Synopsis of the Doctoral Research

Comparative Performance of Agricultural Sector in Andhra Pradesh and Orissa

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One of the puzzles that exist in Indian agriculture is the differential performance of states. There are three interrelated sets of literature that explains the differential performance of states. One set of literature identified that the growth rate of crop output and income is different for different states. Some states identified as high growth states whereas some other states identified as low growth states in terms of agricultural income and output. The second set of literature analysed whether regional differences are increasing or decreasing. The studies suggested that the degree of regional disparity in agricultural development has been increasing in terms of income from agriculture. The third set of literature analysed whether there is convergence in rate of growth of income in the different states. The studies showed that there was no evidence of convergence among the states with respect to the per capita net state domestic product. This implies that the Indian states grow differently with respect to the income and output.

The factors that are identified in literature to explain the differential growth performance among the states can be classified into four categories. The first set of factors that lead to the differential growth performance is the existence of different natural conditions i.e. the amount of rainfall is not homogenous for the states. The second set of factors that is identified in the past studies is the difference in the state policy. Agriculture is a state subject and the performance of the agriculture mainly depends on the individual state’s policy. State policies can be in the form of land reform or public investment into irrigation or the introduction of new technology by green revolution. The benefits from the land reform were different for different states. Land reform was successful in some part of the country but in the case of Orissa, Bihar and Rajasthan it witnessed marginal influence. Public investment in the form of irrigation was also different from one state to other. Some state took initiative to invest on irrigation like canal irrigation in Punjab, Haryana and Tamil Nadu. According to some other literatures the regional difference in the agricultural performances increased after
the state led plan for the introduction of the new technologies into agriculture. The flow of green revolution was different for different states, and therefore the gain out of it was also different. The third set of literature mentioned that the difference in the private initiative in terms of crop diversification and well irrigation can also lead to the differential performance among the states. Crop diversification may lead to increase in farm profit, as well as it helps to avoid risk and uncertainty due to climatic variation. The states like West Bengal, Assam, Maharashtra, Karnataka, Gujarat, Rajasthan, and Andhra Pradesh witnessed an increase in crop diversification and thus increase in the agricultural output in between the period 1980-1998. The fourth set of literatures established the fact that the initial arrangement of the inputs, affects the present day performances. 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.

While analyzing the performance of the economy, the received literatures assume that the structures of all state economy are similar. But the structure of the economy can be different from one state to other. One can broadly identify two economic structures. One is a market-oriented structure and the other one is the non-market or traditional or pre-capitalist structure. In a traditional economy the exchanges are personal with an absence of markets for the inputs and production is organized for self consumption. The farming community hardly practices any new methods either by trail and error or from other sources. Thus the risk and uncertainty was low and it arises only when the transformation gets under way. On the other hand in a modern economy, production is a conscious action of agents and is called science based. 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 growth when compared to the traditional economy. In a modern economy the land and the natural factors of production are substituted by the technology. The performance of the economy to a large extent depends on 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.
Indian agriculture at the time of independence witnessed non-market and pre-capitalistic structure. The process of agrarian transformation was not complete. The market for primary inputs like land and labour are not completely formed. Thus the Indian states witnessed “Dual Economy”, which implies the existence of both traditional and modern or science based agriculture. But the importance of the market economy is not homogenous for all the states. In an economy when the market based economic structure dominates, the agricultural performance in term of output and income will be better compared to other states with less dominance of the market economy. Thus in a dominantly market oriented structure, the performance of the agricultural sector dominate by the modern inputs and the crop diversification towards the market oriented crops. In such an economy the performance of agricultural sector in term of structural break, growth pattern and short run fluctuations depends on the modern inputs. But with a relatively less dominance of the market structure, the economy’s performance depends on the natural and the land related factors. Thus in such economies the performance of agricultural sector in term of structural break, growth pattern and short run fluctuations depends on the land and land related factors.

The present study attempts to bring the structure of the economy as an important feature for analysing of the performance of agricultural sector in term of growth and cyclical fluctuations. The study tries to understand the performance of agriculture and thus analysed the cause for the differential performance among states. Thus the study analysed the effect to the cause. In other words an attempt has been made here to understand whether the modern inputs dominate the performance of the agricultural sector overtime (1960-61 to 2005-06). 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.

The study has four objectives.

i. The first objective of the study 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 modern inputs.

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.

For the analysis the study considers two states, namely Orissa and Andhra Pradesh. The present study considers net income from agriculture as the main indicator to examine the agricultural growth rate over the period. The data about 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 1960-61 to 2005-06.

The thesis is organized into six chapters. The first chapter states the problem dealt by the present work. The second chapter introduces the difference in structure between the two states. The third chapter makes an attempt to examine the structural break points in the agricultural income in two states and to understand the factors accounting for break points. The factors influencing the agricultural income growth rate in different phases were examined in the fourth chapter. In the fifth chapter an attempt has been made to analyse the short run fluctuation in agricultural income. The co-movements of the agricultural income and the variables are studied in this chapter. The last chapter presents the conclusion of the study.

The structure of two economies is studied from both supply and demand side. The structure can introduce constraints to the agents to expand the production by constraining the demand that exists or constraining the supply of goods by the agent. A supply side constraint arises when the agents want to expand their production but does not expand it as they feel that they will not be able to appropriate the returns from their ‘effort’ of expanded production. Thus the agent has an incentive problem to invest.
There are three set of supply side constraints identified in the study. The land settlement introduced before the independence period has the influence on the performance of the sector. When land market as a re-allocating system is under-formed then the allocation of land to individual becomes constraint to the performance. If more land is allocated to the non-cultivator, the investment in the land is low. The private property right on land is necessary for the better investment on land. In India, the Roytwari system is the closest approximation of individual private property rights. In the Zamindary system there exists the intermediary between the farmer and the government that affect the investment capacity of the agent. Different Indian states have different combination of the land settlement, thus the result from the land reform is different. In Orissa the higher proportion of land was under the Zaminadari and the under Princely states at the time of independence. But the land settlement introduced by the British for Andhra Pradesh was more conducive for the appropriation of increases in the output when compared to Orissa due to the higher proportion of land under ryotwari settlements. The implementation of land reforms measures was relatively more successful in Andhra Pradesh when compared to Orissa. The second type of supply side constrained faced by the agent due to the structure is the share of the tribal population in the economy. In an economy, where the share of tribes is high the investment in agriculture becomes low. The comparison of two economies shows that in Orissa the share of the tribes was significantly higher than Andhra Pradesh. In Orissa, around one fourth of the population were tribes (according to 2001 census), thus the incentive to invest is low in the economy. The third supply side constraint is the distribution of labor force in two states. A large share of the non-workers imply a larger share of output being distributed for consumption purpose thus low share of output is used for investment purpose. The share of the non-workers in Orissa was higher compared to Andhra Pradesh in the 2001 census.

The demand side constraint is introduced by the structure when the agent does not want to expand the production because of lack of demand in the economy. The study identified two set of demand side constraint faced by the agent. The distribution of land holding pattern is different in two states. The increase in small farmer holding, who produce foodgrains and do not specialize in agricultural production may constraint demand for good produce by the
structure. In Andhra Pradesh the share of the small farmers was higher than Orissa. The allocation of the labour in the different sector of the economy can also lead the constraint in the demand side. With the process of development one would expect the change in composition of labour as well as output. If more share of labour is engaged in the industry sector that leads to migration of labour from agriculture to industry that in turn leads to increase in demand for goods and services. The share of workers engaged in the industry and services sector was much higher in Andhra Pradesh compared to Orissa.

This shows the structure of the two economies is different comparing both the demand side and supply side. Andhra Pradesh economy witnessed higher share of the land with private property rights, low tribal population, higher share of working population and shift of the workers engaged in agricultural sector towards the industry and service sector. Thus the Andhra Pradesh economy witnessed the structure which is comparatively more conducive for the agricultural growth compared to Orissa.

The structure of two economics being different from one another the agricultural performance of the two states was studied by taking income from agriculture as the main indicator. The growth rate of net state domestic product originating from agriculture is estimated by using exponential growth rate. The growth rate of agricultural income was higher in Andhra Pradesh than Orissa. The whole period of analysis is divided into three different phases derived endogenously from the data. In all the three phases the growth rate of agricultural income witnessed an increasing trend for Andhra Pradesh. But the growth rate of agricultural income declined from the first phase to the third phase in Orissa. In comparison, one finds that the growth rate of agricultural income increased in one state, whereas in the other it declined. There exists a difference in the growth profile of agricultural income in two states because the nature of generation of each phase was different.

Agricultural income is a function of area, yield and crop diversification. The break points in net income from agriculture can result due to structural break in the area under cultivation or structural change in yield or due to crop diversification. So the growth of agricultural
income can be disaggregated into a set of physical factors viz. area, yield and crop diversification. To understand the aggregate performance of the economy the study used index number of area, yield and crop diversification. The index numbers of area, yield and production was calculated by taking 1998-99 as the base year.

The first structural break for agricultural income (1975-76) in Andhra Pradesh was generated due to the yield expansion. The calculated index number of yield and income from agriculture witnessed structural break at the same period with an increasing trend. The index of area also witnessed a break point in the same period (1975-76) but its growth rate declined after the break, thus the break in the income series was mainly due to the yield break. The factors accounting for the second break point in agricultural income for Andhra Pradesh was primarily due to the increase in the crop diversification.

In the case of Orissa the factors accounting for break points was different from that of Andhra Pradesh. The first structural break point of agricultural income in Orissa was on 1976-77, and the growth rate of income declined after the period. The index of area and diversification also witnessed a break in the same period. But the index of area witnessed increase in growth rate after the break. After the first break the state witnessed diversification from rice towards inferior cereals. Thus the increase in the area under cultivation shifted from rice towards inferior cereals and the shift towards inferior cereals did not help in increasing the aggregate income. The yield index did not witness any break in the first period. This implies that the effect of green revolution was negligible in the state. The shift from second phase to the third phase in Orissa was mainly due to the decline in the index of both area and yield. Both area and yield index witnessed decline in the trend after 1991. The thirds phase in Orissa witnessed decline in the crop diversification and the increase in the specialization of crop production.

Thus the above analysis shows that in Andhra Pradesh the yield and crop diversification were the prominent factors leading towards the structural break in the aggregate income. But in Orissa area under crops continued to be the important factor for the decline growth rate in the aggregate income.
The factors accounting for break points are different thus by implication the sources for the growth in agricultural income should be different from one another. In this case, the whole period analysis may not provide a clear understanding of the factors affecting agricultural growth rate in each phase. Thus the importance is shifted towards the phase wise analysis of sources of growth rate. With the time period one can expect the importance of the land and land related factors to decline and importance of the modern factors to increase. In order to understand the change in importance of the traditional (like rainfall and area under cultivation) and modern factors (like modern inputs and private investment), a set of variables are taken into consideration. Different models have been used for measuring the change in growth performances in three different phases. The impact of the independent variables for different phases was examined by taking multiple regression analysis by using ordinary least squares (OLS). The present study considers more than one model for each phase because use of single model is not appropriate on econometric ground as it poses serious problem of multi-collinearity problem.

The first phase in Andhra Pradesh witnessed the phase of intensive cultivation with increase in the public provision of irrigation and area under double cropping. There was increase in the importance of the modern inputs in the second phase and diversification towards cash crops in the third phase. Thus Andhra Pradesh agricultural sector witnessed a transformation from traditional based cultivation system towards modern agriculture. Quite contrary to Andhra Pradesh in case of Orissa, the first phase witnessed an increase in the irrigation with the shift of the cropping pattern towards inferior crops like bajra and jowar. The uses of modern inputs like HYV seeds and fertilizer increased in the second phase but the aggregate agricultural income declined. The decline in the aggregate income was revealed due to the decline in the land under cultivation. Thus even if the growth rate of the utilization of modern inputs increased, its realization towards the output was negligible. In the third phase, there was decline in the aggregate income and it was highly influenced by the amount of rainfall. It implies the third phase in Orissa represents a natural or traditional economy where the application of the modern technology was insignificant.
The comparison of two economies shows that while in Andhra Pradesh over the period the dominance of land and natural factors as a source of growth declined and the importance of modern inputs and crop diversification plays a central role. But in case of Orissa the importance of land and natural factors continue to play an important role.

The factors accounting for break points in agricultural income are different in each phase and also the sources of growth rate for each phase are different. In this case the nature of the short run fluctuation can be different from one phase to other. Also the sources of fluctuation in income can be different from one set of economic system to another. Different economic system may have different combination of production structure thus generates different types of cyclical behavior pattern in the growth process. The present study calculates the year to year fluctuation in the agricultural income by counting the number of cycles present in the series. One of the important features in the study of cyclical pattern is the recognition of that variables fluctuate together or there exists co-movement between variables. In case of agriculture, production/income has co-movement with rainfall, inputs used etc. The co-movements between the income and the factor inputs are measured by the correlation coefficient between income and the set of inputs used in the analysis.

The study found that the cycles in agricultural income and land or natural factors correlated with each other for Orissa in all the three phases. The cyclical behaviour pattern in the agricultural income for Orissa was due to the cycles exists in the land under cultivation, area under foodgrains and rainfall in all the phases. On the other hand in Andhra Pradesh the factors influenced the cyclical pattern of agricultural income has changed from one phase to another. In the first phase area under irrigation, area under cash crops and the land cultivated witnessed significant influence on the fluctuation in the aggregate income. The cycles exist in the uses of modern inputs explained the cyclical pattern of the income at the second and the third phase. In Andhra Pradesh over the time period the co-movements of the modern inputs with agricultural income increased and the affect of the traditional factors declined.
The above analysis of break points, sources of growth and the short run fluctuation in two states, Andhra Pradesh and Orissa shows that the nature of growth process is different in two states. The structure of two economies was also different from one another.

In 1960’s agricultural sector in Orissa witnessed a relative dominance of traditional sector when compared to Andhra Pradesh. Over time, the importance of modern sector increased in both the states. But in the process of evolution of Andhra Pradesh agrarian economy, markets in terms of increasing share of land allocated to market oriented crops, increased private investment and importance of modern inputs is increasing. These trends are not true for Orissa. In addition, the growth process in Orissa continues to be constrained by land related factors while Andhra Pradesh seems to have substituted modern inputs for land. Therefore, one finds that the Orissa economy continues to be land constraint with traditional economy being predominant in the composition of the economy and with lower levels of performance. In contrast, Andhra Pradesh economy has a composition of relatively lower traditional sector when compared to Orissa. To conclude, the study finds that the initial structure as well as the evolving structure of the two states is different in terms of the growth and fluctuations. Therefore, the state level comparison of the performance of the agriculture sector depends on the structure of the particular state economy. Hence, the present study concludes that to analyse the performance of the economy, the structure of the economy needs to be studied.