

Farm households' access to credit: who needs and who gets? Evidence from Malawi

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Abstract

This study examines farm households' access to credit in rural Malawi. Unlike previous empirical studies, particular attention is also given to non-borrowers and discouraged borrowers in small farm households who are basically ignored in such studies. In order to examine households' access to credit in the rural credit market, discouraged borrowers thus, households that require credit but unable to borrow due to fear of denial should be given a special consideration. Using the 2010/2011 household survey data from Malawi, the study addresses three main objectives: (1) to determine the factors that distinguish farm households who need credit from those who do not; (2) to investigate who are the discouraged borrowers; and (3) to analyse the characteristics of rejected applicants in comparison to successful applicants. A three-step sequential estimation model is adopted using both a univariate probit estimation for the "need for credit" decision and a bivariate probit selection model to correct for the self-selection bias in applying for credit, and subsequently been denied or offered credit. Factors including both demographic and socio-economic characteristics of the farm households are used as explanatory variables. The findings revealed that though more women were likely to be discouraged, those who applied were more likely to be successful. Further, discouraged borrowers included households that received remittances and households residing farther away from a bank. This study therefore concludes that financial institutions should increase their presence in communities, especially rural farm areas.

(JEL classification: Q12, Q14, C35)

Keywords: Rural farm households; Credit; Discouraged; Denied; Bivariate probit

1. INTRODUCTION

Farm households make decisions ranging from when to plant; whether to adopt technology and/or which technology to adopt; whether to hire extra labour for ploughing or harvesting; when, how and whom to sell the farm produce to; and also whether or not to participate in non-farm economic activities, among others. One other major decision that farm households are faced with is whether or not to use credit.

Credit has proven to be a necessary tool for economic development which affects positively the welfare of households and individuals (Atieno, 1995). Studies have laid down three main paths through which credit can affect the welfare of households (Zeller et al., 1997, Diagne and Zeller, 2001). Firstly, reducing the capital constraints whereby farmers could have access to agricultural inputs at the right time of production; secondly, making farmers able to cope with and manage risky choices which they would not have considered in the absence of credit; and lastly making possible for households to smooth consumption throughout the year without rationing.

Malawi as a developing country is among the poorest countries in the world moving down the Human Development Index from the 160th position in 2009 to the 170th in 2012 out of 185 countries (UNDP, 2013). Household access to economic prospects, services and assets are extremely uneven across the country translating to the high level of poverty in the country. With poverty as a rural phenomenon, rural households in the southern part of Malawi are among the poorest while those in the central part of the country are comparatively less poor.

It has been confirmed that farm households, especially in sub-Saharan Africa, and Malawi in particular, are credit constrained (Diagne and Zeller, 2001). Shocks to household livelihood forces households to take adverse decisions such as sell their assets, withdraw children from school and also reduce their food consumption. In the rural areas of Malawi where nearly 90 per cent of households are employed in agriculture with little economic diversification, only 12 per cent manage to access credit (IFAD, 2011). This percentage does not even indicate whether those who had access to credit had the full amount they had applied for.

Data from the Malawian Integrated Household Survey for 2010/11 shows a slightly higher proportion (about 3.1%) of successful borrowers than denied borrowers. Further, there are a greater number of farm households who need credit but are unable to borrow due to, among

other reasons, the fear of being denied credit. These non-applicants are termed as discouraged borrowers in the access to credit literature (Kon and Storey, 2003). According to Jappelli (1990), ignoring these group from the definition of credit constrained households bias downward its estimation or calculation.

Most empirical studies that have looked at farm households' access to credit or credit constraints in sub-Saharan African have generally focused only on those who actually apply for credit (Hazarika and Alwang, 2003, Hazarika and Sarangi, 2008, Diagne and Zeller, 2001, Diagne et al., 2000). These studies among others have focused on successful and rejected applicants only while others have also looked at the source of the credit, whether from a formal or informal source. The policy recommendations of these studies are therefore unable to impact households that are discouraged from borrowing. Considering the bias in these studies, it is necessary to include discouraged borrowers in research that bothers on access to farm household credit.

This study hence considers, farm households who need credit; those who are discouraged from borrowing; and those who receive or are denied credit. The objective of this paper is three fold. Firstly, to identify factors that explains why some farm households need credit while others do not. Secondly, to investigate the factors that determines discouragement and credit application. Lastly, is to identify the characteristics of successful and unsuccessful borrowers. The study uses data from the 2010/11 wave of the Malawi Integrated Household Survey adopting a three-step sequential estimation technique.

The rest of the study is organised as follows: the next section looks at theories and empirical literature on farm household's access to credit and discouraged borrowers, the third and fourth sections focus on data and methodology. The fifth section presents the analytical results and the final section concludes.

2. LITERATURE REVIEW

2.1 Access to credit

There have been several studies on rural households' or farm households' demand for, or access, to credit. The review of previous studies has shown two main approaches that have been used in the measurement of the access to credit (Diagne et al., 2000). The first is when

there is violation of the life cycle hypothesis brought about by the household being credit constrained (Hall, 1978, Deaton, 1992). These studies have often used data on household consumption or income to test for the existence of households' constrain to credit. Where households seem to be much dependent on transitory income, indicates that the household is credit constrained (Browning and Lusardi, 1996). But according to Jappelli (1990), among other limitations to the use of this approach, consumers who were credit constrained were unobservable and therefore involved using an indirect approach to determine the characteristics of credit constrained households.

The second approach is through a direct collection of information on credit from households. This is done through a survey questionnaire whereby households directly answer questions on their credit activities in terms of access and participation, thereby drawing inference on the possibility of a household being credit constrained (Diagne et al., 2000). Several studies using data from household surveys have used this approach to determine households' credit constraint (Jappelli, 1990, Feder et al., 1990, Zeller, 1994, Schrieder and Heidhues, 1995, Zeller et al., 1996, Barham et al., 1996). However, such studies are not without limitations. Thus they are unable to provide or predict the extent to which households are credit constrained (Diagne et al., 2000). The study by Diagne et al. (2000) extended the direct model to look at how much farm households get against how much they applied for, thus attempting to find the level of households' credit constraints.

Following the empirical approach, previous studies have found some factors that determine household access to formal or informal credit. Household demographic and economic characteristics were found to play important role in explaining access to credit. In a study by Mohammed (2003) where he looked at access to formal and quasi-formal credit by small farmers and fishermen in Zanzibar found factors such as sex, age, education and income level to be very important in explaining access to credit. One other key variable was the awareness of the availability of credit. Among others, he concludes that there is limited access to credit in Zanzibar and further women are discriminated against in the credit market.

Also, Okurut (2006) found varying significance levels and effect of factors such as age, sex, education, household size, location, race and expenditure on the accessibility of informal, semi-formal and formal credit source over the period 1995 and 2000 in South Africa. He argues for an improved access to a credit market that is organized so as the poor and blacks could have easy access. Shimamura and Lastarria (2010) also noticed that female household

heads were less likely to participate in credit programs in rural Malawi. The age of the household head, the larger household size and residing in an area with a credit program increased the possibility of participation. They implied from their findings that there is not enough labor force to stimulate micro-credit activities and this therefore contributed to the limited access of credit by the poor.

In addition to some household characteristics, Vaessen (2001) found in his study of access to credit by rural households that, the purpose of households taking informal credit and access to information and recommendations through networks were significant in explaining access to credit in the northern part of Nicaragua. Dallimore and Mgimeti (2002) also noticed the influence of application cost, which includes long distance and transport cost, constraining rural households to access formal financial services since they are mostly situated in urban communities. In general this study includes most of these factors in the analyses of those who need credit and those denied credit.

2.2 Discouraged borrowers

Stiglitz and Weiss (1981) have argued that credit rationing will still persist even in an equilibrium loan market mainly due to information asymmetry. Banks do not have all information on all their customers so use some screening methods such as increasing interest rates or/and collateral requirements to detect bad borrowers from good ones. Three situations may occur from this: (1) potential borrowers may borrow less than they initially expected; (2) some borrowers may be denied credit by the bank; and (3) both good and bad borrowers may be discouraged from borrowing.

Until recently, studies on access to credit have given little attention to discouraged borrowers because they do not make any loan application and may be because they do not add to bank loan portfolio risk. However, through the review of available literature, studies on discouraged borrowers have become necessary because of some three main reasons (Han et al., 2009). As found by Levenson and Willard (2000) and Freel et al. (2012), discouraged borrowers were identified to be twice as much as denied applicants. This was even more in the studies by Brown et al. (2011). This therefore increases the size of credit constrained borrowers. Also, being discouraged may vary across some demographic characteristics of borrowers (Vos et al., 2007). Demographic characteristics such as gender or race may give

information on discrimination in the credit market. Further, seen as a positive thing to lenders, discouragement is viewed as a self-rationing process whereby those who do not apply for credit upon self-assessment are considered as bad borrowers (Kon and Storey, 2003).

Jappelli (1990) in his study on credit constraint in the US economy identified discouraged borrowers as consumers who possibly with a high likelihood of denial, do not apply for credit because of the perception of being denied in the presence of application cost. Kon and Storey (2003) however restrict the definition to only creditworthy firms in his theoretical study of discouraged borrowers. This was done since all lenders try to avoid lending to non-creditworthy customers since they add to default rate. However, since it is difficult to empirically distinguish a creditworthy borrower from a non-creditworthy one, Han et al. (2009) do not attempt to make that distinction and therefore include both in their empirical study. Similarly, this study does not distinguish between creditworthy and non-creditworthy borrowers.

Empirical studies on discouraged borrowers have mostly focused on small non-farm enterprises and majority of them, if not all, are also studies from the developed countries (Brown et al., 2011, Cole, 2010, Freel et al., 2012, Han et al., 2009, Levenson and Willard, 2000). This leaves a huge gap in such studies in developing countries especially on rural farm households.

In his study of small business firms, Cole (2010) using a bivariate probit selection model finds that of the firm characteristics, discouraged firms are small in size, have very poor credit quality and are urban located. On the owner characteristics, owners of firms that were discouraged were much younger, had very poor credit quality (using owner bankruptcy and delinquencies as a form of measure) and have less wealth.

Freel et al. (2012) identifies the importance of increasing firm size and family ownership of the business as factors reducing the likelihood of small and medium size firms being discouraged from borrowing in the UK. But on the other hand, discouraged firms were serially owned, were in the industry sector, provided knowledge-intensive service, had no banking relationship and also following having strategies that are cost-focused.

Also using a US data on small firms, Han et al. (2009) examines the causes of discouragement and further test the hypothesis that discouragement is an effective self-

rationing mechanism. Using logit estimation, the study finds that the owner and business characteristics affect discouragement. Factors such as firm size, firm's use of financial services, owners' age and wealth were identified to be significant in explaining firms who were discouraged. Further, they find that riskier borrowers were more probable to be discouraged from applying. Hence, they concluded that discouragement was a good self-rationing tool.

Other studies such as Jappelli (1990) and Petrick (2004) combined denied applicants with discouraged borrowers as credit constrained borrowers with the assumption that they are homogenous. In Jappelli's (1990) study where he uses a probit estimation model where he found that increase in age, income and wealth reduces the probability of being credit constrained. Also, married, white, home owner, possessing savings and residing in the North-Central of USA reduces your being credit constraint. But an increase in the family size increases the likelihood of being credit constrained. With a similar estimation process, Petrick's (2004) study also finds that the borrower's reputation and individual characteristics of the household were important in determining credit access among farmers in Poland.

3. DATA

The study uses data from the 2010/2011 wave of the Malawi Living Standards Measurement Survey (Malawi Third Integrated Household Survey (IHS3)) collected by the National Statistical Office (NSO) of Malawi from March 2010 to March 2011. The IHS3 is actually the fourth household survey conducted by NSO. The first survey was carried out in 1990 and was known as the Household Expenditure and Small Scale Economic Activities (HESSEA). The second (IHS1) and the third (IHS2) of these surveys were conducted in 1997/98 and 2004/05 respectively. These surveys gather information ranging from education, health, labour, agriculture, food security and credit among others.

The IHS3 is representative household survey involving 12,288 households across the country. The survey adopted a two-stage stratified sample design. The first stage involved selecting 768 enumerations areas (EAs) across the country. Further, 24 EAs were selected in each district while 16 households were interviewed in each EA.

For the purpose of this study, the sample was narrowed to rural farm households. This reduced the sample size to 7,027 households (57.19 per cent of the original data). Since not

only farm households were interviewed in the survey, it is possible for some to be over-sampled in certain areas and under-sampled in others. The survey sample weights are therefore used during the estimation of the results to ensure that areas where farm households were over-sampled or under-sampled would be brought to the same measure or weighting.

The key variables are extracted from the credit section of the survey. This section of the questionnaire contained, among others, three main questions on which this paper is centred. These questions are:

1. “S01. Over the past 12 months, did you or anyone else in this household borrow on credit from someone outside the household or from an institution for business or farming purposes, receiving either cash or inputs?”
2. “S12. During the last 12 months, did you try to borrow from someone outside the household or from an institution and were turned down?”
3. “S19. Why did you not attempt to borrow in the last 12 months?”

4. METHOD OF ANALYSES

The study employs both univariate and multivariate analysis. Three dependents variables were generated from the three questions after categorising farm households into non-borrowers, discouraged borrowers, rejected (denied) borrowers and successful (approved) borrowers:

1. Non-borrowers are farm households who did not take credit on the basis that they did not need credit.
2. Discouraged borrowers are categorised as farm households who require credit but did not apply due to these stated reasons: believed would be refused, too expensive (high interest rate), inadequate collateral, too much trouble for what is worth, do not like to be in debt, and do not know any lender among other reasons, other than not in need of credit.
3. Rejected borrowers are farm households that applied for credit but were denied the credit for one reason or the other.
4. Successful borrowers are farm households that applied for credit and were approved (either received the full amount or part of it).

The dependent variables that were generated from the above categories include:

- *desire_credit*: a dummy variable equal to one (1) for households that are discouraged borrowers, rejected borrowers or successful borrowers and zero (0) where the household is a non-borrower.
- *apply_credit*: a dummy variable equal to one (1) if the farm household is a rejected or successful borrower and zero (0) if the household is a discouraged borrower.
- *denied_credit*: a dummy variable with one (1) if the household is a denied borrower and zero (0) if a successful borrower.

The logic is presented in Figure 1 where a rural farm household either requires credit or not. For those who need credit, some are discouraged for the reasons mentioned earlier while others apply. For applicants, depending on whether they are creditworthy, they are either denied or approved and obtained credit.

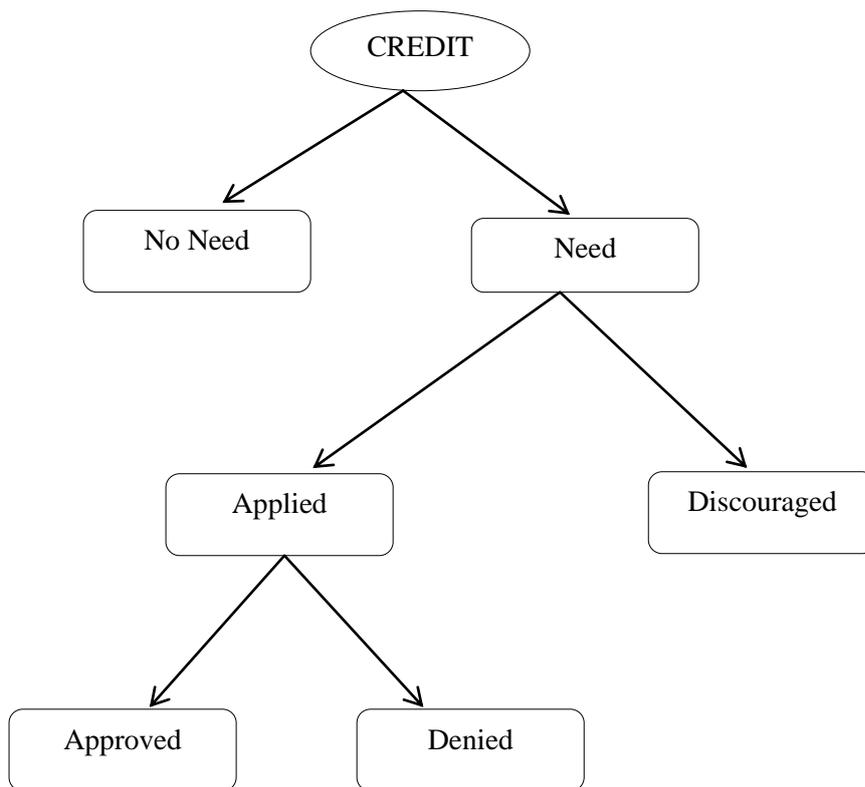


Figure 1: A sequential break down of credit access

A three-step sequential model is estimated using a probit model and a bivariate probit selection model (BPSM) employing a maximum likelihood estimation technique. In order to generalise the results obtained to all rural farm households within Malawi, the survey sample weights that will be applied to the estimation will ensure that.

4.1 Probit Model for farm households that desire credit

The first step is to estimate whether a farm household desires to take credit or not. It is captured by a dichotomous variable as seen from its definition earlier. To estimate such a decision, the study adopts a univariate probit model using the maximum likelihood technique. Equation 1 is used to estimate the factors that explain a farm households' desire for credit.

$$y_i^* = \beta_1 x_i + \mu_i \quad (1)$$

where $y_i = 1$ if $y_i^* > 1$ and 0 otherwise, $i = 1, \dots, I$

$$\mu_i \sim N(0,1)$$

x_i is a $1 \times K$ vector of farm and household characteristics

β_1 is a $K \times 1$ vector of parameters to be estimated

Let $y_i = 1$ if the farm household is willing to take credit (discouraged, rejected or successful borrowers), and 0 if otherwise. x_i is the vector of farm and household characteristics that are likely to explain the desire to take credit.

4.2 Bivariate probit selection model for applied credit and denied credit decisions

A bivariate probit selection model is estimated for the second and third steps of the three step sequential model. The second step involves a model that explains the decision of those who required credit to apply for credit or to be discouraged. A bivariate model is used because households who require credit and thus apply for credit do not form a random sample of all farm households. This creates the problem of sample selection bias (Heckman, 1979).

Sample selection bias occurs when the unit of analysis, in this case households, are self-selected implying that that they were not randomly determined. Therefore in order to account

for the problem of self-selection bias the application for credit equation is estimated conditioned on whether a household needs credit. Analogous to the second step, the third step also encounters the problem of sample selection bias. Hence, *denied_credit* is also estimated conditioned on the decision to apply for credit.

Equations 2 and 3 are employed to estimate the bivariate estimations. Thus,

$$y_{1i}^* = \alpha_1 x_{1i} + \varepsilon_{1i} \quad (2)$$

$$y_{2i}^* = \alpha_2 x_{2i} + \varepsilon_{2i} \quad (3)$$

$$y_{ni} = 1 \text{ if } y_{ni}^* > 1, 0 \text{ otherwise, where } n = 1, 2 \text{ and } i = 1, \dots, I$$

x_i is a $1 \times K$ vector of farm and household characteristics

α_i is a $K \times 1$ vector of parameters to be estimated

$$E[\varepsilon_{1i}] = E[\varepsilon_{2i}] = 0,$$

$$Var[\varepsilon_{1i}] = Var[\varepsilon_{2i}] = 1,$$

$$Cov[\varepsilon_{1i}, \varepsilon_{2i}] = \rho$$

In step two, y_{1i} is *apply credit* and y_{2i} is the dependent variable for *desire credit*. Consequently, for the third step, y_{1i} is the dependent variable for *denied credit* and y_{2i} is dependent variable for *apply credit*. To estimate such model, so as to account for the issue of non-randomness or sample selection bias, a Heckman selection model (Heckman 1979) is estimated following the “heckman probit” (heckprob) command in STATA.

In estimating a Heckman sample selection model, the independent variables in the outcome equation should be a subset of the selection equation, where independent variables in the selection equation contain at least one extra variable than the outcome equation. The extra variable(s) should be correlated with the selection dependent variable and not have any effect on the outcome dependent variable. This is termed exclusion restriction. The difficulty has always been to identify such independent variable(s).

4.3 Independent variables

The independent variables used in the estimation are presented and defined in Table 1. The choice of the independent variables were informed by various previous literature on access to credit, where it can be hypothesised that access to credit by rural farm households depend on household demographic, socio-economic and farm level characteristics.

[Insert Table 1]

4.3.1 Age of household head

Gibb and Ritchie (1982) are of the view that as one grows there is a continuous increase in one's experience and also assets, all other things being equal. Hence it is expected that younger farm household heads will be much in need for credit but less successful in their loan applications because of their lack of experience (Freel et al., 2012). Therefore younger farm household heads need for credit makes them less discouraged than their older counterparts though their applications are more likely to be unsuccessful.

4.3.2 Gender

Females are characterized as lacking self-confidence, have lower capability of managing risk, have the opinion that borrowing brings higher risk and also the perception that banks discriminate against them (Watson, 2006). It is therefore the expectation that female headed households would be more discouraged in applying for credit. Further in Malawi, most female-headed households cultivate for household consumption and spend much of their time on household chores, while their male counterparts cultivate tobacco which is the main cash crop of the country while also spending much of their time on productive activities. It is therefore expected that female-headed households would be discriminated against in the credit market and therefore denied credit.

4.3.3 Education

Education as a tool for human capital development is expected to be positively associated with firm growth (Storey, 1994) and some knowledge of bank loan application procedure. Higher levels of formal education are mostly restricted to non-poor households hardly found in the rural areas of Malawi. It is therefore expected that majority of households would be highly discouraged from applying for credit.

4.3.4 Location

Discrimination in the credit market also exists across geographic location (Leyshon and Thrift, 1996). This is mostly prominent in deprived areas such as the rural communities in Africa where there is lack of economic and infrastructural development such as financial institutions. As already stated, rural central of Malawi is comparatively less poor, while rural south of Malawi is the poorest. The very poor locations are expected to be deprived of financial services and may even lack the means to afford the collateral requirements. It is therefore the expectation that households in the rural north and south of Malawi will be more discouraged to borrow.

4.3.5 Household size

Poor rural households are believed to have larger household size than the non-poor. With the already high pressure of being poor, larger households would require extra resources to survive. Despite this, they do not have the means to apply for credit, hence are discouraged from applying.

4.3.6 Land size

Large land size cultivated or owned by a household could be related to high household wealth. Households with large land size may produce higher outputs. This may lead to these farm households being less in need for credit. But where greater land size does not relate to higher output and therefore higher wealth, the expectation will be a more likelihood of credit application. Also, these households are able to use their land as loan collateral

4.3.7 Off-farm work

Participation in off-farm economic activities serves as a source of diversifying household income. The impact of participation on borrowing decision is quite ambiguous. Income from off-farm work may be used in financing household farming activities and therefore reduce the dependence on, or need for, credit. Whereas credit may be needed by the household to finance both off and on-farm work since credit helps with the growth of firms.

4.3.8 Network/Social group

Social groups which include family, friends, neighbours, community associations, markets, etc. are very influential on households. Information flows easily from the more informed members to the less informed ones. Household members who belong to one credit program or another may influence non borrowers either positively or negatively depending on their experience from borrowing. With a positive experience it is expected that households in these groups will advise others to apply for credit.

4.3.9 Household asset

Household assets are very important in affecting the welfare of a household. Higher farm household assets enable farmers to work efficiently thereby raising farm household income. At the worse, these assets could be sold to support the household in times of need. Hence it is expected that rural farm households with higher assets will less likely apply for credit. On the other hand, households with higher household assets may be in a better position to meet collateral requirements to take up loans.

4.3.10 Remittances

Access to remittances by farm households is very significant in affecting the household's wellbeing. Remittances contributes to household income and could be used in financing both farm and off-farm work. It therefore can substitute for farm household credit. For this reason, households with lower remittances are more likely to be in need of credit and more likely to apply for credit and not discouraged.

4.3.11 Expenditure

Annual household consumption expenditure is proxy for annual household income. This implies that a higher expenditure translates to a higher household income. This may also affect the desire for farm credit whereby households with less expenditure would be needier and willing to apply for credit than those with higher expenditure.

4.3.12 Distance to banks

Location could also be linked with distance to financial institutions. Households in deprived communities mostly have to walk long distances to the financial institutions. This increases the cost and frustration of applying for credit and therefore may discourage farm households from applying though they may be in need of it.

4.3.13 Distance to ADMARC

Agricultural Development and Marketing Corporation (ADMARC) is a Malawian agency required to help market or sell agricultural farm harvest and farm inputs while also play a key role in the countries food security within the maize sector. A traditional problem of farmers is selling their produce and accessing farm inputs at the right time. With the help of ADMARC farmers may be able to have access to inputs at the required time and also sell their produce for revenue. This therefore gives farm households some assured income which may be a substitute to credit. Therefore the presence of ADMARC in a rural farm community is likely to reduce households' need for credit.

5. RESULTS:

5.1 Descriptive analysis

Among the entire rural farm households 83.3 per cent required credit indicating the need for credit for production and possibly consumption purposes among rural farm households in Malawi. Despite this only 24 per cent of them (36.7% of the total sample) applied for credit

implying a high level of discouragement among majority of the rural farm households. Only 36.4 per cent of those who applied for credit were denied credit. As a result, only 20.2 per cent of those who desired credit applied and obtained it. This shows that among the households that required credit in rural Malawi, almost 80 per cent were credit constraint, comprising both discouraged and denied borrowers.

To understand who these rural farm households are, Tables 2, 3 and 4 present some descriptive statistics on the characteristics of the rural farm households in Malawi by their borrowing status. Thus, Table 2 presents the summary of the characteristics of the total sample and further of non-borrowers and those that need credit. Table 3 includes discouraged borrowers and those who applied for credit and Table 4 presents denied and approved borrowers. These are the weighted mean values according to the borrowing status. Two univariate statistical tests have been carried out. The student t-test determines the statistical difference of the weighted mean values of each continuous variable by the paired borrowing status, while the chi-square (χ^2) test examines the relationship between the categorical or discrete variables and the borrowing status of the rural farm households.

Table 2 indicates that 74.7 per cent of all respondents were male headed households. However, the χ^2 test shows no statistically significant relationship between the sex of the household head and need for credit and the status of non-borrower. The average age of non-borrowers was 45.8 years and was significantly different ($t= 7.2$, $p< .01$) from that of the mean age of households that needed credit, 42.4 years. There were on average 5 members in each household and each household participated on average in 3 social networks in their communities. The differences in the weighted mean values of these variables between non-borrowers and those who needed credit were statistically significant at 1 per cent level. Average land cultivated during the raining season was approximately 2 acres, total household assets, total annual real consumption expenditure and remittance per household were respectively 42,779, 186,175 and 1,857 Malawian Kwacha. These also showed statistically significant difference between non-borrowers and those who needed credit.

[Insert Table 2]

Table 2 further shows that among the rural farm households in the sample, just a little below 50 per cent of the respondents reside in the rural south of the country. An overwhelming 80.4 per cent have had no level of formal education, while a further 83.4 per cent have worked only on-farm. Location of the household and the level of education had a strong association with the need for credit inferred from their χ^2 values significant at 1 per cent level. Distance to the nearest bank and ADMARC were on average 30.4 and 8.5 kilometres respectively, but the t-test showed no statistically significant difference between non-borrowers and those who needed credit.

Table 3 presents the statistics of discouraged borrowers and those who applied for credit. Again, male headed households were numerous with an average of 82 per cent of those who applied for credit, while 53.5 per cent were located in the rural central of the country. Also 76 per cent of those who applied had no formal education and only 0.8 per cent had tertiary education; 23.4 per cent participated in other off-farm economic activities in addition to the farm work. These variables, sex, location, education and off-farm participation, all had statistically significant χ^2 values at 1 per cent level showing a strong association between each of them and application for credit.

[Insert Table 3]

Discouraged borrowers were older than those who applied for credit (43.3 years and 39.3 years respectively), they also received a greater level of remittances and stayed further away from the banks. These differences in mean were all significant implying a difference between discouraged borrowers and those who applied for credit. The households that applied for credit had on average 5 members each, belonged to more social groups, had larger farm area cultivated and also greater household expenditure than those who were discouraged from borrowing. These differences in mean were all statistically significant at 1 per cent as shown in Table 3.

The descriptive statistics of the variables for households who were either refused credit or were successful in their application is presented in Table 4. Sex of the household head, land cultivated during the raining season, total assets of the household, remittances, and the distance to the closest bank in the community were all not significant. Age of the household

head was significant at 10 per cent level indicating that the mean age of denied borrowers were greater than that of the successful borrowers. Concerning the number of networks and expenditure, successful applicants had greater mean values than those of the denied borrowers and these were also significant at 1 per cent level.

[Insert Table 4]

Rural households in the central part of Malawi constituted 55.9 per cent of those who received the loan followed by those in the rural south. Location had a 5 per cent level of significant association with the application of credit. The majority of applicants were without any level of education (73.5%), while 73.7 per cent worked only on-farm. These also showed a strong relationship with application for credit, being significant at 1 per cent level.

5.2 Multivariate analysis of who needs and who gets credit

As indicated earlier, the econometric estimations follow a three-step sequential model where the first step is a univariate probit which determines the factors that influence rural households' need for credit. The second and third steps follow a bivariate probit selection model to identify the factors that explain the decision to apply for credit and subsequently whether a household that applies is successful in gaining credit. The marginal effects of the estimated probit and bivariate probit models are presented in Table 5.

[Insert Table 5]

5.2.1 Determinants of the desire for credit

Column A of Table 5 presents the results of the weighted probit estimation with the dependent variable *desire_credit* which equals 1 if the household is willing to take credit, and 0 if the household does not need credit. The wild chi-square test statistics is 364.7 and is

significant at 1 per cent level, rejecting the null hypothesis that the estimates of the parameters are simultaneously equal to zero.

The results show that household heads with some level of formal education, be it primary, secondary or tertiary, were most likely to be non-borrowers. Further, the higher the educational level of the household head, the greater the likelihood of being a non-borrower. At first glance this seems counter intuitive since education comes with knowledge including possible financial knowledge. But education also provides the opportunity to engage in other productive non-farm work, which may make these households financially stable and therefore provide them with income which decreases the need for credit.

Households that cultivated larger land areas during the raining season also showed less need for credit. This was also evident for households with higher value of assets. The asset variable includes farm inputs, livestock and machinery. Therefore, the larger the household land size and assets, the less likely for the household to need credit. Moreover, majority of commercial agricultural credit given in rural Malawi are in kind (seeds, fertilizers and other inputs) and therefore households already having such inputs would not desire for credit.

The results further show that older household heads are more likely to desire credit, whereby an increase in the age of the household head increases their need for credit. This might be because of experience gathered over the years. But at the age of 66 years, an increase in age of the household head beyond this reduces their need for credit. This corroborates with the life-cycle hypothesis in that their marginal propensity to consume reduces beyond this age. Also, larger rural households in Malawi are particularly poor and this increases their need for credit, as confirmed by the analytical results.

Households in the rural central and south of Malawi were more likely to desire credit than those living in the rural north of the country. The coefficients are larger for rural south dwellers. The rural south inhabitants include the majority of very poor households. This might explain why households in the rural south desire more credit than the dwellers in other areas. Also, households that lived farther away from the nearest bank had a higher likelihood of desiring credit. The larger the distance from a banking institution implied the household was more rural and probably poor.

5.2.2 Determinants of the decision to apply for credit

Column B of Table 5 presents the results of the bivariate probit model with the need for credit equation as the selection equation and *apply_credit* as the outcome equation. It is worth reminding that *apply_credit* equals 1 for households who need and apply for credit, irrespective of whether they were successful or denied applicants and 0 for those who are discouraged. The Wald chi-square test rejects the null hypothesis that the estimated coefficients are simultaneously equal to zero implying that at least one of the coefficients is not equal to zero. The Wald test which tests the null hypothesis of independence of the two equations ($\rho=0$) estimated jointly is rejected at the 1 per cent significance level. This indicates that estimating a univariate probit model for *apply_credit* would have been misleading.

Rural south households had a greater chance of being discouraged from borrowing compared to those in the north. The majority of the rural households in the south of Malawi are highly poor and therefore would not have the needed collateral to borrow. These households are therefore highly unlikely to apply for credit since they do not own their own farms. But in contrast to this, rural central dwellers were highly likely applicants. The central part of Malawi, where Lilongwe the capital of Malawi is located, is probably the most developed area in the country. Rural households found in the central part of Malawi will hence be closer to financial institutions which might facilitate loan application. Households living away from a bank were also more likely to be discouraged. Longer distance from credit sources may add to the transaction costs of applying for credit. Remittances played a significant role. Households receiving higher remittances were discouraged from applying. Remittances in this case act as a substitute for credit.

Male headed households were more likely to apply for credit implying that female headed households were discouraged. Female headed households are often much poorer than their male counterparts and most often lack the necessary confidence to apply for credit. Further, likely applicants had either primary or secondary level of education with the latter having a greater probability of applying. Therefore those educated households who needed credit are more likely to apply. They might be better informed about the benefits and risks of credit and of the application procedure than the uneducated household heads. Participating in an off-farm economic activity was also an important factor explaining the probability of applying

for credit. These farm households may apply for credit especially to support their off-farm activity.

Households that participated in more networks were more likely to apply for credit. The more networks a household joined, the more influenced that person is going to be by members of the group who may themselves be borrowers. Further if households cultivating large farm lands during the raining season and households with high real annual aggregate consumption expenditure desired credit they were more likely to decide to apply. Large farm land size implies more collateral for the credit. Households with high expenditure may be richer households who can also provide collateral.

5.2.3 Determinants for denied credit

The last column, C, of Table 5 presents the results of the estimates of whether a household is approved or denied credit, with the variable *denied_credit* coded as 1, while successful applicants are coded as 0. This decision is conditional on whether a household applies for credit, thus *apply_credit* is the selection. The test of whether the estimated coefficients are simultaneously zero is rejected at the 1 per cent significance level. The test for the independence of the two equations estimated jointly shows that the equations are truly dependent and therefore a right model has been estimated.

The results show that among all the variables, only sex of the household head and the locations of the household were statistically significant. Male headed households had a greater probability of being denied credit as compared to their female counterparts. Some credit schemes have targeted female headed households due to the fact that women are seen to be more efficient in handling and paying back credit, and therefore they were considered as lower risk borrowers.

Further, rural farm households located in either the central or the southern part of the country were more likely to be refused credit than those in the northern part of the country. But comparing the magnitude of the coefficients, those in the central part of the country have a greater probability of being denied credit compared to those in the south of Malawi.

6. CONCLUSION AND IMPLICATIONS OF THE STUDY

This study contributes to rural farm households' access to credit particularly highlighting on non-borrowers and discouraged borrowers. Using a rich data source from the third wave of the Malawi Integrated Household Survey, a three-step estimation model was followed using both a univariate probit and bivariate probit estimations. Specifically the study addressed three objectives which included determining the demographic and socio-economic factors that influence households'; (1) desire for credit; (2) discouragement from applying for credit; and finally (3) being denied credit.

This study found that there were more discouraged borrowers than denied borrowers showing a greater percentage of constraint households than would have been if only denied borrowers were considered. This is consistent with the findings of Levenson and Willard (2000), Freel et al. (2012) and especially Brown et al. (2011) who found that discouraged borrowers were more than twice as much as denied applicants. Hence this makes a big case for the inclusion of discouraged borrowers in studies of access to credit ensuring that all those who are credit constrained are analysed for an appropriate policy recommendation.

The findings further showed varying significance and direction of the effect of the explanatory variables on the diverse borrowing decisions. On one hand while the educational levels were statistically significant in explaining the need for credit and applying for credit, it was negatively related to the former but positively related to the latter. This shows that the educated households in rural Malawi did not require credit and hence did not apply for credit, or discouraged from borrowing.

As expected female headed households were more discouraged from borrowing than their male counterparts. Despite this, females were more likely to be successful in their application for credit. To this regard, policy intervention should be directed at encouraging more female heads to apply for credit. It is established that female heads are able to affect the poverty level of the household than their male counterparts given some financial support.

Also the negative relationship between remittances and application for credit shows that discouragement is not always a self-rationing mechanism where bad-borrowers self-exclude themselves from borrowing. Remittances are therefore considered here as farm credit substitute. Though this is not to wholly recommended out-migration of the youth from rural areas, it is recommended that financial institutions should be established closer to the rural

communities where remittances can be sent easily to families in rural households. As seen from the results long distance from financial institutions facilitate discouragement. Therefore bringing them closer to the households would not only encourage borrowing but also serve as a medium to receive remittances.

The influence of social groups within rural Malawi cannot be underplayed. Since households living within rural areas have close relationship each other, information easily spreads. As a complement to the extending financial services to rural communities, it will also be necessary to establish bank clubs or bank social events where financial literacy can be taught. Information could then be passed on from those who attend to those who do not attend.

Finally to conclude, it is recognised that the open definition given to discouraged borrowers using the Malawi data may differ for another researcher. Despite that, the results are not expected to differ extremely from this study. Further empirical research needs to be done in other regions of the sub-Saharan Africa so as to have a correct measure of those who are credit constrained.

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APPENDIX

Table 1: Description of independent variables used in the model

| Variable name | Variable type | Description |
|---|---------------|--|
| Sex | Binary | Sex of the household head (1= male , 0=female) |
| Age | Continuous | Age of household head in years |
| Household size (hhsiz) | Continuous | Number of members in the household |
| Location | | Geographical location of the households |
| Rural North | Binary | 1 = rural north, 0 = elsewhere |
| Rural Central | Binary | 1 = rural central, 0 = elsewhere |
| Rural South | Binary | 1 = rural south, 0 = elsewhere |
| Education level | | Educational levels of household head |
| None | Binary | 1= no education, 0 = otherwise |
| Primary | Binary | 1= primary education, 0 = otherwise |
| Secondary | Binary | 1 = secondary, 0 = otherwise |
| Tertiary | Binary | 1 = tertiary, 0 = otherwise |
| Off-farm | Binary | 1= work off-farm, 0=otherwise |
| Network | Continuous | Number of networks households are involved in |
| Land size cultivated (Land) | Continuous | Total land size cultivated in the rainy season in acres. |
| Total asset value (Total assets) | Continuous | Total value of farm assets including livestock in Malawi Kwacha |
| Consumption per household (Expenditure) | Continuous | Real aggregate household consumption per household in Malawi Kwacha |
| Remittance | Continuous | Remittances sent to the household by children living outside the household |
| Bank Distance | Continuous | Distance to the nearest bank |
| ADMARC distance | Continuous | Distance to the nearest Agricultural Development and Marketing Corporation |

Table 2: Mean characteristics of rural farm households that desire credit

| Variables | Non-borrowers n2=1,171 | Need Credit n3=5,856 | All respondents n1=n2+n3=7,027 | Statistical test |
|------------------|---------------------------|-------------------------|-----------------------------------|------------------------|
| Sex | | | | |
| Female | 0.236 | 0.258 | 0.253 | $\chi^2=0.4003$ |
| Male | 0.764 | 0.742 | 0.747 | |
| Age | 45.78 | 42.39 | 42.99 | $t=7.2292^{***}$ |
| Household size | 4.462 | 4.639 | 4.615 | $t=-3.8246^{***}$ |
| Location | | | | |
| Rural North | 0.166 | 0.0867 | 0.102 | $\chi^2=206.661^{***}$ |
| Rural Central | 0.576 | 0.382 | 0.417 | |
| Rural South | 0.258 | 0.531 | 0.480 | |
| Total | 2.093 | 2.444 | 2.378 | |
| Education | | | | |
| None | 0.751 | 0.818 | 0.804 | $\chi^2=27.1341^{***}$ |
| Primary | 0.110 | 0.0861 | 0.0905 | |
| Secondary | 0.122 | 0.0904 | 0.0980 | |
| Tertiary | 0.0171 | 0.00586 | 0.00782 | |
| Total | 1.405 | 1.285 | 1.310 | |
| Off-farm | | | | |
| No | 0.830 | 0.835 | 0.834 | $\chi^2=0.6532^{***}$ |
| Yes | 0.170 | 0.165 | 0.166 | |
| Network | 3.112 | 3.017 | 3.038 | $t=3.5651^{***}$ |
| Land | 2.161 | 1.733 | 1.811 | $t=6.4078^{***}$ |
| Total assets | 84192 | 33513 | 42364 | $t=9.0132^{***}$ |
| Real expenditure | 208316 | 180860 | 186649 | $t=5.485^{***}$ |
| Remittance | 3382 | 1511 | 1830 | $t=4.6676$ |
| Bank distance | 29.88 | 30.49 | 30.42 | $t=1.3027$ |
| ADMARC distance | 7.940 | 8.573 | 8.453 | $t=-0.7316$ |

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 3: Mean characteristics of rural farm households that are discouraged or applied

| | Discouraged n4=4,446 | Applied n5=1,410 | Need Credit n3=n4+n5=5,856 | Statistical test |
|------------------|-------------------------|---------------------|-------------------------------|-------------------------|
| Sex | | | | |
| Female | 0.281 | 0.180 | 0.258 | $\chi^2=53.7375^{***}$ |
| Male | 0.719 | 0.820 | 0.742 | |
| Age | 43.31 | 39.34 | 42.39 | $t=7.5998^{***}$ |
| Household size | 4.524 | 5.018 | 4.639 | $t=-7.6729^{***}$ |
| Location | | | | |
| Rural North | 0.0964 | 0.0549 | 0.0867 | $\chi^2=164.3288^{***}$ |
| Rural Central | 0.336 | 0.535 | 0.382 | |
| Rural South | 0.568 | 0.410 | 0.531 | |
| Total | 2.472 | 2.355 | 2.444 | |
| Education | | | | |
| None | 0.835 | 0.760 | 0.818 | $\chi^2=29.9439^{***}$ |
| Primary | 0.0779 | 0.113 | 0.0861 | |
| Secondary | 0.0816 | 0.120 | 0.0904 | |
| Tertiary | 0.00531 | 0.00769 | 0.00586 | |
| Total | 1.257 | 1.376 | 1.285 | |
| Off-farm | | | | |
| No | 0.855 | 0.766 | 0.835 | $\chi^2=48.5308^{***}$ |
| Yes | 0.145 | 0.234 | 0.165 | |
| Network | 2.878 | 3.475 | 3.017 | $t=-11.3606^{***}$ |
| Land | 1.657 | 1.984 | 1.733 | $t=-6.6915^{***}$ |
| Total assets | 32872 | 35631 | 33513 | $t=-0.4688$ |
| Real expenditure | 169180 | 219434 | 180860 | $t=-12.4128^{***}$ |
| Remittance | 1767 | 665.3 | 1511 | $t=2.1146^{**}$ |
| Bank distance | 31.20 | 28.14 | 30.49 | $t=2.5183^{**}$ |
| ADMARC distance | 8.682 | 8.211 | 8.573 | $t=3.9427^{***}$ |

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 4: Mean characteristics of rural farm households that received or was denied credit

| Variables | Approved n6=897 | Denied n7=513 | Applied n5=n6+n7=1,410 | Statistical test |
|------------------|--------------------|------------------|---------------------------|----------------------|
| Sex | | | | |
| Female | 0.190 | 0.161 | 0.180 | $\chi^2=0.367$ |
| Male | 0.810 | 0.839 | 0.820 | |
| Age | 38.81 | 40.40 | 39.34 | $t=-1.7^*$ |
| Household size | 5.122 | 4.813 | 5.018 | $t=2.287^{**}$ |
| Location | | | | |
| Rural North | 0.0579 | 0.0490 | 0.0549 | $\chi^2=6.998^{**}$ |
| Rural Central | 0.559 | 0.490 | 0.535 | |
| Rural South | 0.383 | 0.461 | 0.410 | |
| Total | 2.325 | 2.412 | 2.355 | |
| Education | | | | |
| None | 0.735 | 0.808 | 0.760 | $\chi^2=11.6^{***}$ |
| Primary | 0.130 | 0.0798 | 0.113 | |
| Secondary | 0.123 | 0.112 | 0.120 | |
| Tertiary | 0.0116 | 0 | 0.00769 | |
| Total | 1.412 | 1.304 | 1.376 | |
| Off-farm | | | | |
| No | 0.737 | 0.824 | 0.766 | $\chi^2=8.049^{***}$ |
| Yes | 0.263 | 0.176 | 0.234 | |
| Network | 3.612 | 3.204 | 3.475 | $t=3.433^{***}$ |
| Land | 1.996 | 1.960 | 1.984 | $t=-0.345$ |
| Total assets | 38057 | 30835 | 35631 | $t=1.131$ |
| Real expenditure | 229425 | 199683 | 219434 | $t=3.341^{***}$ |
| Remittance | 592.7 | 808.8 | 665.3 | $t=-0.563$ |
| Bank distance | 27.34 | 29.72 | 28.14 | $t=-1.119$ |
| ADMARC distance | 7.669 | 9.283 | 8.211 | $t=-3.151^{***}$ |

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 5: Marginal effects for who desires and who gets credit

| Independent variables | [A] Need credit ^a | [B] Apply credit ^b | [C] Denied credit ^c |
|----------------------------|---------------------------------|----------------------------------|-----------------------------------|
| Sex ^d | -0.0136 [0.0130] | 0.0483*** [0.0161] | 0.0392*** [0.0145] |
| Age | 0.00342* [0.00182] | 0.000613 [0.00303] | -0.00141 [0.00256] |
| Age squared | -5.17e-05*** [1.76e-05] | -1.71e-05 [3.47e-05] | 1.45e-05 [2.97e-05] |
| Household size | 0.00966*** [0.00289] | | |
| Rural Central ^e | 0.0489** [0.0213] | 0.112*** [0.0340] | 0.0508*** [0.0131] |
| Rural South | 0.196*** [0.0190] | -0.0738* [0.0445] | 0.0320** [0.0158] |
| Primary ^f | -0.0335* [0.0197] | 0.0541** [0.0236] | |
| Secondary | -0.0574*** [0.0198] | 0.0677*** [0.0237] | |
| Tertiary | -0.175** [0.0745] | 0.100 [0.0856] | |
| Off-farm | -0.0106 [0.0141] | 0.0737*** [0.0175] | -0.00927 [0.0174] |
| Network | 0.00249 [0.00316] | 0.0172*** [0.00443] | 0.00125 [0.00333] |
| Land | -0.0113*** [0.00324] | 0.0126*** [0.00454] | |
| Total assets | -9.98e-08*** [3.39e-08] | -5.37e-08 [6.57e-08] | -4.27e-08 [5.23e-08] |
| Real expenditure | -2.09e-08 [4.38e-08] | 2.17e-07*** [5.93e-08] | 3.93e-08 [3.91e-08] |
| Remittance | -2.97e-07 [3.05e-07] | -1.66e-06* [9.00e-07] | -3.92e-07 [1.06e-06] |
| Bank distance | 0.000633*** [0.000228] | -0.00103*** [0.000283] | 4.14e-06 [0.000244] |
| ADMARC distance | -0.000242 [0.000622] | | |
| Observations | 7,027 | 7,027 | 5,856 |
| Censored obs. | | 1171 | 4446 |
| Uncensored obs. | | 5856 | 1410 |
| Log pseudo-likelihood | -736112.21 | -1429412 | -892121.8 |
| Wald chi-square | 364.74*** | 412.52*** | 27.35*** |
| Wald test of independence | | 6.88*** | 4.91** |

Notes: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

^a Desire Credit = 1 if either discouraged, rejected or successful, 0 if non-borrower. ^b Apply credit = 1 if rejected or successful, 0 if discouraged. ^c Denied credit = 1 if denied credit, 0 if successful.

^d Base group for sex of household head is female; ^e Base category for location is Rural North;

^f Base category for education is None