PRIVATE INVESTMENT IN INDIAN AGRICULTURE : AN INTERSTATE ANALYSIS 1961-1981

Dissertation submitted to the Jawaharlal Nehru University in the partial fulfillmet of the requirement of the award of

MASTER OF PHILOSOPHY

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1999

DEDICATED TO

MY PARENTS . . .

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CERTIFICATE

This is to certify that the dissertation titled "**Private Investment in Indian Agriculture : An Interstate Analysis 1961-1981,** submitted by Surendra Meher, in partial fulfillment of the requirements of the award of the degree of **Master of Philosophy** of the University, is to the best of my knowledge, a bonafide work and may be placed before the examiners for evaluation.

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ACKNOWLEDGEMENT

Number of people and friends have provided their kind co-operation and moral support to render my research obsession into a near consumate reality.

I am extremely obliged and thankful to my supervisor Dr. Kusum Chopra whose supervision, fruitful suggestions and inspiration helped me in completing this academic endeavour. Her contribution is tremendous to shape up my mind which will help me a lot afterwards in my life.

I would like to thank Prof. Amitabh Kundu, Prof. S.K. Thorat, Prof. A.K. Mathur and Prof. Aslam Mahmood for being a constant source of inspiration to carry on my research work.

I am also thankful to the Jawaharlal Nehru University Library, Central Statistical Organisation Library and to the library of National Institute of Public Finance and Policy (NIPFP).

My friends Partha, Kishore, Biresh, Deepa, Ramesh, Chandra bose, Rajesh and Bhisma have been of immense moral and intellectual support during the process of completion of this work. I thank Mr. Varghese, Mr. Raju, and Mr. Satish in data processing and Benga da' for his intellectual suggestions. They have encouraged me at different stages of this work.

Lastly brother Tankadhara, pretty faces of Micky and Pincky and the friends of my village have encouraged me a lot when I made a little progress to write this academic endeavour.

However, the entire responsibility for the shortcoming in this work, if any, is absolutely mine and I am alone to be held responsible for it.

New Delhi

July 21st, 1999.

SURENDRA MEHER

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CHAPTER 1

INTRODUCTION

THE NATURE OF BACKWARD AGRICULTURE

In many underdeveloped countries, agriculture remains the mainstay of the economy. This becomes evident from the percentage of people dependent on it or by the percentage share it contributes to the country's gross domestic product. The share however goes on decline as the economy begins to develop but the occupational pattern remains more or less constant. Given this fact the people are not able to realise the potential gains out of it neither their contribution to country's prosperity is on the increase. There are many structural and technological obstacles which come in the way of agricultural development in these countries. The small size of land holding, adverse land man ratio, poor institution act as the structural impediments, where as the technological factors cover the unwise land utilization, use of outdated traditional techniques, unscientific farm practices and so on. Being the cornerstone of the economy, the backwardness in agricultural sector affects the industrial prosperity and the prospects of the whole economy.

The nature of the backwardness of the agricultural sector is well formulated in Schultz's[1] well known book "Transforming Traditional Agriculture". He pronounced it basically as an investment problem in the sector itself.

[1] T.W. Schultz ; Transforming Traditional Agriculture,(1970).

Transforming traditional agriculture to modern one requires huge investment and this in turn constitutes the chief source of economic growth. In Schultz's own words economic backwardness is the result of three important factors viz, the state-of-art remain constant, the motives and preferences for holding and acquiring sources of income remain constant for a long period of time. These state of art, motives and preferences according to him obviously imply that the nature and kind of technologies adopted in the underdeveloped economies for their agricultural sectors. Not to mention that these are traditional and outdated[2] . The consequences of this being, the marginal productivity of investment continues to decline. Then there comes to a point when the rate of return is so low that there are no incentives to save for additional investment.

Ragnar Nurkse[3] coined the term "vicious circle of poverty" while explaining the backwardness of the economy. The thesis is too well applicable to the agricultural sector. The term implies the ''circular constellation of forces tending to act and react upon one another in such a way as to keep a poor country in a state of poverty''. The circular forces operate both on the supply and on the demand side. On the supply side, there is a small capacity to save resulting from low level of income. The low level of income is a reflection of low productivity, which in its turn is due to the lack of capital. And the lack of capital is a result of a low level of saving, and so the circle is complete. On the

[2] Tara Shukla's (1965) Study also revealed that a major proportion of farm capital formation during those period came from bullock.

[3] Nurkse Ragnar: " Problems of Capital Formation in Underdeveloped Countries" Indian Branch , Oxford University Press,Bombay

demand side the inducement to invest may be low because of small buying power of the people, which is due to their small real income and low productivity. The operation of this vicious circle do not make to accelerate investment and growth in poor agrarian economy.

The investment incentive in the less developed economies are determined by the demand for capital, which is very deficient. To be able to invest in a capital good one has to have sufficient income and at the same time there should be enough purchasing power in the economy. In other words incentive to investment is limited by the size of the market. The proposition is also a modern variant of Adam Smith's famous thesis "The division of labour is limited by the extent of market". How ever the demand factor or the role of purchasing power comes in when the economy starts developing.

For the case of India, before green revolution period the capital investment in the agricultural sector did not receive much attention in view of the lack of investment incentives and low per capita income of the cultivator households. The demand for capital or the incentive to invest was largely determined by the size of holding which was very small, caused by fragmentation of land. Given the small size of holding, availability of sophisticated and modern form of capital in traditional agriculture presents a problem of discontinuam and capital cannot be used to its fullest capacity. The biggest land holders, on the other hand diverted their savings for non agricultural purposes, like money lending, cane-crushing, plying buses and trucks. And since the intensity of

demand for capital affects the magnitude of capital in the long run, the demand factor assumes importance. The crux of the problem thus lies in structural and institutional bottlenecks, which affect the growth of demand and supply of capital in the long run. The inability of the government to accelerate the pace of land reform programme, the insufficiency of institutional credit, and continued dependence on money lenders were of great concern.

The demand side of the capital formation is no doubt important, but these by and large can be corrected by overcoming structural and institutional bottlenecks, which is within the competency of a country, how so ever underdeveloped it may be. In contrast the difficulties on the supply side are more insurmountable and present real problem in capital formation.

THE CASE OF INDIA, BEFORE GREEN REVOLUTION

During fifties and early sixties (i.e., before the Green Revolution period), India was taken typically as an underdeveloped agricultural economy. There were many problems involved for the development of the economy. Increasing population growth, uneconomic land utilisation, static and under developed technologies, falling agricultural productivities, relatively small income and virtual socio-economic stagnation were the main obstacles in pacing of the process of economic development. The agricultural sector was seen to be relatively gloomy. The sector was not given due consideration during the early phase of planning development. Given this scenario, the problem of

agricultural development towards a long run objective of self sustained growth was largely viewed as a problem of farm capital formation.

Commenting upon India's agricultural policy during early sixties Prof. T.W. Schultz[4] puts "The root cause of trouble is the policy preferences for industrialization, agriculture's contribution to its attainment being cheap food, as a source of cheap labour and public revenue". In other words low farm product price and cheap food, accompanied by high input price were integral part of economic policies, and consequently the disincentive to invest arose.

Professor Esward Mason[5] on Economic development of India and Pakistan states "both countries despite worded paragraphs in their five year plan assigning high priority to agriculture and neglected this overwhelming important sector". Agricultural development in both countries was characterized during the early period by declining incentive to farm investment, as the internal terms of trade moved against agricultural products. He repeats PL 480 shipment had to do something with reducing farm incentives and in quantifiable degrees must share the blame for relative stagnation of agricultural output.

Nevertheless, there was a great technological breakthrough which took place during the mid sixties. The modern farm implements, HYV seeds, scientific methods of production replaced the outdated and unscientific means of

[4] Schultz T.W ; "Economic Crisis in World Agriculture", The University of Michigaon Press, Ann Abbor,USA, 1964.

[5] Mason Edward; " Economic Development in India and Pakistan " Centre for International affairs, Havard University, Cambridge.

production. Though the introduction of new technology was biased to certain crops and areas, it significantly raised the production and productive potential of the Indian farmers. It however spread to the other parts of India during seventies and later to the Eastern parts during late eighties, and resulted in shifting the whole production possibility curve upwards. The use of capital per head increased considerably during the phase of Green revolution. This is indicated by the incremental capital ratio which was only 1.9 during fifties to around 7 during sixties(S.N. Mishra 1996)[6] . Many agricultural economists opine that , since the new technology largely favoured the big farmers and was not intimately supported by the spread of proper infrastructure, it remains an unmixed blessing to Indian average farmers. But still it is of high importance since it teaches the new business practice to the Indian farmers.

The agriculture as we saw in the previous discussion, has always been a way of life rather than a business and has suffered by stagnation due to low productivity arising from inadequate investment. Except for a few states low investment, caused by low farm income which in turn follows from low resource productivity competing the vicious circle. The crucial problem therefore is to break through from such a state of affairs towards an upward movement is to find ways of increasing capital investment. The public sector has to play an important role in raising the level of investment in Indian agriculture. Besides government Price support system, subsidization of farm inputs and institutional credit support, public investment in irrigation scheme,

[6] Mishra S.N ." Capital Formation and Accumulation in Indian Agriculture since Independence" Indian Journal of Agricultural Economics,(IJAE) Vol.51, No:1 and 2,Jan-June, 1996.

soil and water conservation, land reclamation, construction of regulated market structure of farm produce, research and extension of services have been carried out to meet the developmental objectives of Indian agriculture.

But these developmental objectives have not been properly met concerning the ineffectiveness of Land Reforms, increase in inter regional disparities, adverse terms of trade and the constraints of Rainfed agriculture. The significant imbalance in resource allocation and inefficiencies in the management of major expenditure programmes are also contributing factors, which come in the way of attaining the desired goal. What is more concerning is that the level of public investment on the agricultural sector has been declining during the recent years particularly during the eighties.

THE REVIEW OF LITERATURE

The study of investment and capital formation comes into front when the Indian Society of Agricultural Economics took up the subject during 1960s. The prime interest was to develop the country's capability to feed the growing populations, continued dependence on PL 480 since mid fifties and food crisis during the sixties. Dr Tara shukla[7] took this as a subject of study for the period 1920 to 1960 using the plan documents as the main sources of data. Her study shows that there is a close relationship between investment and labor supply over a period of forty years in Indian agriculture.

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[7] Shukla Tara : "Investment in Agriculture" Economic and Political Weekly, November 9,1968.

This discovery supports the alternative theory that the level of investment is more influenced by the production requirement or by the need of income and consumption in future, rather than by the capacity to save in the past or current income and consumption needs. The second conclusion she arrived at is that the total investment in Indian agriculture during 1950-51 to 1965-66 increased at an increasing rate. Both the public and private investments have tended to increase. But it appears that the rate of increase of public investment has accelerated faster than the rate of increase of private investment. Nevertheless,out of total investment, the private sector occupied alarger share during the same period. According to the author's estimate, the private sector investment increased at the rate of 15%, public sector at 42% and total investment at the rate of 22% from the first plan period to the second plan period.

The total gross capital formation as related to the total value of crop output has more or less remained constant, over a period of 25 years, it fluctuates between 8 to 12%. Traditional inputs like bullocks constituted the major proportion of total capital formation. But during decade of 1950-51 to 1960-61, though the major contribution was made by bullocks, the increase in total investment was largely due to the investment in irrigation projects. This increase in irrigation investment has increased the relative share of public investment to the total investment.

With investment in irrigation rising and the public sector playing a dominant role, still there may be some substitution between private and public

investment. But over time, private investment has been on an increase. There are evidences that private investment has been pushed up as a result of the public investment in irrigation. The construction of dams, soil conservation measures or proper drainage and by the government have improved the level of sub-terranean water table and has encouraged the sinking of wells. In terms of investment in bullocks or the investment in fixed assets, there is a clear decline during the last period of this study. Irrigation has helped to increase the use of inputs such as fertilizers and improved seeds.

With this trend the broad conclusions she formed is that the rate of increase of capital formation is not adequate for a self sustained growth, but it is sufficient to match the growth in labour and in maintaining the level of farm production. The value of coefficient of correlation between the gross capital stocks and labour worked out to be (0.9836) during the period 1920-21 to 1960-61. This near parallel movement of labour and capital indicates their high complementarity. Capital output ratio works out to be between 100 to 103.26 during the period. And the constancy in labour, capital and output indicates that the Indian agricultural economy maintain equilibrium, but at a lower level of income.

S.L. Shetty (1990)[8] has undertaken a review of the behavior of public and private investment based on new series of national account statistics published by central statistical organisation, with 1980-81 as base year. He took the time

[8] Shetty S.L :, "Investment in agriculture" Brief Review of Recent Trends, Special Article ,EPW, February 17-24,1990.

series data from 1960-61 to 1987-88 and found that the gross capital formation in agriculture at 1980-81 prices was steadily rising during 1960s and became relatively subdued during the first half of the 1970s, and thereafter gathered momentum during the second half of the decade and attained a peak level of over Rs. 5200 crores during 1979-80, But since then, it has been persistently declining in absolute terms, the investment in relation to GDP has been declining according to the study. No wonder the share of agriculture in total domestic investment has revealed the same pattern during the period of study.

Over the decade 1960-61 to 1970-71 gross capital formation in agriculture at 1980-81 price rose at an annual compound growth rate of 6.3 per cent per annum based on three yearly moving average. Over the next decades i.e 1970s, it was 5.91% and during 1980s (till 1987) it experienced an absolute decline at a rate of 2.6% per annum.

The gross capital formation in relation to GDP (both in agr.sector at 1980-81 prices) was around 6% during the early 1960s and 8 per cent in the early 1970s, reaching a peak of 14% during 1979-80 and there after it has been showing a declining trend. As a proportion of GDP originating in the private sector, the private sector investments rose steadily from about 4% in the early 1960s to 6 per cent in the early 1970s and finally reached a peak of 9.5 per cent in 1979-80. There after it registered a sharp decline touching the lowest ever figure of 4.9% in I983-84 and 5.5% in 1986-87.

Agriculture's share in total domestic investment is more vividly brought out when we relate to the total public sector investment in the economy as a whole. This trend has also shown a declining tendency during 1980s. For the three consecutive decades, the percentage was 12.4 per cent, 11.3 per cent, and 13.1 per cent, respectively. But during 1986-87 it slided down to about 7.2 per cent. And the same figure is revealed when we relate the private sector capital formation in agriculture to the private capital formations.

Shetty's explanations of the factors responsible for the declining of public investment in agriculture during 1980s was due to a rapid increase in revenue account expenditure on agriculture. The proportion of expenditure on agriculture under revenue account which remained at 44% during 1970s shot up to nearly 70% by 1988-89. And despite the rapid expansion of institutional credit,. There has been sluggishness in the private investment in agriculture. The reasons put forward by him is that the expansion of credit by financial agencies has tended to be a substitute for ''own saving" and used for usurious non-institutional practices.

The All India Debt and investment Survey[9] results shows that the average debt per household increased from Rs. 500 in 1971 to Rs. 661 in 1981, (at current prices) at a compound growth rate of 2.8% per annum, as against 15% increase in institutional credit. Secondly, the institutional credit does not get translated into investments sometimes due to it being used for a payment of part loan and diversion to consumption. Thirdly, the concentration of

[9] All India Debt and Investment Survey -1981-82, Assets and Liabilities of Households as on 30th June, September ,1981.

institutional credit was presents only in few states, and even if it was there in less developed regions, the presence of inadequate land ownership rights, infrastructure bottlenecks caused by inadequate public investment hinder the gains of the formal credit. Moreover the terms of trade have been against agriculture during 1980s, and this has been one of the main reason for discouraging the level of private investments.

A. Ganesh Kumar (1992)[10] also reached the same conclusions as Shetty that, the investment in agriculture has shown a declining tendencies during 1980s. Agricultural investment in India has grown, at 1980-81 prices (new series of CSO) from Rs. 1,777 crores in 1960-61 to about 4,864 crore in 1980-81. The share of agriculture in total investment has remained more or less constant and has fluctuated between 15 to 20 per cent over the same period. Since 1980-81 agricultural investment has shown a clear fall both in level and also as a percentage to total investment. It had fallen to Rs. 4,360 crore in 1986-87. In his study it is shown that the fall in the public investment and the slowing down of the investment in irrigation are the main contributory factors of declining trends of the total investment. The annual compound growth of gross irrigated area was 2.87 per cent, 2.46 per cent and 1.57 per cent in 1961-71, 1971-81, 1981-87 respectively for the three consecutive decades. The addition to the total gross irrigated areas between 1961-71 was 10,124 thousand hectares (TH), an average of 928.5 T.H added every year. Between 19871-81, it was 11,681 T.H adding 1064.9 T.H every year and finally during

[10] Kumar A. Ganesh; " Falling Agricultural Investment and it's Consequences". EPW , Oct 17,1992.

1981-91. It was only 5761 T.H implying an average addition of 823 T.H. per annum. The study shows that the net irrigated area by surface water sources (canal & tanks) has been stagnating during the decade of 1980s, and was largely government controlled, but the ground water sources (tube well, well) have shown increasing trends which is largely due to investment made by the private sources. Thus it seems that the source of the problem is the fall in the public investment in agriculture.

To show the impact of the fall in the agricultural investment he put a computable general equilibrium model of Narain, Parikh and Srinivasan (1989). In his results he has shown that, the shift of investment in favour of non-agricultural sector results in an accelerated growth of Gross Domestic product, brought about mainly, through higher output of non-agricultural sector. Secondly, this result of a lack of investment in the agricultural sector would effect it's export potential badly. And finally the slowing down of agricultural growth results in greater rural inequalities with substantial increase in the number of rural poor.

Similarly many agricultural economists and scholars like B.D Dhawan (1996), S.K. Mallik (1993) H. Rao (1994, Pattnaik (1987), Nilakanth Rath (1989) Y.K. Alagh (1994), Gandhi (1996) empirically showed that agricultural investment has shown a clear decline during eighties compared to the previous two decades.

The year to year fluctuations in the rate of agricultural investment raises the question of what determines the levels of investment in Indian Agriculture. As

for example, the real public capital formation ranges at a low level of Rs. 589 crores in 1960-61 and a high level of Rs. 1769 crores in 1980-81. The coefficient of variation being 35%. So far as the public investment is concerned borrowing and revenue surplus are the major determinants of public investment in Indian agriculture (S. S. Yadav, B.D. Dhawan (1996)[11] . But for private investment it has got significant regional variations due to the different endowment of natural resources,skill,technology,irrigation, credit availability etc. The terms of trade one of the main indicator of price factor, which also takes the cognisanse of the farm investment. In a cross sectional analysis across regions, it is almost impossible to relate private investment to terms of trade. However, in a country of continental dimensions interstate variations of the two price variables namely wage rate and the farm interest rate can be well marked. (Dhawan 1996)[12] .

Of the non-price factors, technology, government investment in the agricultural sector regarding farm output and marketing availability of cheap institutional credit are the important factors, determining farm investment. Many empirical studies found that out of all the factors mentioned, public investment on agriculture itself is the main determinant of the private farm investment. And so there is "Crowding in" effect of private investment which exists in Indian agriculture. The agricultural economists prefer to coin the term as "complementarity". Both the terms are synonymous implying the same key

[11] Dhawen B.D,Yadav.S .S, " Public Investment in Indian Agriculture". Trends and Determinants, EPW, April 5, 1997.

[12] Dhawan B.D,Yadav S.S; "Private Fixed Capital Formation in Agriculture," Some Aspects of Indian Farmers' Investment Behaviour. EPW Sept 30, 1995.

ideas namely public investment in Indian agriculture induces farmers to step up their own investment.

Using the National Accounts Statistics (NAS) prepared by CSO, many economist estimated the elasticity of private investment with respect to public investment. The estimation work has been generally attempted in a multiple regression framework, whereby positive influence of other factors on private fixed farm investment has been duly eliminated. The elasticity turns out to be less than unity and ranges between (0.26 to 0.90). A less than proportionate impact of public investment on private investment is understandable since fixed agricultural capital formation on private account far exceeds the corresponding capital formation on government account.

One of the study based on the long time series for the period 1960-61 to 1989-90, by NCEAR[13] , where the value of elasticity is found to be 0.26.

Another study by a joint research team of institute of Economic Growth led by K. Krishnamurthy and Delhi School of Economics led by V.N.Pandit[14] find a relationship of almost one to one correspondence between the two categories of investment in Indian agriculture. In other words, one rupee of additional investment in agriculture on public sector account is accompanied by almost one rupee of additional investment on private account.

[13] National Council of Appiled Economic Research (NCAER), 1995, Developemnt of Trade and Investment Blocks of the NCAER Macro Model for India , New Delhi.

[14] Krishnamurty,K. (1985), "Inflation and Growth , A model for India" in K. Krishnamurthy and V.N Pandit (Eds),1985, Macro Modelling of the Indian Economy; Studies in Inflation and Growth, Hindustan Publishing ,Corporation ,Delhi.

In view of this complementary relationships, they concluded that the decline in private investment during 1980s was mainly because of the decline in public sector investment in Indian agriculture.

B.D. Dhawan's (1996)[15] study particularly relates to the government investment on canal irrigation and it's likely impact in private farm investment in Indian Agriculture. According to him, the public investment in canal irrigation which constitutes a very substantial portion of public investment on Indian agriculture, can stimulate private investment through the price route. It even leads to crop diversification for example banana, sugar cane which cannot be grown without the aid of artificial irrigation. And the added farm income under irrigated conditions induces more investment in fixed assets. It has also been found that the institutional lending for agricultural development in India is more concentrated in irrigated than in the dryland tracts. Using the data published by AIDIS, RBI, for 17 states for the period of 1981-82, it is found that canal irrigation ratio bears a significantly positive correlations with total private fixed farm investment (r = 0.65) and with investment in machinery. The canal irrigation ratio and the institutional credit per cultivator house hold was well correlated at (r = 0.58).

In an earlier study Dhawan and Yadav (1995)[16] , with the help of AIDIS data, brought out by RBI broadly discuss about the proportions (state wise,

[15] Dhawan B.D. Relationship between Public and Private Investments in Indian Agriculture with Special Reference to Public Canals. IJAE,Vol.51,No:1& 2 ,Jan-June, 1996.
[16] Dhawan B.D; " Trends and Determinants of Capital Investments in Agriculture". IJAE, Vol. 51,No:4,Oct-Dec-1996.

household wise), composition and determinants of the private fixed capital formation in Indian agriculture during 1981-82 published in 1988-89. The data reveals that bulk of the fixed capital formation on private account during 1981-82 was by cultivator household that is out of the total of Rs. 14.5 billion of farm business about Rs. 2.7 billion was accounted for by the cultivator households alone and out of the total of 25 states, major 17 states account for 98.5 per cent of the total fixed capital formation in agriculture. The three states Punjab, Haryana, and U.P together account for one third of the all India FCFA, by the cultivators' households. one of the notable conclusion they arrived is that canal irrigation development in a state plays a significant role in forming fixed capital among the cultivator household. Since this category of irrigation is practically under public sector in India, the slowing down in it's development during 1980s has led to the slow down of private fixed capital formation during the same period.

In a more disaggregative study of G.S. Bhalla and G.K.Chadha (1983)[17] who carried a statewide survey of Punjab agriculture found that public investment on canal irrigation enhanced farmer's own investment on their farm.

It is seen that most of the studies i.e of Dhawan (1996), H. Rao (1994), Krishana Murthy (1985), Shetty (1990) found that private sector capital formation is largely affected by the public sector investments though the

[17] Bhalla G.S and Chadha G.K. (1983) ,''Green Revolution and the Small Peasants". A Study of Income Distribution Among Punjab Cultivators,Concept Publishing Company,New Delhi.

elasticity is found to be less than unity. S.N. Mishra & Ramesh Chand (1995)[18] commented upon the complementary hypothesis. The elasticity of private investment in respect of public sector is found to be negative (-0.5) during 1980s. They regard complementarity as a relationship of being together to form a unity and not simply a causal relationship. Public investment on infrastructure may create enabling condition to induce private investment. The development of agriculture also requires investment in the production of large number of modern inputs such as fertilizers, pumpsets, tractors etc. which fall outside the agricultural sector. Dantwala[19] simply puts "what is relevant is not simply investment in agriculture but for agriculture". Secondly, when the movement of the two series (public and private investment) is marked during 1980s, it is observed that during 1960s and 1970s, they move broadly in the same direction, but during 1980s, the movement is quite in different direction. This obviously falsities the supposed complementary hypothesis. According to them ''Inducement effect in casual, where as complementarity is not it arises due to the technical extrenalities of public investment". Still the "inducement effect hypothesis" is spurious during 1980s. Though it seems to be present in earlier decades, yet these private sector capital formations in Indian Agriculture may be partly induced by public capital formation are partly autonomous and the issue should be posed accordingly.

[18] Mishra S.N,Chand Ramesh; "Public & Private Capital Formation in Indian Agriculture" Comment on Complementairty Hypothesis and Others, EPW, June 24,1995.
[19] Dantwala M.L (1986) " Indian Agricultural Development Since Independence ", A Collection of Essays, Oxford and IBH Publishing Co, New Delhi.

Another issue they raised is the under estimation of changes in stock by CSO during 1980s and so concluded that the private fixed capital formation has not indeed declined during the same decade. Y.K. Alagh, (1991)[20] though supported the declining tendency of investment in Indian agriculture, argued if inventory formation or changes in stocks is netted out, there is no evidence of declining investment levels although fluctuations can be estimated depending on the importance given to agriculture in macro and investment policies. And secondly when the gross domestic product accruing from the agricultural sector is declining, it is obvious that the share of capital formation in agriculture would also decline. In fact it is a normal process when the economy appears to be developing.

S.N. Mishra (1996)[21] talked about the efficiency of capital use in Indian agriculture. He calculated it on the basis of reciprocal of ICOR (Incremental Capital Output Ratio). In his study, the ICOR has been declining since the forth plan period and conversely the efficiency of capital use has been increasing. The increasing efficiency of capital use is of course a matter of satisfaction in the face of decline tendency of investment during eighties.

Objectives of the Study

1. The first objective is to determine the trends in the level of public and private investment since 1960. The whole of the thirty year period has been

[20] Alagh.Yosender .K. (1994) "Macro Policies For Indian Agriculture" in G.S Bhella (ed) "Economic Liberation and Indian Agriculture" Institute for Studies in Industrial Development, New Delhi.
[21] Mishra S.N. " Capital Formation and Accumulation in Indian Agriculture Since Indepedence; IJAE Vol.51,Nos: 1&2,Jan-June,1996.

subdivided into three decades for the sake of comparison among three successive periods.

2. Secondly, the composition and the interregional distributions of private investment in Indian agriculture have been made according to the bench mark decennial survey of "All India Debt and Investment Surveys" of the Reserve Bank of India. Besides this the assets wise distribution of private farm investment is made a part of the analysis.

3. Thirdly, the determinants of private investment will be undertaken,so that it's behaviour is properly analysed.

HYPOTHESIS

1. The richer states have higher concentration of private fixed investments as compared to the poorer states , owing to the lack of mobilisation of public investment and many other social economic factors.

2. There is a positive relationship between the asset group formation and private farm investments.

3. The 'complementary hypothesis' or 'inducement effect' holds good till the end of 1970s but it has been refuted in the eighties.

METHODOLOGY:

To determine the trends in the levels of investments, and other interrelated items, (from 1960-61 to 1994-95)compound growth rate is calculated. And for

the sake of comparison, the growth rate of three different decades is calculated.

The formula for calculating compound growth rate is

$P_t = P_o(1+r^t)$

where, r = compound growth rate

Po =value at base year

Pt =value at current year

t =time variable ; no of years

Secondly, in order to find the inequality in the possession of different agricultural inputs among various asset groups, the measure of Gini coefficient is used, the formula or calculating Gini coefficient is.

$$1 + \frac{1}{n} - \frac{2}{n^2\bar{x}}[(X,n) + X_2 (n-1) + 3 (n-2) + \ldots . X_n)]$$

Where, n =number of observations

x = Arithmatic mean of the series.

If the value of GF is found to be 1, then there is perfect inequality in the distribution and if it is found to be 0 then there is perfect equality in the distribution ;or there is no inequality at all. In other words every item of the series will have equal value.

Thirdly, to determine the factors affecting private investments, Ordinary Least Square method is applied . The result of the multiple regression analysis

explains the changing behavior of dependent variable with respect to independent variables. The regression equation is of the following manner.

$$Y = a + b_{i1} X_{i1} + b_{i2} X_{i2} + \ldots b_i n X_i n$$

Where, b_{i1}, b_{i2} . . . . bin represents the coefficients of the independent variables.

Besides this, percentage calculations has been applied to determine the share of different variables like public investments and private investments with respect to the total investments and the same for other interrelated variables . The tool of simple growth rate has also been applied wherever necessary.

Data Base:

The Main source of data for time series analysis is from the National Accounts Statistics, published by central statistical organisation, ministry of planning. The data for gross capital formation, gross domestic product are based on new series on National Accounts Statistics with the base 1980-81, which are introduced by CSO in February 1988. The data reveals the gross domestic capital formation by industry of use in aggregate and in public sector. There fore to find out the private sector capital formation in agriculture, public sector capital formation is deducted from the aggregate capital formation in agriculture. The segregated data of public sector and private sector is however available since 1960- 61. Therefore the analysis is based on the data after the period 1960-61.

Since the central statistical organisation does not publish state wise data for capital formation in agricultural sector, the bench mark survey of All India Debt and Investment Survey is followed. This nation wide survey data was carried out for both 1970s and 1980s in the earlier part of the decade. Three volumes on the same were brought out by the Reserve Bank of India. One volume entitled All India Debt and Investment Survey, 1981-82, statistical tables relating to capital Expenditure and capital formation of Household during the year ended 30th June 1982, was released in late 1988, and provides valuable data on fixed capital formation in agriculture. During 1961-62, the survey was confined to rural areas only and so it was titled as All India Rural Debt and Investment Survey. It was only after 1971-72 that, the survey extended to the Urban areas which help to provide valuable informations about the capital formation and capital expenditure in different activities for both rural and Urban areas.

Besides these two important sources of data, many other sources have also been followed to find data for independent variables . The statistical statements relating to co-operative movement in India provides valuable data for state wise institutional credit flow to agricultural sector. The data for normal rainfall have been obtained from Statistical Abstract of India. National Accounts Statistics , CSO releases the data of domestic product for both state wise and sector wise , which is the main sources of data to obtain state wise agricultural income per rural household. The net domestic product from the agricultural sector is divided by the rural population of the respective state. And finally the data for statewise area under HYV seeds and the area irrigated have been obtained from the Centre for Monitoring Indian Economy , India's agricultural sector 1996.

CHAPTER II

TRENDS OF PUBLIC INVESTMENT IN INDIAN AGRICULTURE

INTRODUCTION

Since independence the public sector has been playing an important role in boosting the production and productivity in Indian agriculture. To achieve these desired goals both structural and technical weapons have been injected by the government. During early sixties, in view of the threat of food security, the objective of expanding food production was kept in motion. It is only during the mid sixties, that the great technical breakthrough came upon, despite the presence of inter regional and inter personal inequalities. This breakthrough has led an incredible increase in the production and productivity of the agricultural products.

A large chunk of farm policies have also been undertaken for the development of Indian agriculture. The price support for important grain crops, subsidisation of key farm inputs, institutional credit support have been undertaken, though many of them may be termed as indirect farm investments on government accounts. At the same time the productive base of Indian agriculture has sought to be enlarged through direct public investment in irrigation schemes, soil and water conservation work, land reclamation, constitution of regulated market and the investment in research and education. It was hoped that these public investments would, in effect lead to enhance the private farm

investment, by virtue of the crowding in or the "complementarity" of these two sets of investment. In other words a short fall in the former might cause a danger signal to the latter.

There are few literature available regarding the trends in public and private investments in Indian agriculture, though the major issues concerning the ineffectiveness of the land reforms, intercrop price disparities, advancement of trade and constraints to Rainfed agriculture have received sufficient attentations. In view of the relative stagnation of investment in Indian agriculture during 1980s, Nilakanth Rath, (1987) and Prabhat Pattnaik (1987) drew pointed attention on these matters. Following the recent past literature, the present chapter deals with the trends in the public and private investments, since 1960. It is from this period onwards that segregated data on public and private sector capital formation is available at 1980-81 prices.

The Concept Of Capital Formation And Investment.

Before analysing the trends of public investments in Indian agriculture it is important to discuss the term investment and capital formation. capital formation is usually defined as an addition to the stock of productive equipments over time. According to Tosteble[1] , who made a pioneering study of capital formation in US agriculture, capital formation must be viewed "not as an automatic forces but a response to investment of money, effort and time in new resources or facilities of production." It is defined as " the growth of

[1] Tostlebe A.S ; "Capital in Agriculture: " It's formation and Financing Since 1870,National Bureau of Economic Research, Princeton University Press,1957, P.6.

inputs" as is indicated by the growth of "reproducible wealth " which helps larger production in future. The "reproducible wealth" includes all possible resource inputs. In the National Accounts Statistics, sources and methods[2] , it is defined as " the aggregates of gross addition to fixed assets and increase in the stocks of inventories"

The public sector gross capital formation is prepared by CSO separately by taking the data on land improvement, agricultural implements and machinery, irrigation work, live stock, drought cattle etc. The CSO however does not publish any data regarding the private sector capital formation in agriculture, therefore the data for it has been obtained by deducting the public sector capital formation from the aggregate capital formation in this sector. The data of capital expenditure and capital formation for cultivator households are provided by All India Debt and Investment survey, it follows the "expenditure of fund" approach for the measurement capital formation. The expenditure of a capital nature which directly contributes towards augmenting the productive capacity of the household serves as a Measure of capital formation . Therefore capital formation in Indian agriculture may also serve as an alternative of investment in the sector itself. It is for this reason that the two terms investment and capital formation has been used synonymously.

[2] Central Statistical Organisation (1989); National Accounts Statistics, Sources and Methods 1989. October, Department of Statistics, Ministry of Planning ,Government of India, New Delhi.

THE TRENDS

Looking at the time series data as revealed by the central statistical organisation (CSO) from 1960-61 to 1995-96 (at constant 1980-81 prices), it has been found that, for the whole three and half decades the annual compound growth rate of gross capital formation in agricultural sector is around 3.5 per cent per annum. For the decade 1960s the growth rate has remained 5.15 per cent per annum and is maintained a little over that during the decade of the 1970s, though it has been relatively subdued in it's early years. In the year 1978-79 it has reached it's peak at Rs. 5246 crores and there after it never took the form till the end of 1980s. It is clearly shown (in table 3) that during 1980s it has shown a negative growth rate of -0.08 per cent per annum. However, during the early 1990s, the growth rate of gross capital formation has gathered momentum and increased at a rate of 4.32 per cent per annum, which is no doubt a welcome step by the government, though a major part is still contributed by the private sector.

The nature of a decline trend of the investments during 1980s can be better understood from the trends of public capital formation on the government account. During this decade it has registered a negative growth of -4.32 percent per annum. And the private investment has registered a moderate growth of 1.98 per cent per annum. Thus the fall in the total agricultural investment during 1980s has mainly come about due to the fall in the public investment. Public investment in agriculture in India during 1980-81 was Rs. 1796 crores and fell to Rs. 1157 crore during 1989-90. Whereas private investment during

the same period hovered around Rs. 3000 crores, with a slight increase from Rs. 2840 crores in 1980-81 to Rs. 3198 crores during 1989-90 at 1980-81 prices. The annual compound growth rate for another related items is evident from table 2. The aggregate gross capital formation form 1960-61 to 1994-95 grew at the rate of 4.93 percent per annum. The growth rate has remained highest during 1970s; it was 7.9 percent, but the growth rate of public sector aggregate gross capital formation has remained lowest i.e 1.92 percent during the first half of 90s. This may be due to the fact that industrial sector had a very poor performance during this period. But private sector gross capital formation had grown at the rate of 7.08 percent annually during the same period. During the decade 1980s the growth rate of the private sector capital formation also had remained highest i.e. 7.15 percent annually.

As far as the growth rate of Gross Domestic Product in the agricultural sector is concerned, the annual compound growth rate has become highest during 1980s, despite the fall in aggregate gross capital formation in this sector . This may be due to the impetus given to the farmers in the form of subsidies which helped them to grow output at an accelerating rate at the lower cost of production . In the decade 1960s, the annual compound growth rate of GDP was 2.22 percent per annum ,came down to 1.68 percent in 1970s and after growing steeply in 1980s at the rate of 3.68 percent it came down again to 2.41 percent in the first half of 1990s.

TABLE. I
THE TIME SERIES DATA FOR GROSS CAPITAL FORMATION AND GROSS DOMESTIC PRODUCT AGGREGATE AND DIS AGGREGATE

YEAR	A	B	C	D	E	F	G	H	I	J
1960-61	1668	589	1079	1585	11775	4805	6970	9793	62904	28841
61-62	1670	600	1070	1665	10813	4815	5998	9752	64856	28748
62-63	1848	694	1154	1804	12692	5731	6961	11037	66228	28131
63-64	2000	725	1275	1939	13535	6473	7062	11963	69581	28658
64-65	2128	765	1363	2103	14223	6822	7401	12660	74858	31619
65-66	2308	798	1510	2258	14743	7412	7331	13599	72122	27360
66-67	2346	696	1650	2313	15455	6569	8886	13239	72856	26734
67-68	2589	688	1901	2580	14891	6662	8229	13272	78785	31298
68-69	2894	775	1919	2558	13249	6002	7247	12756	80841	31190
69-70	2871	775	2096	2754	15102	5997	9105	13578	86109	33451
70-71	2758	789	1969	2625	16550	6984	9566	13762	90426	35930
71-72	2924	851	2073	2767	17941	7650	10291	14351	91339	34973
72-73	3180	1049	2131	2938	17636	9053	8583	16277	91048	33005
73-74	3208	993	2215	2902	20007	8969	11038	15767	95192	35786
74-75	2975	919	2056	2709	20729	8757	11972	15515	96297	34800
75-76	3388	1041	2347	2935	22908	11030	11878	18117	104908	39740
76-77	4258	1378	2880	3646	22498	12326	10172	18859	106280	37323
77-78	4073	1534	2539	3744	22415	10445	11970	19927	114219	41994
78-79	5246	1697	3549	4246	28144	12519	15625	22150	120504	42831
79-80	5215	1772	3443	4440	27334	13029	14305	21653	114219	37108
80-81	4636	1796	2840	4537	28357	14000	14027	26317	122226	42466
81-82	4499	1779	2720	4346	35001	15903	19038	26488	129776	45145
82-83	4575	1725	2850	4409	33688	16761	16927	28607	133830	44570
83-84	4097	1707	2390	3957	34267	16730	17537	28708	144817	49753
84-85	4551	1673	2878	4287	35919	18537	17382	30058	150542	49702
85-86	4322	1516	2806	4068	40453	19114	21339	31441	158176	49855
86-87	4014	1428	2586	3798	39514	20417	19930	34291	164441	48955
87-88	4418	1461	2957	4219	37982	17658	21829	35848	170332	49317
88-89	4349	1364	2983	4260	46225	19463	26362	37954	188462	57940
89-90	4355	1157	3198	4191	44507	20629	23878	40062	201453	58568
90-91	4595	1154	3441	4460	49886	21896	27990	44092	211260	60991
91-92	4729	1002	3727	4667	46718	20047	26671	45131	213590	59322
92-93	5372	1061	4311	5260	52131	20583	31548	47698	222089	62440
93-94	5038	1153	3885	5012	52245	21495	30750	52244	238864	65713
94-95	5678	1329	4349	5499	63511	24091	39420	58374	256095	68706

SOURCE : NATIONAL ACCOUNTS STATISTICS, CSO.

Note A,B,C,D,... Mentioned in page 29.

Trends of Public, Private and Total Investment in Indian Agriculture

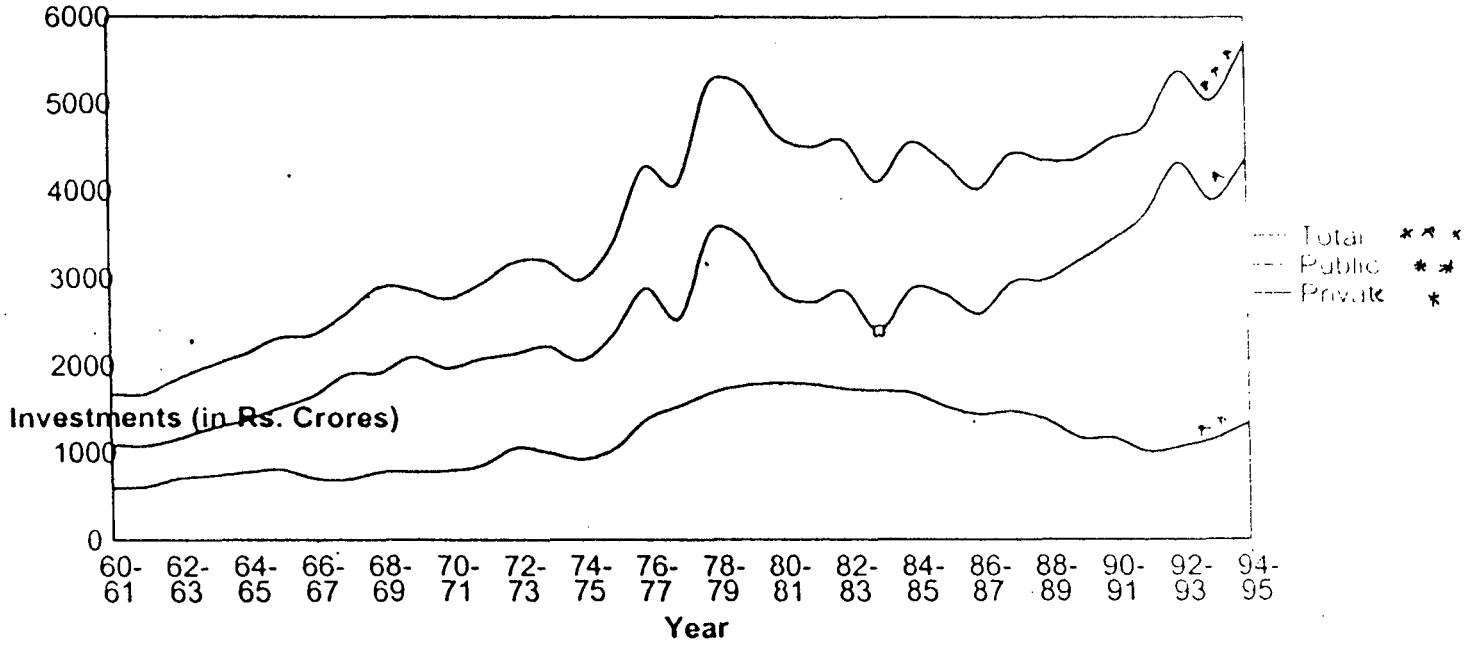

Table 3

Annual compound growth rate for capital formation and gross domestic product sector wise and aggregate.

Years	A	B	C	D	E	F	G	H	I	J
1960-61- 1970-71	5.15	2.96	6.19	5.17	3.46	3.81	3.21	3.46	3.69	2.22
1970-71 - 1980-81	5.33	8.57	3.73	5.62	5.35	7.20	3.90	6.69	3.05	1.68
1980-81 - 1990-91	-0.08	-4.32	1.93	-0.17	5.81	4.57	7.15	5.29	5.62	3.68
1990-91 - 1994-95	4.32	2.86	4.79	4.72	7.94	1.92	7.08	5.77	3.92	2.41
1980-81 - 1994-95	1.36	-1.98	2.88	1.29	5.52	3.68	7.13	5.45	5.05	3.25
1960-61 - 1994-95	3.56	2.35	4.06	3.61	4.93	4.71	5.07	5.23	4.09	2.51

Here,

A = Gross capital formation (GCF) in agricultural sector.

B = Public sector gross capital formation in agricultural sector.

C = Private sector gross capital formation in agricultural sector.

D = Gross fixed capital formation in agricultural sector.

E = Aggregate gross domestic capital formation.

F = Aggregate gross domestic capital formation in public sector.

G = Aggregate gross domestic capital formation in private sector.

H = aggregate gross domestic fixed capital formation.

I = Total Gross Domestic product at factor cost in the economy.

J = Gross Domestic product at factor cost originating in agricultural sector.

TABLE : 2
RELATIVE SHARES OF THE DIFFERENT ITEMS.

YEAR	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1960-61	35.31	64.69	14.17	2.65	5.78	40.81	59.19	18.72	0.94	1.72	2.04	3.74	12.46	15.48	45.84
61-62	35.93	64.07	15.44	2.57	5.81	44.53	55.47	16.67	0.93	1.65	2.09	3.72	12.46	17.83	44.32
62-63	37.55	62.45	14.56	2.79	6.57	45.15	54.85	19.16	1.05	1.74	2.47	4.10	12.1	16.57	42.47
63-64	36.25	63.75	14.78	2.87	6.98	47.82	52.18	19.45	1.04	1.83	2.53	4.45	12.2	18.05	41.18
64-65	35.95	64.05	14.96	2.84	6.73	47.96	52.04	19.00	1.02	1.82	2.42	4.31	11.21	18.41	42.23
65-66	34.58	65.42	15.65	3.20	8.44	50.27	49.73	20.44	1.11	2.09	2.92	5.52	10.76	20.59	37.93
66-67	29.67	70.33	15.18	3.22	8.78	42.50	57.50	21.21	0.96	2.26	2.60	6.17	10.57	18.56	36.69
67-68	26.57	73.43	17.39	3.29	8.27	44.74	55.26	18.90	0.87	2.41	2.20	6.07	10.32	23.1	39.72
68-69	26.78	66.31	21.84	3.58	9.28	45.30	54.70	16.39	0.96	2.37	2.48	6.15	12.91	26.47	38.58
69-70	26.99	73.01	19.01	3.33	8.58	39.71	60.29	17.54	0.90	2.43	2.32	6.27	12.92	23.02	38.54
70-71	28.61	71.39	16.66	3.05	7.68	42.20	57.80	18.30	0.87	2.18	2.20	5.48	11.29	20.58	39.73
71-72	29.10	70.90	16.30	3.20	8.36	42.64	57.36	19.64	0.93	2.27	2.43	5.93	11.12	20.14	38.23
72-73	32.99	67.01	18.03	3.49	9.63	51.33	48.67	19.37	1.15	2.34	3.18	6.46	11.58	24.82	26.25
73-74	30.95	69.05	16.03	3.37	8.96	44.83	55.17	21.02	1.04	2.33	2.77	6.19	11.07	20.06	37.59
74-75	30.89	69.11	14.35	3.09	8.55	42.25	57.75	21.53	0.95	2.14	2.64	5.91	10.49	17.17	36.13
75-76	30.73	69.27	14.79	3.23	8.53	48.15	51.85	21.84	0.99	2.24	2.62	5.91	9.43	19.75	37.88
76-77	32.36	67.64	18.93	4.01	11.41	54.79	45.21	21.17	1.30	2.71	3.69	7.72	11.17	28.31	35.11
77-78	37.66	62.34	18.17	3.57	9.70	46.60	53.40	19.62	1.34	2.22	3.65	6.05	14.68	21.21	35.54
78-79	32.35	67.65	18.64	4.35	12.25	44.48	55.52	23.36	1.41	2.95	3.96	8.29	13.55	22.71	32.48
79-80	33.98	66.02	19.08	4.57	14.05	47.67	52.33	23.93	1.55	3.01	4.78	9.28	13.6	24.06	34.74
80-81	38.74	61.26	16.35	3.79	10.92	49.37	49.47	23.20	1.47	2.32	4.23	6.69	12.8	20.24	34.78
81-82	39.54	60.46	12.85	3.47	9.97	45.44	54.39	26.97	1.37	2.10	3.94	6.03	11.2	14.28	33.3
82-83	37.70	62.30	13.58	3.42	10.26	49.75	50.25	25.17	1.29	2.13	3.87	6.39	10.29	16.83	34.35
83-84	41.66	58.34	11.96	2.83	8.23	48.82	51.18	23.66	1.18	1.65	3.43	4.80	10.2	15.18	33.01
84-85	36.76	63.24	12.67	3.02	9.16	51.61	48.39	23.86	1.11	1.91	3.37	5.79	7.02	16.55	31.51
85-86	35.08	64.92	10.68	2.73	8.67	47.25	52.75	25.57	0.96	1.77	3.04	5.63	7.93	13.14	29.77
86-87	35.58	64.42	10.16	2.44	8.20	51.67	50.44	24.03	0.87	1.57	2.92	5.28	6.99	12.97	28.95
87-88	33.07	66.93	11.63	2.59	8.96	46.49	57.47	22.30	0.86	1.74	2.96	6.00	8.27	13.54	30.74
88-89	31.36	68.59	9.41	2.31	7.51	42.10	57.03	24.53	0.72	1.58	2.35	5.15	7	11.31	29.07
89-90	26.57	73.43	9.78	2.16	7.44	46.35	53.65	22.09	0.57	1.59	1.98	5.46	5.28	13.39	28.87
90-91	25.11	74.89	9.21	2.18	7.53	43.89	56.11	23.61	0.55	1.63	1.89	5.64	5.27	12.29	27.77
91-92	21.19	78.81	10.12	2.21	7.97	42.91	57.09	21.87	0.47	1.74	1.69	6.28	4.99	13.97	28.11
92-93	19.75	80.25	10.30	2.42	8.60	39.48	60.52	23.47	0.48	1.94	1.70	6.90	5.15	13.66	27.51
93-94	22.89	77.11	9.64	2.11	7.67	41.14	58.86	21.87	0.48	1.63	1.75	5.91	5.36	12.63	26.82
94-95	23.41	76.59	8.94	2.22	8.26	37.93	62.07	24.80	0.52	1.70	1.93	6.33	5.51	11.03	24.98

N: A as a % of I
R: E as a % of I
V: C as a % of J

W: B as a % of F
X: C as a % of G
Y: J as a % of I

K: B as a % of A
L: C as a % of A
M: A as a % of E

O: A as a % of J.
P: F as a % of E
Q: G as a % of E

S: B as a % of I
T: C as a % of I
U: B as a % of J

The Relative Share Of Public And Private Capital Formation Of The Total Capital Formation In Agricultural Sectors

In Table 2. It is clearly evident that, the private sector capital formation in the agricultural sector has been dominating taking almost two third of the total figure, since the beginning of the 1960-61. During the second half of the decade 1960s, (Green Revolution Period) it has remained over 70 per cent of the total capital formation in the agricultural sector. During the first half of the sixties and in the last two decades (excluding the late 80s), it has remained a little over 60 percent though in some years it reached to nearly 70 per cent. One remarkable feature during the late 1980s and during the beginning of the 1990s, the share remained even more than 70 per cent, exceptionally during 1992-93 it reached it's peak of 80.24%.

And conversely, the share of public sector capital formation to the total capital formation in agricultural sector had remained lowest in the late eighties and early nineties hovering around 20 to 30 percent.

Investment In Relation To GDP In Agriculture

In relation to the Gross Domestic Product, originating in agriculture, the gross capital formation in the sector contributed about 6 per cent in the early 1960s and this share rose to a little over 8 per cent in the early 1970s and reached it's peak at 14 per cent towards the end of the decade (1979-80). Thereafter, it has been consistently declining till the end of 1980s. However it has shown a slight improvement in recent years, an increase of about 7.5 per cent in 1990-

91 to 8.8 per cent in 1995-96. The contribution of the private sector investment to total agricultural GDP remains in between 4 to 8 per cent. But during the year 1979-80, it had the highest contribution of 9.27 percent. On the other hand, the contribution of public sector investment hovered in between 2 to 4 per cent in all the decades except in the nineties, where it has remained only a little over one and a half per cent. Undoubtedly the main reason as to why the share have remained so low is that, the public sector capital formation itself is declining and also the gross domestic product contributed by the agricultural sector has been falling.

The Share Of Agricultural Capital Formation In Relation To The Total

The percentage of public sector capital formation in agriculture to public sector's total domestic capital formation has also had a significant fluctuations. It was around 12 per cent during early 60s and slid to 9.4 per cent during 1975-76, followed by a quantum jump in the subsequent years of fifth Five Year Plan period (1974-75 - 1975-80), with the agriculture sharing a peak of 13.6 per cent in the terminal year. And as happened to other items, it slid to a low figure of 6.99 during 1986-87. Again it fell to a further low figure of 4.99 per cent during 1991-92, thereafter improving slightly to 5.51 per cent in 1994-95. The share of private sector capital formation in agriculture also observed a similar pattern with the share in 1980s being significantly lower than what was observed in the earlier decades. On the other hand, the proportions of total gross capital formations in agriculture to the total gross capital formation was around 14 per cent during the first half of the 60s,which

reached it's peak in 1968-89 to 21.84 per cent and thereafter it has managed to reach only to 19.07 percent in 1979-80, and recently slowing down to only 8.82 per cent in 1995-96.

The observation of the annual compound growth rates and the relative shares of investment in agriculture to the total investment is seen to have suffered a distinct loss, during 1980s, though it has improved in recent years. This has to be accelerated very fast, other wise it would have a severe impact on the sector itself and on the whole economy, for the simple reason that the growth rate of area under all crops has been declining since the beginning of 1980. During the pre-Green Revolution Period the recorded area growth rate was 1.62 per cent annually and though it continued with a positive growth of 0.41 per cent till the end of 1980s, it has started declining by 0.65 per cent in the nineties[3] .

While inaugurating the Indian Society of Agricultural Economics Y.K.Alagh[4] rightly pointed out "There is much of concern about the Indian Agriculture as we entered the ninth plan. Agricultural fixed capital formation requirements of fixed investment to finance growth is no where in sight. This is happening at a time when area growth rate has stopped and investment requirements are so high that agricultural intensification can only proceed through larger investment in land, water and yield improvement. The crisis of channeling larger loanable fund through developing rural credit line continues".

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[3] Mallik .J.K. "Growth of Agriculture in Independent India: 50 Years and After"RBI Occasional Papers,Vol.18,Nos: 2& 3,special Issue (June &Sept) 1997,Pg.148,Table 2.

[4] Alagh Yoginder. K. "Agricultural Investment and Growth " Inaugural Address,Published in IJAE,Vol.52,No:2,April-June,1997.

FACTORS RESPONSIBLE FOR DECLINING INVESTMENT DURING 1980s

The behavior of investment in agriculture, as it has been marked in the above discussion indeed shows a declining trend during 1980s. The investment on public account seems to be more discouraging than the total investment in agriculture. Below are given some reasons for such a state of Indian agricultural economy.

In the first place the main cause of the declining tendency is that, a large proportion of the total resource flow to the agricultural sector on current account expenditure is spent on subsidies for agricultural inputs rather than on investment. There fore there are only a few resources available for investment in the agricultural sector, specially in irrigation, which has a high potential to enhance yields and to have improvement in agriculture. When we look at the data of expenditure and investment in Indian agriculture, it is found that, the fall in government total expenditure has not been as sharp as the fall in relative investment in agriculture. The government's total expenditure on agriculture as a proportion of GDP originating in the sector steadily increased from 3.1 per cent in 1970-71 to 8.6 percent in1981-82 and finally to 11.9percent in1987-88. The corresponding public sector investment to GDP fell from 4.3 per cent in 1980-81 to 3.6 per cent in 1986-87(S.L.Shetty)[5] Which further fell to 1.9 per cent in very recent years.

[5] The data for Govt. Expenditure and % of GDP in the Sector is Borrowed from "Investment in Agriculture",. S.L Shetty EPW Feb-17 - 24,1990.

Level and magnitude of agricultural sector expenditure,1980-81 and 1990-91.

Table-4

	1980-81	1990-91
Total agricultural expenditure		
As a percent of GDP	3.2%	3.3%
As a percent of total government expenditure	12.5%	10.0%
Total Irrigation expenditure		
As a per cent of total government expenditure	7,2%	3.6%
As a % of total government agricultural expenditure	58%	37%
Fertilizer subsidy		
As a percent of total government agricultural expenditure	11.5%	25%
As a per cent of total government expenditure	1.4%	2.5%

Source : Public Expenditure Review, Sector Report III : Agriculture, India, NIPFP.

In the above table 4 it is quite evident that, the percentage expenditure on irrigation to the total expenditure has declined substantially from 1980-81 to 1990-91 and that the expenditure on fertilizer has shot up to a great extent. Corresponding to these changes in functional compositions, the share of agricultural capital formation has fallen sharply during 1980s. This in turn has supported to build private capital formation. In other words, the private capital

formation has not fallen as sharply as the public investment due to this huge capital subsidy and due to subsidized term loans to the agricultural sector.

The trends in the rising shares of revenue expenditure in the total expenditure clearly indicate the political economy of agricultural policies during the late 1970s. Public financing of the private sector capital formation became the priority concern under the pressure of farmers' interest group. The rapid increase in the share of current account expenditure in fact did not leave much room for the public sector capital formation. Thus the real cause of decline in the real public sector capital formations during 1980s lies in the policies followed for the agricultural sector.

Besides this major concern, there are many other factors which restricted the public sector capital formation during 1980s[6] . They are largely attributed to the major and medium irrigation systems. Firstly, there is an escalation of per hectare cost of these systems compared to minor irrigation sources, which are largely in the private sector. Secondly, during the decade of 1980s there had been some forceful rise of environmentalist movement both domestic and foreign against the major irrigation systems. The Narmada system is a burning example in this case. Lastly the federal nature of the large subcontinent (problem of interstate water dispute) has also been a severe constraint on public sector capital formations in irrigation system.

[6] A few extraneous factors leading to a decline in public investment in Indian Agriculture" in Mishra and Chand's " public and Private Capital Formation in Indian Agriculture," comments on complementarily hypothesis and others,EPW,June 24,1995.

AGRICULTURAL INVESTMENT AND OUTPUT IN INDIA

Looking at the data on gross fixed capital formation and gross domestic product in Indian agriculture, one may arrive at a conclusion regarding the efficiency of capital use in agricultural sector. Mishra and Chand (1995)[7] using the data conclude that, the efficiency of capital use (reciprocal of incremental capital output ratio ICOR) has been increasing since the beginning of forth plan. For estimating ICOR, they used fixed rather than gross capital formation, because it is the former that is actually deployed in the process of production.

The study speaks of a declining trend in the ICOR, it fell from 8.36 during forth plan to 4.15 during the fifth plan and further down to 1.75 in the seventh plan. During the third plan the ICOR rose to a high of 15 from a low of 1.6 in the first plan. This is because the period was marked by a low growth of production and great policy emphasis on investment in major irrigation systems. The next period of annual plans 1966-67 to 1968-69, showed the lowest ICOR and the highest marginal efficiency of capital because it overlapped the agricultural crisis of 1965-66 and picked up production in 1968-69. Thus the result showed that ICOR expectedly rose during the pre-Green Revolution period from 1.9 to a peak of 6.65 and fell to 3.62 during the Green Revolution period and further to 2.4 in the post Green Revolution period.

[7] Mishra S.N "Capital Formation and Accumulation in Indian Agriculture Since Independence. IJAE, Vol.51,Nos 1&2,Jan-June,1996.

The broad conclusions however is that, from forth plan onwards, the picture is one of falling ICOR and rising marginal efficiency of capital, until the end of seventh plan (1985-90). This clearly shows that though the real capital formation during eighties declined in absolute terms there was more efficient use of capital in this period compared to other decades. Y.K. Alagh (1997)[8] also reports of a decline in the ICOR in Indian agriculture from 7.37 during the period 1978-79 to 1987-88 to 3.32 during 1987-88 to 1991-92. He observes it would be imprudent to plan an ICOR of less than 3 for agricultural fixed capital formation.

Table 5

Estimates Of Incremental Capital Out Put Ratio Since 1951.

Period	ICOR	1/ICOR
First Plan	1.58	0.635
Second Plan	1.58	0.554
Third Plan	15.01	0.067
Annual Plan	1.46	0.772
Forth Plan	8.36	0.122
Fifth Plan	4.15	0.260
Sixth Plan	2.21	0.452
Seventh Plan	1.79	0.556
1951-52 - 1960-61	1.90	0.526
1961-62 - 1967-68	6.65	0.150
1968-69 - 1978-79	3.62	0.276
1979-80 - 1989-1990	2.41	0.414
1990-91 - 1995-96	3.24	0.308

Source: The Table has been borrowed from Mishra S.N., "Capital Formation and accumulation in Indian Agriculture since independence, IJAE, Vol. 51, No. 1 and 2. Jan- June, 1996. The ICOR for 1990-91 to 1995-96 has been calculated following the same formula i.e., Gross Capital Formation divided by incremental GDP at constant price.

[8] Alagh.Yoginder .K. "Agricultural Investment and Growth ", Inaugural Address. IJAE,Vol.52,No:2,April-June,1997.

In dec ade 1950s , the ICOR had remained all time low because during this period there were very less capital used in the agricultural sector. The technique of production was traditional .People were using bullock and bullock cards extensively, therefore the efficiency of capital use was highest. The ICOR had remained 2.41 during 1980s one of the lowest after the green revolution period. This indicates that the gross capital formation had declined during this period, but the growth rate of GDP form the agricultural sector had remained highest . Since the ICOR is the ratio of gross fixed capital formation to the incremental GDP, the low value of ICOR is an obvious consequence during 1980s. As a result of which the efficiency of capital use had increased, calculated on the basis of the reciprocal of ICOR.

During the first half of the nineties in the face of increasing gross capital formation, and slow growth of GDP in Indian agriculture one would observe an increasing capital output ratio and a decreasing efficiency of capital use. It is estimated to be 3.24 and 0.308 respectively.

However the comparison of growth rate of investment and output in agriculture in indeed puzzling(J.K.Mallick)[9] .

[9] J.K Malik in his article" Growth of Agriculture in Independent India.'' 50 years and after,RBI Occasional paper,considered the relationship between Investment and ouput Puzzling , and inverse relationship between these to variables is turning the growth theory upside down.

Table 6

Comparison of annual compound growth rate of agricultural GDP and investment.

Period	GFCF	(Annual compound growth rate) Agricultural GDP
1960-61 - 1970-71	5.17	2.22
1970-71 - 1980-81	5.62	1.68
1980-81 - 1990-91	-0.17	3.68
1990-91 - 1994-95	4.27	2.41

Source : Table 3

It is observed from the table that during eighties, when gross fixed investment growth rate slowed down, the growth rate of output accelerated and when it was higher during the first half of the nineties, the output growth rate slowed down. This may be due to two possible reasons. Firstly the effect of the fixed investment might have taken a long gestation to generate sufficient output. Secondly, the period when the fixed investments were lowest (as for example in 1980s)when the resources had diverted to meet the variable cost like payment of labour, purchasing fertilizer and HYV seeds which gives quick resultant output . this was a case during eighties when such inputs were provided by the government at a lower cost in the form of subsidies.

CONCLUSION

The investment in agriculture as it is seen in the analysis has undergone declining trends during 1980s and has picked up recently. The decrease in investment on public account is rather more pronounced than on Private account. This has mainly come about due to the escalation of current account expenditure, basically a politics based Indian agrarian policy in the late 1970s, which has supported to build up private fixed capital formation. The share of private sector capital formation in agriculture had remained all time high i.e around two third of the capital formation in agriculture sector . The gross capital formation in agricultural sector has also shown a decling trend during 1980s as a percentage of GDP in the sector, though it has improved in the early 1990s . But the public sector capital formation has shown a steep decline as a percentage of GDP during the early 1990s. The share of capital formation in agricultural sector to the total capital formation has also shown a clear fall during 1980s. Y.K. Alagh considers the decline tendency of investment as a threat caused by negative growth rate of area in the contribution of total output. At the same time he argued this is a normal feature in the agricultural sector as the economy approaches towards development. And since the GDP accruing to the agricultural sector is declining as a proportion of total GDP, It may not be a cause of concern and despite a declining trends of investment during 1980s. The capital has rather been used efficiently in the same period, calculated on the basis of the reciprocal of incremental capital output ratio compared to the earlier two decades. The relationship between the agricultural fixed capital formation and output in seen negative. Though there are not much theoretical evidence on this , still it may be perceived that the fixed capital formation has taken a long gestation to be able to generate output in the agricultural sector.

CHAPTER III

PRIVATE INVESTMENT IN INDIAN AGRICULTURE

Introduction

The continued dependence of food import and stagnation in Indian agriculture during pre-green revolution period was mainly viewed as a subject of low investment in the sector and tradition based technology of the Indian farmers. Thanks to the availability of cultivated area which contributes as much as 60 percent of the increase in out put during fifties. The availability of additional land brought into cultivation and its contribution to the productivity is no longer possible in recent times. It is important to remark that the contribution of area in augmenting production for food grain crops has shown a negative growth rate during nineties. Therefore raising productivity from a particular piece of land in terms of intensive cultivation is the call of the day which requires the application of modern technology rather than relying upon traditional one.

As far as the composition of investment or the percentage share in total expenditure is concerned, it is seen that purchase of livestock was the chief item in the list (Tara Shukla 1965)[1]. Even during 1970s one fourth of the total capital expenditure goes for the purchase of livestock, followed by 19.6 percent on the purchase of agricultural implements, machinery and transport

[1] Shukla Tara; "Rates of Gross and Net Capital Formation in Indian Agriculture and factors influencing them" Indian Journal of Agricultural Economics Vol. XX, Jan-March, 1965, No. 1.

equipment. (AIDIS 1971-72)[2]. This figure clearly indicates the traditional nature of investment in Indian Agriculture during the pre-Green Revolution period. Though the application of Modern equipment has taken over the traditional equipment in the composition of total expenditure during 1980s, the use of bullocks in ploughing the field is still in existence in some areas of the country. This factor particularly makes a difference in agricultural productivity with that of advanced countries like United States. The current agricultural abundance of US is largely due to a massive and substantial application of science to the solution of the problems which farmers encounter in their day to day farming operations. The education system for farmers, both public and private, quickly informs the agriculturist of the scientific finding as where to get inputs and how to use them properly. The poor research and education system in Indian agriculture is also one of the main contributory factor for the near constancy in Private investment. It is the function of research, extension and education system to identify and evaluate the new technology and get it into daily use. The American Private sector has performed exceptionally well in both spheres on their own initiative and in collaboration with private sector research and educational institutions.

Another important facet in Indian agriculture is the existence of interregional and interpersonal inequality. The inter regional inequality aggravates due to the difference of natural environment and of governance, and interpersonal inequality is caused due to unequal possession of land holding among the rural

[2] All India Debt and Investment Survey,Capital Expenditure and Capital Formation of Rural Households During 1971-72, pp 1.

cultivators. The large land sized farmers have tended to invest more in the farm business owing to their access to credit facilities and of course their risk taking capabilities.

The present chapter deals with the item wise, state wise and asset group wise, capital expenditure and capital formation on farm business in Indian Agriculture. The figures reveal a comparative picture of three consecutive decades i.e. 1961, 1971 and 1981, for which data was available. For 1961, the data is of All India Rural Credit and Investment Survey and for 1971 and 1981, it is of All India Debt and investment survey, RBI.

THE CONCEPTS AND LIMITATIONS OF THE DATA

The Concepts

In general language the term 'investment" means to buy shares, stocks, bonds and securities which are already existing in the stock market. But this is not real investment because it is simply a transfer of existing assets. In Keynesian terminology, investment refers to real investment which adds to capital equipment. It leads to an increase in the level of income and production by increasing the production and purchase of capital goods. Investment thus includes purchase of new plants and equipment, construction of public works like dams, roads building etc, "Capital" on the other hand refers to real assets like factories, plants, machinery and inventories of finished and semi-finished goods. It is only the previously produced inputs that can be used in the production process to produce other goods. The amount of capital available in

an economy is the stock of capital. More precisely investment is the production or acquisition of real capital assets during any given period of time.

In the Monograph of All India Debt and Investment survey[3] the term "Capital" is used to cover all assets which are capable of further production, and include land, orchards and plantation, all irrigation resources, agricultural implements and machinery, transport equipments, farm houses, barns, cattle sheds, livestock, non-agricultural land, furniture and fixtures, residential plots, buildings and durable household assets. The last two items though in the nature of current items are included as capital assets in AIDIS in view of long life and continued flow of service from them over a number of years. These various items of capital expenditure have been broadly classified into three categories viz (1) expenditure on farm business (ii) on non farm business and (iii) on residential plots, building and durable house hold assets.

Capital expenditure on farm business includes all payments incurred either on new purchases or additions, improvements, repairs to the various capital assets used in the farm business comprising cultivation of land, plantations, orchards and other allied activities to agriculture. Expenditure incurred on non-farm business includes the activities of manufacturer such as industry, mining, quarrying, trade, transport, miscellaneous profession and service. And the third category of expenditure is that incurred on housing and durable household assets which includes residential plots, houses, buildings and durable household assets such as bullion, utensils, radios, gramophones, sewing

[3] Ibid, p. 1

machines etc. However the present analysis limits itself to the investment on farm business only.

The other explanatory variable is the "capital formation" which refers the accrual to the physical capital assets of the community over a given period measured in monetary term. The All India Debt and investment survey[4] follows the "expenditure of fund" approach for the measurement of capital formation. The expenditure of a capital nature which directly contributes towards augmenting the productive capacity of the household serves as a measure of capital formation. In other words all capital expenditure leading to fixed asset formation has been taken to represent capital formation. The survey covers "maintenance expenditure" and expenditure leading to asset formation in respect of individual items. The estimates of capital expenditure leading to asset formation in farm business, non-farm business and residential housing are taken as constituent of fixed capital formation in the rural house hold sector. To arrive at fixed capital formations, not only expenditure in cash and kind, but also imputed value of own assets and materials used, as also that of the work done by members of this household and permanent servant were included. In addition to the expenditure on repairs, replacements and maintenance, the expenditure on purchases of land, land rights and livestock were excluded in the completion of the estimate. And also the estimates are not adjusted for sale of fixed assets and loss caused to fixed assets on account of natural and other calamities during the reference year.

[4] Ibid, p. 151

One of the components like "other capital expenditure" is the expenditure which is not covered by any of the item mentioned. It includes the expenditure incurred on conversions of sugarcane fields into paddy fields, orchard land into wheat land on preparation of hedges, fences etc and other items of work undertaken for the permanent protection or improvement of the farm included here.

Limitations of the Data

The validity of any conclusion drawn from a comparative study obviously depends upon the extent of limitations. Among the limitations, we find from the AIDIS data are as follows.

Firstly these data relates to one year only and hence no time series analysis can be done with this data. Since the survey takes place deccennialy the comparison of the pattern of capital expenditure and capital formation at two or three points of time may not reveal the long time trends, which may be observed from the time series data.

Secondly there are a lot of factors, which influence the capital expenditure in different time periods like the capacity to save and spend by the rural households, level of consumption, vagaries of monsoon, farmers initiative and so on. These factors may lead to vary the level of capital expenditure in different time periods and in different places.

Thirdly, and more importantly, the comparison of the magnitude and pattern of capital expenditure of capital formation for three successive decades (1961,

1971, and 1981) is beset with difficulties arising out of the price changes over the decade. It calls for the readjustment of monetary values with the help of a deflator. The survey itself reports that a common deflator to readjust the value of assets in 1971 or 1981 at the level of their prices prevailing in 1961 may not serve the purpose in view of the marked difference in the rate of changes in prices of different assets of rural household. This would require special deflators for at least main group of assets, and since no such acceptable price deflator is available, the level of capital expenditure and capital formation in real terms is not attempted.

Analysis

At the outset the overall picture of capital expenditure in the rural sectors, for cultivators, non-cultivators and all rural household is summed up in table (1). The table reveals a comparative picture of the magnitude and pattern of capital expenditure in three successive decades, though the figures are not free from price changes over the periods, it represents a clear picture regarding this fact. During the period 1961-62, the total capital expenditure in all activities amounted to Rs 1102 crores out of which the cultivator household had a share of 92.3% and non cultivator households share the rest. In the farm business only the cultivator house hold accounts 69 percent. Both in the field of proportions of area reported and average value, the cultivator households dominated over the non-cultivators. The non cultivator households were rather interested in incurring expenditure on residential plots, houses and durable house hold assets.

TABLE : 1

CAPITAL EXPENDITURE IN FARM AND NON-FARM BUSINESS, RES.PLOTS AND HOUSE CONSTRUCTIONS.

ITEMS	ALL RURAL HOUSEHOLS				CULTIVATORS				NON-CULTIVATORS			
	A	B	C	D	A	B	C	D	A	B	C	D
FARM BUSINESS	52.2	106.4	730.2	66.2	66.7	139.5	702.1	69	12.2	15.4	28.1	33.1
NON-FARM BUSINESS	6.2	6.6	45.1	4.1	5.5	6.5	32.5	3.2	8.0	6.9	12.6	14.9
RESI. PLOTS	46.1	40.7	279.6	25.4	49.8	48.1	242.2	23.8	36.0	20.5	37.4	44.7
DURABLE H.H ASSETS	10.5	6.9	47.5	4.3	11.6	8.1	40.8	4.0	7.8	3.6	6.7	7.9
TOTAL			1102.4	100			1017.6				84.8	100
1971-72												
FARM BUSINESS	37.9	156.9	1209.0	60.7	48.6	205.6	1164.9	63.6	8.4	21.9	45	28
NON-FARM BUSINESS	6.5	15.3	118.0	5.9	6.0	16.8	95	5.2	7.6	11.3	23	14.3
RESI. PLOTS	30.7	65.4	504.3	25.3	34.0	77.1	437.2	23.8	21.5	32.8	67	41.6
DURABLE H.H ASSETS	17.7	20.9	161.3	8.2	18.7	23.8	135.1	7.4	15.1	12.8	26	16.1
TOTAL			1993.6	100			1832.2	100			161	100
1981-82												
FARM BUSINESS	39.1	346	3248	50.4	47.8	435	3116	52.8	11.54	59	132.5	11.1
NON-FARM BUSINESS	14.1	58	520	8.08	14.2	62	448.6	7.6	13.94	32	714.8	60.2
RESI. PLOTS & DURABLE H.H ASSETS	44.6	284	2666	41.4	46.9	325	2328	39.5	37	151	337.6	28.4
TOTAL			6434	100			5892	100			1184.9	100

Source : All India Debt and Investment Survey (AIDIS)

(A) Proportion of house hold reporting

(B) Average value per household (Rs.)

(C) Aggregate (in Rs crore)

(D) Percentage of the total.

There is an increase of about 66 percent in total expenditure on farm business in 1971-72 compared to 1961-62. This may be mainly due to various steps taken in the direction of Green revolution in the later half of the decade. But compared to 1971-72, the percentage increase is 167 percent during 1981-82. This is because the green revolution extended to almost all parts of the country, as a result of which the farmers have come forward and have applied scientific methods of cultivation, which initially require higher amount of costs. For all rural sector, the average expenditure per household in farm business rose from Rs 106 to Rs 157 in 1971-77 and further to Rs 346 in 1981. But for cultivator households, the quantum jump has become higher than that , it rose from Rs 139.5 in 1961 to Rs 305.6 in 1971 and further to 435 in 1981-82.

The second proposition is that, the proportion allocated in farm business has come down significantly. For all rural household category, the percentage share of expenditure in farm business was 66.2 percent came down to 60.7 percent in 1971 and further to only 50.4 percent in 1981. For cultivator household also the percentage decline is reported to be the same. On the other hand for non-farm business, the percentage allocation is on an increase. It is 4.1, 5.9 and 8.09 percent for three decades respectively. The third item residential plots constitute one forth of the total in 1961 and 1971 and it rose to 41.4 percent in 1981, the percentage of durable house hold assets was also shown an increase over the three decades.

Thirdly, most of the increase in expenditure on non-farm business was accounted by the rise in expenditure by cultivator households, which reflect

broadly the diversification by farmers into non-farm business. In the case of durable household goods, though both cultivator and non-cultivator households increased their share in total expenditure, the rate of accretion was higher in the case of non-cultivators than the cultivators.

Fourthly the proportions of household reporting capital expenditure has gone down over the period. It was 52 percent during 1961-62, came down to 37.9 percent in 1971-72 and has shown a marginal increase of 39.1 percent in 1981-82. This would indicate that a smaller proportion of households took the opportunity of Green Revolution, possibly due to a steep rise in the acquisition of assets by the rural households, as it has been marked that the average expenditure has remained higher after the green revolution period.

The above mentioned propositions led to the conclusion that, the rural households have diversified from farm business to non-farm business, so as to reduce pressure of population on land over the decades. And secondly the reduction in the proportion of household indicates that, despite increasing opportunities available under various agricultural development programmes, the number of rural households capable of taking the advantage of these opportunities were on the decline.

Statewise Trends

The state wise data on capital expenditure in farm business reveals wide differences among states over the two decades. The proportion of households reporting capital expenditure declined in almost all states in conformity with all India trends. (Table 2). Gujrat, Madhya Pradesh, Rajsthan did not show any

TAB: 2.

CAPITAL EXPENDITURE IN FARM BUSINESS, STATEWISE.

	1960-62		1971-72		1981-82		1961-62		1971-72		1981-82		1961-62		1971-72		1981-82	
	CULTIVATOR HOUSEHOLDS						NON-CULTIVATOR						ALL RURAL CULTIVATOR					
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
AND PRADESH	46.3	183.5	27.4	127.5	48 5	544	9 3	23.2	4.4	8.5	9 1	74	33.5	128	18.8	82 9	35	384
ASSAM	69.6	102.3	41.9	105.4	27.9	130	11.2	14.5	7	26.9	13.4	17	55.2	80 7	36	92	25.9	115
BIHAR	72.5	69.2	37.2	73 2	35.2	155	11.7	5.6	4.7	3.5	10.1	22	59 2	55.3	31.3	60.6	29.5	125
GUJRAT	64.4	202.1	63 9	373.1	45.5	534	4.1	5 2	8.4	36	11	10	44.9	138.6	43.9	251.4	38.4	427
J&K	44.6	95.7	71.1	154.3	70.6	600	10.7	71.6	5.9	16	35.9	367	41.6	93.6	67.9	147.6	64.8	561
KARNATAKA	74.7	272	58.5	373.3	49.8	796	17.5	17.8	12.8	22.6	8.8	86	59.4	204.1	44.6	268.5	39.6	620
KERALA	65.2	93 2	39.8	119.4	43.7	544	24.9	17.6	9.2	41.3	5.5	79	57.3	78.4	36.9	111.8	41.8	512
M.P.	63.2	111.7	59.9	223.6	60.7	361	10.4	6.7	9.3	22.8	8.7	41	52.1	89.3	51.7	190 9	50.3	297
MAHARASTRA	59.9	142.2	50	242	56.1	622	9	10.9	11.4	27.4	12.9	45	43.7	100.4	38.2	174.4	42	433
ORISSA	56.1	77.1	50.4	75.3	47.7	157	13	3.4	2.9	3.2	13.9	15	43.6	55.8	39.7	59	42.1	134
PUNJAB	80.1	289	71.7	1159.3	51.5	1437	18.8	42.2	17.5	80.5	16.1	129	54.9	187.6	44.9	618.5	38.5	956
RAJASTHAN	58.2	185.3	57.6	263.3	25.3	481	12.2	21.2	8.8	36	7.5	124	52.1	163.5	52.2	238.2	22.5	427
T.NADU	51.6	188.2	36.9	205.1	32.5	406	10	13.3	8.3	21.5	3.8	12	36.3	123.5	243	123.9	23.6	283
U.P.	83.2	135.3	51.9	187 4	65.1	471	15.6	22	8	17.5	20.2	70	69.7	112.7	42.7	151.7	55.4	385
W.BENGAL	65.5	59.7	52.9	131.7	42	173	12	7.5	8	8.9	7	15	49.5	42.5	38.2	9.4	34.5	139
ALL INDIA	66.7	139.5	48.6	205.6	47.7	435	12.2	15.4	8.4	21.9	11.5	59	52.2	106.4	37.9	156.9	39.1	346

SOURCE : AIDIS

Source: AIDIS

A: Proportion of Area Reported

B: Average value per household.

significant decline in 1971-72 as compared to 1961-62. Rajasthan has however shown a significant decline in 1981-82 compared to 1971-72. Andhra Pradesh, Kerala, Maharastra, Orissa, U.P. has shown an increase in the proportion of area reported in 1981-82 compared to 1971-72. Among the factors responsible for severe decline in 1971-72 are the natural calamities like drought conditions which prevailed in Maharastra and Andhra Pradesh and floods in Uttar Pradesh, Bihar and West Bengal in 1971-72, which might have affected adversely the level of income of cultivators and their ability to incur capital expenditure out of their savings. Secondly the steep rise in the price of farm inputs, particularly fertilizers, following a sharp increase in crude oil prices might be another contributory factor leading to lower proportion of households reporting investment expenditure during the year 1971-72. In the next decade however almost all states have maintain at per with the national level. As an exception, Jammu and Kashmir registered a substantial increase from 41.6 to 67.9 percent and maintained at the same level during 1981-82, possibly due to an impetus given to production of fruits and up keep of orchards and plantation by the state governments.

Punjab has been on the top in the average value per cultivator house hold in farm business, in three decades, it respectively being Rs 289, Rs 1160 and Rs 1437, followed by Karnataka, Andhra Pradesh and Maharashtra. However the non-cultivators in Jammu and Kashmir, have a much higher average value than the national average, followed by Rajasthan, Kerala, Karnataka.

Item wise Analysis

Table 3 reveals the average value and the percentage allocations of capital expenditure per cultivator household on different items. The average value per cultivator household for purchase of land has been increasing over time, the percentage allocation has remained almost stable, indicating that the price of land has been increasing and land as a scarce factor of production is fixed. The expenditure on reclamation of land after showing a marginal decline in 1971 rose significantly in 1981-82. In view of higher profitability of orchard and plantations, the cultivators increased their allocation on this item. The states which were responsible for most of the increase in expenditure under this head are Karnataka, Andhra Pradesh, Bihar, Punjab and Haryana.

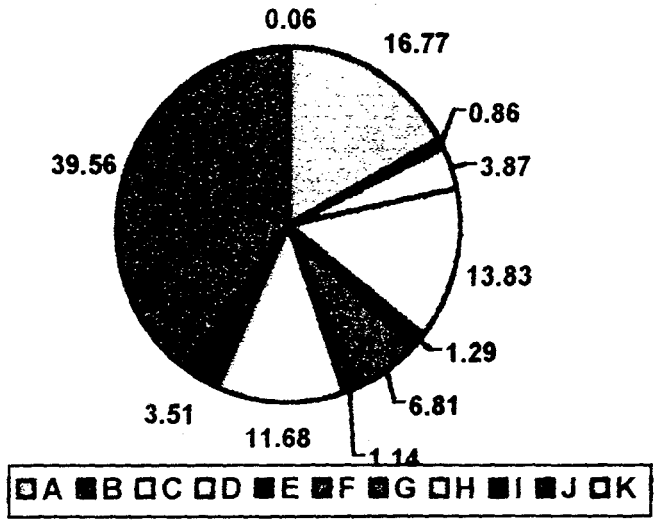
Item-Wise Capital Expenditure in Farm Business

Table No 3

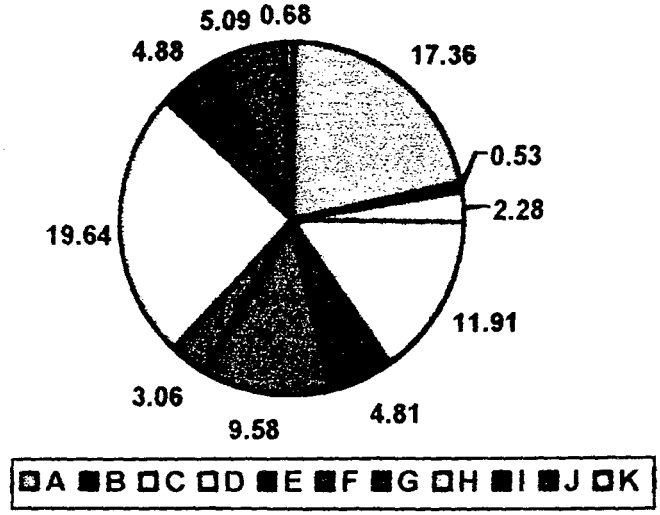
Items	Average value per cultivator household			% share of capital expenditure per cultivator household		
	1961-62	1971-72	1981-82	1961	1971	1981
Purchase of land (A)	23.4	35.7	56.7	16.77	17.36	12.87
Purchase of land rights (B)	1.2	1.1	1.4	0.86	0.53	0.22
Reclamation of land (C)	5.4	4.7	32.3	3.87	2.28	7.35
Bundling and other land improvements (D)	19.3	24.5	44.6	13.83	11.91	10.11
Orchards and plantation (E)	1.8	9.9	18.7	1.29	4.81	4.13
Wells (F)	9.5	19.7	35.0	6.81	9.58	8.04
Other irrigation sources (G)	1.6	6.3	16.9	1.14	3.06	3.67
Agr. Implements & machinery, transport equipments etc (H)	16.3	40.4	115.4	11.68	19.64	26.43
Farms house, barns (I)	4.9	10.4	16.2	3.51	4.88	3.67
Purchase of live stock (J)	55.2	51.6	90.4	39.56	25.09	20.68
Other expn. (k)	0.9	1.4	7.3	.06	0.68	1.68
Total	139.5	205.6	435.5	100	100	100

Source : AIDIS

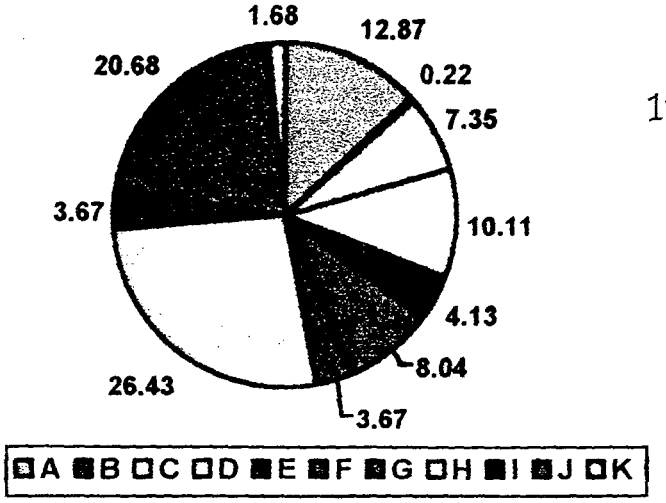
Share of Individual items of Gross Capital Expenditure in Farm Business, Cultivator Households



1961-62



1971-72



1981-82

Purchase of live stock in the expenditure head continued to dominate till 1971-72, thereafter agricultural implements, machinery and transport equipment topped in 1981-82. The capital expenditure on irrigation has increased significantly in all the decades. Though not in quantum, but percentage allocation has remained stagnant in 1981-82.

The overall figure of the Fixed Capital Formation in all Activities, of the Rural Household

Fixed capital formation represents, the proportions of capital expenditure leading to fixed asset formation. The All India Debt and Investment survey follows expenditure method in estimating the fixed capital formation in rural sector. Capital formations in all activities in rural sector is estimated to be Rs 348.6 crores during 1961-62(Tab 4). Of all the rural economic activity, the farm business shared 47.7 percent and the residential plots and house construction had a share of 43.5 percent. The fixed capital formations in non farm business had very little significance. The average value per rural household was almost the same in both farm business and residential plots in 1961-62. The non-cultivator households were more interested in residential plots and house constructions sharing 62 percent of the total fixed capital formation of all activities. The cultivator household had a share of 51.37 percent in farm business and a little less then that in residential plots and house constructions.

During 1971-72, the fixed capital formation rose to 472.0 crores compared to 348.6 crores in 1961-62. The cultivator household's capital formation jumped from 322.6 crore to 444.5 crore. The average value per rural house hold was

TABLE : 4

FIXED CAPITAL FORMATION IN FARM AND NON-FARM BUSINESS, RES.PLOTS AND HOUSE CONSTRUCTIONS.

ITEMS	ALL RURAL HOUSEHOLS				CULTIVATORS				NON-CULTIVATORS			
	A	B	C	D	A	B	C	D	A	B	C	D
FARM BUSINESS	18.1	24.3	166.8	47.7	23.3	32.7	164.7	51.37	3.6	1.1	2.1	8.0
NON-FARM BUSINESS	2.3	4.4	29.9	8.6	1.9	4.4	22.1	6.89	3.4	4.3	7.8	30.0
RES. PLOTS & HS.	4.2	22.1	151.9	43.7	4.7	27.0	135.8	42.10	2.7	8.8	16.1	61.9
TOTAL			348.6	100			322.6	100			26.0	100
1971-72												
	A	B	C	D	A	B	C	D	A	B	C	D
FARM BUSINESS	14.9	38.8	298.6	63.3	19.3	52.0	294.3	66.2	2.6	1.7	4.2	15.4
NON-FARM BUSINESS	2.2	7.5	57.6	12.2	1.9	8.5	47.1	10.6	3.0	5.1	10.5	38.4
RES. PLOTS & HS.	4.0	15.1	115.7	24.5	4.4	18.2	103.1	23.2	2.8	6.3	12.6	46.2
TOTAL			472.0	100			444.2	100			27.3	100
1981-82												
	A	B	C	D	A	B	C	D	A	B	C	D
FARM BUSINESS	5.2	392.0	1298.5	10.5	16.0	176	1265.9	37.6	3.1	14	32.3	10.0
NON-FARM BUSINESS	13.1	138.0	388.9	35.3	5.2	47	342.7	10.2	4.9	144	46.2	14.1
RES. PLOTS & HS.	9.2	213.0	1999.9	52.3	10.2	245	1757.5	52.2	6.3	108	242.4	75.9
TOTAL			3687.2	100			3366.19	100			320.0	100

Source : All India Debt and Investment Survey

A: Proportion of Household reported.
B: Average value Per household.
C: Aggregate (Rs. in Crore)
D: Percentage to the total.

almost doubled, but it fell in the case of residential plots and housing, indicating that they relied more upon farm business considering the gains of green revolution.

During 1981-82, there has been a substantial rise in the fixed capital formations of the rural household. For all categories the proportion reporting fixed capital formation increased at a faster rate over the decades. In fact the quantum of fixed capital formations in residential plots and housing over took to that of farm business, where in all times it was remaining below that. Exceptionally the non-cultivator took a share of 75.5 percent in this sphere. The percentage allocation in farm business by the cultivator households came down significantly from 66.2 percent in 1971-72 to 37.6 percent in 1981-82, but the average value per cultivator rose from Rs 52.0 to Rs 176 is 1981-82.

Thus over the decades there has been a considerable change in percentage allocation and average value per rural house hold in fixed capital formations. Particularly during 1971-72, the shift made to farm business but lost significance in 1981-82, when most of the households shifted their allocation to the non-farm business, residential plots and house constructions.

State wise :

The share of fixed capital formation in each state varies in different time periods. And this is an obvious consequence since the natural endowment, productivity, farmers incentive is different in different states. For the country as a whole, the fixed capital formation has increased from Rs 164.6 crore in

1961 to Rs 349.8 crore in 1971 and improved considerably during 1981 to Rs 1265.9 crore (Table 5) . The average value per cultivator household increased from Rs 32.7 to Rs 61.8 and further to Rs 176 in three consecutive decades. But the proportions of area reporting has been decreasing since 1961, indicating that Most of the cultivator household have preferred to incur expenditure on non-farm business over the time.

The share of each state in the total capital formation is presented in table 5. It is seen from the table that the highest share (12.8) percent of the total capital formation is contributed by Maharashtra followed by Karnataka (12.7) percent, Tamilnadu (12.6), Uttar Pradesh (11.7) and Andhra Pradesh (11.7). The lowest remains in the poor agricultural states like Bihar (3.1), Orissa (3.5), J&K (0.8) West Bengal (1.6). During 1971-72, the share picked up by Uttar Pradesh, (15.2), Punjab (16.8), Gujrat (11.8) and the states Tamilnadu, Karnataka, and Maharashtra which had topped in 1961-62 suffered a steep decline. And once again in 1981 Uttar Pradesh increased it's share (17.8) percent in total fixed capital formation, Punjab (9.7) suffered a distinct loss. The other states like Andhra Pradesh, Maharashtra, Kerala, and Rajashtan also picked up the share in 1981-82.

The average value per cultivator household in 1971-72 improved in almost all states except Orissa and Andhra Pradesh, both the states registered a negative growth (simple) rate during the period. Punjab, Gujrat, M.P. Rajasthan, U.P, and West Bengal were much higher than the All India growth rate of 89% in 1971-72 over 1961-62. During 1981-82, though the average value per

TABLE : 5
STATE WISE FIXED CAPITALFORMATION IN FARM BUSINESS
BY CULTIVATOR HOUSEHOLDS

STATE	61-62				71-72				81-82				61-71 #	71-81 #
	A	B	C	D	A	B	C	D	A	B	C	D		
ANDHRA	17.4	44.3	1810	10.9	9.6	29.9	1246	3.5	16.4	187	10485	8.3	-32	525
ASSAM	25.2	22.6	348	2.1	22.1	26.1	420	1.2	19	51	1083	0.8	neg	95
BIHAR	25.1	8.6	512	3.1	17.2	17.5	1283	3.6	10.6	43	3786	3	1.5	145
GUJRAT	23.8	79.8	1528	9.3	26	172.1	4140	11.8	17	327	9593	7.5	118	90
J&K	9.9	27.4	133	0.8	20.9	29.5	156	0.4	26.7	113	742	0.6	7	283
KARNATAKA	34.7	84.6	2093	12.7	32	101.4	2933	8.4	17.5	253	8814	6.9	19	149
KERALA	27.4	22.3	449	2.7	9.7	22.8	534	1.5	14.3	136	4356	3.6	3	496
M.P.	22.1	18.6	824	5	20.3	54.8	2711	7.7	21.8	151	8207	6.6	-194	175
MAHARASTRA	22.1	46.3	2119	12.8	18.4	81	3378	9.6	21.9	304	15097	11.9	74	275
ORISSA	36	24.6	586	3.5	22.4	16.9	481	1.4	26.2	38	1333	1.1	-31	124
PUNJAB	45.3	50.4	820	4.9	46	453.1	5893	16.8	29.2	915	12260	9.7	798	101
RAJASTHAN	16.4	27.2	738	4.8	23.2	70.8	1954	5.6	13	234	8868	7	160	229
T.NADU	22.5	60.5	2073	12.5	13.9	74.6	2666	7.6	13.2	164	7988	6.3	23	118
U.P.	25.2	20	1932	11.7	15.7	49.6	5340	15.2	12.4	178	22596	17.9	148	258
W.BENGAL	16.5	8.3	273	1.6	24.3	25.6	1045	2.9	13.5	54	3293	2.6	208	110
ALL INDIA	23.3	32.7	16469	100	19.3	61.8	34980	100	16	176	126594	100	89	184

A= Proporation of Household reporting , B= Avg. value per Rural cultivators(Rs) C= Aggregate Rs. lakhs, D= per cent of the total.
SOURCE: AIDIS
Growth Rate

cultivator household remained the highest in Punjab, Maharastra and U.P., the states of Andhra Pradesh, Kerala, J&K registered a steep hike in growth rate. Gujrat (90 percent), Assam (95 percent) remained lowest compared to the all India growth rate of 184 percent during 1981-82. One of the important feature is that, though the state Uttarpradesh had the highest shares in both 1971 and 1981, the average value per cultivator was lower than Punjab in 1971, and it was lower than many other states in 1981-82. This reflects the Population pressure in the state,resulting in a large number of cultivator households.

Item Wise

The percentage share of individual items of fixed capital formation of the cultivator households for three consecutive decades is presented in table 6. It is seen from the table that, the purchase of agricultural implements and machinery constituted the most important items of capital formation for all the decades, and it's share is also going to increase in successive time periods from 28.6 percent in 1961-62 to 43.2 percent in 1971-72, further to 46.56 percent in 1981-82. The increasing importance of farm equipments and machinery reflects the increased mechanisation in the country over the time. It also indicates the energisation of irrigation on the one side and betterment of middle and large farmers on the other. This major item is followed by investment in wells and other irrigation resources. This constitutes one fourth of the total in all time period. It's share however remains highest during 1971-72 i.e. 27.1 percent and showed a decline to 25.88 percent during 1981-82.

Share of individual items of Fixed Capital Formation in farm business All India - cultivator Households.

Table No 6

Item	1961-62	1971-72	1981-82
A	32.1	11.5	14.9
B	2.8	1.8	3.5
C	26.5	27.1	25.9
D	28.6	43.2	46.5
E	9.1	10.3	6.9
F	0.9	1.1	2.3
Total	100	100	100

Here:

A: Reclamation of land; new land brought under cultivation, major repairs and alternations, additions and new constructions.

B: Orchards and plantations.

C: Wells and other irrigation sources.

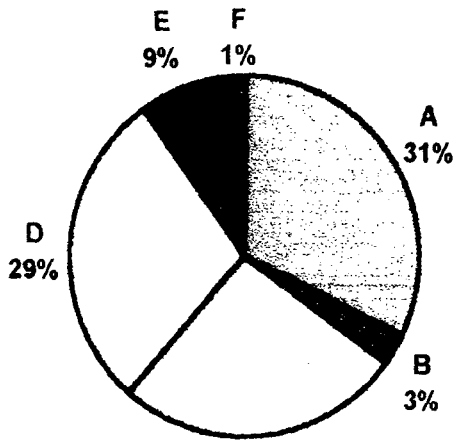
D: Agricultural implements; major repairs, new purchases, own production of implements.

(for 1961-71, it includes purchase of agricultural implements and machinery, traditional type and modern type).

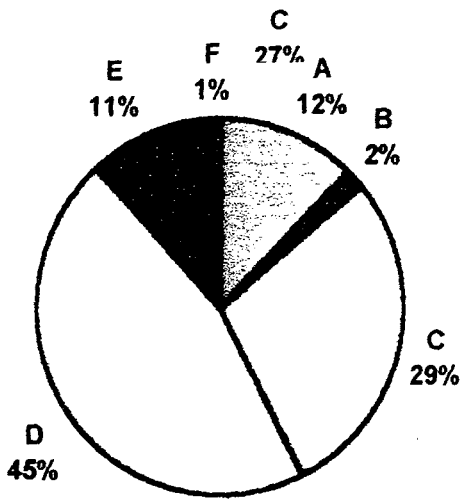
E: Farm building; New purchases, major repair and alternations, additions and new constructions.

F: Others;

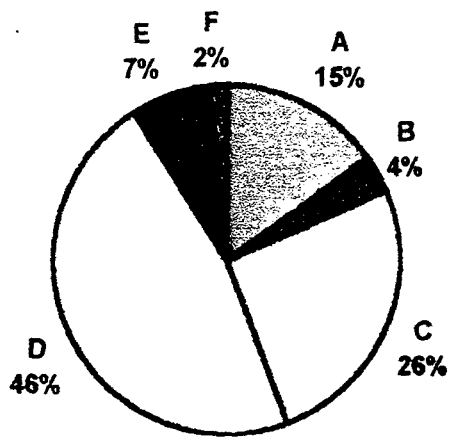
Share of individual items of Fixed Capital Formation in farm business All India – Cultivator Households.



1961-62



1971-72



1981-82

The next in importance is the reclamation of land in farm capital formation by the cultivator households. In fact it's share was the highest during 1961-62 and came down significantly in the successive time periods. This is followed by farm buildings, whose share remains highest (10.3 percent) in 1977-72 and came down to 6.89 percent in 1981-82. The percentage share of orchards and plantations improved considerably after a steep fall in 1971-72. And finally the share of "others" in fixed capital formation rose at a steady rate from 0.9 percent in 1961 to 11 in 1971 further to 2.3 percent in 1981-82

Thus the composition of individual items of capital formations in farm business indicates the increasing farm mechanization in Indian agriculture over the periods.

The investment on irrigation has shown a slight fall in 1980s. And the farmers had rather shifted their activities in other agri-business looking at the profit levels.

The state and item wise fixed capital formation (on the basis of share of individual items of the total in each state is presented in three tables (7,8,9) at three points of time.Table-10 shows highest and lowest states having fixed capital formation of cultivator households. This table gives a clear picture as to which items has got relative significance for which states and also represents the cropping behaviour of the individual states.

During 1961-62, in the states Orissa, Assam, Kerala, the cultivators allocated highest percentage on land reclamation, new land brought under cultivation, major repairs and additions and new constructions (Table 10). During 1971-72

TABLE : 10
HIGHEST AND LOWEST IN STATES ,THE SHARE OF INDIVIDUAL ITEMS IN FIXED CAPITAL FORMATION.

		1961-62				1971-72			1981-82		
(A)	LAND RECLAMATION										
	Highest	in %	Lowest	in %	Highest	in %	Lowest	in %	Highest	in %	Lowest	in %
	Orissa	83.8	Rajasthan	11.1	Orissa	53.7	U.P.	5.5	Orissa	43.9	U.P.	4.3
	Assam	67.2	Gujrat	16.3	Kerala	36.8	Gujrat	6.4	Gujrat	37.5	Haryana	4.9
	Kerala	38.7	Punjab	17.9	Assam	30.8	Punjab	8.2	Karnataka	24.4	Punjab	8.3
(B)	ORCHARDS AND PLANTATION											
	Kerala	23.2	And.Prd	0.1	Assam	15.9	Rajasthan	0.1	Kerala	43.3	Gujrat	0.5
	Kernataka	9.7	Rajasthan	0.2	Kerala	13.6	Gujrat	0.2	Assam	19.9	Punjab	5.3
	J & K	6	Gujrat	0.2	J & K	8.2	T.Nadu	0.4	WB	8.6	Haryana	5.5
(C)	IRRIGATION											
	Rajasthan	45.5	Orrisa	3.6	Punjab	52.9	J&K	1.5	Maharashtra	45.5	J & K	0.1
	Maharastra	35.4	W.Bengal	3.7	UP	49.7	Assam	3.9	Bihar	40.7	WB	5.3
	Bihar	34.7	Assam	10.1	Rajasthan	49.2	Orrisa	6.1	Rajasthan	39	Orrisa/Assam	5.5
(D)	AGRICULTURAL IMPLEMENTS AND MACHINARIES											
	Gujrat	54.6	J&K	1.3	Gujrat	55.1	Assam	17.6	Punjab	68.9	Kerala	10.8
	Punjab	46.8	Assam	2.5	Punjab	52.9	Orrisa	19.8	UP	68.4	Assam	17.3
	Tamilnadu	36.8	Orrisa	8.6	UP	49.7	J&K	23.1	Haryana	67.1	Orrisa	23.9
(E)	FARM BUILDING											
	J & K	61.8	T.Nadu	3.1	J & K	49	And.Prd	3.6	J & K	36.9	Gujrat	0.5
	W.B	42.4	Orrisa	3.9	Assam	31.3	T.Nadu	4.5	Assam	33.4	Maharastra	1.9
	Punjab	17.9	Karnataka	5.8	Punjab	13.8	Bihar	5.2	WB	26.4	Haryana	2.5
(F)	OTHERS.											
	Kerala	3.3	Orrisa	0.1	Karnataka	2.9	U.P.	0.1	Assam	9.1	M.P.	0.2
	Tamilnadu	2.8	Maharastra	0.3	Gujrat	2.5	And.Prd	0.1	WB	4.7	Him.Prd	0.3
	Assam	2.3	U.P.	0.2	J & K	1.8	Assam	0.5	Maharashtra	3.3	Gujrat	0.7

source : AIDIS

also they kept it up registering in top three. In the subsequent decade Orissa still being in the top position, but the other two ranks were taken by Gujrat and Karnataka. It is important to note here is that the farmers in Gujrat were allocating very low percentage on this item than the previous decade.. However the percentage allocations on this item has shown a declining trend in the successive decades by almost all states. Punjab and U.P., have taken very little interest in investing on land reclamation at all time periods.

The percentage share of fixed capital formation on orchards and plantations is the highest in states like Kerala, Assam, Jammu and Kashmir, Karnataka and West Bengal. During 1981-82, Kerala had a share of 43.22 per cent on orchards and plantations. The farmers in states of Rajasthan and Gujarat had a very low share of their investments on orchards and plantations.

Coming to irrigations (wells and other irrigation sources), which is the most important factor in agricultural development shared mostly by the cultivators in Rajasthan, Punjab, U.P and Maharashtra. The share of these four states is a little less than 50 per cent. And in the agriculturally less developed states like Orissa, West Bengal, Assam, Jammu and Kashmir, the cultivators had a very little share on irrigation as far as fixed capital formation is concerned, these states have kept low at all time periods. Agricultural implements and machinery had been seen taking a dominating share in total fixed capital formations in farm business of the cultivator households. In this item also the agriculturally developed states like Gujarat, Punjab, Tamil Nadu, U.P, Haryana had registered highest percentage for all time periods. And again poor states like Assam, Orissa and Jammu and Kashmir kept low share at all time periods.

However J&K, Assam, West Bengal were on top of the list in fixed capital formation on farm buildings, barns and cattle sheds.

As it is seen in table 6 that the percentage share of fixed capital formation of cultivator households on reclamation of land is declining and agricultural implements and machinery are taking its place. Keeping this in mind it is important to analyze which are the states mainly responsible for this movement. The tables 7,8 and 9 reveal that, during 1971, among the states mainly responsible for decline in investment on reclamation of land are Andhra Pradesh, Assam, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu and U.P. And there are only two states West Bengal and Bihar where farmers have increased their share on this item. It's share again fell marginally from 16.5 per cent in 1971 to 14.8 in 1981, West Bengal, Assam, Orissa are the states which have contributed to a fall in the share. Another item is the agricultural implements and machinaries which is reported a steady growth over the period of analysis. Here the farmers in almost all states raised their share on this item. Exceptionally Jammu and Kashmir showed a steep hike in the share from only 1.3 per cent in 1961 to 23.1 per cent in 1971, and further to 45.43 per cent in 1981. Fixed capital formation on irrigation fell marginally between 1971 to 1981, after a near constancy between 1971 and 1961. The farmers in the states of Gujarat, M.P, Punjab and Uttar Pradesh are responsible for a decline in the share. And by the way other states Maharashtra, Bihar, Rajastan marked highest in 1981-82 as far as percentage share of irrigation in fixed capital formation is concerned.

TABLE : 7

STATE WISE AND ITEM-WISE PERCENT SHARE OF FIXED CAPITAL FORMATION (1961-62) OF CULTIVATOR - HOUSEHOLDS

STATES	A	B	C	D	E	F
ANDHRA .PR.	34.0	0.1	26.3	33.0	6.6	na
ASSAM	67.2	3.5	10.1	2.5	14.2	2.5
BIHAR	25.7	0.9	34.7	26.6	12.1	na
GUJARAT	16.3	0.2	19.1	54.6	9.4	0.3
J & K	20.7	6.0	10.2	1.3	61.8	na
KARNATAKA	35.3	9.7	26.4	21.8	5.8	1.4
KERALA	38.7	23.2	10.0	15.8	9.0	3.3
M.P	40.3	neg	33.3	16.3	8.1	2.0
MAHARASHTRA	36.7	1.2	35.4	19.1	7.2	0.4
ORISSA	83.8	neg	3.6	8.6	3.9	0.1
PUNJAB	17.9	0.4	17.0	46.8	17.9	neg
RAJSTHAN	11.1	0.2	45.5	35.1	7.7	0.3
TAMIL NADU	21.2	1.1	35.0	36.8	3.1	2.8
UTTAR. PR.	31.4	2.5	26.2	26.4	13.3	0.2
WEST BENGAL	25.7	4.7	3.7	20.2	42.4	2.3
ALL India	32.1	2.8	26.5	28.6	9.1	0.9

Source : All India Debt and Investment Survey

TABLE : 8

STATE WISE AND **ITEM-WISE PERCENT SHARE OF FIXED CAPITAL FORMATION (1971-72) OF CULTIVATOR-HOUSE HOLDS**

STATES	A	B	C	D	E	F
ANDHRA.PR.	19.7	0.6	39.3	36.5	3.6	0.3
ASSAM	30.9	15.9	3.9	17.6	31.3	0.5
BIHAR	29.6	3.3	16.9	45.7	5.2	1.2
GUJARAT	6.4	0.2	28.3	55.1	7.5	2.5
J & K	16.5	8.2	1.5	23.1	49	1.8
KARNATAKA	34.2	3.3	18.4	36.1	5.2	2.8
KERALA	36.8	13.6	12.6	25.8	10.0	1.2
M.P	18.1	neg	40.4	32.0	8.5	1.0
MAHARASHTRA	19.3	4.3	36.0	28.7	1.3	0.4
ORISSA	53.7	8.9	6.1	19.8	8.6	0.9
PUNJAB	8.2	0.2	23.4	52.9	13.8	0.5
RAJSTHAN	11.9	0.1	31.8	49.2	6.2	0.8
TAMIL NADU	14.1	0.4	36.2	44.2	4.5	0.7
UTTAR. PR.	5.5	0.8	28.2	49.7	13.7	0.1
WEST BENGAL	30.8	4.1	8.9	44.0	11.2	1.0
ALL INDIA	16.5	1.8	27.1	43.2	10.3	1.1

Source : All India Debt and Investment Survey

TABLE : 9

STATE WISE AND ITEM-WISE PERCENT SHARE OF FIXED CAPITAL FORMATION (1981-82)

STATES	A	B	C	D	E	F
ANDHRA.PR.	13.4	1.8	35.9	41.4	5.3	1.9
ASSAM	14.9	19.9	5.2	17.3	33.4	9.1
BIHAR	24.8	0.9	40.7	25.4	5.5	2.5
GUJARAT	37.5	0.2	23.3	37.6	0.5	0.7
J & K	10.9	4.3	0.1	45.4	36.9	2.2
KARNATAKA	34.5	5.59	10.4	32.8	4.4	3.2
KERALA	24.4	43.3	13.4	10.8	5.7	2.1
M.P	12.9	0.6	35.7	47.9	2.6	0.2
MAHARASHTRA	20.6	2.0	45.5	26.4	1.9	3.3
ORISSA	43.9	6.2	9.5	23.9	13.9	2.5
PUNJAB	8.3	0.3	10.2	68.9	9.1	3.0
RAJSTHAN	10.7	0.1	38.5	42.3	4.9	3.3
TAMIL NADU	17.9	3.2	39.1	35.0	3.1	1.4
UTTAR. PR.	4.3	0.7	13.5	68.4	11.9	1.1
WEST BENGAL	14.6	8.7	5.3	40.2	26.5	4.7
ALL INDIA	14.8	3.5	25.9	46.5	6.9	2.4

Source : All India Debt and Investment Survey

To conclude this section, in almost all states a major shift took place from investing on land reclamation to agricultural implements and machinery in three successive time periods. Jammu & Kashmir always topped in the list in investing on farm houses and buildings - Orissa, Assam, and Kerala used to invest more on reclamation of land and new land was brought under cultivation. And this is an obvious reason to undertake investment particularly on this item in Hilly and coastal areas. But in other items the farmers of these states kept low. On the other hand the farmers of Punjab, Haryana, U.P, Gujarat shared maximum on those items which are very essential for agricultural productivity growth and development.

COMPARISON OF GROSS CAPITAL EXPENDITURE AND FIXED CAPITAL FORMATION IN INDIAN RURAL SECTOR ; 1961, 1971, 1981

The 'expenditure method' as adopted by All India Debt and Investment Survey in measuring fixed capital formation in the rural sector includes the expenditure of a capital nature which directly contributes towards augmenting the productive capacity of household in the rural economy. The maintenance expenditure, purchase of land and land right and loss caused to fixed assets due to natural calamities have been excluded in the measurement. From this angle it is interesting to see what percentage of capital expenditure is going for fixed asset formation in the rural household sector, and how it varies in successive decades.

TABLE : 11
PERCENTAGE SHARE OF FIXED CAPITAL TO GROSS CAPITAL EXPENDITURE

	ALL RURAL HOUSEHOLDS			CULTIVATOR HOUSEHOLD			NON-CULTIVATOR		
1961-62	A	B	C	A	B	C	A	B	C
Farm business	730.2	166.8	22.8	702.1	164.7	23.4	28.1	2.1	7.4
Non farm business	45.1	29.9	.2	32.5	22.1	68	12.6	7.8	61.9
Residential plots & house constr.	279.6	151.9	54.3	242.4	135.8	56	37.4	16.1	43
1971-72									
Farm business	1209	298.6	24.6	1164.9	294.3	25.2	44.9	4.2	9.3
Non farm business	118	57.6	48.8	95	47.1	49.5	23	10.5	45.6
Residential plots & house constr.	504.3	115.7	22.9	437.2	103.1	23.5	67	12.6	18.8
1981-82									
Farm business	3248.1	1298.3	39.9	3116	1265.9	40.6	13.5	32.3	24.3
Non farm business	520	388.4	74.7	448.6	342.7	76.3	714.8	46.2	6.4
Residential plots & house constr.	2666.3	1999.9	75	2328.7	1757.5	75.4	337.6	242.4	71.9

SOURCE :AIDIS

A: Gross Capital expenditure (Rs. in Crores)
B: Fixed capital formation (Rs. in Crores)
C: % of Fixed capital formation to Gross Capital expenditure.

During the decade 1961-62, the cultivator households had 23.4 percent of fixed capital formation to the total capital expenditure (Table 11). The non-cultivators had a share of only 7.4 per cent indicating that they were not interested in fixed asset formations in farm business during 1961-62. But both the cultivators and non-cultivators had a major share in non-farm business, rather than on the farm business i.e., to the extent of 68 and 62 percents respectively. For residential plots and house constructions, the shares were little below the non-farm business.

In the next decade i.e., after the Green Revolution both the cultivator and non-cultivator households increased their percentage share compared to the previous decades, and reduced the same in non-farm business. As it is seen in table 11, that the cultivators' share got reduced from 68 percent in 1961 to only 49.5 per cent in 1971-72, and for non-cultivator household it reduced from 62 per cent to 46 per cent. And again the share of cultivator households in residential plots has been marked to have increased considerably in 1971-72.

During 1981-82 also the cultivator households raised the percentage of fixed capital formation to the gross capital expenditure and at the same time the share also increased in other items. On the other hand the non-cultivator households raised the same in farm business and residential plots with a marked reductions in non-farm business. Thus to be more precise after the great breakthrough in Indian agriculture in mid sixties the rural cultivator households, both cultivator and non-cultivator have accumulated more fixed capital assets in farm business, and during 1981-82, in residential plots and house constructions.

T ABLE :12
STATE WISE PERCENTAGE OF FIXED CAPITAL FORMATION TO GROSS CAPITAL EXPENDITURE, (ALLOCATED BY CULTIVATOR HOUSEHOLD)

YERA→	1961-62			1971-72			1981-82		
	A	B	C	A	B	C	A	B	C
STATES ↓									
AND. PRADESH	183.5	44.3	24.1	127.5	29.9	23.2	544	187	34.3
ASSAM	102.3	22.6	22.1	105.4	26.1	24.7	130	51	39.2
BIHAR	69.2	8.6	12.4	73.2	17.5	23.9	155	43	27.7
GUJRAT	202.1	79.8	39.5	373.1	172.1	46.1	334	322	96.4
J&K	95.7	27.4	28.6	154.3	29.5	19.1	600	113	18.8
KARNATAKA	272	84.6	31.1	375.3	101.4	27.1	796	253	31.7
KERALA	93.2	22.3	23.9	119.4	22.8	19.1	544	136	25
M.P.	111.7	18.6	16.5	223.6	54.8	24.5	361	151	41.2
MAHARASTRA	142.2	46.3	32.5	242	81	33.5	622	304	48.8
ORISSA	77.1	24.6	31.9	75.3	16.9	22.4	157	38	24.2
PUNJAB	289	50.4	17.4	1159.5	453.1	39.1	1437	915	63.6
RAJASTHAN	185.3	27.2	14.6	263.3	70.8	26.9	481	234	48.6
T.NADU	188.2	60.5	32.1	205.1	74.6	36.4	406	164	40.4
U.P.	135.3	20	14.7	187.4	49.6	26.4	471	178	37.8
W.BENGAL	59.7	8.3	13.9	131.7	25.6	19.4	173	54	31.2
ALL INDIA	139.5	32.7	23.4	205.6	61.8	30.1	435	176	40.4

SOURCE : AIDIS

Note : A= Average value of per cultivator household (Gross capital expaenditure)
B= Average value per cultivator household (Fixed capital formation)
C= Per cent of fixed capital formation to gross capital expenditure

The state wise percentage share of fixed capital formation in total gross capital expenditure shows (table 12) that, the state of Gujarat reported the highest allocations which are 39.48, 46.12 and 96 percent respectively in the successive decades, followed by Punjab and Maharashtra. But the allocations remained lowest in states like Assam, Bihar, Jammu and Kashmir, Kerala and Orissa. However Orissa and Jammu and Kashmir were above the national level in allocation for fixed asset formations, both might be gearing in land reclamation and orchards and plantations. During 1961-62, Tamil Nadu, Maharashtra, Karnataka and Gujarat were the other states which were above the national average during the same period. And states like Gujarat, Maharashtra, Punjab, Tamil Nadu were above the national average during 1971-72 and during 1981-82, it were Rajasthan, Gujrat Haryana and Punjab.

The Capital Expenditure and Capital Formation According to Size of Asset Group

The growth and development of Indian Agriculture exhibits many inter-regional and inter-personal inequalities, which came about by a difference in the pattern of land holding, asset possession and endowment of natural resources for different persons and regions. As we saw in the previous analysis that the developed states like Punjab, Haryana, U.P, Gujrat and Maharastra have gained all the governmental development programme to their fullest extent in terms of maintaining their investment in the farm business. On the other hand the agriculturally poor states like Assam, Orissa, West Bengal have always lagged behind. The marginal and small farmers in these states have thus rarely benefitted from the green revolution of 1965. The inability in making

investment expenditure in these states truly reflects the extent of inequality in the possession of land and other productive assets. And even if the land reform programme has started since long, the pattern of land holding has been rarely affected. In the context, the study of capital expenditure in farm business by different asset groups of farmers will be useful.

The comparison of inequality as far as investment in different asset groups is however not free from limitations. Firstly the cultivators according to asset groups are divided into four groups during 1971-72, according to the data available, where as during 1981-82, they are divided into eight categories. Secondly, the lack of a suitable deflator to give a real picture, and obviously it is a very difficult task since various groups of farmers and different items of investment like irrigation, land, livestock have different price indices. But an overview of the extent of ineqality different asset groups and different items of investment may obviously be found.

For examining the relative performance of different groups of cultivator households (tab: (13) in capital expenditure in farm business, the households have been divided into four groups on the basis of ownership of assets. Cultivator households, the value of whose assets did not exceed Rs 2500 forming 18.5 percent of the total number of cultivator have been termed as marginal cultivators. Those assets worth Rs 2500 to Rs 5000 have been clubbed as very small cultivators. The next group is that of called small cultivators with assets between Rs 5000 to Rs 10,000 and those with Rs 10,000 or more formed large cultivators.

During 1971-72, a total of 557 lakh farmers reported a total capital expenditure of 1165 crores which works out to Rs 205 per cultivator households. 59.8 percent cultivators belongs to the assets group within Rs 10,000 and the rest 40.2 percent cultivator were termed as large farmers,owning assets of more than Rs 10,000.

Asset Groupwise Gross Capital expenditure and Fixed Capital Formation All India Cultivator household

Table No 13

Asset Group(Rs)	A	B	C	D	E	F
Marginal farmers (0-2500)	10319	18.5	1.2	3.0	4.0	33.4
Very small farmers (2500-5000)	10128	18.1	2.6	6.4	8.9	72.3
Small farmers (5000 - 10,000)	12900	23.1	9.0	12.8	24.4	114.9
Large farmers (10,000 & above	22422	40.2	87.2	77.8	135.7	404.3
Total	55769	100	100	100	62.8	205.6
Gini coefficient			0.6613	0.5770	0.5936	0.4624

Source : AIDIS

Here

A: No. of cultivators

B: Percentage cultivators in asset groups

C: percentage share of cultivators in total fixed capital formation

D: Percentage share of cultivators in total capital expenditure

E: Amount of Fixed Capital per cultivator households (Rs)

F: Amount of Gross Capital Expenditure per cultivator households (Rs)

The comparison of capital expenditure by different groups of cultivator households, reveals that the marginal farmers having assets less than Rs 2500 incur an expenditure of merely one sixth of the national average of Rs 205; and one fifteenth of the total fixed capital formation on per household basis. Whereas the large farmers shared more than two to three times the average figure. Consequently out of the total expenditure of Rs 1165 crores, marginal farmers accounted for 3.0 percent of the total but the large farmers had a share of 77.8 percent. In the case of fixed capital formation, the gap is wider than that of capital expenditure and therefore the inequality seems to be higher (calculated on the basis of Gini coefficient) in accumulating fixed capital in farm business. It works out to be 0.5936 in fixed capital formation and 0.4624 in gross capital expenditure. And there is an obvious reason, for higher ineqality in fixed capital formation per cultivators, with such a large proportions of household having low assets, that too with very small share of productive assets and low average capital expenditure we cannot expect enough earning by them to build up capital. However if the expenditure calculated on per acre basis, the expenditure of the marginal farmer would not be less than the large farmers, because of their small piece of land they would also have tried their best to raise higher productivity or supplement their activities like livestock rearing and investing in orchards and plantations. The point will be more clear in Table 14 where both item wise and asset group wise distribution is presented.

Share of each items in farm business in total expenditure of cultivator Households and the level of inequality

Table No 14.

Item	Marginal farmers assets upto 2500	Very smal farmers 2500-5000	Small farmers 5000-10000	Large farmers 10,000 and above	Gini coefficient
A: Purchase of land	18.0	25.4	17.1	16.7	0.0875
B: Purchase of land right	0.3	0.8	0.2	0.6	0.2660
C: Land Reclamation	3.8	2.0	2.6	2.2	0.1368
D: Bunding and other land improvement	16.0	12.6	15.0	11.2	0.0767
E: Orchards and plantations	7.3	5.8	3.7	4.8	0.1366
F: Wells	2.7	5.0	7.2	10.6	0.2540
G: Other irrigation resources	1.2	1.1	1.0	3.6	0.2863
H: Agricultural Implements, machinery Transportation etc.	7.3	9.0	13.7	22.0	0.2347
I: Farm houses, barns, golas & cattle sheds	3.8	3.8	4.5	5.3	0.0748
J: Purchase of livestock	39.0	34.0	34.1	22.4	0.0990
K: Others	0.6	0.5	0.7	0.7	0.0770
	100	100	100	100	

Source : AIDIS

It is seen from the table that, the marginal farmers reported relatively larger shares in respect of purchase of land (18 percent), bunding and other land

improvements (16.0 percent), orchards and plantations (7.3 percent) and the purchase of livestock (39.0 percent. On the other hand the large farmers had relatively larger shares in wells and other irrigation sources (14.2 percent) and in agricultural implements and machinery (22.0). It thus follows that the pattern of capital expenditure of large farmers vis-à-vis the very small farmers was such that the large farmers spent relatively larger proportion of their expenditure on items which improve productivity of land to make them still richer, and the marginal farmers spend a larger proportion on items which help to supplement their earnings.

During 1981-82, the cultivators have been grouped into eight categories, from within one thousand to above five lakh. This is because as the time goes on the income level of the cultivator is on the increase. There were only 26.25 percent households under the asset group of Rs. 10,000, in 1980-81 compared to 40 percent in 1971-72 (tab.15)

Secondly, it can be marked from the table (15) that, the cultivators of asset group of Rs 10,000 had a share of only 2.8 percent of total capital formation and 6.3 percent of gross capital expenditure in 1981-82 compared to 12.8 percent and 36.3 percent respectively in 1971-72. This indicates that the average cultivators have become poorer in 1981-82, though the aggregate level of income has risen over the decade.

Asset Group wise farmer's gross/fixed capital formation in 1981-82

Table No 15.

Asset Group	A	B	C	D	E	F
Upto 1000 (Rs)	11,276	1.57	0.28	0.10	3.21	28.13
Rs 1000 – 5000	80,684	11.27	1.05	2.13	16.46	82.52
5000 – 10000	95,989	13.41	1.63	4,03	21.48	137.11
10000 – 20000	14,8223	20.71	5.36	8.97	45.83	188.69
20000 – 50000	20,6589	28.87	16.16	20.51	79.03	309.45
50000 – 100000	99,963	13.97	18.41	20.75	233.19	647.76
100000 –500000	69,604	9.72	47.45	36.78	862.99	1648.61
500000 and above	3,204	0.44	9.89	6.61	3910.33	6437.54
All asset groups	71,5534	100	100	100	176	435
Gini coefficient			0.5814	0.5025	0.7769	0.7174

Source: AIDIS

For ABCDEF... See Page 64

Thirdly, the asset holding and the investment per cultivator has a positive relationship, meaning thereby that, as the asset holding of the cultivator rises, the investment level is also rising. However the asset group owning more than five lakhs had a low percentage share for both fixed capital formation and gross capital expenditure, though the average value is many times higher than the other group of cultivators. This indicates, the proportion of cultivators in this group is very little, amounting to only 0.44 percent.

Fourthly, between the allocations of fund for fixed capital and capital expenditure, the inequality is marked higher in former. This was also a fact in 1971-72, which holds true in 1981-82 also, where the lower income groups are

not capable to accumulate fund for fixed capital formation in the farm business.

The asset group wise and item wise distribution of capital expenditure and capital formation for 1981-82 is presented in table 16 and 17 respectively. Table 16 reveals that capital expenditure on land reclamation and purchase of livestock is the highest in the lowest asset groups. The expenditure on orchards and plantation and agricultural implements and machinery is marked highest for highest asset groups i.e. having assets of more than five lakhs. The percentage expenditure on wells and other irrigation sources is the highest in the asset group between 1 lakh and 5 lakhs.

The inequality in capital expenditure on items such as purchase of land rights, well and other irrigation sources, agricultural implements and machinery have kept intact in 1981-82. The only item agricultural implements and machinery, where the inequality has been reduced compared to other items, indicates that the increasing farm mechanization has affected almost all groups of cultivators.

In the case of fixed capital formation, the middle farmers have accumulated most of the share for almost all items. The first two lowest groups, have hardly accumulated assets in wells and other irrigation sources. They have rather got the highest share in investments on improvement of land. The inequality is found to be lowest in accumulating funds for agricultural implements and machinery, and is the highest on heads like other expenditures, farm buildings and irrigation resources. This is clearly evident in table (17).

ASSET GROUPWSISE CAPITAL EXPENDITURE OF CULTIVATORS, 1981-82

Table No 16.

Items / Asset Group(Rs)	A	B	C	D	E	F	G	H	I	J	K
Upto 1000	8.44	0	20.34	4.66	2.19	0.20	0.04	9.98	0.07	54.04	0.03
1000-5000	17.10	2.68	12.83	11.06	1.23	2.02	0.16	14.33	4.64	33.0	0.93
5000-10000	26.63	0.09	7.16	8.22	1.44	2.33	0.74	11.79	2.80	35.65	3.14
10000-20000	9.72	0.13	11.21	10.56	2.80	6.58	2.19	13.22	3.12	36.77	3.69
20000-50000	9.74	0.58	8.30	14.08	2.81	8.21	2.81	20.32	4.11	27.31	1.71
50000-100000	16.64	0.25	6.48	12.25	3.68	8.93	4.06	20.30	4.75	21.09	1.56
100000-500000	13.19	0.16	6.86	7.90	4.00	9.09	5.17	35.78	3.08	13.31	1.42
500000 – above	5.88	0.39	3.99	5.85	17.35	6.67	5.06	44.70	4.01	5.76	0.35
Total	13.02	0.33	7.43	10.25	4.30	8.06	3.87	26.50	3.72	20.77	1.70
Gini Coefficient	0.2454	0.6329	0.2589	0.1840	0.4582	0.3246	0.4387	0.2869	0.2167	0.2737	0.4097

Source : AIDIS

The items A,B,C,D,E .. . mentioned in page 66

Asset Group Wise Fixed Capital Formation of Cultivator Households, 1981-82

Table No 17.

Asset Group	A	B	C	D	E	F
Upto 1000 (Rs)	42.45	8.37	0	48.61	0.49	0.05
Rs 1000 - 5000	41.08	3.21	10.22	22.80	18.95	3.71
5000 - 10000	24.36	2.39	17.23	38.98	12.95	4.06
10000 - 20000	21.44	7.66	40.27	10.28	11.08	9.25
20000 - 50000	19.51	3.31	30.28	35.82	7.94	3.13
50000 - 100000	19.38	3.58	31.69	34.13	9.14	2.06
100000 - 500000	11.38	1.95	24.13	55.55	0.05	1.91
500000 and above	10.08	7.33	16.62	59.57	5.86	0.51
Total	14.84	3.48	25.86	46.56	6.89	2.34
Gini Coefficient	0.2584	0.2776	0.3199	0.2269	0.3244	0.4478

Source: AIDIS

for ABCDEF... See page 56.

CONCLUSION

The analysis of private investment in Indian agriculture for three consecutive decades reveals big changes over the period, accompanied by the presence of wide interstate and interpersonal differences. The average value of gross capital expenditure per rural cultivator household has been increasing since 1961, but the proportions allocated to farm business have come down indicating that the cultivator household have diverted their economic activities to non-farm business. And the proportions of households reporting capital expenditure has shown a marginal decline indicating that not all the farmers had taken full advantage of developmental programme in Indian Agriculture. The developed states, have reported highest investment expenditure compared to the less developed states. In all the decades the state of Punjab has been the top in the list, followed by Karnataka, Tamilnadu, Gujrat, Andhra Pradesh and Maharashtra where as Assam, Orissa, Bihar and West Bengal always lagged behind. The regional distribution of fixed capital formations is also not very much different with that of gross capital expenditure.

The itemwise and statewise analysis of investment in agriculture reveals that, the developed states have registered the highest on items like irrigation, agricultural implements and machinery which are necessary for agricultural growth and development. On the other hand the poorer states have relied on traditional inputs, though the increase in the share on modem inputs is very slow. Orissa, Kerala and Assam have taken highest shares particularly on land reclamations, considering the land conditions in these states and that of Jammu and Kashmir on farm building and housing by virtue of it's specialisation, in all the decades. Nevertheless, almost all states have increased the share of their investment expenditure on modern farm equipments and machinaries in the farm business

over the two decades. But the private investment on irrigation after picking up in 1971-72, have remained almost stagnant in 1981-82.

The issue of inequality in the level of investment by different asset group of cultivator households reveals that investment expenditure rises as the size of asset group increases. And the higher asset group have dominated over the main groups of investment, whereas the lower assets group of farmers have relied upon the purchase of livestock. The inequality calculated on the basis of gini coefficient is found to be more on fixed capital formation rather than on gross capital expenditure, which indicates that the poor farmers having low assets and less investment could not be expected to build sufficient amount of capital in farm business.

CHAPTER - IV

DETERMINANTS OF PRIVATE INVESTMENT IN INDIAN AGRICULTURE

INTRODUCTION

According to the theory of investment, the decision to invest in a new capital asset depends on the expected rate of return on investment. If the expected rate of returns exceeds the cost of capital used, then investment will be a worthwhile proposition and vice versa. However, uncertainties about the expected return and investor's risk taking capabilities render investment decision truly a complex one. Compared to industrial sector, where the proposed investment theory mostly applicable, the complexities rise manifold in the case of private investment in agricultural sector. Various reasons may be put forward for this complexity. Firstly in industrial sector, the past rate of return on capital serves as a good guide to the investors. There is day to day maintenance of record regarding the costs and returns of the factors. But in the agricultural sector, the farmers (mostly small farmers) make things going without keeping the past records and having any future expectations. Secondly, the year to year fluctuations in farm production caused by fluctuating weather makes the farm product price fluctuate time and again. Since agricultural price serves as an important incentive for investment, the fluctuations in it, in a given period may fluctuate the level of investment in that period. Thirdly in a subsistence farming, the farmers use own human and bullock labour without resource to financial institutions. They usually borrow funds from the village

moneylenders, who charge high rate of interest. Thus for many farmers the access to institutional credit is not still good. Thus these are the reasons that prevail in Indian agriculture, make the investment behaviour of the Indian farmers a complex one.

With the introduction of new technology in mid sixties, the Indian agriculture has been on the threshold of a change from subsistence to scientific farming. As far as the third factor (use of human labour and dependence on village money lenders) is concerned, the nationalisation of commercial banks in 1969 and the extension of rural credit have reduced the dependence on informal credit society by the farmers. Public sector has also been playing an important role in terms of investing in irrigation system, soil conservation measures and research extensions facilities. These sorts of direct investments have induced to undertake investment by the farmers at individual farm level. Therefore, the areas of decision making of the Indian farmers has got broaden which was limited in a traditional farming set up. The farmers have to choose between the types of inputs, he will be using in production and he has also to study the market in order to get the best possible prices for his produce. Here comes the importance of government's price support programme, provision of input subsidies and government investments on agriculture and infrastructure sectors, that can be motivated through farmer's lobby.

The twin factors determining agricultural investment

There are many factors responsible for agricultural growth and investment. All of them can be analytically divided into two categories namely ''price and non-

price factors"[1] . The price factor includes farm's output and input price. Farm's output price is the price received by the agricultural sector from the rest of the economy. This is called the terms of trade index. Favourable terms of trade are envisaged to impel farmers to invest more in agriculture because it tends to increase the overall return of the investment. On the other hand, unfavourable terms of trade tends to diminish the overall return. This would however be so especially when farmers perceive some sorts of permanence in favourable terms of trade. In other words it has to be remain favourable for some years in a row. If the farmers experience a favourable terms of trade in one year and unfavourable in the subsequent years, then the investment and out put response may be changing. As far as the input price is concerned, the farmers would tend to invest more when the input price like wages, interest rates, price of fertilizer and irrigations kept low. (However it may happen that the high wage rate impels the farmers to adopt farm mechanisation). The role of government on this regard has been outstanding. As a measure of indirect farm investment, the government has been increasing the input subsidies on irrigation, fertilizer, power etc. so that private investment could be stepped up.

The various non-price factors determining private farm investment are (a) Technology; which comes from both public and private investments. Biotechnology holds the key on this regard. (b) Institution; Institutional credit, land and tendency reform belong to the realm of institution which positively encourage investment in Indian agriculture. Institutional credit has been

[1] Dhawan B.D.; "Trends and Determinants of Capital Investments in Agriculture" IJAE,Vol.51,No:4.,Oct-Dec,1996.

serving as the fuel of agricultural investment and growth. The spread of institutional credit facilities to the rural areas have no doubt created a positive environment to undertake investment in terms of getting credit at a lower cost and saving the farmers from the hands of village moneylenders. On the other hand the tenancy reforms, land consolidations work affected private investment positively. (c) Thirdly, the government investment in agriculture and infrastructural sector, covering investment on watershed development programmes, irrigation works, establishment of regulated market, rural electrifications, road and transport are the most important factors inducing the private capital formation in Indian agriculture. (d) The other factors are the soil and weather condition, level of industrialisation also affects private investment in agriculture sector.

The present chapter is concentrated to discuss a few determinants of private investment in Indian agriculture,with the help of multiple regression analysis. Among all these factors, only three important independent variables have been taken. These are institutional credit flow to agricultural sector, public investment in Indian agriculture and the price of agricultural product relative to manufacturer product. All the variables are deflated at 1980-81 prices and then converted into log term. The data relates to 34 years period from 1960-61 to 1993-94. The whole period is also divided into two sub periods i.e., 1960-61 to 1979-80 and 1980-81 to 1993-94 in order to show the effectiveness of independent variables at the two different time periods. Thereafter the multiple regression analysis for the state wise cross sectional data has also been made, in order to determine the behaviour of private fixed capital formations of the

cultivator households of 17 states. The analysis pertains to the period 1971-72 and 1981-82.

EMPIRICAL FINDINGS:

The multiple regression equation for the whole period 1960-61 to 1993-94 is found as :

$$PSCF = 0.23 + 0.17\ (PUB\text{-}INV) + 0.59\ (AGR.\ CREDIT) + 0.26\ (AGR.PRICES)$$

$$(1.40) \qquad (4.46)^{***} \qquad (2.96)^{***}$$

$R^2 = 0.83 \qquad \bar{R}^2 = 0.81 \qquad n = 34.$

Here,

PUB.INV: Public investment in Indian agriculture.

AGR.CREDIT: Flow of institutional credit to agriculture.

AGR.PRICES: Price index of agricultural product relative to industrial product, at 1980-81 price. PSCF : Private Sector Capital formation

The above equation reveals that the explanatory variables are able to explain the dependent variable at the order of 83 per cent and all the regression coefficients have expected signs. The two variables viz. agricultural credit and agricultural price are statistically significant at 1 per cent level. Among the three variables the role of institutional credit in enhancing private investment is significant, which suggests that, credit does have an indirect role in promoting growth through increasing private capital formation in Indian agriculture. The

*, **, *** , ** , * represents Significant at 1%, 5% and 10% respectively. Figures in the parantheses are 't' values. This holds same for other subsequent equations.

next importance is the price received by the agricultural sector from the manufacturing sector, indicating that favourable prices to the farmers have induced them to invest more in their farm operations. Public investments in the agricultural sector for the whole period have also a contributory role in enhancing private investment. The elasticity of private investment with respect to public investment is found to be 0.17. One of the earlier study by National Council of Applied Economic Research (NCAER) the elasticity was found to be 0.26 for the period 1960-61 to 1989-90. Thus even if the elasticity is found to be positive, it is less than unity. A rupee of public investments have induced to undertake private investments worth of 17 paise.

The equation for 1960-61 to 1979-80 :

PSCF = -1.05 + 0.55 (PUB.INV) + 0.23 (AGR. CREDIT)

(3.70) *** (1.51)*

+ 0.39 (AGR. PRICES)

(7.05) ***

$R^2 = 0.95$ $\bar{R}^2 = 0.94$ n = 20

The equation reveals that, the independent variables are able to explain as much as 95 per cent of the variations in dependent variable. All the regression coefficients have shown positive signs which are expected. The role of public investment and agricultural price is stronger during this period. Agricultural credit has also played a significant role to enhance private investment. Infact from 1960-61 to 1980-81, the private investment has gone in line with the

public investment. In other words the complementary effect is stronger during this period. The investment elasticity is found to be 0.55. So far as the agricultural price is concerned, during this period the farmers have enjoyed a favourable terms of trade with the manufacturing sector. (During 1967-68 to 1978-79 the terms of trade was favourable to agricultural sector)[3] .The farmers thus realising the expected returns, they have tended to invest more in their farm business. The regression coefficient for agricultural credit is of the order of 0.23 which also indicates a stronger positive role of the independent variable on private capital formation for the period 1960-61 to 1979-80.

The equation for 1980-81 to 1993-94 :

PSCF = 7.64 - 1.18 (PUB. INV) - 0.45 (AGR. CREDIT) +0.02 (AGR. PRICES)

(-4.87) (-1.58) (0.10)

$R^2 = 0.79$ $\bar{R}^{-2}$ 0.72 n = 24

The above equation suggests a negative correlation of the private capital formation with the public investments and institutional flow of credit at the order of -0.84 and -0.76 respectively and with the agricultural price it is 0.035. The explanatory variables are able to explain 79 per cent of the variations of the private investments. The regression coefficient has high negative sign for the public investment (-1.18) during this period indicating that, the proposed hypothesis of complementarity between public and private investment has been refuted after 1980. This is also evident from the graph in the second chapter, where the movement of the two series have taken place in a

[3] Mishra V.N. and Hazell, P.B.; "Terms of Trade, Rural Poverty,Technology and Investment ". The Indian Experience ,1952-53 to 1990-91. EPW,March 30,1996.

different direction. Public investments have fallen sharply from 1796 crore during 1980-81 to 1153 crore in 1993-94, at constant prices. In fact there was a negative growth of public investments during this period whereas private investments have shown a rise, though slower than before. It was 2840 crore in 1980-81 and rose to 3885 crore in 1993-94. As it was concluded in Chapter 2, that during the period i.e., after 1980 the resources were mainly diverted to current account expenditure in the form of input subsidies to the farmers. This has supported to build up capital formation in the private agricultural sector. The low cost of input has led to increase production and productivity in the agricultural sector, which have helped them to finance their farm business.

The flow of institutional credit to the agricultural sector also bears a negative relationship with the private farm investment. The institutional credit here is taken as the summation of both co-operative and commercial bank Credit offered to the Indian farmers. During the late 80s and early 90s, the flow of credit has fallen in real terms. But the private sector investment did not show any decline during the same period. This may also happen that at times when the farmers are not sufficiently availed with the institutional credit, they have tended to invest and run their farm business from their own resources. Secondly, it could be inferred that, the major part of institutional term credit during this period does not get translated into investment for a variety of reasons such as repayment of part loans and diversion to consumption.

The price of agricultural product with respect to manufacturer product also reveals a weak relationship with the private investment, though not negative,

during 1980s. The simple reasoning is that, the terms of trade had moved against agricultural sector from the industrial sector, which was not sufficient enough to get an incentive for further investment. ":Unfavourable terms of trade for agriculture will reduce agricultural surplus, discourage private investment and increase the intensity of rural poverty, and the favourable terms of trade will increase income, encourage investment and reduce rural poverty".[4] The excessive flow of agricultural subsidies during 1980s helped the farmers to reduce cost and increase production. Therefore the increased production have not received sufficient returns so as to enhance their level of income.

The statewise cross sectional analysis

The statewise cross sectional analysis of the determinants of private fixed capital formation has also been made for the year 1971-72 and 1981-82, separately, as the data revealed by All Indian Debt and Investment Survey (1971 and 1981). The survey held once in ten years and the latest survey pertains to 1991-92. But unfortunately the reports for this year are not yet available, thus our analysis of the determinants of private fixed capital formation is based on 1971-72 and 1981-82 data. The interregional variations of the private fixed capital formation has already been discussed in the previous chapter, where it is seen that the concentration of investment has mostly taken place in the well developed regions. The extension of investment stimulus, natural factors like rainfall and soil condition and infrastructure for

[4] Banarjee Amalesh; "Dynamic Captial Formation in Agriculture and Financial Reform". IJAE.Vol.51,No:4 Oct-Dec,1996.

investment are not homogeneous across the states. It is therefore essential to see what are those major determinants for the inducement of private investment in various states. The six independent variables are taken for the purpose of the analysis. And multiple regression analysis has been applied to study those determinants.

The six independent variables are:

(1) Institutional credit (co-operative and commercial bank) per cultivator households (CREDIT).

(2) Preference for fixed capital formations (percentage of fixed capital to the Gross Capital Expenditure) (PREFERENCE).

(3) Normal rainfall of a state (RAINFALL).

(4) Net state Domestic product, per rural household in the agricultural sector (AGR. INCOME).

(5) Net irrigated Area as a percentage of state's gross cropped area (IRRIGATION).

(6) Percentage of area under HYV seeds (HYV).

(7) FCFPC: Fixed Capital Formation Per- cultivator

The empirical findings for cross sectional data

During 1971-72, the private fixed capital formation is well correlated with the institutional credit (0.66), preference (0.68) and agricultural income (0.71). And with the irrigated areas and areas under HYV seed the coefficient of

correlation is found to be very weak. The normal rainfall of the state (-0.73) is however negatively correlated with the private investment.

In he multivariate analysis for 1971-72 the following equation is found.

FCF?C= 2.02 + 0.12 (CREDIT) + 0.17(PREFERENCE)

(0.90) (1.34)

-0.60 RAINFALL + 0.25 (AGRICULTURAL INCOME) - 0.42(IRRIGATION)

(-4.67) *** (1.94)* (-3.26)***

+ 0.58 (HYV)

(4.75)***

$R^2 = 0.93$ $\bar{R}^{*2} = 0.89$ n = 17

It is clear from the above regression equation that institutional credit both from co-operative and commercial bank agricultural income and extensions of HYV seeds have significantly contributed to the private fixed capital formation in Indian agriculture. But the normal rainfall and irrigation development (mostly public canal irrigations) have a negative impact on the private fixed capital formation.

The analysis for 1980-81 reveals the same result except a few deviations. The preference for acquisition of fixed capital and agricultural income happened to play an increasing role during this period, showing high correlation i.e 0.84 and 0.83 respectively. Irrigations and areas under HYV seeds still remains weakly correlated with private capital formation. And the normal rainfall

during 1981-82 also negatively correlated with the private capital formation across the states.

The regression equation for the period 1981-82 is :

FCFPC = -5.09 + 0.19 (CREDIT) + 0.40 (PREFERENCE)
(1.56)* (2.95)**

- 0.04 (RAINFALL) + 0.54 (AGR. INCOME) - 0.06 (IRRIGATION) + 0.11 (HYV)
(-0.42) (4.37)*** (1.07) (-0.65)

$R^2 = 0.92$ $\bar{R}^2 = 0.87$, n=7

The estimated regression equlition has pretty high R^2 value and expected signs of the six regression coefficients. But only three variables are statistically significant. The result shows that, during this period, institutional credit, preference, agricultural income and area under HYV seeds also have increasing positive role in enhancing private fixed capital formation. The rest two variables have still negative impact on the private investments. But it is to be noted that, compared to the regression coefficients of normal rainfall (-0.65) and irrigation development (-0.68) in 1971-72, the coefficients have increased to -0.04 and -0.06 respectively during 1981-82. This indicates that even the high rainfall states have tended to improve their investments on fixed capital during 1981-82, compared to the earlier decade.

The negative relationship between the private fixed capital formation and normal rainfall across the states suggests that, the farmers located in low rainfall regions tended to have higher fixed capital formation per cultivator

than their counterparts in high rainfall states. This is evident from the data itself that, during 1971-72 (tab-1), the states Assam (0.023), Bihar (0.013), Himachal Pradesh (0.023), Kerala (0.008), M.P. (0.044), Orissa (0.011), West Bengal (0.009), UP (0.040) have lowest ratio of Private fixed capital formation per cultivator with respect to the normal rainfall of a state in terms of millimeter. On the other hand the relatively low rain fall regions like Rajsthan (0.162), Haryana (0.364), Punjab (0.714), Karnataka (0.126), Gujarat (0.193) have the highest ratio. This negative relationship between fixed capital formation percultivater and normal rainfall, thus signifies that, the farmers in low rainfall regions have invested more on private means of irrigation like wells, tube wells, pump sets, electricity etc. this may also be concluded and as Dhawan[5] finds that ''the development of infrastructural facilities and institutional credit tends to be lower in high rainfall regions than in the lower rainfall regions.'' The negative relationship between the extension of irrigations facilities and normal rainfall also found to be negative which is an obvious consequence.

The private fixed capital formation per cultivator household across the state is also found to be negatively related with the extension of irrigation facilities, measured by the net irrigated area as a percentage of states cropped area. During 1971-72 the states like Gujarat (12.28), Karnataka (7.76), Maharashtra(10.01),Rajasthan(5.07),M.P(6.11), are having less irrigation facilities. The farmers in those states have invested more on fixed capital. The

[5] Dhawan.B.D. "Trends and Determinants of Capital Formation in Indian Agriculture,"" IJAE,Vol.51.No.4, oct-dec,1996.

TABLE : 1

RATIO OF FIXED INVESTMENT TO NORMAL RAINFALL AND AREA IRRIGATED (1971-81)

STATES	1971-72		1981-82	
	A	B	C	D
ANDHRA.PR	0.01	1.11	0.21	5.66
ASSAM	0.01	1.04	0.022	2.42
BIHAR	0.013	0.58	0.033	1.13
GUJRAT	0.193	12.28	0.361	6.7
HARYANA	0.364	6.29	0.931	10.68
HIM.PRD.	0.233	2.05	0.057	6.43
J&K	0.051	0.72	0.102	2.62
KARNATAKA	0.126	7.76	0.566	10.07
KERALA	0.008	1.15	0.048	12.36
MADHYA PR.	0.044	6.11	0.124	12.58
MAHARASTRA	0.094	10.01	0.348	27.63
OSISSA	0.011	1.13	0.026	2
PUNJAB	0.714	6.36	1.543	11.29
RAJASTHAN	0.162	5.06	0.456	12.31
T.NADU	0.077	1.74	0.161	3.48
U.P.	0.04	1.02	0.139	3.23
W.BENGAL	0.009	0.96	0.025	2

A=Ratio of Fixed Investment to normal Rainfall(mm),1971-72;
B=Ratio of Fixed Investment to the area irrigated(1971-72);
C=Ratio of Fixed Investment to Normal Rainfall(mm)1981-82;
D=Ratio of Fixed Invesment to the area irrigated (1981-82)

Source : AIDIS,CMIE & STATISTICAL ABSTRACT.

reverse is the case in the states Andhra Pradesh (1.11), Assam (1.04), Bihar (0.58), J&K (0.72), Kerala (1.15), Orissa (1.13), UP (1.02), West Bengal (0.96), where the farmers have less investment on fixed capital by virtue of the requisite rainfall and extention of canal irrigation facilities.

This sort of investment behaviour remained more or less same during 1981-82, though the magnitude of fixed capital formation had increased considerably compared to the earlier decade. But the regression coefficients of normal rainfall & irrigation development during 1981-82 found to be higher than that of the 1971-72, though in both time periods they were negative. This shows that the high rainfall states have improved their investments on fixed capital formation on private irrigation, agricultural implements and machinaries etc to a great extent. . This can be evident from the table where the ratio of private fixed capital formations to normal rainfalls and net area irrigated have increased in almost all states. The increase is private fixed investment during 1981-82 in some states, despite the availability of public canal irrigations could be attributed to the substitutional effect of both the components" Dhawan[6] (96) argues, "the very history shows, in the later stages of canal development the farmers had renewed in developing their own means of irrigation, especially in wells. Uncertainty of canal supplies and risk avoidance through a supplementing source of irrigation was admittedly an important consideration".

[6] Dhawan B.D; "Relationship Between Public and Private Investment in Indian Agriculture with Special Reference to Public Canals."" IJAE,Vol.51,No 1 and 2, Jan-June,1996.

Conclusion

To conclude this section, the Private Sector capital formation in Indian Agriculture is positively induced by the public sector investment, flow of institutional credit to agriculture and the price received by the agricultural sector from the manufacturing sector, during the 34 years period i.e. from 1960-61 to 1993-94. But following the declining trends of public sector investment during 1980s, the private sector investment didn't shown any decline . It has a moderate increase though not faster than the earlier decades. The complementarily relationship of both the sets of investment has been refuted in this period. In the face of declining institutional credit to agricultural sector in real terms during the late 80s, it could not contribute sufficiently to the private sector capital formation. The policy implications emerged from this analysis are that, the government should enhance it's investment programme on irrigation works, orchards and plantations, encouraging production of agricultural implements and machinery etc., so that private sector investment could be stepped up. Had the huge amount of expenditure on input subsidies during 1980s been diverted to the direct investment programme, then the private investment would have increased as much faster as it had during the same period. On the other hand institutional credit facilities should be extended to rural areas accompanying with necessary agricultural infrastructures. And the price policy of the government should be such that it would support the farming community.

The cross sectional analysis also reveals that agricultural income, credit intake, preference for fixed capital and the percentage area under HVV seeds have positively enhanced to build private fixed capital formation. The farmers in the high rainfall states and with having extensive irrigation facilities did not opt for private fixed capital formation. But in the later years they had shown an increasing interest on the same. As a matter of risks and uncertainties the farmers in these states have incurred investment on private means of irrigation like pumpsets, well, tube well, etc. and at the same time on other fixed capital assets.

CHAPTER V

CONCLUSIONS

In this study, an attempt has been made to examine the trend of public and private Investment in Indian agriculture since 1960-61. Besides this, the compositions and the determinants of private investment have also been discussed . The trend reveals that there was a clear decline of investments in Indian agricultural sector during 1980s. The nature of such a decline in the investment was largely attributed by a fall in the public sector investment, which registered a negative growth (-4.32) during the same period. In the previous two decades i.e. in 1960s and 1970s, the rate of increase of the public investment had remained satisfactory, the annual compound growth rate remained more than 5 percent. At the same time the private investment had also shown an increase at the rate of 3 and 8 percent receptively. However during 1980s, the steep fall in the public investment in Indian agriculture did not induce to decline in the private investment. The latter grew at the rate of around 2 percent during the same period. Therefore the "complementarity" of both the sets of investments has been refuted, as it had in the previous two decades. The increase in private investment, despite a fall in the private investment has come about mainly because a large proportion of the total resources flow to the agricultural sector were diverted to current account expenditure. The government relied on short term gains of the farmers in terms of providing them huge input subsidies rather than investing on agricultural infrastructures. Therefore the impetus given to the farmers have helped them to raise production and productivity and consequently it has positively affected

to build up capital formation. As far as the relative share of public and private capital formation to the total in agricultural sector is concerned, the latter shared two third and kept on maintaining at the same rate. During early nineties, the share moved upto a little over 80 percent. Conversely the share of public sector capital formation hovered in between 20 to 30 percent since 1960-61.

The share of capital formation in Indian agriculture, in relation to GDP originating in this sector and gross capital formation of the economy, was also marked to have declined during 1980s. The share in relation to the former had remained a high of 14 percent in 1979-80, came down to 7 and a half percent during the last three years fo the decade 1980s. The share of public sector capital formation in relation to GDP in the agricultural sector remained between 2 to 4 percent in all the decades but it has come down to a little over one and half percent in the first half of ninities. So far as the share of gross capital formation in agriculture to the gross capital formation of the whole economy is concerned, it was around 14 percent during the first half of the 60s, which reached it's peak in 1968-69 to 21.84 percent and there after it has managed to reach only upto 19.07 in 1979-80. But it has recently slid down to only 8.94 percent in 1994-95. Thus from what ever angle we view, the capital formation in Indian agriculture has slowed down during 1980s.

However, despite the fall in the capital formation during eighties, the capital use efficiency has been on the increase, calculated on the basis of the reciprocal of Incremental Capital Output Ratio. The period between 1961-62 to

1968-69, the ICOR was 6.65and between 1968-69 to 1978-79 it was 3.62,conversely the reciprocal of ICOR were 0.15 and 0.27. But the period between 1979--80 to 1989-90, the ICOR was 2.41 and it's reciprocal was 0.41. Therefore the efficiency of capital use measured on the basis of reciprocal of ICOR, has been highest during 1980s compared to earlier decades. This is because, during 1980s, the increase in output had come about by the increase in productivity, which is inturn a consequence of government expenditure policy on input subsidies favouring the farming community at a large scale. Therefore during this period, even if there was a fall in capital formation in the agricultural sector, the output response was quite high .

The compositions and asset group wise distributions of private fixed capital formation for the year 1961,1971 and 1981 reveals a wide fluctuations among the different regions and different group of farmers. According to the availability of data, the fixed capital formation of both cultivator and non-cultivator households in their respective business has been made as a part of analysis. It is found that, in all the decades the cultivator households have dominated over the non-cultivator households as far as capital investment on farm business is concerned. But during 1981-82, the porportion of capital expenditure on farm business with respect to the total capital expenditure has gone down. The proportion was 69 percent in 1961-62, came down to 63 percent in1971-72 and further to 52 percent in 1981-82. This indicates that the proportionate expenditure on non- farm business had increased and that was mostly accounted by the cultivator households. This broadly reflects the diversification by the farmers into non-farm business.

The percentage allocations of capital expenditure on different items reveals that the average value of expenditure per cultivator houehold on land has been increasing, but the percentage allocations has remained almost constant. This indicates price of land has been increasing and land, as a scarce factor of production is fixed. The expenditure made by the cultivator households on the purchase of livestock has been reducing and increasingly replaced by the expenditure on agricultural implements and machinaries over the three decades.

Fixed capital formation, defined as the proportion of capital expenditure leading to fixed asset formation has also shown a considerable variations over the three decades. During 1961-62, of the total fixed capital formation of the rural sector, the farm business had a share of 47.7 percent, where as the residential plot and house construction had a share of 43.57 percent. In the next decades the, i.e in 1971-72 the share had increased to 63.3 percent on the farm business and decreased to 24.5 per cent on the residential plots and house constructions. But during 1981-82 the shift has made to non-farm business, residential plots and house construction. The non-cultivator households were more interested on residential plots and house construction sharing 63 percent of the total fixed capital formation of all activities and further to 79 percent in 1981-82. The cultivator's share on the farm business was 51.37 percent in 1961-62, rose to 66.2 percent in 1971-72, but further declined to 37.6 percent in 1981-82. The share of fixed capital formation as residential plots and house constructions had rather increased during 1981-82 by the cultivator households.

The item wise analysis of fixed capital formation in three successive decades reveals that the proportion of agricultural implements and machinary by the cultivator households constituted the most important item of capital formation in the three successive decades. It's share has been increasing from 28.6 percent in 1961-62 to 43.2 percent in 1971-72 and further to 46.56 percent in 1981-82 . However during 1961-62, the proportion of reclamation on land was the important item bythe cultivator household . having 32.1 percent of the total. The next -important item after agricultural implements and machinery was well and other irrigation sources, though it's proportion had shown a slight decline during 1981-82.

The analysis of state wise and item wise fixed capital formation in Indian agriculture represents the investment behaviour of the individual state. During 1961-62, the cultivators in three states Orissa, Assam, and Kerala had highest percentage allocation on reclamation on land. They kept it up in 1971-72 also. But in the subsequent decade i.e . in 1981-82, Orissa still had a big share and the other the ranks were taken by Gujarat and Karnataka. The states like Kerala, Assam, Jammu and kashmir, Karnataka and West Bengal had highest percentage allocations on orchards and plantations. The investment on irrigation was mostly shared by the cultivators of Rajasthan, Punjab, U.P and Maharshtra. And finally,the farmers in the states Punjab, Tamil nadu, Haryana, U.P and Gujarat had highest percentage allocations on agricultural implements and machinaries. However, the broad conclusion of the analysis is that, the percentage share of fixed capital formation of cultivator households on reclamation on land has been declining and the agricultural implements and

machinaries has been taking the place. Secondary the relatively developed states like Punjab, Haryana, U.P, Gujarat, shared maximum allocations on those items, which are essential for agricultural growth and development .

The preference for fixed capital, measured by the percentage of fixed capital formation to the gross capital expenditure reveals that , the interest for investing on fixed capital came particularly after the green revolution period. Both cultivator and non-cultivator households raised the percentage share in farm business during 1971-72. And this sort of investment behaviour also remained same during 1981-82. Among the states, which have highest allocations on fixed capital formation are Gujarat, Punjab, and Maharshtra and the allocations remained lowest in states like Assam, Bihar, Jammu&Kashmir, Kerala and Orissa.

Besides the interregional inequalities of private investment in Indian agriculture, the interpersonal inequalities (Measured on the basis of Gini Coefficient) among different categories of households has been discussed. However while comparing the ineqalities of investment, at two point of times, the rate of the change of price has been ignored,this is because a uniform price indices can't serve the purpose for different categories of asset holders. During 1971-72, out of the total capital expenditure, the marginal farmers having assets between (Rs 0-2500) accounted only 3.0 percent where as the large farmers, within the asset group of (Rs.10,000 and above)had a share of 77.8 percent during the same decade. But in the case of fixed capital formation the gap is wider than that of capital expenditure, therefore the inequality seems to

be higher in accumulating fixed capital on farm business. The value of Gini Coefficient works out to be 0.5936 in fixed capital formation and 0.4624 in gross capital expenditure. Thus the higher inequality in fixed capital formation may be due to the fact that the small farmers having very low asset holding and that with a very low average capital expenditure, they canot be expected enough earnings to build up capital. But the small farmers had higher allocations of fixed capital formation in the purchase of land, bunding and other land improvements and the purchase of live stock. On the other hand the large farmers had shown higher allocations on the purchase of agricultural implements, machinaries and irrigation resources. This suggests the proposition that the patterns of capital expenditure between both the categories was such that the large framers spent relatively larger proportions on those items which improve the productivity of land and marginal farmer spent a large proportions on the items which help to supplement their earnings. During1981-82, the cultivator households within the asset group of Rs 10,000 had a share of only 2.8 percent of the total fixed capital formation and 6.3 percent of gross capital expenditure compared to 12.8 percent and 36.3 percent respectively in 1971-72. This indicates that the inequalities of capital investment by the cultivator households in the subsequent decade have increased. However in the both the decades, the common propositions are that the pattern of asset holding and capital investment by the cultivator households are positively related. Secondly the inequality in marked higher in the acquisition of fixed capital assets. Thirdly the pattern of investment has

favoured to the large farmers to raise their productivity , where as in the case of small farmers, just to supplement their earnings.

In the last chapter, the determinants of private investments in Indian agriculture has been discussed. It is seen from the analysis that the dependent variable i.e private investment is positively induced by the public sector investment , flow of institutional credit to agricultural sector and the price received by the agricultural sector from the manufacturing sector, for the 34 years period i,e from 1960-61 to 1993-94 . the elasticity of private investment with respect to public investment is found to be less than unity i.e 0.17. The role of public investment on Indian agriculture has become stronger from 1960-61 to 1979-80, when the elasticity was 0.55 but the period between 1980-81 to 1993-94 the elasticity came out to be negative . Therefore it can be concluded that, the complementarity relationship between private and public investment in Indian agriculture had stronger till 1981-82, but it has been refuted after 1981-82. During 1980s the public investments had shown a steep fall , but private investment has registered a moderate increase. The expenditure policy of the government was such that it did not leave much room for raising public investment but rather helped to enhance private fixed capital formation. The regression coefficient of agricultural credit has also shown a negative sign during 1980s . This might have come about due to the fact that, the flow institutional credit has declined in real terms during 1980s and the major parts of the institutional credit did not get translated into investment. The price received by the agricultural sector from the manufacturing sector had all

time played a major contributing role to enhance private investment, though it's role was stronger prior to 1980-81.

The state wise cross sectional analysis of the determinants of private fixed capital formation reveals that agricultural income, credit intake by the cultivator households , preference for fixed capital and the area under HYV seeds have positively encouraged to build up private fixed capital formation. But the cultivators in states receiving high rain fall and having extended irrigation facilitates have not had more fixed capital formation compared to their counterpart in low rainfall states and having less irrigation facilities in both the decades. However during 1981-82, the cultivator households, even if having irrigation facilities and receiving high rainfall, they have shown an increasing interest on fixed capital formation interms of investing on private means of irrigation and other agricultural implements and machinaries.

The policy implications emerged from the analysis are that the public investment in Indian agriculture, largely confined to major and medium irrigation projects, should now be diversified in high valued short gestation project. Infrastructure, technology, energy, marketing, communications are the important areas which call for extensive public investment for diversified agricultural production. The higher private investment and agricultural growth could also be achievable through investing on vigorous research and development effort. And these sorts of public investment should be diversified to different regions, crops and activities so that surplus vis-a-vis the employment and income could be generated to the poor mass of the rural

communities. At the same time the institutional credit facilities should be extended to the remote areas, so that the poor cultivators will be saved from the usurious practice of the village moneylenders. The excessive flow of resources to current account expenditure has to be reduced through reducing expenditure on subsidies and the resources should rather be diverted for direct investment programmes, which will have a long term benefit to the farmers. And finally the positive regression coefficient of the relative price of agricultural product to the manufacturing product suggests that the price needs to be strengthened in order to push up agricultural investment. The government's policy of minimum support price to food grain products needs to be continued.

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