LAND REFORMS AND AGRICULTURAL GROWTH IN WEST BENGAL

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CERTIFICATE

This is to certify that the dissertation entitled " **Land Reform and Agricultural Growth in West Bengal**", submitted by me is in partial fulfilment of the requirements for the award of the degree of **MASTER OF PHILOSOPHY** of Jawaharlal Nehru University. This dissertation has not been previously submitted for any other degree of this or other university and is my own work.

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INTODUCTION

Land reforms have been a persistent theme in the debates on rural development. Land reforms in India have been concerned with the following set of issues.

- Security of tenure,
- Imposition of land ownership ceilings and redistribution of ceiling surplus land from landlords to the land-less and land poor.

In our study we are mainly concerned with the growth aspect of land reforms in West Bengal. Land reforms affect the productivity and growth through two channels. Firstly, introduction of land reforms, would mean that now, renting out of land is illegal so that landlords in turn may cultivate the land for himself, to increase his income the landlord will have to make investments and in turn increase the productivity on his land. This is called the direct effect of land reform. The second way, is land reforms provide security to the sharecroppers and now he cannot be easily evicted from his land, this security acts as an incentive to increase the productivity on his land by making investment on his land and using inputs more efficiently. In our dissertation, we are solely concerned with the indirect effect of land reform, where sharecropper's security in turn have a positive impact on agricultural productivity and in turn will have a positive impact on growth.

Agricultural growth in West Bengal started accelerating from early 1980's. This coincides with the period when land reform was introduced by the Left Front Government (LFG) in 1977. This gave rise to a series of studies so as to investigate the cause of this spurt in agricultural growth. The aim of this study is to look at the change in the agrarian structure that took place between 1970 to the recent year. . To what extent have the land reform measures introduced by the LFG been able to increase investment in land and hence to increase agricultural productivity? Can we attribute the increasing productivity in Bengal's agriculture to the land reform measure alone or do we also have the technological factor to play a vital role in increasing the agricultural productivity? These are the few things we ought to reinvestigate in our study. We do a district level analysis to do carry out our study.

Hypothesis:

We can now build a hypothesis as follows. Has the land reform measures introduced post 1977 led to higher bargaining power for the tenants, which in turn led to higher investment and hence to higher agricultural productivity?

The first chapter looks into the relation between agrarian relation and agrarian development, and how agrarian structure prevalent in the pre-Independence led to agricultural stagnation. What were the changes that were brought in after post Independence period with special emphasis to the land reforms introduced by the LFG in 1977. This chapter also looks into the existing debate on agricultural productivity and land reforms in West Bengal.

The second chapter looks at the changing agrarian structure in West Bengal from 1970 onwards. What were the changes that were brought in land ownership, operational holdings, tenancy status and terms of lease.

The third chapter looks into the trends in agricultural growth in West Bengal. We have in this chapter compared the agricultural growth of West Bengal with the neighbouring States of Bengal with the same agro-climatic conditions particularly Bihar and Orissa . And have shown that agricultural growth in Bengal had registered a growth higher than Bihar and Orissa.

The final chapter tries to reinvestigate the main cause of agricultural growth in West Bengal. Whether it was land reforms measure or input use or both .

Methodology:

The methodology is described at the end of each chapter as Appendix.

Data Sources:

The data sources used in this are as follows:

- Agricultural Census of West Bengal, Land and Land Reforms Department, Government of West Bengal. Issues: 1970/71, 1985/86, 1990/91 and 1995/96.

- National Sample Survey. Data on Land holdings

- Economic Review, Bureau of Applied Statistics and Economics. Government of West Bengal. (Various Issues).

- Statistical Abstract of West Bengal. Bureau of Applied Statistics and Economics. Government of West Bengal. (Various Issues).

- Area and Production of Principal crops in West Bengal, Government of West Bengal. (Various Issues).

- Indian Agricultural Statistics; Ministry of Agriculture, New Delhi.

- Centre for Monitoring Indian Economy, (CMIE). Mumbai.

- District Handbook of West Bengal, Government of West Bengal.

Chapter One

Agrarian Growth and Agrarian Structure in Bengal:
A Historical Overview

Introduction:

The relation of the actual tiller to the land is important as it depends upon him to increase the productivity of the land by using better inputs and modern techniques of production. But if the agrarian relation is such so as to leave him with no scope to introduce better methods of techniques, then there will be a situation of stagnant productivity or even in some cases, negative productivity. This was exactly the situation that prevailed in the Indian agriculture scenario in the pre-independence period. We specifically look into Bengal Agrarian scene, and see how the agrarian relations prevalent there were, to a large extent responsible for agricultural backwardness. We also look at the changes that were brought about over time to make the actual tiller more secure on his land.

The first section of this chapter looks into the agrarian relations in West Bengal in the pre-independence period. The second section deals with the agrarian change in the post independence period and also looks at the land reform programme introduced by the LFG in 1977. The last section deals with the existing literature on the debate of agricultural productivity and land reforms in West Bengal.

Agrarian relations in West Bengal in the pre-independence period

Bengal's agrarian relations underwent a drastic change with the coming of the British in India. "The important feature of the agrarian relationship in Bengal prior to British Lord Cornwallis introduced the permanent settlement in 1793. Under this settlement, a class called zamindars were created, they were made the proprietors of the land in intervention was that the cultivator could not ordinarily be evicted from the land

unless he failed to pay the stipulated revenue to the zamindars"[1] exchange for payment of revenue. The zamindars often led to sub letting of land; this led to the emergence of a new class called jotedars who were often involved in extracting heavy rent from the actual cultivators. "The maintenance of this hierarchical structure of interest in the land has required in effect that quite a substantial proportion of the produce be reserved for persons who performed no agricultural labor".[2] The end effect of such a system is that the actual cultivator was left with no surplus to invest in the agricultural land and as his tenure was insecure no attempt was made to raise his efficiency. " This complex of legal, economic and social relationship uniquely typical of the Indian country side served to produce an effect which is called 'built in depressor'.[3] The low growth of agricultural productivity is attributed to product sharing. " The spread of sharecropping in Bengal is owed mainly to the emergence of a class of gentle man called Jotedars under the British rule, who would not cultivate the land for themselves and prefer to lease it out against a share of produce. They would lease out land in exchange for rent. Besides, under the impact of poverty, indebtedness and subdivision of holding, many peasants became dependent on barga cultivation to supplement heir family income".[4]

According to Bhaumik, spread of sharecropping was due to several factors:

- with the destruction of the indigenous manufacturing, a vast population was thrown back to agriculture and had to rely on barga cultivation to supplement their income;

- with the diminution of the peasant holding due, inter alia, to the operation of inheritance laws, many peasants started depending on barga cultivation to supplement their income;

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[1]   Bhaumik ,S.K : " Tenancy relation and agrarian development"

[2]   Thorner,D 1956, 'The Agrarian Prospect in India'

[3]   ibid

[4]   Haque ,t: " Impact of Tenancy Reforms on Productivity Improvement and Socio Economic Status of Poor Tenants" Policy Paper National Centre For Agricultural Economics and Policy Research

- the 'bhadralok' would not involve himself in actual cultivation since this would lower his social status;

- the growth of barga cultivation owed to creation of urban job opportunities for the more educated middle class landholding families.[S. K. Bhaumik, 1993]

"Sharecroppers had very limited or customary rights and were ignored by tenancy legislation".[5] The common belief with respect to sharecroppers was that " it was popularized as an equal relationship, where by the cultivator and landlord provide equal inputs, take equal risks and receive equal share of crops".[6] But if we look into the actual scenario, we see that the scene was not so simple. The landlords often exploited the sharecroppers and they were extremely vulnerable to the demands of the landlords. Evidence provided by A Cooper shows that the pattern of sharecropping was biased in favour of the landlord. "The half sharing served an ideological in sounding, whilst in reality the sharecropper was deprived of even a half share because of deductions of seeds and other inputs".[7]

Before we look into the impact of sharecropping on agricultural productivity, let us briefly look at the theoretical literature on sharecropping. The theoretical literature on sharecropping begins with Adam Smith. According to Smith, the ultimate disadvantage of such an arrangement lay in the lack of stimulus towards investment on the part of these cultivators, since a proportion of the returns accrue to the landowner. Arguing along the line of Smith, Alfred Marshall also argued that sharecropping is inefficient. Marshall argues that " A share tenancy or sharecropping contract is by definition one in which the tenant promises to give the landlord a fraction, r, of the total output. The fraction is decided in advance and, it has been seen empirically, that it tends to be 0.5".[8] Hence, even by using some input that would increase his output he would not be interested in raising the output, as he knows that

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[5] Cooper .A : "Sharecroppers and landlords in Bengal" from Journal of peasant studies

[6] ibid

[7] ibid

[8] Basu , Kaushik: " Agrarian Economic Relations: theory and Experience"

he will get only half of the additional output. Hence, unless the value of additional output, is at least double the cost of the new inputs, the adoption of productivity raising new inputs will tend to be sub optimal. This was the essence of Marshallian critique[9]. Later classical economists such as McCulloch and Jones believed sharecropping practices to be the underlying cause of poverty and stagnation characterizing West European agriculture. The traditional theory was seen to be concerned with the essential 'inefficiency' of sharecropping. Cheung was the first to formally outline not only how sharecropping might be as productive as other forms of contract, but also the context in which it might be the preferred contract.

The whole arrangement of sharecropping provided little incentive and means for agricultural improvement by the actual cultivator.[10]

In Bengal one of the most impressive movements raising specific demand of the sharecroppers was the te-bhaga movement. "The te-bhaga movement in Bengal which started in mid nineteen-forties was a struggle of the sharecroppers to retain two-thirds of the produce for themselves and thereby reduce from half to one-third the produce as rent paid to jotedars".[11] The te-bhaga movement did spread in most of the districts in Bengal. But the sharecropper's struggle of the nineteen-forties and the fifties was considered to be unsuccessful since it failed to achieve legal reforms and provide long term solution to the sharecroppers.

Thus, sharecropping is to a large extent responsible firstly for the insecurity of tenure and secondly for the extraction of heavy surplus from the actual cultivator, leading to agricultural backwardness in terms of low productivity and low wages in Bengal during the pre-independence period .

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[9] ibid.

[10] Blyn study showed that for the period 1891-1947, annual average growth of yield as well as output were negative (-0.55 and — 0.73 per cent respectively) for food grains in Greater Bengal (Bengal, Bihar and Orissa) while the growth of population was 0.65 percent.

[11] Dhanagre, D.N. (1976) , ' Peasant Protest and Politics-The Tebhaga Movement in Bengal' *Journal of Peasant Sudies* , vol.3, no.3.

Apart from a wide prevalence of sharecropping, there also existed a large inequality of ownership of land holdings, where land was concentrated in the hands of few rural rich. As Ambica Ghosh argues "even as early as 18th century in Bengal, the small owners were predominantly a large group".[12] He further provides evidence to show that even as early as 1920-1930, the majority of the families, in a number of regions in Bengal owned less than two acres of land. The information provided by the Floud commission (see tables 1 and 2) and the surveys of the Indian Statistical Institute, which shows the percentage distribution of families is shown below. We see that larger proportion of land is held by a miniscule section of the population, while majority continues to hold only a smaller amount of land. Thus the inequality that persisted between 1939 and 1946 in Bengal is clearly brought out in the table below. . The richer peasant, as we have seen earlier, usually leased out land in exchange for rent. In advent of poverty, the poorer peasant leased in land on sharecropping system. The rent after being extracted by the landlord leaves the tenant (sharecropper) with no investible surplus. In the situation of extreme poverty he continues to use the traditional techniques of production (Table 3 shows the description of techniques furnished by the census of agricultural implements in Bengal carried out in 1940). This means that there is stagnation in the techniques, which in turn lead to low productivity in agriculture.

Table: 1 Percentage distribution of families.

Area owned in acres	Floud Commission 1938	Bengal famine inquiry		Plot to plot enumeration of Bengal 1945	Bengal rural survey 1946
		1939	1944		
0-2	46.0	78.5	73.0	76.1	67.3
2-5	28.6	14.6	21.1	9.6	21.2
5-10	17.0	-	-	-	-
10& above	8.4	6.9	5.9	14.3	3.7
Total	*100*	*100*	*100*	*100*	*100*

Source: Ambica Ghosh. : "Emerging Capitalism in Indian Agriculture.

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[12] Ambica Ghosh , ' Emerging Capitalism in Indian Agriculture'.

Table: 2 The Percentage distribution of area owned

Area owned in acres	Bengal famine inquiry		Plot to plot enumeration of Bengal 1945	Bengal rural survey 1946
	1939	1944		
0-2	20.6	21.9	22.9	16.3
2-5	27.9	25.8	14.7	30.3
5& above	51.5	52.3	62.4	53.7

Source: same as the above table.

Table: 3 Description of implements

Description of implements	No in 1940
Wooden plough	4330804
Iron plough	6304
Cart	821194
Sugarcane crusher(power worked)	128
Sugarcane crusher (bullock worked)	17670
Oil engine (irrigation)	128
Electric pumps for tube wells	55
Tractors	52

Source: Same as the above table.

Thus, we see that the agrarian structure, which prevailed in the pre-independence period, was to a large extent responsible for agricultural backwardness in West Bengal.

Agrarian Relations in the Post Independence Period

We have seen that the agrarian structure that prevailed at the time of Independence had several features that inhibited agricultural growth. Some of these features were the existence of a parasitic class who took away a larger proportion of surplus from the actual cultivator, inequality in the ownership of concentration of land in the hands

of the upper class, widespread prevalence of insecure tenancies and extreme fragmentation and subdivision of holdings.

The issue of implementation of land reforms came to the center of West Bengal politics in the post independence period. A number of tenancy legislation's were passed to protect the interest of the sharecroppers but they lacked effective implementation (P.S. Appu). The act had two clauses:

Sharecroppers (Baragdars) will have permanent and heritable rights to the land that is registered in their name provided they pay the legally stipulated share to the landlords, do not leave the land fallow and do not sublease the land. Except in such cases, the sharecropper will lose his right to land only if the landlord was to use the land for personal cultivation. These rights are inheritable but not transferable.

The share that the landlord will demand will be no greater than 25 percent.[13]

But this phase was widely recognized as a failure as landlords continued to exploit the tenants. Numerous loopholes[14] in the act meant for abolition of intermediaries could not abolish the concentration of land in the hands of this class. . Two years, later a second land reform act was enacted in 1955, which was intended to limit landholder's ability to transfer land and provide greater security to the Bargadars. "Zamindari abolition and tenancy reform were expected to correct the gross inequalities in land ownership and simultaneously by giving the actual cultivator ownership or at least more favorable and secure long term rights in land cultivated by them and create conditions for increasing land productivity".[15]

However there were no serious administrative efforts in implementing the land reforms programme. Tenancy reforms lacked effective implementation as Bhaumik puts it " The bargadars were denied their share of crop^^, many of them demanding

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[13]   Cases in which the landlord pays the cost of all non labour inputs, the law fixes his share at 50 percent. However this clause rarely applies.

[14]   These included generous ceiling exemption for plantations, orchards, tank fisheries, and charitable trust.

[15]   Vaidhyanathan,A: " Performance of Indian agriculture since independence" from Kaushik Basu (eds)Agrarian Question.

protection under the law were in fact evicted and regulated to the status of agricultural labourers".[16]

In 1967 the United Front Government was formed with coalition of the Left wing and the Congress. The United Front government tried to improve the peasant's rights and distribute ceiling surplus land. As far as the bargadari rights are concerned, little was done to provide them greater security. But the Government, to a certain extent ,was successful as far as redistribution of land was concerned.

The United Government collapsed in 1970 after which the President's rule was imposed in West Bengal. . During this period, important amendments were made to improve the position of the Bargadars. But they lacked effective implementation[17].

In 1977 the Left Front Government [LFG] came to power with the support of agricultural peasants and labourers, with the promise to change the agrarian relations which existed in West Bengal. Land reform introduced by the LFG centers around two main programmes:

Operation Barga[18]: a program designed to provide the recorded sharecroppers permanent and heritable rights. Registration will provide the bargadars legal rights of cultivation and thereby prevent the practice of eviction of tenants by the landlords. It was also supposed to push down the share of the landlord in the harvest from the customary 50 percent to improve the material condition of the tenant cultivator. This in turn will give him the incentive to invest in his land and cultivate his land more efficiently.

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[16]   Bhaumik, S.K: " Tenancy Relation and Agrarian Development.   ^^ A survey conducted in the early 1960's shows that the bargadars hardly obtained more than 50 percent of gross output even when they covered all the costs of production.

[17]   Tim Hanstad and Jeniffer Brown (2002), ' Land Reform Law and Implementation in West Bengal: Lesson and Recommendations' *Rural Development Institute*, Washington.

[18]   Operation Barga is nothing but a massive drive to register the names of the sharecroppers with the collaboration of the groups of beneficiaries with the active assistance of the peasant organization (Ratan Ghosh, 1981).

Redistribution of land: Land above the ceiling surplus will be redistributed among the land poor and the land-less.

"Operation Barga was launched in 1978 with the primary purpose of recording tenancy lease".[19] According to Abhijit Dasgupta, " legislative measures were not enough to improve the living conditions of the sharecroppers. It was necessary to give them tenurial rights by some other methods. In order to do so the new government of West Bengal came out with a new method for the registration of the names of sharecroppers. The programme came to be known as Operation Barga".[20] LFG introduced the land reform in an attempt to provide tenurial rights to the sharecroppers and to redistribute ceiling surplus land among the land-less and land poor. This in turn was supposed to provide an incentive to the tenant to invest in his land, use better methods of cultivation to increase the output of his land.

Thus ,so far we have seen the agrarian situation that prevailed in West Bengal in Pre-independence Bengal and the type of reform that was introduced by the LFG in 1977 to wipe out the discrepancies that prevailed in Bengal.

Agricultural Growth and Agrarian Reform.

Our concern here is to see to what extent the institutional reforms brought about by LFG succeeded in promoting growth and raising the well being of the rural masses. We know that agricultural productivity and real wage of agricultural labourers started rising from mid 1980's, a period, which coincides with the agrarian reform introduced by the LFG. Hence the question raised is: To what extent can we attribute this growth to the land reform measures? Much of the existing literature attributes this rise in agricultural productivity in West Bengal to the agrarian reform measures that were introduced by the LFG after coming to power in 1977.

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[19]   Sengupta and Gazdar (1997) ,' Agrarian Politics and Rural Development in West Bengal' from *Indian Development ,Selected Regional Perspectives* (eds) Dreze and Sen

[20]   Dasgupta , Abhijit 1998, ' Growth with equity'

A study by Chandrasekhar and Sen[21] calculated the poverty estimates shown in the table 5. It is seen that there has been a continuous decline in the poverty ratio in West Bengal during 1977-'78 and 1993 -'94.

Table: 5 Poverty estimates in West Bengal

	1977-78	1983	1986-87	1987-88	1989-90	1990-91	1992	1993-94
West Bengal	68.3	63.1	47.3	48.3	37.2	49.5	44.0	40.3
India	53.1	45.6	38.3	39.1	34.4	35.0	44.0	37.5

Source : Chandrasekhar and Abhijit Sen

Moreover, see below table 6, agricultural wages tripled during this period, and the real wage increase in West Bengal was also the highest in India.

Table: 6 Daily wage rates for male agricultural labourers (Rs of Rice)

	1956	1983	1987	1990
Bengal	2.95	2.56	3.62	5.07

Source: Sunil Sengupta and Gazdar from "Indian Development, selected regional perspective

As far as agricultural production is concerned, "using an index number series on aggregate agricultural production, the exponential growth ate for all West Bengal for the period 1981-82 to 1990-91 was an impressive 6.4 percent".[22] And the annual growth rate of agricultural output for the period 1965-80 was 2.2 (in exponential form) percent[23]. The table below shows the indices of growth of agricultural production, which shows a continuos rise in production.

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[21] Chandrasekhar and Abhijit Sen, 1996

[22] Saha and Swaminathan (1994),' Agricultural Growth in West Bengal in the 1980's A Disaggreation by District and Crops' *Economic and Political Weekly* , March 26

[23] Boyce, J, (1987). 'Agrarian Impasse in West Bengal, page 68

Table : 7 Indices of growth in West Bengal and India

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Agricultural Production

(1967-70=100)

	1975	1977	1979	1981	1983	1985	1987	1988-89
Bengal	129	139	115	114	150	158	173	193
India	125	133	117	143	156	158	151	181

Source : G. K. Lieten (1992) page 195

It is often said that Operation Barga was the main driving force behind the recent spurt in agricultural growth in West Bengal. The reasons attributed to this were:

- It provided a security of tenure to the sharecroppers, which was associated with new incentives to cultivate land more efficiently.

- It ensures their entitlement for accessing institutional credit facilities.

- O.B and other institutional reform altered the agrarian structure, thereby enabling the sharecroppers and poor peasant to have equal access to modern technical inputs.

The arguments, which center on the recent rise in agricultural productivity, have given rise to a number of lively debates. While some have attributed the rise in agricultural growth in West Bengal to the effective implementation of the land reforms programs of the LFG, others do not support this view. "Much of the debate on the cause of growth in West Bengal agriculture has been dominated by arguments about the effects of political change on agricultural output".[24]

Atul Kohili (1987) in his book The State and Poverty argues that data on land shows that over the years larger landholdings have been breaking down. But this does not necessarily mean gains for the lower rural classes, nor do these trends mean that the

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[24] Gazdar and Sengupta,: "Agricultural growth and recent trends in well-being in rural West Bengal" from Sonar Bangla?

family incomes for large landholders necessarily decline. The data provided by the government data source show that overall tenancy has declined. But inequality still exits in the sense that majority of the land is operated by big landowners. He further argues that Operation Barga did not significantly alter the sharecropper's condition after registration.

Sengupta and Gazdar (1997)[25] conducted a survey in the WIDER village, and found that land redistribution did not significantly alter the class relation between the land rich and the land poor. They argue that wage labor was the most important source of earning for the landless who were primarily dependent on it for their livelihoods. They argued that " the real test of the success of the campaign is its effect on the share of the produce that actually goes to the tenant"[26]. Though the evidence on crop share show a mixed result across villages, Operation Barga has been able to extend security to the tenants and give them higher crop share even though they are lower than the stipulated shares. But to the question regarding the extent, to which land reforms were responsible for this growth in agricultural productivity, they argue "despite their wide coverage in terms of beneficiaries, the redistributive reforms have affected only a relatively small proportion of total cultivable area. For land reform and operation barga to be the driving force behind accelerated growth, these relatively small areas of land would have to achieve extraordinarily high rates of productivity growth. This clearly has not been the case. Instead there has been a wide adoption of HYVs for aman, and an extensive increase in (irrigated) boro cultivation".[27]

Ratan Khasnobis argues that operation barga has failed to provide an impact on cropsharing. In the survey he carried out in the villages of Bardhaman, Medinipur, Nadia, Purilia, he found that the recorded bargadars did not get any extra benefit than their unrecorded counterpart. "The result thus indicate that there does not exist sufficient evidence in favour of the fact that the recorded bargadar does get a better

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[25] Sengupta and Gazdar (1997) : " Agrarian Politics and Rural Development in West Bengal" from Indian Development Selected Regional   Perspective (Ed) Jean Dreze and Amatya Sen.

[26] Ibid

[27] ibid

share proportion than his unrecorded counterpart".[28] Among others who do not support the positive aspect of the reform is Ross Mallick as he puts it " A survey of 14 villages in West Bengal indicates that even among the recorded bargadars the legally stipulated three-quarter crop share as often a exception. Only one of the 11 villages where share proportions were specifically mentioned applied the three - quarters share even though villages had recorded bargadars".[29]

However, others like *Dipankar Basu*[30] argues that redistribution programme has slowed down after the LFG government came into power in1977. In the same context, Rawal and Mishra (2002) [31] argue that land redistribution programme has been a success but they pointed out that " land reform in West Bengal was a programme of limited reforms which could not radically alter the relations of productions . It did not completely do away with the baggage of the pre capitalist relation".[32]

In one of the most exhaustive works done by *G.K.Lieten* in his book called Continuity and Change in Rural West Bengal, Lieten has shown that the land redistribution programme of the left front government has been successful in providing land to many families. He argues that " after the LFG government came to power, the average size of the plots allocated to the beneficiaries fell dramatically to hardly 1 bigha (one third of an acre from around 3 bighas in 1967)".[33] But the primer objective was to provide land to more and more families, so that their economic condition is improved. Table 8 shows that the number of beneficiaries has increased over the years.

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[28] Khasnobis, R (1994): " Tenurial conditions in West Bengal Continuity and Change"

[29] Mallick, Ross 1992, 'Agrarian Reform in West Bngal: The End of an Illusion' *World Development*

[30] Basu , Dipankar 2001, 'Political economy of middleness behind violence in rural west Bengal' EPW , vol 36 no, 16 April 21

[31] Rawal and Mishra 2002, 'Agrarian Relation in Contemporary West Bengal' from Agrarian studies in Less Developed Countries (Ed) V.K.Ramachandran and M. Swaminathan

[32] ibid. page 334.

[33] Lieten, G. K 1993. " Continuity and Change"

Table : 8 Progress of land reforms in West Bengal (1000 acres)

	Pre-1967	1967	1972	1976	1977	1979	1981	1985	1990
Vested agricultural land	337	628	925	1025	1057	1177	1249	1236	1259
Total vested	-	1911	-	-	2578	2761	2487	2864	2870
Injuction	-	-	-	-	160	178	179	182	168
Possession	-	402	702	856	916	1012	1069	1087	1110
Distributed	-	230	367	620	632	641	716	804	879
Beneficiaries	-	238	-	897	977	1018	1324	1650	1828

Source: Lieten (1993)

The effect of land reform is that the operated area by small and marginal farmers has increased from 44 percent in 1970-71 to 63 percent in 1985-86.

He further argues that there has been a downward trend in real number of agricultural labourers, a process, which he calls "depeasantisation discontinued"." Due to the reform programme, poor households in West Bengal now suffer less deprivation and this is essentially due to the campaign of Operation Barga".[34] As far as registration of bargadars is concerned, Lieten argues that the progress can be seen from the table below, where the registration has speeded up many fold due to the initiatives of the LFG and in effect was successful in providing security to the tenant.

Table: 9 Operational Landholding Structure in West Bengal

Size (hectare)	Share of holdings				Share in area			
	1970-71	1976-77	1980-81	1985-86	1970-71	1986-87	1980-81	1985-86
< 0.5	37	-	48	-	8	11	12	-
0.5-1	23	-	22	-	14	17	17	-
<1	60	66	70	71	22	28	29	32
1-2	22	21	20	19	26	29	31	31
2-4	13	10	9	8	29	27	25	24
4-10	4	2.5	2	1.5	19	12	11	9
>10	0.1	0.03	0.02	0.02	4.6	4.0	3.7	3.6

Source: Lieten (1993)

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[34] ibid

Table : 10 Progress of Bargadar Registration (per 1,000)

	1978	1979	1980	1981	1982	1983	1985	1987	1989	1990
Bengal	242	573	785	1002	1126	1213	1315	1362	1402	1426

Source : Lieten 1993

Lieten further argues that due to Operation Barga ,the personal income of the rural masses has increased due to rising share in produce. Thus in essence O.B. from these viewpoints cannot be termed as unsuccessful in providing legal rights to the rural masses. Lieten who surveyed a village in Birbhum also noted that most of the sharecroppers in the village have gone for registration. As far as accelerated productivity is concerned, he attributes it to the land reform policy of the LFG. "The LFG policy has succeeded in executing land reforms and in increasing production, productivity and some diversification in agriculture which is no small achievement".[35]

In a survey of villages in Nadia district by Abhijit Dasgupta[36] it was found that most sharecroppers managed to register their names. He found that operation barga did provide greater security to the sharecroppers, reforms did help in increasing production and raising the real wages of agricultural workers.

John Harris (1993), who surveyed villages in the Birbhum district, found that " the evidence from none of the three villages that I visited in Birbhum and Bardhaman supports the view that the agrarian reform policies persuaded by this government have brought any really significant change in the agrarian structure, or that the reforms have been instrumental in increasing agricultural production".[37] But broadly, he comes to the same conclusion as that of Lieten that "higher productivity and a better deal for small peasants and agricultural labourers have combined to reduce the extreme poverty and reverse the immisersation process".[38] Among others who are the

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[35]   ibid

[36]   Dasgupta Abhijit 1998 , ' Growth with Equity '

[37]   Harris, John 1993, ' What's happening in rural West Bengal' *Economic and Political Weekly* , June 2

[38]   Lieten ,G.K 1993 , 'Continuity and Change in Rural West Bengal'

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advocate of land reform programme in West Bengal by LGF is *Sunil Sengupta*(1981).[39]

Dr T.Haque's study showed that the positive interaction between tenancy reform, technological change and credit availability helped. " Sharecroppers who succeeded in improving crop yields, attributed 25 percent of yield improvement directly to barga recording and remaining 75 percent to increased access to irrigation and HYV technology was also the indirect effect of tenancy reform".[40] In his sample, he districts revealed that almost 100 percent of the sharecroppers had a feeling of greater security due to recording of barga. In effect, he tries to argue that the security provided to the sharecropper due to the tenancy reform increased his incentive to undertake investments in land to increase his production as now he is entitled to a greater share of the output. " Nearly 25 percent of yield improvement was attributed to greater work incentive due to barga recording and the remaining 75 percent to increased irrigation facility and the new technology which were also facilitated by tenancy reform".[41]

In a recent study by Banerjee, Ghatak and Gerler , in their paper they have discussed that " within a year of being elected in 1977 , a left wing administration launched operation barga, a programme designed to implement and enforce the long dominant agricultural tenancy laws that regulated rents and security of tenure of sharecroppers. Under this law, if tenants were registered with the department of revenue they would be entitled to permanent and inheritable tenure of the land they sharecropped as long as they paid the landlord at least 25 percent of output as rent. Moreover agricultural productivity grew faster in West Bengal as compared to the other states in India, earning praise from many".[42] They argue that security of tenure could help in the process by, firstly disallowing eviction which restricts the use of such incentives and

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[39] Sunil Sengupta 1981, EPW June *Review Of Agriculture*

[40] Haque, T 2001, ' Impact of Tenancy Reforms on Productivity Improvement and Socio Economic Status of Poor Tenants' *Policy Paper National Centre For Agricultural Economics and Policy Research*

[41] ibid

[42] Banerjee,Getler and Ghatak : "Empowerment and Efficiency" from Journal of Political Studies.

thereby reduces efficiency, secondly, greater security of tenure encourages the tenant to invest more since it gives him the confidence that he will stay on the land long enough to enjoy the fruits of his investment. (Banerjee,Getler and Ghatak). They further argue that O.B was to quite an extent successful in providing security and higher crop share to the sharecroppers. Evidence from their survey suggests that while shares rose both for registered and unregistered tenants, the increase was greater for registered tenants. They estimated that O.B explains around 28 percent of the subsequent growth of agricultural productivity in West Bengal.

Sen and Sengupta (1995)[43] discuss that agricultural productivity did increase in West Bengal from mid 1980's. Investigating into the cause for the growth, they conclude, " technological inputs and infrastructure emerge as very important variables determining the level of production. And, the spread of electricity and commercial banks can also be seen as contributing to better combination of inputs in the 1980's. But none of these explain fully the transition to high growth in the 1980's"[44]. Thus in essence what explains this spurt is the land reform programme of the LFG.

Thus, so far, we have looked into the vast literature that existed on the agrarian conditions in West Bengal. The next chapter looks into the changing agrarian structure in West Bengal in the post- Independence period.

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[43] Sen. and Sengupta: " The Recent Growth in Agricultural output in Eastern India, With special reference to the case of West Bengal" Paper presented at the center for Studies in Social science, Calcutta , 9-12 January 1995

[44] ibid. : page 29

Chapter Two

Changing Agrarian Structure in the
Post Independence Bengal

Introduction:

We have discussed in the previous chapter that inequality in land, exploitation of the 'actual tiller' of the soil by the landlord and insecurity of the tenure, all these factors acted as an obstacle to the growth of agriculture in Bengal. This, to a large extent explains agricultural stagnation in Bengal prior to 1980. The LFG came to in 1977 and introduced the land reforms measures, which was supposed to bring drastic change in the highly skewed ownership and operational holdings that existed in rural West Bengal. Land structure, so as to do away with the land inequality that existed in rural West Bengal. They introduced land reforms that constituted, firstly redistribution of land above the ceiling surplus and secondly, registration of the number of Bargadars so as to provide the sharecroppers security of tenure. These were essentially aimed to remove the factors of inequality, exploitation of the sharecroppers and provide security of the tenure to sharecroppers.

What we intend to do in this chapter is to look at the changing land relations in West Bengal and the districts and to evaluate how the land structure has changed over the years if it has changed at all.

To evaluate the changing land relations in West Bengal we re-examine how the pattern of Ownership and operational holdings , leasing-in as well as tenancy has changed over the years. We do the analysis, from the data collected from NSS and Agricultural Census, government of West Bengal.

In our entire discussion we would first look into the State scenario and then look into the district level scenario, to see if there exists any variation among these districts.

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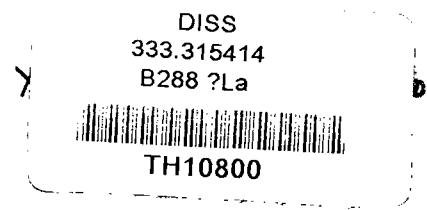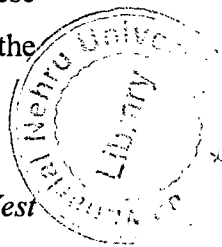
Ownership Pattern:

If we look into the ownership pattern (table 1), we see that for the marginal category , both the number and area owned by them has increased. The rise in the number of households was from 77.62 percent to 81.6 to 89.8 percent during 1970/71, 1980/81 and 1991 respectively. On the other hand, the rise in area operated by the marginal class was from 27.3 percent in 1971/72 to 30.3 percent in 19981/82 and to 42.6 percent in 1991/92. The small category registered a decline in the number of holdings between 1971/72 to 1991/92 from 12.6 percent in 1970/71 to 11.5 percent in 1980/81 and 6.8 percent in 1991/92. But the area owned by the small category of owners increased from 25.69 percent to 28.77 percent in 1971 and 1982, which then declined to 27.3 percent in 1991/92.

The number of households belonging to semi-medium and medium category has continuously declined between 1970/71 and 1991/92. The area owned by them also follows the same pattern of a declining trend between 1971/72 and 1991/92. But the percentage distribution of households and the area owned by the large farmers underwent a rise between 1970/71 and 1985/86. The area owned by them rose from 0.7 percent in 1970/71 to 1.54 percent in 1985/86.

However the important point that emerges from our discussion is that though the area owned by the marginal category of farmers increased, so has the number of households in the marginal category. The rate of increase of the area owned has been less than the rate of the increase in the number of holdings, so that the average owned area has infact declined.

Table: 1 Percentage Distribution of Ownership Holdings:

size class	1971-72		1981-82		1991-92	
	number of households	area	number of households	area	number of households	area
marginal	77.62	27.28	81.6	30.33	89.8	42.6
small	12.64	25.69	11.5	28.77	6.8	27.3
semi-medium	7.3	27.72	5.54	27.23	2.9	22.6
medium	2.39	18.61	1.28	12.12	0.5	7.5
large	0.05	0.7	0.08	1.54	na	na
	100	100	100	100	100	100

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.00 ha),
medium (4.01-10.00 ha), large (> 10.0 ha)

Source: National Sample Survey.

Operational holdings:

(A) State Level Analysis:

Table 2 gives the percentage distribution of operational holdings and area operated in West Bengal. Beginning from 1970-71, we see that there has been a continuous rise in the number of holdings and area operated by the marginal class. The number of holdings for the marginal class was 59.9 percent and the area operated by them was 21.52 percent in 1970-71. This rose to 66.49 and 27.15 percent in 1976-77, further to 70.97 and 32.27 percent in 1985-86 and 76.42 and 42.93 percent in 1995-96. So, we see that the marginal category registered a continuous rise both in the number and area operated by them over the years.

For the small category, we see that the number of holdings declined continuously between 1970-71 and 1995-96. As the figure shows that the number declined from 22.33 percent in 1970/71 to 20.55 percent in 1975/76 and further to 19.54 percent in 1980/81, 19.09 percent in 1985/86, to 17.61 percent in 1990/91 and 16.81 percent in 1995/96.

Table 2 : Percentage Distribution Of Operational holdings and operated area

Size-Class	1970-71		1976-77		1980-81		1985-86		1990-91		1995-96	
	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
Marginal	60.0	21.5	66.5	27.2	69.7	29.2	71.0	32.3	73.8	36.5	76.4	42.9
Small	22.3	25.7	20.6	28.5	19.5	31.2	19.1	31.1	17.6	30.0	16.8	29.1
Semi Medium	13.2	28.9	10.4	27.1	8.8	25.3	8.4	24.5	7.3	22.4	5.8	18.7
Medium	4.4	19.2	2.6	13.2	1.9	10.7	1.5	8.6	1.3	7.5	0.9	5.7
Large	0.1	4.6	0.0	4.0	0.0	3.7	0.0	3.5	0.0	3.6	0.0	3.6
All Sizes	100	100	100	100	100	100	100	100	100	100	100	100

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.00 ha),
medium (4.01-10.00 ha), large (> 10.0 ha)

Source: Agricultural census; 1970,1976,1980,1985,1990,1996

Table :4 Percentage Change Of Number Of holdings and Operated Area

Size-Class	Number					Area				
	1970-71 to 76	1976-1981	1981-1986	1986-1991	1991-1996	1970-71 to 76	1976-1981	1981-1986	1986-1991	1991-1996
Marginal	38.5	23.1	17.0	14.3	6.6	12.4	6.2	13.4	7.9	16.2
Small	14.9	12.6	6.1	16.4	2.3	1.1	-5.8	-3.4	-0.6	-4.1
Semi Medium	-2.2	-3.6	-4.8	-0.8	-0.6	-1.5	-11.5	-8.2	-16.5	-17.5
Medium	-27.2	-40.7	-16.8	-14.0	-16.1	-18.3	-15.5	-12.5	-23.9	-25.6
Large	-46.8	-11.7	-26.7	-1.9	-11.2	-1.6	3.3	1.2	-6.6	-0.1
All Sizes	24.9	3.1	11.6	6.4	4.7	1.6	2.1	0.2	4.2	-1.2

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.00), medium (4.01-10.00 ha), large (> 10.0 ha)

Source: Agricultural census; 1970,1976,1980,1985,1990,1996

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But the area operated by them underwent a continuous rise till 1980-81; it increased from 25.71 percent in 1970/71 to 28.53 percent in 1975/76 and 31.20 percent in 1980/81. After which the percentage of area operated by them declined continuously from 31.20 percent in 1980-81 to 29.95 percent in 1990/91 and 29.05 percent in 1995-96.

However, the area as well as the number of holdings in the semi-medium and medium categories underwent a continuous decline. For the semi-medium category, the number of holdings declined from 13.23 percent in 1970/71 to 5.82 percent in 1995/96. Similarly, the area operated declined from 28.94 percent in 1980/81 to 18.72 percent in 1995/96. The number of holdings and area operated by the medium category also declined continuously between 1970/71 and 1995/96. The number of holdings in the medium category declined from 4.3 percent in 1970/71 to 2.5 percent in 1976/77, 1.9 percent in 1985/86 and 1.52 percent in 1990/91 and .92 percent in 1995/96. Similarly the area operated by them has registered a continuous decline, from 19.2 in 1970/71 to 5.8 in 1995/96.

If we look into the number of holdings and area operated by the large category, we see that between 1970-71 and 1985-86, there was a continuous decline in the number and area operated by the larger category. However, the number and area operated by them registered a rise in 1990-91 but then declined again in 1995-96.

Table 4 which showing the percentage change of area operated and number of holdings it is only the marginal category that has registered a rise though at a declining rate in the number and area operated by them from 1970-71 to 1995-96. For the semi-medium, medium and large category, the percentage change was negative.

However , despite the continuous rise in the area and number of holdings by the marginal class, the average operated area by them increased only marginally from 0.43 hectares in 1970-71to 0.47 hectares in 1995-96. The average area operated by the large category on the increased substantially from 64.2 hectares in 1970-71 to 167.95 hectares in 1995-96 (table 3). The average operated area by the small category increased only marginally from 1.38 hectares in 1970/71 to 1.47 hectares in 1995/96. The average area operated by the semi- medium and medium categories registered a

marginal rise. Operated area for the State as a whole has declined from 1.20 hectares in 1970-71 to 0.85 hectares in 1995-96.

The table below shows that it is only the marginal category that has registered continuous rise over the years both in the operated area and in the number of holdings. Thus, this means that more and more peasants are being pushed towards marginal category, which is a clear indication of marginalization of peasantry in West Bengal, i.e. more and more peasants are being pushed towards bare subsistence level.

Table: 3 Average operated area

	1970-71	1975-76	1980-81	1985-86	1990-91	1995-96
Marginal	0.4	0.4	0.4	0.4	0.4	0.5
Small	1.4	1.4	1.5	1.5	1.5	1.5
Semi Medium	2.6	2.6	2.7	2.7	2.8	2.7
Medium	5.3	5.1	5.3	5.2	5.4	5.2
Large	64.2	108.0	144.5	160.1	157.0	168.0
All Sizes	1.2	1.0	0.9	0.9	0.9	0.9

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.00),
medium (4.01-10.00 ha),large (> 10.0 ha)

Source: Agricultural census; 1970,1976,1980,1985,1990,1996

Table: 5 Gini's Coefficient of Operational Holdings

State	1970/71	1981/82	1991/92
West Bengal	0.490	0.597	0.585

Source : Sarvekshana

If we look at the Gini's coefficient then we see that inequality was increasing in West Bengal from 0.490 in 1971/72 to 0.597 in 1981/82, in 1991/92 it declined slightly to 0.585 but was greater than the 1981/82 value.

(B) District Level Analysis of Operational Holdings:

Now let us analyze the district level scenario of the operational holdings. Table 6(a), 6(b), 6(c), 6(d), shows us the percentage distribution of operated area and number of holdings across the districts. The results in these tables show us that the area operated by the marginal farmers increased continuously between 1970/71 and 1995/96 in all the districts. Not only has the area operated increased but also the number of marginal

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households increased in all the districts in the same period. However in Purulia, the operated area had increased till 1985/86 but then, had declined marginally in 1991/92 and finally rose to a level higher than in all the years.

The district results for small category of holders show that the area operated and number of holdings rose for all the districts except Midnapore between 1970-85. However between 1985-96 both the number of holdings and area operated by the small category declined in most of the districts, except West Dinajpur, Nadia, Birbhum, and Purulia. Only area declined in 24 Paraganas(S) and Bankura ,and only number of holdings declined in Howrah .

For the semi-medium category, the number and are operated in all the districts declined between 1970/71 –1985/86 except Burdwan,. Birbhum, Howrah, West Dinajpur, and Cooch Behar. But, between 1985/96 number and area operated area declined in all the districts except Bankura and Midnapur (w).

For the medium category of farmers, there was a decline in both the number and area operated by them between 1970/71 and 1985/86 across all the districts. However, between 1985-96 except Cooch Behar and Hooghly the operated area declined in all the districts and the number followed the same suite as that in the previous years.

For larger categories, both number of holdings and operated area declined between 1970/86 in all the districts except Jalpaiguri and Hooghly. But for the period 1986-96 the decline in the operated area and number of holdings has been reversed and that now many of the districts had registered a rise in the number of holdings and area, except, Darjeeling, Malda, 24 Paraganas, Howrah, Burdhawan, Birbhum and Midnapur (E). However only Purulia registered a decline only in area operated while Howrah showed a fall only in number of holdings .

As argued in the case of the State that, though there was a rise in the number of the marginal category of farmers and area operated by them also increased, but the average operated area registered a very marginal rise in all the districts. According to the 1995/96 census, the average operated area among the marginal class was the highest in, Nadia (0.62%), Birbhum (0.61%), West Dinajpur (0.59 %), Burdawn (0.57%) and Bankura (0.55 %).

Average operated area in various districts (table 7) between 1985/86 and 1995/96, shows that the area operated by the marginal class increased in almost all the districts except 24 Paraganas(s),Bankura and Midnapur (w), it remained constant in Purulia. However, the rise was only very marginal. For the small farmers the result was mixed, average operated area declined in Darjeeling, Coochbehar, Malda, Nadia, 24 Paragnas (s), Howrah, Hooghly and Birbhum. The average operated area for the semi-medium farmers increased in all the districts except Murshidabad, Howrah, Purulia and Midnapur. For the medium category, again there was a rise in the average operated area in all the districts except Midnapur, Nadia, Murshidabad, and Darjeeling. Among the large category, the average operated area increased substantially in all districts except, Coochbehar, West Dinajpur, Bankura and Purulia. However the average operated area among all size classes between 1986-96, show that it declined in all the districts except for Coochbehar.

Thus, we see that on the whole, the districts show the same results as that of the state.

Table : 6 (a)   Number and area of Operational holdings in the Districts of West Bengal

1970/71 Districts	Marginal		Small		Semi-medium		Medium		Large	
	number	Area	number	area	number	area	number	area	number	area
TF Paraganas	68.1	27.93	18.91	27.51	9.86	27.72	3.02	16.74	--	--
Nadia	53.81	18.28	24.01	25.47	16.51	33.40	5.67	22.69	--	--
Murdshidabad	63.81	24.33	20.25	26.38	12.91	30.41	3.78	18.57	--	--
Burdwan	5.144	17.14	24.45	24.61	17.96	34.74	6.15	23.31	--	--
Birbhum	49.56	14.91	24.24	23.16	18.83	33.93	12.33	27.20	--	--
Bankura	50.02	17.25	27.26	27.30	17.04	31.66	5.98	23.55	--	--
Midnapur	65.37	28.25	21.92	30.04	9.89	25.88	2.82	18.15	--	--
Hooghly	68.58	30.43	19.98	30.27	9.25	26.75	2.19	12.01	--	--
Howarah	86.94	55.31	9.92	26.35	2.65	13.45	0.49	6.89	--	--
Jalpaiguri	37.86	9.45	33.19	18.82	23.49	24.28	5.25	10.67	0.11	36.78
Darjeeling	38.12	6.67	27.89	12.95	23.34	20.34	10.37	19.19	0.28	40.85
Malda	59.26	19.97	20.38	22.81	14.42	30.92	5.94	26.07	--	--
West Dinapur	43.33	12.85	25.91	21.80	20.75	31.81	10.01	33.43	--	--
Cooch Behar	56.48	23.52	26.60	31.68	13.64	30.56	3.28	14.24	--	--
Purulia	55.07	21.61	25.58	26.49	13.95	27.62	5.40	23.96	--	--
West Bengal	59.96	21.53	22.34	25.72	13.32	28.93	4.46	19.94	0.02	3.87

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.0) medium (4.01-10.00 ha),large (> 10.0 ha)

Source: Agricultural Census. Government of West Bengal. 1985/86, 1990/91, 1995/96.

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and area of Operational holdings in the Districts of West Bengal

	Marginal		Small		Semi-medium		Medium		Large	
	number	Area	number	area	number	area	number	area	number	area
	70.20	39.33	14.92	30.33	5.83	22.21	1.04	7.86		
	67.71	30.62	21.20	34.29	9.02	23.65	2.07	11.44		
	70.61	32.29	20.24	35.55	7.76	24.03	1.38	7.98		
	55.45	20.30	26.65	32.60	14.47	32.12	3.37	14.23		
	56.39	21.66	26.05	32.86	14.18	31.66	3.05	13.34		
	60.59	23.97	25.19	35.82	11.70	27.68	2.52	12.21		
	75.76	35.93	16.18	31.16	6.65	23.08	1.39	9.56		
	76.99	39.83	16.46	34.49	5.90	21.03	0.65	4.57		
	89.08	57.85	8.55	27.58	2.20	12.57	0.17	2.00		
	62.14	17.59	24.04	20.78	11.37	19.16	2.35	7.22	0.10	35.26
	54.10	11.42	27.01	17.17	13.92	16.88	4.62	11.09	0.34	43.44
	71.71	29.61	18.08	31.92	8.17	25.34	2.00	12.36		
	61.97	22.64	21.18	27.15	13.30	32.94	3.54	17.11		
	60.87	26.38	25.28	34.78	11.83	30.06	2.02	9.58		
	61.62	24.23	24.39	33.17	10.70	26.24	3.27	15.77		
West Bengal	69.69	29.30	19.50	31.20	8.80	25.30	1.90	10.70	0.02	3.66

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.0) medium (4.01-10.00 ha),large (> 10.0 ha)

Source: Agricultural Census. Government of West Bengal. 1985/86, 1990/91, 1995/96.

Table : 6 (c)   Number and area of Operational holdings in the Districts of West Bengal

1985/86										
Districts	Marginal		Small		Semi-medium		Medium		Large	
	number	Area	number	area	number	area	number	area	number	area
Bankura	62.31	31.63	24.20	33.86	11.49	25.96	1.99	8.50	0.00	0.05
Birbhum	55.90	21.78	26.77	33.15	14.61	32.89	2.70	11.70	0.03	0.48
Burdwan	60.52	20.80	29.24	33.44	14.98	31.16	3.51	13.78	0.06	0.82
Coochkehar	44.18	26.17	18.35	34.52	8.59	29.74	1.44	9.39	0.00	0.18
Darjeeling	54.26	11.69	27.20	18.94	13.86	16.71	4.39	11.20	0.20	40.94
Hooghly	76.33	39.89	16.94	34.72	6.17	21.21	0.53	3.71	0.03	0.48
Howrah	89.61	59.03	8.16	26.97	2.07	12.20	0.15	1.65	0.00	0.15
Jalpaiguri	64.02	17.75	24.12	21.03	32.37	19.45	23.46	6.91	0.91	34.87
Malda	71.81	31.74	18.03	31.50	8.17	25.04	1.95	11.18	0.05	0.55
Midnapur (W)	70.88	39.23	19.53	30.61	1.94	6.59	1.35	7.06	0.00	0.15
Midnapur (E)	83.16	47.09	12.59	32.03	3.85	16.86	0.41	3.96	0.00	0.06
Murshidabad	72.54	37.62	19.66	33.64	6.97	23.20	0.82	5.39	0.01	0.15
Nadia	67.71	30.58	21.20	34.24	9.02	23.62	2.07	11.44	0.00	0.11
Purulia	67.14	31.19	23.08	32.59	9.94	25.53	2.10	10.38	0.02	0.31
24 Paraganas (N)	77.40	42.31	16.15	31.08	5.69	21.13	0.75	5.36	0.01	0.13
Midnapur (S)	80.86	44.84	13.00	29.17	5.21	20.62	0.75	5.26	0.01	0.11
West Dinajpur	59.51	23.13	20.34	23.15	12.78	33.41	2.78	14.11	0.01	0.24

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.0) medium (4.01-10.00 ha),large (> 10.0 ha)

Source: Agricultural Census. Government of West Bengal. 1985/86, 1990/91, 1995/96.

Table 6 (d) Number and area of Operational holdings.)

1990/91										
	Marginal		Small		Semi-medium		Medium		Large	
	number	area	number	area	number	area	number	area	number	area
Bankura	62.31	31.61	24.20	33.81	11.49	25.92	1.99	8.53	0.01	0.13
Birbhum	60.14	23.78	25.36	33.88	12.33	31.33	2.15	10.63	0.02	0.38
Burdwan	59.99	26.33	25.82	32.42	11.58	28.60	2.57	12.05	0.04	0.60
Coochkehar	72.43	37.61	17.96	27.92	7.91	23.17	1.69	9.78	0.01	0.52
Darjeeling	59.76	15.84	22.98	15.83	13.52	16.90	3.46	9.23	0.29	42.20
Hooghly	81.79	47.28	13.35	29.83	4.25	18.02	0.61	4.84	0.00	0.03
Howrah	89.81	61.90	8.14	25.37	1.92	11.08	0.13	1.39	0.00	0.25
Jalpaiguri	69.34	22.58	20.03	19.42	8.57	15.90	1.95	6.94	0.11	35.16
Malda	75.53	39.16	16.15	27.84	6.57	21.25	1.71	11.22	0.03	0.54
Midnapur (W)	75.48	42.49	17.04	32.28	6.52	19.86	0.96	5.16	0.01	0.20
Midnapur (E)	87.87	57.77	9.62	27.98	2.31	12.21	0.20	1.91	0.01	0.14
Murshidabad	72.75	38.50	19.71	34.41	7.05	23.73	0.48	3.13	0.01	0.23
Nadia	67.11	32.29	22.21	33.38	8.94	24.71	1.72	9.18	0.03	0.43
Purulia	63.30	28.74	21.84	31.07	12.86	30.33	1.98	9.57	0.02	0.29
24 Paraganas (N)	79.08	43.88	14.83	30.20	5.37	20.25	0.70	5.58	0.01	0.10
Midnapur (S)	80.85	43.80	13.10	29.45	5.33	21.73	0.72	4.96	0.00	0.05
West Dinajpur	69.46	34.40	19.71	30.13	8.70	24.01	2.11	11.08	0.02	0.39

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.00), medium (4.01-10.00 ha), large (> 10.0 ha)

Source: Agricultural Census. Government of West Bengal. 1985/86, 1990/91, 1995/96.

Table 6 (e) Number and area of Operational holdings.

1995-96	Marginal		Small		Semi-medium		Medium		Large	
	number	area	number	area	number	area	number	area	number	Area
Bankura	63.49	31.83	23.55	32.80	11.06	26.79	1.88	8.38	0.01	0.19
Birbhum	65.09	36.12	25.41	34.29	8.28	22.99	1.21	6.16	0.01	0.44
Burdwan	60.74	35.06	18.50	31.33	8.08	23.79	1.68	9.16	0.03	0.66
Coochkehar	69.77	38.65	20.87	27.20	7.55	24.08	1.81	9.26	0.02	0.80
Darjeeling	68.87	21.37	20.24	17.45	9.28	14.42	1.39	4.29	0.22	42.48
Hooghly	81.52	51.09	14.73	29.74	3.24	14.81	0.51	4.29	0.004	0.08
Howrah	89.85	66.39	8.15	22.23	1.92	10.21	0.08	0.99	0.0004	0.18
Jalpaiguri	73.66	38.62	17.70	27.27	7.12	18.88	1.39	7.11	0.09	47.09
Malda	73.54	39.81	15.71	28.39	6.37	20.95	1.59	10.49	0.03	0.37
Midnapur (W)	79.58	49.90	15.39	30.91	4.27	14.23	0.75	4.63	0.01	0.33
Midnapur (E)	91.23	71.72	7.16	20.69	1.50	6.40	0.11	0.99	0.002	0.20
Murshidabad	77.58	44.10	19.16	32.91	6.25	14.76	0.56	3.53	0.01	0.17
Nadia	71.37	47.31	22.67	33.93	5.08	13.94	0.87	4.54	0.01	0.29
Purulia	68.72	36.61	22.40	34.17	7.67	22.02	1.18	6.88	0.02	0.32
24 Paraganas (N)	80.27	46.57	14.98	33.21	4.39	17.33	0.35	2.73	0.01	0.16
Midnapur (S)	88.15	52.61	11.38	25.33	5.33	22.79	0.50	4.08	0.002	0.06
West Dinajpur	69.07	39.68	21.28	30.12	8.28	22.76	1.35	7.12	0.02	0.32

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.00),medium (4.01-10.00 ha),large (> 10.0 ha)

Source: Agricultural Census. Government of West Bengal. 1985/86, 1990/91, 1995

Table : 7 Average operated area

	Marginal			Small			Medium			Large			All Sizes		
	1985-86	1990-91	1995-96	1985-86	1990-91	1995-96	1985-86	1990-91	1995-96	1985-86	1990-91	1995-96	1985-86	1990-91	1995-96
Bankura	0.58	0.57	0.56	1.59	1.57	1.54	4.85	4.82	4.95	25.38	14.53	16.93	1.13	1.12	1.11
Birbhum	0.47	0.44	0.62	1.50	1.49	1.50	5.24	5.51	5.69	23.23	22.22	48.54	1.21	1.12	1.11
Burdwan	0.45	0.50	0.58	1.50	1.44	1.70	5.15	5.40	5.45	18.26	15.99	19.03	1.31	1.15	1.13
Coochkehar	0.44	0.50	0.54	1.38	1.50	1.27	4.80	5.59	5.00	59.25	37.89	47.96	0.74	0.97	0.98
Darjeeling	0.47	0.55	0.53	1.51	1.43	1.48	5.52	5.55	5.29	304.19	306.62	339.22	2.17	2.08	1.72
Hooghly	0.38	0.41	0.41	1.48	1.58	1.34	5.03	5.59	5.54	11.10	12.00	13.83	0.72	0.71	0.66
Howrah	0.30	0.30	0.32	1.48	1.35	1.17	5.02	4.72	5.31	19.50	43.67	185.00	0.45	0.43	0.43
Jalpaiguri	0.47	0.53	0.55	1.45	1.57	1.61	5.03	5.78	5.33	657.78	541.23	532.30	1.66	1.62	1.45
Malda	0.40	0.45	0.45	1.58	1.50	1.50	5.21	5.71	5.48	10.65	15.63	11.27	0.91	0.87	0.86
Midnapur (W)	0.58	0.57	0.55	1.65	1.92	1.75	5.50	5.48	5.37	31.86	35.22	48.06	1.05	1.02	0.87
Midnapur (E)	0.33	0.38	0.43	1.49	1.66	1.58	5.73	5.49	4.74	14.88	15.20	50.87	0.59	0.57	0.55
Murshidabad	0.40	0.40	0.45	1.32	1.31	1.35	5.11	4.86	4.97	12.88	13.07	12.08	0.77	0.75	0.76
Nadia	0.44	0.46	0.62	1.57	1.44	1.40	5.38	5.12	4.88	36.00	15.77	36.96	0.97	0.96	0.94
Purulia	0.48	0.48	0.47	1.46	1.49	1.35	5.09	5.06	5.15	13.48	13.33	11.91	1.03	1.05	0.89
24 Paraganas (N)	0.38	0.38	0.39	1.34	1.41	1.50	4.94	5.48	5.24	11.35	11.19	12.73	0.69	0.69	0.67
Midnapur (S)	0.39	0.38	0.36	1.58	1.59	1.36	4.92	4.91	4.95	11.78	12.11	14.29	0.70	0.71	0.61
West Dinajpur	0.41	0.53	0.59	1.19	1.65	1.45	5.32	5.67	5.43	20.54	18.43	18.49	1.05	1.08	1.03

Note: marginal (<1.01 ha), small (1.01-2.00 ha), semi-medium (2.01-4.00), medium (4.01-10.00 ha), large (> 10.0 ha)

Source: Agricultural Census. Government of West Bengal. 1985/86, 1990/91, 1995/96

Thus , we have so far discussed the change in operational holdings at the State and the district level. We bring out the main findings of operational holdings from our above discussion.

- *The largest section of the rural household belongs to the marginal category of farmers, and the extent of marginalisation has increased over time.*

- *An important point that emerges from the whole discussion of the land holdings is that the land holdings of the marginal peasant has substantially increased over time. Despite this the fact remains that the average area operated by the small category of farmers has registered only a very marginal increase.*

- *The number of households in small and semi-medium category instead of being moved upwards, is being pushed downwards, towards marginal category.*

- *The number of holdings for the large category has declined more than the area operated by them, so that the average operated area by them has infact increased. While according to 1995/96 census, large category and the medium category together constitute only 0.93 percent of the households but the area they operated was 9.3 hectares. Thus,we see that large tract of the land is still dominated by the big and large farmers, i.e. changes in the landholdings structure could not remove the extreme inequality as large farmers continue to dominate the rural agrarian scene.*

- *The average size of operational holdings has declined for the State as well I forthe districts .*

Having discussed the changes in the pattern of operational holdings at the State and district level, let us now look at some of the possible reason for these changes:
These changes in the land holdings structure were brought about by several factors such as ;

- There has been considerable sub division of land from one generation to another due to demographic pressure .

- Implementation of tenancy legislation under Operation Barga programme launched in 1978 for recording of land rights so that the bargarars could be protected against eviction by the land lords.[1]

- Some notional transfer of land has taken place within the family with the view to evade ceiling legislation's

- Some surplus land accruing due to fixation of ceiling might have been re-distributed among small holders.[2]

Tenancy Status

(A) State Level Analysis

Thus, we have so far discussed the changing structure of ownership and operational holdings. We now look at the changing structure of tenancy status. Looking at the *leasing-in* pattern by the various size classes groups we see that leasing-in of land is done mainly by the marginal category of operators (See in table 8). As we can see from the table, 93.4 percent of the households in the marginal and small categories taken together leased-in 79.4 percent of the wholly leased-in holdings in 1975/76. This number and area of wholly leased-in holdings was 95 and 80.7 percent in 1985/86, 95.6 and 80.74 percent in 1990/91 and 98.3 and 92 percent in 1995/96. Of these figures, the marginal category leased-in the largest proportion of wholly leased-in holdings both in terms of area leased-in and number of marginal holders who are leasing-in land. Thus, wholly leased-in holdings for both number and area constitutes the highest among the marginal category. As far as partly leased-in holdings is concerned, again it the marginal and small category of holders who leases in the larger proportion of land. As to the percentage distribution of total number of holdings ,we can infer from the table that number of holdings who partly owns and partly leases in land constitute almost 56 percent for the marginal category, and 67 percent in case of wholly leased-in holdings in 1975/76. And this number has been continuously increasing over the years for marginal category. Thus, total leasing-in of

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[1]   Ghosh Madhusudan , ' Agricultural Development, Agrarian Structure and Rural Poverty in West Bengal' EPW November 21, 1998.

[2]   Laxminarayan H and S S Tyagi, 'Some Aspects of Size- Distribution Of Agricultural Holdings' EPW November 9, 1976.

area partly or wholly constitute the highest among the marginal category. Whereas it the large category of holders who constitute the lowest leased-in area and number to the total leased-in area and number of holdings leasing-in land.

To evaluate the change in tenancy structure in West Bengal, we look at the percentage of wholly owned, wholly leased-in and mixed holdings by size groups of operational holdings in West Bengal (Table 9). From the table, we can see that for marginal category, partly owned and partly leased-in holdings were on a downward trend between 1975-76 to 1990/91. It declined from 7.67 percent in 1975/76 to 7.48 percent in 1990/91 and then increased again in 1995/96 to 15.75 percent. Partly leased-in area to the total leased-in land by the marginal category declined from 5.55 percent to 4.28 percent to 4.17 percent in 1975/76, 1985/6 and 1990/91, leased-in area for the marginal category then marginally increased to 5.53 hectares in 1995/96.

For all size classes, partly leased-in area and the number of holdings was declining from 4.95, 4.12, 4.17 percent and 9.15, 8.64, 8.59 percent respectively in 1975/76, 1985/86 and 1990/91. However, the area and number of partly leased-in holdings both increased in 1995/96 to 6.70 hectares and 17.25 percent respectively

Table : 8 Percentage distribution of leased-in area and number of holdings to the total leased-in hold

Size-Class	1975-76							1985-86						
	Wholly owned &self operated area		partly owned & partly leased-in holdings			Wholly leased-in holdings		Wholly owned &self operated area		Partly owned & partly leased-in holdings			Wholly leased-in holdings	
	No	Area	no	owned area	Leased-in area	no	area	No	Area	No	owned area	Leased-in area	no	area
Marginal	67.3	27.9	55.8	22.4	30.4	66.8	38.6	71.3	33.2	63.0	30.7	33.5	79.0	44.8
Small	19.6	28.6	30.5	37.0	37.8	26.6	40.8	18.5	31.3	27.3	39.1	40.8	16.1	35.9
Semi Medium	10.4	28.6	11.7	28.6	24.4	6.2	17.7	8.5	25.8	8.7	24.1	21.4	4.7	18.1
Medium	2.7	14.6	2.0	11.6	6.1	0.3	2.0	1.6	9.5	1.0	6.0	4.1	0.2	1.2
Large	0.02	0.3	0.1	0.4	1.3	0.05	0.8	0.02	0.2	0.01	0.2	0.2	0.0	0.0
All Sizes	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Size-Class	1990-91							1995-96						
	Wholly owned &self operated area		partly owned & partly leased-in holdings			Wholly leased-in holdings		Wholly owned &self operated area		partly owned & partly leased-in holdings			Wholly leased-in holdings	
	No	Area	no	owned area	Leased-in area	no	area	No	Area	No	owned area	Leased-in area	no	area
Marginal	74.3	36.4	64.2	32.5	36.5	79.9	47.7	77.6	44.4	69.8	35.4	35.5	85.4	59.6
Small	17.1	29.2	26.0	37.1	36.8	15.8	33.0	16.2	28.7	20.3	30.0	31.3	12.9	32.4
Semi Medium	7.3	22.7	8.4	22.9	20.3	3.7	14.5	5.5	18.0	7.9	23.1	21.0	1.7	7.7
Medium	1.3	7.7	1.3	7.2	5.9	0.6	4.7	0.7	4.4	2.0	11.0	11.7	0.04	0.3
Large	0.0	4.0	0.03	0.2	0.6	0.004	0.1	0.01	4.4	0.04	0.6	0.5	0.0	0.0
All Sizes	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Agricultural Census Of West Bengal . 1975/76,1985/86,1990/91,1995/96

Table : 9 Percentage of wholly owned, wholly leased-in and mixed holdings by size groups of operational holdings in West Bengal

	1975-76						1985-86					
	Wholly owned &self operated area		partly owned & partly leased-in holdings		Wholly leased-in holdings		Wholly owned &self operated area		partly owned & partly leased-in holdings		Wholly leased-in holdings	
Size-Class	No	Area	no	Leased-in area	no	area	No	Area	No	Leased-in area	no	area
Marginal	90.0	86.5	7.7	5.6	1.0	1.1	88.8	87.5	7.7	4.3	2.2	2.0
Small	84.9	84.4	13.6	6.6	1.3	1.1	85.8	85.7	12.4	5.4	1.7	1.6
Semi Medium	88.9	88.8	10.3	4.5	0.6	0.5	89.8	89.8	9.0	3.6	1.1	1.1
Medium	92.7	92.6	7.1	2.3	0.1	0.1	94.0	94.1	5.8	2.0	0.2	0.2
Large	60.7	6.8	16.0	1.6	1.3	0.2	69.8	5.6	5.1	0.2	0.0	0.0
All Sizes	88.9	84.2	9.2	5.0	1.0	0.8	88.4	85.2	8.6	4.1	2.0	1.4

	1990-91						1995-96					
	Wholly owned &self operated area		partly owned & partly leased-in holdings		Wholly leased-in holdings		Wholly owned &self operated area		partly owned & partly leased-in holdings		Wholly leased-in holdings	
Size-Class	No	Area	no	Leased-in area	no	area	no	Area	no	Leased-in area	no	area
Marginal	88.9	87.8	7.5	4.2	1.8	1.7	82.1	10.2	15.8	5.5	1.6	1.4
Small	85.6	85.7	12.7	5.1	1.5	1.4	78.0	12.8	20.8	7.2	1.1	1.1
Semi Medium	89.1	89.2	10.0	3.8	0.9	0.8	76.3	15.3	23.3	7.5	0.4	0.4
Medium	90.1	90.3	9.1	3.3	0.8	0.8	61.9	24.1	38.1	13.9	0.1	0.1
Large	86.1	98.6	11.6	0.7	0.3	0.02	60.9	2.1	34.7	0.9	0.0	0.0
All Sizes	88.4	88.1	8.6	4.2	1.7	1.3	80.9	12.4	17.3	6.7	1.5	1.0

Source: Agricultural Census Of West Bengal . 1975/76,1985/86,1990/91,1995/96

The *wholly leased-in* holdings for the marginal category infact increased from 0.98 percent in 1975/76 to 2.11 percent in 1985/86 during 1975/76 to 1985/86, then followed a downward trend till 1995/96. Similarly,the total leased-in area for the marginal class first increased from 1.09 hectares in 1975/76 to 1.97 hectares in 1985/86, and then it declined to 1.70 hectares in 1990/91 and 1.36 hectares in 1995/96. This pattern of variation of first rising till 1985/86 and then declining till1995/96 of the wholly leased-in area to the total leased-in area was found in all the other size classes also.

Total leased-in area wholly or partly ,to the total operated area for the marginal category was 6.64 percent in 1975/76. It declined to 6.25 percent in 1985/86 and further to 5.87 percent in 1990/91, subsequently it rose again in1996 to 6.92 percent. Leasing-in of area by the large category constitutes 1.73 percent in 1975/76, which declined to 0.69 percent in 1990/1 but, then it too increased again in 1995/96 to 0.9 percent. Total leased-in area for all size classes was 5.7 percent in 1970/75, which declined to 5.54 percent and 5.47 percent during 1985/6 and 1990/91, then increased again to 6.70 percent in 1995/96.

For all size classes, wholly leased-in holdings started declining from 1985/86 onwards till 1995/96 from 1.98 percent 1.67 percent in 1990/91 and finally to 1.46 percent in 1995/6. The wholly leased-in area for all size classes also declined from 1.42 hectares to 1.30 hectares and 1.01 hectares in1975/76, 1985/86 and 1995/96 respectively.

Thus, we see that there was a decline in the percentage of entirely leased-in holdings. This may be due to the eviction of large number of poor tenants who are pushed to the ranks of agricultural labourers[3]. This also explains the increase in the percentage of agricultural labourers in West Bengal after Independence. It may be noted that the percentage of agricultural labourers in total rural workforce increased in West Bengal from 18.97 percent in 1951 to 32.95 percent in 1981, to 32.27 percent in 1991 and 33.04 percent in 2001[4].

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[3]   Bhaumik, S.K, Tenancy Relations and Agrarian Development, a Study of West Bengal.

[4]   Taken from District Handbooks: government of West Bengal.

(B) District Level Analysis

For the district level such a detailed analysis is not possible .So we look at the data that is possible to interpret. If we look at the Tenancy status by size class (table 10 (a), 10(b)) we see that, *wholly leased-in* holdings for the marginal class between 1991 and 1996 has declined both in area and number so that the average leased-in area has declined in all the districts except, West Dinajpur, Malda, 24 Paraganas(n) Howrah and Purulia . The number and area leased-in by the small category has also declined in all the districts except, Malda, 24 Paraganas, Bankura and Purulia. The area and number of holdings leasing-in for the semi-medium category has declined in all the districts, except Midnapur and Purulia. For the larger category and medium categories adequate data is not available for analysis at the district level.

However, if we look into the partly leased-in holdings and area, then we see that in conformity with the state level data, number of holdings for the partly leased-in holdings has been increasing for most of the districts across all size classes between 1991 and 1995/96.

Thus, we a drift from wholly leased-in holdings to partly leased-in holdings in the recent years. Therefore, what emerges out from the entire discussion is that wholly leasing-in area has declined over the years. However in the recent years we can see that number of holdings partly leasing-in area has increased while the number of holdings wholly leasing-in holdings have declined. This means that pure tenants have been evicted and possibly pushed to the position of agricultural labourers.

Summarizing the important conclusions from our discussion on the tenancy status, we can say that:

- *The percentage of wholly leased-in operated area has been declining in the State.This point is also supported by the district level data.*

Table : 10 (a) District wise leased-in area

1990-91

Districts	MARGINAL Wholly leased-in holdings		MARGINAL Partly leased-in holdings		SMALL wholly leased-in holdings		SMALL Partly leased-in holdings		Semi-Medium wholly leased-in holdings		Semi-Medium Partly leased-in holdings		Medium Wholly leased-in holdings		Medium Partly leased-in holdings		Large wholly leased-in holdings		Large Partly leased-in holdings	
	Number	area	number	area	number	area	number	area	number	area	number	area	Number	area	number	area	number	area	number	area
Jalpaiguri	1.71	1.78	2.79	0.92	1.08	1.07	5.29	1.51	0.16	0.21	5.89	1.39	0.61	0.66	6.67	2.14	0.00	0.00	0.00	0.00
Coochbehar	2.35	2.63	6.21	3.74	4.48	4.54	11.27	1.54	3.33	3.13	12.22	5.41	0.00	0.00	13.16	3.45	0.00	0.00	13.39	0.31
West Dinajpur	1.28	1.39	1.60	0.69	0.52	0.51	8.56	3.35	0.76	0.86	4.69	1.93	0.55	0.49	2.16	0.90	0.00	0.00	13.51	2.07
Malda	0.57	0.43	3.93	1.95	0.24	0.24	6.32	2.25	0.48	0.51	5.66	2.02	0.00	0.00	7.32	3.33	0.00	0.00	39.58	28.04
Murshidabad	1.49	1.21	9.66	5.81	0.83	0.81	21.14	8.59	0.00	0.00	18.65	6.33	0.00	0.00	12.52	3.75	0.00	0.00	0.00	0.00
Nadia	1.58	1.68	7.39	4.50	1.14	1.09	12.80	6.98	0.83	0.84	8.19	3.10	0.00	0.00	7.51	2.52	0.00	0.00	7.89	1.01
24 Paraganas (n)	2.06	1.36	2.76	4.23	0.63	0.58	13.98	4.73	0.00	0.00	9.62	2.49	0.77	0.83	9.26	3.48	0.00	0.00	19.59	0.00
24 Paraganas (s)	1.90	1.44	8.16	3.85	0.38	0.37	10.31	3.02	0.58	0.61	7.83	2.87	1.56	1.95	10.84	5.02	0.00	0.00	15.38	1.37
Howrah	1.07	1.08	8.31	6.16	0.16	0.13	18.97	7.47	0.20	0.24	16.31	5.90	5.65	5.82	11.79	4.28	22.22	22.94	50.00	14.22
Hooghly	2.20	2.07	9.60	7.27	1.11	0.98	17.72	7.51	1.65	1.61	11.17	3.47	0.00	0.00	0.00	0.00	0.00	0.00	83.33	25.95
Burdwan	6.01	5.59	9.98	6.82	2.30	2.18	18.01	8.38	1.17	0.98	15.23	5.10	0.00	0.00	9.23	4.35	0.00	0.00	50.00	43.06
Birbhum	3.76	3.79	2.47	1.03	3.05	2.99	14.82	7.10	1.33	1.23	10.93	4.84	0.83	0.76	10.17	3.70	0.00	0.00	12.07	4.78
Bankura	4.40	5.21	5.64	4.46	8.49	8.60	14.74	9.47	4.08	3.87	13.22	7.83	0.41	0.47	4.01	1.71	0.00	0.00	0.00	0.00
Purulia	2.25	2.04	13.12	6.03	0.95	0.90	16.27	6.13	0.41	0.37	14.46	5.34	1.34	1.43	17.36	6.96	0.00	0.00	20.59	7.69
Midnapur (w)	0.29	0.26	1.68	0.72	0.22	0.25	2.98	1.21	0.00	0.00	3.05	1.09	0.54	0.78	5.77	2.53	0.00	0.00	0.00	0.00
Midnapur (E)	1.18	0.85	7.07	2.59	0.27	0.26	8.80	2.31	0.19	0.19	6.20	1.30	0.57	0.83	5.42	0.81	0.00	0.00	11.11	4.31

Source: Agricultural Census Of West Bengal . 1975/76,1985/86,1990/91,1995.

Table : 10(b) District wise leased-in area

Districts	1995/96 Marginal wholly leased-in holdings		Partly leased-in holdings		Small wholly leased-in holdings		Partly leased-in holdings		Semi medium Wholly leased-in holdings		Partly leased-in holdings		Medium Wholly leased-in holdings		Partly leased-in holdings		Large wholly leased-in holdings		Partly leased-in holdings	
	number	area	number	area	number	area	number	area	number	area	number	area	Number	area	number	area	number	area	number	area
Jalpaiguri	1.02	1.03	10.10	3.36	0.13	0.14	12.72	4.68	0.00	0.00	19.89	6.98	0.00	0.00	38.46	16.18	0.00	0.00	13.40	0.19
Coochbehar	1.30	1.36	16.50	10.17	1.00	1.07	22.69	14.43	0.66	0.53	27.80	17.93	0.00	0.00	56.79	45.36	0.00	0.00	1?.86	0.29
West Dinajpur	0.85	0.72	19.93	9.68	0.45	0.41	23.43	11.11	0.00	0.00	21.23	9.89	0.00	0.00	35.53	16.49	0.00	0.00	21.74	1.63
Malda	0.98	0.72	15.29	5.74	0.34	0.35	20.31	8.02	0.26	0.25	17.81	6.37	0.00	0.00	36.53	13.11	0.00	0.00	56.96	8.01
Murshidabad	2.14	1.91	139.89	7.08	1.20	1.11	23.25	11.28	0.41	0.37	24.94	12.40	0.54	0.43	46.77	20.53	0.00	0.00	48.48	11.11
Nadia	1.23	0.85	9.03	4.83	0.46	0.45	14.19	6.72	0.10	0.09	13.61	7.56	0.00	0.00	24.71	15.19	0.00	0.00	46.88	11.25
24 Paraganas (n)	1.56	1.07	11.31	5.13	0.36	0.36	14.60	4.94	0.00	0.00	13.01	4.84	0.00	0.00	30.31	11.73	0.00	0.00	35.71	0.29
24 Paraganas (s)	1.38	1.03	11.16	4.37	0.59	0.58	14.20	6.20	0.62	0.59	18.83	9.15	0.00	0.00	73.66	35.64	0.00	0.00	45.95	31.00
Howrah	0.49	0.40	21.96	2.89	0.00	0.00	37.37	2.88	0.08	0.11	44.10	3.72	0.00	0.00	50.77	10.86	0.00	0.00	0.00	0.00
Hooghly	3.75	3.64	10.16	6.63	0.46	0.68	30.57	20.74	0.00	0.00	26.22	22.12	0.00	0.00	60.20	41.59	0.00	0.00	100.00	80.00
Burdwan	6.20	5.07	20.33	7.16	2.00	2.07	23.69	6.81	0.30	0.35	26.25	6.10	0.00	0.00	31.94	7.45	0.00	0.00	0.00	0.00
Birbhum	3.08	2.79	20.15	6.58	2.23	2.07	24.79	8.15	0.47	0.42	24.55	6.80	0.08	0.05	27.55	6.35	0.00	0.00	73.78	15.22
Bankura	3.69	4.39	22.42	5.66	7.10	7.03	28.40	9.89	3.13	2.87	30.84	8.93	0.00	0.00	34.37	5.65	0.00	0.00	42.86	2.13
Purulia	2.52	1.73	23.15	6.61	1.22	1.09	25.89	6.15	0.28	0.28	29.74	5.95	0.00	0.00	37.21	5.04	0.00	0.00	36.36	1.61
Midnapur (w)	0.38	0.33	4.17	1.60	0.46	0.45	6.86	2.23	0.15	0.12	9.39	3.00	0.14	0.11	19.48	6.27	0.00	0.00	53.62	15.57
Midnapur (E)	0.57	0.38	16.64	4.80	0.17	0.16	17.90	4.92	0.28	0.27	19.77	5.23	0.00	0.00	48.08	12.30	0.00	0.00	32.26	2.55

Source: Agricultural Census Of West Bengal 1975/76,1985/86,1990/91,1995/96

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- *The percentage of partly leased-in operated area has increased in the recent years, as is confirmed by the data for the State and the district level.*

- *This indicates that pure tenancy has been declining in West Bengal. This declining tendency towards pure tenant cultivation may be due to several factors, such as[5] :*

(a) Subdivision of land through inheritances,

(b) eviction of tenants following tenancy legislation,

(c) redistribution of ceiling surplus land among sharecroppers,

(d) reluctance on the part of the landowners to initiate fresh tenancy arrangements for fear of tenancy legislation awarding the sharecropper a higher proportion of crop and shielding him against eviction and so on,

(e) Another reason could be the spread of new technology in agriculture which made cultivation with hired labour more attractive to many landowners.

Terms Of Lease:

(A) State Level Analysis

Share of produce has been the dominant form of tenancy in West Bengal in the Colonial period as well as in the Post Independence period. Let us look at the data showing the type of tenancy that prevailed in West Bengal and the changes that have been brought in over the years. Tables 11 (a), (b), (c),(d) show that in 1975/76, share of produce was the dominant form of leasing-in land for the marginal, small and semi-medium category where almost more than 80 percent of the wholly leased-in holdings were leased-in for share of produce. Whereas, for the medium category share of produce constituted 69.09 percent of the wholly leased-in land and 28.96 percent of area was leased-in for fixed rent. For, large category, 'other terms' constituted the dominant form of tenancy at 81.19 percent and area leased-in for fixed rent constituted almost 18.8 percent as on 1975/76.

However, the form of tenancy underwent changes over the years. We can see that area leased-in for fixed rent was increasing for marginal, small and semi-

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[5]   S. K. Bhaumik (1993), 'Tenancy Relations and Agrarian Development, a study of West Bengal, Sage Publication.

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medium category. The area leased-in for fixed rent increased for the marginal category from 9.39 percent to 12.44 percent, to 12.93 percent and further to 15.48 percent in 1975/76, 1985/86, 1990/91 and 1995/96 respectively. For small and semi-medium categories there was also a rise in the in the proportion of area leased-in for fixed rent between the same period. The rise for the small category was from 8.8 percent in 1975/76, to 9.80 percent in 1985/86 and further to 12.37 percent in 1995/96. Similarly the rise for the semi-medium category was from 7.04 percent in 1975/76 to 13.9 percent in 1985/86 and further to 21.266 percent in 1995/96. This rise in *fixed rent* meant that there was a decline in some other form of contract, and this was seen by the fall in the form of leasing-in land on the basis on of share of produce. Thus we see that there was a decline in the share produce for marginal, semi-medium, and small category between 1975/6 and 1995/96. For the marginal category leasing-in area for share produce has declined from 81.83 percent in 1975/76 to 74.085 percent in 1985/86 and further to 70.71 percent in 1995/96. For small category, the decline was from 86.83 percent in 1975/76 to 81.98 percent in 1985/86 and further down to 80.96 percent in 19995/96. For the semi- medium category, there was a similar trend and the decline was from 89.09 percent in 1975/76 to82.81 percent in 1990/91 and 73.41 percent in 1995/96. For larger category however, leasing-in on the basis of fixed rent was the dominant form of tenancy. If we look into the changes in the pattern of terms of tenancy for all size groups, then we can clearly see a shift towards fixed rent away from share of produce. There was a decline in share of produce from 83.92 percent in 1975/76 to 75.31 percent in 1985/86 to 76.75 percent in 1990/91 and further to 74.29 percent in 1995/96. Leased-in area on the basis of fixed rent has increased from 9.24 percent in 1975/76 to 12.35 percent in 1985/86 to 12.76 percent in 1990/91 and further rose to 16.22 percent in 1995/96. *Though there was a clear shift towards fixed rent tenancy, share of produce continuous to be the dominant form of leasing-in land in West Bengal.*

Let us now try and look into the terms of leasing-in land in the case of mixed *holdings*. Leasing-in area under share of produce was the dominant form of tenancy for the marginal, small and semi-medium categories. But as we have seen in the case of wholly leased-in area, here too there was a shift towards fixed rent for marginal,

small and semi-medium category between 1975/76 to 1990/91. This shift from share tenancy to fixed rent took place between 1975/76 and 1990/91 after which the percentage of area leased-in under fixed rent fell from the 1990/91's level. For the marginal category, area under fixed rent rose from 4.5 percent to 11.38 percent between 1975/76 and 1985/86 and further to 14.59 percent in 1990/91, after which percentage under fixed rent fell to 10.57 percent in 1995/96. For small category, this trend of rise in the area under fixed rent rose till 1990/91 but then, declined from 12.93 percent in 1990/91 to 8.98 percent in 1995/96. Similar trend was found in the case of semi-medium category. But it should be noted that, though there was a fall in the area leased-in under fixed rent in the 1995/96 figure from the 1990/91's figure, 1995/96's figure of the area leased-in under fixed rent was definitely higher than what prevailed in 1975/76. The rise in the area under fixed rent led to a decline in the area under share of produce. The figures show us that the area under share of produce registered a similar decline for marginal, small and semi-medium categories. For the marginal category, the decline in the share of produce did take place but here again, from 91.4 percent in 1975/76 to 75.9 percent in 1985/86, 70.7 percent in 1990/91 and then rose again to 84 percent in 1995/96. The area leased-in under share of produce basis has declined in 1995/96 from the 1990/1 figure, but as pointed out in the case of fixed rent, area leased-in under share of produce basis is definitely lower than what prevailed in 1975/76.

For the medium category, share of produce was the dominant form of leasing-in land between 1975/76 and 1985/86. Though however there was a shift towards fixed rent in 1985/86 and 1990/91, this was reverted back to share crop basis in 1995/96. For medium category, area leased-in under fixed rent was 5.15 percent in 1975/76, it increased to 16.5 percent in 1985/6 and rose further to 24.4 percent in 1990/91, then declined to 4.7 percent in 1995/6. Similarly area leased-in under share of produce for the medium category declined from 89.73 percent in 1975/76 to 76.7 percent in 1985/6 and further to 42.78 percent in 1990/91, after which area leased-in under share of produce rose to 94.05 percent in 1995/96. For large category fixed rent was the dominant form of leasing-in of area in 1975/76, 1985/86 and 1990/91, though larger category also leased-in land under share crop basis.

However, if we look into the changing pattern of leasing-in area for all size classes, we can infer that there was a shift from share of produce to fixed rent tenancy. As the figures tell us that area leased-in under fixed rent tenancy increased from 4.5 percent in 1975/76 to 10.41 percent in 1985/86 which further increased to 14.88 percent in 1990/91 but then, declined to 8.38 percent in 1995/96. The area leased-in under share of produce declined from 92.03 percent in 1975/76 to 80.79 percent in 1985/86 and further to 71.26 in 1990/91, which then increased to 87.4 percent in 1995/95. But as already pointed out earlier, if we compare it with the figure in 1975/76   then definitely we can say that there was a shift away from share of produce towards fixed rent. . But despite this shift, share of produce still continues to dominate the leasing-in pattern in West Bengal.

Table : 11(a) Terms Of Lease

Category	Partly owned and partly leased holdings area leased-in for					wholly leased-in holdings area leased-in for				
	fixed rent	share of produce	Usufructuary mortgage	other terms	total	fixed rent	share of produce	Usufructuary mortgage	other terms	total
					1975-76					
Marginal	4.5	91.4	0.4	3.7	100.0	9.4	81.8	0.4	8.4	100.0
Small	3.5	94.8	0.4	1.4	100.0	8.9	86.1	0.5	4.5	100.0
Semi Medium	3.9	93.7	1.0	1.4	100.0	7.0	89.1	na	3.9	100.0
Medium	5.2	89.7	2.1	3.0	100.0	29.0	69.1	na	1.9	100.0
Large	42.8	4.2	0.7	52.3	100.0	18.8	na	na	81.2	100.0
Allsizes	4.5	92.0	0.6	2.8	100.0	9.2	83.9	0.4	6.4	100.0

Source: Agricultural Census of West Bengal . 1975/76.

Table : 11(b) Terms Of Lease

Category	Partly owned and partly leased holdings area leased-in for					wholly leased-in holdings area leased-in for				
	fixed rent	share of produce	Usufructuary mortgage	other terms	total	fixed rent	share of produce	Usufructuary mortgage	other terms	total
					1985-86					
Marginal	11.4	75.9	1.9	10.9	100.0	12.4	74.1	0.7	12.8	100.0
Small	8.9	84.0	1.4	5.8	100.0	9.8	82.0	1.4	6.8	100.0
Semi Medium	9.9	83.9	1.5	4.8	100.0	14.0	68.3	1.7	16.0	100.0
Medium	16.5	76.7	1.7	5.1	100.0	59.1	26.1	14.9	0.0	100.0
Large	100.0	na	na	na	100.0	0.0	na	na	na	na
Allsizes	10.4	80.8	1.6	7.2	100.0	12.4	75.3	1.3	11.1	100.0

Source: Agricultural Census Of West Bengal., 1985/86,

Table : 11(c) Terms Of Lease

1990-91										
	Partly owned and partly leased holdings area leased-in for					wholly leased-in holdings area leased-in for				
Category	fixed rent	share of produce	Usufructuary mortgage	other terms	total	fixed rent	share of produce	Usufructuary mortgage	other terms	total
Marginal	14.6	70.7	3.5	11.2	100.0	12.9	75.6	2.3	9.2	100.0
Small	12.9	75.1	2.1	9.8	100.0	9.2	85.2	1.2	4.4	100.0
Semi Medium	13.2	74.8	2.2	9.8	100.0	10.4	22.5	2.2	4.6	100.0
Medium	24.4	42.8	4.3	28.5	100.0	42.4	12.2	34.6	10.8	100.0
Large	34.1	24.2	4.2	37.4	100.0	52.0	0.0	48.0	0.0	100.0
Allsizes	14.4	71.3	2.8	11.6	100.0	12.8	76.8	3.5	7.0	100.0

Source: Agricultural Census Of West Bengal . 1990/91.

Table : 11(d) Terms Of Lease

1995-96										
	Partly owned and partly leased holdings area leased-in for					wholly leased-in holdings area leased-in for				
Category	fixed rent	share of produce	Usufructuary mortgage	other terms	total	fixed rent	share of produce	Usufructuary mortgage	other terms	total
Marginal	10.7	84.0	1.7	3.7	100.0	15.5	70.7	2.3	9.1	100.0
Small	9.0	86.1	1.7	3.2	100.0	12.4	81.0	2.2	4.4	100.0
Semi Medium	5.6	91.7	0.5	2.1	100.0	21.3	73.4	0.0	5.3	100.0
Medium	4.8	94.1	0.4	0.7	100.0	12.9	87.1	0.0	0.0	100.0
Large	6.9	93.1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
Allsizes	8.4	8.7	1.3	2.8	100.0	16.3	74.3	2.9	7.3	100.0

Source: Agricultural Census Of West Bengal 1995/96

(B) District Level Analysis:

Let us analyse the district level scenario of the terms of tenancy. As the table 12 shows, that the area leased-in under share produce tenancy was on a decline till 1990/91 in almost all the districts except Darjeeling and Birbhum. While at the same time, area under fixed rent has increased in all the districts except Darjeeling, Jalpaiguri, Birbhum and Purulia in the same period. But as in the case of State level scenario, this trend towards a shift to fixed rent was reversed in 1995/96, and the area leased-in under share tenancy was increasing. Despite this phenomenon, the district level analysis shows that share cropping continues to remain the dominant form of leasing-in most of the districts in West Bengal.

If we look at the pattern of leasing-in by size class tables 13(a) and 13(b), (the data for which is available only for agricultural Census 1990/91 and 1995/96). We can see that in all the districts leasing-in land on share crop basis was the dominant form of tenancy for the marginal class and semi-medium categories between 190/91 and 1995/96. . However for the medium category fixed rent was the dominant form of leasing-in Nadia, 24 Paraganas (n), Burdwan and Bankura, in all other districts share of crop was the dominant form of leasing-in land. But in 1995/96 for the medium category share of produce becomes the dominant form of leasing-in all the districts. For the Large category, Fixed rent was dominant in Jalpaiguri, Cooch behar, Malda, 24 Paraganas (n), Howrah, and Midnapur(w), in 24 Paraganas (s) and Hooghly fixed rent was the dominant form of leasing-in land (for the rest of the districts information is not available) as in 1990/91. Fixed rent which was the main terms of leasing-in land for the large category, declined in 1995/96, now large land owners were leasing-in land under share crop basis in most of the districts for which data is available, except 24 Paraganas (n) and Birbhum. Thus, in conformity with the State data, sharecropping is the dominant form of tenancy in most of the districts in West Bengal.

The shift in the fixed rent tenancy can be attributed to the fact that with the coming of new technology, the large farmers leased out land on fixed rent to get the benefit of better technology[6].

Table : 12 Terms of Lease

	1975/76		1990/91		1995/96	
	Fixed Rent	Share of produce	Fixed Rent	Share of produce	Fixed Rent	Share of produce.
Darjeeling	14.0	64.3	11.6	46.7	2.6	89.8
Jalpaiguri	8.4	88.3	4.4	79.0	5.0	90.7
Cooch Behar	0.8	96.7	8.5	77.9	3.0	91.5
West Dinajpur	3.1	91.1	16.6	50.2	9.0	77.7
Malda	0.7	97.2	6.1	78.8	7.2	88.4
Murshidabad	2.4	95.5	18.2	69.2	17.1	80.1
Nadia	1.1	96.7	44.3	49.6	14.9	76.9
24 Parganas (n)	3.9	92.7	23.6	40.2	11.6	85.3
24 Parganas (s)	6.3	89.8	13.3	61.7	26.5	55.4
Howrah	0.4	99.3	22.7	77.7	13.1	85.8
Hooghly	2.5	95.8	12.3	109.4	11.3	87.4
Burdwan	9.1	82.1	16.5	78.2	7.3	90.6
Birbhum	12.7	64.3	3.8	93.6	5.1	92.8
Bankura	1.9	94.9	10.9	77.8	13.2	80.1
Purulia	15.1	82.1	11.8	59.8	7.0	89.1
Midnapur (W)	7.5	88.1	16.8	58.5	9.0	88.8
Midnapur (E)	4.1	93.2	9.6	74.7	7.3	88.2

Source: Agricultural Census Of West Bengal . 1975/76,1985/86,1990/91,1995/96

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[6]   Ghosh , M.G (1981) , in his study of two villages in Burdwan district of West Bengal observes how the lease market for land underwent several changes with the coming of new technology. He notes that share cropping is more prevalent among the small farmers compared to the large farmers who now prefer fixed rent tenancy.

Conclusion:

We may now summarize the main changes that took place in the land structure of West Bengal.

The analysis on the study of ownership shows that the area and number of holdings of the marginal category of operators have increased, but the rate of increase in the number of holdings was more than the increase in the area owned by the marginal category, so that the average owned area has changed only marginally. Moreover, the distribution of owned area has been far from equal, with a larger proportion of land being concentrated in the hands of the large operators.

The study of operational holdings indicates an increase in the percentage of *'marginal holdings'* over time. But the distribution of land holdings is far from equal. The average size of operational holdings continuously declined in West Bengal.

Thus, we see that inequality in the ownership and in the operation of land has to a large extent remained unaltered.

Looking into the leased-in area, we saw that the practice of leasing-in is higher among the marginal categories. However, over the years , the leased-in area, both partly leased-in and wholly leased-in has declined. Another important aspect is that a general decline in the practice of leasing-in land is noticeable in West Bengal among all categories of operators. The decline in area under tenancy is also accompanied by a decline in the percentage of the entirely leased-in holdings. This implies that the pure tenants must have been pushed to the rank of agricultural labourers. We can say that the practice of leasing-in of land has been largely confined to marginal and to some extent small and semi-medium holders.

Terms of lease shows that share of produce is the dominant form of leasing mostly among the marginal and small category of farmers. Over the years area leased-in under fixed rent has however increased. However, its total impact has so far made only a marginal difference on the overall tenancy structure in the State and share tenancy continues to be the dominant form of tenancy.

Table : (13a) Terms Of Lease (Districts wise)

	1990/91									
	Marginal		Small		Semi Medium		Medium		Large	
	Share of Produce	Fixed rent	Share of Produce	Fixed rent	Share of Produce	Fixed rent	Share of Produce	Fixed rent	Share of Produce	Fixed rent
Darjeeling	58.6	12.9	60.6	9.2	28.9	15.5	23.8	9.3	0	0
Jalpaiguri	76.3	5.5	82.8	3.3	82.7	2.5	56.4	5.1	31.0	37.8
Cooch Behar	70.7	3.6	90.2	2.8	77.9	0.0	56.4	0.0	0.4	27.2
West Dinajpur	54.5	17.5	64.0	10.9	51.6	20.3	25.0	15.3	0	0
Malda	73.4	8.5	79.4	5.1	88.4	3.6	80.2	5.5	0.0	100.0
Murshidabad	71.4	17.3	66.7	22.2	75.9	9.1	13.0	10.4	0	0
Nadia	59.7	33.9	40.8	52.2	50.5	43.2	41.3	58.7	0	0
24 Parganas (n)	43.6	37.3	51.2	31.5	33.0	38.1	5.8	46.1	0.0	32.1
24 Parganas (s)	62.1	15.7	68.7	9.1	64.5	18.7	23.1	2.3	100.0	0.0
Howrah	68.7	25.2	76.5	14.7	92.3	7.2	0	0	32.3	41.9
Hooghly	80.1	9.3	81.8	11.1	84.9	7.2	65.0	3.9	100.0	0.0
Burdwan	83.1	11.7	38.6	9.8	68.9	25.0	44.2	52.3	0	0
Birbhum	89.9	3.7	94.9	3.5	94.9	3.1	73.9	21.6	0	0
Bankura	83.1	4.9	81.9	8.9	90.9	7.7	19.6	45.1	0	0
Purulia	60.4	20.9	77.4	5.2	65.9	1.7	27.8	23.6	0	0
Midnapur (W)	56.4	13.9	63.3	19.5	59.9	19.9	48.1	20.3	0.0	100.0
Midnapur (E)	76.2	9.9	73.9	7.3	60.4	12.0	100.0	0.0	0	0

Source: Agricultural Census Of West Bengal, 1990/91.

Table: (13a) Terms Of Lease

	1995/96									
	Marginal		Small		Semi Medium		Medium		Large	
	Share of Produce	Fixed rent	Share of Produce	Fixed rent	Share of Produce	Fixed rent	Share of Produce	Fixed rent	Share of Produce	Fixed rent
Darjeeling	79.2	6.5	84.2	2.5	96.6	0.9	100.0	0.0	100	0
Jalpaiguri	87.3	5.4	85.8	7.8	93.3	4.5	98.4	1.6	100	0
Cooch Behar	91.8	4.5	93.4	1.9	95.0	3.7	97.0	0.1	83.3	16.7
West Dinajpur	74.2	9.9	70.7	9.9	88.4	5.5	88.1	10.3	100	0
Malda	81.4	10.3	87.1	8.4	92.1	5.2	97.1	2.6	100	0
Murshidabad	72.2	24.1	76.8	19.3	92.6	7.2	96.4	2.7	100	0
Nadia	71.8	18.1	74.9	16.7	91.6	5.8	93.1	2.8	100	0
24 Parganas (n)	76.7	17.2	85.0	12.5	97.6	7.7	99.7	0.0	37	63
24 Parganas (s)	55.8	25.4	49.7	27.6	50.7	32.8	72.3	16.7	0	0
Howrah	72.4	25.7	96.5	2.8	100.0	0.0	100.0	0.0	100	0
Hooghly	88.5	10.5	89.2	9.3	81.5	14.2	67.9	32.1	0	0
Burdwan	88.0	8.0	1.2	0.1	95.9	3.3	98.1	1.9	100	0
Birbhum	89.2	5.7	94.7	4.0	94.0	6.0	91.8	8.1	34.5	65.5
Bankura	76.4	14.2	82.1	13.5	86.1	6.6	68.4	31.1	83.3	16.7
Purulia	83.6	9.5	91.8	4.2	88.5	8.0	92.5	7.5	94.5	5.5
Midnapur (W)	84.6	11.8	90.0	8.8	92.8	5.9	98.7	1.3	100	0
Midnapur (E)	86.8	8.4	89.8	4.8	92.7	6.4	98.1	1.9	0	0

Source: Agricultural Census Of West Bengal,1995/96

Chapter Three

Agricultural productivity in West Bengal

In this chapter, we examine the changes in production and productivity in West Bengal for various crops during 1970-2000. While there was stagnation in the agricultural growth in 1970,s in eastern India, a noteworthy growth took place from 1980's. In our study we particularly concentrate on the growth pattern of West Bengal, and compare it with the growth pattern in the neighbouring states of Bihar and Orissa to see how, given the same agro-climatic conditions, the growth pattern differs among the states.

The growth rates in table(s) 1, 2,3,4 are calculated from an exponential growth equation of the type

$$\ln y_t = a + bt + u_t$$

(which is a linear transformation of $y_t = Ae^{bt}v_t$)

Where, y_t is the output in the year t, a is a constant and v_t is the error term.

We have compared the growth rates of rice, wheat and food grains for West Bengal, Orissa, Bihar and All India. We can see from the table that productivity level for all the three states has increased for both rice and wheat between 1970's and 1980's[1]. However, one important thing that comes out of this table is that the rate of foodgrain yield level registered the fastest growth in West Bengal when compared to Bihar, Orissa and All India Productivity levels. The production of foodgrains and productivity level increased from 0.08 to 3.6 percent and 0.758 to 3.6 percent between 1970's and 1980's. In Orissa, production increased from 0.86 to 2.86 percent and yields increased from –0.644 to 2.4 percent in the same period. Bengal registered the highest growth in the said period where its

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[1]   1970's refers to 1970 to 1980 and 1980's refer to 1980 to 1990

TABLE 1 : EXPONENTIAL GROWTH RATE OF RICE

Year	Bihar			Orissa			West Bengal			All India		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
1970	0.63	1.11	0.48	-0.97	-0.57	0.41	0.00	1.34	1.34	0.83	2.29	1.44
1980	-3.75	4.22	8.27	0.46	3.76	3.29	1.27	6.39	5.06	1.32	3.76	2.41
1990	-1.06	3.29	4.39	0.06	-1.94	-2.00	0.07	1.90	1.83	0.61	1.78	1.17
1970-2000	-0.59	1.46	2.06	0.01	1.66	1.65	0.59	3.27	2.67	0.60	2.86	2.25

Source: Calculated from CMIE, Agriculture, various issues.

TABLE 2: EXPONENTIAL GROWTH RATE OF WHEAT

Year	Bihar			Orissa			West Bengal			All India		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
1970	1.99	1.93	-0.06	11.87	13.60	1.54	1.40	-1.28	-2.65	2.28	4.53	2.20
1980	1.96	4.71	2.70	-7.17	-8.66	-1.60	2.05	1.41	-0.63	0.51	3.68	3.15
1990	0.63	2.49	1.85	-12.30	-13.80	-1.71	4.81	6.19	1.32	1.20	3.04	1.81
1970-2000	1.05	3.24	2.16	-8.07	-9.05	-1.07	-0.80	-0.39	0.41	1.19	4.13	2.91

Source: Calculated from CMIE, Agriculture, various issues.

TABLE 3 : EXPONENTIAL GROWTH RATE OF FOOD GRAINS

Year	Bihar			Orissa		
	Area	Production	Yield	Area	Production	Yield
1970	0.08	0.84	0.76	1.51	0.86	-0.64
1980	-0.01	3.69	3.70	0.45	2.87	2.40
1990	-1.01	2.79	3.84	-2.47	-3.40	-0.95
1970-2000	-0.58	1.90	2.50	-0.37	1.12	1.49

Source: Calculated from CMIE, Agriculture, various issues.

TABLE 4: EXPONENTIAL GROWTH RATE OF FOOD GRAINS

Year	West Bengal			All India		
	Area	Production	Yield	Area	Production	Yield
1970	-0.09	0.97	1.07	0.41	2.27	1.85
1980	0.93	5.81	4.84	-0.13	2.93	3.06
1990	0.22	2.10	1.87	-0.20	1.75	1.95
1970-2000	0.16	2.78	2.62	-0.06	2.57	2.63

Source :Calculated from CMIE, Agriculture, various issues.

production rose from 0.97 to 5.8 percent and productivity from 1.06 to 4.84 percent. {Figure 3(a) shows the same} West Bengal's growth rate was not only higher than its neighbouring states but also higher than the all India average. All India's growth rate of production was 2.56 and 2.92, whereas the yield level was 1.84 and 3.06 percent in the said period.

Figure 3(a)
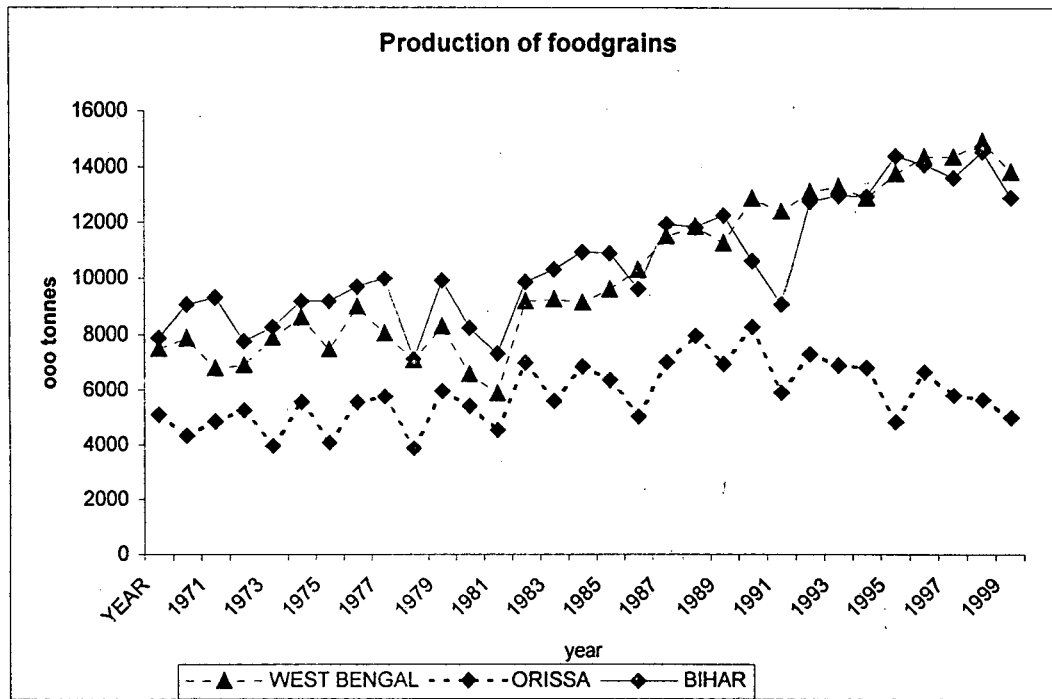
Thus, from the above, we can say that the eastern part of India saw a rapid rise in both production and productivity levels in the 1980's, but it was West Bengal that registered the highest growth rate. Moreover we can see from the decomposition pattern of the growth of foodgrains into yield and area we can see that the rise in the production of food grains was essentially due to the rise in the productivity level in all the three states described as well as in All India. The same is true in the case of growth rate for rice production, where we can read from the table that West Bengal registered the highest growth rate not only compared to it's neighbouring states but also to All India.

We now move on to look at the pattern of growth at the state as well as district level of some important crops, foodgrains, rice , wheat, pulses and potato .

The growth rates found for the major crops follow the methodology given by James Boyce[2](see appendix to chapter 3).

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[2]   Boyce, James: Agrarian Impasse in West Bengal.
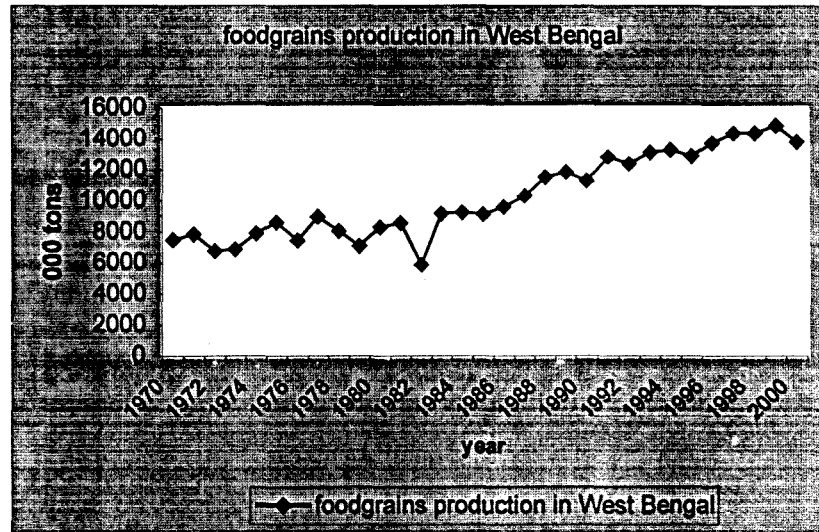
FOODGRAINS

State level

Let us now look into the trend of growth of foodgrains production, area and yield. Figure 3 (b) clearly shows that foodgrains production started growing from early 1980's. Kinked exponential growth rates calculated for foodgrains production shows that foodgrains production registered a high positive growth rate of 4.43 percent in 1980's. It was also accompanied by a rise in the growth rate of both area under foodgrain from –0.59 percent in 1970's to 0.47 percent in 1980's so that trend break[3] between 1970's and 1980's for area was to the extent of 1.06 percent. Growth rate in the productivity of foodgrains rose from 0.66 percent to 4.033 percent in the same period showing a positive trend break of 3.37 percent in 1980's.

District Wise Analysis

The district wise scenario shows the same trend, one where growth rate in production increased in all the districts to show a positive trend break, except Burdwan and West Dinajpur. The highest growth rate in foodgrains production was achieved in Howrah (7.22%), Bankura (6.9%) and Murshidabad (6.2%). The growth rate was negative in Burdawan in 1980's (-1.5%) and West Dinajpur (0.89%). For yield, it was Burdwan and West Dinajpur, which showed a negative growth rate in 1980's, all the other districts registered a rise in the growth of yield. Moreover, except West Dinajpur and Jalpaiguri, all other districts experienced a rise in the area grown under foodgrains shown by the positive trend break across all districts in 1980's.

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[3]   Trend break is the difference in the growth rates.

Figure 3(b)

Looking into the decomposition pattern of total foodgrains production in yield level and sown area, we see that the increase in production across districts was attributed to the increase in yield more than the rise in sown area. The percentage of foodgrains production to the total (table 5), shows that Burdwan, Midnapur and Twenty Four Paraganas are some of the major foodgrain producing districts, and have been so over the last three decades.

However, the picture in the *nineties* seems to have been different from that of the *eighties,* where the increasing growth in foodgrain production was halted. In other words growth rate started declining in West Bengal in 1990's. Food grains production fell from 4.5 percent in 1980's to 2.1 percent in 1990', a fall of –2.3 percentage. This fall in the growth of production was accompanied by a fall in the growth rate of both yield and area of food grains. Yield shows a decline of 2.19 percent, as the growth rate declined from 4.03 percent in 1980's to 1.83 percent in 1990's. The area growth declined from 0.47 to 0.3 percent between 1980's and 1990's, so that acreage registered a decline of –0.17 percent between 1980's and 1990's. One point that is to be noted is that though the production and

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productivity levels have declined in 1990, they still remain at a level higher than the 1970' s level.

The nineties scenario for the districts follows the same pattern as that for the State as a whole, where the growth rate declined for all the districts, except, Burdwan, Jalpaiguri and West Dinajpur, where there was a rise in the growth rate in 1990's over 1980's. Foodgrains production was negative in the 1990's in Darjeeling and Howrah. West Dinajpur (9.66%) and Malda (4.32%) registered the highest growth in 1990's. The district Howrah, which registered the highest growth rate in 1980's, was the one which experienced the largest decline in 1990's shown by the trend break of –8.61 percent. Growth rate of yield shows that the rate declined in all the districts except Burdwan, Malda, and West Dinajpur. Darjeeling and Howrah registered a negative growth rate in 1990's. The area under food grains also declined in 1990's except in the districts the districts of Birbhum, Burdwan, Murshidabad, Midnapur, and Tenty four Paragnas . The decline in the output of foodgrains was mainly attribute due to a decline in the yield of foodgrains in all the districts, except, Coochbehar, Malda and Purulia, where the decline in the growth rate of foodgrains output was due a to decline in the acreage under foodgrains.

TABLE 5 : KINKED EXPONENTIAL GROWTH RATE OF FOODGRAINS

	PRODUCTION					YIELD					AREA				
	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990
Bankura	-2.05	6.91	1.75	8.97	-5.16	-1.00	5.93	1.75	6.93	-4.19	-1.05	0.98	0.01	2.03	-0.97
Birbhum	-1.82	3.84	2.65	5.66	-1.19	-0.50	4.50	1.67	5.00	-2.83	-1.32	-0.67	0.98	0.66	1.64
Burdwan	9.00	-1.51	3.11	-10.51	4.62	9.79	-2.09	1.29	-11.88	3.38	-0.79	0.58	1.82	1.37	1.24
Coochbehar	-3.52	4.35	0.55	7.87	-3.81	-1.03	2.98	1.73	4.01	-1.26	-2.49	1.37	-1.18	3.86	-2.55
Darjeeling	1.55	6.31	-3.89	4.76	-10.20	0.78	5.04	-0.08	4.26	-5.12	0.77	1.28	-3.81	0.50	-5.08
Hooghly	-0.81	4.26	1.08	5.07	-3.18	0.13	3.53	1.07	3.40	-2.45	-0.94	0.73	0.01	1.67	-0.72
Howrah	0.38	7.22	-1.39	6.84	-8.61	0.06	5.23	-0.77	5.17	-6.00	0.32	1.99	-0.62	1.67	-2.61
Jalpaiguri	-1.06	1.27	2.00	2.33	0.73	-2.10	2.20	2.07	4.29	-0.12	1.04	-0.93	-0.08	-1.96	0.85
Malda	0.11	5.74	4.32	5.64	-1.42	2.17	4.81	5.85	2.64	1.04	-2.06	0.93	-1.52	2.99	-2.46
Murshidabad	-1.36	6.19	2.36	7.55	-3.83	-0.58	5.40	1.40	5.98	-4.00	-0.78	0.79	0.96	1.57	0.17
Midnapur	-0.55	4.06	2.24	4.62	-1.83	0.04	4.54	2.17	4.51	-2.37	-0.59	-0.48	0.07	0.11	0.55
Nadia	0.83	6.73	1.00	5.90	-5.73	2.00	5.69	1.07	3.69	-4.62	-1.17	1.04	-0.06	2.21	-1.10
Purulia	-2.94	6.18	0.82	9.13	-5.36	-1.06	3.87	1.40	4.93	-2.47	-1.89	2.31	-0.58	4.20	-2.89
24 Paragnas	1.05	4.67	1.95	3.62	-2.72	1.06	4.22	1.34	3.17	-2.88	0.00	0.45	0.60	0.45	0.15
West Dinajpur	0.82	-0.89	9.66	-1.71	10.54	0.78	-0.35	9.15	-1.12	9.50	0.04	-0.54	0.50	-0.58	1.04

Note: 24 Paragnas includes both north and south 24 Paragnas
West Dinajpur includes both north and south West Dinajpur

Source: From Statistical Abstract of West Bengal and Area and Production of principal crops , West Bengal, Various Issues.

Table : 5 (a)   Percentage of Foodgrains Production to the total

	1970	1980	1990
Bankura	6.8	6.8	7.5
Birbhum	8.4	7.1	7.0
Burdwan	12.0	14.5	12.8
Coochbehar	4.0	3.8	3.3
Darjeeling	1.2	1.4	1.2
Hooghly	5.8	5.2	5.1
Howrah	1.7	2.0	1.8
Jalpaiguri	4.0	3.1	2.7
Malda	4.8	5.0	9.6
Murshidabad	15.2	15.3	16.9
Midnapur	8.9	8.3	8.3
Nadia	5.3	6.5	6.5
Purulia	4.0	3.9	3.7
24 Paragnas	10.9	10.9	11.2
West Dinajpur	7.1	6.1	7.3
West Bengal	100.0	100.0	100.0

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source : Calculated from Statistical Abstract Of West Bengal , Various Issues.

RICE

We look at the three important varieties of rice grown in West Bengal by season- Amam, Boro and Aus. Rice production (table 6) in West Bengal rose from a figure as low as –0.17 percent to 5.9 percent between 1970's and 1980's to show a trend break as high as 6.04 percent in the same period. So has the productivity of rice risen from 0.09 percent in 1970's to 4.6 percent in 1980's the trend break showing a high positive growth rate of 4.5 percent. Following the same trend, there was also a rise in the area under rice cultivation, from –0.27 percent in 1970's to 1.25 percent in 1980's.

Production (table2) of Aman also shows a rise in the growth rate from 0.29 percent in 1970's to 4.75 percent in 1980's, showing positive trend break of 4.5 percent in West Bengal between the period 1970's and 1980's. Yield and area also showed a positive growth rate. For yield the growth rate rose from –0.7 t 1.3 percent between 1970's and 1980's, the trend break being 1.6 percent. Area registered a rise from 0.04

percent in 1970's to 0.58 percent in 1980's, the trend break showing a positive growth rate of 0.54 percent.

Production of Aus rice registered a very significant growth rate from a very low figure of –5.46 percent in 1970's to 5.1 percent in 1980's, showing a positive and a high trend break of 10.58 percent between the same period. Growth rate in productivity of Aus rice shows a trend break of 9.2, for which the rise was again from a very low –2.6 percent in 1970's to 6.5 percent in 1980's. In comparison, though the trend break for area shows a positive growth rate of 1.71 percent, but area under Aus rice cultivation still shows a negative growth rate, though less in 1980's (-1.19 percent) than in 1970's (-2.9 percent).

Output of Boro rice registered a growth rate from 1.69 in 1970's to 11.17 percent in 1980's, to shows a trend break of 9.5 percent. Growth rate of productivity of Boro rice also registered a rise from –0.8 percent in 1970's to 1.3 percent in 1980's, showing a trend break of 2.1 percent between 1970's and 1980's. The area under Boro rice also expanded significantly, from 2.5 percent in 1970's to 9.8 percent in 1980's the trend break thus showing a very high growth rate of 7.3 percent.

The analysis above brings forward a few important features of the growth pattern of rice in 1980's as discussed below.

- *The rise in the growth rate of rice is primarily attributable to a rise in the growth rate of yield. The decomposition pattern (table9) of rice into area and yield shows that out of the 5.9 percent growth ratein output in 1980's, 4.6 percent is due to the yield of rice, and a growth rate of 0 .26 percent is due to area.*

- *Boro rice registered the highest growth rate in production in 1980's.*

- *Aman is the most important of the three rice-growing seasons both in terms of acreage and sown production shown in the table.*

- *Area under boro rice underwent a significant rise during 1980's and in the subsequent years. Thus there was a significant rise in cultivation of boro rice in West Bengal after 1980's and this, to a large extent contributed to the increase in the total rice production. However, aman rice is the most important of the three rice growing seasons in terms of both acreage sown and production as shown in the table below.*

Thus, we see that the stagnation in rice production came to an end in 1980's and this was primarily due to the substantial increase in the yield of rice.

TABLE 6 : PRODUCTION OF RICE BY SEASON

	Kinked exponential growth rate					Simple exponential growth rate
	1970	1980	1990	Trend break 1980	Trend break 1990	1970-2000
Aus	-5.5	5.1	-2.2	10.6	-7.3	0.4
Boro	1.7	11.2	5.5	9.5	-5.7	7.4
Aman	0.3	4.8	0.7	4.5	-4.1	2.5
Rice	-0.2	5.9	1.9	6.0	-3.9	3.3

Note : 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: Calculated from Statistical Abstract of West Bengal and Area and Production of Principal crops in West Bengal. Various issues.

TABLE 7 : PRODUCTIVITY OF RICE BY SEASON

	Kinked exponential growth rate					Simple exponential growth rate
Year	1970	1980	1990	Trend break 1980	Trend break 1990	1970-2000
Aus	-2.6	6.5	1.8	9.2	-4.7	2.9
Boro	-0.8	1.3	0.6	2.1	-0.8	0.6
Aman	-0.8	1.3	0.6	2.1	-0.8	2.4
Rice	0.1	4.6	1.7	4.5	-3.0	2.7

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: Calculated from Statistical Abstract of West Bengal and Area and Production of Principal crops in West Bengal. Various issues.

TABLE 8: AREA OF RICE BY SEASON

	Kinked exponential growth rate					Simple exponential growth rate
Year	1970	1980	1990	Trend break 1980	Trend break 1990	1970-2000
Aus	-2.9	-1.2	-4.2	1.7	-3.0	-2.4
Boro	2.5	9.8	4.9	7.4	-4.9	6.8
Aman	0.05	0.6	-0.6	0.5	-1.2	0.1
Rice	-0.3	1.3	0.3	1.5	-1.0	0.6

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: Calculated from Statistical Abstract of West Bengal and Area and Production of Principal crops in West Bengal. Various issues.

TABLE 9: DECOMPOSITION PATTERN OF RICE

	Kinked exponential growth rate		
Year	Production	Area	Yield
1970	-0.2	0.3	-0.1
1980	5.9	1.3	4.6
1990	1.9	0.3	1.7

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: Calculated from Statistical Abstract of West Bengal and Area and Production of
Principal crops in West Bengal. Various issues.

Table 10 : Share of aus, aman and boro rice in total production of rice and total area sown with rice in West Bengal.

	Production			Area		
Year	Aus	Aman	Boro	Aus	Aman	Boro
1970-71	14.82	76.46	8.72	16.13	80.11	3.76
1980-81	7.72	80.69	11.59	11.88	81.42	6.69
1990-91	8.62	65.79	25.53	10.50	74.09	15.42
1999-2000	6.02	61.51	32.47	6.95	69.08	23.97

Source: Calculated from Statistical Abstract of West Bengal and Area and Production of
Principal crops in West Bengal. Various issues.

Districtwise Analysis

So far, we looked into the State level analysis. We move to the districtwise analysis on the pattern of growth in rice production. The results in table (14) shows that all the districts had registered a positive trend break in rice production during 1980's, ranging from a high growth rate in the trend break of 11.27 percent in Coochbehar, 10.30 percent in Midnapur and 9.38 in Bankura.

From table (14), we can infer that Midnapur, registered the highest growth rate of 10.47 percent in rice production in 1980's, followed by Howrah showing a growth rate of 8.14 percent, Nadia 8.99 percent and Bankura 7.465 percent. However, the growth rate in rice production in these districts declined in 1990's. West Dinajpur (3.64%), Burdwan (2.8 %) and Murshidabad (2.3 %) registered the highest growth in rice production in 1990's. Jalpaiguri (2.25 %) and Darjeeling (3.93%) registered the

lowest growth rate in rice production in 1980's. As in the case of the state level analysis, where the increase in the rice production was attributed to the increase in the yield level, the same holds true for the district level analysis also. In all the districts, without an exception the main impetus for the rise in the growth rate came from the growth rate in the yield level.

Let us now look at the pattern of growth rate of different varieties of rice across districts.

Aman

The results in the table in (11) show that in case of production of Aman, all the districts registered a positive growth rate in 1980's except for Malda. Growth rate in the yield of Aman shows a positive trend break for all the districts except Nadia and Malda, where there was a decline in the growth of yield. In case of Malda, the decline was from 3.23 percent in 1970's to 2.71 percent in 1980's, Nadia registered a decline from 5.7 percent in 1970's to 4.9 percent in 1980's. In case of growth in the area of Aman rice, Twenty-four Parganas, Murshidabad, and Howrah showed a negative trend break between 1970's and 1980's. But as a whole, the districts follow the same pattern of trend as the State level analysis. In all the districts, the growth in Aman rice production was mainly due to the rise in the growth of yield, except Darjeeling and Coochbehar where increase in acreage growth was the main factor responsible for growth in output.

Aus

The Table (12) shows that all the districts registered a significant growth in 1980's as compared to the 1970's, which is clearly shown by the tend break pattern, where all the districts is seen to have a significant shift in the pattern of growth rate. The growth rate of yield of Aus rice, shows that growth rate had fallen to a negative figure in the districts of Darjeeling, Jalpaiguri and Murshidabad. Growth rate of yield , though maintained a positive figure, but declined in Coochbehar, all the other districts registered rise in the growth rate . The growth rate in the area under Aus rice had increased in all the districts except, Coochbehar, Jalpaiguri, Midnapur, and

West Dinajpur, which registered a decline in the growth rate. The rise in the growth rate in the production of Aus rice was attributed to the increase in the yield level in all the districts, except Darjeeling and Jalpaiguri, where the rise in the growth rate was due to acreage increase.

Boro Rice

Growth rate of Boro rice, table 13 increased in all the districts between 1970's and 1980's, except in Darjeeling and Nadia shown by the negative trend break. However, there is an exception in the case Boro of rice in whose case, the rise in the growth rate of Boro production was mainly due to increase in the acreage and not due to the rise in the yield level. This is in contrary to what we have seen in the case of other varieties of rice. Area growth over 1970's to 1980's registered a rise in all the districts except Nadia and Darjeeling. Rate of growth in the yield of Boro rice between 1970's and 1980's rose in all the districts, except Coochbehar, Darjeeling and Murshidabad. Some of the districts which registered the highest growth rate in 1980's were Bankura (25.6 %), Coochbehar (40.3%), Jalpaiguri(29%), West Dinajpur (24.7%) and Purulia(20.0%).

As in the case of state, the district level data to supports the view that rate of growth in the output of rice and its varieties in 1980's was essentially due to growth in the yield level. However, in the case of Boro rice, the growth in its output was mainly due to the rise in the acreage under Boro rice.

In terms of contribution of each district to the total rice production, Table 11(a) shows that Midnapur, Twenty-four paraganas, Burdwan are the major rice producing districts. Together, they contributed 42.63 percent in 1970,42.01 percent in 1980 and 42.85 percent in 1990. Though the share of Twenty-four paraganas declined in 1990 it still stand out in terms of highest contributor. Murshidabad's contribution has substantially increased over the years from 5.9 percent in 1970's to 6.51 percent in 1980's and 9.4 percent in 1990. Darjeeling, due to its agroclimatic conditions being more favorable for tea cultivation, contributes the lowest to the total rice production.

Growth Rate s of Rice in Nineties

This robust growth rate in the rice production from 1980's however started declining in 1990's. We can see from the table that the growth rate of rice production declined from 5.87 percent in 1980's to 1.94 percent in 1990's, the trend break showing a negative growth of −3.9 percent. This decline in the rice production was due to the decline in the yield of rice from a high 4.6 percent to 1.66 percent. So, the decline in the growth rate was −2.95 percent. On the other hand, the growth of area under rice cultivation declined from 1.25 percent to 0.27 percent, the trend break showing a decline of −0.97 percent.

This decline in the growth rate of rice production took place uniformly in all the districts. The highest growth rate in Rice production in 1990's was attained in West Dinajpur (3.64%) and Burdwan (2.8%). The two districts with the highest growth rate in 1980's were Midnapur and Nadia. These were the districts that registered the largest decline in the growth rate in 1990's. The highest fall was registered in Midnapur and Nadia, shown by a trend break of −14.04 percent and −7.80 percent. Darjeeling and Midnapur registered a negative growth rate in 1990's. In all the districts,this decline was due to a decline in the yield of rice cultivation more than the decline in area except Coochbehar and Darjeeling, where the decline came with the decline in area under rice cultivation. However, what needs to be stressed is that there was also a decline in the growth rate of area under rice cultivation and this fall took place in all the districts except Birbhum district.

We see there was also a decline in Aman, Aus and Boro production. For Aman , the decline in the growth rate was from 4.75 percent in 1980's to 0.67 percent, growth rate of Aus production declined from 5.1 percent to −2.2 between 1980 and 1990, and finally Boro production declined from 11.17 percent to 5.51 percent during the same period. In the case of Aman, Aus and Boro there was a decline in both area and productivity. For Aman the decline in production came from a decline in its yield more than the area, for Aus and Boro , production ,decline came from a decline in area under   cultivation more than the decline in the yield level.

District wise scenario shows that there was a decline in the production of Aman rice in 1990's except in the district of Malda. The rate of growth was negative in 1990's in Howrah, Hooghly, Nadia, Jalpaiguri, Midnapur and Darjeeling. The districts with the highest growth rate in 1980's were Nadia and Midnapur. Both these districts registered the largest decline in the growth rates (20 percent for Midnapur, and 15 percent for Nadia). The district with the highest growth rate in Aman production in 1990's was in Malda (2.68 percent) and Bankura (2 percent). The decline in the production of Aman rice was due to the decline yield in most of the districts, except Birbhum, Coochbehar, Darjeeling, Malda, Midnapur and West Dinajpur where the decline in the area under Aman rice was more than the decline in the level of yield.

In case of Aus, the growth rate was negative in all the districts except, Murshidabad and Jalpaiguri. The area under Aus rice as well as the productivity of Aus rice under went a decline.

District wise Boro production shows that there was a decline in growth rate of Boro production in 1990's, except in Darjeeling and Howrah. Bankura and Howrah registered a negative growth rate in 1990's. However, the decline in Boro rice came with a decline in the area under Boro cultivation more than the decline in the yield of Boro Rice. Area under Boro rice also underwent a decline except in the districts of Howrah and Malda. There was also a decline in the productivity of Boro rice in all the districts except in Burdwan, Darjeeling and Murshidabad.

Thus, we that the rapid rise in the production of rice slowed down in the nineties can be attribute to the onslaught of liberalization policy, where there was a shift of a large portion of area to non-foodgrains cultivation, and this phenomenon was not a special case applicable to West Bengal but a countrywide aspect.

TABLE 11(A): PERCENTAGE TO THE TOTAL

	1970				1980				1990			
	AMAN	AUS	BORO	RICE	AMAN	AUS	BORO	RICE	AMAN	AUS	BORO	RICE
Bankura	8.9	5.8	1.1	7.5	8.9	7.1	3.1	7.5	9.7	9.7	3.3	7.9
Birbhum	9.1	5.9	4.5	8.1	9.2	3.2	4.0	7.6	8.5	2.9	4.2	6.9
Burdwan	12.8	6.8	21.9	13.3	13.6	8.0	14.8	13.4	11.6	9.7	16.7	12.9
Coochbehar	3.9	8.7	0.1	3.9	4.1	10.3	0.5	3.9	3.5	8.9	1.3	3.2
Darjeeling	0.9	0.8	0.0	0.8	0.8	1.3	0.0	0.6	0.6	1.0	0.0	0.4
Hooghly	4.9	3.2	16.6	6.2	5.4	3.9	7.9	5.8	5.2	3.1	6.7	5.5
Howrah	1.7	0.4	3.6	1.8	1.7	0.8	4.5	2.2	1.3	0.3	3.9	2.0
Jalpaiguri	4.4	8.2	0.0	4.3	3.5	6.7	0.1	3.0	3.0	9.0	0.3	2.6
Malda	2.7	7.6	6.8	3.7	3.2	6.1	7.3	4.3	3.5	3.0	5.8	4.1
Murshidabad	17.9	8.3	20.5	17.2	16.7	9.2	20.5	16.8	17.8	17.0	18.8	18.0
Midnapur	5.1	12.2	5.2	5.9	5.5	12.8	7.3	6.5	10.6	10.0	6.7	9.5
Nadia	2.0	12.7	6.2	3.8	3.0	13.4	11.4	5.6	2.8	13.3	10.9	5.8
Purulia	5.7	0.4	0.2	4.4	5.7	0.3	0.1	4.0	5.7	0.6	0.1	3.8
24 Paragnas	13.3	5.2	11.4	12.2	11.6	7.2	14.7	11.9	12.1	6.8	12.7	11.9
West Dinajpur	6.7	13.9	1.8	6.9	7.2	9.7	4.3	6.8	7.4	4.4	7.5	7.2
West Bengal	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source : Calculated from Statistical Abstract Of West Bengal , Various

TABLE 11 : KINKED EXPONENTIAL GROWTH RATE OF AMAN

	Production					Area					Yield				
	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990
Bankura	-1.2	5.8	2.0	6.9	-3.8	-0.2	0.5	-0.3	0.7	-0.8	-1.0	5.2	2.2	6.2	-3.0
Birbhum	1.7	3.1	1.5	1.3	-1.5	1.7	-0.6	-0.1	-2.2	0.4	0.1	3.6	1.6	3.5	-2.0
Burdwan	2.6	22.8	-0.4	20.2	-23.2	0.5	0.1	-0.4	-0.5	-0.4	2.2	4.5	-0.2	2.2	-4.6
Coochbehar	-4.6	5.3	0.1	9.9	-5.1	-3.9	2.9	0.0	6.8	-2.9	-0.7	2.4	0.1	3.1	-2.3
Darjeeling	-0.3	2.4	-3.4	2.8	-5.8	-0.7	1.5	-3.4	2.3	-4.9	0.4	0.9	0.0	0.5	-0.9
Hooghly	1.4	5.7	-1.3	4.3	-6.9	0.4	1.0	-2.1	0.6	-3.1	0.9	4.6	0.8	3.7	-3.8
Howrah	0.5	4.1	-2.8	3.6	-6.9	0.8	-0.2	-1.1	-1.0	-0.9	-0.3	4.3	-1.6	4.6	-6.0
Jalpaiguri	-2.0	2.2	0.0	4.2	-2.2	-0.1	0.5	-1.5	0.7	-2.0	-2.4	14.5	-16.1	16.9	-30.6
Malda	4.9	4.0	2.7	-0.9	-1.3	1.7	1.3	-0.3	-0.4	-1.6	3.2	2.7	3.0	-0.5	0.3
Murshidabad	-0.7	4.7	1.3	5.3	-3.3	0.0	-0.2	-0.3	-0.2	-0.1	-0.6	4.9	1.7	5.5	-3.2
Midnapur	-1.4	12.2	-8.1	13.7	-20.4	-0.8	2.9	-3.5	3.7	-6.4	0.7	4.9	-0.3	4.3	-5.2
Nadia	3.1	9.7	-5.9	6.7	-15.6	1.1	2.7	-3.9	1.7	-6.7	5.7	4.9	-2.6	-0.8	-7.5
Purulia	-2.6	6.1	1.1	8.6	-5.0	-2.0	2.2	0.1	4.2	-2.1	-0.6	3.9	0.9	4.4	-2.9
24 Paragnas	0.4	3.7	1.0	3.3	-2.6	0.0	-0.1	-0.5	-0.1	-0.4	0.4	3.8	1.5	3.4	-2.3
West Dinajpur	-0.1	5.3	1.9	5.4	-3.4	-0.1	1.6	-0.8	1.7	-2.4	0.0	3.6	2.8	3.6	-0.8

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: From Statistical Abstract of West Bengal and Area and Production of principal crops , West Bengal, Various Issue

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TABLE 12 : KINKED EXPONENTIAL GROWTH RATE OF AUS RICE

	Production					Area					Yield				
	1970	1980	1990	Trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990
Bankura	-9.6	12.8	-15.1	22.4	-27.9	-9.3	5.3	-1.5	14.6	-6.8	-0.3	7.5	0.0	7.8	-7.5
Birbhum	-28.6	18.9	-10.3	47.4	-29.1	-27.6	13.0	-9.6	40.6	-22.6	-1.9	8.9	-2.3	10.8	-11.2
Burdwan	-5.5	8.6	-1.9	14.1	-10.5	-4.0	3.7	-1.1	7.7	-4.8	4.5	-0.4	0.8	-4.9	1.2
Coochbehar	-4.1	6.7	-7.7	10.9	-14.5	1.0	-0.7	-11.4	-1.7	-10.7	-4.9	6.5	0.4	11.4	-6.1
Darjeeling	-4.8	11.6	-10.3	16.4	-21.9	1.4	5.3	-10.8	3.8	-16.1	-6.3	6.3	0.5	12.6	-5.8
Hooghly	-1.3	5.6	-6.8	6.9	-12.3	-4.5	2.5	-5.8	7.0	-8.3	0.3	4.2	0.4	3.9	-3.7
Howrah	-5.1	11.7	-18.7	16.8	-30.4	-7.2	4.3	-14.7	11.5	-18.9	2.1	6.9	-4.0	4.8	-10.9
Jalpaiguri	-4.8	2.2	4.0	7.0	1.8	0.4	-2.5	0.9	-2.9	3.4	-5.2	4.7	3.1	9.9	-1.6
Malda	-6.0	0.4	-9.4	6.4	-9.8	-4.1	-2.3	-13.6	1.7	-11.3	-2.0	2.7	4.2	4.7	1.5
Murshidabad	-7.2	9.7	4.4	16.9	-5.3	-5.1	2.8	2.4	7.9	-0.3	-2.0	6.8	1.3	8.8	-5.5
Midnapur	-1.4	0.7	-3.7	2.1	-4.4	0.2	-2.2	-6.3	-2.4	-4.0	1.3	2.9	2.5	1.7	-0.4
Nadia	-3.0	3.8	-0.6	6.8	-4.4	-3.6	-2.1	-1.9	1.5	0.2	0.7	5.9	1.3	5.3	-4.7
Purulia	-20.3	16.7	-2.1	37.0	-18.9	-15.3	8.8	-2.2	24.0	-11.0	-5.0	8.0	4.3	13.0	-3.7
24 Paragnas	-2.0	6.6	-2.9	8.6	-9.5	-3.2	0.0	-0.1	3.2	-0.1	1.2	6.6	-2.7	5.4	-9.3
West Dinajpur	-5.1	-1.5	-14.5	3.6	-13.0	-0.1	-9.2	-15.8	-9.1	-6.6	-4.9	7.7	1.2	12.6	-6.5

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: From Statistical Abstract of West Bengal and Area and Production of principal crops , West Bengal, Various Issues

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TABLE 13 : KINKED EXPONENTIAL GROWTH RATE OF BORO RICE

	Production					Area					Yield				
	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990
Bankura	4.6	25.6	-0.9	21.0	-26.5	5.8	20.9	-0.40	15.1	-21.3	-1.2	4.7	-0.5	5.9	-5.2
Birbhum	4.9	10.6	8.0	5.8	-2.7	7.3	8.4	7.2	1.1	-1.2	-2.4	2.2	0.8	4.7	-1.5
Burdwan	-1.9	9.3	8.7	11.2	-0.6	1.0	7.3	6.7	6.3	-0.7	-2.9	1.9	2.0	4.9	0.1
Coochbehar	-29.3	40.3	12.7	69.6	-27.6	-26.5	38.8	12.6	65.3	-26.2	2.1	1.6	0.1	-0.6	-1.4
Darjeeling	58.4	-50.0	8.7	-108.4	58.7	34.7	-33.8	8.7	-68.4	42.5	23.7	-16.2	0.1	-40.0	16.3
Hooghly	-2.0	3.6	5.9	5.6	2.3	-1.1	3.1	5.4	4.2	2.3	-0.9	0.6	0.5	1.4	-0.1
Howrah	-1.7	17.6	-1.2	19.4	-18.9	-1.4	16.5	-0.1	17.9	-16.6	-0.4	1.2	-1.1	1.6	-2.3
Jalpaiguri	-2.0	29.0	18.5	31.0	-10.5	-9.4	29.1	20.3	38.5	-8.8	7.4	-0.1	-1.8	-7.5	-1.7
Malda	2.3	11.7	1.7	9.4	-10.0	2.4	4.6	7.2	2.2	2.6	0.7	3.0	-0.5	2.2	-3.5
Murshidabad	-0.8	12.0	4.1	12.8	-7.9	-2.3	11.7	3.8	14.0	-7.9	-1.2	-1.4	5.1	-0.2	6.5
Midnapur	7.7	12.2	2.3	4.5	-9.8	6.9	9.9	4.9	2.9	-5.0	0.9	1.7	1.6	0.8	-0.2
Nadia	15.1	12.1	4.2	-3.0	-7.9	16.0	10.7	3.6	-5.2	-7.2	-0.8	1.4	0.6	2.2	-0.7
Purulia	-17.0	20.0	2.5	37.0	-17.5	-15.7	18.1	3.9	33.8	-14.2	-1.8	1.9	-1.4	3.7	-3.3
24 Paragnas	7.3	10.3	3.9	3.0	-6.4	7.7	9.7	4.2	2.0	-5.6	-4.5	2.9	0.4	7.5	-2.5
West Dinajpur	-1.3	24.7	9.0	25.9	-15.7	2.5	20.4	8.4	17.9	-12.0	-3.7	4.3	0.6	8.0	-3.6

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: From Statistical Abstract of West Bengal and Area and Production of principal crops , West Bengal, Various Iss

TABLE 14 : KINKED EXPONENTIAL GROWTH RATE OF TOTAL RICE

	Production					Area					Yield				
	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990
Bankura	-1.91	7.47	1.65	9.38	-5.82	-1.07	1.73	0.01	2.80	-1.72	-0.84	5.74	1.64	6.58	-4.10
Birbhum	-0.11	4.25	2.23	4.26	-4.03	-0.07	0.44	0.55	0.51	0.11	-0.04	3.81	1.68	3.86	-2.13
Burdwan	1.10	4.46	2.826	3.36	2.381	-0.27	1.17	1.17	1.44	0.00	1.37	3.29	1.11	1.92	-2.18
Coochbehar	-5.15	6.12	0.11	11.27	-6.01	-3.10	1.95	-1.40	5.05	-3.35	-2.05	4.17	1.51	6.22	-2.66
Darjeeling	-1.15	3.93	-4.40	5.08	-8.33	-0.52	2.49	-4.94	3.01	-7.44	-0.63	1.44	0.55	2.07	-0.89
Hooghly	0.15	4.85	1.07	4.70	-3.79	-0.18	1.42	0.02	1.60	-1.40	0.33	3.43	1.04	3.09	-2.39
Howrah	0.48	8.14	1.49	7.67	-6.65	0.11	3.33	-0.42	3.22	-3.74	0.37	4.82	-1.08	4.45	-5.89
Jalpaiguri	-2.53	2.25	1.34	4.78	-0.91	0.05	-0.23	-0.67	-0.28	-0.43	-2.58	2.48	2.01	5.06	-0.48
Malda	1.66	6.03	1.56	4.38	-4.47	-0.13	1.13	-0.65	1.26	-1.78	1.79	4.91	2.22	3.12	-2.69
Murshidabad	-1.07	6.49	2.32	7.56	-4.17	-0.59	1.26	0.89	1.84	-0.36	-0.49	5.23	1.43	5.72	-3.80
Midnapur	0.18	10.48	-3.57	10.30	-14.04	0.06	2.00	-1.33	1.94	-3.33	0.12	8.48	-2.24	8.35	-10.71
Nadia	3.41	8.99	1.19	5.59	-7.80	0.09	2.73	0.42	2.64	-2.32	3.31	6.26	0.77	2.95	-5.48
Purulia	-2.81	5.23	0.99	8.04	-4.23	-2.21	2.33	0.10	4.54	-2.23	-0.60	3.90	0.89	4.50	-3.01
24 Paragnas	1.36	5.05	1.98	3.69	-3.07	0.24	0.93	0.67	0.69	-0.25	1.12	4.13	1.31	3.00	-2.82
West Dinajpur	-1.49	5.98	3.64	7.47	-2.34	-0.25	0.49	0.34	0.74	-0.15	-1.24	5.49	3.30	6.72	-2.19

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: From Statistical Abstract of West Bengal and Area and Production of principal crops , West Bengal, Various Issu

WHEAT

Wheat production in West Bengal registered only a negligible growth rate in 1980's, shown by the trend break of 0.045 percent. However, area under wheat registered a very high decline, shown by the negative growth rate in 1980 over 1970, with a trend break as high as –6.59 percent. Though there was a growth in yield of wheat in 1980 over 1970, a substantial decline in the area under wheat lead to a very marginal rise in the wheat production in West Bengal.

A cross sectional analysis shows that across the districts, trend break for wheat production was found to be positive only for Birbhum, Malda, Murshidabad, Midnapur, Nadia, and Twenty Four Paraganas. The trend break for yield though shows a better performance with trend break being negative only for Coochbehar, Darjeeling, Howrah and Jalpaiguri, this is nullified by a decline in the area under wheat production, where the trend break is found to be positive only for Birbhum, Malda and Purulia. The trend break for area under wheat was as high as –31.36 percent in Jalpaiguri, -20.844 percent in Darjeeling, -15.75 in Coochbehr, -14.7108 percent in Hooghly, -12.72 percent in Howrah and –12.21 percent in West Dinajpur.

In Nineties however , area under wheat cultivation increased substantially as for the state as a whole from a growth rate of –2.9 percent in 1980's to 3.5 percent in 1990, so that the trend break in 1990, was 6.5 percent. Across districts,the area under wheat cultivation increased substantially as in the case of the state. Howrah registered the highest rise in area under wheat cultivation with the trend break of 42.39 percent, followed by Coochbehar where the trend break was 17.34 percent, Hooghly with a trend break of 16.36 percent and Murshidabad with a trend break of 15.9 percent. Only Malda district registered a negative growth in the area under wheat cultivation in nineties.

The growth in the yield level also registered a rise but was substantially less than that of the acreage increases. The growth rate in yield level was from 0.65 to 1.389 percent, so that the trend break was 0.72 percent. A cross sectional analysis shows that all the districts in West Bengal showed a positive trend break between 1980 and 1990's, except for Bankura, Darjeeling, Hooghly, Howrah, and Twenty Four Paraganas. As in the case of the state ,here too, we can see that the rate of growth

though increased in 1990 over 1980's, was still lower than the rate of increase in acreage under wheat cultivation. Thus, what follows is that production of wheat increased substantially in 1990 shown by the growth rate of 4.949 percent in 1990's, the trend break shows a high positive growth rate of 7.2 percent for West Bengal as a whole. The districts also followed this rising phenomenon. The highest growth rate was registered in Howrah as the trend break for Howrah shows a very high growth rate of 45.36 percent, Burdwan and Jalpaiguri followed this as the trend break for them were 19.82 percent and 19.68 percent respectively. It was only in Malda district that the production level fell in 1990 over 1980's from a figure of 5.3 percent to 3.89 percent all the other districts registered an increasing growth rate for wheat production.

Thus, what follows from the discussion is that area under wheat cultivation increased substantially in the 1990's and to a large extent was the main contributor to the rising production of wheat in 1990's.

TABLE 15 : KINKED EXPONENTIAL GROWTH RATE OF WHEAT

	PRODUCTION					YIELD					AREA				
	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990
Bankura	-2.92	-5.52	-0.91	-2.60	4.61	-1.68	1.80	0.43	3.48	-1.37	-1.24	-7.32	-1.34	-6.08	5.98
Birbhum	-10.45	-6.90	9.36	3.55	16.26	-1.42	1.53	3.51	2.95	1.98	-9.03	-8.43	5.85	0.60	14.28
Burdwan	-8.51	-17.25	2.58	-8.74	19.82	-1.82	-0.43	2.05	1.39	2.48	-6.69	-16.82	0.53	-10.14	17.35
Coochbehar	11.64	-6.10	3.80	-17.74	9.90	0.11	-1.87	1.38	-1.98	3.25	11.53	-4.23	2.42	-15.75	6.65
Darjeeling	25.82	-8.62	7.47	-34.43	16.09	9.45	-4.14	-0.80	-13.59	3.34	16.37	-4.48	8.27	-20.84	12.75
Hooghly	-8.26	-21.38	-5.67	-13.12	15.71	-1.48	0.11	-0.54	1.60	-0.65	-6.78	-21.49	-5.13	-14.71	16.37
Howrah	-9.07	-28.16	17.21	-19.09	45.37	2.38	-3.98	-1.01	-6.36	2.97	-11.45	-24.18	18.22	-12.73	42.40
Jalpaiguri	28.72	-8.75	10.93	-37.47	19.68	3.15	-2.96	2.93	-6.11	5.89	25.57	-5.79	8.00	-31.36	13.80
Malda	-1.73	5.31	3.90	7.04	-1.41	0.45	1.22	1.44	0.77	0.22	-2.18	4.09	2.46	6.27	-1.63
Murshidabad	-9.02	-7.15	10.72	1.87	17.86	-3.12	0.25	2.16	3.37	1.91	-5.90	-7.39	8.56	-1.49	15.95
Midnapur	-1.95	0.32	5.81	2.27	5.49	-1.51	0.84	1.94	2.36	1.09	-0.44	-0.53	3.88	-0.08	4.40
Nadia	-0.70	-0.56	2.80	0.15	3.36	-0.50	0.09	0.54	0.59	0.46	-0.20	-0.64	2.26	-0.44	2.90
Purulia	-3.48	-6.80	8.33	-3.33	15.14	-0.10	0.69	1.95	0.79	1.26	-3.38	-7.49	6.39	-4.12	13.88
24 Paragnas	-3.90	-3.11	-0.30	0.79	2.81	0.66	0.89	-1.49	0.23	-2.38	-4.56	-4.00	1.19	0.56	5.19
West Dinajpur	4.65	-4.18	4.38	-8.82	8.55	-1.73	1.66	0.75	3.39	-0.91	6.38	-5.84	3.63	-12.21	9.46

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: From Statistical Abstract of West Bengal and Area and Production of principal crops , West Bengal, Various I

PULSES

Growth in the production of pulses does not show a robust growth pattern as we have seen in the case of rice and foodgrains. The growth rate for the production of pulses was –4.18 percent in 1970, –3.7 percent in 1980 and –2.20 percent in 1990. This however leads to a positive trend break in pulse production, implying that there was a marginal increase in the growth in pulse production in 1980 over 1970's to the extent of 0.46 percent, which in the next decade, showed a further increase of 1.52 percent in 1990's over 1980's. This increase in pulse production is entirely due to the increase in yield level, where from the table we can see that area under pulse production declined from –2.71 percent to –6.01 percent between 1970's and 1980's, showing a negative trend break in 1980's of –3.3 percent. So this increase in the level of production comes entirely from the increase in the yield level, (see table) growth in the yield of pulses increased from –1.47 percent in 1970's to 1.60 percent in 1980's amounting to a positive trend break of 3.75 percent in 1980's. However , this whole scene has changed in 1990's where both production and productivity declined.

A district wise result shows that only Coochbehar, Malda, Nadia, Purulia registered a positive trend break between 1970's and 1980's, while all the remaining districts registered a negative trend break in the same period. The area under pulses across all the districts registered a rate of decline between 1970's and 1980's. The decline was as high as –23.21 perecnt for Jalpaiguri, -19.9 percent in Burdwan, and -24.25 in Hooghly . Only Coochbehar, Malda and Purulia showed an increase in area under pulses. The growth rate for yields shows that there was an increase in the growth rate between 1970's and 1980's, as the trend break is positive for almost all the districts . except Coochbehar, Darjeeling, Howrah, and Malda. But this increase in the yield level was heavily counter balanced by the decline in the level of area under pulses.

TABLE 16: KINKED EXPONENTIAL GROWTH RATE OF PULSES

	Area					Production					Yield				
	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	Trend break 1990
Bankura	-3.79	-8.57	-10.39	-4.78	-1.82	-5.80	-7.02	-9.72	-1.22	-2.70	-2.01	1.55	0.68	3.56	-0.87
Birbhum	-3.06	-12.80	1.95	-9.74	14.75	-2.30	-8.92	9.09	-6.62	18.01	0.76	3.88	7.14	3.12	3.26
Burdwan	-1.86	-21.78	8.92	-19.92	30.70	-3.83	-19.36	9.94	-15.53	29.30	-1.97	2.42	1.02	4.39	-1.40
Coochbehar	-8.75	1.37	0.51	10.12	-0.86	-6.47	2.20	0.19	8.68	-2.01	2.27	0.84	-0.32	-1.44	-1.16
Darjeeling	0.82	-0.37	4.69	-1.19	5.06	5.85	-3.90	8.14	-9.75	12.04	5.03	-3.53	3.45	-8.56	6.98
Hooghly	-1.64	-25.89	-1.00	-24.26	24.89	-5.89	-22.74	1.32	-16.85	24.06	-4.26	3.15	2.31	7.41	-0.84
Howrah	5.28	-14.05	-25.17	-19.33	-11.12	7.74	-14.69	-22.08	-22.43	-7.39	2.46	-0.64	3.09	-3.10	3.73
Jalpaiguri	9.00	-14.21	7.69	-23.21	21.90	-0.77	-12.28	7.22	-11.51	19.50	-9.77	1.93	-0.47	11.70	-2.40
Malda	-7.14	0.13	-8.27	7.27	-8.39	-2.86	0.77	-10.84	3.63	-11.61	4.28	0.65	-2.58	-3.63	-3.22
Murshidabad	-1.81	-8.89	-2.96	-7.08	5.93	-5.11	-2.32	-2.13	2.79	0.19	-3.30	6.57	0.83	9.87	-5.74
Midnapur	0.17	-9.23	-0.41	-9.40	8.82	-4.99	-8.29	3.28	-3.30	11.57	-5.16	0.94	3.69	6.09	2.76
Nadia	-3.09	-3.38	-4.39	-0.28	-1.01	-5.90	-0.20	-5.22	5.70	-5.02	-2.81	3.18	-0.84	5.99	-4.02
Purulia	-5.77	3.87	-3.13	9.64	-6.99	-7.67	7.14	-6.57	14.82	-13.72	-1.90	3.28	-3.45	5.18	-6.72
24 Paragnas	-1.60	-8.64	-2.25	-7.04	6.38	-2.26	-6.65	-0.78	-4.39	5.87	-0.66	1.99	1.47	2.65	-0.52
West Dinajpur	-0.39	-6.65	-3.00	-6.26	3.65	-1.69	-5.05	-2.65	-3.36	2.40	-1.30	1.60	0.35	2.90	-1.25

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: From Statistical Abstract of West Bengal and Area and Production of principal crops, West Bengal, Various

However, in the nineties, the increase in pulses production was due to the increase in area under pulse production rather than the increase in yield level. As the data shows that the trend break for yield level was negative between 1980's and 1990's, whereas the area under pulses underwent a positive growth rate between 1980's and 1990's. The district study too supports the same view that increase in pulses production was essentially due to an increase in area under pulses, where the trend break was as high as 30.70 percent for Burdwan, 24.89 percent for Hooghly and 21.89 percent for Jalpaiguri. Except Bankura, Coochbehar, Howrah, Malda, Nadia and Purulia, all the other districts underwent a significant growth rate in area between 1980's and 1990's. The just opposite case holds for the rise in yield where in 1990's, more districts underwent a negative growth rate, Except Birbhum, Darjeling, Howrah, and Midnapur.

POTATO

"West Bengal is the second largest producer of potato in the country, after Uttar Pradesh"[4]. Production of potato in 1980's was not as good as in 1970's as the growth rate declined from 9.5 percent in 1970 to 5.1 percent in 1980, showing a negative trend break in 1980 of –4.40 percent. Across districts, Bankura, Birbhum, Coochbehar, Jalpaiguri, and Purulia registered a rise in the production of potato during 1980 over 1970 shown by their positive trend break. This decline in the production of potato was essentially due to the fall in area under potato cultivation while for the state, the fall in the growth rate of the extent of –1.15 percent.

There was also a decline in the yield of potato shown by a fall in the growth rate from 3.04 percent in 1970 to 2.765 percent in 1980 and a trend break of –0.27 percent, but this fall was less than the fall in the area under potato cultivation. Therefore , we may conclude, that the decline in potato production was due to a fall in area under potato production.

For the districts, the decline in the production in 1980 came with a decline in area except Burdwan, Darjeeling, Hooghly, Murshidabad, Twenty-four Paraganas and West Dinajpur where the decline was due to a decline in the yield level.

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[4]   Rawal et.al. (2002) : 'Agriculture in West Bengal ; Current Trends in Directions for future growth.'

However, in nineties however potato production registered a rise as its growth rate rose from 5.12 percent in 1980's to 5.36 percent in 1990's, this rise came with a rise in the area under potato production. The district level data does not follow the same pattern as that of the state. Bankura, Birbhum, Burdwan, Howrah, Nadia and Purulia districts showed a decline in the growth rate of potato production, shown by their negative trend break. Moreover, in the districts where potato production rose, it was not entirely due to an increase in area under potato cultivation as in the districts of Darjeeling, Coochbehar and West Dinajpur the rise in the growth rate of potato production was due to the growth of yield of potato.

TABLE 17 : KINKED EXPONENTIAL GROWTH RATE OF POTATO

	Area					Production					Yield				
	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990	1970	1980	1990	trend break 1980	trend break 1990
Bankura	6.63	9.21	5.50	2.58	-3.71	8.53	13.54	4.07	5.01	-9.47	1.90	4.33	-1.43	2.43	-5.76
Birbhum	3.48	1.58	3.27	-1.90	1.69	2.98	8.06	3.41	5.07	-4.65	-0.16	5.39	5.23	5.55	-0.16
Burdwan	6.42	3.74	2.61	-2.68	-1.13	10.57	4.05	1.93	-6.52	-2.13	11.77	-5.92	0.61	-17.69	6.53
Coochbehar	-1.54	9.18	11.13	10.72	1.94	-1.60	14.92	20.55	16.52	5.63	-0.05	5.74	9.42	5.80	3.68
Darjeeling	5.22	2.57	2.78	-2.65	0.21	11.62	3.61	7.87	-8.00	4.26	6.39	1.04	5.09	-5.35	4.05
Hooghly	6.37	5.99	3.65	-0.38	-2.34	9.19	7.65	2.44	-1.54	-5.21	2.82	1.66	-1.20	-1.16	-2.85
Howrah	3.03	1.37	9.83	-1.66	8.46	7.05	4.66	8.54	-2.39	3.89	4.02	3.29	-1.29	-0.73	-4.58
Jalpaiguri	2.48	7.91	14.26	5.43	6.35	6.25	12.94	23.06	6.69	10.12	3.77	5.02	8.80	1.26	3.78
Malda	6.21	-0.91	5.79	-7.12	6.71	10.39	3.41	11.75	-6.99	8.34	4.19	4.32	5.96	0.13	1.64
Murshidabad	3.53	10.30	5.18	6.76	-5.12	7.84	16.02	14.21	8.18	-1.81	5.12	3.41	0.79	-1.71	-2.62
Midnapur	7.36	-2.87	4.91	-10.23	7.78	6.55	0.61	6.89	-5.94	6.28	-0.85	3.51	1.97	4.35	-1.54
Nadia	20.95	-6.11	9.33	-27.06	15.44	21.61	-3.38	10.80	-24.99	14.19	0.66	2.73	1.47	2.07	-1.26
Purulia	-1.56	9.17	0.82	10.74	-8.36	-1.43	10.46	-0.43	11.89	-10.89	4.66	-3.29	0.16	-7.95	3.46
24 Paragnas	7.61	-3.32	9.36	-10.93	12.69	9.48	-0.29	10.75	-9.76	11.04	-1.04	4.10	2.78	5.14	-1.32
West Dinajpur	5.16	-2.66	6.64	-7.82	9.30	10.53	-3.93	17.28	-14.46	21.21	4.73	-3.39	14.30	-8.13	17.70

Note: 1970 refers to 1970-1980, 1980 refers to 1980-1990 and 1990 refers to 1990-2000

Source: From Statistical Abstract of West Bengal and Area and Production of principal crops , West Bengal, Various Issue

Pattern of Input Use

Here we look at the pattern of input use in West Bengal.

Fertilizer

If we look at the pattern of fertilizer use in West Bengal that is fertilizer application per gross cropped area shown in table (18), we can infer that application of fertilizer use has increased tremendously in the state and in the districts between 1970 and 2000. The table below shows that fertilizer application in the state on an average has increased from 13.1 kilograms per hectare in 1970 to 36.9 kilograms per hectare in

TABLE 18: RATE OF FERTILIZER APPLICATION (KILOGRAMS OF NPK PER HECTARE OF GROSS CROPPED AREA), DISTRICTS AND WEST BENGAL

Districts	1970/1	1980-81	1990-91	1999-00
Bankura	15.8	29.5	63.7	106.5
Birbhum	21.8	43.3	110.0	143.9
Burdwan	21.2	61.1	115.1	152.3
Coochbehar	2	16.3	72.5	123.2
Darjeeling	15.5	23.7	88.1	199.8
Hooghly	42.9	98.5	170.1	223.5
Howrah	23.9	107.8	242.0	346.3
Jalpaiguri	3.7	11.1	51.2	109.2
Malda	8.3	33.9	90.6	135.2
Murshidabad	8.1	30.1	69.0	114.0
Midnapur	9.4	35.4	74.4	104.2
Nadia	11.9	45.3	79.6	102.3
Purulia	4.7	19.6	77.2	142.0
24 Paragnas	10.9	32.0	76.0	129.2
West Dinajpur	2.4	20.6	57.7	87.6
West Bengal	13.1	36.9	86.9	129.0

Source: Calculated from Various issues of Economic Review. Government of West Bengal.

1980, 86.9 kilograms per hectare in 1990 and further to 129.03 kgs per hectare in 2000. Thus, what appears is a massive rise in the use of fertilizer application in West Bengal. The analysis of district wise scenario shows that although fertilizer application has increased in all the districts, there are large variations in the level of fertilizer application (table). Howrah continues to be far ahead of other districts in

terms of fertilizer application between 1980 and 2000, the average fertilizer application in the district increased from 107.81 kilograms per hectare in 1980 to 241.961 and 346.25 kilograms per hectare in 1990 and 2000.

Adoption of High Yielding Varieties

There has been a steep increase in the adoption of high yielding varieties of paddy in West Bengal in the 1980's and 1990's. Of the three crops of rice in West Bengal, boro cultivation is based on the cultivation of high yielding varieties (HYV's). The adoption of HYV's increased from 25.34 percent in 1980's to 49.1 percent in 1990 and further to 85.9 percent in 2000 (see table below)

TABLE 19:   PROPORTION OF HYV TO TOTAL AREA UNDER RICE

Districts	1980-81	1990-91	1999-00
Bankura	16.1	44.7	76.5
Birbhum	33.4	54.8	98.0
Burdwan	46.9	72.3	92.0
Coochbehar	14.9	29.6	68.4
Darjeeling	28.8	34.5	41.8
Hooghly	55.3	68.3	90.4
Howrah	27.6	57.0	81.6
Jalpaiguri	9.3	28.8	69.2
Malda	22.8	48.4	88.5
Murshidabad	20.0	49.7	87.1
Midnapur	28.2	48.0	78.2
Nadia	30.3	60.3	78.6
Purulia	18.5	34.1	82.0
24 Paragnas	24.0	45.9	77.6
West Dinajpur	12.4	41.9	77.6
West Bengal	25.3	49.1	85.9

Source: Calculated from Various issues of Economic Review. Government of West Bengal.

There was a rapid increase in the adoption of HYV's in all the districts, but again there was a variation in the adoptions of HYV's across districts. The rate of adoption of HYV's was the highest in Birbhum, Burdwan, and Hooghly between 1980 and 2000. In Birbhum, the rate of adoption of HYV's increased from an average of 33.4 percent in 1980 to 54.8 percent in 1990 and 97.9 percent in 2000. In Burdwan, the

rate of adoption increased from 46.8 to 72.2 and 91.6 percent during the same period. In Hooghly the rate of adoption increased from 55 %to 68 %and to 90.35 percent.

Irrigation

Area irrigated as percentage of gross cropped area has been on a continuous rise in West Bengal.

TABLE 20: AREA IRRIGATED AS A PERCENTAGE OF GCA

Year	Area Irrigated
1980	27.8
1985	36.1
1990	43.2

Source: Calculated from Agricultural Census. Government of West Bengal.

As the table shows, area irrigated has increased from 27.7 percent in 1980 to 36.08 percent in 1985 and 43.2 percent in 1990. About 1.2 million hectares of land were brought under irrigation between 1975-76 and 1992.

TABLE 21: AREA IRRIGATED BY TUBEWELL, CANALS, WELLS AND TANKS IN WEST BENGAL

	tubewell	canals	well, tanks
1975/76	13.6	47.6	38.8
1980-81	18.5	46.3	35.2
1985-86	31.6	37.3	31.0
1990-91	52.8	11.1	36.1

Source: Calculated from Agricultural Census. Government of West Bengal.

Looking at the percentage distribution of the different sources by which area is irrigated, we that over the years, area irrigated by tubewells has gained importance. In the total distribution pattern of the different sources of irrigation, total area irrigated by tubewells was only 13.6 in 1975/76, which increased to 52.81 percent in 1990/91. On the other hand, area irrigated by canals was declining from 47.6 percent in 1975/76 to 11 percent in 1990/91. Thus, it is clear that among the different sources

of irrigation, the fastest growing sector in 1980's and 1990's was irrigation from tubewells.

Below, we look at the growth rate of public canals in the districts of West Bengal,

TABLE 22: GROWTH RATE OF GOVERNMENT CANAL'S

Districts	1970-1980	1980-1990
Bankura	6.44	2.27
Birbhum	0.92	2.00
Burdwan	0.05	1.71
Coochbehar	18.04	11.39
Darjeling	-3.82	-3.23
Hooghly	-.61	1.18
Howrah	0.76	1.93
Jalpaiguri	-4.80	-2.14
Malda		
Midnapur	3.90	3.45
Murshidabad	0.65	1.43
Nadia		
Purulia	21.48	16.10
Twenty Four Paraganas		
West Dinajpur	7.34	-2.67
West Bengal	1.72	3.49

Source: Calculated from Economic Review Various Issues. Government of West Bengal.

The growth rate of government canals shows that as compared to the 1970's the spread effects of canals in 1980's across the districts of Bengal are seen. So we see that there was a large expansion in the input use particularly large are was brought under irrigation, the use of fertilizer increased tremendously and there was a expansion of area under HYV's and in West Bengal in 1980's.

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Conclusion:

Thus, we see that there has been a rapid rise in agricultural productivity in West Bengal in 1980's . In the next chapter, we carry out an analysis of main factors that led to agricultural take off in West Bengal.

Chapter Four

Land Reforms, Input Use and Agricultural Growth

In the previous chapter, we had discussed that agricultural productivity in West Bengal has increased tremendously since early 1980's. So the obvious question that is asked is what were the factors that led to the agricultural take off in West Bengal. We had earlier compared the agricultural performance of West Bengal, with it's neighbouring states having the same agro-climatic condition to show that West Bengal's agricultural performance stands out much better than Bihar and Orissa. Now the proximate cause for this departure may be due to two simultaneous processes, first the land reforms that have been introduced in the post 1977 period, and secondly the improved input use, might have contributed to this increasing productivity. Land reforms measures, by providing security of tenure may have allowed the farmers to use better techniques of production in farming, which in turn might have contributed to this increasing agricultural productivity.

We plan this chapter as follows; the first section deals with operation barga and land redistribution. To see whether the districts that had a fairly high registered bargadars attained a high growth rate. So that we can infer that bargadari registration was the main input that explained the agricultural take off. The second section deals with land reforms and agricultural development, to analyse the impact of land reforms on agricultural development, for that we carry out regression analysis. Having done that, we discuss results first for the state level, then look into the district level analysis to see if there are any variations in the factors that explain the output and productivity growth.

Thus, what we intent to do in this chapter is to re-examine the proximate cause of agricultural takeoff in West Bengal empirically. We look at the indirect effect of land reforms, where the security provided to the sharecroppers in turn provides them with an incentive to investment in land and use input more efficiently. Th direct effect of land reform is the one where landowners are now pressurized to cultivate the land for themselves, as renting out of land is restricted by the land reforms act. Thus to

increase his income he will cultivate the land more efficiently, which will obviously have a positive impact on the productivity of the land. In our study here we concentrate on the indirect effect of land reforms. Since nothing much can be said about the impact of land reforms on growth, with the state level data, analysis has been shifted to district analysis level. Hence, to examine these interrelationships we undertake a time series analysis at both the state and district levels attempting to relate output and productivity measures of land reforms aspect and the input use.

Operation Barga and Land Redistribution.

Following our discussion earlier, we have seen that operation barga might have helped the sharecroppers in adopting better methods of cultivation, so as to improve the productivity of land.

Before we move into the whole discussion of the effect of land reforms on agricultural growth, let us first try and look how operation barga and land redistribution has spread in rural Bengal. The Operation barga led to the recording 15 lakh sharecroppers covering about 11.1 lakh acres of land in 2000. Table 1, shows the percentage share of the total bargadars in West Bengal. The district of Midnapur recorded the highest number of bargadars at three points of time, shown in the table. The districts of Twenty-four Paraganas recorded the second highest number of bargadars at three points of time.

Table 2 indicates the area under recorded tenancy as a percentage of net sown area in each district. It is seen from the table that 6.9 percent of land was reported to be under sharecropping in 1980, this increased to 8.2 percent in 1990 and 8.1 percent in 2000. Some of the districts that recorded the highest land under sharecropping were Birbhum, Coochbehar, Malda, Howrah, Hooghly and West Dinajpur. Their area under recorded sharecropping was higher than the State average at all three points of time, ranging from 9.7 percent in West Dinajpur to 13.8 percent in Coochbehar and 14.2 percent in Birbhum as on 2000.

Moreover, we see that the amount of vested land redistributed as a proportion of cropped land for the State as a whole see table 3, for instance represent only around 3.3 percent upto 1980, 4.3 upto 1990 and 4.4 percent of the cropped area as on 2000. The land which is vested with the government, is usually the ones which is not fit for

cultivation or land which are very less productive. If we do a simple correlation between land productivity and vested land redistributed, then we find a negative correlation, as for 1980, the correlation coefficient was -0.41, in 1990 it was -0.43 and in 2000 it was -0.45. *This proves that vested land redistributed infact will have no impact or even a negative impact on productivity.* A further point that is established regarding the redistribution of vested land is redistribution is generally found to be higher in areas, which are less productive. See table 3, districts such as Coochbehar and Purulia that are less productive has a higher proportion of redistribution of vested land. On the other hand, districts such as Burdwan, Birbhum, Hooghly, Murshidabad and Nadia, which are productive in terms of contribution to the total foodgrains, have less redistributed vested land. So, we can conclude that there the availability of land is greater in areas of low productivity, because these areas generally tend to have larger availability of barren land or land which are not fit for cultivation. The government in turn acquires these lands and redistributes them to the land-poor people. So, vested land redistributed by the government are generally those which are less fertile, or those not fit for cultivation. This in turn may not have any positive effect on land productivity and it may also have a negative impact on productivity.

TABLE 1: PERCENT SHARE OF BARGADARS TO THE TOTAL

	1980		1990		2000	
	number	Area	Number	Area	Number	Area
Burdwan	8.0	8.5	8.3	9.7	8.8	10.4
Birbhum	7.0	9.8	7.2	9.7	7.5	10.2
Bankura	7.7	5.5	7.4	5.6	7.8	6.0
Midnapur	21.3	13.4	21.3	12.5	19.5	10.8
Howrah	3.1	2.4	2.8	2.3	2.9	2.2
Hooghly	6.6	5.0	7.2	5.2	7.6	5.6
24 paragnas	13.1	9.5	12.9	12.0	12.5	12.0
Nadia	3.9	3.1	3.9	3.1	4.3	4.2
Murshidabad	4.8	5.4	5.5	5.7	5.6	6.0
West dinajpur	6.5	10.1	6.9	9.1	6.9	2.5
Malda	6.0	7.5	5.5	7.1	5.4	7.1
Jalpaiguri	4.5	1.8	3.9	8.0	4.1	8.7
Darjeeling	1.0	1.9	0.9	1.6	0.9	1.6
Coochbehar	5.5	7.3	5.7	7.5	5.6	7.5
Purulia	0.1	0.1	0.5	0.7	0.6	0.7
West Bengal	100.0	100.0	100.0	100.0	100.0	100.0

Source: Economic review, Various issues, Government of West Bengal.

TABLE 2: LAND UNDER BARGA AS A PERCENTAGE OF NET SOWN AREA

Districts	1980	1990	2000
Bankura	5.5	6.8	8.8
Birbhum	10.9	14.7	14.2
Burdwan	6.8	9.4	10.4
Coochbehar	10.5	13.4	13.8
Darjeeling	4.2	4.7	4.5
Hooghly	8.0	10.1	11.0
Howrah	9.3	10.0	10.5
Jalpaiguri	2.1	11.1	10.5
Malda	10.1	10.8	11.6
Midnapur	5.9	7.0	5.6
Murshidabad	4.8	6.1	6.2
Nadia	3.7	4.0	5.9
Purulia	0.1	1.1	1.1
24 Paragnas	5.2	8.0	8.3
West Dinajpur	8.2	9.3	6.7
West Bengal	6.9	8.2	8.1

Source: Economic review, Various issues, Government of West Bengal.

TABLE (3): REDISTRIBUTION OF LAND AS A PERCENTAGE OF GROSS CROPPED AREA

Districts	Upto1980	Upto1990	Upto2000
Bankura	4.1	4.1	5.2
Birbhum	1.7	2.6	3.4
Burdwan	1.9	2.9	2.7
Coochbehar	3.2	4.3	5.0
Hooghly	1.0	1.0	1.0
Howrah	0.5	0.8	0.9
Malda	2.6	3.8	6.8
Midnapur	6.1	7.0	6.6
Murshidabad	1.6	2.9	1.9
Nadia	1.0	0.9	1.0
Purulia	6.3	7.5	7.6
24 Paragnas	5.5	6.0	6.2
West Dinajpur	3.5	4.4	4.4
West Bengal	3.3	4.3	4.4

Source: Economic review, Various issues, Government of West Bengal

Land Reforms and Agricultural Development

It is often said that 'operation barga' was the main driving force behind the recent spurt in agricultural growth. As we have already said that, 'operation barga' provided security of tenure to the sharecroppers, which was associated with new incentives to cultivate the land more efficiently. It also enabled poor peasants to have equal access to modern inputs. Then according to this, the recorded bargadars would be able to increase the productivity of land. However one important thing that should be noted, the Operation barga led to the recording 15 lakhs sharecroppers covering about 11.1 lakh acres of land in 2000, i.e. 8.2 percent of the arable land and 20.2 percent of agricultural households. Thus, it is doubtful that operation barga and other land reforms programmes could be the sole variables explaining agricultural take-off in 1980's. . Since only for land reforms to have a positive effect, these small areas of land will have to achieve extraordinary high rates of productivity growth, which was unlikely, the case.

Moreover, to the question so as to see if the districts that recorded the highest registered bargadars were the ones to register the highest growth rates. We have seen that in 1990 Midnapur and Twenty-Four Paraganas recorded the highest number of bargadars but the growth rates of rice show that it has risen significantly for Midnapur but not in Twenty-Four Parganas. On the other hand, Purulia and Howrah recorded the lowest number of bargadars in 1990, but despite this fact the growth rate it achieved in both districts in 1980's was higher than the growth rates the districts such as Birbhum, Burdwan, and Twenty-four paraganas which had fairly high registered bargadars. So what follows is that there could also be other factors in addition to Operation barga, which explain the spurt in agricultural growth in West Bengal.

We now move to the debate whether land reforms particularly operation barga was the main driving force or whether it was the input use .We have, seen in our earlier chapter that, the adoption of HYV technology and chemical fertilizers were very rapid after 1980's. There was a substantial increase in the number of shallow tube-wells, and the land brought under canal irrigation had increased in the same period.

To find the exact quantification of the effect of land reforms on agricultural productivity we have carried out a regression analysis. The choice of variables, methodology, choice of years, choice of crop has been described below.

While operation barga itself did not provide any other services other than registration opportunities and the enforcement of tenancy laws, there were clearly other programmes that was a part of government overall programme.

First, there was some expansion of infrastructure in West Bengal. We control for pubic investment in infrastructure by including measures of the availability of public government canals, and tube-wells,

Secondly, the use of HYV seeds spread during this period was partially a part of the government programme,

Thirdly, the rate of fertilizer application increased during this period, this again was a partially spurred by government programme where fertilizer now became readily available due to credit facility,

Fourthly, In addition to all these factors the government also redistributed some amount of land to the landless and land poor.

Going back to our theoretical discussion on how registration of bargadars can affect the sharecroppers, we saw that registration provided security of tenure to the sharecroppers, which were associated with new incentives to cultivate land more efficiently. Thus, we can say that bargadari registration in turn *might* have led the tenants to use inputs more efficiently so as to increase the output of agricultural products

Methodology

For explaining the behavior of the independent variables on the dependent variables

We use the log linear transformation equation of the form

$$\ln Y_t = a_t + \sum_{i=1}^{n} b_i \ln x_{it} + u_t$$

y_t = dependent variable

a_t = constant term

x_i's are the explanatory variables

where $i = 1, 2, \ldots, n$.

n is the number of the explanatory variables, b_i's are coefficient which are estimated and u_t is the error term

Choice of Years

We do the regression analysis for the period 1980 to 2000. This period has been chosen, as this was the period when agricultural productivity started increasing, this was also the period when land reforms programme started gaining acceleration.

Choice Of Crop,

We regress the independent variables on output and productivity of rice, as rice contributes almost 80 percent of the total food-grains output.

Defining Variables

A. Dependent variables
1) Yield of rice (LY)
2) Production of rice (LP)
B. Independent Variables 1) Number of bargadars per 1000 hectares of net sown area (LB) 2) Land under barga as a percentage of net sown area (LBA) 3) Land holdings per bargadars (LHB) 4) Vested Land redistributed as a proportion of NSA. (LLR) 5) Fertilizer consumption per 1000 hectares of net sown area (NSA). (LF) 6) Proportion of rice area under HYV cultivation. (LHYV). 7) Area irrigated by government canals per 1000 hectares of gross cropped area. (LCG) 8) Number of government tube-wells per 1000 hectares of NSA. (LTW) 9) Index of Rainfall. (LR)

Final Model :

We have alternative set of models that is made to explain the behavior of agricultural take off in West Bengal.

For yield

Model 1 : $\ln y = \alpha + \beta_1 \log lb + \beta_2 \log llr + \beta_3 \log lgc + \beta_4 lhyv + u$

Model 2 : $\ln y = \alpha + \beta_1 \log lb + \beta_2 \log llr + \beta_3 \log lf + u$

Model 3 : $\ln y = \alpha + \beta_1 \log lb + \beta_2 \log llr + \beta_3 \log ltw + u$

where $\beta_1, \beta_2, \beta_3, \beta_4$, are the coefficients, α is the constant and u is the error term.

For production

Model 1 : $\ln p = \alpha + \beta_1 \log lb + \beta_2 \log llr + \beta_3 \log lgc + \beta_4 lhyv + u$

Model 2 : $\ln p = \alpha + \beta_1 \log lb + \beta_2 \log llr + \beta_3 \log lf + u$

Model 3 : $\ln p = \alpha + \beta_1 \log lb + \beta_2 \log llr + \beta_3 \log ltw + u$

where $\beta_1, \beta_2, \beta_3, \beta_4$, are the coefficients, α is the constant and u is the error term.

The above models have been selected on the basis of certain criteria. For example, there is a strong association between several variables, hence there arises a problem of multi-collinearity, which tends to give insignificant coefficients in the presence of high-adjusted R- squared. This means that explanatory variables tend to explain the dependent variable but at the same time are shown to be insignificant. Insignificant here would imply, partly their contributions are possibly getting explained by other variables, which are significant and can show a significant coefficient. But this will not mean that the explanatory variables with insignificant coefficient are not contributing to the behavior of the dependent variable. To avoid the problem of multi-collinearity, we have constructed the models shown above. We have used model 1 to carry out our analysis, as we have tried out the models and found that model 1 gives the best fit, by looking at the adjusted R-squared. Fertilizer and HYV, fertilizer and tube-wells, tube-wells and HYV, are generally found to be related to each other. So we have tried to estimate the equation explaining production and productivity by not including fertilizer and tube-wells and keeping other variables, because these inputs though important could become insignificant even when it is related to the dependent

variable due to their association with other variables. Moreover, we have chosen the two important agricultural policies: public canals and adoption of HYV as these are typically seen as the major technological sources of increased productivity. Secondly, among the land reforms variable registration of bargadars explain the productivity and output level more than either LHB or LBA. This is done, by looking at the adjusted R- square value. On doing the exercise adjusted R-Squared were found to be the highest for registration of bargadars, so we take in our final model registration of bargadars as the Operation barga variable.

State Level Analysis

We first look at the state level analysis to see the impact of land reforms and input uses in West Bengal see table 4 (a) and 4 (b). The first half table 4(a) shows that the explanatory variables, HVY, public canals, registration of bargadars and land redistributed are regressed on rice yield. For the simple linear models considered here, the coefficient measures the marginal contribution of the independent variable to the dependent variable, holding all other variables fixed.

Table 4(a) and 4(b) shows that for both output and productivity, registration of bargadars, public canals and HYV show a positive and a significant coefficient. Thus showing that bargadari registration and inputs like public canals and HYV explains the growth rate. . Better farming practices though canal irrigation; use of HYV's corroborated with the fact that the actual tiller is more secure as now he is now registered through operation barga to a large extent explains the agricultural take-off in West Bengal.

Thus, among the explanatory variables, barga registration seems to have a stronger impact on both yield and output, as shown by the coefficient. As far as land redistributed is concerned, the coefficient is shown to be negative and significant for both output and productivity. This may be explained by the fact that the land, which

Table 1(a)

WEST BENGAL				
Dependent Variable: LY				
Method: Least Squares				
Sample: 1980 2000				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LB	2.401726	0.457151	5.253687	0.0001***
LGC	0.426998	0.213535	1.999665	0.0618*
LHYV	1.14864	0.301524	3.809454	0.0014***
LLR	-3.17602	1.213493	-2.61725	0.018*
	R-squared 0.85764		Adjusted R-squared	0.832518

Table 1(b)

Dependent Variable: LP				
Method: Least Squares				
Sample: 1980 2000				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LB	1.704687	0.426055	4.001101	0.0009***
LI	0.496708	0.19901	2.4959	0.0231*
LHYV	1.086084	0.281014	3.864882	0.0012***
LLR	-2.34302	1.130949	-2.07172	0.0538*
	R-squared 0.88991		Adjusted R-squared	0.870482

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level.

is available for redistribution, was the land which is not suited for cultivation,(discussed so this may not have a very positive effect on both output and yield. The results show that explanatory variables are being able to explain the dependent variable, shown by the fit of regression, R-squared (= 0.85) for yield and (=0.88) for production.

Thus, it follows from the discussion the reasons in the beginning of the chapter those land reforms measures particularly, 'Operation Barga' could not be the sole variable explaining the agricultural growth. This is supported by our regression analysis, which show a mixed result, where both the land reforms and the input use like public canals and HYV explains the spurt in agricultural growth rate in early 1980's. In short we can say that land reforms factor alone can not alone explain the agricultural take off in West Bengal, it is also attributable to the wide adoption of input use by the farmers. In other words land reforms, technological factors helped the agricultural take off.

District Wise Analysis

So far we have looked into the State level analysis, to investigate which (among input use and land reforms) were the factors that explained the growth rate in output and yield level in West Bengal. We now turn to district wise analysis, to see if there existed any variation in the pattern of the input use and land reforms factor explaining output and yield across districts.

The methodology to carry out the analysis is given below:

$$\ln Y_t = a_t + \sum_{i=1}^{n} b_i \ln x_{it} + u_t$$

y_t = dependent variable

a_t = constant term

x_i's are the explanatory variables

where $i = 1,2,.......,n$.

n is the number of the explanatory variables, b_i's are coefficient which are estimated and u_t is the error term

The results of the district wise analysis are shown in tables 2 to 15. As table 2 show that in Bankura, public canals, HYV and bargadari registration had a positive and a significant coefficient and with both output and productivity. A higher magnitude of production and productivity elasticity for bargadari registration shows that, bargadari registration is more responsive to the growth rates of productivity and production. On the other hand, land redistribution has a positive but insignificant coefficient with production of rice, and a positive but an insignificant coefficient with land redistributed. As explained in the case of State level analysis that this may be due to the fact that the land redistributed may not be productive enough land so that it may not have a very positive effect on yield and output. Thus in effect we can say that bargadari registration, public canals and HYV were the main factors explaining the output and yield level in Bankura.

For Birbhum, all the explanatory variables show a positive coefficient, but only public canal is found to have a statistically significant effect on both yield level and output. Other variables though showing a positive coefficient i.e. have an effect on yield and output, but were not found to be statistically significant. Thus in Birbhum only public canal to mainly explain output and yield level.

In Burdwan area irrigated by public canals and bargadari registration shows a positive coefficient with the output levels and yield level, but only bargadari registration was found to be statistically significant with output and yield.

In Coochbehar, since area irrigated by public canals is very negligible, we take number tube-wells, bargadari registration, and land redistribution as the explanatory variables. We find that for output and yield level, area irrigated by tube-wells and registration of bargadars was found to have a positive and significant coefficient. Bargadari registration has a stronger impact on both yield and output as we can see by the larger coefficient. But overall, bargadari registration and tubewell irrigation explains the output and yield level in Coochbehar.

In Darjeeling again due to the agroclimatic condition and the region, either tube-wells or public canals irrigated very small area. So we take fertilizer as the input variable, and see that fertilizer and bargadari registration explain the output. Though in case of

yield level both fertilizer and bargadari registration are found to have positive coefficient with the yield level, but it is only fertilizer that is found to be significant.

In Hooghly we see that except for land redistribution all other variables show a positive coefficient but only government canals and bargadari registration are found to explain both production and yield level in the district.

We take fertilizer use apart from the land reforms variable to explain the factors affecting output and yield in Howrah. Here all the explanatory variables are seen to show a positive coefficient with both yield and output but only fertilizer application is found to be significant.

In Jalpaiguri, registration of bargadars and fertilizer application show a significant and a positive coefficient with both output level and yield level. Again land redistribution shows a negative and a significant coefficient with both yields and output level, the explanation stand the same as in the case of the state.

In Nadia due to absence of data on area irrigated by government canals, we take tube-wells in addition to the land reforms factor as the explanatory variable. The results show that tube-wells and bargadari registration explains the output and productivity growth in Nadia . Tube-wells though show a positive coefficient but were not found to be statistically significant. Hence, we see that only bargadari registration was found to be the significant factor explaining output and yield. However this does not mean that inputs have no role to play in, as it follows from our theoretical understanding that bargadari registration alone in itself cannot raise productivity and output. Bargadars must use inputs more efficiently on his land to increase the output.

TABLE: 2

BANKURA

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGC	0.55	0.12	4.45	0.00***
LHYV	0.26	0.15	1.77	0.09*
LB	1.70	0.34	4.99	0.00***
LLR	-0.70	0.60	-1.16	0.26
R-squared	0.78		Adjusted R-squared	0.75

Dependent Variable: LP Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGC	0.715232	0.142753	5.010272	0.0001***
LHYV	0.498039	0.16835	2.958352	0.0088***
LB	1.605718	0.890522	1.951044	0.0593*
LLR	0.052561	0.687619	0.076439	0.94
R-squared	0.82383		Adjusted R-squared	0.792741

*Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level.*

TABLE : 4

BIRBHUM

Dependent Variable: LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGC	1.40	0.52	2.70	0.02**
LB	0.47	0.42	1.10	0.29
LHYV	0.39	0.27	1.44	0.17
LLR	0.058	.1256	0.684	.756
R-squared	0.60		Adjusted R-squared	0.53

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGC	1.48	0.32	4.61	0.0003***
LLR	0.30	0.42	0.72	0.48
LB	0.35	0.43	0.81	0.43
LHYV	0.18	0.29	0.63	0.54
R-squared	0.59		Adjusted R-squared	0.52

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level.

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TABLE: 5

BURDWAN

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLR	-1.50	1.39	-1.08	0.30
LGC	0.01	0.09	0.08	0.93
LB	2.65	1.46	1.82	0.09*
	R-squared 0.47		Adjusted R-squared	0.38

Dependent Variable: LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLR	-2.58	1.52	-1.70	0.11
LGC	0.05	0.10	0.54	0.60
LB	4.24	1.59	2.66	0.02**
R-squared	0.61		Adjusted R-squared	0.54

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % l

In Murshidabad, irrigation by public canals, HVY and bargadari registration shows a positive coefficient with both output and yield, but bargadari registration does not show a significant coefficient with yield level. Only irrigation by public canals and HYV tend to explain the productivity in Murshidabad. But in case of production only canal irrigation is found to be statistically significant, though bargadari registration and HYV have a positive coefficient with output, but then they are statistically found to be insignificant.

In Midnapur all the explanatory variables were found to have a positive coefficient with output and yield, but in case of yield only bargadari registration and canal irrigation are found to have positive and a significant coefficient. Production is also explained by bargadari registration and canal irrigation, which showed a positive and a significant coefficient.

In Purulia, for yield level, canal irrigation, bargadari registration, land redistributed and HYV show a positive coefficient, but only public canal are found to be significant at 10 percent level. For production, however bargadari registration, public canals and HVY show a positive coefficient, but again in this case also, only irrigation and bargadari registration are found to be statistically significant

Table :5

COOCHBEHAR

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTW	0.227131	0.054974	4.131622	0.0007***
LB	0.497113	0.168885	2.943501	0.0091***
LLR	-0.85479	0.446621	-1.9139	0.0726*
R-squared	0.88		Adjusted R-squared	0.855

Dependent Variable: LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTW	0.286718	0.074331	3.857291	0.0013***
LB	0.917587	0.228353	4.01828	0.0009***
LLR	-1.81316	0.603888	-3.00248	0.008***
R-squared	0.81		Adjusted R-squared	0.78

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level.

TABLE: 6

HOOGHLY

Dependent Variable: LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob
LLR	-0.63	0.65	-0.96	0.35
LGC	0.44	0.19	2.3	0.04**
LHYV	0.26	0.18	1.44	0.17
LB	1.33	0.48	2.77	0.014**
R-squared 0.76			Adjusted R-squared 0.71	

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob
LLR	-1.32	1.02	-1.3	0.21
LGC	0.93	0.29	3.15	0.006***
LHYV	0.21	0.27	0.78	0.45
LB	2.5	0.74	3.33	0.004***
R-squared 0.75			Adjusted R-squared 0.69	

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level

TABLE: 7

HOWRAH

Dependent Variable: LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob
LB	0.22	0.43	0.51	0.62
LLR	0.13	0.24	0.56	0.59
LF	9.38	1.25	7.54	0.00***
R-squared 0.86			Adjusted R-squared 0 .83	

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob
LB	0.01	0.01	0.83	0.42
LLR	0.00	0.01	0.51	0.62
LF	7.39	0.04	15.12	0.00***
R-squared 0.89			Adjusted R-squared 0.86	

Note: *** significant at 1 % level.

TABLE : 8

JALPAIGURI

Dependent Variable: LP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLR	-0.33	0.14	-2.32	0.03**
LF	3.26	0.18	17.93	0.00***
LB	0.08	0.03	2.36	0.03**
	R-squared	0.78	Adjusted R-squared	0.75

Dependent Variable: LY

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLR	-0.3	0.1	-3.4	0.00
LF	3.9	0.1	30.8	0.0023***
LB	0.1	0.0	4.1	0.0015***
	R-squared	0.9	Adjusted R-squared	0.9

*Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level*

TABLE:9

MALDA

Dependent Variable: LY

Variable		Coefficient	Std. Error	t-Statistic	Prob.
LTW		0.025085	0.174337	0.143886	0.8872
LLR		0.612441	1.064868	0.575133	0.5723
LB		1.866825	0.789046	2.365926	0.0294**
	R-squared	0.38		Adjusted R-squared	0.31

Dependent Variable: LP

Variable		Coefficient	Std. Error	t-Statistic	Prob.
LTW		0.003484	0.13705	0.025419	0.98
LB		1.665147	0.83712	1.989139	0.0621*
LLR		0.702775	0.620289	1.13298	0.2721
	R-squared	0.69		Adjusted R-squared	0.67

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level

TABLE : 10

MIDNAPUR

Dependent Variable: LY

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGC	0.290517	0.071554	4.06012	0.0009***
LLR	0.749167	0.549926	1.362304	0.192
LB	1.810672	0.029246	3.064906	0.0072***
LHYV	0.178933	0.126757	1.411617	0.1772
	R-squared	0.80	Adjusted R-squared	0.75

Dependent Variable: LP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLR	.010672	0.29246	.364006	.72
LGC	0.312846	0.077357	4.0442	0.0009***
LHYV	0.229883	0.137037	1.677519	0.1129
LB	1.049594	0.594526	1.76543	0.0966*
R-squared	0.86		Adjusted R-squared	0.81

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level

TABLE : 11

MURSHIDABAD

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGC	1.439263	0.662436	2.172683	0.0452
LHYV	1.826955	1.004098	1.819498	0.0876
LB	2.350863	1.932143	1.216713	0.2414
LLR	-2.86931	1.800868	-1.59329	0.1307
	R-squared	0.56	Adjusted R-squared	0.46

Dependent Variable: LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGC	1.663861	0.636536	2.613929	0.0188
LHYV	1.667891	1.031259	1.617336	0.1253
LBA	5.061735	3.930696	1.287745	0.2161
LLR	-2.41736	1.83857	-1.31481	0.2071
	R-squared 0.57		Adjusted R-squared	0.46

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level

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TABLE : 12

NADIA

Dependent variable : LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTW	0.855421	0.886119	0.965357	0.3479
LLR	-0.66846	1.219729	-0.54804	0.5908
LB	1.759219	0.796563	2.208511	0.0412**
	R-squared 0.80		Adjusted R-squared	0.76

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTW	0.156465	0.650824	0.240411	0.8129
LLR	-0.09357	0.895849	-0.10445	0.918
LB	1.264198	0.585048	2.160844	0.0453**
	R-squared 0.76		Adjusted R-squared	0.72

*Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level*

TABLE : 13

PURULIA

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLR	0.657582	0.439486	1.496252	0.1541
LGC	0.698613	0.283032	2.468321	0.0252**
LHYV	0.115967	0.100498	1.153921	0.2655
LB	2.122341	1.165114	1.238143	0.27
R-squared	0.52		Adjusted R-squared	0.40

Dependent Variable: LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLR	-0.50776	0.607196	-0.83623	0.4153
LGC	0.641021	0.312469	2.051473	0.057*
LHYV	0.031508	0.113499	0.277606	0.7849
LB	0.286958	0.140902	2.036579	0.0586*
R-squared	0.61		Adjusted R-squared	0.51

Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level

TABLE : 14

TWENTY FOUR PARAGANAS

Dependent Variable: LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGC	0.262955	0.177613	1.480492	0.157
LHYV	0.489267	0.227957	2.146316	0.0466**
LLR	0.349508	0.304926	1.146206	0.2676
LB	1.353123	0.210487	6.428533	0.0000***
	R-squared	0.34	Adjusted R-squared	0.22

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LB	2.401726	0.457151	5.253687	0.0001***
LLR	-3.17602	1.213493	-2.61725	0.018**
LHYV	1.14864	0.301524	3.809454	0.0014***
LGC	0.426998	0.213535	1.999665	0.0618*
	R-squared	0.86	Adjusted R-squared	0.83

*Note: *** significant at 1 % level, ** significant at 5 % level and * significant at 10 % level*

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TABLE: 15

WEST DINAJPUR

Dependent Variable : LP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LB	2.28	0.68	3.38	0.004***
LGC	0.06	0.07	0.89	0.39
LHYV	0.01	0.16	0.03	0.97
LLR	-0.01	0.18	-0.05	0.96
R-squared 0.84		Adjusted R-squared	0.80	

Dependent Variable: LY				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LB	1.670029	0.56756	2.942469	0.0096***
LGC	0.030814	0.058117	0.530213	0.6032
LHYV	0.057068	0.137956	0.413669	0.6846
LLR	-0.00932	0.154964	-0.06015	0.9528
R-squared 0.83		Adjusted R-squared	0.79	

Note: Significant at 1 % level.

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In Twenty-Four Parganas, for the yield level all the variables, public canal, HYV, land redistributed, bargadari registration is seen to have a positive coefficient, but only bargadari registration and HYV are found to be significant. Of which bargadari registration appears to have a greater effect on yield than HYV. As in the case of yield the production of rice also shows a positive and a significant coefficient with barga registration, HYV, in addition public canal.

In West Dinajpur, for both yield and output, bargadari registration, canal irrigation and HYV is seen to show a positive coefficient. However only bargadari registration shows a statistically significant coefficient. The other variables though having a positive coefficient but the results were not found to be significant.

If we look at the compilation table 15(a) and 15 (b) we see that in case of productivity, bargadari registration has been found to be significant in all the districts except, Birbhum, Purulia, Howrah and Murshidabad. Of which Purulia and Howrah recorded the lowest number of bargadars, but then how do we explain the spurt in growth rate in these districts? Our results show that agricultural growth in these districts is explained by the input use. In Howrah, the growth rate is explained by the fertilizer application, and in Purulia, public canals have explained the agricultural take off. The same holds true for explaining productivity.

So, we see that in the case of the Sate, the results of the district too show a mixed result, where land reforms and input use both explain the agricultural spurt in West Bengal.

TABLE: 15(A) DEPENDENT VARIABLE: PRODUCTION

	Bargadari registration	Public Canal	Tube-wells	HYV	Fertilizer
West Bengal	significant	significant		significant	
Bankura	significant	significant		significant	
Birbhum		significant			
Burdwan	significant				
Purulia		significant			
Howrah					Significant
Twenty-four paraganas	significant			significant	
Hooghly	significant	significant			
Coochbehar	significant				Significant
Murshidabad		significant		significant	
Midnapur	sigificant	significant			
Nadia	significant				
Malda	significant				
Jalpaiguri	significant			significant	
W dinajpur	significant				

TABLE : 15(B) DEPENDENT VARIABLE: YIELD

	Bargadari registration	Public Canal	Tube-wells	HYV	Fertilizer
West Bengal	significant	significant		significant	
Bankura	significant	significant		significant	
Birbhum		significant			
Burdwan	significant				
Purulia		significant			
Howrah					Significant
Twenty-four paraganas	significant			significant	
Hooghly	significant	significant			
Coochbehar	significant		significant		
Murshidabad		significant		significant	
Midnapur	significant	significant			
Nadia	significant				
Malda	significant				
Jalpaiguri	significant			significant	
W Dinajpur	significant				

From table 2, we see that the Land under barga as a proportion of net cultivated area did not cross more than 14.2 percent the highest recorded in Birbhum in 2000. The lowest was recorded in Purulia, where the barga land recorded was 1.1 percent in the same year. Thus we see that the recorded land is very marginal, and this small registered land must to achieve significantly high growth rates, which is unlikely the case. Thus, in conformity with our regression results we can say, that the wide adoption of input use in Bengal after 1980's played an important role in explaining the agricultural take off in Bengal. Hence we can conclude that in addition to the factors of land reforms, the input use have also played an important role in explaining the agricultural take off in West Bengal.

Lastly, one more important thing that emerges out from the discussion is that it is the southern districts of West Bengal Murshidabad, Birbhum, Bankura, Nadia, Howrah, Murshidabad, Twenty-four paraganas, which have achieved a high growth rate in Food-grains production. The Northern part of West Bengal, Jalpaiguri, Darjeeling, and Dinajpur are the districts that have relatively achieved a low growth rate in agricultural output and yield.

Conclusion:

In conclusion, we can say that in an attempt to re-examine the main cause of agricultural takeoff in West Bengal, the results were found to mixed, both land reforms measures and input use explained the agricultural take off in Bengal. In the end, it was the registration of bargadars, along with the input use (most important among them were public canals, area under high yielding varieties) that had a positive effect on both output and yield. Moreover, as to the question as which factor (land reforms or input use) was more important in explaining the growth rate. Our regression result shows (look at the compilation table), that for example in Birbhum, only bargadari registration has been the main factor in explaining the agricultural growth. On the other hand in the case of Howrah only input use has been the main factor in explaining spurt in agricultural growth (fertilizer application), for Purulia only public canal and in Murshidabad, HYV and public canal explains the trend. For other districts, both the land reforms factor and input use that explained the agricultural take off. We cannot single out any one factor that explains the agricultural growth. All we can conclude from the secondary data source is that, interaction between land reforms and input use explained the agricultural take off in West Bengal.

However, what is comes out from our discussion is that the very fact that input use also explains the agricultural productivity, shows government's intervention in terms of making inputs available to farmers maybe at a subsidized cost, making public investment in terms of public canals. Which in turn have led to the wide use of inputs after 1980's (evidence provided in the earlier chapter). Thus this only

show that in absence of land reforms measures, with proper government intervention in form of subsidies and public irrigation, HYV technology provided to the farmers, can help the farmers to use inputs extensively so as to led to agricultural growth. And this is supported empirically in case of West Bengal, where we have seen that input use has to a large extent explained the transition from stagnation to higher growth rate.

But in the end we can only say that with land reforms measures and with more government intervention for technological diffusion, might led to more intensive cultivation of land, which in turn might bring gains to production.

Chapter Five

Summary and Conclusion

Under the land policy adopted by the British government, the peasant lost their customary rights. The pattern of crop sharing was such that led the peasant with no incentive to invest. Moreover heavy extraction of rent by the landlords led the actual cultivator with no surplus to invest, so as to use better methods of cultivation.

In the post Independence period several acts was passed in an attempt to (a) abolish the intermediaries, (b) prevent eviction of tenants and provide security of tenure to the tenants, (c) regulation of rent. But no serious administrative effort was made to them.

The Left Front government came to power in 1977 and in an attempt to change the prevailing the land structure, introduced two land reform measures (a) Operation Barga and (b) Redistribution of Land. Operation barga was aimed at providing legal protection against rent –enhancement and eviction by landlord's registration to the bargadars, so as to remove the impediments to agricultural growth. Land Redistribution was aimed at redistributing the ceiling surplus land to the land-less and land-poor. Land reforms were an attempt to change the agrarian structure prevalent in West Bengal, remove the concentration of land in the hands of few.

We now summarize few of our results that we have found in our study:

The analysis on the study of ownership shows that the area and number of holdings of the marginal category of operators have increased. But the rate of increase in the number of holdings was more than the increase in the area owned by the marginal category, so the average owned area has changed only marginally. Moreover the distribution of owned area has been far from equal, with a larger proportion of land being concentrated in the hands of the large operators.

The study of operational holdings indicates the increases in the percentage of 'marginal holdings' over time. But the distribution of landholdings is far from equal. The average size of operational holdings continuously declined in West Bengal.

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Thus we see that inequality in the ownership and in the operation of land has to a large extent remained unaltered.

Looking into the leased in area, we saw that the practice of leasing is higher among the marginal categories. However over the years the leased in area, both partly leased in and wholly leased in has declined. Another important aspect is, a general decline in the practice of leasing in land is noticeable in West Bengal among all categories of operators. The decline in tenanted area is also accompanied by a decline in the percentage of the entirely leased in holdings. This implies that the pure tenants must have been pushed to the rank of agricultural labourers. We can say that the practice of leasing of has been largely confined to marginal and to some extent small and semi-medium holders.

Terms of lease shows that share of produce are the dominant form of leasing mostly among the marginal and small category of farmers. Though over the year's area leased in under fixed rent has increased. However, its total impact has so far made only a marginal difference on the overall tenancy structure in the State and share tenancy continues to be the dominant form of tenancy.

The study on the growth rate of output and productivity shows that, growth rate of agricultural productivity accelerated from early 1980's. Given the coincidence of growth with reform, so we have tried to reinvestigate around the possible connection between the two. The main findings of our results is as follows:

We saw that it was the registration of bargadars which had a positive effect on both output and yield, along with the inputs, most important among them were public canals, area under high yielding varieties, fertilizer and tube-wells. Our district-wise results brings a better picture of this mixed effect, where our regression results show that for example in Birbhum, only bargadari registration has been the main factor in explaining the agricultural growth. On the other hand in the case of Howrah only input use has been the main factor in explaining spurt in agricultural growth (fertilizer application), for Purulia only public canal and in Murshidabad, HYV and public canal explains the trend. For other districts, it was both the land reform factor and input use that explained the agricultural take off. We cannot single out any one factor that

solely explains the agricultural growth. But in the end we can only say that with land reform measures and with more government intervention for technological diffusion, can led to more intensive cultivation of land, which in turn might bring gains to production. *However, at the end of our study we can only say that the cause of agricultural takeoff in West Bengal in early 1980's is explained by the interaction between land reform and input use.*

APPENDIX TO CHAPTER 3

METHODS USED FOR GROWTH ESTIMATION

The method used in this chapter for estimation of growth follows the discussion by Boyce (1985). In chapter 3, we have used two functional forms for the estimation of growth, exponential and kinked exponential. The exponential growth is estimated using the log linear function as follows:

$$\ln y_t = a + bt + u_t$$

(which is a linear transformation of $y_t = Ae^{bt}v_t$)

Where, y_t is the output in the year t, a is a constant and v_t is the error term.

The estimates of coefficient b gives the exponential growth rate.

The estimates of coefficient b give the exponential growth. We are looking at the pattern of growth from 1970 upto 2000. Boyce argues that independent estimation of exponential growth in different sub periods is likely to result in estimation of discontinuous trend line and therefore might give anomalous results in comparison with the growth rate of the overall period. A superior alternative to estimate comparative estimates of growth in different sub-periods, Boyce has pointed out, is to use the Kinked Exponential models, which imposes a linear restriction for elimination of discontinuity between sub-periods and jointly estimate growth in different sub periods. The kinked exponential estimation assumes that there is one or more kink at certain points of time and jointly estimates growth for the periods before and after the kinks.

The kinked exponential growth rates are estimated using the following equations:

For a single kink.

$\ln y_t = a_1 + b_1 D_1 t + b_2 D_2 t + u_t$

where t is normalised to $t = o$ at the kink,

$D_1 = 1$ if $t < 0$ and $D_2 = 2$ if $t >= 0$ and $D_2 = 0$ otherwise

The estimates of b_1 and b_2 give the growth rates in the periods before and after the kink.

For two kinks :

$\ln y_t = a_1 + b_1(D_1 t + D_2 k_1 + D_3 k_1) + b_2(D_2 t - D_3 k_1 + D_3 k_3) + b_3(D_3 t - D_3 k_2) + u_t$

where $t = k_1$ is the first kink and $t = k_2$ second kink;

$D_1 = 1$ if $t < k_1$ and $D_1 = 0$ otherwise,

$D_2 = 1$ if $k_2 > t >= k_1$ and $D_2 = 0$ otherwise,

$D_3 = 1$ if $t >= k_2$ and $D_3 = 0$ otherwise.

The estimates of b_1, b_2 and b_3 give the growth rates in the three sub periods.

Boyce argues that the kinked estimates for each sub period are based on data for the whole period. In comparison, the simple exponential estimates of growth for individual sub periods use information only for that sub period. As a result, in contrast to simple exponential estimates of growth, "kinked exponential models make use of the full set of available information from the outset of the estimation exercise, to better distinguish the growth trend in a given sub-period from the instability or fluctuation around it. The result, in general, is more accurate estimates of underlying growth rates"

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