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RESEARCH NOTES

Economics of Change in Cropping Pattern in Relation to Credit: A Micro Level Study in West Bengal

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I

INTRODUCTION

Agriculture in West Bengal was mired in stagnation during the first three decades of the post-Independence period. The state has registered a rapid rate of growth of output during 1977-95. The best feature of the state's agricultural performance is that productivity has been the main contributor to output growth. While the rate of growth of foodgrains output has been very high, the cropping pattern in most of the districts has noticeably changed in favour of high-value non-food crops. The rate and pattern of output growth for most of the districts, however, suggests that the period of stagnation in West Bengal agriculture has come to an end during the Left Front Rule (Sanyal *et al.*, 1998). Apart from the natural factors like rainfall, growth in agricultural production depends on infrastructural facilities. The government's intervention in creating infrastructural facilities coupled with the farmer's ability to use modern productive technologies thus play crucial roles. For the latter to occur the flow of timely and need-based credit to the farmers is an essential prerequisite (Rajeev and Dev, 1998). A number of studies conducted during the sixties and seventies have shown that the small farmers lagged in the adoption of high-yielding variety (HYV) technology due to inadequate flow of institutional credit besides uncertainty and unfavourable tenurial conditions. The important point, however, is the virtual impossibilities of a poor farmer's financing from his current savings the whole of balanced investments needed to adopt new technology. The farmers and public agencies borrow institutional credit for this investment mainly because of liquidity constraint (Singh and Vidyasagar, 2004). Considering the role of credit from the demand side it is observed that under improved technology, the adoption without adequate capital may lead to reduction in net returns because of lack of proper combination of inputs. Thus adoption of new technology could be considered

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as a function of the farmer's resources. Any constraint on this count could be visualised as a serious impediment in the process of agricultural growth. The adequacy of individual farmer's financial resources is to be augmented from outside (Vijaya Kumar, 1976). From the development perspective, the agricultural credit is important in sustained absorption of technological innovations. It is seen that the technology adopters tend to borrow far more than the non-adopters do. It is also observed in a study conducted by Poddar *et al.* (1995) that the adoption of new technology is itself affected by the credit availability. On the other hand, as a result of the nationalisation of commercial banks, a huge amount of institutional credit has been provided for the development of agricultural sector in India. The initial surge in technology adoption in India got a complementary support from the institutional credit with term lending forming a major proportion of private fixed capital formation in agriculture. The small farmers have received more than their proportionate share of total institutional credit vis-à-vis their share in land. But the institutional credit forms only a small part of the credit needs of small farmers. Certain areas have been getting more than proportionate share of credit. The dependence of small and marginal farmers and of less developed regions on the informal sources for credit continues to be large. The credit has played an important role in green revolution by facilitating technological upgradation and commercialisation of agriculture and also in raising the income of farmers (Singh and Vidyasagar, 2004).

The existing literature on the change in cropping pattern and agricultural growth in India highlights mainly three aspects – (i) role of change in cropping pattern on agricultural growth and that on income and employment, (ii) factors (including credit) influencing the change in cropping pattern/farming practices/cropping intensity/agricultural growth and (iii) optimum cropping pattern. The study conducted by Poddar *et al.* (1995) in Karnataka has revealed that the optimisation of resource use with the existing and improved technology led to cultivation of a few but more profitable crops in the new cropping patterns. The credit availability has made optimisation of resource use and led to enhancement in farm income through the cultivation of a few but more remunerative crop enterprises. The study also revealed the role of credit in increasing cropping intensities in different farm situations. It is evident from brief review of existing literature that no in-depth study has yet been undertaken to examine the economics of change in cropping pattern in relation to credit in West Bengal. Against this backdrop, the present study has made an attempt at a micro level study on the economics of change in cropping pattern in relation to the credit availability of farmers in Midnapore district of West Bengal. The study proceeds as follows. Section II discusses the objectives of the study. Section III highlights the data base and methodology. Section IV explains the economics of change in cropping pattern in relation to credit availability. Section V summarises the findings and suggests policy implications.

II

OBJECTIVES OF THE STUDY

The study focuses on the economics of change in cropping pattern in relation to credit availability of the sample farm households by examining the following issues: (i) Whether there exists any significant difference of the change in cropping pattern between the different groups of cultivators classified on the basis of use of credit or no credit, viz., farm households with institutional credit, farm households with non-institutional credit, farm households with both institutional credit and non-institutional credit and farm households without credit, i.e., with own fund only, (ii) Whether there exists any significant relationship between cropping pattern on the one hand and credit availability, profitability and employment per unit of cultivated land, etc., among those groups of cultivators in different agro-climatic zones. (iii) Whether there exist any significant differences in cropping pattern in relation to credit availability between those groups of sample cultivators belonging to different size classes of land holdings. (iv) Whether there exist any significant differences in the availability of credit among the sample households with different size of land holdings. (v) Whether there exists any significant differences in cropping pattern in relation to credit availability among the sample households with different size of land holdings in different agro-climatic zones.

III

DATA BASE AND METHODOLOGY

In this study both the secondary and primary data relating to area under crops, credit, etc. have been used. The secondary data have been collected from various Government publications, viz., *Statistical Abstract of Government of West Bengal, Banking Statistics* of Reserve Bank of India, *Statistical Statements Relating to Co-operative Movement of India* of Reserve Bank of India/National Bank for Agriculture and Rural Development (NABARD) and offices, viz., Co-operative Statistical Cell of Government of West Bengal, office of the Principal Agriculture Officer (Midnapore), and District Agricultural Marketing Officer (Midnapore). The district of Midnapore selected for a thorough study at the micro level has been classified into three agro-climatic zones, viz., coastal or saline, alluvial and laterite by following the usual state government norms. For field level survey data relating to our research problem have been collected from 160 farm households belonging to six villages, viz., Chitra of Sahid Matangini block and Harasankar of Tamluk block in the saline/coastal zone, Govindanagar, Kaya and Maguri Jagannath Chak of Panskura-I block in the alluvial zone, and Lapuria of Garbeta-I block in laterite zone of Midnapore (undivided) district in West Bengal. Among the sample farm households, we have taken 90 farm households with credit and 70 without credit. Of the total 90 sample farm households with credit, 20 farm households are from the villages in coastal zone, 50 from the

villages in the alluvial zone, and 20 from the villages in the laterite zone. Of the total 70 farm households without credit, 20 farm households are from the villages in the coastal zone and laterite zone each, and 30 from alluvial zone of the district. It is to be noted that to examine the impact of credit availability of change in cropping pattern we have selected some commercial crops, namely, betelvine, potato, flower, etc., which are capital intensive and require a substantial amount of credit for cultivation and some farmers who undertake commercial farming using credit. In three agro-climatic zones of the district those crops and farmers are largely concentrated in the alluvial zone. Due to this concentration unequal number of sample households across the three agro-climatic zone has occurred. The credit availability has been used as a criteria to classify farm households into four categories viz., farm households with credit (both institutional and non-institutional credit), farm households with only institutional credit, farm households with only non-institutional credit and farm households without credit. After the classification of farmers into above categories, the selection of farm households has been made at random. The primary data have been collected both by questionnaire and interview method. Various statistical and econometric techniques have been employed for the analysis of data. The percentage of area under non-foodgrains to the gross cropped area (NFA) or the ratio of area under non-foodgrains to the area under foodgrains (NFA/FA) has been used as an index of cropping pattern change. To examine the impact of credit on the change in cropping pattern across the sample farm households the following regression model has been used:

$$Y_i = \beta_1 + \beta_2 X_{i2} + \varepsilon_i \quad i = 1, 2 \ldots n \qquad \ldots (1)$$

where Y_i = NFA of the households: X_{i2} = dummy variable (representing the presence and/or absence of credit for cultivation) which takes the value '1' if Y_i corresponds to the households with credit facilities and OF and '0' if Y_i corresponds to the farm households without credit facilities, i.e., only OF and β_2 measures the difference in the percentage of area under non-foodgrains for the farm households with credit and the farm households without credit and ε_i = disturbance term. On the other hand, the impact of different types of credit, viz., institutional credit or non-institutional credit on the change in cropping pattern across the sample farm households has been estimated from the following model:

$$Y_i = \alpha_1 + \alpha_2 D_{i2} + \alpha_3 D_{i3} + \alpha_4 D_{j4} + \varepsilon i \qquad \ldots (2)$$

Where Y_i = NFA.

$$D_{i2} = \begin{cases} 1 \text{ if } Y_i \text{ corresponds to farm households with institutional credit and OF} \\ 0 \text{ otherwise (i.e., if } Y_i \text{ corresponds to the farm households with OF only)} \end{cases}$$

$$D_{i3} = \begin{cases} 1 \text{ if } Y_i \text{ corresponds to farm households with non-institutional credit + OF} \\ 0 \text{ otherwise} \end{cases}$$

$$D_{i4} = \begin{cases} 1 \text{ if } Y_i \text{ corresponds t o FHs with institutional credit + non-institutional credit + OF} \\ 0 \text{ otherwise} \end{cases}$$

and other symbols have their usual meanings.

IV

ECONOMIC ANALYSIS OF CREDIT AVAILABILITY AND CHANGE IN CROPPING PATTERN: FIELD LEVEL OBERVATIONS

(A) *Credit and Cropping Pattern Across Farm Households:*

Before the discussion of field level observations on the economics of change in cropping pattern in relation to credit, we may examine the impact of institutional credit on the change in cropping pattern in West Bengal as a whole and Midnapore in particular during 1972-73 to 1995-96. The estimated regression equations are as follows:

$$\text{West Bengal: NFA} = 13.29 + \underset{(4.29)}{0.032}{*}\text{I.C.}, \; R^2 = 0.48. \; F=20.31$$

$$\text{Midnapore: NFA} = 6.62 + \underset{(2.27)}{0.01}{*}\text{I.C.}, \; R^2 = 0.21. \; F=5.86$$

Figures in parentheses indicate t-values. * implies significance at 5 per cent level.

Thus the institutional credit has made significant impact on the change in cropping pattern in both West Bengal and Midnapore. Against this perspective, we have conducted a micro level study to examine the economics of change in cropping pattern in relation to credit availability among the farm households in Midnapore district. In order to establish the relationship between credit and cropping pattern for the sample farm households we construct a frequency distribution of the NFA for the households before and after they received loans either from institutional or non-institutional sources or from both of them. It is seen from Table 1 that the cultivators with credit have allocated more land for the cultivation of non-foodgrains in the post-loan period. On the other hand, the number of sample farm households receiving no credit from any sources and cultivating non-foodgrains on a given percentage of area has, in general, declined during 1992 and 1997. Thus, it is seen from the above table

TABLE 1. FREQUENCY DISTRIBUTION OF SAMPLE FARM HOUSEHOLDS (FHs) BY THE PERCENTAGE OF AREA UNDER NON-FOODGRAINS TO THE GROSS CROPPED AREA (NFA) IN MIDNAPORE

		Farm households with credit		Farm households with institutional credit		Farm households with non-institutional credit		Farm households with both institutional credit and non-institutional credit		Farm households without credit	
NFA	Class Mark	Pre-loan period	Post-loan period	Pre-loan period	Post-loan period	Pre-loan period	Post-loan period	Pre-loan period	Post-loan period	1992	1997
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0		24 (26.67)	0 (0)	9(30)	0 (0)	7 (23.33)	0 (0)	8 (26.67)	0 (0)	8 (11.43)	6 (8.57)
1-5	3	22 (24.44)	15 (16.67)	8 (26.67)	3 (10)	8 (26.67)	5 (16.67)	6 (20)	7 (23.33)	12 (17.14)	14 (20)
6-15	10.5	19 (21.11)	23 (25.56)	5 (16.67)	6 (20)	7 (23.33)	9 (30)	7 (23.33)	8 (26.67)	20 (28.57)	28 (40)
16-35	25.5	15 (24.44)	24 (26.67)	5 (16.67)	10 (33.33)	5 (16.67)	7 (23.33)	5 (16.67)	7 (23.33)	15 (21.43)	14 (20)
36-55	45.5	6 (6.67)	14 (15.56)	2 (6.67)	6 (20)	2 (6.67)	4 (13.33)	2 (6.67)	4 (13.33)	10 (14.28)	7 (10)
56-65	60.5	4 (4.44)	14 (15.56)	1 (3.33)	5 (16.67)	1 (3.33)	5 (16.67)	2 (6.67)	4 (13.33)	5 (7.14)	1 (1.43)
Total		90 (107.97)	90 (100)	30 (100)	30 (100)	30 (100)	30 (100)	30 (100)	30 (99.99)	70 (100)	70 (100)

Source: Field level survey.
Note: Figures in parentheses indicate percentages to total.

that the availability of credit to the farmers has motivated them to cultivate non-foodgrains on more areas out of their fixed land. Now the question that automatically arises is why the farmers go for cultivating more area under non-foodgrains than the area under foodgrains. Profit per acre from non-foodgrains vis-à-vis the profit per acre from foodgrains may be one of the motivating factors. To test this hypothesis a comparative analysis of profit per acre of foodgrains and non-foodgrains for different sizes of land households is made here (Tables 2 and 3). Several findings emerge from these results: (1) The profit per acre from non-foodgrains is significantly higher than that from foodgrains for all the sample households whether they use credit or no credit for cultivation of the crops. (2) The profit per acre from either non-foodgrains or foodgrains for the sample households using credit for cultivation is much higher than that for the sample households using no credit for cultivation of these crops. This implies that the sample households receiving loans use the credit to buy and use more of modern inputs such as fertilisers, pesticides and insecticides, irrigation water, etc. in time and in required amount, which increase the land productivity and the profit per acre. But the households who do not receive loans are not in a position to buy and use these inputs either in times or in required amount. As a result, the land productivity and, therefore, profit per acre have been lower for them in relation to those sample households receiving loans and using loans for increasing land productivity through the use of modern inputs. (3) Let us now consider the profit earnings of the different categories of farmers who do not avail themselves of any credit facilities. It is seen from Table 2 that the profit per acre, whether from foodgrains or from non-foodgrains, increases with the increase in the size of land households. But the situations are completely reversed for the farmers who have used credit for cultivation of foodgrains and non-foodgrains (Table 3). There has been steady fall in the profit per acre for both non-foodgrains and foodgrains. The availability of credit to most of the marginal and small farm households as against a negligible proportion of the farm households with larger sizes of land households (Table 4) and closer supervision of agricultural activities, and the use of family inputs, viz., family labour, in large quantities by the small and marginal farmers (which are not included in the estimation of total production cost) are some of the factors that explain, to a large extent, why profit per acre is relatively much higher for those farmers having smaller land households.

TABLE 2. AVERAGE PROFIT PER ACRE PER SIZE CLASSES OF LAND HOLDINGS FOR SAMPLE FARM HOUSEHOLDS WITHOUT CREDIT IN MIDNAPOE

Size of land holdings (acres) (1)	No. of households (2)	Average profit per acre from non-foodgrains (Rs.) (3)	Average profit per acre from foodgrains (Rs.) (4)
Less than 1.0	8	42500.00	4000.00
1.0-less than 2.0	20	60000.00	4500.00
2.0-less than 3.0	20	62000.00	5000.00
3.0 and above	22	65000.00	5000.00
Total	70	57375.00 (Av.)	4625.00 (Av.)

Source: Field level survey.

TABLE 3. AVERAGE PROFIT PER ACRE PER SIZE CLASS OF LAND HOLIDNGS FOR SAMPLE FARM HOUSEHOLDS WITH CREDIT IN MIDNAPORE

Size of land holdings (acres) (1)	No. of households (2)	Average profit per acre from non-foodgrains (Rs.) (2)	Average profit per acre from foodgrains (Rs.) (3)
Less than 1.0	29	73500.00	5900.00
1.0-less than 2.0	43	70000.00	5675.00
2.0-less than 3.0	11	65000.00	5200.00
3.0 and above	7	62000.00	5200.00
Total	90	67625.00 (Av.)	5493.75 (Av.)

Source: Field level survey.

TABLE 4. DISTRIBUTION OF SAMPLE FARM HOUSEHOLDS WITH AND WITHOUT CREDIT BY SIZE CLASS OF LAND HOLDINGS IN MIDNAPORE

	Farm households		Farm households with credit			Farm households without credit		
Size of land holdings (in acres) (1)	No. (2)	Percentage to total (3)	No. (4)	Percentage to total farm households with credit (5)	Percentage of farm households of a class (6) (4)/(2)x100	No. (7)	Percentage to total farm households without credit (8)	Percentage of farm households of a class (9) (7)/(2)x100
Less than 0.5	17	10.62	12	13.33	71.00	5	7.14	29.00
0.5-less than 1.0	20	12.50	17	18.89	85.00	3	4.20	15.00
1.0-less than 1.5	27	16.87	23	25.56	85.00	4	5.71	15.00
1.5-less than 2.0	36	22.50	20	22.22	56.00	16	22.86	44.00
2.0-less than 3.0	31	19.37	11	12.22	35.00	20	28.57	64.00
3.0 and above	29	18.12	7	7.78	24.00	22	31.43	76.00
Total	160	99.98	90	100	56	70	99.91	44.00

Source: Field level survey.

In this context, the question arises that if the profit per acre of non-foodgrains is larger than that of foodgrains, then why there is not a wholesale shift for the cultivation of non-foodgrains. It can be said that higher cost of cultivation for non-foodgrains, limited availability of land, capital, etc., food security, fluctuation of price of foodgrains, risk aversion, non-availability of credit at the right time and in the right quantity, etc., are the factors inhibiting the marginal and small farmers to make a wholesale shift towards the non-foodgrains production. Besides, in case of medium and large farmers, the higher risk of production, agro-ecological suitability, storing and marketing problems, non-availability of credit at the right time and in the right quantity, etc. are also the factors inhibiting the wholesale shift towards the non-foodgrains production. In case of sample farm households one of the most important reasons of not wholesale shifting from foodgrain crops to non-foodgrain crops is mixed crop-livestock farming system which is widely prevalent across the country. To meet the fodder requirement of the animals, foodgrain crops are *sine qua non* in India as most of our livestock thrive on crop residues and crop by-products.

(B) *Changes in Cropping Pattern in Relation to Credit According to Size of Land Holdings*

We shall now analyse the relationship between credit availability and cropping pattern change according to the size of land holdings. In the case of farm households with institutional credit, the values of correlation coefficient (r) between size of land holdings and institutional credit/institutional credit + OF, size of land holdings and NFA/FA, IC/IC+OF and NFA/FA are –0.81*, -0.97*, 0.83* respectively. Again, in case of farm households with non-institutional credit, the values of r between size of land holdings and non-institutional credit/non-institutional credit + OF, size of land holdings and NFA/FA, non-institutional credit/non-institutional credit + OF and NFA/FA are 0.78*, 0.98*, 0.69* respectively. Side by side, in case of farm households with institutional credit and non-institutional credit, the values of r between size of land holdings and institutional credit + non-institutional credit/institutional credit + non-institutional credit + OF, size of land holdings and NFA/FA, institutional credit + non-institutional credit/institutional credit + non-institutional credit + OF and NFA/FA are -0.89*, -0.79*, 0.96*, respectively. *implies significance at 5 per cent level. From the values of r the following observations were made: (1) There exists an inverse relationship between size of land holdings and availability of institutional credit, but a positive relationship between size of land holdings and availability of non-institutional credit. Let us explain the reasons behind these relationships. Due to the factors like larger participation of family labour, closer supervision, etc., the cost of cultivation of smaller farm households is lower as compared to the larger farm households. On the other hand, due to the priority sector lending policy and/or proactive bank policy the share of small holders in total institutional loans be higher. The factors like inability to provide tangible collaterals, exorbitant rate of interest, larger provision of institutional credit, lower cost of cultivation, higher risk of repayment, etc., have influenced smaller farm households to take smaller amount of loans from non-institutional sources. But the factors like ability to provide tangible collaterals, higher cost of cultivation, non-availability at the right time and of the required amount of institutional credit, higher transaction cost of institutional credit, etc. have influenced larger farm households to receive larger amount of loans from non-institutional sources. Under these circumstances, there exists an inverse relationship between size of land holdings and availability of institutional credit and a positive relationship between size of land holdings and availability of non-institutional credit, (2) In case of farm holdings with either institutional credit or institutional credit + non-institutional credit, an inverse relationship between size of land holdings and change in cropping pattern in favour of non-foodgrains is observed. Thus, the credit has influenced change in cropping pattern significantly in case of lower size of land holdings. But that relationship is opposite for farm households with only non-institutional credit. Let us explain the reasons behind these relationships. In case of

farm households with either institutional credit or institutional credit + non-institutional credit the factors like larger participation of family labour, closer supervision, more relaxation of financial constraint through larger availability of institutional credit and subsidised interest rate for institutional credit, lower cost of cultivation, etc., have helped smaller farm households to make larger change in cropping pattern in favour of non-foodgrains. On the other hand, in case of farm households with non-institutional credit only the factors like ability to provide tangible collaterals, availability at the right time and of the required amount of non-institutional credit, more relaxation of financial constraint through larger availability of non-institutional credit, lesser risk of repayment from the point of view of lenders, etc., have helped the larger farm households to make larger change in cropping pattern in favour of non-foodgrains. (3) There exists a positive relationship between credit (institutional credit or non-institutional credit or both) availability and change in cropping pattern in favour of non-foodgrains cultivation.

(C) *Changes in Cropping Pattern in Relation to OF According to Size of Land Holdings*

In case of farm households without credit it is observed that there exists a positive correlation between size of land holdings and OF/acre, size of land holdings and NFA/FA, OF/acre and NFA/FA. The values of these correlation coefficients are 0.99, 0.96, 0.94, respectively (The values are statistically significant at 5 per cent level). It means that the farm households other than small and marginal ones cultivate non-foodgrains on greater percentage of total cultivated area with their OF.

(D) *Different Types of Credit and Change in Cropping Pattern – A Regression Analysis with Dummy Variables*

In the following paragraphs the statistical tests of the hypotheses regarding the relation between total credit and cropping pattern as well as between different types of credit, taken separately, and cropping pattern are carried out. To estimate the relation between credit as a whole, i.e., the total credit from all sources and cropping pattern, we used the regression model in equation (1). The estimated equation is

$$Y_t = 37.43 + 19.54\, X_{i2} \quad (i = 1 \ldots\ldots\ldots n \text{ households})$$
$$(49.56)\ (19.41)$$

$R^2 = 0.71$, $\overline{R}^2 = 0.70$, N = 160, F = 376.85. (Figures in parentheses are t values). This implies that the effect of credit on NFA is statistically significant at 1 per cent probability level. We now make an attempt to statistically measure and test the impact of different types of credit on the cropping pattern in the study area. To examine this impact we have used regression model in equation 2.

The estimated regression equation is given by

$$Y_i = 48.98 + 3.28D_{i2} + 5.34D_{i3} + 13.81D_{i4};\ R^2 = 0.63,\ \text{Adj}, R^2 = 0.62,\ F = 87.24,\ N = 160.$$
$$(103.87)\ (3.81)\quad (6.21)\quad (16.05)$$

(Figures in parentheses are t values).

It is seen that the differences between the effects of OF and OF + institutional credit, OF and OF + non-institutional credit and OF and OF + institutional credit + non-institutional credit are all statistically significant at less than 1 per cent probability level. All of them have positive influence on Y_i (i.e., NFA). Further, it is observed that non-institutional credit has greater and statistically significant influence on Y_i than institutional credit and institutional credit + non-institutional credit has much greater and statistically significant influence on Y_i than institutional credit or non-institutional credit taken separately. Thus, from the above results of the statistical analysis, the following observations can be made:

1. The credit, whether institutional or non-institutional, has played a significant role in changing the cropping pattern from foodgrains to more profit earning non-foodgrains.
2. When OF + non-institutional credit has been supplemented by institutional credit or OF + institutional credit has been supplemented by non-institutional credit, their joint effect has been statistically significantly greater than that of OF + institutional credit or OF + non-institutional credit alone.

(E) *Credit and Change in Cropping Pattern in Different Agro-Climatic Zones*

Let us examine the impact of credit on the change in cropping pattern and other related issues in the individual sample blocks in the district under study. Each sample block has certain distinctly different agro-climatic features and, because of these differences, the blocks have specialised in the cultivation of those non-foodgrain crops that suit the agro-climatic conditions pertaining to that block. For example, Sahid Matangini and Tamluk blocks are more suited for cultivation of betelvine, some parts of Panskura-I block have specialised in floriculture and some parts grow potato, jute and vegetable on large areas. Garbeta I block produces potato as the main non-foodgrain crop. Some features common to these agro-climatically different zones need to be mentioned here. In case of the sample blocks, it is observed that the credit (viz., institutional credit, non-institutional credit or both) has a positive role in effecting change in cropping pattern in all the agro-climatic zones of Midnapore district. On the other hand, the rate of change in cropping pattern is lower for the households without credit than that for the households with credit in different agro-climatic zones of Midnapore district. In the following paragraphs we have made an analysis to highlight the various aspects of change in cropping pattern in relation to

credit availability in different agro-climatic zones of Midnapore (Table 5). For Panskura-I block, a part of which produces flowers of different varieties and another part produces potato, jute and vegetable as non-foodgrain crops, the following observations can be made: (1) All farmers with relatively small size of land holdings allocate larger share of cultivable land for non-foodgrains cultivation. (2) The credit has been an important factor determining change in cropping pattern in favour of non-foodgrains. (3) The expanding non-foodgrains cultivation has made statistically significant impact on the profitability of all categories of farmers in this block. (4) Side by side, the change in cropping pattern has also made significant impact on the employment generation. Similarly, for both Garbeta-I, Sahid Matangini and Tamluk blocks, the relations between (1) size of land holdings and cropping pattern, (2) credit and cropping pattern, (3) credit and profit earned from cultivation of these crops and (4) employment and the area under non-foodgrains have been found to be the same as in the case of Panskura-I block. A common thing that emerges from the above analysis is that the change in cropping pattern largely explains higher levels of profit for the farm households enjoying credit facilities as compared to those without credit. It is also observed that the provision of credit to the farmers has created a "chain of multiplier effects" which helps the farmers to initiate multiple cropping round the year using HYV technology, wherever possible.

TABLE 5. ESTIMATED REGRESSION EQUATIONS CONCERNING CREDIT AND CROPPING PATTERN (CP) FOR SAMPLE FARM HOUSEHOLDS (FHs) IN DIFFERENT AGRO-CLIMATIC ZONES IN MIDNAPORE

Alluvial Zone: Panskura –I: (1)	Fit (2)		R^2 (3)
Govindanagar and Kaya: FHs with credit			
	NFA = 55.94-	5.47* LH (-2.31)	0.29
	NFA = 10.07+	0.011** Tcr (4.95)	0.65
	GP = 3204.08+	167.47** NFA (11.75)	0.91
	EMP = 189.69+	4.56* NFA (2.24)	0.28
FHs without credit			
	NFA = 53.68-	4.35**LH (-1.84)	0.21
	GP = 3296.32+	169.16** NFA (10.04)	0.89
	EMP = 291.16+	458* NFA (2.34)	0.29
Alluvial zone: Panskura-I: Maguri Jagannath Chak: FHs with credit			
	NFA = 53.65-	4.20* LH (-2.68)	0.18
	NFA = 10.45+	0.01** Tcr (4.46)	0.60
	GP = 2926.39+	177.94** NFA (9.47)	0.87
	EMP = 176.93+	4.95* NFA (2.64)	0.38

(Contd.)

TABLE 5 (*CONCLD.*)

Alluvial Zone: Panskura –I: (1)	Fit (2)		R^2 (3)
FHs without credit			
	NFA = 58.03-	5.21*** LH (-1.93)	0.22
	GP = 2751.66+	184.77** NFA (8.49)	0.47
	EMP = 162.44+	5.49* NFA (2.76)	0.37
Coastal zone: FHs with credit			
	NFA = 53.65-	4.20* LH (-2.68)	0.18
	NFA = 16.39+	0.01** Tcr (4.57)	0.62
	GP = 58.85+	0.01** NFA (4.79)	0.64
	EMP = 189.69+	4.56* NFA (2.24)	0.28
FHs without credit			
	NFA = 53.68-	4.35***LH (-1.84)	0.21
	GP = 70.87+	0.008** NFA (3.22)	0.44
	EMP = 191.95+	4.52* NFA (2.36)	0.34
Laterite Zone: FHs with credit			
	NFA = 53.65-	4.20* LH (-2.68)	0.18
	NFA = 11.29+	0.01** Tcr (4.31)	0.59
	GP = 34.19+	162.86** NFA (12.86)	0.93
	EMP = 191.95+	4.52** NFA (2.36)	0.30
FHs without credit			
	NFA = 53.96+	4.81*** LH (-1.44)	0.14
	GP = 60.43+	0.01** NFA (4.68)	0.60
	EMP = 191.21+	4.55** NFA (2.46)	0.32

Source: Field level survey.

Notes: (i) NFA = Percentage of area under non-foodgrains to gross cropped area. LH = size of land holdings, Tcr = total credit per acre. GP = Gross Profit/acre. EMP = Employment/acre. (ii) Figures in parentheses indicate t ratios. (iii) *, ** and *** indicate level of significance at 5, 1, 10 per cent level respectively.

(F) *Various Types of NIC, change in Cropping Pattern and their Relative Effects on the Economic Conditions of the Farmers*

Let us now discuss the different types of non-institutional credit and their relative merits and/or demerits. The sample farmers obtain non-institutional credit in cash from rural money lenders, or mahajans, aratdars, commodity traders and in kind from fertiliser and pesticide traders, suppliers of water for irrigation, ploughing agencies, etc., for accelerating agricultural growth through change in cropping pattern. The

loans from rural money lenders or mahajans generate interest cost, but the loans from others do not generate such interest cost since these agencies provide loans to farmers to serve their business interest. Therefore, the loans provided by aratdars, fertiliser and pesticides suppliers etc. (except the loans from mahajans or rural money lenders) may reduce the cost of production, which, in turn, increases the profit per acre. Again, the loans from fertiliser and pesticide traders, aratdars, etc., benefits largely the very small or marginal farmers who have very limited scope of getting non-institutional credit from mahajans or money lenders and hence such type of loans creates benefits to the poorest of the poor. The timely availability and lower transaction cost of non-institutional credit also help the farmers to maximise profit. Side by side, this process of provision of credit has created an interlocking of different markets, namely, product market, credit market and input market. In such cases some types of 'deprivation' of farmers (by aratdars, fertiliser and pesticide traders, etc.) and perpetual debt condition of the farmers are also noticed. For example, in case of betelvine, the aratdars or traders do not pay the full amount of sale value at one time to the farmers and so the farmers become unable to meet their cash requirements which is necessary to purchase either different agricultural inputs or their family consumption goods. As a result, the farm households are obliged to take loans either in cash or in kind from different sources like the traders of agricultural inputs, traders of consumer goods, etc. This phenomenon forces the cultivators to fall into a perpetual debt condition. In the betelvine growing areas it has been found that most of the betelvine cultivators have been trapped into this type of perpetual debt conditions. Again, sometimes, it is also observed that the betelvine aratdars pay less than the contracted amount to the farmers showing the reason that the sold baskets of betel leaves contain many damaged betel leaves (which is often not true) and in this way these aratdars (who have supplied loans to the cultivators and to whom the cultivator is obliged to sell the product) deprive the cultivators of their dues. A perpetual debt condition is observed in the case of floriculture too, though at a relatively lesser extent. The exorbitant interest rate and perpetual debt condition have created some detrimental effects on the economic condition of the sample farm households. Due to the interlocking of markets in the study area, the concentration of economic power is seen and as a result a new rural elite class (other than big farmers) who are not landlord, but lord of water, fertiliser, etc., is also found.

V

CONCLUSIONS

The whole analysis reveals that the credit availability from both institutional and non-institutional sources has made a significant contribution on the change in cropping pattern. But the impact of credit availability on cropping pattern change has been more significant in case of smaller size of land holdings. Again, the profitability is also higher in the case of small and marginal farmers. The closer supervision for

cultivation, availability of credit, exclusion of cost of family inputs viz., family labour, etc., are the factors behind this higher profitability. The profit per acre from non-foodgrains cultivation is larger than that from foodgrains. Despite this higher profitability, the factors like food security, higher cost of cultivation, non-availability of credit at the right time and in right quantity, mixed crop-livestock farming system etc., are hindering the wholesale shift of cropping pattern towards non-foodgrains cultivation. When OF + non-institutional credit has been supplemented by institutional credit or OF + institutional credit has been supplemented by non-institutional credit, their joint effect has been statistically significantly greater than that of OF + institutional credit or OF + non-institutional credit alone. All farmers with relatively small size of land holdings and credit allocate larger share of cultivable land for non-foodgrains cultivation. The expanding non-foodgrains cultivation has made statistically significant impact on the profitability of all categories of farmers. Side by side, the change in cropping pattern has also made significant impact on the employment generation. In the study area, non-institutional credit also plays an important role to change the cropping pattern. It is observed that the provision of credit to the farmers has created a "chain of multiplier effects". The deprivation of farmers and a new rural elite class are also observed in the study area.

From the above analysis, the following policy recommendations can be made. First, since credit plays a substantial role in effecting a significant change in cropping pattern in favour of non-foodgrains needed to satisfy the rising demand/diversified demand in the context of rapid industrialisation, urbanisation, and population growth, the Government of India must put greater emphasis on increasing the availability of institutional credit to the farmers, particularly, the poorer ones. If this is done, the country will experience a higher rate of agricultural growth through change in cropping pattern towards commercialisation of agriculture. Second, institutional credit should be made available on time and in required amount. The transaction cost of this credit should be reduced so that it can adequately compete with non-institutional credit. Third, the change in cropping pattern, particularly, in favour of commercial crops cultivation, has jeoparadised the food security of the country in recent years. So, the Government must design an appropriate cropwise credit policy which can ensure food security.

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