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Examination of the Determinants of Credit Constraints in the Rural Agricultural Credit Market of Nigeria

[1, 2]Yusuf Ibrahim Kofarmata, [2]Shri Dewi Applanaidu and [2]Sallahuddin Hassan
[1]Department of Economics and Agribusiness, Universiti Utara, Malaysia
[2]Department of Economics Northwest University, Kano, Nigeria

Abstract: Improving and sustaining production efficiency of small farmers under the dominance of borrowing constraints require the improvement of access to credit among other factors of production. Although, there has been a substantial literature on credit rationing in developing world, there is surprisingly little information on the characteristics of farmers who are likely to be affected by the factors identified to be the credit constraints. Therefore, using data of 171 respondents from the household survey, the research provides new evidence on credit rationing and borrowing constraints for rural farmers in Nigeria. The estimates of the probit regression model reveal that constraints to credit is negatively related to educational attainments of the farmers, family members and positively correlated with high off-farming income and secondary occupation. Based on the findings, the study recommends the need for the policy makers to strengthen the lending capacity of rural credit markets, redesign the educational system and encourage micro businesses in the rural areas.

Key words: Determinants, credit constraints, financial obstacles, agricultural credit rural, farmers

INTRODUCTION

Credit is regarded as one of the apparatus of financial services considered important in all production activities. Generally, there has been a growing awareness on the importance of farm credit as an instrument for the development of agriculture, particularly its impact on the financial structure in the production unit (Barry and Robison, 2001).

Part of the reason why farm credit is increasingly getting momentum in many economies is as a result of the response to the demand of micro entrepreneurs, specifically small holder farmers and rural dwellers who have limited access to financial services. For the past decades, development scientists such as Von Pischke and Adams (1980) elucidate that the inability of the rural farmers to access farm credit undoubtedly has adverse consequences on income earning, farming production and more importantly the rural welfare. Therefore, inaccessibility of farm credit may lead to lack of acquiring necessary inputs for farming that may distort the entire production process through the multiplier effect leading to vicious circle. Consequently, in order to achieve the sustainable development for a given economy, the human, natural and physical capital which is also called traditional composition of capital need to be extended to include poor households. Growing empirical literature suggests that social and human capital were among the element of sustainable development. Therefore, consideration is being given to the importance of social and human capital on the welfare of the families and the level of development of nations and economies. In this regard, Lawal *et al.* (2009) established a positive relationship between access to credit and social capital among the rural farmers.

It is well understood that demand for farm credit differ according to varying attributes of the individuals. Nonetheless, the difference between the demand for credit and its corresponding supply indicates a clear demarcation that some degree of credit constraint exists among the households. However, Nagarajan *et al.* (1998) expounds that the wider the difference, the higher the level of credit constraint. Thus, constraint to credit could be seen as a difference between excess demand and shortage credit supply due to lack of capital by the lenders, information asymmetric (Stiglitz and Weiss, 1981), transaction cost (Boucher *et al*., 2009; Guirkinger and Boucher, 2008) and attributes of the households (Kofarmata *et al*., 2014). Thus, Omonona and coauthors defined credit constraint as the condition on which an individual cannot avail the desired credit for production at the prevailing market price.

Growing research from the empirics advocates that in developing economies, lack of credit have substantial negative consequences on farm profit (Carter, 1989), output and farm investment. Moreover, the prevalence of constraints to credit in developing nations like Nigeria

Corresponding Author: Yusuf Ibrahim Kofarmata, Department of Economics and Agribusiness, Universiti Utara, Malaysia

and its effect on production have led to insufficient agricultural production. Empirical evidence from southern Nigeria indicates that aggregate social capital index (meeting attendance, membership, decision making), experience, amount of loan requested, collateral availability and cash contribution reduces credit constraints one hand. On the other hand, production of cash crops such as cocoa increases credit constraints status of the farmers (Lawal *et al*., 2009). Similarly, Omonona and coauthors (2010) found that 79% of the sampled respondents were credit constraint in Nigeria and that some demographic attributes, human capital and asset and number of contact with extension worker are the major determinants of credit constraints by the households. But the percentage of credit constraints households is much more severe in Ghana where Bigsten *et al*. (2003) reported 90% of the small firms and households are credit constraints with respect to institutional loan, owing to their inability to secure collateral. In a study conducted in U.S. Netherlands and Italy, Crook and Hochguertel found that younger individual and low income earners are likely to be credit constraint. However, they elucidate that much of the loan applications are being rejected in the U.S. in comparison to Netherlands and Italy. Besides, in different studies conducted in South Asia, America and Africa by Yu and Jappelli (1990) and more recently by Koomson and coauthors reaffirmed that financial attributes of the households such as wealth, income and savings are the major determinants of credit constraint.

However, going far within the literature, this current research has noticed that previous studies have put more weight on household's financial attributes as a possible factors that can shed light on the credit constraints status of the household. Other factors such as human capital indicators and household carrier that receive little attention in the past has been acknowledged in this study. Moreover, econometric modelling of these variables in the context of the study area has been very rear. With this in mind, this study seeks to analyse the determining factors of credit constraints in agricultural credit market in rural Nigeria.

MATERIALS AND METHODS

Data: A three-stage random sampling method has been used for the selection of the respondents in the study area. This involves the random selection of the three local governments from each of the three agricultural zones in Kano State of Nigeria at the first stage. Namely Kura, Dambatta and Wudil Local Government Areas from Zone 1-3, respectively. While the second and third stages of sampling procedure are the selection of the local wards and grass root farmers from these three local government areas. Based on the registered farmers in these areas, 57 respondents were selected from each of this three local government areas making a total of 171 respondents. Vital information necessary for the study were collected from them via the questionnaire and the data were believed to be the first in the study area.

Econometric model: It has been established in the literature that regression with qualitative dependent variable could best be handle with the binary regressand models. In this case Probit model, since the dependent variable is a response to the qualitative questions on credit constraint status of the farmers with 1 representing unconstrained and 0 for the constraints farmers. Following Ai and Norton (2003) and (Papatla and Krishnamurthi (1992), the model is presented in Eq. 1:

$$Y_i^* = X^i\beta + \mu_i \tag{1}$$

Where is not observed, however, we do observe:

$$Y_i = \begin{Bmatrix} 1, \text{if } y^* > 0 \\ 0, \text{if } y^* < 0 \end{Bmatrix} \tag{2}$$

If includes an intercept, zero threshold is a normalization that is of no consequence as discussed by Greene. Specifying the model in Equations (1) and (2), we therefore have:

$$= \Pr(y = 1) = \Pr(x^i\beta + \mu_i > 0) \tag{3}$$

$$= \Pr(-\mu_i < x^i\beta) \tag{4}$$

$$= F(x^i\beta) \tag{5}$$

Where is the cumulative distribution function (c.d.f.) of. If is standard normally distributed, this will yields the normit model popularly known as probit model. Conventionally, we have to set in the probit model, so as to impose restrictions and to exceptionally define the scale of in the model. Following this normalization the Empirical Model is presented below in Eq. 6:

$$\begin{aligned} \text{Prob}(y = 1|x) = {} & \beta_{oi} + \beta_1 AGE_i + \beta_2 AGE2_i + \\ & \beta_3 DEP_i + \beta_4 SEC_i + \beta_5 TER_i + \beta_6 EXP_i + \\ & \beta_7 CVS_i + \beta_8 SEM_i + \beta_9 OFF_i + \mu_i \end{aligned} \tag{6}$$

Where AGE is the age of the farmers in years, AGE2 is the age squared, DEP is the number of dependents per household, SEC is the dummy taking a value of 1 for secondary school attendant and 0 otherwise, TER is binary variable taking a value of 1 for tertiary school attendant and 0 otherwise, EXP is the household's years of farming experience. CVS is dummy variable taking a value of 1 for civil servant, SEM is also a dummy variable taking a value of 1 for self-employment and OFF represents off-farming income. It is hypothesized that the probability of being credit constraint decreases with an increase in household wealth and age (Hayashi, 1982; Jappelli, 1990; Zeldes, 1989) and increases with number of family (Mariger, 1986).

However, human capital indicators such as education could be positively related with some awareness regarding institutional credit and therefore less likely to be intimidated by lending agencies (Storey, 1994). It is expected therefore to be less credit constraints. Similarly, households with self-employment or being part of the township leadership is likely to demand credit in order reinvest in more productive ventures and therefore less likely to be constraints households (Li *et al*., 2013).

RESULTS AND DISCUSSION

This section of the study discusses the socio-economic attributes of the farmers in the study. Analysis of the estimates from the probit model and the corresponding marginal effects have also been discussed.

Attributes of the farmers in the study area: As indicated in Table 1, the mean age of the farmers in the study is 35.15. This indicates that majority of the farmers in the study area are economically active within their productive age. The estimated average number of dependent per household head is 7. This implies that farmers may hire less labour while benefiting from the abundant family resource. It may also be viewed from different perspectives that households with more siblings are likely to battle with an increase in expenditure that may possibly affect investment decision.

Interestingly, the average years of farming experience is 19 which signifies the managerial capability to most of the farmers regarding production decision. Similarly, the average off-farming income is $677. 83 (N149,143), on which together with the savings from farming ventures may likely be enough for farmers to reinvest in more productive activities, making them to be less credit constraints.

As indicated in Fig. 1, there seems to be a wide difference between constrained and unconstrained

Table 1: Household attribute

Variables	Mean	SD	Min	Max
AGE	35.15	9.888	20	50
DEP	7.222	7.275	1	41
EXP	19.04	12.55	1	50
OFF	149.123	157.879	50.000	700.000

1=N220

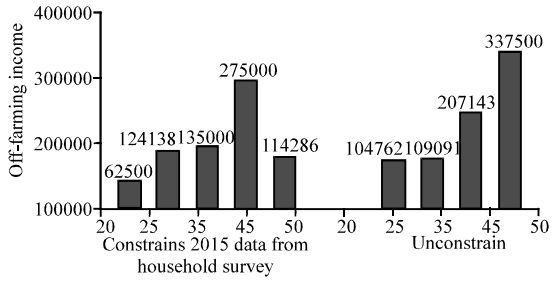

Fig. 1: Mean of off-farming income by age and credit constraints conditions

farmers within the age cohort with respect to income. The mean off-farm income for 50 years of age within the unconstraint farmers is far higher than their cohort in the constrained category. However with an inception of this, the mean off-farm income for constraints farmers is little > their counterpart. More surprisingly, Fig. 1 depicts that younger farmers within cohort of 20 years were denied access to farm credit indicating age bias.

Regression analysis: As mentioned in econometric model 2, probit model was used in this study to analyse the factors responsible for credit constraint status of the farmers in the study area. The maximum likelihood estimates of the econometric model as presented in Table 2 yields an interesting findings. The strength of this probit robust estimates was validated by the significance of the Wald x^2at 2 percent (prob> x^2 = 0.024). Similarly, the likelihood ratio test for model selection has favoured estimates from the probit model over the nested model as indicated by the significance of the Lrx^2(1) = 4.50 at 3% (prob> x^2 = 0.033).

Four out of nine coefficients of the probit estimates are significant at different levels. These are DEP, TER, CVS and OFF as indicated in the credit constraints model in Table 2. In addition, the average marginal effects of these estimates are also obtained for better understanding on the effects of these variables on constraints status. As evident from Table 2, the positive marginal statistical significant of DEP indicates that an increase in one family member increases the chances of being unconstrained borrower by 0.098% points. This implies that more members means more connections, therefore, farmers of this nature are likely to benefit from their social network and their loan applications are 1 ikely to succeed on one

Table 2: Probit Estimates

Variables	Probit model	Marginal effects
AGE	0.047	0.017
	-0.096	-0.035
AGE2	-0.001	0
	-0.001	-0.001
DEP	0.270*	0.098*
	-0.142	-0.05
SEC	0.315	0.114
	-0.301	-0.108
TER	0.670**	0.242**
	-0.318	-0.111
EXP	-0.01	-0.004
	-0.015	-0.006
CVS	-0.534*	-0.193*
	-0.292	-0.102
SEM	-0.238	-0.086
	-0.312	-0.112
OFF	0.275**	0.100**
	-0.129	-0.045
Constant	-3.737*	
	-2.033	
Wald x2	19.09	0.171
Prob> x2	0.024	
Pseudo R2	0.0653	

Credit constraints is the dependent variable taking a value of 1 for unconstraint and 0 for constraints. Robust standard errors in parentheses; *** p<0.01; ** p<0.05, * p<0.1.

hand. On the other hand, lenders are more willing to release farm credit to households with more members in order to benefit from the abundant chief labour that can lessen the cost of production. This contradicts the findings by Omonona and coauthors and Koomson coauthors but can be compared with those by Doanetal.

Similarly, human capital indicator was found to be very promising by the statistical significant of TER at 5%. The positive sign of this coefficient infers that a unit increase in the level of education increases the probability of being unconstrained farmer by 0.242% points. This suggests that farmers with higher educational qualification are likely to utilize their education to become more informative with regard to credit source and loan procedure. And by virtue of their qualification they are likely to be the favourable banks' clients. Similar result was reported by Girma and Abebaw and Omonona and coauthors but contradict the finding by Sebu that household with more years of schooling is unlikely to apply for loan.

However, the negative statistical significant coefficient of CVS at 10% predicts that those in government administration are less likely to become unconstrained borrowers but more likely to become constrained farmers. It follows that any additional promotion will decrease the chances of farmer to apply for loan by 0.193% points. This suggests that civil servant has additional chance to engage in different productive business that might make these type of farmers more economically stable that may decrease their demand for loan. This finding is consistent with results by Papias and Ganesan (2010) and Tang and coauthors but disagree with Mpuga (2010) and Li *et al.* (2013).

As expected and hypothesized, the positive and statistical significant coefficient of OFF at 5% implies that a unit increase in off-farm income increases the chances of being credit unconstrained farmer by 0.10% points. This result suggests that some kind of credit may be needed by this type of farmers to finance big projects on one hand. On the other hand, credit worthiness is associated with high income earners and lenders favour customers with higher capabilities of repayment. This is similar with the position by Crook and Hochguertel and Yu.

CONCLUSION

This study contributes on the analysis of farmers' access to farm credit particularly highlighting more on the credit constraints status of the rural households, using a micro level farm data sourced from the household survey. Precisely, the study examined the determinants of household's being credit constraints.

The econometric credit constraints model shows that farmers with little or no off-farm income and less educated ones together with those at the administrative cadre are likely to be denied loan. Therefore, these type of farmers stand at high risk of being credit constraints compared to more educated with income from different sector. Unlike previous studies, this study concludes that households with more dependence (siblings) are also likely to be included in the agricultural credit market.

SUGGESTIONS

The study suggests that appropriate educational adjustment is needed to incorporate more rural farmers by given them more access to educational system and awareness with respect to credit market. This structural educational arrangement could include the provision of part time classes and adult literacy programs. However, the fact that only 24.15% get farm credit, the study recommends the need to strengthen the lending capacity of the lenders in order to supply more credit to the rural households.

By addressing this issue, rural farmers might have access to farm capital that will be reinvested and generate more earnings, thus decrease the vulnerability of production. Moreover, the authorities should encourage off-farming commitment so that return form farming will be utilized especially during the off-farm season.

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