth rate of agricultural GSDP and Forecast

Bhattacharya and Mitra (1990) reported that the share of agriculture in India is relatively high and that of industry is relatively low in 1981 as compared to other developing countries. The fall in the relative share of agriculture in other developing countries had been mostly accounted by a rise in relative share of industry. It was suggest through the study that further point out that in this way India is a special case that was; the change in production structure in India had not resulted in corresponding change in occupational structure. Further show that the income from services has grown faster than commodity sector in both pre and post-green revolution periods. Except in the case of the trade group, commodity output has a very poor relationship with services income. In general the growth rate of services income was independent of the growth rate of commodity sector income. Services sector had not only grown faster than commodity sector but its growth rate appears to be independent of the commodity sector.

Sawant and Achutan (1995) studied and conclude that, state or regions which lagged in behind considerably during the period 1968-69 to 1981-82 were able to push up their share considerably during the period 1981-82 to 1990-91. Thus, this study had shown regional disparities in agricultural growth tended to decline in the period 1980s. They have computed CAGRs of State Domestic and found that excepting western region (Gujarat, Maharashtra) and Andhra Pradesh from Southern region the process of acceleration in agricultural growth was almost universal across the states in period 1981 82 to 1990-91. Moreover, the north-western region, which spear headed. India's green revolution continued to be the high growth region even during period II (1981-82 to 1990-91).

Thamarajakshi (1999) noticed that it is time that efficiency consideration prevails in public spending in agriculture and market signals allowed to come into full play so that changes in agricultural investment and production are demand driven in response to domestic and international prices. She has mainly paid attention on

investment in agriculture, gross capital formation in agricultural sector, sector wise contribution in GDP and index of value of value added per worker, real wages of agricultural labourers and poverty, during the port reform period. The period for this study has considered from 1985 to 1997 with two-sub period since 1985 to 91, 1991 to 1997. She argued that, agriculture is basically a private activity. The public investment has a critical role to play in creating the infrastructure in terms of irrigation roads, markets, storage facilities, electrification and technology development besides education and health. There was need of implementing a reform agenda for agriculture comprising enlarged productive investment by public sector for agricultures infrastructure and market based pricing system for agricultural outputs and inputs. Moreover, despite large food subsidy and massive expenditure on anti-poverty programmes, rural poverty has not significantly declined. She suggested that, the role of government is to focus on productive investments, technology and research marketing, storage and agro processing facilities and provision of food safety nets for the vulnerable poor and development of a diversified agriculture in line with emerging demand patterns.

Timmer *et al.* (2002) studied and used a panel of 65 developing countries over 1960-1985 to show a positive correlation between growth in agricultural GDP and its lagged values and non-agricultural GDP growth. He suggested in study that this correlation can be explained by first order effects of agricultural growth on lower food prices, labour migration and capital flows from agricultural as well as second order effects such as improved nutritional intake which improves workers' productivity.

Majumdar (2005) worked on growth and development an Indian experience and tried to explore interlink age between growth and development in India, According to her, issues concerning the similarities and the differences between growth & development are quite old in the history of economic thinking. The growth and development, they have their different indicators. Growth is narrow concept but development encompasses much more issues like, education, health, equality liability etc. Moreover, it has been after perceived that, the experience of economies in terms of growth and in terms of development have not matched – high growth nations failing to 'develop' while low growth nations managing to do so. In his paper, she

used conventional measure as well as rise in spectral income level, as indicators of growth. Moreover, she used proper statistical techniques also to process and get results to study growth and development for the Indian experience. She concluded that, there has been impressive rise in PCI in India over the decades leading to significant economic growth. However, although there has been noticeable rise in levels of development during the study period, the rate of improvement of has lagged behind the rate of growth.

Massimiliano (2007) evaluated an extensive evaluation of the role of nonlinear time series models for GDP growth and inflation. His main conclusion was that in general linear time series models can be hardly beaten if they are carefully specified, and therefore still provide a good benchmark for theoretical models of growth and inflation. Through this study finding was particularly evident when using real time data or considering only the period starting in the mid-'80s. However, they have also identified some important cases where the adoption of a more complicated benchmark can alter the conclusions of economic analyses about the driving forces of GDP growth and inflation.

Ranganathan (2014) examined in his study that Haryana, Rajasthan and Odisha have shown high growth with Haryana having high growth from crop cultivation while Rajasthan and Odisha have high growth largely from livestock incomes. Growth rates have been low in Assam, Bihar and West Bengal. All these states have shown very low or negative growth in cultivation incomes and despite high livestock income growth in Assam, the farm household income growths in these states have been disappointing. As a general rule, states showing high growth in cultivation incomes and livestock incomes show high growth in total farm household incomes as well. And argued that livestock incomes have also generated high growth rates in the recent times and provide reasonable profitability compared to agriculture, they must be used as an engine for equitable growth. Changing diet patterns which might lead demand for consumption of food rich in proteins might just provide this impetus some states might have seen a good growth in the years from, 2002-03 to 2011-12 and the year 2012-13 could have been a bad year because of the weather. The growth data will not be able to look into that particular aspect.

Yaniv and Panos (2014) find out that the aggregate accounting earnings growth has predictive content for future GDP growth, especially for the one-quarter-ahead forecast horizon. Additional tests show that the predictive content of aggregate accounting earnings growth for future GDP growth is incremental to that of other leading indicators including Treasury yields, term spreads, quarterly stock market returns, contemporaneous GDP growth, as well as the current-quarter SPF consensus forecast of future GDP growth. Importantly, in this study found that although professional macro forecasters fully impound the predictive content of other leading indicators, they underreact to the predictive content of aggregate accounting earnings growth—a previously unknown leading indicator of the U.S. economy. As a result, future GDP growth forecast errors are predictable based on accounting earnings data that are available to macro forecasters in real time. Show that aggregate accounting earnings growth is a leading indicator of future GDP growth, especially for the one-quarter-ahead forecast horizon. However, professional macro forecasters do not fully incorporate aggregate accounting earnings growth when forecasting GDP growth. As a result, future GDP growth forecast errors are predictable based on accounting earnings data that are available to professional macro forecasters in real time. A direction for additional research is to aggregate accounting data in a cost-effective way and identify which accounting data are more useful for macro forecasting. A related direction for additional research is to probe the link between aggregate accounting data, subsequent GDP growth, revisions of GDP growth forecasts, and stock valuation. In follow-up studies, we investigate these directions.

2.3 GSDP and agricultural GSDP

Bruno and Easterly (1998) conclude that there was no evidence of a growth-inflation trade off in a sample which excluded discrete high inflationary crisis. On the other hand, there was ample evidence to show that growth turned sharply negative when inflation crossed past a high threshold rate of 40 percent per annum. This study also argue that the failure of investigators in detecting a meaningful relationship between inflation and growth can be attributed to a stylised rapid recovery of output after inflation which, on an average, renders the overall statistical relationship insignificant.

Deosthali and Nikam (2004) attempted to study that the regional growth trends of rice crop in Maharashtra According to them, the growth in rice crop could achieve by bringing more and more area under cultivation of it. Rice area and production In Maharashtra has increased in 1960-61 to 1996-97. They conclude that, the production and area of rice in Maharashtra have increased by 47.5 percent and 12 percent respectively indicating increase in production mainly yield led, the development of out spread of the High yield variety-led technology. In the entire control region, high vertical growth has seen with low concentration of rice area in the GCA (less than 60%). It is matter of concern that the spread of improved technology is in pockets around the university, research centre or the district headquarters where diversification of land use is resulting in limited area under rice cultivation.

Krishna (2004) examined that preliminary account of the patterns and determinants of growth in Indian states during the period 1960-2000. Almost 14 major states are taken for analysis which together account for a little over 90 per cent each of the population and the GDP of the country. It had been found that growth in the different states during 1960-2000 was characterized by instability and volatility. The degree of volatility was very high in some states. It would be instructive to extend the analysis to sectorial growth rates and identify the sectors contributing to volatility and instability. Inter-state disparities in income levels and growth rates as measured by the coefficient of variation increased over time.

Hatai and Sen (2008) worked on economic analysis of agricultural sustainability in Orissa. Tis study have calculated the sustainable livelihood security index for agricultural sustainability and evaluated present status of the agricultural development. The Orissa state has been selected since it focus wide inequality, management and over, exploration of natural resources and explosion of population. Based on Swami Nathan's dimension and existing states of Orissa state, they have calculated three-index viz. Ecological Security Index (ESI) Economic Efficiency Index (EEI), and Social Equity Index (SEI) and analysed economically agricultural sustainability.

Bhalla and Singh (2009) discussed the performance of agriculture and cropping pattern changes that have taken place in area allocation as well as in terms of

value of output. This study analysed the growth performance of agricultural output at the state and regional levels during 1962-65 to 2003-06 and three sub-periods, 1962-65 to 1980-83, from 1980-83 to 1990 and period from 1990-93 to 2003-06. It conclude about changes in GCA and it contribution to output growth and further discus of the association between output levels and growth with the level of use of modern agricultural inputs. Analysis of cropping patterns changes over the study period was discussed by them. Compound Annual Growth Rates are computed to interpret the data and on the basis of state-level analysis they concluded that the new technology was instrumental in raising the yield and output levels of wheat and was confined to irrigated states in the north-western region of India. This study resulted in raising crop yields and promoting growth of agricultural output in most of the north-western states. The rapid growth of output in these states also resulted in raising agricultural worker productivity in these states.

CHAPTER 3

METHODOLOGY

DATABASE

Present study is based on secondary data which is collected from several sources and database of Indian government.

For the object of convergence in agricultural Gross State Domestic Product (GSDP) across different states in India, the data have been taken from government releases, CSO (Central Statistical Organisation) and Office of Registrar General & Census Commissioner of India, Indiastat.com. Data available from the different sources as given above is taken from the year 1993-94 to 2013-14. All the data are taken is in term of 2011 general price level.

Data for obtain the second objective of the study (Calculate growth rate of agricultural GSDP in India and Forecast the GSDP up to 2021-22) are taken on constant base price from Ministry of Statistics and Programme Implementation (MOSPI), central statistical organization (CSO) and the site of indiastat.com from 1993-94 to 2015-16 on different base price of different states.

The data for total GSDP from all three sectors of different states and agricultural GSDP have been taken for last object of the study. Data are taken from the CSO (Central Statistics Office) database, MOSPI (Ministry of Statistics and Programme Implementation), and the site indiastat.com. Data is taken of the year 2014-15 on 2011 base price.

ANALYTICAL PROCEDURE

3.1 To study about convergence in agricultural Gross State Domestic Product (GSDP) across different states in India.

For calculating the per capita Agricultural GSDP of each state we are taking the data provided by different sources of GSDP and population data of that respective

state. For obtain per capita agricultural gross domestic product we are divided the value of GSDP by the population of their respective state. The data of per capita GSDP is in terms of 2011 base price.

$$\text{Per Capita agricultural GSDP} = \frac{\text{Total Agriculture GSDP}}{\text{Total population of respective state}}$$

Then we calculate Compound annual growth rate. For calculate the CAGR we are using basic formula given below:-

$$\text{CAGR} = \left[\frac{\text{Value of GSDP at the last year of time period}}{\text{Value of GSDP at the begining year of time period}}\right]^{\left(1/\text{total no.of years}-1\right)} - 1$$

Further for achieve result we are using logarithm value (log x) of already calculated PCAGSDP value of every state and take average of all the log value [log ($\bar{x}$)] and then simply subtract the average log value from each states logged GSDP.

$$\log x_i - \log \bar{x}$$

Here:-

x represents the state

Next step is to take average of growth rate which is already been taken before. And similarly subtract the average growth rate from each state per capita agricultural GSDP growth rate.

$$g_i - \bar{g}$$

Here gi represents different growth rate of different states

3.2 Calculate growth rate of agricultural GSDP in India and Forecast the GSDP.

First of all set all the GSDP data on the same base year *i.e.* 2011. Then for calculating (CAGR) compound annual growth rate of agricultural GSDP in different states, divide the GSDP of every state at the end of the period *i.e.* 2015-16 by the value of GSDP at the beginning of the period *i.e.* 1993-94. Raise the result to the power of one divided by the period length minus one, and subtract one from the subsequent result.

This can be written as follows:

$$\text{CAGR} = \left[\frac{\text{Value of GSDP at the last year of time period}}{\text{Value of GSDP at the begining year of time period}}\right]^{\left(1/\text{total no.of years}-1\right)} - 1$$

For forecast I have using the data back from 1993-94 to 2014-15. Then multiply the agricultural GSDP of ending period year (here it is 2014-15) from its compound annual growth rate for the respective state. The subsequent results show the growth in value of GSDP for next year. Then add it into the previous year agricultural GSDP. Result shows the forecasted GSDP for next year. Then repeat it, and now the ending period of year is 2015-16, up to the year of 2021-22.

3.3 To study about total GSDP and agricultural GSDP comparatively of different states in India.

After taking the data simply find out the percentage share of agricultural GSDP in total gross state domestic production of a state. Formula using for calculation is:-

$$\text{Percentage share} = \frac{\text{Agricultural GSDP}}{\text{Total GSDP}} \times 100$$

Plot the figure between Agricultural GSDP and total GSDP of different states.

CHAPTER 4

RESULTS AND DISCUSSION

From agriculture point of view India is the average growing country in the world. Growth in the agricultural sector has been cyclical & not so stable than growth in other sectors. Agriculture with its allied sectors is the main sectors contribute a major part in Indian economy.

Livestock sector have grown faster compare to other sub sectors. Contribution in total GDP of India from the agriculture sector is more at the time of independence, and decline year to year due to more of urbanization mainly. The share of agriculture sector in GDP is decline from 55.28 percent in 1950-51 to 15.11 percent in 2016.

4.1 Convergence in agricultural Gross State Domestic Product (GSDP)

Convergence in economics which is also known as Catch Up effect is basically a hypothesis in which hypothesized those poorer economies' per capita incomes will tend to grow at faster rates than richer. All economies should eventually converge in terms of per capita income.

Indian states have been converging to some extent. The task is to find out whether there is any a priori reason to believe that the states within India have been converging to some extent. Some degree of convergence would support the view that the centralized planning process did help in removing a particular element of disparity hence; they are all expressed in 2011 prices. In the given table we have tabulated the period (2013-14) per capita agricultural gross state domestic product (PCAGSDP) at 2011 prices and the compound annual growth rate for the entire -period.

Table 4.1: Data of Growth Rate and PCAGSDP

State	PCAGSDP in 2013 (rupees) (x_i)	CAGR of PCAGSDP 1993-94 to 2013-14 (percent)	log (x_i)- log ($\bar{x}$)	g_i- $\bar{g}$
ANDHRA PRADESH	15326.52508	5.90	-0.131258192	1.786206897
ARUNACHAL PRADESH	35036.89673	3.80	0.227823741	-0.313793103
ASSAM	9862.580329	3.20	-0.322711339	-0.913793103
BIHAR	5904.144433	4.90	-0.545544919	0.786206897
CHHATISGARH	11480.44732	6.00	-0.256743082	1.886206897
DELHI	1245.78708	1.50	-1.22125807	-2.613793103
GOA	14928.57608	-0.50	-0.142683507	-4.613793103
GUJRAT	19215.98972	4.40	-0.033039135	0.286206897
HARYANA	25737.05217	3.70	0.093856911	-0.413793103
HIMACHAL PRADESH	20748.28227	2.90	0.000280256	-1.213793103
JAMMU & KASHMIR	10554.58995	1.90	-0.293260527	-2.213793103
JHARKHAND	7080.009436	7.70	-0.466668056	3.586206897
KARNATKA	12957.37706	4.10	-0.204184795	-0.013793103
KERALA	14375.05906	-0.10	-0.159092254	-4.213793103

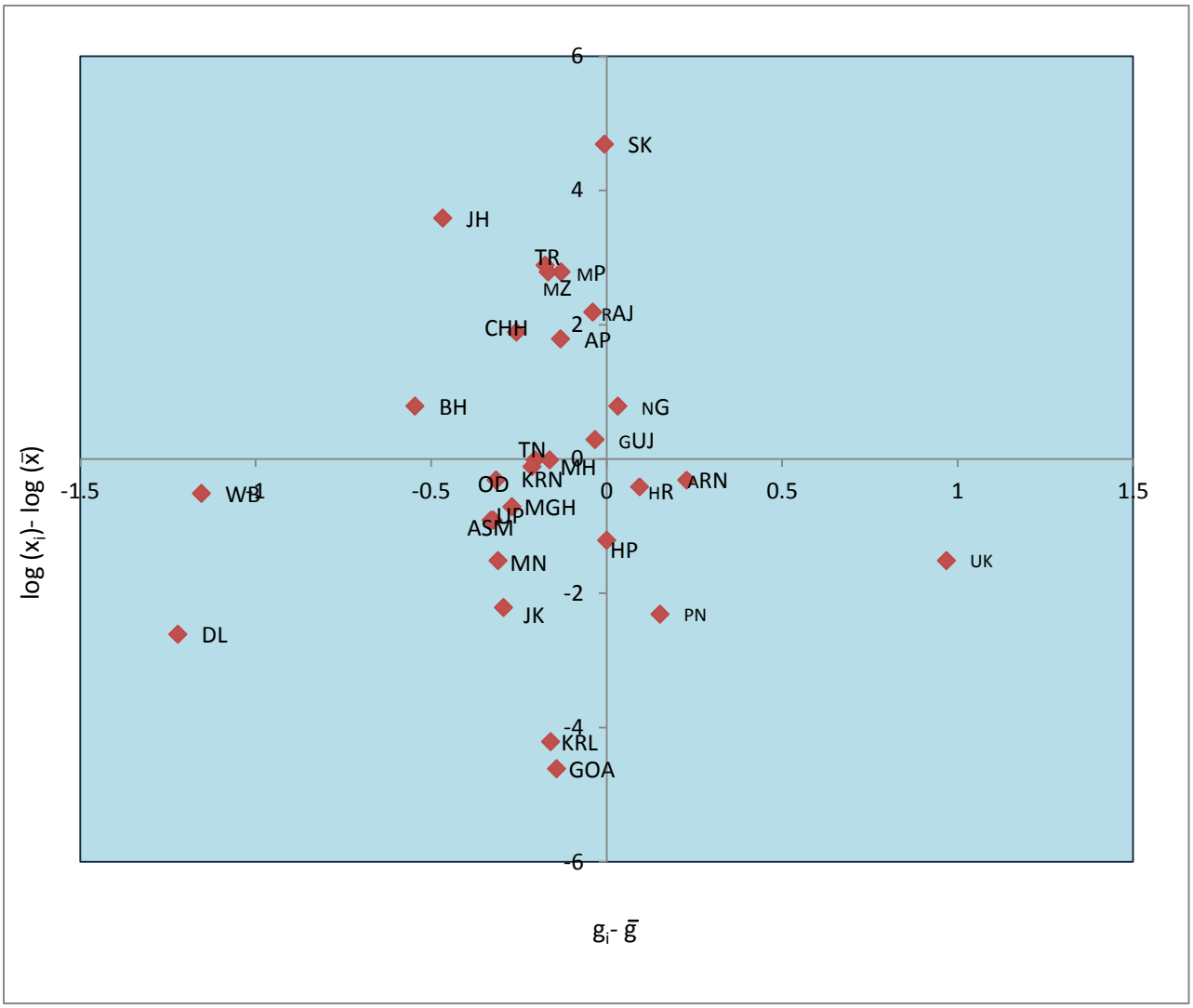
MADHYA PRADESH	15390.78083	6.90	-0.129441238	2.786206897
MAHARASHTRA	14279.91123	4.10	-0.161976385	-0.013793103
MANIPUR	10173.82576	2.60	-0.309217597	-1.513793103
MEGHALYA	11147.70387	3.40	-0.269516469	-0.713793103
MIZORAM	14127.33798	6.90	-0.166641557	2.786206897
NAGALAND	22324.87003	4.90	0.032087047	0.786206897
ODISHA	10047.52489	3.80	-0.314642802	-0.313793103
PUNJAB	29461.03313	1.80	0.15254608	-2.313793103
RAJASTHAN	18956.77942	6.30	-0.038937336	2.186206897
SIKKIM	20439.35491	8.80	-0.006234708	4.686206897
TAMILNADU	12726.21201	4.00	-0.212002738	-0.113793103
TRIPURA	13852.00047	7.00	-0.175189395	2.886206897
UTTAR PRADESH	9729.687817	3.20	-0.328602986	-0.913793103
UTTRAKHAND	192747.9097	2.60	0.968287785	-1.513793103
WEST BENGAL	1453.777913	3.60	-1.154203826	-0.513793103

Per capita agricultural Gross State Domestic Product is higher in Uttarakhand state, followed by Arunachal Pradesh and Punjab. Delhi and west Bengal having lower PCAGSDP among all states, while Compound annual growth rate point of view Uttarakhand is on third position and Assam is higher CAGR followed by Goa.

In the table we have tabulated the base period (1993, 1999 and 2004) per capita agriculture gross state domestic product at 2011-12 prices and the compound annual growth rate for entire period.

The figure represents the proportion between the PCAGSDP (x_i) of the year of 2013 for each state and the average ($\bar{x}$) expressed in logarithm terms ($\log x_i - \log \bar{x}$). The vertical axis denotes the deviation from the compound annual growth rate ($g_i - \bar{g}$) of PCAGSDP. The numbers corresponding to each state are given in the table.

Figure: 4.1: Annual Growth (1993-94 to 2013-14) of PCAGSDP



The figure suggests some interesting patterns. Capital Delhi and West Bengal starting from a low per capita agricultural GSDP but have a good growth rate and Uttarakhand did exactly opposite and there is a band of states such as Uttar Pradesh, Meghalaya, Odisha, Assam, Manipur, Jammu Kashmir, Punjab and Himachal Pradesh along with Haryana and Arunachal Pradesh which started from different levels but roughly grew at the same rate. Sikkim, Nagaland, Tripura, Mizoram, Madhya Pradesh, Rajasthan, Chhattisgarh and Andhra Pradesh started with relatively strong base and continued to grow at a faster rate. Kerala, Goa and Jharkhand started with a similar level as the other states belonging to the thick band in the middle, but grew much faster.

If ignore West Bengal and Delhi, the dotted points shows roughly an upward drift. This suggests that prima facie there is no evidence that the states in India have been converging in terms of the PCNSDP. In fact we have evidence which suggests that barring the states belonging to the thick band, strong states grew even stronger.

In this exercise we need to precisely show the pattern of 'divergence', if we assume that each state is progressing towards its own 'steady state', then clearly these 'steady states' do not seem to be the same. Even at the regional level we observe a feature that endogenous growth theorists believe a typical 'cross-country' experience, i e, poorer countries growing at slower rate than the richer ones. And 'Solow type' conclusion whereby the regional convergence follows from the basic law of diminishing returns cannot be sustained. Hence, it requires a separate analytical framework to capture the 'divergence' phenomenon at the regional level.

4.2 Calculate growth rate of agricultural GSDP in India and Forecast the GSDP

To achieve this objective we follow the procedure as given in previous chapter. We concluded in this object that Compound Annual Growth Rate of agricultural GSDP is higher in newly established state Telangana with 12.3 percent and Sikkim is on 2nd position with having 8.80 percent growth rate. The capital of the country Delhi is growing at the rate of 1.5 percent in agriculture GDP. While Goa growing with lowest growth rate which is – 0.5 percent and Kerala is on 2nd last position with having -0.10 percent CAGR in agricultural GSDP.

Table: 4.2: CAGR of Different States

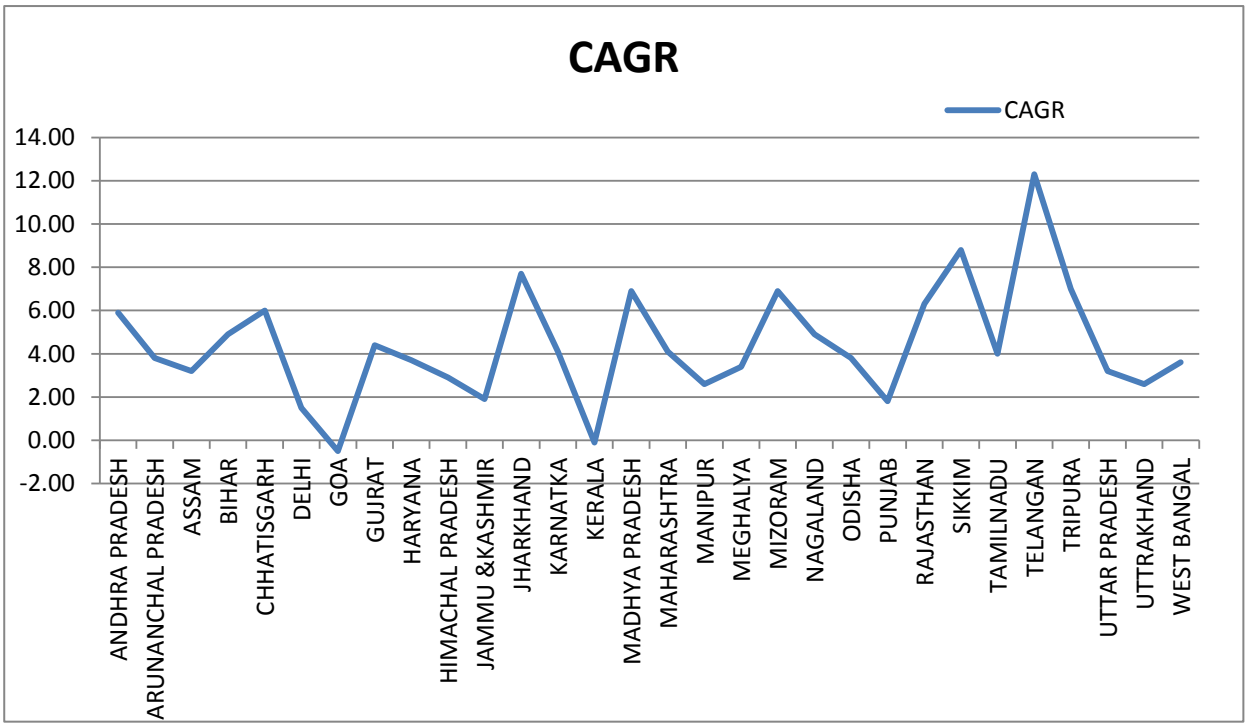
State	R^2	Coefficient	CAGR (%)
ANDHRA PRADESH	0.887	0.059*	5.9
ARUNACHAL PRADESH	0.894	0.038**	3.8
ASSAM	0.982	0.032**	3.2
BIHAR	0.772	0.049**	4.9
CHHATISGARH	0.909	0.06*	6.0
DELHI	0.121	0.015**	1.5
GOA	0.5	-0.005***	-0.5
GUJRAT	0.721	0.044**	4.4
HARYANA	0.927	0.037**	3.7
HIMACHAL PRADESH	0.668	0.029**	2.9
JAMMU &KASHMIR	0.827	0.019**	1.9
JHARKHAND	0.942	0.077*	7.7
KARNATKA	0.834	0.041**	4.1
KERALA	0.02	-0.001***	-0.1
MADHYA PRADESH	0.897	0.069*	6.9
MAHARASHTRA	0.717	0.041**	4.1
MANIPUR	0.53	0.026**	2.6
MEGHALYA	0.887	0.034**	3.4
MIZORAM	0.907	0.069*	6.9
NAGALAND	0.934	0.049**	4.9
ODISHA	0.932	0.038**	3.8
PUNJAB	0.962	0.018**	1.8
RAJASTHAN	0.883	0.063*	6.3
SIKKIM	0.846	0.088*	8.8
TAMILNADU	0.803	0.04**	4.0
TELANGANA	0.916	0.123**	12.3
TRIPURA	0.956	0.07*	7.0
UTTAR PRADESH	0.975	0.032**	3.2
UTTRAKHAND	0.861	0.026**	2.6
WEST BENGAL	0.817	0.036**	3.6

Here * represents 10 percent level of significance

** represents 5 percent level of significance

*** represents 1 percent level of significance

Figure: 4.2: Compound Annual Growth Rate From Different States in India



Top five states those have higher CAGR in agricultural GSDP are given below:-

Table: 4.3: Top 5 States of CAGR

State	CAGR (%)
TELANGANA	12.30
SIKKIM	8.80
JHARKHAND	7.70
TRIPURA	7.00
MIZORAM	6.90

Table: 4.4: Top 5 States of Least CAGR

State	CAGR (%)
GOA	-0.50
KERALA	-0.10
DELHI	1.50
PUNJAB	1.80
JAMMU &KASHMIR	1.90

From the CAGR next calculate the forecast of agricultural GSDP in different states. The calculation is done for next six years i.e. 2021-2022. The currently focused goal of agriculture department is how to double the income of farmers' up to 2022, so I forecast agricultural GSDP of all states. From this rate of growth how much the agricultural GSDP will be had by different states?

I found that the Uttar Pradesh state which is first from population point of view will have higher agricultural GSDP. Followed by Andhra Pradesh, West Bengal and then Goa will have lowest agricultural GSDP.

Table: 4.5: Forecast Agricultural GSDP (lakh rupees) up to 2021-22.

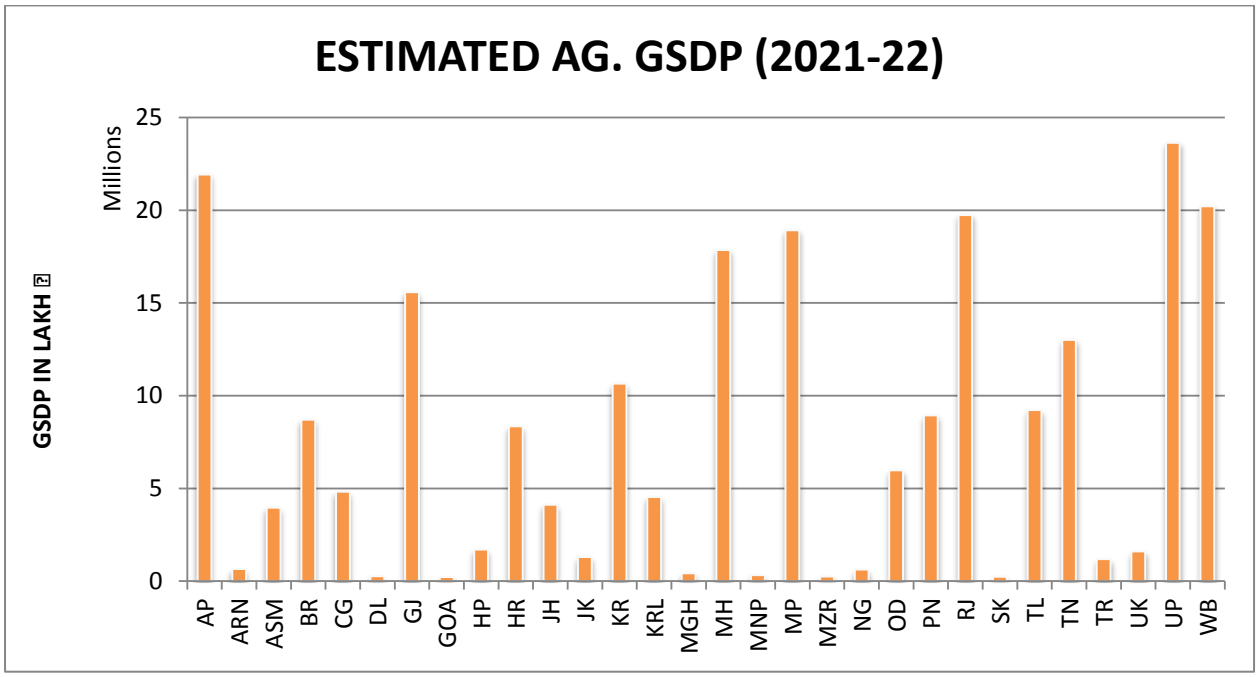
State	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
ANDHRA PRADESH	14680287	15546424	16463663	17435019	18463685	19553043	20706672	21928366
ARUNACHAL PRADESH	505461	524668.5	544605.9	565300.9	586782.4	609080.1	632225.2	656249.7
ASSAM	3182347	3284182	3389276	3497733	3609660	3725169	3844375	3967395
BIHAR	6228145	6533324	6853457	7189276	7541551	7911087	8298730	8705368
CHHATISGARH	3212257	3404992	3609292	3825849	4055400	4298724	4556648	4830047
DELHI	235809	239346.1	242936.3	246580.4	250279.1	254033.3	257843.8	261711.4
GOA	230248	229096.8	227951.3	226811.5	225677.5	224549.1	223426.3	222309.2
GUJRAT	11534224	12041730	12571566	13124715	13702202	14305099	14934524	15591643
HARYANA	6477388	6717051	6965582	7223309	7490571	7767722	8055128	8353168
HIMACHAL PRADESH	1398505	1439062	1480794	1523737	1567926	1613396	1660184	1708330
JAMMU &KASHMIR	1142819	1164533	1186659	1209205	1232180	1255592	1279448	1303757
JHARKHAND	2453548	2642471	2845941	3065079	3301090	3555274	3829030	4123865
KARNATKA	8042687	8372437	8715707	9073051	9445046	9832293	10235417	10655069
KERALA	4577572	4572994	4568421	4563853	4559289	4554730	4550175	4545625

MADHYA PRADESH	11866294	12685068	13560338	14496001	15496225	16565465	17708482	18930367
MAHARASHTRA	13486265	14039202	14614809	15214016	15837791	16487140	17163113	17866801
MANIPUR	269681	276692.7	283886.7	291267.8	298840.7	306610.6	314582.5	322761.6
MEGHALYA	339625	351172.3	363112.1	375457.9	388223.5	401423.1	415071.5	429183.9
MIZORAM	154626	165295.2	176700.6	188892.9	201926.5	215859.4	230753.7	246675.8
NAGALAND	445284	467102.9	489991	514000.5	539186.5	565606.7	593321.4	622394.2
ODISHA	4607846	4782944	4964696	5153354	5349182	5552451	5763444	5982455
PUNJAB	7895027	8037137	8181806	8329078	8479002	8631624	8786993	8945159
RAJASTHAN	12877970	13689282	14551707	15468464	16442978	17478885	18580055	19750599
SIKKIM	130020	141461.8	153910.4	167454.5	182190.5	198223.3	215666.9	234645.6
TAMILNADU	9886554	10282016	10693297	11121029	11565870	12028505	12509645	13010031
TELANGANA	529098	594177.1	667260.8	749333.9	841502	945006.7	1061243	1191775
TRIPURA	5747139	6149439	6579899	7040492	7533327	8060660	8624906	9228649
UTTAR PRADESH	18963024	19569841	20196076	20842350	21509305	22197603	22907926	23640980
UTTRAKHAND	1341783	1376669	1412463	1449187	1486866	1525524	1565188	1605883
WEST BENGAL	15789680	16358108	16947000	17557092	18189148	18843957	19522339	20225144

At this compound annual growth rate of different states Uttar Pradesh may have higher GSDP which is 23640980 lakh rupees. The state that has lesser gross state domestic product from agriculture sector is Goa 222309 lakh rupees.

The figure is plotted below for estimated agricultural GSDP of different states in 2021-22, which is easy to see the higher and lower of GSDP.

Figure: 4.3: Estimated Agricultural GSDP in 2021-22



4.3 To study about total GSDP and agricultural GSDP comparatively of different states in India.

For this objective I found the contribution of agricultural GSDP in total GSDP (from all three sectors) in percentage. It is higher for Arunachal Pradesh which is 39.26 percent, followed by Nagaland with having 31.95 percent. The capital Delhi contribute lowest part of agriculture in total GSDP which is 0.5 percent, and Telangana which have higher compound annual growth rate is contributing its only 1.25 percent with 2nd position followed by Goa with having 6.9 percent from agriculture in total GSDP.

The contribution from agricultural GSDP in total GSDP from different states of India is given in table below:-

Table: 4.6: Contribution From Agriculture GSDP in Total GSDP

State	Percentage Share in Total GSDP
Andhra Pradesh	31.84
Arunachal Pradesh	39.26
Assam	19.92
Bihar	22.79
Chhattisgarh	16.09
Delhi	0.53
Goa	6.90
Gujarat	15.82
Haryana	18.81
Himachal Pradesh	17.19
Jammu and Kashmir	15.48
Jharkhand	14.09
Karnataka	11.17
Kerala	11.92
Madhya Pradesh	30.69
Maharashtra	11.13
Manipur	18.53

Meghalaya	15.96
Mizoram	17.15
Nagaland	31.95
Odisha	16.27
Punjab	27.37
Rajasthan	26.93
Sikkim	10.30
Telangana	1.25
Tripura	28.02
Tamil Nadu	10.90
Uttar Pradesh	24.20
Uttarakhand	9.90

For that we have divide the entire states compound annual growth rate into three classes, which show different level of growth.

- Higher Agriculture GSDP in Total GSDP (more than 25 %)
- Middle Agriculture GSDP in Total GSDP (15 - 25 %)
- Lower Agriculture GSDP in Total GSDP (less than 15 %)

In the tables categorised states are shown in which 10 states including with Delhi are showing lower agriculture sector contribution in total GSDP (Table 4.7). If we ignore Delhi and Telangana rest of states are showing more than 5 percent contribution. Jharkhand is under categorised lower agriculture GSDP contribution but having a minor difference to reach middle level of categorization.

Total 12 states are showing (Table 4.8) the contribution between 15 to 25 percent in total GSDP in which Uttar Pradesh is having higher contribution from Agriculture in total GSDP. Only 7 seven states are having a major part from agriculture to their total GSDP. These all are showing (Table 4.9) higher than 25 percent contribution from agriculture sector to total GSDP.

Table 4.7: Lower Agriculture GSDP Growth States

State	Percentage Share in Total GSDP
Delhi	0.53
Telangana	1.25
Goa	6.9
Uttarakhand	9.9
Sikkim	10.3
Tamil Nadu	10.9
Maharashtra	11.13
Karnataka	11.17
Kerala	11.92
Jharkhand	14.09

Table 4.8: Middle Agriculture GSDP growth states

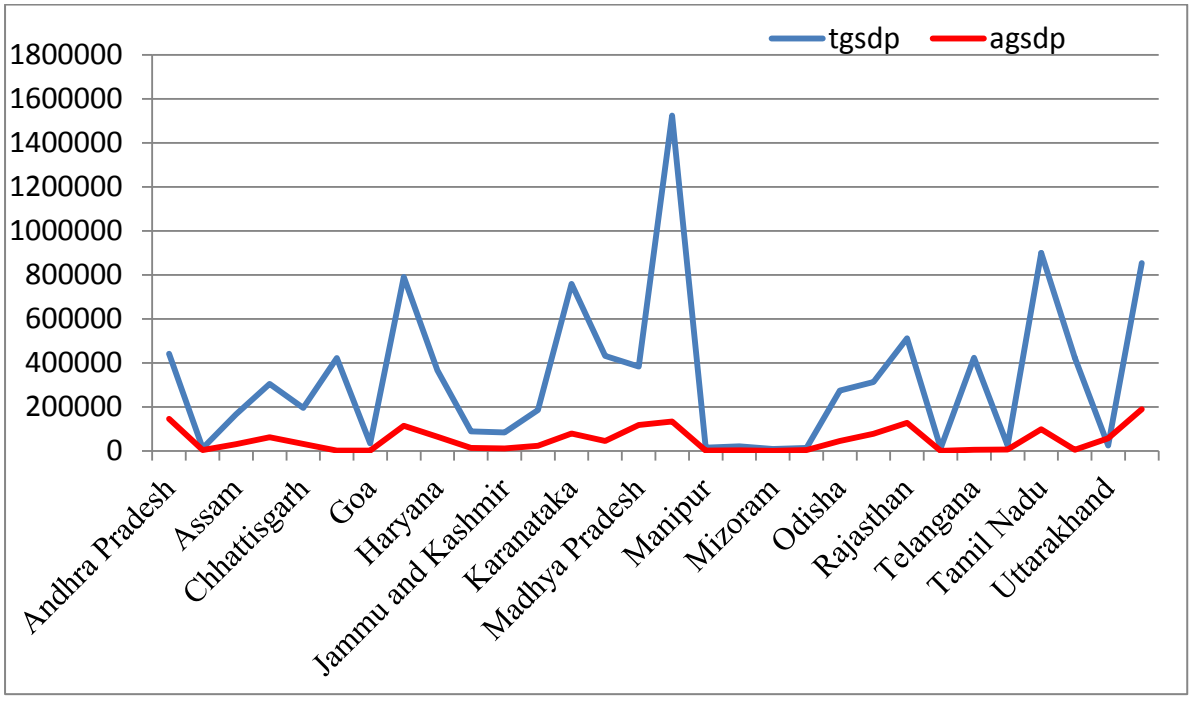
State	Percentage share in total GSDP
Jammu and Kashmir	15.48
Gujarat	15.82
Meghalaya	15.96
Chhattisgarh	16.09
Odisha	16.27
Mizoram	17.15
Himachal Pradesh	17.19
Manipur	18.53
Haryana	18.81
Assam	19.92
Bihar	22.79
Uttar Pradesh	24.2

Table 4.9: Higher Agriculture GSDP growth states

State	Percentage share in total GSDP
Rajasthan	26.93
Punjab	27.37
Tripura	28.02
Madhya Pradesh	30.69
Andhra Pradesh	31.84
Nagaland	31.95
Arunachal Pradesh	39.26

Comparatively total GSDP and agricultural GSDP is shown in the figure presented below. Blue line is showing the total GSDP of states and red showing the agricultural GSDP of different states in India during 2014-15.

Figure: 4.4: Agriculture GSDP and Total GSDP of Different States



Note: - tgsdp: - Total Gross state domestic production.

agdsp: - Agricultural GSDP

CHAPTER 5

SUMMARY AND CONCLUSION

India is one of the fastest growing economies in the world. Rapidly declining growth of agriculture sector in last years has contributing small but important part for the gross domestic product of India. Agriculture contributes 17.4 percent in countries Gross Value Added and in GDP of India 13.9 per cent share in 2015-16 is from this sector. The growth in agriculture is not as stable as compare to other sectors in economy. Few subsectors are contributes in GDP of agriculture. Those are given following:-

- Crop production
- Livestock
- Forestry
- Fisheries and aquaculture

All subsectors give a major contribution in agricultural GDP. The growth in livestock sector is major rather than forestry and fisheries.

The entire decline in share of agriculture sector in GDP, i.e., from 55.28 per cent 1950-51 to 13.9 per cent in 2015-16, has been picked up by the services sector. The other sector like industry more or less depends on agriculture for its raw material.

India depends heavily on the agriculture sector, especially on the food production unit after the crisis in food sector in 1960. Since then, India has put a lot of effort to be self-sufficient in the food production. Then Green Revaluation came into existence with the aim to improve the agriculture in India.

The growth of agriculture sector in India is 4.1 per cent in 2016. In this study the finding is that the Telangana state of India is on first position with 12.3 percent growth rate in agriculture GSDP and Sikkim is on second position with having 8.80 percent growth rate, followed by Jharkhand and Tripura.

While Goa growing with lowest growth rate which is – 0.5 per cent and Kerala is on second last position with having -0.10 per cent followed by Delhi at the growth rate of 1.5 percent in agriculture GDP.

Capital Delhi and West Bengal starting from a low per capita agricultural GSDP but have a normal growth rate and Uttarakhand did exactly opposite and there is a band of states such as Uttar Pradesh Meghalaya, Odisha, Assam, Manipur, Jammu Kashmir, Punjab and Himachal Pradesh along with Haryana and Arunachal Pradesh which started from different levels but roughly grew at the same rate.

Sikkim, Tripura, Mizoram, Madhya Pradesh, Rajasthan, Chhattisgarh and Andhra Pradesh started with relatively strong base and continued to grow at a faster rate. Jharkhand started with a similar level as the other states but grew much faster.

Upon the basis of compound annual growth rate of different states forecast of agriculture sector share in respective states total GSDP has been done. In this I found that the state Uttar Pradesh may have higher GSDP in agriculture sector compare to other states in 2021-22 which is 23640980 lakh rupees, followed by Andhra Pradesh and West Bengal.

The state that will have lesser gross state domestic product in 2021-22 from agriculture sector in their total GSDP is Goa 222309 lakh rupees, followed by capital region Delhi.

The contribution of agricultural GSDP in total GSDP (from all three sectors) is higher in case of Arunachal Pradesh which is 39.26 percent, followed by Nagaland with having 31.95 percent. The capital Delhi contribute lowest part of agriculture in total GSDP which is 0.5 percent, and Telangana which have higher compound annual growth rate is contributing its only 1.25 percent in total GSDP from agriculture sector with 2nd position followed by Goa with having 6.9 percent from agriculture in total GSDP.

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Appendix

Table-A: Gross State Domestic Product at Factor Cost By Industry of Origin at 2011-12 Constant Prices (in Lakh Rupees)

State	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90
AP	3431716	4118249	4065126	4272603	3902130	3900947	3501908	3936512	4731774	4857954
ARN	117229	144727	137488	164985	164985	195003	210839	217559	252641	236039
ASM	1757591	1755224	1880976	1981082	1887479	2022887	1940707	2062493	2040983	2202774
BH	3063122	2889068	2784128	3285747	3640006	3672109	3993550	3258454	3809160	3505310
DL	297831	311686	326727	349838	376145	427849	436416	349590	402562	421045
GOA	140583	129614	129317	136247	139898	118367	112270	132764	146383	161151
GJ	3891487	4572834	3962010	4786893	4845592	3761631	3757694	2153370	5254462	4677677
HR	2288203	2262411	2369098	2440957	2509537	2830434	2703498	2363922	3274697	3227264
HP	535371	579805	506665	564797	487394	548219	589153	502719	558445	684186
KR	3173688	3508465	3408824	3576864	3888407	3413527	3915989	3898229	4117535	4215945
MP	3569701	3719263	3812796	4123318	3756852	4151862	3750225	4083891	4389408	4154055
MH	4786457	5013805	4759613	5062025	4970309	4855624	4246946	5498971	5871701	7313778
MN	101667	104496	102402	110940	113497	116820	114131	120152	119941	120353
MGH	117182	119258	119050	117374	122196	126108	118076	129317	107330	131169
OD	2487844	2551344	2252345	2916851	2527334	2950152	2824047	2559205	2995203	3363170
PUN	2981360	3296499	3400357	3371082	3741316	4056310	4029778	4219951	4353967	4826029
RJ	3118620	3486795	3471174	4553572	4055077	3774332	3642032	2962613	5313311	4845771
TN	3007113	3752693	2933696	3495412	4103703	3823586	3860891	3907144	3947263	4437429
TR	144589	136818	155745	139074	143172	145283	147096	167026	174228	181508
WB	3947798	3545546	3603232	4569355	4752137	4956856	5140958	5475698	5790546	5978990

Continue…

State	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
AP	4717257	4804987	4772648	5292020	5227323	5522113	5861865	4877274	6113180	5973976
ARN	263710	310922	324733	353639	345865	354359	356455	299105	301001	330646
ASM	2220763	2282939	2296408	2337813	2362782	2404935	2396087	2482698	2376684	2367957
BH	4076596	3510011	3200291	3310113	3849386	3016094	4022166	3223873	3811168	3504938
CHH	NA	NA	NA	1998058	2088161	1984778	2036443	1616979	1771994	1703352
DL	453853	484539	549301	379175	210287	170886	158196	198561	245977	219838
GOA	153517	154499	182627	181478	173817	172511	180080	178380	180940	194731
GJ	4425769	3716429	5454433	4228146	5924166	5197845	6963047	6381432	6756280	4852296
HR	3577015	3560449	3647545	3763458	4027452	3840369	4242310	3915813	4042290	4224414
HP	682731	660449	668717	678252	684202	694449	705534	710214	716826	687744
JK	NA	NA	NA	697460	790374	809551	862880	832626	870825	940791
JH	NA	NA	NA	825868	909715	872676	901136	891207	913831	1053045
KR	3966758	4680078	4842064	5232195	5209226	5326734	5578142	5412734	6060845	6609078
KRL	NA	NA	NA	4179427	4587307	4534572	4651497	4415119	4529316	4647387
MP	4914931	4389248	4739610	5465436	5364984	5514924	5825352	5939894	6045442	6397638
MH	6876660	5635399	7641172	8118793	7988717	8345919	9658799	8305320	8825391	9502771
MN	126183	136060	134872	143621	134206	134308	142352	158577	162361	160802
MGH	140590	142681	113302	124830	127866	147403	157280	158457	164230	187914
MZ	NA	NA	NA	NA	NA	NA	NA	NA	NA	93021
NG	NA	NA	NA	92839	103698	95861	107878	124253	131434	148412
OD	2337448	2692247	2458901	2835704	2802819	2846872	2517334	3024078	2977529	2753240
PUN	4763480	5147354	5263645	5468970	5581311	5584310	5976851	5707451	5881896	6310056
RJ	5856855	5061651	6013137	4880107	6091206	5883337	7101471	7381375	7343380	6434571
SK	NA	NA	NA	47452	47476	51261	53087	54252	41663	42691
TN	4607924	5113859	5229537	5699910	6344485	5534187	5492329	5968595	6531495	6200779
TR	193203	185827	180833	193772	181014	195753	210563	213269	230023	239382
UP	NA	NA	NA	9585556	9865275	10022317	10958572	10409854	10750433	11685904
UK	NA	NA	NA	675955	703681	755601	745749	749690	784911	776103
WB	5833924	6580375	6632056	7254959	7838982	8025307	8510789	9203697	8926938	9195133

Continue…

State	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
AP	6760364	6656662	6140061	7069855	7384074	7270326	7504323	8849371	8691987
ARN	373795	354270	351865	364838	355239	349767	361024	425733	418161
ASM	2336137	2321278	2349626	2385217	2352980	2413331	2459471	2528796	2577904
BH	4710795	3807254	4745181	3973363	4510414	3995388	4974866	4603359	5473312
CHH	1304968	1867943	1440991	2062581	1706410	1924017	2010274	2197667	1979066
DL	223427	219833	216103	218280	219919	212382	214815	208785	207433
GOA	168018	160169	174942	195876	194335	240127	201734	204818	189905
GJ	4293323	5608651	5225402	7309696	6815694	8390310	8328834	9055917	8406565
HR	4371308	4365403	4316095	4649838	4806717	4719907	5387850	5384537	5772876
HP	799859	866887	887785	989919	1005450	1067562	1060222	1155440	1144726
JK	936399	991929	1016650	1106886	1120579	1123215	1135085	1142452	1186174
JH	988101	1326279	1092369	1126908	1257170	1303019	1467002	1549263	1805973
KR	6154948	5470139	5057195	4409119	5453074	5994101	5823724	6544223	6692518
KRL	4711820	4777976	4866756	4798970	5049067	4711820	4777976	4866756	4798970
MP	4717172	5827641	4744170	6487509	6208076	6645382	6801409	6700207	7293082
MH	9066864	9571337	9812799	10835803	10180813	11117935	12677800	14421794	12193324
MN	167575	173528	167600	192678	210909	210278	210445	231514	253272
MGH	199034	205325	218427	222388	236804	248397	251697	249389	259734
MZ	86247	86884	90391	89184	93066	94584	94841	108176	121378
NG	193830	218871	246605	260196	283699	290941	293766	295571	317818
OD	2549515	2960168	2453443	3013192	3112769	3216805	3279078	3431924	3495961
PUN	6399937	6451501	6372740	6740123	6885943	6951691	7149882	7423314	7574128
RJ	6040073	7626512	5070727	9196580	7941460	7965845	8564268	8702631	9067453
SK	45480	48676	51674	55687	58578	60997	61052	63442	66162
TN	6496575	6345168	5041423	4919233	5805052	6574694	7445057	7116972	6953813
TR	216709	263489	260941	274545	283923	293037	316788	371198	392219
TL	NA	NA	NA	NA	2389452	2192780	2699212	3256768	4058410
UP	11985182	12373841	13085218	14181809	14826197	15173018	15540069	16086133	16697833
UK	860213	844178	935531	1011347	1122698	1086532	1137135	1160897	1118394
WB	9164011	9956229	9779656	10128030	10332583	10562215	10786380	11455970	11186656

Continue…

State	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
AP	9286600	9180502	9475067	11260533	12963294	14680287	16408561
ARN	446767	441663	455834	470903	484815	505461	527545
ASM	2755584	2834019	2881900	3056979	3077675	3182347	NA
BH	4727072	5516552	6206655	6729455	6146182	6228145	6352181
CHH	2147300	2608646	2685950	2850360	2932703	3212257	NA
DL	262614	283387	286065	222574	209142	235809	NA
GOA	191416	194604	197421	188948	217740	230248	NA
GJ	8344464	10150596	10706946	9224811	11614085	11534224	NA
HR	5689349	5986055	6456789	6329621	6524719	6477388	NA
HP	1016660	1204329	1162627	1246494	1424287	1398505	NA
JK	1180581	1279223	1308724	1227119	1323683	1142819	NA
JH	1693752	1769378	2233546	2364954	2335563	2453548	NA
KR	6964958	8091232	7554870	7182602	7916348	8042687	NA
KRL	5049067	4611788	4837594	4906807	4802141	4577572	NA
MP	7943624	7962774	9028499	11340296	11177833	11866294	13628390
MH	12318064	14898874	14517809	14248305	16046955	13486265	NA
MN	287690	235331	240920	257230	261507	NA	NA
MGH	265597	270564	282868	313890	330740	339625	362007
MZ	132510	154272	149468	145937	155006	154626	NA
NG	326994	354481	373363	392141	441698	445284	NA
OD	3766615	3838209	3815451	4446373	4217370	4607846	4015555
PUN	7551091	7675194	7816825	7886831	8173474	7895027	NA
RJ	8823451	12039917	11910650	12263755	12994576	12877970	NA
SK	68964	72312	100053	110243	124798	NA	NA
TN	7395417	7947636	8738509	7798550	9181584	9886554	NA
TR	412615	459852	467507	467507	508911	NA	NA
TL	3640722	3659560	5461488	5944282	6071339	5747139	5489424
UP	16631770	17415003	18389333	19352681	19441117	18963024	NA
UK	1226131	1279817	1331185	1356727	1326952	1341783	1398049
WB	11962886	11712256	11806747	13758370	15188000	NA	NA

Abbr.: NA- Not Available

AP	ANDHRA PRADESH
ARN	ARUNACHAL PRADESH
ASM	ASSAM
BH	BIHAR
CHH	CHHATISGARH
DL	DELHI
GOA	GOA
GJ	GUJRAT
HR	HARYANA
HP	HIMACHAL PRADESH
JK	JAMMU & KASHMIR
JH	JHARKHAND
KR	KARNATKA
KRL	KERALA
MP	MADHYA PRADESH
MH	MAHARASHTRA
MN	MANIPUR
MGH	MEGHALYA
MZ	MIZORAM
NG	NAGALAND
OD	ODISHA
PUN	PUNJAB
RJ	RAJASTHAN
SK	SIKKIM
TN	TAMILNADU
TR	TRIPURA
TL	TELANGANA
UP	UTTAR PRADESH
	UTTRAKHAND
WB	WEST BENGAL