Chapter: I
Introduction

The Problem:

Pre independent India was characterised by a stagnant agrarian economy with large differences between various regions in their performance. The growth rate of crop output was 0.4% between 1891 and 1946\(^1\) (Rao and Despande 1986). The structure of the economy at the time of independence was largely identified as pre-capitalist/non-market based structure. In the post independence period, the leaders of Independent India wanted to initiate development and growth in the agrarian economy and also aimed at implementation of policies to reduce regional disparities. The method, as visualized by the leaders, for initiating development and/or growth was a State-led planned development process. The received literatures identified the stagnancy in Indian agriculture as a result of the low levels of investment and the related lack of incentives for agents to invest in productivity enhancing changes. One of the important constrains for the low level of investment in agriculture is the nature of institutional structure in agriculture. A process by which institutional structure constraints growth via low level of investment are nature of land rights and the existence of series of intermediaries between the state and cultivators. In the early post independence period there was an attempt to bring about a change in the institutional arrangements in agriculture with public policies like Land Reforms, provision of credit via formal institutions, marketing regulation etc. One of the principal movements to change the institutional structure of agriculture was the land reform measure. However, land reform measure was a mixed bag of successful and failed attempts to change the institutional structure of agriculture. Abolition of intermediary was to a large extent a success but other measures in land reform were a failure like ceiling abolition, tenancy regulation etc. The limited success of land reform in terms of abolition of intermediary was seen as one condition for the increase in land under cultivation. Simultaneously the state also increased public investment in agriculture, one of the forms of the public investment being public provision of irrigation. This has led to a massive expansion in land under cultivation. Thus the growth in the period has been identified as an extensive type with a

\(^1\) It has been pointed out by Vaidyanathan (2000) that in the growth rate of crop output in the period before independence was below 1 percent.
growth rate of agricultural income around 2.66 percent in the fifties (Abel 1970). In the same period the growth rate of foodgrain production was 2.5% and growth rate of total crop production was 3% (Rao and Despande 1986). But by the mid 1960’s the agricultural sector faced a major food crisis leading to change in policy towards a technical solution to the problems of agricultural sector without changing the institutional structure. This is generally identified as the “green revolution’ policy. The green revolution policy depends on public provision of subsidized inputs necessary for production. In between the period 1962-65 to 1970-73 the new seed fertilizer technology led to significant increase in the yield of wheat and rice was confined to Punjab, Haryana and Western Uttar Pradesh in north-west India. (Subrahmanyam and Sekhar, 2003). During the period of 1970s the green revolution spread to new areas like coastal Andhra Pradesh and Tamil Nadu, eastern Uttar Pradesh and some part of Rajasthan. However, the spread of green revolution was not homogenous for all the states. Thus the overall crop output at all India did not witness a significant increase in the growth rate². The period of 1980s appeared to be the best period for Indian agriculture with significant acceleration in output growth and reduction in regional inequality because of the introduction of the HYV seeds for other crops³, spread of green revolution to eastern part⁴ and emphasis on watershed programmes in dry areas (Subrahmanyam and Sekhar 2003). But the increased state involvement in the provision of inputs led to a fiscal crisis during the 1990’s. The fiscal crisis led to a change in public policy wherein the state withdrew from investment and/or provision of subsidized inputs and assigned itself the role of facilitator of production in the economy. Again the period of 1990s witnessed decline in the growth rate of the crop output and income⁵.

After nearly fifty years of Independence, Indian agriculture did witness increased performance as compared to the pre-independence period. But a remarkable systematic

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² Specific crops like rice and wheat witnessed increase in the yield and output but the over all growth rate of total crop output has declined in the period 1968-85 to 2.63 percent compared to the 3.02 percent in 1950-65 at all India level [(Rao Ray and Subharao (1988) and Rao and Deshpande (1986)].

³ In the 1980s the new technologies spread to some other crops like cereals, rapeseed and mustard, soybean, sunflower, cotton and sugarcane etc

⁴ In 1980s there was spread of green revolution towards eastern Indian states of Bihar, West Bengal, Orissa and Assam.

⁵ The growth rate of gross domestic product (GDP) from agriculture declined from 4.2% in the 1980s to 3.7% per annum in the 1990s (Economic Survey 2001). Again the GDP from agriculture witnessed decline in the growth rate to 2.02% in between 2000-01 to 2004-05 (Mathur, Das and Sircar 2006).
result on the studies of the performance of agricultural sector is that states perform differently. Some states grow faster and some do not grow fast while some states witness a decline in the rates of growth. There exist three interrelated sets of literature analysing the growth performance of the states. One is related to the analysis of growth of crop output or income over time in the different states\(^6\) [Srivastava (1993), Sawant and Achuthan (1995), Shand and Bhide (2000)]. The general conclusion that emerged from the past studies is that the growth patterns of states are not similar with regards to the yield per hectare, output and income. For example the study by Chand, Raju and Pandy (2007) established that the growth rate of agricultural Net State Domestic Product (NSDP) was above 2% in the states like Bihar, Punjab, West Bengal, Andhra Pradesh and Haryana in the period 1995-96 to 2004-05. On the other hand, the growth rate of agricultural NSDP was below 1% in the states like Rajasthan, Maharashtra, Orissa, Gujarat, Karnataka and Assam for the same period.

The second set of literature analysed whether regional differences are decreasing or not. One of the important objectives of the state led planned development process was the reduction in regional inequality. Though state through its instruments like investment and introducing new technology, aimed at reducing the inequality it was observed from the past studies is that the degree of regional disparity in agricultural development has been very high in term of income from agriculture [Alagh (1980), Dev (1985), Bhalla and Tyagi (1989), Marjit and Mitra (1996), Bhalla and Singh (1997), Rao, Shand and Kalirajan (1999), Bhattacharya and Sakthivel (2004)].

The third set of literature analysed whether there is convergence of rate of growth of income in the different states. The literature suggested that there was no evidence of convergence among the states with respect to the per capita net state domestic product

\( ^6\) The growth rate of Net State Domestic Product (NSDP) from agriculture in the period 1970-71 to 1980-81 was higher in Gujarat, Maharashtra, Assam, West Bengal, Punjab, and Haryana (the growth rate varied between 3 in Haryana to 5% in Gujarat). Uttar Pradesh, Madhya Pradesh, Orissa, Bihar, Andhra Pradesh and Karnataka witnessed moderate growth rate in the same period (the growth rate varied between 1.7% in Karnataka to 2.9% in Uttar Pradesh). Rest of the states witnessed growth rate below 1% and Tamil Nadu is the only state where the growth rate was negative in between 1970-71-1980-81. All most all the states witnessed increase in the growth rate of agricultural NSDP in 1980s compared to the earlier decade except for Orissa and Assam, where the growth rate has declined (Shand and Bhide, 2000)].
[Marjit and Mitra (1996), (Ghosh, Marjit and Neogi (1998)]. The convergence hypotheses can be tested by σ-convergence, absolute or unconditional β-convergence and conditional β-convergence. The study by Ghosh (2006) calculated the absolute β-convergence and the result shows that there is no significant convergent or divergence in the land productivity and per capita agricultural output, there has been significant divergence in the labour productivity particularly after 1990s. The study also used the σ-convergence and the result shows that after the introduction of HYV seeds the per capita agricultural output increased significantly. The analysis of inter-state variation using the club convergence and unit root test shows that states like Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh share a common steady state path with all India. Other states like Haryana, Punjab, Kerala, Orissa, Tamil Nadu and West Bengal are diverging from the national average steady-state path. Another study by Mukherjee and Kuroda (2002), examined the convergence hypothesis by using the total factor productivity (TFP) of agriculture in the states. The study divided the states into two groups as high performing states and low performing states according to the growth rate of TFP considering 1970 as the base year. The result suggested that the there is no evidence of a reduction in the productivity gap between the two groups of states over time. Study by Dagupta, Maiti, Mukherjee, Sarker and Chakrabarti (2000) suggested that there was no evidence of β-convergence across states with respect to the per capita State Domestic Product (SDP) for the period 1960-61 to 1995-96. The σ-convergence showed that the states diverge in terms of their per capita agricultural output but converge in terms of infrastructure.

The concept σ-convergence concerns with cross sectional dispersion of per-capita income. This convergence is said to be exist if the dispersion of per capita incomes across regions decreases over time. The existence of σ-convergence implies a tendency of per capita income to be equal across regions over time. Whether the presence of σ-convergence in per capita income is due to higher growth rates of the poor regions can be explained by β-convergence. Absolute β-convergence is said to exist if the poorer regions tend to grow faster than the richer ones. The existence of absolute β-convergence is empirically examined by estimating cross sectional regression of annual average growth of per capita income on the initial level of per capita income. The absolute β-convergence assumes poor regions will grow faster than the rich ones depend on the key assumption that the regions differ in their levels of capital only. But regions my differ in many other respect like investment, rate of capital depreciation, population growth rate, literacy etc. These difference may generate different steady state for different regions. In different steady states for different regions one can test the conditional β-convergence, holding the steady state of each regions constant. Conditional β-convergence is perceptible only after other factors, which may cause variation in steady states across regions are accounted for.
**1.1 Factors Influencing the Performance of Agricultural Sector at the State Level:**

The factors affecting the increase in the differential growth performances in the agriculture was divided broadly into four categories based on the past literatures. The first set of factors is the difference in the natural conditions, the second set of factors that identified in the literatures is the difference in the state policy. The state policy can take with respect to the land reform measures or by public investment in agriculture in terms of provision of irrigation facility or by introduction of new technology i.e. the green revolution. The third set of factors that can lead to the differential performance of states is by increase in the private initiative and investment in the form of crop diversification and expansion in well irrigation. Fourthly another set of literature identified the difference in the initial condition in terms of land settlements in colonial period, which affects the present day performance.

i **Natural Factors:**

The disparities in agricultural development have often been attributed to inter regional variations in agro-climatic conditions and resource endowments (Ghosh, 2006). In different regions the natural factors like soils and climatic conditions are fixed and the production technology has to adjust with them. The natural factor like the difference in the amount of rainfall received in different states is different. According to Chand, Raju and Pandey (2007), amount of rainfall is one among the important factor that affects the performance of agriculture thus leading to differential growth performance among states.

ii **State Policies:**

The state policy can lead towards an increase in the difference of the growth rates among states. Agriculture is a state subject and the performance of the agriculture mainly depends on the individual state’s policy. It has pointed out by Srivastava (1993), that the dynamics of change in the regional disparities of agricultural development would depend on the nature of the regional distribution of gains from economic reforms. The state policy can take the form of the implementation of the land reform, public investment in the form of
irrigation and the introduction of the new technology i.e. In Indian case, green revolution in agriculture.

**Land Reform:** Land reform is a measure adopted in order to correct the uneven distribution of land and to provide the private property rights on land. Different Indian states had different land settlement system imposed by the British policy. The demographic and economic factors, together with the differential impact of rent-revenue on different cultivators created a ground for regional difference in the pattern of surplus appropriation and the extent of economic differentiation among the peasantry (Srivastava 1993). After independence Indian states implemented land reform at the all India level but the impact of land reform showed mixed results. In Kerala, West Bengal and Karnataka the reform measures significantly influenced the agrarian structure. But regions like Bihar, Orissa and Rajasthan witnessed only a marginal impact of reform measures (Suri and Raghavulu 1994).

**Public Investment in Irrigation:** Even after the post green revolution period, the difference in public investment in agriculture was considered as the prime factor for analyzing the regional diversity among the states. The difference in the rate of investment largely attributed to a difference in the rate of domestic savings (Kalirajan and Shand 2006). The high productivity states like Punjab, Kerala, Tamil Nadu, Haryana, West Bengal, Uttar Pradesh, Assam and Andhra Pradesh were characterized by high levels of area under irrigation during 1992-95. The similar view was pointed out by Rao, Shand and Kalirajan (1999), that both public investment and private investment has bearing on the regional disparity among the states. (Alagh 1980). Nath (1970) stated that some states shows increase in productivity like Punjab, Haryana and Tamil Nadu, where the proportion of irrigated cropped area are high. In other states like Gujarat and Maharashtra the share in irrigation was low.

**Green Revolution:** The implementation of green revolution was different from different states. With the introduction of the green revolution the regional disparity of the productivity has increased (Yechuri 1976, Bhala and singh 1997, Mukherjee and Kuroda
2002, Banerjee and Iyer 2004, Ghosh 2006). The emphasis of the new technology was obtaining larger output of foodgrain along with achieving food security. The impact of technological change was felt throughout the country, but more vigorously in few states and in case of few crops (Parayil 1992). The states reacted to the technological change differently because the flow of new technology was different for different states. During the mid sixties the new seed fertilizer technology was confined to the irrigated area of Punjab, Haryana and Western Uttar Pradesh in north-west India. During the period of 1970s the green revolution spread to coastal Andhra Pradesh and Tamil Nadu, eastern Uttar Pradesh and some part of Rajasthan. The spread of green revolution was late for the eastern Indian states. The new technology is highly irrigation intensive, thus the HYV seeds was initially adopted on a large scale in the irrigated area of Punjab and Haryana, and recorded significant acceleration in crop output of those region. Not only did the states enjoy a high proportion of area under irrigation but also less burdened by the deadweight of pre-capitalist exploitative relationships.

iii Private Initiative and Investment into Agriculture:

The third factor that can lead to the differential growth performances among the states is the private initiative into agriculture. Pattern of private investment is the major determinant of economic growth (Alagh 1980). Private initiative can take the form of diversification of the production from foodgrains towards the high value cash crops or investment in irrigation i.e. well irrigation.

Crop Diversification: The level of diversification of crop enterprises reflects the extent of economic development in the rural sector. Crop diversification led to the increase in the farm profitability as well as to help avoiding risk and uncertainty due to climatic and biological vagaries (Hazra 2001). At all India level, out of total growth in per hectare value of crop output, at least 27 percent was contributed by the shift in the cropping pattern towards high value crops in between 1980-98. During 1980-81 to 1998-99, there was considerable increase in crop diversification in West Bengal, Assam and Maharashtra. There was also a marginal increase in crop diversification in Karnataka, Gujarat, Rajasthan
and Andhra Pradesh. In other states there was a decrease in the degree of crop diversification between the 1980-81 to 1998-99 (Acharya 2003). Thus the difference in the private initiative inorder to under take the investment also helps to increase the regional variation in agricultural performances.

Well Irrigation: The investment in the private irrigation system like well irrigation also led to the differential growth performance of the states. For example in the wheat regions the introduction of new varieties, the expansion of irrigated area and improvement in quality of irrigation through the use of tube-well, led to substantial increase in production (Easter, Abel and Norton, 1977).

iv Initial Condition in the form of Land Settlements:

Another factor that affects the regional difference in agricultural performance is the growth at the initial period. The pattern of institutional development in the history influences the growth performances at the present day (Banerjee and Iyer 2004). The historical arrangements like land distribution pattern and public investment at the colonial period led to the differences in the distribution of wealth among the states. British policy gave importance on the imposition of land revenue for the maximization of surplus over the time period. The revenue demand was high in the east region of India compared to the Mahalwari region of Punjab and the Royatwari region of Madres province. The narrow base of a surplus owning peasantry in the east was contrasted with the relatively prosperous base of the middle-rich peasantry in the north-west, due the difference in the land revenue, public investment in irrigation, road and electricity. Public investment of British India concentrated particularly in irrigation, chiefly in area where gains in productivity could be fly off as additional revenue, viz. North-West, Bombay and Madras provinces. For example out of total gross public investment on irrigation, 47% was in Punjab, 18% in Madras provinces, 14% in Bombay, 8% in united province and only 11% in other areas in the period 1898-99 to 1918-19. (Thavaraj 1972). There was large and significant difference in the measures of agricultural investment and productivity between landlord and non land lord areas in post independence period (1957-87) (Banerjee and Iyer,
The landlord states are classified as Bihar, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal and the non landlord states are Andhra Pradesh, Assam, Gujarat, Karnataka, Kerala, Maharashtra, Punjab and Tamil Nadu. The study shows that non landlord districts have 24% higher proportion of irrigated area and 43% higher levels of fertilizer uses. They have 27% higher proportion of rice area and 18% more of wheat under high yielding verities. Overall agricultural yield is 16% higher, rice yield being 17% higher and wheat yield 23% higher in the non landlord regions compared to the landlord regions. According to the study, the major difference arising between the landlord and non landlord regions is the difference in the public spending. On an average, the landlord regions spend 13 rupees per capita on development expenditure in between 1960-65 whereas the non-landlord region spent 19 rupees per capita in non landlord districts. The difference again widened after the introduction of new technology when the landlord states spent 29 rupees per capita while the non landlord states spent a much higher amount of 49 rupees per capita.

The different type of factors identified by the past studies assumes the structure of all the states economies to be similar thus analysing the performance of the state economies Different states can have different combinations of structure.

1.2 Importance of Structure in Studying the Performance of States:

One can broadly identify two economic structures. One is a market-oriented structure and the second is the non-market or traditional or pre-capitalist structure. One can identify three broad features, which separate the two structures. They are: the production, distribution of knowledge, nature of exchanges between agents.

In a traditional economy production of knowledge is not a conscious action of agents but more a reflection of randomness. “The knowledge that is use for the farming is known by the farmer for long generation. “The farming community hardly practices any new methods either by trail and error or from other sources” (Schultz 1972). Thus the risk and uncertainty was low and it arises only when the transformation gets under way. The state
of skill is known in case of traditional agriculture and the supply price of reproducible factors rises as the quantity of these factors increases.

The production in these traditional economies is for home consumption. The mode of production in a traditional system can be explained by the underdevelopment of market in a small isolated community, in which gains from the division of labour based on market are severely limited. The niggardliness of agriculture in poor communities is frequently attributed by cultural values. There is lack of saving and stagnant in agricultural community and this is the consequence of the cultural characteristic of the farm people in these communities (Schultz 1964).

On the other hand in a modern economy production is a conscious action of agents and is called science based. The modern or the scientific agriculture includes the scientific knowledge on physics, chemistry, biology and also engineering, with respect to irrigation and transport facility and agricultural machinery. The use of new scientific inputs requires efficient economic incentives, adequate information and learning of new farming skill (Schultz 1976). The transfer of knowledge is inter-generational in a traditional economy while in a modern economy it is market mediated (Shultz 1964). In a traditional economy the exchanges are personal with an absence of markets for the inputs and production is organised for self-consumption. In the traditional village environment, the decentralized system of independent peasant produce tied by personalized exchanges called as “personalized market” (Hayami 1981). But in a market oriented economy the exchanges are mediated by the anonymous market and there exists markets for input as well as output.

A market economy can generate higher levels of performance (growth) when compared to the traditional economy. The higher performance could be due to demand side or supply side factors. A market economy which induces higher levels of specialisation and division of labour generates a higher demand for goods and services produced in the economy. This could result in specialisation at the micro level and crop diversification (to high valued crops) at an economy level, which can induce higher levels of performance of the economy. On the supply side, improvements in sciences can get embodied in
improvements in input usage in agriculture leading to better performance of the economy. In this case, technology substitutes for land and the performance (growth) thus depend on the modern technologies. The performance of the economy to a large extent depends on the levels of specialisation and the technology used in the production process. In contrast in a traditional economy, which is repetitive in production systems, the performance gets defined in terms of the ‘natural’ conditions and the extent of land under cultivation.

In developing countries like India, the process of agrarian transformation is incomplete. In other words the market economy is not the dominant structure in Indian agriculture. This could be identified as the co-existence of dual economies (Stiglitz 1998) or in terms of co-existence of multiple modes of production. In the India situation, the markets for primary inputs are not completely formed. The land market is said to be an inactive market. The land market witness few transactions. In addition, small farmers are said to be more ‘efficient’ farmers but the land market does not facilitate transfer to the small farmers (Vyas 2003). In the same vein, there exists surplus labour existing in agriculture and the labour market is also said to be incompletely formed. According to Bhaduri (1984) the inadequately formed labour market is the basic postulate for backward economy. In addition, the literatures of contractual forms existing in Indian agriculture also show that personalized exchanges are decisive in explaining the ‘stylised facts’ in these economies.

The agrarian transformation is incomplete among the Indian states. But different states may have different structures. Even under conditions of incomplete transformation of the Indian economy, the states are not similar in terms of the relative importance of market economy. The importance of the market economy could be different in the different states. Some states may have structure that is conducive for the growth and individual might have incentive to change, and thus perform better. In these economies where the market economy dominates and the individual has the incentive to change, the demand for product is more and the producer has an incentive to produce. But some structure may constraint the individual to initiate change that affects the overall performance adversely. In such a system wherein the markets are not completely formed, the initial allocation of resources
influence on the performance of the economy. In these economies the performance is constraint by the structure from both demand and supply side.

1.3 Objective of the Study

The study attempts to analyse the impact of structure on performance in terms of the effect. It tries to understand the performance of the agriculture and thus analyse the cause for the differential performance among states. Thus the study analyses the effect to the cause. If the ‘modern inputs’ and crop diversification significantly influence the performance of the state economy, we presume that market-oriented economy is relatively more important in the state. But if land and nature based factors influence the performance of the economy we presume that traditional economy plays an important role.

In this context the study would like to analyse the following objectives.

i. The first objective is to find the phases in the agricultural performance of two states.

ii. The second objective analyses the factors accounting for the breaks and whether it is land based or yield based or crop diversification based.

iii. The third objective analyses the factors accounting for growth and whether the factors are land based or modern inputs based, for each phase in the two states.

iv. The fourth objective analyses the year to year fluctuations in the agricultural sector and analyses whether the cycles are land based or modern inputs based, for each phase in two states.

Two adjoin states, Andhra Pradesh and Orissa are taken into consideration to analyze the agricultural growth performances over the period of time. Orissa is generally considered as a low income state (total net state domestic product was 67090 crore in 2005-06) whereas Andhra Pradesh is a relatively higher income state (total net state domestic product was 204312 crore in 2005-06). On the basis of growth rate, Orissa is considered as a low
growth state among the Indian states (the growth rate of agricultural NSDP was below 1% in 1995-96 to 2004-05) but the growth rate on agricultural NSDP was above 2 percent in Andhra Pradesh for the same period (Chand, Raju and Pandy 2007).

1.4 Indicator Used to Study the Performance of Agriculture:

Several attempts has been made to analyze the growth of agricultural sector incorporating indicators like total crop output [Mukhopadhyaya (1976), Bhalla and Singh (1997), Ramasamy (2004), Rath and Jena, (2006) Mathur, Das and Sircar (2006)], food crop output [Dev (1987), Ranjan (1997), Singh, Raj and Karwasra (1997), Singh, Singh and Shrivastava (2005)], capital formation and state income from agriculture [Subrahmaniam and Sekhar (2003), Bhattacharya and Sakthivel, (2004), Chand, Raju and Pandey, (2007)]. The Present study considers net income from agriculture as the indicator to examine the agricultural growth rate over the period. The study makes an attempt to understand the aggregate performance of agriculture in two states, thus the aggregate income of the sector has been considered.

The use of the income data has its own limitations. There are two sources of collecting the State Domestic Products (SDP) estimates. The first is the comparable estimate made by the Central Statistical Organisation (CSO). However this series is available only from 1967-68 to 1985-86 and that being only in current prices. The alternative is to use the estimate of SDP made by the statistical bureau of each state. These figures are not comparable across the states though the states follow a broadly uniform approach and methodology (Rao, Shand and Kalirajan 1999). There are two arguments for using these figures. First, they are the only estimates available in a long time series. Second, a study by Das and Barua (1996), which estimated inequalities using both the series obtained almost identical results and therefore concluded that “regional accounting variations are only minor from the viewpoint of inequality measure”. The concept of SDP only indicates the income originating in different states and does not represent total income accruing to them. However there are estimates of net factor income accruing to a state from outside its boundaries, so it not possible to take these into account.
1.5 **Sources of Data:**

The data regarding Net State Domestic Product (NSDP) in agriculture was collected from the Director of Economic and Statistics of the respective states. The period of analysis is from 1960 to 2005. The NSDP in agriculture in constant prices is taken into account rather than current prices. The current prices over the time do not reveal actual economic growth because it contains the combined effect of the changes in volume of goods and services and the changes in the prices of goods and services. In order to eliminate the effect of price changes or inflation the estimates of state domestic product are prepared by evaluating the good and services at the prices prevailing in the base year known as estimates at constant (1993-94) prices. The base year is shifted to the more recent base with a view to capture realistic growth of the economy and to show a meaningful analysis of structural changes in the economy.

Agricultural income is dependent on a set of exogenous and traditional factors like rainfall and weather as well as endogenous factors like irrigation and new technology. The sources of data collection of these factors are presented here.

The data on rainfall for Orissa and Andhra Pradesh is collected from Statistical Abstract of the respective States. The data on rainfall in Orissa is available in terms of actual and normal rainfall for the year. This study considers the actual rainfall of the state for every year. The data on rainfall in Andhra Pradesh is available in terms of monsoon and post monsoon rainfall for each year. The rainfall received in monsoon and post monsoon period is added together to find out the total rainfall received in a year in Andhra Pradesh.

Land use cultivation is one among the important factor that affects the income level. The data regarding the land use pattern in Andhra Pradesh and Orissa was collected from the Statistical Abstract of the respective States. The total land in a state is divided into different types like- (i) land under forest, (ii) Area not available for cultivation, it again include (a) barren and uncultivable waste (b) land put to non agricultural use, (iii)
Cultivable west, (iv) Land under miscellaneous tree crops, (v) Permanent Pasture and other grazing land (vi) Fallow land it include (a) Current Fallow (b) Other than Current Fallow, (vii) Net Area Sown (viii) Area Sown More than Once, (ix) Gross crop area. The total land available for cropping is again divided into net sown area and area sown more than once. The category from 1 to 5 is not used for the research work. The study mainly concentrates on the area under agricultural uses and the fallow land because these two categories have a direct impact on the agricultural production.

The crop area which kept as fallow during the current year is called as “current Fallow”, for example if any seeding area is not cropped again in the same year it is treated as current fallow. Fallow land “other than current Fallow” refers to the lands which are taken up for cultivation but are temporarily out of cultivation for a period of not less than one year but not more than five year. The reason for keeping fallow can be either poverty, inadequate supply of water or malarial climate or silting of canal and rivers.

Net Area Sown (NSA) represents the area sown with crops counted only once in the same year. Area Sown More than Once (ASMO) refers to area on which crops are cultivated more than once during each agricultural year. This is obtained by deducting net area sown from gross crop area. Gross Crop Area (GCA) represents area covered under crops, including both areas under net sown as well as area under double cropping. This is the sum total of the area covered by all individual crops.

The data regarding Irrigation sources was collected from statistical abstract of respective states. The Directorate of Economics and Statistics in Orissa, presents the data regarding irrigation potential created in the state. Three main sources of irrigation in Orissa i.e. major and medium irrigation, minor irrigation (which is divided into lift irrigation and flow irrigation) and the third one is other sources. Depending on the size of cultivable command area (CCA), irrigation projects are classified as major (above 10,000 ha), medium (between 2000 ha to 10,000 ha) and minor (between 40 ha to 2000 ha. On the other hand in Andhra Pradesh the sources of irrigation represents, irrigation through Canals, tanks, wells and other sources.
The data regarding consumption of fertilizers in Andhra Pradesh was collected from Fertilizer Statistics of the state and for Orissa, the data is collected from the Statistical Abstract of Orissa. Fertilizers includes Nitrogen, phosphate and potash, all three combined together gives the total consumption of fertilizer in the state. The data regarding area under HYV seeds was collected from Department of Agriculture of Andhra Pradesh. Area under HYV seeds in Orissa is available in Agricultural Statistics of Orissa, Directorate of Economics and Statistics.

The amount of electricity consumption for agricultural purpose in two states was collected from the All India Electric Statistics. The data regarding the total electricity consumption in Orissa was only available from 1975 onwards, whereas the data for Andhra Pradesh was available from 1960-61 onwards.

The change in the cropping pattern is calculated by the share of area under each crop to the total gross crop area. The crop categories are divided into four main categories like area under Foodgrains, Oilseeds and Cash crops and area under Other crops. Area under foodgrains includes all types of cereals and pulses. Area under Oilseeds includes area under groundnuts, sesame, castor, linseeds, mustard and other seeds. Area under cotton, jute, mesta, sugarcane, tobacco and other fibres constitutes cash crops. Other crops include area under potato, onion, ginger and other vegetables.

1.6 Chapter Outline

The present study comprises of six different chapters based on different objectives of the study. After the first introductory chapter, in the second chapter the structural difference between two states is analyzed. The third chapter makes an attempt to examine the phases in the agricultural income in the two states and the nature of the different phases. Unlike the past studies, an attempt has been made here to understand the different phases endogenously from the data by applying the statistical tool. The sources of agricultural income growth rate in different phases are examined in the fourth chapter. The factors
leading for the growth in agricultural income can be different from one phase to the other depending on the nature of the phases. In the fifth chapter an attempt has been made to analyse the short run fluctuations in agricultural income. The cyclical behaviour pattern of the overall income can be influenced by the nature of the economic structure. The co-movements of the agricultural income and the variables are studied in this chapter. The last chapter presents the conclusion of the study.