**Assessment of Financial Literacy of Farmers and its Impact on Farm Financial Management: Heckman Two-Stage Model**

**Abstract**

In India, financial education is essential due to the widespread low literacy rates and the significant portion of the population that remains excluded from the formal financial system. The present study assessed farmers' financial literacy and its impact on farm financial management. A sample of 120 respondents was collected from the Madurai district. The Heckman selection two-stage model was employed to analyze the study results. The study revealed that factors like age, education, experience, size of landholdings, relationship with bank, frequency of bank visits, and ownership of a bank account had significant and positive influences on planning financial literacy. In the second stage of the model, age, education, experience, size of landholdings, relationship with the bank, frequency of bank visits and owning a bank account significantly influenced the adoption of financial planning. It is concluded that the increased knowledge of financial planning enhanced the adoption of financial planning.

**Keywords:** Financial literacy**,** financial planning, Heckman selection model

**Introduction**

Financial education is considered important in India because the literacy level is low and a large section of the population lacks access to formal financial institutions (Nash, 2012). For this purpose, the Reserve Bank of India (RBI) launched a new initiative called “Project Financial Literacy" in 2007. About 51 per cent of farmers are financially excluded and do not have formal access to credit; only 27 per cent have access to formal credit. The situation is even more critical in the Central, Eastern and Northeastern regions, where 64 per cent of farmers are not included in the economy (NABARD 2008).

Financial literacy refers to the capacity to grasp and apply essential financial principles and tools, such as budgeting, saving, investing, managing credit, and making informed financial decisions. It enables individuals to effectively handle both personal and business finances, guiding them toward sound financial choices.

 In a rapidly evolving economic landscape, the importance of financial literacy continues to grow. It supports individuals in setting and achieving long-term financial objectives, steering clear of unmanageable debt, maintaining financial stability, and dealing with unexpected financial situations. For vulnerable groups like rural communities, farmers, and small entrepreneurs, financial literacy is especially crucial as it strengthens their financial security and helps them access formal financial services.

Fostering financial literacy benefits not just individuals, but society as a whole. It promotes inclusive financial participation, reduces poverty, and contributes to sustainable economic development. As financial systems become more digital and complex, the ability to navigate them responsibly is essential for everyone.

Financial literacy involves the capability to comprehend and effectively apply financial concepts such as money management, budgeting, investing, saving, and evaluating financial services and products. It empowers individuals to make sound and responsible financial decisions. In an increasingly complex global economy, financial literacy is not only important for individual financial health but also plays a key role in ensuring the economic stability of families and communities. For groups like farmers, small business owners, and entrepreneurs, having financial knowledge supports better decision-making in areas such as resource use, managing financial risks, and planning for long-term goals. As financial systems grow more sophisticated and interconnected, fostering financial literacy becomes crucial for building resilient and inclusive economies.

Financial literacy refers to comprehending essential financial concepts and skills, including taxation, borrowing, investing, budgeting, and handling financial transactions. The absence of this understanding is termed financial illiteracy. Gaining financial knowledge is crucial as it equips individuals to manage their income, expenses, and debt efficiently. Being financially literate enhances farmers' capacity to grasp and apply various financial tools and principles, enabling them to handle farm finances more effectively and with greater confidence (Anjana *et al.,* 2024).

Financial literacy includes both an individual's understanding of financial concepts such as an entrepreneur or owner-manager and their ability to apply this knowledge in managing business finances, including tasks like budgeting and evaluating capital investments (*Nolan et al.,*2024).

Financial literacy positively influences both short-term (liquid) and long-term (fixed) investments. However, these effects differ among farmers depending on factors such as the size of their farmland and whether they have purchased insurance. Risk preferences act as a mediating factor in the relationship between financial literacy and both types of investments, while time preferences influence only the link between financial literacy and fixed investments. Consequently, enhancing financial education in rural regions is essential. It is also important to consider the varying investment intentions of different farmer groups, strengthen their ability to manage risks and improve their patience for long-term returns, ultimately encouraging greater agricultural investment (Liu *et al.,* 2024 ).

Various formal institutions such as community Co-operatives, Regional Rural Banks (RRBs), Scheduled Commercial Banks (SCBs), Non– non-banking financial Institutions (NBFIs), and Self-help Groups (SHGs) are working to meet the short- and long-term needs of the farmers. Various measures have been taken to empower rural people, make credit institutions more effective and improve farmers' access to credit institutions. A larger proportion of farmers in India are resource-poor and marginalized (Datta *et al.,* 2012). These groups are certainly vulnerable to further economic downturns. Moreover, without good banking relationships, poor groups are forced to opt for expensive options. Financial literacy can help people plan for life’s needs in advance and cope with unexpected debt.

The complexity of financial management requires businesses, small and medium-scale enterprises and family businesses to have separate offices or staffs to manage finances (Gitman, 2011). When it comes to agriculture, the economics of Indian agriculture requires farmers to be entrepreneurs. As an agricultural entrepreneur, financial management is very important because farm finance has always been an important factor in farming (Kumar et al., 2010). Agricultural development requires a timely and adequate supply of agricultural inputs. Farmers are mostly poor and lack the capital resources to meet the increasing demand for advanced agricultural equipment. One of the main reasons for low agricultural productivity in our country is the lack of capital (Shah et al., 2008). The increase in agricultural production largely depends on providing finance to farmers in the region (Agricultural Development Bank of Pakistan, 1999). Reduction in costs due to timely access to agricultural finance also affects agricultural production.

The aim of the programme is to impart knowledge about banking to a wide target including students, women, rural and poor people, defense personnel and elderly people. Financial education is considered important in India due to low levels of literacy and lack of access to financial institutions by the majority of the population (Nash, 2012). To provide free financial literacy or education and credit counseling, Reserve Bank India has directed banks to set up Financial Literacy and Credit Counseling Centers(FLCCCs) in all districts from 2009 onwards. FLCCC was set up with a large company (Canara Bank) in the Madurai district. It provides financial advice through face-to-face meetings, email, fax, mobile phones, etc. With this backdrop, a study has been conducted to evaluate the financial literacy of farmers and its impact on farm financial management.

**RESEARCH METHODOLOGY**

**Sources of data**

In this study, primary data was collected through pre-assessment interviews to assess farmers' financial literacy in Madurai district**.** A sample of 120 respondents was interviewed during data collection.A multi-stage stratified random sampling method was used in this study. Three villages were selected for data collection and 40 respondents were interviewed in each selected village.

**Heckman selection two stage model**

Heckman's two-stage selection model was used to assess the farmers' financial literacy and its impact on farm financial management. Adoption of farm financial management is a two-stage process, namely, knowledge acquisition phase and adoption phase. In first stage of the model, probit model is estimated to determine whether farmers have adopted agricultural financial management knowledge, and in the second stage, OLS model is estimated to determine whether the farmers have acquired farm financial management knowledge based on the agricultural financial management knowledge acquired in the first stage.

The Heckman selection model assumes the following relationship :

The latent equation is given by:

Yj \*= Xj β+U1j------- (1)

 The probit model gives the binary outcome as:

Yj probit = Yj \*> 0 -------(2)

The dependent variable was observed only if the observation j was observed in the selection equation:

Yj select = Zjδ + U2j> 0----- (3)

Where X was considered as k- a vector of explanatory variables which included different factors hypothesized to affect adoption and z was considered as m vector of explanatory variables which included different factors hypothesized to affect knowledge; β is a vector of coefficients for the participation decision. This part models the likelihood of Y>0, which could be the probability of an increase in farmers’ financial literacy adoption. U1 and U2 represented the error terms.

The first stage of Heckman’s sample selection model analyzed the knowledge of the farm financial management practices and this was considered as a selection model (Equation 3). The second stage, the outcome model (Equation 1), analyzed, whether the farmer adopted the farm financial management practices, conditional on the first stage that they knew farm financial management.

**RESULTS AND DISCUSSION**

**Personal characteristics of black rice growers**

Factors such as age, education, experience, size of landholdings, relationship with banks, distance to the nearest bank, frequency of bank visits and number of bank accounts were incorporated as explanatory variables in the Heckman selection model (Table 1). The average age of the respondents was 42 years, with a farming experience of 18.65 years. About 87 per cent of the household heads were educated. Most respondents had primary and secondary levels of education, whereas others possessed higher secondary and higher education. The average size of the landholdings was found to be 2.3 ha. The average relationship with banks and distance to the bank were found to be 19 years and 2 km, respectively. The frequency of bank visits and number of bank accounts were found to be 12 times and 2 numbers, respectively.

**Table 1: Descriptive statistics (explanatory variables) of respondents applied in Heckman selection model** **(n=120)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Explanatory variables** | **Types** | **Parameters** | **Frequency/ average** | **Parameter’s sign** |
| Age  | Continuous | Age of households (years)  | 41.97 | + |
| Education  | Dummy | Education of household head (literate = 1, 0 = otherwise)  | 104(86.66) | + |
| Experience  | Continuous | Farming experience sample respondents (years) | 18.65 | + |
| Size of land holding (ha) | Continuous | Area of land holdings by the sample respondents | 2.3 | + |
| Relationship with the bank  | Continuous | Number of years (no) | 19(15.83) | + |
| Distance to nearest bank  | Continuous | Distance (Km) | 2 | + |
| Frequency of bank visit | Continuous | Number of times (no) | 12(10.00) | + |
| Number of bank account | Continuous | Number of bank account (no) | 2 | + |

**Factors Influencing financial literacy**

The Probit estimates of the Heckman selection model for the effect of financial planning skills are presented in Table 2. As expected, the co-efficient of age is positive and significant, indicating an increase in the odds of financial planning skills of 36 per cent. The co-efficient of education had positive skills of about 39 per cent. Experience with financial planning skills had a positive and significant effect, increasing the odds of financial literacy by about 56 per cent. The coefficient of land size is positive, indicating an increase in the odds of the financial ratio by 55 per cent. Relationship with the bank, frequency of bank visits and number of bank accounts also have a positive and significant impact on financial planning ability increasing the probability by 89 per cent, 49 per cent and 64 per cent, respectively. The impact of other variables such as distance to the nearest bank was found to be insignificant on financial planning ability.

**Table 2: Probit model estimates of Heckman selection model (n=120)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Co-efficient** | **Std.error** | **P-value** | **Marginal effect** |
| Age (Years) | 0.006\*\*\* | 0.167 | 0.093 | 0.369 |
| Education  | 0.865\*\* | 0.319 | 0.032 | 0.399 |
| Experience (Years) | 0.489\*\* | 0.476 | 0.040 | 0.568 |
| Size of land holding (ha) | 0.606\* | 0.099 | 0.100 | 0.552 |
| Relationship with the bank (Years) | 0.759\*\* | 0.785 | 0.006 | 0.895 |
| Distance to nearest bank (Km) | 0.235 | 0.433 | 0.280 | 0.451 |
| Frequency of bank visit | 0.106\*\*\* | 0.707 | 0.007 | 0.492 |
| Number of bank account | 0.039\*\* | 0.692 | 0.039 | 0.064 |
| Const | 0.667 | 1.026 | 0.516 | 0.678 |
| Total observation | 120 |  |  |  |
| Censored observation | 58 |  |  |  |
| Uncensored observation | 62 |  |  |  |

**\*\*\* , \* \*, \* denotes significant at 1%, 5% and 10 % level, respectively.**

**Source: Primary data, 2024**

 Farmers with higher education were considered to be more economically competent than those with lower education. The results were consistent with those of Bumcrot et al. (2011) and comparable. It was concluded that farmers who had bank accounts and a higher level of education were more economically competent.

**Factors influencing the adoption of financial literacy**

**Table 3: OLS estimates of Heckman selection model (n=120)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **Co-efficient** | **Std.error** | **P-value** |
| Age (Years) | 0.026\*\*\* | 0.034 | 0.001 |
| Education  | 0.335\*\* | 0.845 | 0.040 |
| Experience (Years) | 0.546\*\* | 0.563 | 0.034 |
| Size of land holding (ha) | 0.206\*\* | 0.256 | 0.032 |
| Relationship with the bank (Years) | 0.427\*\*\* | 0.673 | 0.000 |
| Distance to nearest bank (Km) | 0.564 | 0.899 | 0.670 |
| Frequency of bank visit | 0.874\*\*\* | 0.350 | 0.006 |
| Number of bank account | 0.674\*\*\* | 0.991 | 0.000 |
| Lambda | 0.034 | 0.874 | 0.542 |
| Const | 0.667 | 0.443 | 0.001 |
| Total observation | 120 |  |  |
| Censored observations | 58 |  |  |
| Uncensored observations | 62 |  |  |

**\*\*\* , \* \*, \* denotes significant at 1%, 5% and 10 % level, respectively,**

**Source: Primary data, 2024**

Table 3 shows the OLS estimation results of the Heckman selection model on the impact of financial adoption. The results showed that age has a positive and significant impact on the adoption of financial planning (2.6 per cent). Respondents’ education and experience also proved to be positive and significant, increasing the adoption of financial planning by 33 per cent and 54 per cent, respectively. The size of landholdings has a positive and significant impact on the adoption of financial planning, increasing its probability by 20 per cent. Relationship with banks, frequency of bank visits and number of banks were also positive and significant, increasing the adoption of financial planning by 42 per cent, 87 per cent and 67 per cent, respectively. The variable of distance to the nearest bank was found to be insignificant for the adoption of financial planning. Danes *et al.,* (1999) also reported that financial literacy enabled individuals to make informed financial decisions, discuss financial issues, and plan for the future. Thus, it is concluded that improved knowledge of financial planning promotes the adoption of financial planning.

It is recommended to improve farmers' knowledge of financial planning through farmers' financial education programmes so that better financial planning can be made among farmers. Overall, the percentage of farmers who prepared farm plans, crop plans, long-term plans and maintained farm records was high.

**Conclusion**

Financial education is viewed as crucial in India due to the country's low literacy levels and the substantial number of people who are not part of the formal financial system. The analysis revealed that a high percentage of farmers-maintained farm plans, cultivation plans, long-term plans and records. The majority of the farmers in the study area estimated their financial needs empirically. Education and knowledge on financial planning contributed significantly to farmers’ financial planning. The probit selection model also showed that variables such as age, education, experience, size of land holdings, relationship with bank, frequency of bank visits and possession of bank account had a significant and positive impact on knowledge of financial planning. The results of OLS estimation of the Heckman selection model in influencing the adoption of financial planning indicated that age, education, experience, size of land holdings, relationship with bank, frequency of bank visits and possession of bank account significantly influenced the adoption of financial planning. It can be concluded that the increased knowledge of financial planning has promoted the adoption of financial planning.

Based on the results of the present study, the following recommendations are made to improve the financial literacy and accessibility of formal finance among the farmers. Financial literacy enhancement programs should be targeted at young farmers to improve their financial literacy for better sourcing and utilization of farm finance. Financial literacy programs should concentrate on less educated, marginal and small farmers in the study area, as they have low levels of financial literacy. Farmers should be encouraged to open bank account by strengthening the financial inclusion programs. Farmers should be educated more on the pros and cons of formal and informal savings. It would enable them to make informed decision on their choice of savings destination. The farmers should be trained on different farm budgeting methods, such as whole farm budgeting, partial budgeting, and enterprise budgeting, for effective financial planning. Knowledge on different farm credit schemes offered by the financial institutions should be improved.

**Disclaimer (Artificial intelligence)**

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