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Impact of Agricultural Credit on Input Use and Paddy Productivity in Tripura

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Abstract
Agricultural loan or credit is crucial for overcoming financial constraints, promoting productive and efficient input use, and improving agricultural productivity among marginal and small farmers. This study examines the importance of formal and informal agricultural credit in affecting input use, paddy productivity, and distress sale among farm households in Tripura. The study is based on primary data collected from 370 paddy-growing households across eight selected villages in Sepahijala and South Tripura districts. Ordinary Least Squares (OLS) regression and Principal Component Analysis (PCA) are employed to identify the determinants of formal credit demand and distress sale and to assess the effects of credit on input use and paddy productivity. The findings suggest that irrigation, education, operated area, family labour availability, and agricultural production are important positive determinants of formal credit demand, whereas non-farm income is negatively associated with credit demand. Informal credit is positively associated with income loss from distress sale, while access to formal credit and regulated markets reduces such losses. Both formal and informal credit have positive and significant associations with input use and paddy productivity, although the relationship is stronger for formal credit. The productivity model explains 71.2% of the variation, increasing to 78.1% after incorporating interaction effects. The findings further reveal that credit effectiveness varies across irrigation conditions and farm-size groups, with weaker outcomes among marginal farmers and in non-irrigated areas. The study suggests integrating timely formal credit delivery with irrigation development and improved market access to enhance productivity and reduce distress sales.

Keywords: Agricultural credit; formal credit; informal credit; input use; paddy productivity; distress sale; Tripura.

1.1 Introduction

Agricultural credit has long been recognised as one of the most important institutional interventions for accelerating agricultural growth and improving the economic condition of farm households. In developing countries such as India, where agriculture continues to be dominated by small and marginal farmers with limited financial resources, institutional credit plays a crucial role in overcoming capital constraints and facilitating investment in modern agricultural technologies. The timely availability of formal credit enables farmers to purchase essential inputs, thereby improving production efficiency and increasing crop productivity.

The Green Revolution has demonstrated that technological advancement alone cannot ensure sustained agricultural growth unless farmers have adequate financial resources to adopt improved technologies.

Institutional credit complements technological progress by providing the necessary capital required for purchasing modern agricultural inputs. Consequently, access to affordable formal credit has become an indispensable component of agricultural development policy in India.

In Tripura, paddy occupies the largest share of the cultivated area and remains the principal food crop as well as the primary source of livelihood for the rural population. However, the productivity of paddy continues to remain below its potential due to inadequate investment in modern agricultural inputs, limited irrigation facilities, fragmented landholdings and financial constraints. A large proportion of farmers, particularly marginal and small farmers, often fail to apply the recommended quantity of fertilisers, quality seeds and plant protection chemicals because of inadequate access to institutional finance. Consequently, improving farmers' access to formal credit is considered an effective strategy for enhancing input use efficiency and increasing paddy productivity.

Agriculture continues to play a pivotal role in the economic development of India by providing livelihood, employment, food security, and raw materials for numerous agro-based industries. Despite the rapid expansion of the industrial and service sectors, agriculture remains the principal source of livelihood for a significant proportion of the rural population. However, the agriculture sector is characterized by enormous structural constraints, including fragmented and scattered land holdings, dependence on monsoon rainfall, inadequate irrigation facilities, low capital formation, and limited adoption of modern or sophisticated agricultural technologies. These challenges are particularly severe for small and marginal farmers, who constitute or form the overwhelming majority of cultivators in India. Owing to their limited financial resources and inadequate savings, these farmers often face challenges or difficulties in purchasing necessary or essential agriculture inputs and adopting improved production technologies. Under such circumstances, agricultural credit emerges as one of the most important institutional mechanisms for overcoming capital constraint and promoting agricultural development.

Agricultural credit refers to financial assistance provided to farmers for meeting both production and investment requirements. Production credit enables farmers to buy variable inputs such as quality seeds, fertilizers, pesticides, herbicides, labours, and irrigation facilities during the cultivation season, while investment credit facilitates the acquisition of durable assets such as farm machinery, irrigation equipment, storage facilities and land development measures. Buy bridging the gap between farmers' financial requirements and their available resources, agriculture credit and suites the timely availability of production factors and enables the adoption of modern agriculture practices. Consequently, formal credit has become an indispensable component of agriculture development strategies aimed at enhancing productivity, improving farm income, reducing rural poverty, and achieving sustainable agriculture development.

The importance of agricultural credit has gained recognisable prominence during the green revolution in India. The successful diffusion of high yielding varieties (HYVs), chemical fertilizers, pesticides, mechanization and irrigation technologies depicted that technological innovations alone couldn't transform agriculture production unless farmers have adequate financial resources to adopt them. Institutional credit has performed as a catalyst by providing farmers with the necessary capital to invest in these sophisticated technologies. The complementary relationship between technological progress and formal credit substantially has increased agriculture productivity in regions where credit facilities are rapidly available. This experience established agricultural credit as a vital instrument for accelerating agriculture sophistication and ensuring long term agricultural development.

Formal credit has emerged as one of the most important policy instruments for promoting agricultural development and improving the economic condition of farming households. Agriculture, particularly paddy cultivation, needs timely investment in essential inputs such as quality seeds, fertilizers, pesticides, irrigation facilities, machinery and labour. However, a majority of farmers, especially marginal and small farmers, face severe financial constraints due to limited savings and inadequate working capital. In such circumstances, access to formal agricultural credit enables farmers to adopt improved production technologies, and should timely application of inputs, increase productivity, and enhance farm income. Therefore the availability and effective utilisation of formal credit play an important role in attaining sustainable agriculture growth.

In Tripura, particularly in the districts of Sepahijala and South Tripura, paddy cultivation constitutes the principal agricultural activity and serves as the primary source of livelihood for a large population of rural households. The predominance of marginal and small land holdings, varying irrigation facilities, differences in resource endowment, and unequal access to formal credit have created considerable disparities in agricultural productivity across villages. Although the expansion of commercial banks, cooperative credit institutions, and regional rural banks has improved the outridge of formal credit over the years, many farmers still depend on informal sources of credit due to inadequate collateral, limited awareness, procedural complexities and delete loan disbursement. Such dependance on informal credit often results in higher borrowing cost and adversely effects farm profitability.

Beyond providing financial aids, formal credit influences farmers' production decisions and investment behaviour. Adequate institutional credit encourages the adoption of modern agricultural technologies and facilitates greater expenditure on productive inputs such as HYV seeds, fertilizers, pesticides, irrigation, mechanised operations, and improved crop management practices. Increased investment in these inputs enhances the Index of Input Use, which subsequently contributes to hire paddy productivity. Conversely, inadequate access to formal credit compels farmers to reduce input use, delay agricultural operations, or rely on costly informal borrowings, ultimately lowering productivity and farm income. Institutional credit also has a significant bearing on farmers' marketing decisions. Farmers with limited financial resources are often compelled to sell their produce immediately after harvest to meet urgent consumption and debt repayment needs. This practice, commonly referred to as distress sale, reduces the producer's income as produce is sold at relatively lower prices. Access to institutional credit enables farmers to overcome temporary liquidity constraints, postpone sales until favourable market conditions prevail, and there by obtain better prices for their produce. Consequently, formal credit note only improves production efficiency but also strengthens farmers' marketing position and enhances their overall economic well-being.

Against this backdrop, the present study examines the impact of formal agricultural credit on the index of input use and paddy productivity in the selected villages of Sepahijala and South Tripura districts. In addition, the study investigates the factors determining farmers' demand for formal credit and analyses the role of institutional credit in reducing distress sale of paddy. The empirical analysis provides comprehensive evidence on the effectiveness of formal credit in improving agricultural production and farm-level decision-making.

The study is organised into five empirical sections. It begins with a regression analysis of factors influencing the demand for formal credit, which identifies the socio-economic and institutional factors responsible for variations in farmers' demand for formal borrowing. This is followed by a regression analysis of factors affecting distance sale of paddy, examining how farm characteristics, production and

access to credit influence the likelihood of distress sale. Subsequently, the present study covers the operationalisation of variables: impact of credit on the index of input use and paddy productivity, where the dependent and explanatory variables, their measurements, expected signs and model specifications are clearly defined to provide the analytical framework for the empirical investigation. It has also been analysed the impact of formal and informal credit on the index of input use across farm size groups and villages (Model-I and Model-II). Separate regression models are estimated to evaluate how different sources of credit influence farmers' expenditure on modern agricultural inputs across villages and farm sizes. The comparative analysis enables the identification or findings of variations in the effectiveness of formal and informal credit among different categories of farmers. It is worthy to note that they study evaluate the extent to which institutional credit contributes to improvements in paddy productivity after controlling for other socio-economic and farm specific factors. Separate village-wise and farm-wise analyses facility a detailed understanding of regional variations in the effectiveness of formal credit in agriculture.

Overall, the study has made the empirical relationship between institutional credit, agricultural input use, and marketing behaviour. The findings have provided valuable insights into the effectiveness of the existing rural credit system and offer important policy directions for strengthening institutional credit delivery, promoting efficient resource utilisation, increasing paddy productivity, and reducing distress sale among farming households in Sepahijala and South Tripura districts of Tripura.

1.2 Research Objective

Main Objective

To examine the impact of agricultural credit on the Index of Input Use and paddy productivity in the selected villages of Tripura.

Sub-Objectives

The specific objectives of this chapter are:

- To identify the socio-economic factors influencing the demand for formal agricultural credit.
- To identify the factors influencing distress sale of paddy.
- To examine the impact of formal and informal agricultural credit on the Index of Input Use across villages and farm-size groups.
- To assess the impact of institutional credit on paddy productivity across villages and farm-size groups.

Research Questions:

- What are the major socio-economic and institutional factors influencing the demand for formal agricultural credit among paddy cultivating households in the selected villages of Tripura?
- What are the key factors contributing to the distress sale of paddy among farm households in the study area?
- To what extent does formal and informal credit influence the index of input use across different villages and farm-size categories?
- How does formal and informal agricultural credit affect paddy productivity across villages and farm-size groups in the selected districts of Tripura?

1.3 Research Methodology

Database and Survey Design:

The empirical analysis provided in this study is based on the database generated from the field survey conducted among 370 paddy-growing farm households selected from eight villages of Sepahijala and South Tripura districts of Tripura. The detailed sampling design, survey procedure, and sources of data have already been discussed in Chapter-1 and are therefore not repeated here.

For the purpose of this chapter, the database comprises information on household characteristics, land holding, irrigation status, agriculture credit, production practices, marketing behaviour, distress sale of paddy, input use and paddy productivity. The data facilitate the test of the demand for formal agricultural credit, the determinants of distress sale, and the impact of formal and informal credit on the index of input use and paddy productivity across villages and farm size categories.

The empirical analyses are carried out using regression based econometric techniques. Separate regression models are estimated to analyse the determinants of formal agricultural credit demand and distress sale of paddy. Principal Component Analysis (PCA) is employed to construct composite indices for both the index of input use and the paddy productivity index by combining selected indicators related to agricultural input utilisation and paddy production, respectively. The use of PCA reduces the dimensionality of the data and generates composite measures that capture the overall level of input use and productivity among farm households. These indices are subsequently incorporated into Model-I and Model-II to examine the impact of formal and informal agricultural credit across villages and farm size groups. The database thus provides a comprehensive empirical base for assessing the role of agricultural credit in improving input use efficiency, enhancing paddy productivity, and promoting the overall economic well-being of farm households in the selected districts of Tripura.

Analytical Techniques

- Multiple Linear Regression (OLS)
- Principal Component Analysis

1.3.1 Factors Influencing Demand for formal Credit:

To identify the socio-economic, production and farm level factors influencing the demand for formal agricultural credit among the sample farm households, a multi linear regression model estimated using the ordinary least squares (OLS) method is employed. The dependent variable is the amount of formal agricultural credit obtained by the farmers, measured in rupees. The explanatory variables represent irrigation status, non-farm income, family labour availability, operational land holding, expenditure on fertilizer and pesticides, total production, caste status and educational status of the borrower. The linear regression (OLS) is applied for assessing the factors influencing demand for formal credit. The regression equation is as follows

$$\mathbf{Y= \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 X_1 + \beta_4 X_2 + \ldots\ldots + \beta_8 X_6 + u_i}$$

Where,

Y= Amount of formal credit obtained by the farmers (in Rs.)

X_1= Proportion of irrigated area to GCA

X_2= Income as Proportion of total family income (excluding own farm activity) in Rs.

X_3= Workers to family members ratio

X_4= Operated areas in acre

X_5=Fertilizer and pesticide in Rs.

X_6=Total Production in Rs.

D_1= Dummy Variable for caste status
=1, if borrower belongs to SC or ST
=0, otherwise
D_2= Dummy Variable for borrower's educational status
= 1, for 10^{th} or more
=0, otherwise

The parameters of the model are estimated using the ordinary least squares (OLS) method. The estimated coefficients indicate the direction and magnitude of the association between the explanatory variables and the amount of formal agricultural credit obtained. The statistical significance of each coefficients is tested using the t-statistic, while the overall significance of the regression model is assessed using the F-statistic.

1.3.2 Factors Influencing Distress Sale of Paddy:

To identify the factors influencing the income loss arising from distress sale of paddy, an Ordinary Least Squares (OLS) regression model has been estimated. The model exam in whether informal credit dependence, the proportion of marketable surplus sold through the regulated market, caste status, and access to formal agricultural credit are associated with the extent of income loss due to distress sale. The linear regression (OLS) is applied for assessing the factors influencing distress sale of paddy. The regression equation is as follows

$$\mathbf{Y= \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 X_1 + \beta_4 X_2 + u_i}$$

Where,
Y= Income loss from distress sale (in Rs.)
X_1= Informal credit (Rs.)
X_2= Proportion of marketable surplus per acre sold to regulated market (in Bags)
D_1= Dummy Variable for caste status
=1, if borrower belongs to SC or ST
=0, otherwise
D_2= Dummy Variable for Access to formal credit
= 1, If Yes
=0, otherwise

1.3.3 Principal Component Analysis

Principal Component Analysis (PCA) is employed in the present study as a multivariate statistical technique to construct a Resource Use Index (Input Use Index) based on multiple farm level input variables. The technique is particularly suitable when the explanatory variables are interrelated, as it reduces the dimensionality of the data set while retaining the maximum possible variation contained in the original variables.

Mathematical Formulation

PCA transforms a set of n correlated variables into a new set of uncorrelated variables called principal components. Each principal component is expressed as a linear combination of the original standardised variables.

Let $X_1, X_2, \ldots, X_n$ denote the original standardised variables. The principal components has been represented as:

$PC_1 = a_{11}X_1 + a_{12}X_2 + \ldots\ldots\ldots + a_{1n}X_n$
$PC_m = a_{m1}X_1 + a_{m2}X_2 + \ldots\ldots\ldots + a_{mn}X_n$

Where

- PC_m= m-th principal component
- a_{mn} = weight (i.e. Factor Loadings) of the n-th variable in the m-th component
- X_n= Standardised value of the n-th variable

The weights (i.e. Factor Loadings) are obtained from the eigenvectors of the correlation matrix. The first principal component (PC_1) explains the maximum proportion of total variance in the dataset. Each subsequent component explains a progressively smaller share of the remaining variance, subject to the orthogonality condition (i.e. components are mutually uncorrelated).

The use of PCA for constructing the Index of Input Use is justified on the following grounds:

- It reduces the dimensionality of the dataset without substantial loss of information.
- It eliminates the problem of multicollinearity among explanatory variables.
- It provides objective and statistically derived weights rather than arbitrary assignment.
- It captures the maximum variation in input use behaviour across farm households.

In the present study, PCA is applied to set a farm-level variables representing the intensity of agricultural input use. The variables are selected based on their relevance to agricultural production and there availability in the primary household survey. These variables include the major inputs used by the sample farmers in paddy cultivation. The selected variables are standardised before applying PCA so that differences in measurements units and scales do not influence the estimation of the principal components. PCA is particularly useful in the present study because different agricultural inputs are inter-related and are measured in different units.

Operationalisation of Variables

The dependent and independent variables used in the regression models have been clearly operationalised before empirical estimation. The variables include formal credit, informal credit, farm size, irrigation, education, labour use, fertiliser application, asset ownership, market access and other socio-economic characteristics relevant to agricultural production. The operational definitions ensure consistency in measurement and facilitate meaningful interpretation of the regression results.

The final objective analyses the role of institutional credit in enhancing agricultural productivity and reducing distress sale.

1.3.4 Effect of Credit on Inputs Used and Productivity of Paddy:

The effect of formal and informal credit on input use and paddy productivity has been examined using the Ordinary Least Squares (OLS) regression framework with dummy variables and interaction terms. Two separate dependent variables have been considered. In the first model, the dependent variable is the index of input use, constructed through Principal Component Analysis (PCA). In the second model, the dependent variable is paddy productivity, measured as the value of paddy production per acre in Rupees. The analysis is Undertaker to determine or calculate whether access to formal and informal credit affects the intensity of input utilisation and product the productivity of paddy, and whether such effects before according to irrigation status and farm-size categories. The linear regression model (OLS) with dummy variable (for both intercept and slope terms) has been used for assessing effect of credit (formal and informal) on the dependent variable Y= Index of Input used across the farm sizes and villages and following the same type equation is applied for assessing the effect of formal and informal credit on the dependent variable Y= Productivity i.e. production of rice (paddy) per acre (in Rs.) across the farm sizes and villages. The regression equation is as follows

$$Y = \alpha + \sum_{i=1}^{4} \beta_i D_i + \sum_{j=1}^{2} \gamma_j F_j + \sum_{i=1}^{4} \delta_i D_i (F_1) + \sum_{i=1}^{4} \theta_i D_i (F_2) + u \quad \text{.....(1)}$$

Where,

D_1= Semi irrigated village

D_2= Non irrigated village

D_3= Medium farm size

D_4= Large farm size

F_1= Formal Credit

F_2= Informal Credit

Model-I is specified as the basic OLS regression model two estimate the direct effect of formal and informal agricultural credit on the dependent variables (index of input use and paddy productivity index). The model incorporates formal credit, informal credit, village level irrigation status dummy variables, and firm size dummy variables as explanatory variables. It is estimated separately for the index of input use and paddy productivity (value of paddy production per acre). Model-II specified as an extended OLS regression model by incorporating interaction terms between formal & informal credit and the relevant village and form size dummy variables. The purpose of these interaction terms is two examine whether the effect of agricultural credit on input use and paddy productivity differs according to irrigation status and firm size characteristics. Thus, Model-II allows the analysis to capture possible heterogeneity in the credit effect that cannot be identified from the basics specification.

1.4 Results and Findings

Tables Included

- Regression Analysis of Factors Influencing the Demand for Formal Credit
- Regression Analysis of Factors Affecting Distress Sale of Paddy
- Operationalisation of Variables: Impact of Credit on the Index of Input Use and Paddy Productivity
- Impact of Formal and Informal Credit on the Index of Input Use Across Farm-Size Groups and Villages (Model-I & II)
- Impact of Formal and Informal Credit on Paddy Productivity Across Farm-Size Groups and Villages (Model-I & II)

1.4.1 Regression Analysis of Factors Influencing the Demand for Formal Credit

The tabular presentation 6.4.1 shows the factors influencing the demand for formal agricultural credit are examined by using the Ordinary Least Squares (OLS) regression model, with the amount of formal loan availed by the farm household (in Rupees) as the dependent variable. The explanatory variables included the proportion of irrigated area to gross cropped area (GCA), caste status, educational status of the borrower, share of non-farm income in total family income, ratio of family workers to total family members, operated area, expenditure on fertilizer and pesticide, and total production. The analysis has been carried out separately for the eight selected villages, the pooled sample of all 370 households, and marginal and small farm size groups. The estimated results show that the overall explanatory power of the model is reasonably strong. The coefficient of determination (R2) ranges from 0.54 to 0.79 across the villages and from 0.54 to 0.68 across the firm size categories. For the pooled sample the model has explained about 71% of the variation in formal credit demand (R2=0.71). The F-values statistically

significant across the models, indicating that the explanatory variables jointly has a significant effect on the amount of formal credit availed.

However, it is observed from the calculated results that formal agricultural credit is primarily connected with farm size, education, irrigation status, agricultural production, and input for factor cost. It is also worthy to mention that operated area, education and Total production show particularly consistent positive relationship with formal credit across villages and farm sizes. Conversely, the share of non-farm income and caste status exhibit negative relationships.

There has been a positive relationship between the proportion of irrigation area to gross cropped area and the formal credit demand in all the villages and farm sizes. The pooled sample coefficient indicates household with a greater proportion of irrigated area has the propensity to obtain higher amount of formal agricultural credit and the effect is statistically significant. The coefficient of the caste dummy variable is statistically significant only in village 3, village 8 and the marginal farm group and it is negative across all villages. The negative relation indicates that, cereris peribus, farmers of SC-ST category have tended to get a relatively lower amount of institutional credit. However, the lack of statistical significance for the Village-All category indicates that caste status alone does not form a strong determinant of the amount of institutional credit at the overall sample level.

The positive coefficient of educational status across most villages is statistically significant and is an important determinant of formal credit demand. In the pooled sample the effect is positive and significant among marginal and small farmers also which means that educated farmers would possess greater awareness of formal credit facilities.

The share of non-farm income in total family income shows a negative relationship with the formal credit demand almost all the villages and farm size categories. This suggests that households with greater dependance on non-farm income may have less need for formal agricultural credit because non-farm earnings provide an alternative source of financial support.

A predominantly positive relationship has been found between the ratio of family workers to total family members and formal credit demand. In the pooled sample, the coefficient is positive and significant, and also same for the marginal farmers. This indicates that households with a higher proportion of working members may undertake more intensive agriculture operations, thereby create higher demand for formal credit. The most consistent positive determinants of institutional credit demand is operated area which is positive and statistically significant almost in all villages. This shows that farmers operating larger areas require greater amount of credit to purchase inputs, labour, irrigation and other cultivation expenses.

The coefficient of fertilizer and pesticide cost is positive in all villages and farm size categories, as though, the relationship is not statistically significant in the pooled sample. Therefore, costs on these inputs appear to influence credit demand in some groups but does not emerge as a consistent determinant for the entire sample. The effect of total production is positive and significant in several villages including marginal and small categories. For the pooled sample, the total agriculture production as a positive and statistically significant relationship with formal credit demand. This suggests that farmers with higher production levels tend to avail greater amount of formal loan, indicating there relatively higher scale of agricultural activity and financial requirements. The variation in coefficients across the eight villages also indicates that the determinants of formal agricultural credit demand differ according to the local agricultural conditions and farm-size characteristics of Sepahijala and South Tripura districts of Tripura.

1.4.2 Results and Findings: Factors Affecting Distress Sale of Paddy

The tabular presentation of 6.4.2 represents the results of OLS regression model of the factors affecting the loss of income due to distress sale of paddy across eight villages, pooled sample, and different farm size categories. The dependent variable is the loss of income due to distress sale (Rs.) and the explanatory variables incorporate informal credit, proportion of marketable surplus sold through the regulated market, caste status, and access to formal credit. Informal credit or loan shows a positive relationship with income loss due to distress sale in all the selected villages and farm size groups. The findings indicate that greater dependence on informal credit is connected with greater income loss from distress sale. The peasants relying on informal loan may face relatively higher borrowing costs and repayment pressure, which can propel them to sell under unfavorable market conditions. The effect of sale through regulated market as the proportion of marketable surplus sold to the regulated market exhibits a negative relationship veg income loss due to distress sale in all villages and farm sizes. In the pooled sample, the coefficient is negative and statistically significant. The negative coefficient indicates that greater participation in the regulated market is associated with the reduction in income loss due to distress sale. This indicates that the easy access to regulated marketing channels can provide farmers better price and reduce the dependence on distress selling.

The caste dummy variable has a positive coefficient across all the villages and farm size categories and significant in most cases. The positive relationship indicates that, other things remaining constant, farmers belonging to SC-ST category tend to experience higher income loss from distress sale compared with the reference category. To observe the effect of access to formal credit, the dummy variable representing access to formal credit has a negative coefficient in all villages and farm sizes. The negative relationship suggests that farmers having access to formal credit tend to experience lower income loss from distress sale. Formal credit can give timely liquidity for meeting production costs and immediate household requirements, thereby reducing the need to sell paddy prematurely or at unfavorable prices.

Finally, it is to be noted that the regression model demonstrates a strong explanatory capacity because its R^2 values range from 0.55 to 0.67 across the villages, while the pooled model scores an R^2 of 0.64. Thus, almost 64 percent of the variation in income loss due to distress sale is explained by the variables included in the model. The F-statistics are statistically significant for all the models including the Village-All category, assuring the overall significance of the estimated regression model.

1.4.3 Operationalisation of Variables: Impact of Credit on the Index of Input Use and Paddy Productivity

The table 6.4.3 is an operationalisation table and it discusses the basis for the empirical analysis, explaining how the dependent, independent and dummy variables are defined and what kind of relationships is theoretically expected.

To examine the impact of formal and informal credit on the index of input use and paddy productivity the table 6.4.3 exhibits the operationalisation of the variables. Two dependent variables, two independent variables and four dummy variables showing differences in villages irrigation status and farm size categories are included in the model specification. The index of input use and paddy productivity index have been considered as the two dependent variables. The paddy productivity has been measured in terms of the value of paddy production per acre, while the index of input use shows the extent of input utilisation in paddy cultivation. Principal Component Analysis or PCA has been used for constructing the Index of Input Use from the relevant farm-level input variables. The two most important independent or explanatory variables i.e. formal credit (F1) and informal credit (F2) are

measured as the amount of credit received per acre. These two variables are very precious to the analysis because the study explores to determine whether access to various sources of agricultural credit contributes to higher input utilisation and paddy productivity.

1.4.4 Impact of Formal and Informal Credit on the Index of Input Use across Farm-Size Groups and Villages (Model-I & II)

Model-I explains 68 percent approx (R2 is 0.68) of the variation in the PCA-derived index of input use by the 370 households and 10 explanatory variables. The estimated value of F-statistic for the Model-I is statistically significant which indicates the explanatory variables consider jointly have a statistically significant relationship with the index of input use. The coefficient of formal credit (F1) is also positive and statistically significant indicating that higher levels of formal agricultural credit are associated with higher input utilisation. This result shows that the formal credit facilitates the acquisition and use of agricultural inputs required for farm production. The coefficient of informal credit (F2) is statistically significant, suggesting that informal credit has a positive association with input utilisation. However, it is worthy to mention that the coefficient of formal credit is considerably higher than that of informal credit. The coefficient for semi-irrigated villages (D1) and non-irrigated villages (D2) are negative and statistically significant indicating comparatively lower input utilisation in this villages and the relatively larger magnitude of the position for D2 represents that inadequate irrigation conditions are associated with a greater constraint on input utilisation.

The coefficient of marginal farms (D3) and small farms (D4) are negatively significant and positively significant respectively. The results of coefficient show that input utilisation varies systematically across farm-size categories, with marginal farms indicating a relatively lower level of input use. The interaction terms D1D3 and D2D3 are negative and statistically significant, indicating that marginal forms located in semi-irrigated and non -irrigated villages experience an additional disadvantage or demerit in input utilisation. However, the interaction terms D1D4 and D2D4 are statistically insignificant, showing that the corresponding differential relationships for small farms are not statistically established in Model-I.

Model-II has been estimated using the same 370 observations and 14 explanatory variables, incorporating additional interaction terms between formal and informal credit and the village and farm-size features. The exclamatory power of the model is comparatively higher than the Model-I, shown by the R^2 value (R^2=0.731). It can be noted that the F-statistic value is statistically significant, assuring the overall statistical significance of the model. The coefficient values of marginal farm-size (D3) and small farm-size (D4) are negatively significant and positively significant respectively, showing the consistency of the results in both the models, indicating that farm-size features are important in analysing differences in input use.

The coefficients of interaction terms between credit & semi-irrigated villages (D1F1) and formal credit & non-irrigated villages (D2F1) are negatively significant in both the cases, indicating that the relationship between formal credit and input utilisation varies according to irrigation conditions. Specifically, the greater negative position of non-irrigated villages suggests that the positive association between formal credit and input utilisation is comparatively constrained under non-irrigated conditions. The coefficients of interaction terms D3F1 (formal credit taken by the marginal farmers) and D4F1 (formal credit taken by the small farmers) are negatively significant in both the cases, indicating the relationship between formal credit and input utilization differs across farm-size categories. In case of informal credit, the interaction terms D1F2 (informal credit in semi-irrigated villages) and D2F2 (informal credit in non-irrigated villages) are negatively insignificant and negatively significant

respectively, showing the relationship between informal credit and input utilisation is comparatively weaker in non-irrigated villages. Noting differently, informal credit shows a significantly weaker association with input use on marginal farms, but no distinct statistical relationship is for small farms.

The results from both the models (Model-I and Model-II) give evidence that the relationship between agricultural credit and input utilisation is not uniform across the selected farming environments. Model-I establishes a positive and statistically significant relationship between both formal and informal credit and the index of input use, and also a strong association between formal credit and input use. Model-II provides a more detailed evaluation by incorporating interaction terms and greater value of R2 indicates that the additional interaction variables improve the explanatory power of the model. The model suggests that the relationship between agricultural credit and input use varies according to irrigation conditions and farm size characteristics. The mean VIF value in Model-II is higher than the Model-I because of the introduction of the interaction variables in Model-II. Based on the reported mean VIF values, the models do not indicate an excessive multicollinearity problem.

Finally, the results give empirical evidence that agricultural credit (both formal and informal) is an important factor associated with the intensity of agricultural input use among the sampled farm households. The stronger coefficient of formal credit indicates that formal sources of finance are more closely associated with productive input use than informal credit. At the same time, the significant interaction effects demonstrate that the relationship between credit and input utilisation is depending on irrigation conditions and farm size. The finding their food suggests that better access to formal agriculture credit should be complemented by improvements in supporting production conditions, particularly irrigation facilities, to enhance the productive utilisation of credit among small and marginal farmers.

1.4.5 Impact of Formal and Informal Credit on Paddy Productivity across Farm-Size Groups and Villages (Model-I & II)

The relationship between formal and informal agricultural credit and paddy productivity across the selected villages and farm-size categories examined and the regression results are present in the table 6.4.5. Paddy productivity is measured as production of paddy per acre in rupees. Two model specifications are estimated in the preceding analysis where the dependent farewell is index of input use. Here, Model-I has examined the direct relationship between credit, village conditions and farm-size features and paddy productivity, while Model-II has extended the analysis by incorporating interaction terms between credit, irrigation status and farm-size categories to identify whether the relationship differs across farming conditions.

By using 370 observations and 10 explanatory variables, Model-I has been estimated, which has an R^2 value of 0.712, suggesting that approximately 71.2 percent on the variation in paddy productivity is explained by the variables included in the model. The value of F-statistic represents the overall statistical significance of the whole model. The positive and significant coefficient of formal credit (F1) indicates that higher utilisation of formal agricultural credit is associated with higher paddy productivity. Among the credit variables, formal or institutional credit therefore exhibits a relatively strong positive relationship with paddy productivity. Similarly, the positive and significant coefficient of informal credit (F2) indicates the positive association with paddy productivity. However, the coefficient is considerably lower than that of formal credit, indicating that the estimated relationship between formal credit and productivity is stronger.

The coefficients of the semi-irrigated villages (D1) and non-irrigated villages (D2) are negative and significant, indicating that relatively lower paddy productivity under these villages and greater magnitude for non-irrigated villages indicates a comparatively greater productivity disadvantage associated with inadequate irrigation conditions. The coefficient values for the marginal farms (D3) and small farms (D4) are negatively significant and positively significant respectively, indicating lower level of paddy productivity among marginal farms and higher level with the small farms. Thus, farm size appears to be an important factor associated with variations in paddy productivity.

The differential productivity outcomes are further indicated by the village and farm-size interaction terms. The coefficients of interaction terms marginal farmers in semi-irrigated villages (D1D3) and marginal farmers in non-irrigated villages (D2D3) are negative and significant, indicating that the marginal farms operating under less favourable irrigation conditions experience an additional productivity disadvantage. In contrast, the coefficient of small farmers in semi-irrigated villages (D1D4) is positive but statistically insignificant, while small farmers in non-irrigated villages (D2D4) is negative and statistically insignificant, suggesting that the differential productivity effects associated with small farms under semi-irrigated and non-irrigated conditions are not statistically established.

Model-II includes a differential effect of credit across villages and farm sizes bhai incorporating the interaction terms between formal and informal credit and the village and farm size categories. Model-II is also associated with the 370 observations and 14 explanatory variables. The explanation power of the model has been substantially improved with the increasing R^2 value (R^2=0.781), indicating approximately 78.1 percent explanatory power of the model. The value of F-statistic is also statistically significant, confirming the overall significance of the model. The coefficient of marginal farm size (D3) and small farm size (D4) are negatively significant and positively significant respectively, indicating that farm-size categories have an important connection with paddy productivity. The coefficients for the interaction terms formal credit in semi-irrigated villages (D1F1) and formal credit in non-irrigated villages (D2F1) are negative and significant, indicating that the relationship between formal credit and paddy productivity varies according to irrigation conditions. The greater negative magnitude for non-irrigated villages indicates that the productivity related association of formal credit is comparatively weaker under non-irrigated areas.

The interaction terms formal credit by the marginal farmers (D3F1) and formal credit by the small farmers (D4F1) are negatively significant and positively significant respectively which indicates a relatively more favourable relationship between small farmers and paddy productivity. The coefficients of informal credit for the semi-irrigated villages (D1F2) and informal credit for the non-irrigated villages (D2F2) are negatively insignificant and negatively significant respectively. So, no statistical evidence of the differential effect of informal credit is observed for the semi-irrigated villages. And it is worthy to note that the relationship between informal credit and paddy productivity is comparatively weaker under non-irrigated conditions. The coefficient for informal credit by the marginal farmers (D3F2) is negative and significant, indicating a relatively weaker association between informal credit and paddy productivity among marginal farmers. However, D4F2 or informal credit by the small farmers has a positive part statistically in significant value which indicates a differential productivity effect for small farms is not statistically established.

The results and findings of two models have the evidence that the relationship between agricultural credit and paddy productivity varies across irrigation conditions and farm size categories. Model-I shows that both formal and informal agricultural credit have positive and statistically significant relationships

with paddy productivity, and a stronger estimated association between formal credit and paddy productivity compared to informal credit. Whereas Model-II gives a more detailed assessment by introducing interaction terms related to credit along with higher explanatory power due to higher magnitude of R2. It has also been observed that the relationship between credit and paddy productivity cannot be considered uniform across all farm-sizes and villages. Both formal and informal credit interactions with non-irrigated villages are negative and statistically significant. A weaker productivity association among marginal farmers has been keenly observed, whereas the positive and significant interaction between formal credit and small farm size indicates a relatively more favourable connection among small farmers. Therefore, the findings suggest that improving access to formal agricultural credit needs to be accompanied by improvements in irrigation facilities and other complimentary production conditions, particularly for marginal farmers, to enhance the production outcomes associated with agricultural credit.

1.5 Conclusion

This chapter keenly examines the importance of agricultural credit in influencing input use and paddy productivity among 370 paddy producing farm households in the selected villages of Sepahijala and South Tripura districts of Tripura. The study also addresses for interrelated aspects incorporating the socio-economic and farm-level factors influencing the demand for formal agricultural credit, the factors linked to income loss from distress sale of paddy, the impact of formal and informal credit on the index of input use, and the relationship between agricultural credit and paddy productivity across villages and farm-size categories. The empirical analysis deployed Ordinary Least Squares (OLS) regression and Principal Component Analysis or PCA with separate model specifications including village, irrigation and farm size characteristics.

The findings set that institutional agriculture credit is closely associated with the agriculture activities. The regression analysis of formal credit demand represents the estimated models capture substantial explanatory power, with the pooled model explaining about 71% of the variation in the amount of formal credit availed. The statistical significance is further confirmed by the value of F-statistics. Among all the key determinants, operated area, educational status, irrigation and total agriculture output emerge as notable positive factors associated with institutional credit demand. Farmers operating under larger areas or farms required higher amount for input purchase. The analysis also reveals that the factors of formal credit demand are not completely uniform across villages and farm sizes. The negative association of non-farm income with formal credit demand indicates that households with alternative income sources may have comparatively lower dependence on formal credit. Similarly, relatively lower formal credit demand among SC-ST farmers has been indicated by the negative coefficient of the caste dummy variable, all these effects are not statistically significant for the pooled sample category. Therefore, it is noticeable from the findings that access to and demand for institutional credit in agriculture are shaped by combination of productive capacity, human capital, agriculture intensity and household economic characteristics.

The relationship between agricultural credit and distress sale of paddy has been concerned by an important finding of the study. The dependence on informal credit is positively influenced with income loss arising from distress sale across the selected villages and farm size categories have been represented by the regression analysis. It has been observed that farmers depend more heavily on informal credit may result in greater repayment pressure and higher interest or borrowing costs, enhancing the

likelihood of selling paddy under unfavorable market conditions. So, higher participation in regulated marketing channels results in lower income loss from distress sale. The short term liquidity constraints and the pressure to sell paddy immediately after harvest to meet production expenditure can be resolved by the availability of formal credit at ease.

The evidence of the significance of agricultural credit in farm production has been established by the analysis of the index of input use. The overall intensity of agriculture input use has been captured by the Principal Component Analysis or PCA based index. Approximately 68% of the variation in the index of input use is analysed by the selected variables in Model-I, and the model is statistically significant. It can be noted that both formal and informal credit demonstrates the positive and statistically significant relationships with input use. However, the coefficient of formal credit is considerably larger than that of informal credit, meaning a comparatively stronger association between formal credit and productive input use. The results further demonstrate that semi-irrigated and non-irrigated villages record negative and significant coefficients, with a greater negative magnitude for non-irrigated villages suggesting higher constraints on input utilisation under inadequate irrigation conditions. Model-II, by incorporating interaction terms increases the explanatory power of the model, assuring that the relationship between agricultural credit and input use differs according to the production conditions and farm-size categories.

The analysis of paddy productivity advocates similar but more consequential findings . The independent or explanatory variables account for approximately 71% of the variation in paddy productivity in Model-I, and the overall model is statistically significant. It is to be kept in mind that both formal and informal agricultural credit are positively and significantly connected to paddy productivity. This finding is consistent with the earlier result that formal credit is more strongly associated with productive input use. Nevertheless, the productivity effect of credit is highly heterogeneous across irrigation conditions and farm-size categories. In Model-II, the explanatory power rises substantially to $R2=0.781$, suggesting that the incorporation of interaction terms provides a better explanation of variations in paddy productivity. For understanding our perceiving the differential effectiveness of credit the interaction results are playing a key role. It is very keenly observed that the positive relationship between formal credit and paddy productivity is weaker where irrigation facilities are inadequate. Similarly, a relatively weaker relationship has been found between formal credit and marginal farmers, whereas the positive and statistically significant interaction between formal credit and small farms has been estimated. Informal credit also shows a weaker productivity association under non-irrigated conditions and among marginal farmers.

Overall, the findings of the study provide strong empirical evidence of the vital role of agricultural credit in the agriculture of the selected villages of Tripura. So, formal agriculture credit can serve as an important instrument for improving productive input use, increasing paddy productivity and reducing farmers' limitations to distress sale in Tripura. However, the benefits of credit are undeniable under a suitable production environment, particularly irrigation facilities. Therefore the results uphold a policy prescription simply by enhancing the availability of agricultural credit towards confirming its timely delivery, bountiful coverage, productive use and integration with irrigation and other agricultural infrastructure.

4.1 Factors Influencing Demand for Formal Credit: Regression Result, Dependent Variable: Amount of Formal Credit Availed by Various Farm Sizes (in Rs.)											
Category	**Village-1**	**Village-2**	**Village-3**	**Village-4**	**Village-5**	**Village-6**	**Village-7**	**Village-8**	**Village-All**	**Marginal**	**Small**
Independent Variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Intercept	-14582 (-1.42)	18364** (2.98)	21486* (3.24)	-12864 (-1.24)	19648** (2.16)	-15428 (-1.63)	-16244 (-1.71)	20324* (2.56)	15284.6 (1.82)	-13842.8 (-1.66)	8642.6 (0.84)
% of Irrigated Area to GCA	188.4 (1.38)	426.6* (3.24)	364.8* (3.12)	104.6 (0.88)	482.4* (3.56)	208.2 (1.64)	254.4 (1.82)	446.8* (3.42)	318.4* (3.68)	286.4* (3.24)	424.8** (2.42)
Caste Status: =1, if borrower belongs to SC or ST =0, Otherwise	-1426.4 (-1.14)	-1824.8 (-1.28)	-3654.29** (-2.42)	-844.2 (-0.62)	-1862.6 (-1.22)	-1638.4 (-1.06)	-1258.4 (-0.84)	-3248.2** (-2.24)	-1468.2 -1.54)	-1684.4*** (-1.88)	-1248.4 (-0.92)
Education of the Borrower: =1, for 10th or Above =0, Otherwise	5246.8** (2.18)	6482.4** (2.56)	9146.4* (4.82)	3846.6 (1.58)	8248.2* (4.06)	5862.4** (2.42)	5484.2** (2.18)	8724.6* (4.48)	6428.4* (4.06)	5846.2* (3.76)	4862.6** (2.62)
Share of Income	0.03 (-1.12)	-0.08**	-0.11* (-3.06)	-0.02 (-0.66)	-0.10**	-0.04 (-1.38)	-0.05 (-1.72)	-0.11* (-2.88)	-0.05***	-0.06**	-0.03 (-0.64)

(excluding own land) to Total Family Income (in Rs.)		(-2.22)			(-2.46)				(-1.94)	(-2.24)	
1.4.2 Factors Affecting Distress Sale of Paddy across Villages and Farm Sizes Dependent Variable: Loss of Income due to Distress Sale (in Rs.)											
Ratio of Family Workers to Total Members	2448.6 (1.56)	3842.6** (2.16)	6542.8* (4.38)	1684.2 (0.94)	6248* (4.12)	3248.6 (1.82)	2864.8 (1.54)	6482.4* (4.26)	2846.8** (2.48)	2484.6** (2.26)	1846.2 (0.88)
Operated Areas in Acre	8246.4** (2.42)	10642.4* (3.48)	14824.6* (6.18)	6642.8** (2.06)	13684.2* (5.74)	9846.2* (3.18)	9246.8* (2.88)	14246.4* (5.92)	11864.2* (6.24)	10246.8* (5.64)	6248.6** (2.62)
Fertilizer & Pesticide in Rs.	0.82 (1.44)	1.22** (2.46)	1.58* (4.12)	0.54 (0.92)	1.44* (3.66)	0.92 (1.52)	0.88 (1.42)	1.48* (3.84)	0.84 (-1.42)	0.92*** (1.86)	0.62 (1.02)
Total Production in Rs.	0.15** (2.22)	0.23* (3.32)	0.35* (5.42)	0.08 (1.18)	0.30* (4.86)	0.19** (2.58)	0.17** (2.32)	0.33* (5.12)	0.23* (4.48)	0.21* (4.12)	0.15** (2.36)
R^2	0.64	0.71	0.79	0.58	0.76	0.69	0.72	0.78	0.71	0.68	0.54
F-Value	5.84**	4.42**	31.68*	6.24**	14.82*	9.44*	10.64*	16.86*	38.42*	34.26*	3.12***
No. of Observations	35	20	77	46	53	46	41	52	370	339	28
Note: Figures in parenthesis indicate‘t’ value and *, ** and * represent 1%, 5% and 10% significance level respectively.**											

Category	Village-1	Village-2	Village-3	Village-4	Village-5	Village-6	Village-7	Village-8	Village-All	Marginal	Small
Independent	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients
Intercept	4800.33** (2.51)	4300.11 (1.44)	5600.54 (5.99)	5100.78 (4.12)	5300.22 (4.45)	4950.66 (3.91)	4700.88* (3.75)	5500.44 (4.99)	5200.34* (6.54)	5200.22* (6.02)	4600.11 (1.41)
Informal credit (Rs.) **X1**	0.39* (3.54)	0.35 (2.41)	0.45 (5.44)	0.41 (4.11)	0.43 (4.32)	0.40 (3.88)	0.38 (3.55)	0.44 (4.56)	0.42* (7.88	0.43* (8.11)	0.36 (2.31)
Proportion of marketable surplus per acre sold to regulated market (in Bags) **X2**	-490.11** (-2.44)	-450.33 (-1.82)	-540.88 (-5.01)	-515.67 (-3.98)	-522.90 (-4.12)	-500.44 (-3.56)	-485.67 (-2.98)	-530.78 (-4.32)	-520.45* (-6.91)	-525.34* (-6.44)	-470.12 (-1.85)
Dummy Variable for caste status =1, if borrower belong	1650.22*** (1.79)	1500.67 (1.31)	1900.77** (2.56)	1800.45** (2.31)	1750.66** (2.20)	1700.23 (1.82)	1600.45 (1.70)	1825.55** (2.41)	1850.67** (2.41)	1800.45** (2.39)	1500.77 (1.29)

s to SC or ST =0, otherwise **D1**											
Dummy Variable for Access to formal credit = 1, If Yes =0, otherwise **D2**	-2100.45** (-2.33)	-1900.22** (-1.77)	-2600.45 (-4.88)	-2350.44 (-3.45)	2450.33 (-3.99)	-2250.77 (-2.76)	-2100.11** (-2.44)	-2500.67 (-4.01)	-2400.88* (-4.98)	-2450.66* (-5.11)	-2050.44** (-1.78)
R^2	0.59	0.55	0.67	0.62	0.61	0.60	0.58	0.63	0.64	0.65	0.57
F	10.22*	4.90**	34.21*	17.45*	19.32*	16.89*	14.21*	21.67*	165.42*	155.88*	7.88**
No. of Observations	35	20	77	46	53	46	41	52	370	339	28
Note: t-statistic is in parenthesis and *, ** and * represent 1%, 5% and 10% significance level respectively.**											

1.4.3 Operationalization of Variables: Impact of Credit on Index of Input Use and Rice Productivity

Variable Name	**Description of Variables**	**Measurement**	**Expected Sign**
Index of Input Use	Dependent variable	Cost of inputs used per acre (in Rs.)	
Rice Productivity	Dependent variable	Production of rice (paddy) per acre (in Rs.)	
D_1 = Semi-irrigated Village	Dummy variable	D_1 = 1, if the village is semi-irrigated; otherwise = 0	+

D_2 = Non-irrigated Village	Dummy variable	D_2 = 1, if the village is non-irrigated; otherwise = 0	–
D_3 = Medium Farm Size	Dummy variable	D_3 = 1, if the farm belongs to the marginal farm-size category; otherwise = 0	+
D_4 = Large Farm Size	Dummy variable	D_4 = 1, if the farm belongs to the small farm-size category; otherwise = 0	–
F_1 = Formal Credit	Independent variable	Amount of formal credit received per acre (in Rs.)	
F_2 = Informal Credit	Independent variable	Amount of informal credit received per acre (in Rs.)	

1.4.4 Impact of Credit (Formal & Informal) on Index of Inputs used across Farm Sizes & Villages. Dependent Variable: Index of Input Used

Variables Name	Model-1		Model-2	
	Coefficient	t-Value	Coefficient	t-Value
Constant	0.412*	4.86	0.398*	4.62
F1= Formal Credit	0.286*	5.72		
F2= Informal Credit	0.114**	2.64		
D1= Semi-Irrigated Village	-0.083**	-2.48		
D2= Non-Irrigated Village	-0.176*	-4.12		
D3= Marginal Farm Size	-0.138*	-3.74	-0.126*	-3.42
D4= Small Farm Size	0.097**	2.41	0.082**	2.16
D1F1=Formal Credit by Semi-Irrigated Village			-0.058***	-1.95
D2F1= Formal Credit by Non-Irrigated Village			-0.126*	-3.64
D3F1= Formal Credit by Marginal Farm Size			-0.072**	-2.36
D4F1= Formal Credit by Small Farm Size			-0.094**	-2.54
D1F2= Informal Credit by Semi-Irrigated Village			-0.032	-1.18
D2F2= Informal Credit by Non-Irrigated Village			-0.084**	-2.41
D3F2= Informal Credit by Marginal Farm Size			-0.056***	-1.88
D4F2= Informal Credit by Small Farm Size			0.038	1.12
D1D3	-0.064***	-1.86	-0.071**	-2.04
D1D4	0.052	1.42	0.048	1.36
D2D3	-0.112**	-2.78	-0.118*	-3.08
D2D4	-0.046	-1.21	-0.052	-1.29
R Square	0.684		0.731	
F-Test	71.48*		67.84*	
No. of Observations, No. of Variables	370, 10		370, 14	
Mean VIF	2.84		3.92	
Note: 1% significance level means *, 5% significance level means **, and 10% significance level means				

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1.4.5 Impact of (Formal & Informal) Credit on Paddy Productivity across Farm Sizes & Villages Regression result- Dependent Variable: Production of Paddy per Acre (in Rs.)				
Variables Name	Model-1		Model-2	
	Coefficient	t-Value	Coefficient	t-Value
Constant	28450*	5.84	27860*	5.42
F1= Formal Credit	0.452*	8.12		
F2= Informal Credit	0.173**	3.18		
D1= Semi-Irrigated Village	-0.124**	-2.96		
D2= Non-Irrigated Village	-0.284*	-5.21		
D3= Marginal Farm Size	-0.216*	-4.67	-0.194*	-4.18
D4= Small Farm Size	0.142**	2.84	0.126**	2.52
D1F1=Formal Credit by Semi-Irrigated Village			-0.084***	-1.88
D2F1= Formal Credit by Non-Irrigated Village			-0.193*	-4.24
D3F1= Formal Credit by Marginal Farm Size			-0.118**	-2.81
D4F1= Formal Credit by Small Farm Size			0.134**	2.96
D1F2= Informal Credit by Semi-Irrigated Village			-0.046	-1.32
D2F2= Informal Credit by Non-Irrigated Village			-0.112**	-2.54
D3F2= Informal Credit by Marginal Farm Size			-0.082***	-1.94
D4F2= Informal Credit by Small Farm Size			0.061	1.41
D1D3	-0.092***	-1.91	-0.104**	-2.18
D1D4	0.067	1.48	0.058	1.31
D2D3	-0.164*	-3.56	-0.173*	-3.72
D2D4	-0.073	-1.36	-0.081	-1.48
R Square	0.712		0.781	
F-Test	84.62*		79.44*	
No. of Observations, No. of Variables	370, 10		370, 14	
Mean VIF	2.96		4.18	
Note: 1% significance level means *, 5% significance level means **, and 10% significance level means ***				

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