



Formal Agricultural Credit Access among Paddy Farmers in Tripura: Distribution, Dependency and Determinants

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Abstract – The study explores and examines the access, distribution, dependency and determinants of formal agricultural credit among paddy cultivators in selected villages of Tripura. The study is based on primary data collected from 370 paddy cultivating farm households across eight selected villages of Sepahijala and South Tripura districts of Tripura. This research work analyses the distribution of borrowers and formal agriculture credit across villages and farm size categories and assesses farmers' dependency on formal credit. The findings suggest recognisable variation informal credit access across villages and farm sizes. The study further identifies and confirms the factors influencing access to formal credit using Binary Probit Model. The explanatory variables incorporate landholding patterns, asset ownership, irrigation status, educational attainment, caste status, HYV cultivation, age, family size and household labour availability. The probability of accessing formal credit is significantly influenced by the farmers' productive resources, agriculture intensity, human capital and household characteristics, derived from the results. The findings show the existence of variations in formal credit access and emphasize the need for more inclusive and accessible agriculture credit availability in the study area.

Keywords - Paddy Cultivation, Formal Credit, Credit Access, Credit Distribution, Credit Dependency, Probit Model, Tripura.

I. INTRODUCTION

An important institutional support or assistance for agricultural production and rural development is constituted by the agricultural credit, especially for marginal and small farmers who frequently face obstacle inadequate financial resources. Agriculture or paddy cultivation needs expenses for many inputs and farm activities, including seeds, fertilizers, pesticides, labour, irrigation etc. the availability of adequate and timely credit can therefore influence farmers' capacity to Undertake agriculture activities and maintain the required level of input use.

Institutional credit refers to credit obtained from institutional sources and it is an important alternative to informal credit. Greater access to formal credit reduces dependence on non-institutional lenders. However, differences in farm size, land holding, irrigation conditions, productive assets, education, household characteristics and other socio-economic conditions may influence farmers' ability and capacity to obtain formal credit. The issue is quite relevant in the context of small and marginal farmers. Farmers having limited land holdings and productive resources reduce borrowing capacity and emphasize greater constraints in full feeling the required formal borrowings. Differences in irrigation facilities and agriculture conditions across villages further contribute to variations in the demand for and access to formal credit. Thus, the distribution of institutional credit across farm size categories and villages gives an important basis for evaluating the inclusiveness of the formal credit system in the study area.

The present chapter captures the determinants or factors influencing access to formal credit in the selected villages

of Tripura. It examines the extent and distribution of formal credit across villages and farm size groups. The present study is analysed on the basis of selected sample households and it considers both farm level and household level features that may influence the probability of obtaining formal agricultural credit.

The study begins with an examination of the distribution of borrowers across villages and farm size categories, which gives an initial clear cut understanding of the extent to which farmers belonging to different categories participate in the formal credit system. The chapter further analyses the distribution of formal agricultural loans across farm sizes and villages. The key purpose of the study is to examine and access the share of different farm size groups in the total formal credit available in the study area. This chapter also examines the level of dependency on credit across villages and farm sizes. The level of dependency is examined and essays in relation to agricultural production requirements, including the cost of production per acre and per farm. The analysis helps to perceive the extent to which farmers depend upon credit to finance their agricultural activities. Besides the descriptive statistical analysis, the study seeks to identify the socio-economic, farm level and institutional factors influencing access to formal credit. The empirical analysis includes landholding owned, land quality, asset value excluding land, share of non-farm or non-own-farm income in total family income, proportion of irrigated area, caste status, education of the borrower, gross cropped area under rice, area under HYV rice, age of the borrower, family size and the ratio of family workers to family members are considered as explanatory variables.

The present study considers access to formal agricultural credit as a binary outcome, where a farmer either has



access to institutional credit or does not. Since the dependent variable is qualitative in nature, the Binary Probit Model has been employed to estimate the probability of accessing formal credit. Before estimating the model, descriptive statistics are presented to understand the distribution and characteristics of the explanatory variables included in the analysis.

Accordingly, this chapter analyses the distribution of borrowers, the distribution of formal agricultural loans, the level of dependency on institutional credit, descriptive statistics of the explanatory variables, and the determinants of access to formal agricultural credit using the Binary Probit Model. The findings provide empirical evidence on the socio-economic and institutional factors influencing farmers' access to institutional sources of agricultural finance in the selected villages of Tripura.

Despite continuous policy interventions, access to formal agricultural credit remains uneven across regions and among different categories of farmers. Small and marginal farmers frequently encounter difficulties in obtaining institutional credit because of inadequate collateral, limited awareness, small operational holdings, complicated loan procedures, insufficient documentation, and poor connectivity with financial institutions. Consequently, many farmers continue to depend on informal credit sources, which generally charge higher interest rates and increase the financial burden on farming households.

Research Objective

Main Objective

The main objective of this chapter is to identify the factors affecting farmers' access to formal agricultural credit in the selected villages of Tripura.

The study quests to examine the extent to which the farmers are able to access formal sources of agricultural credit to perceive how their socio-economic characteristics, farm-level resources, demographic attributes and institutional conditions affect such access.

Sub-Objectives

As institutional agricultural credit plays an important role in meeting farmers' requirements for production inputs, working capital and agriculture investment, understanding the factors determining access is important for assessing the inclusiveness and effectiveness of the formal credit system in the study area.

Firstly, the analysis helps identify whether access to formal credit is evenly distributed across the study area or whether or substantial differences prevail among villages and farm categories. Farm-size wise analysis is particularly important and relevant because land holding and farm size can influence borrowing requirements, productive capacity, repayment capability, and eligibility for formal credit. Secondly, the analysis again examines the distribution of formal agricultural credit across villages

and farm size groups to determine whether the volume of credit received is proportional to the number of farmers in each category. The objective also assesses the extent to which farmers depend on formal credit in relation to the size of their agricultural operations. This measure facilitates available comparison across farmers and farm sizes. Finally, the objective is also to empirically identify the factors that significantly influence farmers' probability or feasibility of accessing formal agricultural credit.

The specific objectives are:

- To analyse the distribution of borrowers across villages and farm-size groups.
- To examine the distribution of formal agricultural loans among different categories of farmers.
- To assess the level of dependency on institutional credit per acre of gross cropped area.
- To identify the socio-economic and institutional factors influencing access to formal agricultural credit through the Binary Probit Model.

The explanatory or independent variables incorporate characteristics or features such as farm size, landholding owned, irrigation status, caste, education, gross cropped area, HYV cultivation, age, family size and household labour availability, as specified in the empirical model. The Probit model analysis enables the study to distinguish between variables that have a statistical is significant influence on credit access and those that do not, while controlling the simultaneous effects of other explanatory variables.

II. RESEARCH METHODOLOGY

The fourth objective investigates or explores the socio-economic and institutional factors influencing farmers' access to institutional credit.

Database and Sample Design

The primary household level data from 370 paddy-growing households in eight selected villages of Sepahijala and South Tripura districts of Tripura has been collected for this empirical analysis. The data has been collected through a structured interview schedule framed to obtain detailed information on household characteristics, landholding, agriculture operations, irrigation, cropping pattern, input use, farm income, formal and informal credit, and other socio-economic characteristics of the farm households. The information related to formal agricultural credit and farmer access to formal sources of credit has been extracted from the common household database for the specific purpose of this chapter. The variables incorporated in the presence study considers land owned, lamp quality, asset value excluding land, non-farm income, proportion of irrigated area, caste status, educational attainment, gross cropped area under rice, area under HYV rice, age of the borrower, family size, and the ratio of family workers to total family members. The data related to formal and informal credit have also been used



to examine the distribution and dependency of farmers on formal credit.

The multistage sampling design has been adopted for the overall study. The study area comprises Sepahijala and South Tripura districts, which are purposively, selected recognising their importance in paddy cultivation. Subsequently, the relevant agricultural subdivisions and blocks are selected purposively, followed by the selection of paddy producing villages. A total of eight villages, four from each selected district, are incorporated in the study. The villages have been selected purposively to represent important paddy-producing Ariel within the selected districts. The selected households are subsequently classified into different form size groups on the basis of their operational landholdings, namely marginal, small and medium farms.

By applying Yamen's (1967) formula for a sample calculation of the known population

$$n = N / (1 + N(e)^2)$$

Where n= sample size, N=population size and e= sampling error = 0.05

Sampling Procedure

Sampling Procedure		
Sampling Stage	Sampling Technique	Unit Selected
Stage I	Purposive Sampling	Sepahijala and South Tripura districts
Stage II	Purposive Sampling	Bishalgarh and Bagafa Agricultural Subdivisions
Stage III	Purposive Sampling	Bishalgarh and Jolaibari Blocks
Stage IV	Purposive Sampling	Eight major paddy-growing villages (4 from each district)
Stage V	Probability Proportional to Size (PPS)	Allocation of sample households among villages
Stage VI	Systematic Random Sampling	Selection of 370 paddy-growing households

Analytical Techniques

- Descriptive Statistics
- Probit Regression Model

Descriptive Statistics

Descriptive statistical analysis has been employed to examine the borrowing pattern, formal credit utilisation, and the level of dependency on credit among farm households across different farm-size categories and villages. The collected data have been systematically classified, tabulated, and analysed using frequency distributions, percentages, and proportional shares. Frequency distributions have been used to present the number of households and borrowers in each farm-size category and village, while percentages have been calculated to compare the proportion of borrowers, informal borrowers, formal credit users, and the distribution of formal loans across different groups. Percentage analysis is also used to measure indicators such as the share of formal credit in total borrowings, cost of cultivation per acre, cost per farm, level of dependency on total credit, dependency on formal credit, and the formal credit deficit relative to the cost of production.

The descriptive analysis provides a comprehensive overview of the distribution of borrowers, the extent of institutional and non-institutional borrowing, the accessibility of formal credit, and the degree of dependence on credit among different categories of farmers. By comparing these indicators across villages and farm-size groups, the analysis identifies variations in borrowing behaviour, formal credit coverage, and credit dependency within the study area. This descriptive approach forms the foundation for understanding the credit structure of the sampled households and provides the empirical basis for the subsequent analytical and inferential examination of the determinants and adequacy of agricultural credit.

If the amount of money borrowed from formal sources is divided by the total amount of money borrowed from all sources and multiplied by 100, then the share of formal credit in total borrowings can be calculated. The percentage share of formal credit availed by farm groups to total formal credit is a financial distribution of loans which measures how a bank credit is shared among different types of farmers. It takes all the formal credit given out in a village and calculates what percentage of that money has gone to Marginal, Small and Medium farmers. The percentage share of formal credit availed by the groups of farm to total formal credit is the ratio of formal credit of specific group (village or farm category) and total formal credit multiplied by 100.

The cost per acre (%) is calculated as an index relative to the village average. This formula shows how a specific farm category compares to the overall village average. It is a relative index rather than an absolute cost. Speaking simply, the Cost per Acre (%) is the relation of Average Cost per acre for a specific category (Marginal, Small or Medium) and Overall Average Cost per acre for All Farms in that village and multiplied by 100. The percentage value shows how much cheaper or dearer a specific



category of farm is compared to the overall village baseline. And similarly the Cost per Farm (%) is the ratio of Average Cost per farm for a specific category (Marginal, Small or Medium) and Overall Average Cost per farm for All Farms in that village and multiplied by 100. While per-acre cost does not exhibit wide fluctuations, per-farm cost increases with farm size, reflecting differences in operational scale and input-use intensity.

The level of Dependency on Credit (%) measures how much a farm relies on credit to meet its farming costs and it is calculated by dividing the Total Credit Borrowed by the Total Cost of Cultivation, then multiplied by 100. The Level of Dependency on Formal Credit (%) represents the specific amount of a farm's operational costs that is funded by the formal credit sources. It is calculated by dividing the Total Formal Credit Taken by the Total Cost of Cultivation, and then multiplied by 100.

The term formal credit deficit in agriculture normally represents the shortfall between the total credit demand by the farmers or group of farmers and the actual credit supplied by the formal financial institutions like bank. Thus, Formal Credit Deficit = Total Estimated Credit Demand – Total Formal Credit Disbursed and the Formal Credit Deficit (%) = Level of Dependency on Credit (%) – Level of Dependency on Formal Credit (%). Formal Credit Deficit has been estimated by subtracting formal credit received from the total cost of cultivation. The deficit is expressed as a percentage of total production cost to measure the extent of inadequacy of formal credit in farming. A higher percentage means greater dependence on informal credit sources and inadequate formal credit support. However, it is to be worthy to note that to measure Formal Credit Deficit as a Percentage of Cost of Production per Acre, first of all, the value of the Formal Credit Deficit per Acre (Cost of Production per Acre – Formal Credit per Acre) is to be calculated and then it should be divided by the Cost of Production per Acre and multiplied by 100. Noting differently, the ratio of Credit Deficit and Cost of Production multiplied by 100, is nothing but the Formal Credit Deficit as a Percentage of Cost of Production per Acre.

Probit Model

The Probit model is employed to examine the determinants of access to formal credit. This probability regression model is preferred over the conventional linear regression model when the dependent variable is dichotomous in nature. In this study, the dependent variable represents access to formal credit (1=access, 0=no access).

To present the results systematically, separate tables may be prepared for:

- Factors influencing access to formal credit across villages, and
- Factors influencing access to formal credit across farm size categories.

Prior to the estimation results, a table presenting the descriptive statistics of the variables included in Probit model may also be provided.

Model Specification

The Probit model (D.N. Gujarati & Dawn C. Porter, 2009) is a binary choice model that estimates the probability of access to credit (Y) as a function of a vector of explanatory variables (X). It assumes the existence of an unobserved (latent) variable defined as:

$$Y_i^* = \beta X_i + u_i \quad \dots\dots\dots(1)$$

Where,

- Y_i^* is the latent (unobserved) variable representing the propensity to access credit,
- X_i is a vector of explanatory variables,
- β is a vector of parameters to be estimated,
- u_i is the error term.

Since Y_i^* is not directly observable, we observe a binary outcome variable Y_i defined as:

$$Y_i = 1, \text{ if } y_i^* > 0 \text{ (access to credit)} \\ = 0, \text{ otherwise (no access to credit)} \quad \dots\dots\dots(2)$$

Probability Function

From the above specification, the probability of access to credit is given by:

$$P(Y_i = 1) = P(u_i > -\beta X_i) = 1 - F(-\beta X_i) \\ \dots\dots\dots(3)$$

Where F denotes the cumulative distribution function of the error term. In the Probit model, it is assumed that the error term follows a standard normal distribution.

Thus, the observed binary outcomes are the realization of a Bernoulli (binomial) process, where the probability of success varies across observations depending on the values of the explanatory variables.

Estimation Process

The likelihood function for the Probit model is expressed as:

$$L = \pi_{Y=0} F(-\beta X_i) \pi_{Y=1} [1 - F(-\beta X_i)] \quad \dots\dots\dots(4)$$

Taking the natural logarithm of the likelihood function and maximising it with respect to β , yields the Maximum Likelihood (ML) estimates of the model parameters or slope coefficients.

The Probit model estimates how different socio-economic and institutional factors influence the probability of a farmer accessing formal credit, ensuring that the predicted probabilities lie between 0 to 1.

Worthy to note, in the present study, the Probit model is preferred over the Logit model for analysing the



determinants of access to formal credit. The Probit model is derived from a latent variable framework, which assumes that the observed binary outcome- access or no access to formal credit – is determined by an unobserved propensity influenced by various socio-economic and institutional factors.

The model further assumes that the error term follows a standard normal distribution, which is considered appropriate for representing behavioral decision making processes. Since access to formal credit depends on underlying characteristics such as income level, asset ownership, awareness and institutional linkages, the Probit specification provides a theoretically sound framework for capturing such latent tendencies.

Although both Probit and Logit models yield similar empirical results, the Probit model is widely applied in studies related to credit access and agricultural economics. Therefore, considering its theoretical consistency and common use in empirical research, the Probit model has been adopted for the present analysis.

III. RESULTS AND FINDINGS

Tables Included:

- 1.4.1 Distribution of Borrowers Across Farm-Size Groups and Villages
- 1.4.2 Distribution of Formal Agricultural Loans Across Farm-Size Groups and Villages
- 1.4.3 Level of Dependency on Institutional Credit per Acre of Gross Cropped Area Across Farm-Size Groups and Villages
- 1.4.4 Descriptive Statistics of Variables Used in the Probit Model for Access to Formal Credit
- 1.4.5 Factors Influencing Access to Formal Credit Across Villages: Results of the Probit Regression Model
- 1.4.6 Factors Influencing Access to Formal Credit Across Farm-Size Groups: Results of the Probit Regression Model

Analysis of Distribution of Borrowers across Farm Sizes and Villages

The table 5.4.1 depicts the study shows at how different types of farmers borrow money across eight villages. To make the results or findings clear, the farmers are divided into three groups based on the size of their land e.g. Marginal, Small and Medium. The analysis of the distribution of borrowers across farm sizes and villages reveals a structurally imbalanced agrarian system, characterised by the greater dominance of marginal farmers and a high dependence on credit for sustaining agricultural activities. The pattern, observed across all villages, shows a consistent or almost homogenous rural reality where land fragmentation, limited asset ownership and financial vulnerability shape borrowing behaviour.

Total Household and Percentage of Farm Households: An easy and simple headcount of the farming families surveyed to calculate total households. The large majority of families in every single village are marginal farmers. Marginal farmers form the absolute base of every village. The study area suffers from the extreme land fragmentation, meaning large farms have vanished and land has been split into tiny plots. The study area highlights a profound farm size imbalance that distorts aggregate statistics. Because marginal farmers hold nearly 92% of the total households.

All borrowers are an absolute headcount of households within a specific landholding group and village that have actively taken a loan of any kind whether from formal or informal sources. At the aggregate level (Village-All) out of 370 households, 260 operate as active credit borrowers, yielding an aggregate borrowing rate of 70.2%. The fact that nearly three-fourth of the entire households is actively in debt proves that agrarian families cannot generate enough internal cash reserve or crop profits to self- fund their livelihoods, making external loan necessary just to survive until the next harvest. Percentage of borrowers to total households is the credit intensity or propensity within a particular group is measured by the ratio of percentage of borrowers to total households and multiplied by 100. For the small and marginal categories this measures reaches a binding upper limit of 100% in nearly every single village. Large households are often trapped because they completely depend on loans. Very small families can sometimes earn quick cash by doing daily labour jobs. But the large families cannot do this.

Informal borrowers is the total number of farming households that take loan from non-institutional sources including village moneylender. The informal sector commands a huge market share. Worthy to mention that 169 households (65%) depend on informal credit sources out of total 260 active borrowers in the study area. It is to be kept in mind that 152 out of 169 informal borrower fall under marginal category. This gives undeniable evidence of the dominance of informal credit sources. Besides the government efforts aimed at expansion of public, commercial and cooperative banking branches into rural areas, the uncontrolled moneylenders remain the primary financial support. Percentage of informal borrowers to total households shows the absolute vulnerability or exposure index of the entire households to the informal credit market. The number barely changes from place to place. For most of the small and marginal farmers, it reels between 43% to 50% in nearly every village. However, it reaches 100% for medium farmers in village 3 and small farmers in villages 6 and 7. Speaking truly that the informal lenders are everywhere in the study area and they offer quick loans with no paperwork and no collateral, which formal banks fail to do.

The no. of formal borrowers taking informal loans measures the exact number of farming households who get



a bank loan but are still forced to borrow from non-institutional lenders at the same time. 71 households across all the villages take both formal and informal credit at once and 62 families out of 71 are marginal and small. It proves a major flaw or limitation of the banking system and the bank can covers hardly a part of the farming cost, forcing the farmers to borrow loan from the informal lenders to pay for the rest. Percentage of formal borrowers taking informal loans measures the percentage of bank-approved borrowers who do not get sufficient loan from the bank and forced to take more credit elsewhere. Across all the villages and farm sizes this number reels between 25% and 33%, averaging 27% for the whole study area. This percentage shows that the problem lies with the banking system, not the villages.

The analysis of borrower distribution across the selected eight villages highlights the key role of credit in sustaining rural livelihoods and agricultural activities. The finding discovers that borrowing is a normal phenomenon in the study area, reflecting the increasing need for financial resources to meet both production and consumption necessities. The study also reveals that marginal farmers are the dominant groups within the rural economy accompanied by the largest share of borrowings. A significant finding of the study is the continued importance of informal sources of credit. The study also reflects the prevalence of diverse borrowing practices, where households with access to formal credit continue to depend on informal credit. This indicates the deficiency of formal credit in meeting the total financial needs of rural households. Across all villages, the overall pattern remains almost consistent, reflecting that credit dependency is a widespread phenomenon rather than a village specific issue. Overall, the study concludes that while formal credit has expanded its reach in rural areas, it has not completely been replaced in formal sources of finance. Therefore, improving the availability, adequacy, timeliness, and flexibility of formal credit services is essential for reducing dependents on informal sources and promoting inclusive rural and agricultural development.

Analysis of Formal Credit Distribution across Farm Sizes and Villages

The table 5.4.2 shows the distribution of formal credit across farm sizes and villages provides significant scenario into the functioning of rural credit markets and the extent of institutional penetration in the agriculture sector. The analysis has been carried out using two indicators, namely (i) the percentage share of formal loans in total borrowings, and (ii) the percentage share of formal loans availed by different farm size groups in total formal lending.

Share of Formal Loans in Total Borrowings: At the aggregate level, the share of formal credit is 34 percent of total borrowings, and it is 32 percent among marginal farmers, 42 percent among small famers and 33 percent among medium farmers. The results indicate that the share

of formal loans in total borrowing remains relatively modest or low across the study area, suggesting that institutional sources of credit have not fully supplanted informal lending mechanisms. The proportion of formal borrowing varies across farm size categories, with a clear tendency for the share to increase with farm size. Marginal farmers exhibit a comparatively lower proportion of formal loans in their total borrowing portfolio. In contrast, small and medium farmers demonstrate a relatively higher reliance on institutional credit sources. This differential assessment can be attributed to variations in asset ownership, creditworthiness, repayment capacity, and familiarity with institutional procedures. The persistence of a substantial share of non-institutional borrowings reflects structural rigidities in the rural credit system. Despite policy affords to expand institutional finance, various issues such as collateral requirements, procedural complexities, and limited outreach continue to constrain access for a large segment of farmers, particularly those in the marginal category.

Distribution of Formal Loans across Farm Size Groups:

An examination of the distribution of formal loans across farm size categories reveals that marginal farmers account for the largest share of total formal credit disbursed. At the aggregate level, marginal farmers receive 66 percent of the total formal credit, small farmers receive 23 percent , and medium farmers receive 11 percent. This finding, however, needs to be interpreted in the context of the sample composition, where marginal farmers constitute the overwhelming majority of farm households. While the aggregate share of formal credit received by marginal farmers is high, this does not necessarily imply equitable access at the individual level. On a per-household basis, their access remains limited compared to that of small and medium farmers. The relatively higher share of formal credit among small and medium farmers in proportion to their borrowings indicates a more favourable position in terms of institutional linkage and credit access. Thus, the observed pattern reflects a dual reality: marginal farmers dominate in terms of absolute numbers, whereas relatively larger farmers exhibit better integration with formal financial institutions.

The village level analysis reveals variations in the share and distribution of formal credit, which may be attributed to differences in infrastructural facilities, proximity to financial institutions, awareness levels, and socio-economic conditions. However, despite their inter-village variations, the overall pattern remains consistent across the study area, with formal credit constituting only a part of the total borrowing structure. A notable feature emerging from the analysis is the coexistence of formal and informal borrowing among farm households. A significant proportion of farmers who have access to institutional credit also rely on informal sources to meet their financial requirements. The continued dependence on informal sources, even among formal borrowers, points to gaps in the design and delivery of institutional credit.



The findings of the analysis have several important economic implications. First, the limited share of formal credit in total borrowings suggests that a significant portion of agricultural financing is obtained at a higher implicit cost, which may adversely affect farm profitability and income levels. Second, the differential access to formal credit across farm size indicates the presence of structural inequalities in the rural credit system. Marginal farmers, despite being the largest group, face greater constraints in accessing institutional finance on favourable terms. Third, the coexistence of formal and informal borrowing reflects inefficiencies in the credit delivery mechanism, which may hinder optimal resource allocation and investment decisions in agriculture. Finally, inadequate access to affordable institutional credit may restrict the adoption of improved technologies, limit diversification into high-value crops, and increase the vulnerability of farmers to income shocks.

Level of Dependency on Credit per Acre of GCA across Farm Sizes and Villages

The table 5.4.3 shows the assessment of credit dependency in agricultural production provides critical insights into the financial structure of farm households and the extent to which cultivation activities are supported by borrowed capital. The present analysis evaluates the level of dependency on credit per acre of Gross Cropped Area (GCA) across different farm sizes and villages, incorporating indicators such as cost structure, credit dependence, formal credit utilisation and the extent of credit deficit.

Cost Structure across Farm Sizes and Villages: The analysis of cost distribution reveals noticeable variation in both cost per acre and cost per farm across farm sizes. The study indicates increasing cost intensity with farm size, particularly for medium farms. At the aggregate level, the cost per acre is 100 percent for marginal farms, 108 percent for small farms, 113 percent for medium farms and 104 percent overall. The overall cost per farm for marginal farmers is 26 percent, for small farmers is 31 percent and 40 percent for medium farmers.

Marginal farmers, operating on relatively smaller holdings, exhibit lower total cost per farm but maintain comparable cost per acre, indicating a relatively intensive use of input within limited land resources. In contrast, small and medium farmers incur higher total costs due to larger operational holdings, which may also be associated with a greater capacity to adapt to improved inputs and technologies. At the village level, the “all category” values demonstrate a relatively stable cost pattern, suggesting that cost structures are broadly similar across locations, with only minor variations attributable to local conditions and input accessibility.

Level of Dependency on Credit: This specific percentage outlines exactly how many rupees of loan are utilised for every 100 units of currency spent on farming operations.

Across farm-sizes, marginal farmers show dependency levels ranging from 62 to 67 percent, whereas small farmers record comparatively higher levels, ranging from 68 to 72 percent. The findings indicate a high level of dependency on credit across all farm size categories and villages. On average, nearly two-thirds of the total cost of agricultural cultivation is financed through credit funds. This highlights the critical importance of credit in sustaining agricultural production in the study area. The degree of dependency shows a marginal increase with farm size, implying that medium or large farmers tend to rely more on external financing to support their higher scale of operations. However, marginal farmers also exhibit substantial reliance on credit, underscoring their limited capacity to finance production through their own resources. The consistency of credit dependency across villages suggests that this is not an isolated phenomenon but rather a structural characteristic of the agricultural economy in the region.

Level of Dependency on Formal Credit: At the village level, overall formal credit dependency ranges from 26 percent to 30 percent with an aggregate level of 29 percent. Despite the significant reliance on credit, the share of formal credit in the total cost of production remains relatively low. Across all farm sizes and village, formal sources account for only a limited proportion of total financing requirements. Small and medium farmers demonstrate relatively higher access to formal credit compared to marginal farmers, reflecting differences in institutional connectivity, collateral availability, and financial awareness. However, even among these categories, formal credit falls short of meeting the total credit requirements. The village-level aggregates further confirm that formal financial institutions, while present, are not the dominant source of agricultural finance. This limited penetration indicates constraints in the outreach and effectiveness of institutional credit systems.

Formal Credit Deficit: One of the most significant findings of the analysis is the presence of a substantial formal credit deficit across all farm sizes and villages, with values ranging between 37 and 39 percent across the study area.

The deficit expressed as a percentage of the cost of production remains consistently high, indicating that a large portion of the credit requirement is unmet by formal credit sources. The deficiency of formal loans happens across all farm sizes. At the aggregate level, the formal-credit deficit is 39 percent for marginal farmers, 38 percent for small farmers, 38 percent for medium farmers and 38 percent overall. This shows that the banks do not lend enough and the shortage affects everyone, meaning the banking network itself is flawed. So, this situation forces farmers into debt traps by borrowing loan from informal sources at the high interest rate & unfair terms. This almost uniform pattern assures that the rural banking system is broken at a fundamental level, rather than it being a localised problem with specific villages.



Interrelationship between Cost, Credit Dependency and Credit Deficit: The relationship between cost structure and credit dependency reveals that higher production cost are closely associated with increased reliance on credit. However, the inability of formal sources to adequately lend these costs results in a widening credit gap. This imbalance creates a dual financial structure in which formal and informal sources coexist. While formal credit contributes to reducing the cost burden, its limited availability necessitates supplementary borrowing from informal sources, thereby increasing the overall financial vulnerability of farm households.

The observed patterns have several important economic implications. Limited formal credit penetration suggests inefficiencies in institutional credit systems, potentially restricting investment in productivity-enhancing inputs. Persistent credit deficit leads to increased dependence on informal sources, which may raise the effective cost of cultivation and reduce net farm income. It is worth mentioning that the findings insist the need for strengthening the institutional credit framework to address the gap between credit demand and supply. Enhancing the accessibility, adequacy, and timeliness of formal credit can reduce reliance on informal sources. Particular attention needs to be given to marginal farmers, who, despite their high dependency on credit, face greater constraints in accessing formal finance. Expanding outreach through cooperative institutions, simplifying loan procedures, and increasing credit limits may contribute to bridging the existing gap.

Descriptive Statistics of Variables Used in the Probit Model for Access to Formal Credit

The table 5.4.4 displays the expected positive relationship of total land owned, asset value, irrigation, non-farming income and cropping intensity with access to institutional credit is based on their role or importance in enhancing repayment capacity and diminishing default risk. Large and more resource-endowed farmers are more likely to meet formal lending criteria. Land quality, when defined in terms of low quality land, is expected to negatively influence credit access as it reduces productivity and income stability. Similarly caste is expected to have a negative sign due to social economic disadvantages and institutional barriers faced by marginalised groups. Education is expected to positively influence access to institutional loans by improving awareness, financial literacy, and ability to access institutional procedures. The adoption of HYV seeds and higher cropped areas indicate commercialisation, which enhances credit demand and access. Family size is expected to negatively affect credit access due to higher consumption burden, whereas a higher workers ratio improves income-generating capacity and thus positively influences credit access. The effect of age is ambiguous, as experience may enhance creditworthiness, while older age may reduce borrowing capacity.

Analysis of Results of Descriptive Statistics of Probit Model

The descriptive statistics of the variables included in the Probit model give significant insights into the socio-economic characteristics of the sample households and their access to formal credit. The mean value of the dependent variable shows that a substantial proportion of households have access to institutional credit, suggesting that formal financial institutions have a notable presence in the study area. However, the observed standard deviation indicates considerable variation across households, employing unequal access to formal credit. It is worthy to mention that approximately 70% of the sampled households have access to formal agricultural credit. The farm-size categories indicate a considerably higher proportion of agricultural credit access among households within villages.

The average size of landholdings or Total Land Owned (TLO) remains relatively small, confirming the domination of marginal farmers in the study area. This structural characteristic indicates the prevalence of fragmented and scattered land holdings, and limited asset ownership, which hinders the capacity of farmers to invest in productive activities as the overall mean land owned is 1.32 acres, with a standard deviation of 0.78 acres. The variation in land holding size further suggests heterogeneity or differential features among households, indicating that while some farmers possess relatively larger holdings, the majority operate under constraint conditions.

The mean value of Land Quality (LQ) is 0.58, indicates that a significant proportion of farmers cultivate low-quality land, which negatively affects agricultural productivity and stability of income. The variability in land quality shows distinction in resource endowment across households, which in turn affects their ability to access formal credit. Households with lowland are likely to face higher limitations in squealing or accessing institutional credit due to perceived higher risk and uncertainty. The mean Asset Value (AV) excluding land (₹58,500) of households indicates a recognisable level of capital formation, while the relatively high standard deviation indicates inequality or dispersion in asset distribution. This disparity shows that access to formal credit is likely to be concentrated among relatively better-off households with higher asset ownership.

The share of income from non-farm activities suggests that households have partially diverse or varied earning sources, which curtails dependence on agriculture and escalates financial stability. The mean of the Share of Income from own farm activity to Total Family Income (SITFI) is 0.31, suggesting that approximately 31% of total household income comes from own-farm activities. However, variation in this variable indicates that diversification is not uniform across the sample. The



overall mean value of Percentage of Irrigated Area to GCA or PIAGCA (52.40%) with a standard deviation of 18.6% shows moderate access to irrigation facilities, which is a critical indicator of agriculture productivity and income stability. The observed variability indicates unequal distribution of irrigation equipment, which may influence differences in credit access across households. The caste composition of the sample implies a substantial presence of socially disadvantaged groups, indicating the social economic structure of the region. The caste dummy has an overall average of 0.62, implying that 62% of the sampled borrowers belong to the SC or ST categories.

The Education level among Borrowers (EB) remains relatively low, implying limited human capital development and financial awareness. The overall mean of the education dummy variable is 0.38, meaning that about 38% of borrowers have education at the 10th standard or above. The variation in education levels suggests inequalities in access to information and institutional services. The overall mean Gross Cropped Area under Rice (GCAR) is 1.05 acres, with a standard deviation of 0.62 acres. The extent of GCAR and the adoption of High Yielding Variety (HYV) seeds indicate moderate levels of agriculture intensification, although differences across households highlight differences or variations in technology adoption and investment capability. The overall mean area under HYV seeds is 0.68 acre, with a standard deviation of 0.41 acre. The average Age of Borrowers (AB) is 45.6 years, with a standard deviation of 11.20 years, indicates a mature farming population and moderate variation in the age of the borrowers, suggesting that farming decisions are largely adopted by experienced peasants. However, the variation indicates the existence of both younger and older farmers and the farmers in the relatively larger farm-size groups are comparatively younger than the overall sample (AB for marginal farm is 43.8 years and AB for small farm is 42.5 years). Family Size of the Borrowers (FSB) is moderately high, which enhances consumption requirements and may decrease the availability of surplus funds or credit for productive investment in agriculture. The overall mean family size is 5.3 members, with a standard deviation of 1.6 members, indicating sampled farmers belong to moderately sized households. In contrast, the mean value of Ratio of Workers to Family Members (RWFm) is 0.61, with a standard deviation of 0.15, implies a reasonable level of labour availability within households, which positively contributes to income generation.

Overall, the descriptive statistics reveal that access to formal credit is influenced by a combination of socio-economic and demographic factors. The observed patterns suggest that households with better resource endowment, greater income stability and improved human capital are more likely to access institutional or formal credit, while those with limited resources and social economic disadvantages face higher constraints in accessing credit from the formal sources.

Factors Influencing Access to Formal Credit across Villages: Results of the Probit Regression Model

The table 5.4.5 demonstrates the factors which influence farmers' access to formal credit tested using a Probit regression model, where the dependent variable is binary in nature (1,0), taking the value of one if a farmer has access to formal credit and zero otherwise. The model estimates separately for each village and for the pooled sample in order to identify the socio-economic, demographic and farm specific factors affecting formal credit access. The adequacy and predictive performance of the model are assessed by using several goodness of fit statistics. These indicators together provide empirical evidence regarding the explanatory power, statistical significance and predictive accuracy of the estimated Probit model. The values of Max-Rescaled R² indicate that the explanatory variables included in the model account for a substantial proportion of the variation in farmers' access to formal credit and the relatively high R² values indicate a satisfactory fit of the model and depict that the selected variables are capable of explaining distinctions in credit availability among farmers across the study area. A sharp decline in the value of -2Log Likelihood after including the explanatory variables is the evidence of improvement in the model fit. The Likelihood Ratio (LR) Chi-Square statistics are positive and relatively large, indicating that the full model performs significantly better than the intercept-only model. Thus, the null hypothesis that all explanatory variables jointly have no effect on access to formal credit is rejected. This confirms the overall statistical significance of the Probit model. The predictive ability of the model is reflected in the Percent Concordant values and for the pooled sample, the model correctly predicts 81.80 percent of the observations. Such high concordant values suggest strong classification accuracy and indicate that the model possesses substantial predictive capability in differentiating between farmers who have access to formal credit and those who do not.

IV. RESULT ANALYSIS

The results of the Probit model presented in the table no. 5.4.5 estimating the determinants of farmers' access to institutional credit across eight villages of Sepahijala and South Tripura districts. The dependent variable is binary in nature (1,0), taking the value of one if a farmer has access to formal credit and zero otherwise. The coefficient indicates the direction of influence, while the Wald Chi-Square statistics estimate the statistical significance and relative contribution of each explanatory variable in calculating access to formal credit. The intercept is negative and statistically significant in all villages implies that in the absence of favourable socio-economic and farm-related features, the probability of getting formal credit remains low.

Total Land Owned (TLO) appeared as one of the most significant determinants of formal credit access across all villages, and its positive and highly significant coefficient



implies that farmers possessing higher operation holdings are more likely to obtain formal credit. The coefficient ranges from 0.804 to 0.936, while the pooled coefficient is 0.886. The consistent high Wald Chi-Square values indicate that land ownership is a strong explanatory factor in the credit approval process. The coefficient of Land Quality (LQ) is positive and statistically significant in almost all villages but relatively weak and less consistent statistical connection to formal credit access and the corresponding Wald Chi-Square statistics suggest that land quality contributes importantly to the explanation of credit access. The coefficient ranges from 0.392 to 0.488, while the pooled coefficient is 0.446. The finding indicates that farmers having better quality land, the better opportunity of getting the access of institutional credit as superior land quality improves agriculture productivity and reduces production risk. Asset Value excluding land (AV) demonstrates a positive and significant influence on access to formal credit throughout the study area and the value of

Wald Chi-Square statistics show that this variable is an important determinant in the model. The coefficient ranges from 0.688 to 0.804, while the pooled coefficient is 0.764. The Wald statistics range from 5.08 to 5.95, with a pooled value of 6.36. Such result indicates that household possessing higher value assets are more likely to have formal credit. The estimated coefficient for the Share of Non-Farm Income (SITFI) is positive across villages and significant in most cases. The value of Wald statistics show moderate explanatory power. This result indicates that diversification of household income sources improves access to formal credit. Therefore, additional income sources reduce the probability of loan default. Among all the independent variables, irrigation intensity appears as one of the strongest positive factor of formal credit access. The coefficients are consistently positive and highly significant, while the Wald Chi-Square values are among the highest observed in the model.

1.4.1 Distribution of Borrowers across Farm Sizes and Villages

Categories	Village-1				Village-2				Village-3			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All	Marginal	Small	Medium	All
Total Household	28	7	0	35	14	4	2	20	66	10	1	77
% of Farm Households in each Category from Total Samples	7.6	1.9	0	9.5	3.8	1.1	0.5	5.4	17.8	2.7	0.3	20.8
All Borrowers	18	6	0	24	10	4	2	16	45	9	1	55
% of Borrowers to Total Households	64	86	0	69	71	100	100	80	68	90	100	71
Informal Borrowers	12	3	0	15	6	2	1	9	30	5	1	36
% of Informal Borrowers to Total Households	43	43	0	43	43	50	50	45	45	50	100	47
No. of Formal Borrowers taking Informal Loans	5	2	0	7	3	1	1	5	12	3	0	15
% of Formal Borrowers taking informal loans	28	33	0	29	30	25	50	31	27	33	0	27



Categories	Village-4				Village-5				Village-6			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All	Marginal	Small	Medium	All
Total Household	46	0	0	46	50	3	0	53	45	1	0	46
% of Farm Households in each Category from Total Samples	12.4	0	0	12.4	13.5	0.8	0	14.3	12.2	0.3	0	12.4
All Borrowers	30	0	0	30	34	3	0	37	31	1	0	32
% of Borrowers to Total Households	65	0	0	65	68	100	0	70	69	100	0	70
Informal Borrowers	20	0	0	20	22	2	0	24	20	1	0	21
% of Informal Borrowers to Total Households	43	0	0	43	44	67	0	45	44	100	0	46
No. of Formal Borrowers taking Informal Loans	8	0	0	8	9	1	0	10	8	0	0	8
% of Formal Borrowers taking informal loans	27	0	0	27	26	33	0	27	26	0	0	25

Categories	Village-7				Village-8				Village-ALL			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All	Marginal	Small	Medium	All
Total Household	40	1	0	41	50	2	0	52	339	28	3	370
% of Farm Households in each Category from Total Samples	10.8	0.3	0	11.1	13.5	0.5	0	14.1	91.6	7.6	0.8	100
All Borrowers	27	1	0	28	36	2	0	38	231	26	3	260
% of Borrowers to Total Households	68	100	0	68	72	100	0	73	68	93	100	70
Informal Borrowers	18	1	0	19	24	1	0	25	152	15	2	169
% of Informal Borrowers to Total	45	100	0	46	48	50	0	48	45	54	67	46



Households												
No. of Formal Borrowers taking Informal Loans	7	0	0	7	10	1	0	11	62	8	1	71
% of Formal Borrowers taking informal loans	26	0	0	25	28	50	0	29	27	31	33	27

1.4.2 Distribution of Formal Loans across Farm Sizes and Villages

Category	Village-1				Village-2				Village-3				Village-4				Village-5			
	M	S	Me	All	M	S	Me	All	M	S	Me	All	M	S	Me	All	M	S	Me	All
% Share of Formal to Total Borrowings	33	50	0	38	40	50	50	44	33	44	0	35	33	0	0	33	35	33	0	35
% Share of Formal Credit Availed by the Groups of Farm to Total Formal Credit	56	44	0	100	43	29	28	100	60	32	8	100	100	0	0	100	70	30	0	100

Category	Village-6				Village-7				Village-8				Village-ALL			
	M	S	Me	All	M	S	Me	All	M	S	Me	All	M	S	Me	All
% Share of Formal to Total Borrowings	35	0	0	35	33	0	0	33	33	50	0	34	32	42	33	34
% Share of Formal Credit Availed by the Groups of Farm to Total Formal Credit	100	0	0	100	100	0	0	100	69	31	0	100	66	23	11	100
Note: M, S and Me stand for Marginal, Small and Medium respectively																

1.4.3 Analysis of Level of Dependency on Credit across Farm Sizes and Villages

Category	Village-1				Village-2				Village-3				Village-4				Village-5			
	M	S	Me	All	M	S	Me	All	M	S	Me	All	M	S	Me	All	M	S	Me	All
Cost per	100	108	0	103	102	110	115	106	98	106	112	101	101	0	0	101	99	107	0	102



Acre (%)																				
Cost Per Farm (%)	28	34	0	30	26	32	42	30	25	30	38	27	27	0	0	27	26	31	0	28
Level of Dependency on Credit (%)	62	68	0	64	65	70	72	67	63	69	71	65	64	0	0	64	66	71	0	67
Level of Dependency on Formal Credit (%)	24	30	0	26	26	32	35	29	25	31	34	27	26	0	0	26	27	33	0	29
38Formal Credit Deficit as % of Cost of Production per Acre/ Farm	38	38	0	38	39	38	37	38	38	38	37	38	38	0	0	38	39	38	0	38

Category	Village-6				Village-7				Village-8				Village-ALL			
	M	S	Me	All	M	S	Me	All	M	S	Me	All	M	S	Me	All
Cost per Acre (%)	100	108	0	103	97	105	0	100	102	109	0	105	100	108	113	104
Cost Per Farm (%)	25	30	0	27	24	29	0	26	27	33	0	29	26	31	40	29
Level of Dependency on Credit (%)	65	70	0	66	64	69	0	65	67	72	0	68	65	70	72	67
Level of Dependency on Formal Credit (%)	26	32	0	28	25	31	0	27	28	34	0	30	26	32	34	29
Formal Credit Deficit as % of Cost of Production per Acre/ Farm	39	38	0	38	39	38	0	38	39	38	0	38	39	38	38	38

1.4.4 Factors Influencing Access to Formal Credit- Descriptive Statistics of Probit Model

	V-1	V-2	V-3	V-4	V-5	V-6	V-7	V-8	V-ALL	Small	Medium	Exp Sign
Variable Description	AM & SD	AM & SD	AM & SD	AM & SD	AM & SD	AM & SD	AM & SD	AM & SD	AM & SD	AM & SD	AM & SD	
Dependent Variable Access to Formal Credit: =1, if yes =0, otherwise	0.69 (0.47)	0.80 (0.40)	0.71 (0.45)	0.65 (0.48)	0.70 (0.46)	0.70 (0.46)	0.68 (0.47)	0.73 (0.44)	0.70 (0.46)	0.93 (0.25)	1.00 (0.00)	-
TLO: Total Land Owned	1.25 (0.72)	1.48 (0.85)	1.36 (0.80)	1.10 (0.60)	1.40 (0.82)	1.28 (0.75)	1.22 (0.70)	1.50 (0.88)	1.32 (0.78)	2.45 (0.65)	3.80 (0.70)	+



(in acres)												
LQ: Land Quality =1, for low quality of land =0, otherwise	0.61 (0.49)	0.55 (0.50)	0.57 (0.49)	0.64 (0.48)	0.56 (0.50)	0.59 (0.49)	0.60 (0.49)	0.54 (0.50)	0.58 (0.49)	0.42 (0.49)	0.33 (0.47)	-
AV: Asset Value (in Rs.) excluding Land	52300 (18500)	61200 (22100)	59700 (20900)	48600 (16200)	60800 (21700)	56900 (19800)	53700 (18900)	63500 (23400)	58500 (21300)	92400 (18600)	135000 (22500)	+
SITFI: Share of Income (excluding own farm activity) to Total Family Income (in Rs.)	0.28 (0.13)	0.33 (0.15)	0.32 (0.14)	0.26 (0.12)	0.32 (0.14)	0.30 (0.13)	0.29 (0.13)	0.34 (0.15)	0.31 (0.14)	0.38 (0.16)	0.42 (0.18)	+
PIAGCA: % of Irrigated Area to GCA	48.2 (17.4)	55.6 (19.2)	53.8 (18.7)	46.5 (15.3)	54.2 (19.1)	51.6 (18.2)	49.8 (17.6)	57.9 (20.3)	52.4 (18.6)	68.5 (15.2)	75.2 (12.8)	+
Caste: =1, if borrower belongs to SC or ST =0, otherwise	0.66 (0.47)	0.60 (0.49)	0.63 (0.48)	0.68 (0.47)	0.61 (0.49)	0.62 (0.48)	0.65 (0.48)	0.59 (0.49)	0.62 (0.48)	0.48 (0.50)	0.40 (0.49)	-
EB: Education of the Borrower =1, for 10 th & above =0, otherwise	0.34 (0.47)	0.41 (0.49)	0.37 (0.48)	0.29 (0.45)	0.39 (0.49)	0.36 (0.48)	0.33 (0.47)	0.42 (0.49)	0.38 (0.49)	0.57 (0.50)	0.67 (0.47)	+
GCAR: GCA under Rice (in acre)	0.98 (0.58)	1.12 (0.64)	1.07 (0.63)	0.90 (0.52)	1.08 (0.63)	1.03 (0.60)	0.99 (0.58)	1.15 (0.66)	1.05 (0.62)	1.85 (0.58)	2.60 (0.70)	+
AHYVS: Area under HYV Seeds (Rice)	0.63 (0.39)	0.72 (0.42)	0.69 (0.41)	0.58 (0.37)	0.70 (0.42)	0.66 (0.40)	0.64 (0.39)	0.74 (0.43)	0.68 (0.41)	1.20 (0.45)	1.75 (0.55)	+
AB: Age of the Borrowers (in years)	46.2 (10.8)	44.8 (11.5)	45.2 (11.0)	47.0 (10.5)	45.5 (11.3)	55.8 (11.1)	46.5 (10.7)	44.6 (11.4)	45.6 (11.2)	43.8 (10.6)	42.5 (9.8)	+
FSB: Family Size of the Borrowers (in Nos.)	5.5 (1.7)	5.1 (1.5)	5.4 (1.6)	5.7 (1.8)	5.3 (1.6)	5.4 (1.7)	5.6 (1.7)	5.2 (1.5)	5.3 (1.6)	4.8 (1.4)	4.5 (1.2)	-
RWFM:	0.59	0.63	0.61	0.57	0.62	0.60	0.59	0.63	0.61	0.68	0.72	+



Ratio of Workers to Family Members	(0.14)	(0.16)	(0.15)	(0.13)	(0.15)	(0.14)	(0.14)	(0.16)	(0.15)	(0.13)	(0.12)	
NB: No. of Observations	35	20	77	46	53	46	41	52	370	28	339	

Note: The value of Standard Deviation or SD is kept in the parenthesis

The coefficient of Percentage of Irrigated Area to GCA (PIAGCA) ranges from 1.182 to 1.364, while the pooled coefficient is 0.764. The Wald statistics range from 7.74 to 8.86, with a pooled value of 9.52. Thus, irrigation emerges as a particularly strong and consistent determinant of formal credit access in the study area. Sound irrigation system reduces production uncertainty, stabilises farm income, and increases productivity, making farmers more attractive to formal sources. Moreover, the caste variable shows a negative and statistically significant relationship with formal credit access in most villages, indicating that households belonging to socially disadvantaged groups (SC-ST) experience comparatively lower access to formal credit. Similarly, Education of the Borrower (EB) has a positive coefficient in all villages and in the pooled model. The coefficient varies between 0.864 and 1.014, while the pooled coefficient is 0.958, so, education has a positive and highly significant effect on the access to formal credit across all villages. The Wald statistics are consistently high, ranging from 6.02 to 7.12, with 7.88 for the pooled model. The relatively high Wald statistics suggest that this variable is one of the most important socio-economic determinants in the model. It is to be noted that educated farmers possess better awareness of loan procedure, required documents, government schemes, and banking services. Therefore, higher educational attainment improves the probability of having formal loans.

The coefficient of Gross Cropped Area under Rice (GCAR) is positive and significant, indicating that farmers cultivating greater paddy areas generally require greater working capital for production activities and they can access more formal credit in Tripura. The Wald Chi-Square values also indicate that this variable contributes substantially to the explanatory power of the model.

Beside these, the coefficient of Area under HYV Seeds (AHYVS) is positive and highly significant throughout the villages, and the Wald Chi-Square statistics (ranges from 6.96 to 8.04, reaching 8.84 in the pooled model) indicates strong explanatory power, suggesting that adoption of modern seed technology is closely related to formal credit access. It is worthy to mention that the age variable or Age of the Borrower (AB) shows a negative relationship with access to formal credit, although its statistical significance varies across selected villages, the overall performance remains consistent. The Wald Chi-Square statistics suggest a relatively weaker influence. The result indicates that young farmers are relatively more likely to access formal credit in the study areas, because of their willingness to adopt more modern technology, maintain banking

relationships. Focusing on the Family Size of the Borrower (FSB) it is observed that the coefficient is negative and statistically significant, indicating that larger households may face greater consumption burdens and financial pressures, which could reduce that perceived repayment capacity, as a result, they are getting less opportunities for the excess of formal credit. Lastly, the coefficient of the Ratio of Workers to Family Members (RWFM) is positive and statistical is significant across all the villages. The coefficients range from 0.612 in V-4 to 0.724 in V-3, with a pooled coefficient of 0.682. The Wald Chi-Square statistics depicts that this variable contributes meaningfully to the model. The result suggests that households belonging to more earning members are more likely to access formal credit.

The Probit regression analysis provides important insights into the factors determining farmers' access to formal credit across the study areas. The results clearly show that access to formal credit is not influenced by a single factor; rather, it is affected by a combination of farm resources, household characteristics, socio-economic conditions, and technological factors. Among all determinants, irrigational status, education level, HYV adoption and land ownership considered as the most influential factors, as reflected by their consistently high coefficient and Wald Chi-Square statistics. Overall, the study concludes that access to formal agriculture credit is strongly associated with the economic strength, productive assets, technological advancement and educational status of farming households.

Factors Influencing Access to Formal Credit across Farm-Size Groups: Results of the Probit Regression Model

In order to obtain a comprehensive knowledge of the determinants of farmers' access to formal credit, the present study estimates two separate Probit models: one across villages and another across farm size categories, shown in table 5.4.6. Both the models are very necessary because access to formal credit is affected or influenced not only by household-level characteristics but also by area-specific factors. The estimation of both farm size category and village-wise, Probit model therefore provides a more robust analytical base. While the farm size model highlights the role of household resource endowment and socio-economic features, the village-level model captures the influence of locational and infrastructural factors. Moreover, the uses of separate models also improve the precision of policy recommendations.



The adequacy and predictive performance of the Probit model can be assessed using the statistics, namely Max-Rescaled R², -2Log Likelihood (intercept only), -2Log Likelihood (intercept and covariates), Likelihood Ratio Chi-Square, and Percent Concordant. These statistics together indicate the explanatory power, goodness-of-fit and predictive accuracy of the estimated models. For the present study, the values of Max-Rescaled R² represent that the explanatory variables incorporated in the model possess substantial power in explaining variations in farmers' access to formal credit. The increasing trend in Max-Rescaled R² from marginal to small farmers indicates that the selected explanatory variables are more effective in explaining formal credit availability among large farm categories. The values of -2Log Likelihood for the intercept only for the different farm categories represent the baseline model where no explanatory variables are included and the probability of obtaining formal credit is explained only by the constant term. After introducing explanatory variables, the values of -2Log Likelihood (intercept and covariates) decline substantially, indicating that the explanatory variables significantly improve the ability of the model to predict access to formal credit. The sharp reduction demonstrates that factor such as land ownership, irrigation, education, asset value, HYV adoption, and labour accessibility contribute meaningfully to analysing institutional or formal credit availability. In Probit model, lower values of -2Log Likelihood suggests a better fitting model. The Likelihood Ratio (LR) Chi-Square tests the null hypothesis that all explanatory variables jointly have no effect on access to formal credit. The relatively large Likelihood Ratio (LR) values suggest that the inclusion of explanatory variables significantly improves the explanatory power of the model. Hence, the null hypothesis can be rejected, employing that the selected socio-economic and farm-specific variables together influence farmers' access to formal credit. Percent Concordant measures the predictive accuracy of the model by indicating the proportion of observations that are correctly classified by the estimated probabilities.

The Wald Chi-Square statistic is calculated for both marginal and small farmer categories to test the statistical significance of individual explanatory variables in the Probit model. The Wald Chi-Square statistics therefore help identify which factors significantly affect access to formal credit within each farm-size group and facilitate comparison of their relative contributions across farm categories. There is no predetermined optimal range for the Wald Chi-Square statistic in a Probit model. The statistic is primarily used to test the significance of individual explanatory variables. Higher values indicate stronger evidence against the null hypothesis that the coefficient is equal to zero.

Results of the Probit Model: Factors Affecting Access to Formal Credit across Farm Sizes

The results of the Probit model has been estimated in the table number 5.4.6 for marginal and small farm households

to identify the determinants of access to formal credit. The coefficient of Total Land Owned (TLO) is positive and statistically significant for both marginal farm (0.764) and small farm (0.948), and the corresponding Wald Chi-Square value (9.48 for marginal and 10.26 for small) is among the highest in the model, suggesting that land ownership is one of the most crucial determinants of access to formal credit for both marginal and small farmers. The positive sign suggests that the farmers possessing large operational holdings are more likely to borrow formal credit because land serves as an indicator of repayment capacity and collateral security.

Land Quality (LQ) also shows a positive and significant influence on formal credit availability (0.388 for marginal and 0.462 for small) and the value of Wald statistic confirms its contribution to the model. The result shows that farmers possessing better quality land enjoy greater access to formal credit because higher land productivity improves expected income. The coefficient of Asset Value excluding land (AV) is positive and significant, indicating that farmers having higher level of productive assets are generally considered less risky borrowers by banking institutions. The Wald Chi-Square value (5.30 for marginal and 5.64 for small) suggests that asset ownership as an important role in increasing institutional credit access for all farm categories. The coefficient of Share of Income from Non-Farms Sources to Total Family Income (SITFI) is positive and highly significant (0.504 for marginal and 0.628 for small), suggesting that income diversification strengthens payment capacity and improves more accessibility for formal credit and the value of Wald statistic (3.64 for marginal and 4.52 for small) indicates a moderate contribution to the model. Among all explanatory variables, Percentage of Irrigated Area to Gross Cropped Area (PIAGCA) has been one of the most important determinants of formal credit availability. The Wald statistic further assures its strong explanatory power (8.32 for marginal and 8.84 for small). Irrigation curtails production risk and enhances agricultural productivity, thereby encouraging financial institutions to extend credit. The coefficient of Caste Dummy Variable (=1 if SC-ST, and =0 otherwise) is negative and significant for all farm sizes (-0.748 for marginal and -0.586 for small), indicating that farmers belonging to SC and ST face relatively lower access to formal credit compared with other social groups. The Wald Chi-Square value (4.78 for marginal and 3.42 for small) suggests that caste remains an important determinant of formal credit access for both marginal and small farmers. Education of the Borrowers (EB) has a positive and highly significant coefficient (0.914 for marginal and 1.046 for small). The Wald Chi-Square statistic indicates a strong contribution to the model. The efficient suggests that educated farmers are more of banking proceedings, credit benefits and required documents, thereby increasing their probability of getting formal loans. The coefficient of Gross Cropped Area under Rice (GCAR) is also positive and significant (0.722 for marginal and 0.884 for small), indicating that the farmers



having larger rice cultivating land request huge working capital and therefore maintain a stronger linkage with formal credit sources. Similarly, Area under HYV Seeds (AHYVS) is one of the strongest determinants of formal credit availability. It has the positive and significant coefficient (1.084 for marginal and 1.286 for small) and representing farmers adopting HYV technology typically requires big investment in related inputs and therefore depend on ample amount of formal credit. The coefficient of Age of the Borrower (AB) is negative and significant (-0.042 for marginal and -0.036 for small), although the Wald statistic is moderate (2.96 for marginal and 2.64 for small), the result indicates that young farmers are more likely to access formal credit, possibly due to higher willingness to embrace with new technology and deal with formal credit. Family Size of the Borrower (FSB) depicts a negative and significant coefficient, implying that greater family size of the borrower face relatively lower access to formal credit, perhaps, higher household consumption burdens reduce perceived repayment capacity. Last but not the least, the coefficient of Ratio of Workers to Family Members (RWFm) is positive and significant along with a better statistic of Wald Chi-Square, indicating that labour availability within the household increases repayment prospects and consequently improves access to formal credit.

However, the results demonstrate that access to formal credit among marginal and small farmers is primarily determined by land ownership, irrigation intensity, educational attainment, HYV adoption, asset ownership and labour availability. All these factors positively affect the probability of obtaining formal credit by strengthening the productive and repayment capacity of farm households. Conversely, caste, age and family size negatively influence access to formal loan. A comparison between marginal and small farmers further reveals that the direction of influence remains greatly similar across farm sizes. However, the magnitude of coefficients and Wald statistics is generally higher among small farmers, indicating that the impact of resource endowment and productive features on formal credit access becomes stronger as farm size increases.

V. CONCLUSION

This chapter has analysed the extent, distribution and determinants of farmers access to formal agricultural credit in the selected villages of Tripura. The findings show that credit plays an important role in sustaining agricultural production, as approximately 70.2% of the sample households are active borrowers. However, the dominance of marginal farmers (92%) reflects the highly fragmented nature of the agrarian structure in the study area.

Although formal credit reaches a recognisable number of farmers, its share in total borrowing remains limited. Formal sources account for only about 34% of total borrowings, while the remaining share is obtained from informal sources. An evidence among marginal farmers is

the dependence on money lenders has been continued in the study area. Moreover, 71 households reported borrowing from both formal and informal sources, indicating that formal credits are often insufficient to meet the complete financial requirements of agricultural households. So, access to formal credit does not necessarily imply adequate credit availability.

The analysis of credit dependency further confirms this gap. The borrowed funds finance nearly two-third of the cost of cultivation, whereas formal credit cards only around 29% of total cultivation costs. Consequently, institutional credit deficit remains high at approximately 38% across farm sizes and villages. This shortcomings or deficiency of formal credit often forces farmers to rely on informal credit at higher interest rates and under unfavorable conditions.

It is worthy to note that resource endowment, productive capacity and institutional preparedness become increasingly important as farm size increases. The findings also indicate that marginal farmers remain the most vulnerable group, despite receiving the largest aggregate share of formal credit. The chapter concludes that a formal agricultural credit system in the study area has expanded but remains inadequate, uneven and insufficiently inclusive. Special attention should be given to marginal farmers, SC-ST households, farmers cultivating poor-quality or non-irrigated land, and those with limited education and assets.

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