FINANCIAL LITERACY AND IMPACT ON WELFARE OF CHILLI FARMERS IN EAST JAVA PROVINCE INDONESIA

WAHIB ABDUL MUHAIMIN, DWI RETNONINGSIH & HERY TOIBA

*Research Scholar, Department of Social-Economics, Faculty of Agriculture,
University of Brawijaya, Malang, Indonesia*

ABSTRACT

This study provides empirical evidence on the factors that affect the level of financial literacy and financial literacy impact of the adoption credit and the welfare of farmers viewed from the income they generated. Two districts were chosen as a test site such as Malang and Kediri. A total of 300 farmers used as samples were analyzed by logit regression analysis and propensity score matching (PSM). The results showed participation in farmers' group is the most influential variable positive and significant impact on the level of financial literacy education followed and the number of family members. On the other hand, the life of a significant Negative effect on the level of financial literacy. Furthermore, financial literacy has a significant impact on the income of farmers, where farmers with high levels of financial literacy have higher incomes than farmers with low levels of financial literacy. This implies that financial literacy is indispensable to carry out agricultural activities.

KEYWORDS: Financial Literacy, Logit, PSM, Revenue

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1. INTRODUCTION

1.1. Preliminary

The importance of financial literacy to the attention of various parties, including government, companies and households. Due to the good financial literacy, one can make the right decision in the financial aspect (Jang et al., 2014) lack of knowledge about financial concepts in the Asian resulting in low levels of financial literacy (Grohmann, 2018). The survey results of the Financial Services Authority (FSA), (2018) only 31 % of Indonesian people understand financial literacy. Therefore, should the effort to improve the level of financial literacy, so that it can be a means to improve household welfare (Huston, 2010) one of the efforts to increase financial literacy is to conduct training to those who have the financial literacy is low (Bayrakdaroglu & San, 2014), Rising levels of financial literacy someone will have an impact on the level of their economy,. Along with that Huston (2010) reveals that financial literacy has proved able to cope with financial problems, especially financial problems often faced by many workers. This is caused by a lack of financial literacy that resulted in them can not regulate financial flows (Lusardi, 2011). On the other hand Hakim et al, (2017) proved that the high level of financial literacy in a company manager was positively correlated with the company productivity. can be concluded that financial literacy is one positive aspect in the success of a person or company to boost their economies.

One of the causes of failure in farming is bad management of the financial aspects. This is due to the low level of financial literacy of the farmer. The important proof of financial literacy on the business activities described by Carman & Zamarro (2016) where the household businesses with higher financial literacy have higher incomes as well. The study of financial literacy and its impact on earnings have been carried out one of Carman

and Zammato (2016) contribution to earnings financial literacy and food security. The results showed that financial literacy of households with high incomes and higher food security, this is because households with high financial literacy can set the financial aspects as possible. Mabula & Dong (2018) examined the relationship between financial literacy and access to financial institutions. The results showed that financial literacy has a positive and significant relationship between financial literacy and access to finance. The institutions can be concluded that financial literacy has a positive impact on the adoption of credit and income.

Nonetheless, the study of financial literacy and its impact on revenue and adoption of credit have been carried out. But they assess financial literacy in general. That is still a bit of literature that examines financial literacy focused on farmers, particularly in Indonesia. This study tried to assess the impact of financial literacy and its impact on farmers' income.

1.2. Financial Literacy Level Measurement

Financial literacy is the ability of a person based on financial aspects. To measure financial literacy can be done to provide some questions related to financial concepts. This technique is most often used by researchers to measure the level of financial literacy. Some questions that are frequently used by the researchers can be seen in Table 1.

Table 1: Financial Literacy Question

Concept	Question	Source
Numeracy (Q1)	"Suppose you had \$ 100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? (I) More than \$ 102; (Ii) Exactly \$ 102; (Iii) Less than \$ 102; (Iv) Do not know (DK); (V) Refuse. "	Lusardi and Mitchell (2007)
Understanding of interest compounding (Q2)	"Suppose you had \$ 100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have in total on this account? (I) More than \$ 200; (Ii) Exactly \$ 200; (Iii) Less than \$ 200; (Iv) DK; (V) Refuse. "	Lusardi and Mitchell (2007)
Understanding of inflation (Q3)	"Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? (I) More than today; (Ii) the same; (Iii) Less than today; (Iv) DK; (V) Refuse. "	Lusardi and Mitchell (2007)
Time Value of Money (Q4)	"Assume a friend inherits \$ 10,000 today and his sibling inherits \$ 10,000 three years from now. Who is richer because of the inheritance? (I) My friend; (Ii) His sibling; (Iii) They are equally rich; (Iv) DK; (V) Refuse. "	Lusardi and Mitchell (2007)
Money Illusion (Q5)	"Suppose that in the year 2010, your income has doubled and the prices of all goods have doubled too. In 2010, how much will you be able to buy with your income? (I) More than today; (Ii) The same; (Iii) Less than today; (Iv) DK; (V) Refuse. "	Lusardi and Mitchell (2007)

1.3. Theoretical Model

- **Propensity Score Matching**

Problems often arise when evaluating the effects of treatments that a bias problem heterogeneity between the treatment and non-treatment. One method that can overcome the problems of such bias is propensity score matching (PSM). PSM is a statistical method to estimate match how big the effects of treatment. PSM can be used to eliminate bias due to variable existing confounding of estimating the impact of treatment derived from a simple comparison between the outcomes of respondents who get treatments and non-treatments. This method tries to evaluate the effect of covariate treatment groups was observed that the difference in the propensity score or a single index (Khandker et al., 2009). Then the outcome of the group and the non-treatment same treatments will be compared to derive the value of the impact of treatment. While

respondents do not have a mismatch covariate will be issued.

According to Rosenbaum and Rubin (1983), the propensity score is the conditional probability for the receiving treatment based on the characteristics before the intervention. Mathematically the propensity score as the following equation:

$$P(Z) = P\tau\{D = 1|Z\} = E\{D|Z\} \quad (8)$$

Where $D = (0,1)$ is a binary variable that describes the different groups, $D = 1$ indicates a group treatments, and $D = 0$ is a group of non-treatments. While Z is an indicator before intervention treatments. The conditional distribution of Z , at $p(X)$ is the same for both groups of treatments or non-treatments.

Step-by-step method using propensity score matching (PSM) according to Shahidur (2010) as follows:

- Estimation of the propensity score. Estimate using propensity score using logistic regression models. The variables used to estimate the propensity score treatments is that variable as the dependent variable (y) and household characteristics as the independent variable (x). Mathematically the logistic model can be written as follows:

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots \dots \dots \beta_i x_i + e$$

- Specifies the matching method (Matching algorithm). There are four methods to do the Matching algorithm. Among other nearest neighbour matching, radius matching, Kernel matching, and stratification matching.
- Identifikasi overlap and common support. In this step is matching characteristics between respondents and non-treatments treatments. So they will know some of the respondents who do not have a match, some of the respondents who have a match are respondent would do a comparison, while respondents who do not have a match that respondents with a propensity score that is too high or too low will be dropped.
- Calculating Average Effect of Treatment for the Treated (ATT). ATT calculation performed to obtain the value of the effects of treatment. The value of the ATT is the difference in the average value outcomes as between groups of treatments and non-treatments. In mathematic can be written as follows:

$$\begin{aligned} \tau &= E\{R_1 - R_0 | I = 1\} \\ &= E\{E\{R_1 - R_0 | I = 1, p(Z)\}\} \\ &= E\{E\{R_1 | I = 1, p(Z)\} - E\{R_0 | I = 0, p(Z)\} | I = 0\} \end{aligned}$$

2. METHODS

2.1. Sample and Data

The respondents are the head of household farmers and household heads in the partner district, Malang and Kediri. Determination of the farmer respondents is done by using simple random sampling method. The first step, will list all horticultural farmers in four villages of the two districts, then list horticultural farmers gained from this first step, then used to construct a sampling frame of the study. The next step, of the list of farmers who obtained, will subsequently be selected by random 75 farmer respondents from each village so overall we will get 300 respondents horticultural farmers.

3. DATA ANALYSIS METHOD

3.1. Analysis of Factors Affecting Financial Literacy

Analysis to determine the factors that influence financial literacy using logit regression. In this analysis the dependent variable is financial literacy, while the independent variables are socio demographics. Logit regression models in this study as follows:

$$Lk = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \beta_6x_6 + \beta_7x_7 + e$$

Financial literacy variables (Lk) as the dependent variable (1 = high literacy and low literacy 0) is 0-100, while the independent variables consisted of gender (x1), age (x2), education (x3), the number of family members (x4), land area (x5), the status of land ownership (x6), farmer membership (x7).

3.2. Impact Analysis of Financial Literacy to Kesejahteraan Farmers

Data analysis methods will be used to analyze the impact of financial literacy on the adoption credit is propensity score matching (PSM). This method is used to evaluate the impact of the financial literacy levels of the income of farmers. PSM method chosen because this method can reduce the problem of impact evaluation that selection bias problems caused by the counter-factual that were not observed. This bias can be reduced when the results of a comparison group of non-group treatments and treatments are as close as possible. PSM method aims to find a match of characteristics between the treatment and non-treatment.

There are three categories of variables used in this method include variable PSM treatments, the characteristics of the farmers and the outcome variable. Variable treatments in this study is the level of financial literacy that will be categorized into katogori tingtat low and high categories. While karektristik household consists of gender, age, education, number of family members, land, land tenure, membership farmer. One final outcome variable, namely the income of farmers.

3.3. Impact Analysis of Financial Literacy on the Adoption Credit

Analysis of the data to determine the effect of the influence of socio-demographic variables and level of financial literacy of farmers to credit that the decision to adopt the IV probit regression. Probit regression model equation in this study as follows:

$$Adp = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \beta_6x_6 + \beta_7x_7 + \beta_8z_1 + e$$

In the above probit regression model is the adoption Adp credit as the dependent variable. The dependent variable in the probit regression analysis is dekotomi, which means a value of 0 describes the farmers who did not do the adoption credit and the value of 1 represents the farmers are adopting credit. While the independent variables in this study consisted of gender (x1), age (x2), education (x3), the number of family members (x4), land area (x5), the status of land ownership (x6), the membership of farmers (x7) and financial literacy level (z1). The main independent variable in this study is the level of financial literacy (z1), this variable has a value of 1-100 (shaped score) that describes how the percentage of answers to farmers about the correct financial literacy.

Endogeneity issues have been discussed in the literature review chapter. The main variables in the study of financial literacy endogeneity could potentially happen because it has the potential relationship with e thus have consequences probit MLE estimation model to be biased and is considered ineffective. To prove to these problems, it is necessary to test the endogeneity wald-test. If the test results obtained wald-test proved H0 is rejected, then the main variable in this study indicated endogeneity.

Overcome the above problems it is necessary to add a fourth special treatment that was not correlated with e . But has a strong influence on key variables, namely financial literacy. Variable IV (q) used in this study are those costs incurred to obtain financial education and math skills during school. IV probit models in this study can be written as follows:

$$Adp = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \beta_6x_6 + \beta_7x_7 + \beta_8z_1 + e$$

$$z_1 = y + y_1q_1 + y_2q_2 + u$$

4. RESULTS AND DISCUSSIONS

4.1. Descriptive Statistics

In these discussions will be explained about the data based on the average, standard deviation, minimum and maximum of the value of each household characteristics. Standard deviation indicates the value that is used to see how the distribution of data where the high value of the standard deviation describes the distribution of data is high. Table 2 is a descriptive statistic chilli farmer households Kediri and Malang.

Table 2 shows seen income, gender, age, education, experience, family size, land use, land ownership status and household farmer groups who were respondents in this study have varying characteristics. The average income of respondents Rp.25.9 million per season with the lowest household income of Rp. 900,000 and the highest revenue of Rp 1 billion per season. Most of the chilli growers who were respondents in this study is a man. Selanjutnya male sex, the study respondents on average 47 years old. Where farmers youngest is 24 years old and a farmer who has the oldest age is 80 years. The level of education achieved by the respondent average is 9 years or at the level of secondary school (SMP). Some farmers do not take education and the highest level of education that is 14 years old. The experience farmers have on average 21 years old with 2 years of experience lows and highs of 60 years experience. The average member of the household of 23 people. Some farmers do not have household members and household members the highest 6 people. The land area used by farmers to plant chillies has an average area of 1900.343 m² with 20 m² of land which is the narrowest and widest 84800 m². Land used by farmers to plant chillies is mostly proprietary. Furthermore, the respondents in this study largely participate in farmer groups.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Income	300	25900000	75100000	900000	1000000000
Gender	300	1.013333	0.114889	1	2
Age	300	47.46	11.40447	24	80
Education	300	9.02027	3.769583	0	14
Experience	300	21.86333	12.00019	2	60
number of Families	300	2:57	1.078104	0	6
Land area	300	1900.343	5066.276	20	84800
Land Status	300	0.653333	0.476704	0	1
Farmers	300	0.613333	0.4878	0	1

4.2. Comparative Characteristics of Households Based Financial Literacy Levels

Table 3 is a comparison of the characteristics of the farmers who have a high level of financial literacy and financial literacy levels are low. To see the comparison between the two respondents serve targeted in this study using a different test average.

From the test results depending average age, education, family size, land area and participation in farmers' group had no significant difference between the farmer with a high level of financial literacy and farmers with low levels of financial literacy. Meanwhile, gender, experience, and status of land ownership did not differ significantly between the two

groups of farmers. Farmers with high financial literacy levels have a lifespan and lower than the land area farmers with low literacy. While the education of farmers with high financial literacy education and the number of household members is higher than farmers with low financial literacy. Furthermore, farmers with high financial literacy more than the farmer groups participating in farmers with low financial literacy.

Table 3: Comparative Characteristics of Households Based Financial Literacy Levels

Variables	Hight Financial Literacy (n = 220)		Low Financial Literacy (n = 80)		t-Statistic
	Mean	Std. Dev.	Mean	Std. Dev	
Gender	1.013636	0.1162404	1.0125	0.0125	0077
Age	46.76364	11.73134	49 375	10.2801	-1.8717 *
Education	9.286364	3.224449	7.8375	5.171597	2.3455 **
Experience	21.84545	11.79442	21.9125	12.62526	-0.0414
number of Families	2.668182	1.048542	2.3	1.118317	2.5634 **
Land area	1561.059	1418.259	2833.375	9506.161	-1.1923 *
land status	0.6272727	0.4846331	0725	0.449331	1.6308
Farmers	0.6636364	0.4735424	0475	0.502525	2.9191 ***

Note: *, **, *** indicates significant at each level of 10 %, 5 % and 1 %.

4.3. Respondent Characteristics Influence on Financial Literacy Level Farmers Cabe

Logit regression analysis is one of the stages of the analysis of propensity score matching. Logit regression is required to obtain propensity score (p-score) from each of the respondents in the study. P-score is then used as a reference for comparing the output of each respondent. On the other hand, logit regression analysis can also be used to determine the effect of the characteristics of households on their financial literacy. Logit regression analysis showed farmers age, education level, family size and participation in farmers' group has a significant influence on the level of financial literacy of farmers. Meanwhile, gender, experience, area of land and land ststus not statistically significant effect on the level of financial literacy of farmers.

Age a significant negative effect on the chances of farmers to have financial literacy tinggi. Artinya, the higher the age of the farmer then their chances to have a high financial literacy is getting low. This finding is contrary to the results of research conducted by (Taft et al., 2013; Hassan & Anood 2009). The inconsistency of these results with other studies due to differences in the characteristics of households to be sampled. Suppose if we see from the level of education and age, they have a negative correlation. This means that the older the respondent then taken by the lower education. In fact, education is one of the sources for a person to boost their knowledge of one of them is financial knowledge.

Education variable coefficient is positive and significant at the level of 5%. This shows that education has a positive and significant impact on the chances of farmers to financial literacy memiliki tinggi. artinya, the higher education of farmers then their chances to have financial literacy tinggipun will increase. This finding is not surprising where education is a source of knowledge for everyone wrong astunya found financial knowledge is in line with (Hassan & Anood 2009; Bhushan & Medury, 2013).

Number of family members has a positive and significant impact on the chances of farmers to have financial literacy frequency. This shows the greater number of members of the family then the chances of farmers to have a high financial literacy will be higher as well. This finding is consistent with (Jappelli & Padula, 2013). Finally, the participation of farmers in farmer groups and significant positive effect on their chances to have financial literacy tinggi. Artinya, farmers participating in farmer groups have a higher chance to have a high financial literacy dibagi

farmers who did not participate in the group. Several studies have shown that kelompok tani the social capital that can increase farmers' access to information that they need (Kassie et al., 2013) one of them is financial related information.

Table 4: Respondent Characteristics Influence on Financial Literacy Level Farmers Cabe

Financial Literacy	Coef.	Std. Err	z	P> z
Gender	0.379959	0.749935	0.51	0612
Age	-0.02284	0.009543	-2.39	0017 **
Education	0.06336	0.021908	2.89	0004 ***
Experience	0.013548	0.008831	1.53	0125
number of Families	0.176237	0.07755	2.27	0023 **
Land area	-4.6E-05	0.000045	-1.02	0309
land status	-0.26264	0.1804	-1.46	0145
Farmers	0.5529	0.170424	3.24	0001 ***
_cons	-0.01708	0.94687	-0.02	0986
Log likelihood = -152.97221				
Number of obs = 300				
LR chi2 (8) = 35.46				
Prob> chi2 = 0.0000				
Pseudo R2 = 0.1039				

Note: *, **, *** indicates significant at each level of 10 %, 5 % and 1 %.

4.4. Impact Analysis of Financial Literacy on the Adoption Credit

Analysis of the impact of literacy on the adoption of the loan using probit model shows that each of the predictor variables have a significant influence on the adoption credit. At the significant level of 1%, the farmer group variable influence on the rate of adoption of credit. At the 5% significance level, financial literacy variables, age, and education influence the rate of adoption of credit. While the significant level of 10%, a variable experience, family size, land use, and land status give effect to the adoption credit.

The relationship of each predictor variable to variable credit adoption is divided into positive and negative relationships. According to the data attached, was positively related to the adoption of variable credit occurred in variable financial literacy, education, experience, and the number of families. While the negative correlation to variable credit adoption happening in age, land, land status, and farmer groups.

Positive relationships are owned by the adoption of the financial literacy variable credit means that the higher the person's knowledge in financial managerial would allow adopting credit products of financial institutions. This is consistent with the statement Lusardi (2008) which states that financial education will push up savings and improve the quality of decision making in the field of finance.

The negative relationship between age owned by the adoption of credit means that the person's age will decrease the chances of someone accessing credit products of a financial institution. This is supported by research Supardi (2004) which stated that in general people are getting older productivity will decrease. Even one day no longer productive, but still consumptive. Therefore, when he was young people have started saving in various forms of backup older on the day, so as not to become a burden to others.

Negative relationship status variable land owned by the adoption of credit means that when a farmer's status as a sharecropper will reduce the possibility for him to use credit products of a financial institution, the condition is caused by the lack of guarantee that may be required to the financial institution. Backed by J. & Hiola Sumarno statement FS I (2000)

which states that in general people get older productivity will decrease. Even one day no longer productive, but still consumptive. Therefore, when he was young people have started saving in various forms of backup older on the day, so as not to become a burden to others.

Table 5: Impact of the Adoption Credit Financial Literacy Farmers Cabe

Adoption Credit	Coef.	Std. Err	z	P> z
Financial Literacy	0.01652	0.006747	2.45	0014 **
Age	-0.02203	0.010225	-2.15	0031 **
Education	0.052014	0.022253	2.34	0019 **
Experience	0.002427	0.008561	0.28	0777
number of Families	0.030478	0.075127	0.41	0685
Land area	-0.00004	4.33E-05	-0.93	0355
land status	-0.12494	0.169713	-0.74	0462
Farmers	-0.49113	0.169544	-2.9	0004 ***
_cons	0.499215	0.654293	0.76	0445
corr (e.fl, e.kredit)	-0.25093	0.189688		
sd (e.fl)	24.8781	1.015644		
Log likelihood = -1557.5185				
Number of obs = 300				
Wald chi2 (8) = 46.37				
Prob> chi2 = 0.0000				

Note: *, **, *** indicates significant at each level of 10 %, 5 % and 1 %.

4.5. Financial Literacy Impact on Farmers Income

Propensity Score Matching (PSM) in this study are used to estimate the impact of the financial literacy level of farmers' income to chillies in Kediri and Malang. The results of the propensity score matching analysis can be seen in Table 6.

Measuring the impact of the level of financial literacy with PSM, this study used four matching method comprising; nearest neighbor matching (NNM), radius matching, karnel matching and stratification method. Table 6 illustrates the impact of the financial literacy levels of the chili farmers' income by 4 the matching method. NNM produce matching results showed Average Treatment Effect on the Treated (ATT) amounted to 25.3 million, matching the radius of 24300000, 24500000 and by matching karnel stratification method as big as 24700000. Further views of significance acquired, fourth matching method has significance at the level of 1 %. These results indicate that the high level of financial literacy and significant positive impact on farmers' income. In comparison, farmers with high financial literacy levels have higher revenue of Rp. to \$ 24.3 million. 25.3 million Compared to farmers with low levels of financial literacy.

Figure 1 shows this finding is consistent with previous studies (Braunstein and Welch, 2002; Jacob, Hudson, and Bush, 2000; Servon and Kaestner, 2008) they argue that a person's low-income people tend to have low levels of financial literacy, Furthermore, (Webster and Fidler, 1996; Chelcea 2002) Explains that most low-income people very berhitung to informally with high interest rates. As collateral, farmers are required to sell their products to the informal institutions with low price. On the other hand (Lusardi and Tufano, 2009) suggest that individuals with low levels of financial literacy have difficulty in managing their finances, one of the difficulties in restoring debt, This is what makes the farmers can not be separated from the informal financial institutions.

Table 6: Financial Literacy Impact on Farmers Income Cabe

Matching Method	Treatment	Control	ATT	Std. Err	T
NNM	218	57	25300000	7560000	3353 ***
radius Matching	218	71	24300000	4630000	5246 ***
kernel Matching	218	71	24500000	4660000	5251 ***
stratification method	218	71	24700000	10600000	2342 ***

Figure 1: Financial Literacy Impact on Farmers Income Cabe.

5. CONCLUSIONS

From the research that has been done, it can be summarized as follows; factors are positive and significant impact on the level of financial literacy namely education level, family size and participation in farmers' groups. While age negatively affect farmers' level of financial literacy. Furthermore, financial literacy has an important role to the adoption of the decision of credit and welfare of farmers. With a high level of financial literacy cederung farmers can make good decisions in financial matters. Based on the results of financial literacy have an impact in the adoption credit. The ability of chilli growers in the adoption credit in line with its impact on the welfare of farmers chili.

The results, at least, provide valuable information. One is the effort to improve financial literacy among small farmers to be followed by participation in farmer groups. Without this effort, participation may be lower farmers, and farmers who already have a good level of financial literacy, credit may not adopt. One effort that might be done is to provide knowledge about financial literacy through farmer groups.

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