Original Research Article

ANALYSIS OF THE DETERMINANTS OF ACCESS TO AGRICULTURAL CREDIT AT LOCAL BANK OF MUTUAL AGRICULTURAL CREDIT

Abstract
The objective of this paper is to determine the factors that favour the granting of credit in the microfinance institution at the Local Bank of Mutual Agricultural Credit (LBMAC) the largest in BENIN in a rural area. In methodological terms, the estimation of a logistic regression model has been made. Several variables are collected to explain access to agricultural credit in the institution. The results of the estimates show that, having one person as a guarantor and the seniority in obtaining the loan influence the granting of credit. As a result, the LBMAC is very selective, greatly limiting the demand for credit from farmers. So, economic policies must offer favourable conditions for micro-finance in the agricultural sector to increase their numbers and also allow them to be less selective.
Keywords: Determinants, Agricultural credit, Smallholder logistic regression model, LBMAC
JEL Classification: Code: E23 ; Q14

1. INTRODUCTION

Agriculture is a main source of wealth in BENIN. The services constitute the most important sector of the Beninese economy and are followed by Agriculture. It contributes around 32.7% to the Gross Domestic Product, 75% to export earnings, 15% to State revenue and provides about 70% of jobs. It also and above all contributes to ensuring the country's food security. Thus, BENIN is currently emphasizing the development of the agricultural sector by adopting a strategic plan to revive the agricultural sector. This plan includes a series of measures including, among others, the establishment of a financing, credit and insurance system specific to agriculture.

Access to finance remains a major challenge for farms in developing countries. For Ololade and Olagunju, (2013) farmers are particularly in need of credit because of the seasonality of their activities and the uncertainties they face. The agricultural credit is as important as labor, land, seeds, equipment and raw materials (Rahji, 2000; Wicaksono E, 2014). The availability of credit gives farmers the possibility of accessing fertilizers, improved seeds, insecticides and labor (Hussein & Thapa, 2012; Ololade and Olagunju, 2013), and allows the agricultural calendar to be respected by timely availability of inputs (Memon et al., 2016). According to Feder et al (1990) the access to credit improves agricultural productivity. The low productivity is a threat to food security in countries with worrying level of poverty. However, in Benin, smallholders are dominant with still low productivity levels (Assogba et al, 2017).

For Olagunju and Ajiboye, (2010), farmers with access to credit can engage in the use of modern technology, which promotes technology transfer and investment. In addition, credit strengthens the resilience of farmers by allowing them to adapt to climate change, and to hedge against risk (Olalade and Olagunju, 2013). Thus, the availability and adequate access, in time and at a lower cost, to agricultural credit from institutions is of great importance, in particular for farmers (Elias et al., 2015). However, the conditions of formal finance are not accessible to farmers.

Thus, according to Lanha (2001), in order to fight against poverty and fill the void left by traditional banking systems, Micro Finance Institutions (MFIs) will develop. The experiences of microcredit in Benin go back to the 1970s with the creation in 1977 of the Local Bank of mutual agricultural credit (LBMAC) managed by the national agricultural credit with the objective of offering savings and credit services to farmers and civil servants and entrepreneurs (Sossa, 2011). Today, Benin has about a hundred MFIs and financial services for agriculture are provided by a small number of microfinance (Kodjo et al., 2003). The leader in the sector remains the LBMAC which is established all over the country and especially in rural areas. It appears as a giant of microfinance in Benin. Thus, analyzing the determinants of access to agricultural credit in this institution is important in understanding the supply credit of MFIs to agriculture in the country.

From the point of view of recent literature, Assouto and Houngbeme (2020) analyzed the role of access to credit in improving agricultural productivity and Sossou et al. (2017) analyzed the factors that determine access to credit for farms in Benin.

This paper attempts to identify the determinants of access to credit in the leading structure of agricultural financing and in a municipality whose main activity is agriculture and over 86% of the population lives mainly on agricultural income (INSAE, 2019).

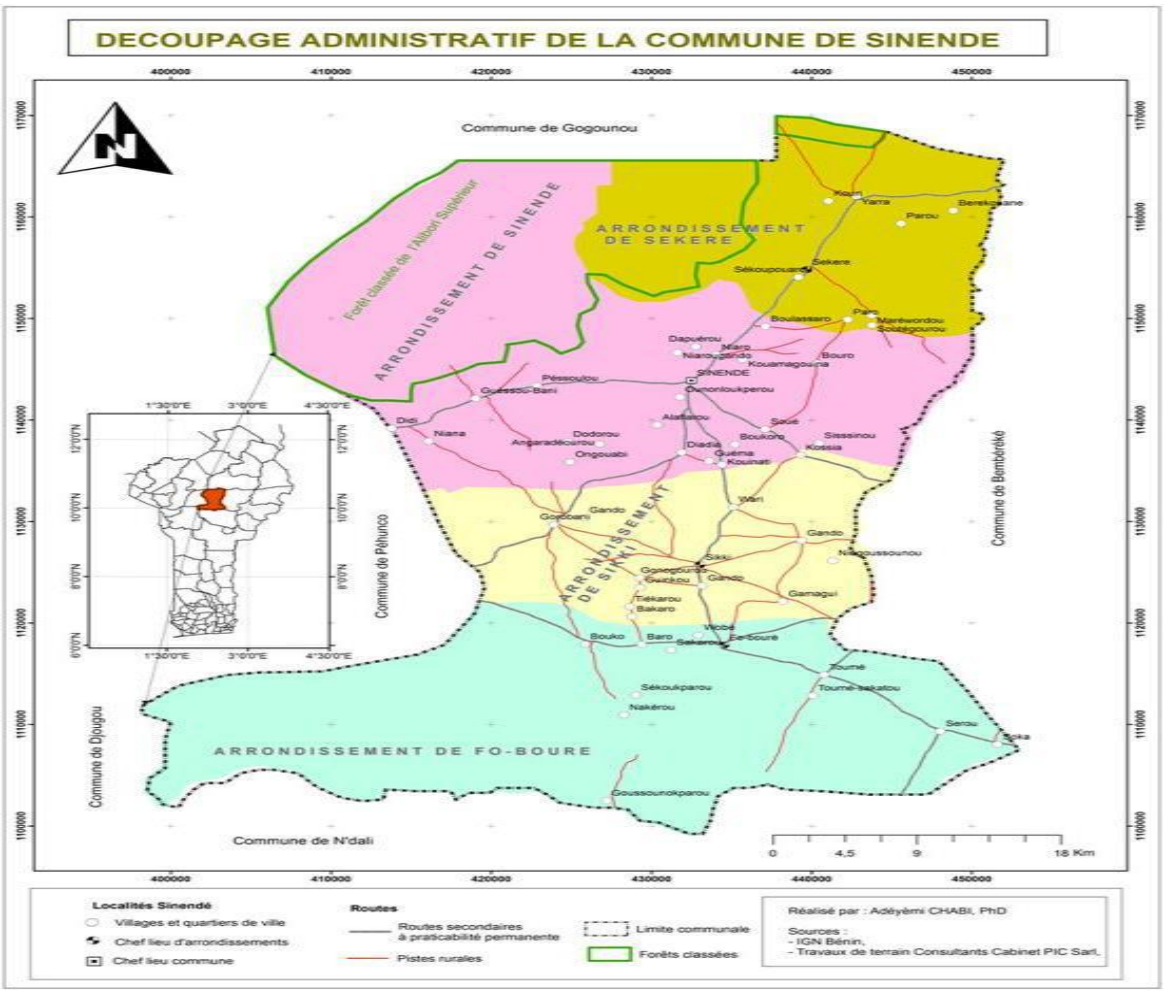
Remainder of the article is divided into three sections. The next part deals with the research methodology. The third section presents and discusses the results. The last draws the conclusion and formulates economic policy implications.

2. RESEARCH METHODOLOGY

2.1. Description of the study area

Included between 10°20'41" and 10°34' north latitude and between 2°22'45" and 2°38' east longitude, the municipality of Sinendé is limited to the north by that of Gogounou, to the south by the commune of N'Dali, to the east by that of Bembéréké and to the west by the municipality of Péhunco. The commune of Sinende is located in the far north of the Borgou department and covers an area of 2,289 km^2. The climate is Sudano-Guinean with two seasons: a rainy season extending from April to October, or about six (6) months of rain and a dry season ranging from mid-October to mid-April. The water level recorded annually varies between 1000 mm and 1200 mm with maximum precipitation in August and September. The average temperature varies throughout the year between 24.2 ° C (September) and 29.5 ° C (March), i.e. a thermal amplitude of 5 ° C. These temperatures are characterized by a diurnal thermal amplitude greater than the annual amplitude. MECPD (2019)

Figure 1 : Map of the municipality of SINENDE



Source : MECPD(2019)

2.2 Data Collection Method and Sources

Data collected are primary. The study population is made up of 597 people who applied for agricultural credit to LBMAC SINENDE in 2019. Given the constraints, we selected a sample of 150 people. The simple random sampling technique without replacement was used for sample selection.

2.3. Analytical Model

2.3.1. Logistics model Specification

Model used is based on the one adopted by Gebeyehu et al. (2019). It is about measuring and explaining the probability of having access to credit. We define a dichotomous variable y_i which is equal to 0 if the farmer has not obtained the credit and to 1 if it is the case, we suppose that there is a continuous latent and unobserved variable Y* which determines the value of Y We therefore have:

$$y_i = \begin{cases} 1 \rightarrow if \;\; y_i^* > \; C \\ 0 \quad\;\; if \; not \end{cases} \qquad \forall \; i = 1 \ldots . N$$

where C is the threshold and y_i the dependent variable which can be written as the sum of a linear combination of characteristics specific to each farmer and a random term.

$$y_i = x_i\beta + \varepsilon_i$$

with the random term εi distributed according to a logistic law where x_i includes all the socio-economic and demographic characteristics of the farmer. It is assumed that the vector x_i does not include constant. The probabilities associated with the two modalities are defined as follows:

$$P_i = \; Prob(y_i = 1) = \; Prob(y_i^* \geq 0)$$

$$\Leftrightarrow P_i = Prob(\varepsilon_i > x_i\beta) = \; 1 - Prob(\varepsilon_i \; < -x_i\beta)$$

$$\Leftrightarrow P_i = \Lambda(x_i\beta)$$

with Λ (.) the distribution function of the logic law; thus the logic model defines the probability associated with the event yi = 1, as the value of the distribution function of the logistic law considered at the point $x_i\beta$.

$$P_i = \Lambda(x_i\beta) = \frac{1}{1+e^{-x_i\beta}} \Longrightarrow 1 - P_i = \frac{e^{-x_i\beta}}{1+e^{-x_i\beta}} \Longrightarrow \frac{P_i}{1-P_i} = \; \frac{1}{1+e^{-x_i\beta}} * \frac{1+e^{-x_i\beta}}{e^{-x_i\beta}} = e^{x_i\beta} = C_i$$

Moreover, the marginal effect of the j th variable on the probability P_i is obtained by:

$$\frac{\partial P_i}{\partial x_i^{[j]}} = \frac{e^{x_i\beta}}{(1 + \; e^{x_i\beta})^2}\beta_j$$

2.3.2. Presentation and definition of model variables

Dependent variable is dichotomous and represents the farmer's access to the institution's credit. It takes the value 1 when credit is granted and 0 otherwise.

The explanatory variables make 10 which are represented in Table 1.

Table 1: Presentation of study variables

Variables	Description	Measurement
	Dependent variable	
Acces	The farmer obtained the credit	Dummy:1 if access, 0 otherwise
	Independent variables	
Age	farmer's age in years	Year
Sex	Farmer's sex	1 = male, 0 = female
Exp	Number of credit experiences	1 = first 2 = second 3 = more than two experiences
num_dep	number of dependents	1 = less than 5; 2 = between 5 and 10, 3 = more than 10
Dur	Duration of the requested credit	1 = less than six months and 2 = more than six months
Guar	has the guarantee	1 = for a famer who has a guarantee, 0 otherwise
crop_d	Crop diversification	1 = yes, 0 = no
mem_ass	Member of an association	1 = yes, 0 = no
act_gen	Other income-generating activities	1 = yes, 0 = no
Pov	Poverty level	1 = poor 2 = well-off and 3 = rich

3. RESULTS AND DISCUSSION

3.1 Demographic and socio-economic characteristics of famers sample

Table 2 shows the age distribution of farmers.

Table 2: Descriptive statistics of the sample for the continuous variable: ages

Variable	Acces (n1=130)		No acces (n2=20)		N=150	
	Mean	SD	Mean	SD	Mean	SD
Age	40.06	11.14	42.36	11.98	40.37	11.24

We see that the average age of farmers is 40 years.

Table 3 shows the descriptive statics of the discrete variables in the sample. Among loan requesters, about 33% are women, 87% on average have had access to credit, and 63% have a seniority of more than two years. In addition, 71% have guarantees or carry out activities other than agriculture. In the sample 27% are poor; the loan duration is 91% more

than one year and 43.33% are in groups. We note that more than 90% of farmers grow more than one crop, and nearly half have less than five persons dependents.

Table 3: Descriptive statistics of the sample famers (for dummy variables)

Variables	Numbers	Percentages	Variables	numbers	percentages
Acces			**Sex**		
0 = No	130	86.67	0 = female	101	67.33
1 = Yes	20	13.33	1 = male	49	32.67
mem_ass			**Dur**		
0 = No	65	43.33	1 = less than six months	14	9.33
1 = Yes	85	56.67	2 = more than six months	136	90.67
Guar			**crop_d**		
0 = No	107	71.33	0 = No	140	93.33
1 = Yes	43	28.67	1 = Yes	10	6.67
Exp			**act_gen**		
1 = first	21	14	0 = No	43	28.67
2 = second	35	23.33	1 = Yes	107	71.33
3=more than two	94	62.67	**num_dep**		
Pov			1 = less than 5	71	47.33
1 = poor	41	27.33	2 = between 5 and 10	63	42
2 = well-off	80	53.33	3 = more than 10	16	10.67
3 = rich	29	19.33			

3.2. The quality of the logit regression model

Logit model is globally significant as indicated by the p-value associated with the chi-square test (Prob> chi2 = 0.0001). To check the robustness of this estimate, the probit model is estimated. The latter is also globally significant with a p-value associated with the chi-square test of (Prob> chi2 = 0.0000). In addition, the signs of the coefficients of the two models are identical, as is the significance of the variables. The area under curve is 0.8750 model performance is good. After performed goodness-of-fit test, the model fits reasonably well.

To assess the model's ability to classify well, we construct the confusion matrix. It allows comparing the observed values of the dependent variable with those which are predicted, then counts the good and bad predictions. Its interest is that it allows both to understand the error rate and to account for the structure of the error.

3.3 Determinants of access to agricultural credit at LBMAC

Results of the estimations show the variables which are the determinants of having of agricultural credit. Table 4 summarizes the results of the estimates.

Table 4: The coefficients and marginal effects of the logistic regression model

VARIABLES	(1) Logistic Acces	(2) probit acces	(3) margin_logistic Acces
Age	-0.0445	-0.0237	-0.004
	(0.0306)	(0.0160)	(0.002)
Sex	1.065*	0.590*	0.086*
	(0.641)	(0.350)	(0.05)
num_dep	0.775	0.425	0.063
	(0.531)	(0.287)	(0.043)
Guar	2.517***	1.389***	0.203***
	(0.653)	(0.347)	(0.046)
Act_gen	0.301	0.193	0.024
	(0.690)	(0.394)	(0.056)
Mem_ass	0.633	0.328	0.051
	(0.637)	(0.347)	(0.051)
Crop_d	-1.117	-0.594	-0.090
	(1.097)	(0.629)	(0.09)
Pov	0.769	0.430	0.062
	(0.502)	(0.264)	(0.040)
Exp	0.988**	0.577***	0.08**
	(0.417)	(0.219)	(0.032)
Dur	0.624	0.355	0.050
	(1.263)	(0.642)	(0.102)
Constant	-3.670	-2.153	-
	(3.377)	(1.791)	-
Observations	150	150	150

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4 shows that only two variables influence the probability of having access to credit at SINENDE's LBMAC. Indeed, the possession of a guarantor and the seniority increase the probability of obtaining an agricultural loan in the MFI. For a farmer who has a guarantee, it increases his chances of obtaining a loan by 20% compared to a farmer who does not have. In addition, between two experiences of applying for credit, the farmer increases his chances of obtaining by 8%.

For Sossou et al (2017), the guarantee does not influence the obtaining of credit unlike the LBMAC of Sinendé. On the other hand, Lemessa and Gemechu (2016) find that experience in using credit is an important variable that influences access to formal credit. This

result confirms ours. In addition, Gebeyehu et al (2019) find that the probability of accessing formal credit was also positively and significantly influenced by the number of years of membership in formal sources of credit. Mpuga, (2004) found that farmers' access to formal credit institution is positively influenced by farm operation in the use of credit. Sossou et al (2017) find no influence between membership and access to credit.

In the case of LBMAC, variables such as age, sex, group membership do not influence credit granting. But, for Mpuga (2004), age influences the granting of credit as for Gebeyehu et al (2019), which is not the case for the study by sossou et al (2017).

Gender is a factor that recurs in the literature as a determining factor in the granting of credit. Thus, from Awunyo-Vitor and Abankwah, (2012) came to the conclusion that men are more likely to access credit than women. Similarly, Gebeyehu et al (2019), find that gender influences the granting of credit. The model of Ololade and Olagunju (2013) revealed the existence of a significant relationship between gender and access to credit. Unlike previous authors, the model results show that the gender variable is not significant in the granting of credit (Sossou et al, 2017).

Finally, belonging to a group, to multipurpose agricultural cooperatives is also a variable that affects access to formal credit (Lemessa and Gemechu; 2016). Membership in a financial solidarity group has a positive influence on access to microcredits (Sossou et al, 2017). Abalo (2007) comes to the same conclusion in his study on micro-enterprises in Togo.

IV CONCLUSION

In this paper, it was a question of determining the factors that favor the granting of credit in the largest microfinance institution in Benin. The methodology revolves around the estimation of a logistic model. Several variables are used to explain access to agricultural credit. The results of the estimates show that only two variables influence the granting of credit. Having a person as a guarantor and your seniority in obtaining a loan improves your chances of obtaining agricultural credit with LBMAC.

Thus, the institution is very selective, which can severely limit farmer's demand for credit. To cope with this situation, policies must offer favourable conditions to MFIs in this sector to not only increase their number but allow them to be less selective. If agricultural producers are forced to leave the formal system and MFIs restrict their access, it will be detrimental to them. This study would benefit from taking into account other variables such as the level of education, the proximity of MFIs. Also, the search for factors that influence obtaining the requested amount or a credit lower than the desired amount is a consideration not taken into account in this study.

REFERENCES

Abalo, K., (2007) Importance of microfinance in the financing of micro enterprises in Togo. African Economic Conference 2007. 'Opportunities and Challenges of Development for Africa in the Global Arena' 15-17 November 2007, Addis Abeba, Ethiopia.

Assogba, P. N., Haroll Kokoye, S. E., Yegbemey, R. N., Djenontin, J. A., Tassou, Z., Pardoe, J. et Yabi, J. A. (2017). “Determinants of credit access by smallholder farmers in North-East Benin”. Journal of Development and Agricultural Economics, 9(8):210-216.

Assouto A. B. and Houngbeme D. J. (2020) Access to credit and agricultural productivity in Benin AERC Biannual Workshop, 18 p.

Awunyo-Vitor, D., Abankwah, V., (2012). Substitutes or complements: Formal and informal credit demand by maize farmers in Ashanti and BrongAhafo Regions of Ghana. International Journal of Agriculture and Forestry, 2(3): 105-112.

Elias, S., Ahmad, I. M., &Patil, B. L.,(2015). The determinants of access to agricultural credit for small and marginal farmers' in Dharwaddistrict, Karnataka, India, 3(5): 1–5.

Feder, G., L. J. Lau, J. Y. Lin and X. Luo, (1990) The relationship between credit and productivity in Chinese agriculture: A microeconomic model of disequilibrium. American Journal of Agricultural Economics, 72(5), pp. 1151-1157.

Gebeyehu L., Emana B., Mitiku F. and Ejeta T.T.(2019). Determinants of Access to Agricultural Credit among Smallholder Maize Farmers: The Case of Hababo Guduru District, Horro Guduru Wollega Zone, Ethiopia. IJHAF Vol-3, Issue-3, May-Jun ISSN: 2456-8635

Hussain, A. and G. B. Thapa. (2012). Smallholders' access to agricultural credit in Pakistan. Food Security 4(1): 73-85.

INSAE (2019). Note de synthèse sur la pauvreté au Bénin. Juillet.

Kodjo, K.Z. M., E. H. Abiassi, M.C. Allagbé, (2003) Financing Beninese agriculture in a context of liberalization: Contribution of microfinance. Faculty of Agronomic Sciences (FSA), University of Abomey-Calavi, Benin. 53 p.

Lanha, M., (2001). The joint surety group loan: Typology, effectiveness and empirical measurement, Mimeo, August 2001, 35 p.

Lemessa A. and Gemechu A. (2016). Analysis of Factors Affecting Smallholder Farmers' Access to Formal Credit in Jibat District, West Shoa Zone, Ethiopia. International Journal of African and Asian Studies Vol.25, 2016 ISSN 2409-6938

MECPD (2019) Communal monograph Spatialization mission for priority SDG targets in Benin, executive summary, 213 pages

Memon A, Jingdong L, Xuangxi X et Wang S. A (2016) Role of agricultural credit in i mproving agricultural productivity in Pakistan : A case stutdy of Kambar Shahdadkot District. Research Journal of Finance and Accounting, 7(11), p1-6.

Mpuga, P., (2004) Demand for credit in rural Uganda: Who cares for the peasants? In A paper presented at the conference on growth, poverty reduction and human development in Africa. Centre for the Studies of African Economies.

Ololade R.A. and Olagunju F.I.(2013) Determinants of Access to Credit among Rural Farmers in Oyo State, Nigeria. Global Journals Inc. Volume 13 Issue 2 Version 1.0 Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Olagunju F.I. and Ajiboye A. (2010): "Agricultural Lending Decision: A Tobit Regression Analysis." African Journal of Food Agricultural Nutrition and Development. 10 (5).

Rahji, M.A.Y. (2000): "An analysis of the Determinants of Agricultural Credit Approval and Loan Size by Commercial Banks in South-western Nigeria" Journal of Nigerian Development Studies. 1 (1): 6-25.

Sossa, T., (2011) Microfinance and financial inclusion in Benin, in La microfinance au Bénin, Geneva, The Graduate Institute Publications ("eCahiers", no 10), 2011, URL: http://iheid.revues.org/ 355; DOI: 10.4000 / iheid.355

Sossou C. H., Dogot T., Adjovi G., Lebailly P. and Coulibaly O. (2017) Analysis of the determinants of access to credit for farms in Benin. BRAB Special issue TA&SA December ISSN on hard copy: 1025-2355 and ISSN on line: 1840-7099

Wicaksono Eko, (2014) The Impact of Agricultural Credit on Rice Productivity », International Journal on advanced science engineering technology , 4(5), p. 1-4