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Role of Institutional Credit and Private Investment in Groundwater Irrigation Development during Boro Rice Cultivation in West Bengal since 1990s

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Abstract

Since the early-1990s, with the advent of globalisation in Indian economy, there had been growing dependence on modern inputs in agriculture associated with the declining public investment due to growing burden of subsidies combined with fiscal constraint. The growing capital intensity and the relatively declining role of the state in input supply resulted a rapid expansion of private investment in agriculture.

In late 1980s, a notable progress of the State of West Bengal was witnessed in achieving food security. This phenomenon could largely be attributed to the enforcement of tenancy reforms and the rapid expansion of groundwater irrigation. One of the dominant causes of growth of rice production in the state could be attributed to the practice of adoption of higher yielding varieties of monsoonal *aman* paddy and the cultivation of winter *boro* paddy, in rotation with aman. As boro cultivation requires controlled irrigation, it flourished where canal irrigation in the post-monsoon season was adequate. In many areas that were outside the command areas of the governmental irrigation facilities, private farmers came into the picture to invest commercially, in the groundwater extraction devices. The growth of private water market in the post monsoon season consequently led to reverse tenancy i.e., leasing out of land from relatively smaller to relatively large farmers.

Our research study examines the development of minor irrigation market and tries to explain the roles of private investment in groundwater extraction mechanism and their impacts on the seasonal tenancy relations in the State of West Bengal during the last two decades. This paper forms a Classical Linear Multiple Regression Model based on the data collected from surveys conducted in some village households of Burdwan, Murshidabad, Birbhum, Hoogly and West Medinipur district.

Keywords: Reverse Tenancy, Irrigation Water, Boro Rice, Groundwater Market, Operation Barga, Thika Contract.

Introduction

Groundwater is a prime natural resource in the earth. Groundwater plays a crucial role in the country in increasing food and agricultural production, providing drinking water and facilitating industrial development. It has emerged as the main source of irrigation for small holder farmers in West Bengal and much of it has been through private investments. Despite extreme population pressures and limited land resources, the notable progress of West Bengal in achieving food security can largely be attributed to the enforcement of tenancy reforms and the rapid expansion of groundwater irrigation. The development of minor irrigation, particularly private investment based expansion of shallow tubewells, has contributed to this impressive performance, and was an outcome of the government's market liberalization policy for irrigation equipment in the late 1980s. This policy promoted rapid expansion of irrigated "boro" rice farming in the dry season. Further cultivation of summer (boro) paddy in the post monsoon season expanded rapidly after the introduction of HYV seeds and the spread of irrigation facilities. In many areas that were outside the command areas of the governmental irrigation facilities, private farmers invested in groundwater extraction devices.

Till the beginning of the 1990s, it appeared that in rice cultivation the small and the marginal farmers had found security of tenure. But

afterwards, the access to water had appeared to be critical for many of the farmers in some parts of West Bengal, especially in parts of the districts of Burdwan, Murshidabad, Hoogly, West Medinipur and Birbhum. Private investment in groundwater extraction mechanisms and the emergence of markets for the supply of groundwater had a significant role in the spread of boro cultivation. Previously (for much of the 1980s) the high risk factor involved in boro cultivation had led the larger landowners to lease out land on a fixed contract 'thika' lease (fixed rent seasonal tenancy). Thus, initially, small and marginal farmers, even landless farmers in West Bengal were directly engaged in the cultivation of boro paddy. In the early 1990s, Mini-Submersible Tube-Wells (MSTWs) began to take over from the earlier diesel power Shallow Tube-Wells (STWs) in some rural areas. The electrically powered MSTWs could easily raise water from more than 20 meters below the ground and thereby reached more secure water resources. The previous tenancy situation had now reversed itself in many areas. The larger cultivators had individually or jointly invested in an MSTWs and proceeded to offer to all the farmers (usually the smaller farmers) in the 15 acre command area of the MSTW, the option of a thika contract for leasing in their land under fixed rent or fixed produce for that season. The owners of water source usually either refused to sell the water to others or they formed a cartel among themselves and raised the price of water to such a high level that relatively smaller farmers could find it profitable to lease out their land to the owners of MSTW, STW etc. In this way, the growth of private water market in the post monsoon season had led to reverse tenancy i.e., leasing out of land from relatively smaller to relatively large farmers in rural West Bengal (Mukherjee, 2016).

Objectives and Study Area

The paper intends to review the emerging changes in the contractual relationship in agricultural land markets in West Bengal. The objective is to examine the reasons, nature and effect of reverse tenancy. Our field survey observed the phenomenon of reverse tenancy in the sample villages since 1990s i.e. a period of about 25 years. We formed a Classical Linear Multiple Regression Model based on the data collected from surveys conducted in some village households of Burdwan, Murshidabad, Birbhum, Hoogly and West Medinipur district. From the Multiple Regression Data Analysis, it can be summarized that there is a greater tendency of farmers for early marketing of boro rice in order to repay the past debts, in case of greater non-availability of proper credit facility, in order to meet immediate financial need for investment in next aman crop and in case of non-availability of proper storage facility.

Review of Literature

The root of the concept of reverse tenancy lied in the well known debate on the issue of the alleged inverse relationship between the farm size and productivity as initiated by Sen (1962). On the basis of the Farm Management Survey data for 1954 to 1957, he found that production acre had decreased with the size holding. The debate on farm size and productivity in India was initiated by Sen (1962) and was later on supported by Khusro (1964), Rao, A. P (1967), Rao, C.H. Hanumantha (1966, 1971) and others. Most of these studies observed an inverse relationship between farm size and output per hectare.

However studies of several economists like Graham (1998), Ghose (1979), Chadha (1978) etc. revealed weakening of the 'inverse relation' between farm-size and productivity with the advent of modern technology. They indicated that the inverse relationship existed in certain types of farms and an essential pre-condition for the existence of the inverse relationship phenomenon was technical backwardness, but the relation could not be generalised. They argued that the larger farmers were capable of modernizing agriculture and of operating with a time horizon which spanned several agricultural years; in addition they were highly effective in availing institutional credit and bringing large surpluses to the market. Feder (1985) opined that the Green Revolution was a programme for large landowners; they were already better equipped, had almost exclusive access to input and output markets, and were the major if not almost exclusive, recipients of agricultural credit.

Bellemare and Barret (2003) presented a theoretical model of reverse share tenancy as it was being practiced in Madagascar. They were especially interested in situations of reverse share tenancy, in which a relatively poorer landlord contracted with a relatively richer tenant. Since the poorer landlord could neither sell her land nor exploit it herself, she rented out to a richer tenant on a share tenancy contract. Webster (1999) found that the principal physical obstruction to productivity in West Bengal were land fragmentation and irrigation. He asserted that there had been consolidation of management around tubewell command areas. Sengupta and Gazdar (1997) pointed out that rapid agricultural growth in West Bengal was attributed to the expansion of groundwater irrigation, mainly in the form of privately owned shallow tubewells (STWs), but later, as water table dropped, through mini submersible tubewells (MSTWs). Mukherjee (2017), using a game theory model, suggested that both the small and the large farmers gain from the seasonal leasing contract of reverse tenancy, without the fear of losing the existing barga rights.

Reasons of Reverse Tenancy

The basic reason behind the changes is 'technology', private ownership of technology bring land into the control of those who control technology. The main causes of growth of rice production in the state were the adoption of higher yielding varieties of monsoonal aman paddy and the cultivation of winter boro paddy, in rotation with aman. Both of these forms of intensification were enabled by the rapid spread of groundwater irrigation, mainly in the form of privately owned Shallow Tube Wells (STWs).

Since the early-1990s, with the advent of globalisation in Indian economy, there had been growing demand for agricultural inputs associated with the growing burden of subsidies combined with

fiscal constraint. Paradoxically with spread of the new technology there was an increasing dependence on modern inputs in agriculture, while there had been declining public investment in agriculture. The share of public sector in the gross capital formation (GCF) in agriculture which was about 43 per cent in the early 1980s drastically declined to about 15 per cent by 2010-11. The growing capital intensity in agriculture and the relatively declining role of the state in input supply raised serious challenges to agricultural development. In fact, there are strong socio-economic reasons for large farmers having greater access to leased land, these are:

The growth of private water market is the main reason of reverse leasing. The large farmers have their own Pump-sets, Shallow Tube-wells, Shallow Pumps, Mini- Submersible Tube-wells (MSTW) etc. whereas the small farmers have to buy water from the large farmers. In the early 1990s, MTSWs began to take over from the earlier diesel power STWs in some rural areas. MTSWs were introduced when the water-level fell in the aquifers and STWs could not ensure water supply. The MSTWs can easily raise water from more than 20 meters below the ground and thereby reach more secure water resources. This also increased the command area. In the early 1990s, an MSTW cost approximately Rs 65,000 to install (this can increase to more than Rs 90,000 if the electrical motor is more than 5 horsepower and driven by a separate diesel generator) and further a payment of Rs 1,500 per annum for the electricity consumed. In late 1990s, the cost had risen almost to Rs.1,30,000 (data collected from some large farmers at the time of interview). Thus the private ownership of MSTWs is concentrated in the hand of some large cultivators. This situation gives the owner of the MSTW a perpetual monopoly over water distribution in the command area. The owners form a cartel among themselves and raise the price of water to such a high level that the relatively smaller farmers are compelled to lease out their land to the owners of MSTWs (Mukherjee, 2014).

The small farmers' limited access to institutional credit is a constraint to investment in new agricultural technology. Small farmers are often unable to satisfy the commercial criterion of credit worthiness (value of assets, land etc.). In relation to the credit requirement of the farmers, the institutional loans are quite insufficient. In addition, the medium and large farmers take more than proportionate share of the institutional credit. This indicates that institutional credit is allocated neither according to need nor to profitability of investment opportunities, but in proportion to value assets (particularly land) owned by different groups. Thus small farmers, largely being pushed outside the institutional credit of the organized money market, are forced to borrow mostly from non-institutional sources. Loans from non-institutional sources are so massive that in-spite-of significant increase in the institutional credit the latter can cover only 47 per cent of all loans (NSSO 70th Round, 2013).

Small farmers are forced to borrow from money lenders, landlords, water suppliers which lead them to surrender their land to big peasants. The agricultural credit system in the country is not realistic. Agriculture is an unorganized profession. Its success and failure depends to a large extent, on climatic factors. Further it is not always possible to distinguish between productive and unproductive loans. Farmers often require loans for consumption purpose as well. The financial agencies do not grant loans for unproductive consumption purposes. Rich farmers and landlords, not only often provide production loans to their tenants, but also provide consumption loans to ensure the supply of labour at a stipulated period (particularly during the peak season) at the prevailing market rate. Accordingly the small farmers are forced to fall back upon money-lenders, water supplier, traders, mahajans etc. who are basically the big farmers or landlords. The economic condition of the small and marginal farmers may automatically lead them to surrender their land to financially capable Landlords or big peasants in exchange of some fixed share of crops or equivalent money.

The return from cultivation per unit of land is higher in large holdings than for the small holdings perhaps due to differential input costs and credit costs. Large farmers purchase raw materials at a lower cost, as compared to small farmers, as they purchase in bulk quantities. The large farmers can afford to store their grains and sell it in the market after four or five months (i.e. August/September) and thereby get a good price of their produce. The small farmers can sell their produce immediately after harvesting season (i.e. March/April) as they cannot bear the cost of storing the grains for a long period; they also need to finance their daily needs, pay back loans they have taken from mahajans and invest for the next aman crop.

Role of Institutional Credit

Access to institutional credit to farmers is an important input that would not only help smooth agricultural operations but also free the farming community from the burden of high interest rates of the non-institutional sources. The farmer is a risk-taking entrepreneur who faces uncertainties from weather, spurious inputs, pests and diseases, and market shocks among other risks. Inadequate and untimely credit along with procedural hassles from formal institutions add to his/her burden. In recent years, policy interventions have led to doubling of agricultural credit, but the limited access of small and marginal farmers to institutional credit continues to be a matter of concern. In spite of the phenomenal rise in the institutional credit, the reach to the farming community was much below their credit needs. This suggests the dependence of marginal-small farmers on non-institutional sources is still very high.

Table -1: Land-size wise distribution of Agricultural Credit Flow by Scheduled Commercial Banks

Category	Share in number of agricultural credit accounts			Share in agricultural credit disbursed		
	1991-92	2002-03	2006-07	1991-92	2002-03	2006-07
Marginal	45.4	38.9	41.6	28.8	22.1	24.7
Small	31.4	30.2	27.9	24.9	25.5	22.9
Semi+	23.2	30.9	30.5	46.3	52.4	52.4

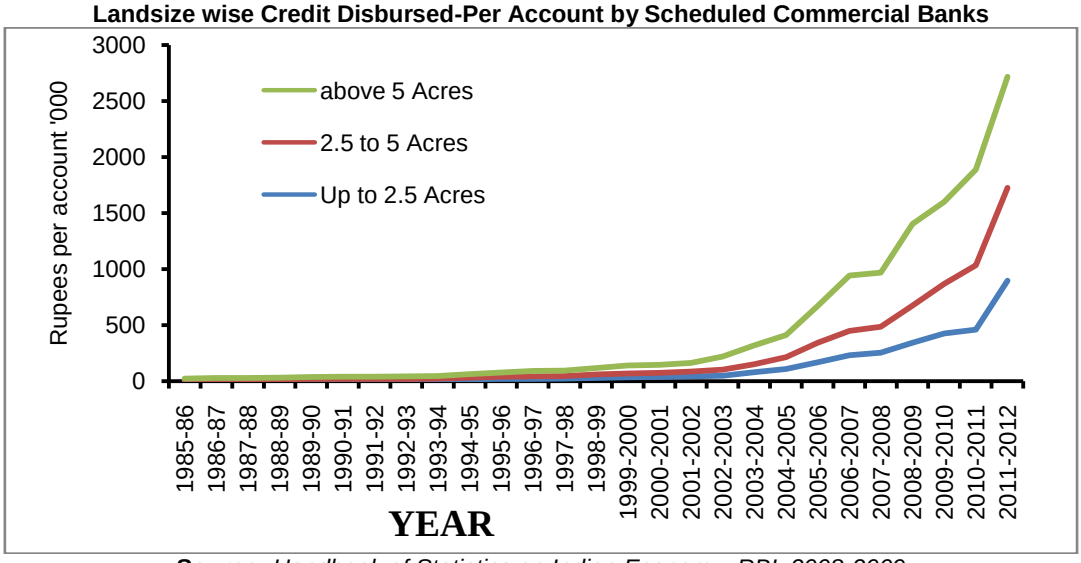
Source: *Handbook of Statistics on the Indian Economy, 2008-09, RBI; Some Aspects of Operational Land Holdings in India, National Sample Survey Organisation (NSSO), various rounds.*

Note: *Semi+ denotes Semi-medium and above. Land holding data are reported in hectares (ha) where Marginal (<1.00 ha), Small (1.00-1.99 ha) and Semi+ (2.00 and above). Credit data across land size given by land-size are up to 2.5 acres, 2.5-5.0 acres and above 5 acres, which approximately resemble Marginal, Small and Semi+ respectively.*

Between 1991-92 and 2003 the share in the number of credit accounts of small and marginal farmers decreased from 77% to 69% and in amount of credit disbursed decreased from 54% to 48%. In contrast, for semi-medium and above farmers the share of credit increased while their share of area declined, as shown in Table 1.

Figure -1

Landsize wise Credit Disbursed-Per Account by Scheduled Commercial Banks



Source: *Handbook of Statistics on Indian Economy, RBI, 2008-2009*

The per account credit disbursed across land holding size had been increasingly getting skewed and the gap was widening between the marginal, small and semi-medium and above farmers (Figure 1). The doubling of agriculture credit period saw almost a vertical rise in the curve relating to more than five acres of farmers indicating the widening gap in the year 2006-07.

Our primary data also showed that the medium and large farmers had taken more than proportionate share of the institutional credit (like banks and cooperative banks). Small farmers were often unable to satisfy the commercial criterion of credit worthiness (value of assets, land etc.) and thus they were forced to borrow mostly from non-institutional sources. The institutional financial agencies did not grant loans for unproductive consumption purposes. Rich farmers, money-lenders and landlords, not only often provided production loans to their tenants, but also provided consumption loans to ensure the supply of labour at a stipulated period (particularly during the peak season) at the prevailing market rate (which is obviously much higher than the bank interest rate). This had indicated that institutional credit was allocated neither according to need nor to profitability of investment opportunities, but in proportion to value assets (particularly land) owned by different groups. Small farmers were forced to borrow from money lenders, landlords, water suppliers which led them to surrender their land to big peasants. The small farmers' limited access to institutional credit was a constraint to investment in new agricultural technology.

A Classical Linear Multiple Regression Model based on Field Data

From field survey data we observed that the price that the large farmers got was much higher than what the small farmers got. Small farmers' holding capacity was very low; their facilities for proper storage of agricultural produce were very inadequate and unscientific. The small farmers generally kept the produce in carts, pits, *kaccha* storehouses etc. which were not at all safe as compared to the godowns used by the large farmers. Quite a part of the produce was lost because of dampness. Because of the inadequacy of warehouse facilities and the possibility of its being damaged, the small farmers' capacity to hold had been reduced. They became very keen on

disposing it off in the shortest possible time and thus, immediately after harvesting the crop, small farmers were forced to sell it.

It was observed that in the district of Murshidabad, in the months of March–April, 2012, the price of boro rice was Rs 900 per quintal whereas the same was sold at Rs. 1400 per quintal in the months of August-September. The yield of Boro rice in Murshidabad was twenty mon (1 mon = 40 kg) i.e. eight quintals per bigha. Thus for each bigha large farmer's revenue was (8X500 = Rs. 4000) rupees four thousand more per bigha than a small farmer. Likewise in the district Burdwan, the price was Rs. 900 per quintal in March-April and Rs. 1300 per quital in August-September. The yield of Boro rice in Burdwan was eighteen mon or a bit more than seven quintal per bigha. Thus for each bigha, a large farmer's revenue was (7X400 = 2800) rupees two thousand eight hundred more than the smaller farmer. So the basic difference between the large and small farmers lied in their return on investment.

Table -2:Marketing of Boro Crop by Different Size Classes

Size class In bigha	Marketing Periods		No of persons Interviewed
	March - April	August - September	
Landless	26	00	41 (26)
0 - 5	10	01	45 (11)
5 – 10	21	04	62 (25)
10 - 20	04	05	52 (09)
20 - 30	04	40	55 (44)
>30	01	30	30 (30)

Note: The figures in brackets are the no. of persons in the sample who cultivated boro crop in the survey moujas in 2012.

Table- 3: Reasons for Early Marketing of Boro Crop

Size class in bighas	Reason A	Reason B	Reason C	Reason D	Reason E	No of persons interviewed
Landless	23	11	26	20	19	41 (26)
0 - 5	09	07	10	09	10	45 (11)
5 - 10	19	14	21	17	19	62 (25)
10 - 20	03	03	03	04	04	52 (09)
20 – 30	--	--	--	04	02	55 (44)
>30	--	--	--	01	--	30 (30)

Code:

Reason A: Repay past debt.
Reason B: Non-availability of proper credit facility.
Reason C: Investment for next aman crop.
Reason D: Non-availability of proper storage facility.
Reason E: Finance daily needs.

Source: *Primary Survey by the author from field survey during 2011-12*

Data and Methodology Used

Firstly, to study the impact of the explanatory variable factors X_1 , X_2 , X_3 and X_4 on Y, our methodology includes the Multiple Regression Analysis (MRA), the theory of Interval estimation and that of Hypothesis testing of the Regression Coefficients (slope coefficients) to test the significance of the individual partial regression coefficients (slope coefficients) for MRA[1]. In case of Multiple Regression Analysis (MRA), the quantity known as Coefficient of Determination denoted by R^2 (Multi - variable regression) has been used to analyze the measure of the goodness of the fit of our regression equations. Verbally, R^2 will measure how far the proportion or percentage of the total variation in dependent variable (Y) is explained jointly by all independent (explanatory) variables (Xs). Moreover, adjusted R^2 has also been used to compare our results of MRA. (Gujrati & Sangeetha, 2008).

Next, in the language of Hypothesis testing, a stated hypothesis or a null hypothesis (H_0) is constructed and is usually tested against the alternative Hypothesis testing (H_1) in the following methods of testing the statistical hypotheses of the regression models. To test the significance of the individual partial regression coefficients (slope coefficients) of our Multiple Regression Model (MRM), two alternative but mutually complementary approaches, namely, Confidence Interval Approach (CIA) and Test of Significance Approach (TOSA) (t test), yielding the same results and conclusions, have been used for deciding whether to reject or accept the null hypothesis. Moreover, Analysis of Variance (ANOVA) Technique (F – test) has been used for the Overall Significance of the Estimated Multiple Regression Models.

In case of CIA, if the unknown parameter β (β_1, β_2, β_3, β_4) under (H_0: $\beta = 0$) falls within the confidence interval, H_0 is accepted and it is said that our finding is statistically insignificant. But, if it falls

[1] Initially we considered five independent variables X_1,.....,X_5 in MRA including finance daily needs as X_5 of Table 5.20. But there arose multi-collinearity problems in our results. So, we decided to drop the variable X_5 in order to get rid of multi-collinearity

outside those confidence limits, then H_0 is rejected so that our finding is statistically significant.

Secondly, under (TOSA) Approach (t test) or in ANOVA Technique, from a two- tailed test, with the given critical values (table values) of $t_{\alpha/2,n-k}$, and $F_{\alpha,(k-1,n-k)}$, if the computed (absolute) t or F value of our estimated slope coefficients(β*s) exceeds their respective critical values at chosen level of significance (α = 5%), then H_0 is rejected with β*s being statistically significant: otherwise H_0 is accepted with their values being statistically insignificant. Alternatively, if the p-value (probability value) of the t statistic is sufficiently low, then also H_0 is rejected and all the β*s are then said to be statistically significant with increasing confidence (Maddala, 2001).

For this, a time series analysis of the Classical Linear Multiple Regression Model (CLMRM), with one dependent variable (Y), and more than one independent variables (Xs), linear in their parameters, has been constructed with the following Multiple Regression equation,

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + u \quad (1)$$

Here, Y denotes the percentage of farmers those who have early marketed boro rice.

X_1 denotes the repayment of past debt,

X_2 denotes the availability of proper credit facility,

X_3 denotes the investment for next aman crop,

and X_4 denotes the availability of proper storage facility, respectively.

β_0 is the intercept which measures the mean or the average value of Y, when all X_1, X_2 X_3 and X_4 are set equal to zero.

β_1, β_2, β_3 and β_4 are the individual partial regression coefficients (slope coefficients) of X_1, X_2 X_3 and X_4 respectively, which measures the change in the mean value of Y, per unit change in one independent variable, (say, X_1, X_2 X_3 or X_4), holding the value of the other independent variables constant. That is, it gives the "direct" or "net" effect of a unit change in X_1, X_2 X_3 or X_4 on the mean value of Y.

In order to test the significance of the individual partial regression coefficients (slope coefficients) of CLMRM, accordingly, the null hypotheses have been constructed:

H_{01}: $\beta_1 = 0$; (change in X_1, holding other variables constant, has no significant influence on Y).

H_{02}: $\beta_2 = 0$; (change in X_2, holding other variables constant, has no significant influence on Y).

H_{03}: $\beta_3 = 0$; (change in X_3, holding other variables constant, has no significant influence on Y).

H_{04}: $\beta_4 = 0$; (change in X_4, holding other variables constant, has no significant influence on Y).

To test the overall significance of MRM,

[(H_0: βs = 0) as against (H_1: βs ≠ 0)] ; (change in all the explanatory variables X_1, X_2 X_3 and X_4 have no linear influence on Y respectively.

Statistical Findings

Table -4: Analysis of Variance Table

Equation No.	Variables	Coefficient	Lower 95 percent	Upper 95 percent	t stat	P value	F	R^2	Adjusted R^2
1	Intercept	4.843	-25.65	35.34	2.02	0.293	60.71	0.996	0.9795
	X_1	1.344	-5.23	7.92	2.60	0.233			
	X_2	-0.975	-3.14	1.19	-5.73	0.109			
	X_3	0.238	-1.05	1.53	2.35	0.256			
	X_4	-0.539	-7.39	6.31	-1.00	0.499			

In case of MRM, corresponding to equation (1), the estimated multiple regression equation is

$$Y = 4.843 + 1.344X_1 - 0.975X_2 + 0.238X_3 - 0.539X_4 + u \quad (2)$$

From the summary statistics of Multiple Regression Data Analysis, it is found from the value of $R^2 = 0.996$, that almost 99.60 % of the total variation in the dependent variable Y is explained jointly by all the above explanatory variables X_1 , X_2 , X_3 and X_4.

From the positive slope coefficients $\beta_1^* = 1.34$, it is implied that one unit increase in X_1 leads to an increase of Y by 1.34 units i.e. if the farmer has to repay the past debts by one unit, there is a greater tendency of early marketing of boro crop.

$\beta_2^* = -0.975$, this inverse relation between X_2 and Y shows that the lower the availability of proper credit facility, the greater is the tendency of early marketing.

$\beta_3^* = 0.238$ implies that if the farmers want to invest more for the cultivation of aman crop next to boro cultivation, they will need immediate finance for which they have to opt for early marketing of boro rice from which they can avail instant investment.

$\beta_4^* = -0.54$ implies that lower the availability of proper storage facility, the greater is the tendency of early marketing.

Further, from the Test of Significant Analysis, it is found that all the slope coefficients β_1^*, β_2^* and β_3^* are highly statistically significant at 5% level of significance as all their estimated 't' values are by convention > 2 i.e. much higher than their Table values. Hence, all null hypothesis i.e. H_1^0, H_2^0 and H_3^0 are rejected which implies that X_1 or X_2 or X_3 are statistically significant i.e. change in either X_1 or X_2 or X_3 greatly influences Y.

Except, the slope coefficient β_4^* is statistically insignificant at 5% level of significance as its estimated 't' value is < 2 . So, null hypothesis H_4^0 ($\beta_4 = 0$) is accepted which implies that change in X_4 (availability of proper storage facility) does not have much influence on Y.

However, the estimated F value is much greater than table value to explain the overall significance of the model at 5% level of significance i.e. the change in all X_1, X_2, X_3 and X_4 greatly influences Y.

From the Multiple Regression Data Analysis, it can be summarized that there is a greater tendency

of farmers for early marketing of boro rice in order to repay the past debts, in case of greater non-availability of proper credit facility, in order to meet immediate financial need for investment in next aman crop and in case of non-availability of proper storage facility. However, the availability of proper storage facility poses a relatively insignificant factor in this respect.

However, among the above factors, non-availability of proper credit facility, X_2, has the greatest influence on the farmers for early marketing of boro rice i.e. it plays the role of dominant factor, because of its highest absolute estimated 't' value.

Conclusions

The return from cultivation per unit of land was higher in large holdings than for the small holdings perhaps due to differential input costs and credit costs. Large farmers purchased raw materials at a lower cost, as compared to small farmers, as they purchased in bulk quantities. They could manage credit at relatively lower bank interest rate as compared to higher non-institutional market interest rate which the small farmers had to pay when they took loan from money-lenders or large farmers.

Keeping all these in mind, a small farmer had faced two options:

1. To lease out his land to the large farmers.
2. To cultivate the land himself.

In most cases it was seen that first option was more profitable for the small farmers. Taking a closer look at the issue of leasing out of land it was apparent that the large farmers (especially who have control on the supply of water in a particular area) formed a cartel and charged a high price for the water they sell to the smaller farmers so that it became unprofitable for the latter to cultivate their own lands. They were then left with the only option of leasing out their land to the nearest large farmer (who owns a pump-set). If the small farmer chose the second option, he ended up with higher costs, lower return and longer labour hours spent. If he opted for leasing out the land to a large farmer then he could earn a fixed rent (or fixed produce) per bigha without providing any labour; and could earn some money by selling his labour (Mukherjee, 2017). During this period the small farmer could earn an extra pay by working on other farmer's land. Given the cost of water and the leasing cost of land, we had drawn an important conclusion that it was always better for a small farmer to lease out his land, if he had an alternative employment opportunity at hand.

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