Journal of Agricultural Sciences (Belgrade)
Vol. 67, No. 1, 2022
Pages 83-104

https://doi.org/10.2298/JAS2201083O
UDC: 631.151(669)
633.493(669)
Original scientific paper

THE NEXUS BETWEEN AGRICULTURAL LOAN ACCESS AND FARM INCOME OF SMALL-SCALE CASSAVA PROCESSORS IN OYO STATE, NIGERIA: AN ENDOGENOUS SWITCHING REGRESSION APPROACH

Olabisi D. Omodara[1*], Oluwaseun E. Adetunji[1,2] and Oluwemimo Oluwasola[1]

[1]Department of Agricultural Economics, Obafemi Awolowo University, Ile-Ife, Nigeria
[2]Department of Economics, University of New Hampshire, Durham, New Hampshire, USA

Abstract: An agricultural loan is an essential tool for transforming commercial agriculture into a profitable venture. In view of this, this study investigated determinants of access to agricultural loans and the profitability of small-scale cassava processing. It also tested whether access to agricultural loans affected the net farm income of cassava processors in Oyo State using budgetary analysis, endogenous switching regression model (ESRM) and augmented inverse probability weighted regression adjustment (AIPWRA) as a robustness check. A multistage random sampling procedure was employed to gather information from 120 cassava processors. The results revealed that female processors dominated cassava processing, and processors had a mean age of 41.1±7.5 years. Only 23% of the respondents had agricultural loan access, which was primarily sourced informally. Budgetary analysis showed that processors earned an average net farm income of ₦10,449.87 (US$29.03) in a production cycle. Endogenous switching regression analysis revealed that married and educated cassava processors that were socially inclusive and that had a large processing unit and earned meagre off-farm income were more likely to access agricultural loans. Furthermore, education (β=0.019, p<0.1), number of family members working (β=0.241, p<0.01), processors' experience (β=0.028, p<0.05) and enterprise size (β=0.001, p<0.01) influenced the net farm income of processors that had access to agricultural loans. The treatment effect from the AIPWRA result revealed that ATT and POM for cassava processing were 4.5% and 37%, respectively. Business risks, small enterprise size and high interest rate were the major constraints to agricultural loan access. From the foregoing, a need for a technical support system among cassava processors is inevitable. More so, cassava processors should be encouraged to join trade associations, and young processors should be given priority in credit initiatives for cassava processing.

Key words: farm credit, loan policy, smallholder, cassava processing, profitability, ESRM, AIPWRA.

[*]Corresponding author: e-mail: omodarao@oauife.edu.ng

Introduction

Cassava (*Manihot esculenta*) is the most important staple crop in Nigeria, followed by maize, sorghum, millet and yam (FAOSTAT, 2019). Cassava is not just a food crop but also a major source of income for producing households and the country at large. As a classic food security crop in Nigeria, cassava generates income for the largest number of households in comparison to other staples, produces high yield of tubers under poor conditions, and contributes significantly to poverty alleviation (Nweke, 2003).

Food and Agriculture Organization report has shown that Nigeria is the world's largest producer of cassava, accounting for about 20.3% (59 million tonnes) of global tuberous cassava root (FAOSTAT, 2019). This is not far-fetched as Nigeria is said to put more than 6 million hectares, representing 25.9% of its total land hectarage, into the cultivation of cassava with a yield of 8.76 tonnes per hectare (FAOSTAT, 2019). According to Nweke (2003), more than 90% of the cassava produced in Nigeria is processed into food, nevertheless, a significant proportion goes into industrial use consisting of a major derivative of High Quality Cassava Flour (HQCF), while less than 1% is exported. The competing need for the processed form of cassava for food over the fresh one has diverted efforts of farmers and processors into cassava processing where 70% of the roots are processed into gari while the remaining portion is used for elubo/lafun, abacha, fufu/akpu among others (Abass et al., 2013).

Cassava processing in Nigeria can be categorized into five-level capacities, namely household (or cottage), micro, small, medium and large scales, of which small and medium-level processing operations are dominant. A study by Adekanye et al. (2013) highlighted the lack of funds, high cost of machines, high operational costs and erratic power supply as the major constraints to the mechanization of cassava processing in Nigeria. Incidentally, access to agricultural loan facilities will, in the meantime, proffer the needed solution to the challenges facing the cassava processing enterprise in Nigeria.

The agricultural loan is a cash-based investment capital (credit) issued by the agricultural financial institutions to farmers with or without interest payment, within a specified period, terms and conditions (Kayani et al., 2017). In most developing countries, including Nigeria, the lack of loan facilities is an important constraint facing cassava processors when efforts are made to improve farm performance and living conditions (Oyelade et al., 2019). Several factors have been highlighted to influence access to credit among farmers (Oluwasola, 2009; Ololade and Olagunju, 2013; Kiplimo et al., 2015; Adeyonu et al., 2017; Tanimonure et al., 2020). There is evidence that having access to agricultural loan can boost farm performance significantly (Awotide et al., 2015; Oyelade et al., 2019). Furthermore, the lack of access to loan services due to farmers' attributes coupled

with the reluctance of financial institutions to issue agricultural loans had adversely inhibited the capital investment capacity of the cassava industry in Nigeria (Adegbite, 2009; Ololade and Olagunju, 2013), causing difficulties in the use of improved processing inputs and technological adaptive capability, and hence, the decline in cassava productivity and profitability (Adekanye et al., 2013; Oyelade et al., 2019). There is a high expectation that a farmer that has access to loan facilities will be in a vantage position to improve his/her operation, use improved implements, seeds, livestock, manpower, transportation and markets for the sales of output and the purchase of inputs at good market prices (Dzadze et al., 2012). However, having access to loans may not necessarily result in improved welfare outcomes if such loan is not used efficiently (Ololade and Olagunju, 2013; Tran, 2014).

Access to agricultural loans is an unabated problem facing the cassava industry in Nigeria. In a bid to reform the agricultural financing after years of benign neglect, the Nigeria Agricultural Promotion Policy in 2016 made a renewed effort to facilitate group access to loans through farm-based organizations; the aim is to access funds as farmers' group from the Bank of Industry, the Bank of Agriculture, and the Anchor Borrowers' Scheme (Dzadze et al., 2012). However, there is a long-standing debate that the Nigerian cassava industry is yet to benefit optimally from the new agricultural credit policy in spite of the advances made in broadening farmers' loan access (Kuye, 2015; Abass et al., 2013) and smallholder cassava processors still do not have sufficient access to affordable agricultural loan (Kuye, 2015; Ololade and Olagunju, 2013; Dzadze et al., 2012). In seeking explanations for loan behaviour of smallholder farmers in the cassava processing industry, the study intends to assess the profitability of small-scale cassava processing; determine factors influencing access to loans among small-scale cassava processors; evaluate the marginal effect of access to agricultural loans on the net farm income of small-scale cassava processors; analyze the effect of access to agricultural loans on the net farm income of cassava processors; and identify constraints facing cassava processors in accessing agricultural loans in Oyo State.

Materials and Methods

Study area: The study was carried out in Oyo State, which is located in the South-Western region of Nigeria. The State lies between longitude $3^{0}38^{1}$ and $5^{0}35^{1}$ East and latitude $6^{0}54^{1}$ and $8^{0}\ 37^{1}$ North of Greenwich meridian, covering approximately an area of 27,648km^{2} with a population of 7,840,900 as projected by the national population commission (City Population, 2021). The State is bounded in the north by Kwara State, in the east by Osun State, in the south by Ogun State, and in the west by the Republic of Benin. It has an equatorial climate with dry and wet seasons and relatively high humidity. The wet season lasts from November to

March, while the wet season starts in April and ends in October. Average daily temperature ranges between 25^0C and 35^0C almost throughout the year. Agriculture is the main occupation of the people of Oyo State. The climatic condition of the area is favourable for cassava cultivation and processing.

Data collection and sampling techniques: A multi-stage sampling procedure was adopted to obtain the data for this study. At the first stage, three Local Government Areas (LGAs) with a high prevalence of cassava processing were purposively selected. These included: Egbeda, Ogo-Oluwa and Oyo North LGAs. At the second stage, four towns from each of the selected Local Government Areas (LGAs) were purposively selected based on the high population of cassava processors in the area according to records of the Oyo State Agricultural Development Programme on cassava processing. The third stage involved the snowball selection of 15 processors from each of the selected towns to make a total of 135 respondents. However, a total of 120 respondents had meaningful information needed to achieve the objectives of this study.

Source and type of data: Within the use of a well-structured questionnaire, arrays of information were elicited on farmers' personal attributes such as the age of processors, marital status, education level, extension contact, membership of trade associations, and off-farm income. Features of agricultural loans such as access, frequency, amount and source of loans acquired as well as information on cassava processing activities including the size of the firm, quantity processed, processing costs and revenues from cassava processing, were also gathered. To validate the reliability of the questionnaire, an initial pilot survey of 15 cassava processors was carried out in the Mokola area of Oyo State. Then, the information obtained with the instrument was tested for internal reliability using Cronbach's alpha test, and the result gave a satisfactory coefficient (Cronbach alpha>0.60). This instrument was then applied to survey the entire respondents. Data obtained were analyzed with descriptive statistics, budgetary analysis, endogenous switching regression model (ESRM) and augmented inverse probability weighted regression adjustment (AIPWRA).

The treatment effect model: the endogenous switching regression model (ESRM)

This study employed ESRM propounded by Lokshin and Sajaia (2004) to analyze the income effects of access to agricultural loans in cassava processing. The use of ESRM in assessing the impact of credit on household economics has been studied by Omodara et al. (2021), Ojo and Baiyegunhi (2020), Bidzakin et al. (2019), Lin et al. (2019), and Ojo et al. (2019). ESRM has merits over other treatment effect models due to the robustness to address endogeneity and heterogeneity biases associated with non-randomized, quasi-experimental studies

using a simultaneous full information maximum likelihood (FIML) estimator. Further, ESRM estimates the economic implications of a policy variable on the treated and untreated observations independently, taking cognizance of unobserved benefits accrued to beneficiaries of target innovations. In addition, with the use of ESRM, the likely spillover effects and interference arising from similar initiatives are addressed to generate unbiased parameter estimates (Omodara et al., 2021; Ojo et al., 2019; Lokshin and Sajaia, 2004).

Following Baiyegunhi et al. (2010) and Lin et al. (2019), the welfare functions of having access to the agricultural loan facility by a household are given as two-regime equations representing a selection model (a decision to access agricultural loans) and an outcome model (the economic implication of access to loans, i.e. net farm income).

$$Y_{1I}^{*} = d_1 X_{1i} + e_{1i} \; if \; CA_i = 1$$
$$Y_{0I}^{*} = d_0 X_{0i} + e_{0i} \; if \; CA_i = 0 \quad (1)$$

where Y_{1I}^{*} and Y_{0I}^{*} stand for the performance indicator (net farm income) of a household that had access to the agricultural loan facility and those that lacked access, respectively; X_{1i} is the vector of i^{th} observable households' socio-economic attributes; the vector of the parameter estimates are d_0 and d_1; e_{1i} and e_{0i} are the disturbance terms while CA_i indicates the agricultural loan access status of the household. This welfare function is constrained by a number of factors. In the case of cassava processing households, the agricultural loan access constraints facing cassava processors are, therefore, defined by

$$CA_I^{*} = ?Z_i + u_i, \quad CA_I = 1[CA_I^{*} > 0], or CA_I = 0[CA_I^{*} < 0] \quad (2)$$

Z is the vector of cassava processor's socio-economic and farm characteristics, u_i is an error term, **?** is the parameter to be estimated.

According to Tran (2014) and Lokshin and Sajaia (2004), the u_i, e_{1i} and e_{0i} are assumed to have a trivariate normal distribution with zero mean and covariance of

$$Cov(u_i, e_{1i} \text{ and } e_{0i}) = ? = \begin{bmatrix} s_u^2 & s_{1u} & s_{0u} \\ s_{1u} & s_1^2 & . \\ s_{0u} & . & s_0^2 \end{bmatrix} \quad (3)$$

$\text{var}(u_i) = s_u^2$, $\text{var}(e_{1i}) = s_1^2$, $\text{var}(e_{0i}) = s_0^2$, $\text{cov}(e_{1i}, e_{0i})$= undefined due to non-simultaneity in observation of $Y_{1i}$and Y_{0i}. Consequently, a full information maximum likelihood estimator is suitable to estimate the selection (1) and outcome (2) equations simultaneously. Given the assumption of normal distribution of the error terms, the likelihood function for ESRM is

$$\ln L_i = \begin{matrix} \sum_1 I_i \omega_i [\ln\{F(\emptyset_{1i})\} + \ln\{f(e_{1i}/\sigma_1)/\sigma_1\}] + (1 - I_i)\omega_i [\ln\{1 - F\}(\emptyset_{0i})\} + \\ \ln\{f(e_{0i}/\sigma_0)/\sigma_0\}] \end{matrix} \quad (4)$$

where F is a cumulative normal distribution function, f is a normal density distribution function, $?_i$ is an optional weight for cassava processor *i*, and

$$\emptyset_{1i}=\frac{(?z_i+?_j e_{ji}/s_1)}{\sqrt{1-?_j^2}} j = 0,1 \quad (5)$$

where $\emptyset_{1i}$ is the inverse Mills' ratio accounting for the selectivity bias in the sample, $?_1 = s_{1u}{}^2/s_1 s_u$ is the correlation coefficient between errors in the selection model e_{1i} and the outcome model u_i. Similarly, $?_0 = s_{0u}{}^2/s_0 s_u$ is the correlation coefficient between e_{0i} and u_i respectively.

ESRM is a 2-step procedure that employs probit and OLS regression models simultaneously to estimate determinants of agricultural loan access and the marginal effect of loan access on the net farm income of cassava processors, respectively. The model is specified as

$$Y_i = d_0 + d_1X_1 + d_2X_2 + d_3X_3 + d_4X_4 + d_5X_5 + d_6X_6 + d_7X_7 + d_8X_8 + u_i,$$

$$\text{select } (D_i = ?_0 + ?_1 Z_1 + ?_2 Z_2 + d_3Z_3 + ?_4 Z_4 + ?_5 Z_5 + e_i) \quad (6)$$

where $Y_i = \text{NFI}; D_i = \text{LOANACES}$; X_1 =AGE; X_2 =GENDER; X_3 =EDU, X_4 =FAMSZ; X_5 =OCCUP; X_6 =WORKHH; X_7 =EXP; X_8 =ENT_SIZE; Z_1 =OFFINC; Z_2 = MARSTAT; Z_3 =LOANPOLICY; Z_4 =EXT_VISIT; Z_5=ASS_MEM

The treatment effect of agricultural loan access on net farm income is then estimated following Lokshin and Sajaia (2004) approach. This treatment and heterogeneity effects are presented in Table 1.

Table 1. The treatment and heterogeneity effects of access to agricultural loans on the net farm income of cassava processors.

Sub-sample	Decision stage		Treatment effect
	Have loan access	Lack loan access	
Farmers that have access to loans	$E(Y_{1i}\|D_i = 1) = Xd_{1i} - s_{1ie}?_o$	$E(Y_{0i}\|D_i = 1) = Xd_{1i} - s_{0ie}?_1$	ATT= $X(\delta_{1i} - \delta_{0i}) + \lambda_1(\sigma_{1ie} - \sigma_{0ie})$
Farmers that did not have access to loans	$E(Y_{1i}\|D_i = 0) = Xd_{0i} - s_{1ie}?_0$	$E(Y_{0i}\|D_i = 0) = Xd_{0i} - s_{0ie}?_0$	ATU=$X(d_{1i} - d_{0i}) + (s_{0ie} - s_{1ie})?_0$
Heterogeneity effect (HH)	$HH_{1i} = d_{1i}(X_{1i} - X_{0i}) + s_{1ie}(?_1 - ?_0)$	$HH_{0i} = d_{0i}(X_{1i} - X_{0i}) + s_{0ie}(?_1 - ?_0)$	TH=HH_{1i}-HH_{0i}

N.B. – ATT means the average treatment on the treated, ATU = the average treatment on the untreated, TH = transitional heterogeneity, s_{1ie} is the covariance of the error terms and $?$= the inverse Mills' ratios.

Table 2. The definition, description and a *priori* expectations for the variables used in the model.

Variable	Description of variable	Type of data/Unit of measurement	A *priori* expectation
Dependent variable			
NFI	Net farm income from cassava processing	Covariate/naira	+
LOANACES	Access to agricultural loan	Dummy; 1=loan access, 0=no loan access	+
Explanatory variables			
AGE	Age of the cassava processor	Covariate/years	+/-
GENDER	Gender of cassava processor	Dummy:1=male, 0=female	+/-
EDU	Years spent in acquiring formal education	Covariate/years	+
FAMSZ	Number of family members in each cassava processor's household	Covariate/count	+
OCCUP	Primary occupation of the cassava processor	Dummy:1=cassava processing, 0=other occupation	+/-
WORKHH	Number of working members of the household	Covariate/count	-
EXP	Number of years spent in cassava processing	Covariate/count	+
ENT_SIZE	Processing capacity per week	Covariate/kilogramme	
OFFINC	Access to off-farm income	Dummy:1=access , 0=otherwise	-/+
MARSTAT	Marital status of cassava processor	Categorical:1=single, 2=married, 3=separated/divorced,4=widowed /widower	+
LOANPOLICY	Awareness about government credit policy	Dummy:1=access , 0=otherwise	+
EXT_VISIT	Frequency of visits by extension agents annually	categorical:4.=Very Frequent, 3=Less frequent, 2=sometimes, 1=rarely 0=never	
ASS_MEM	Trade association membership (cooperative/farmer groups)	Dummy: 1=belong, 0=not belong	+

Budgetary analysis

Budgetary analysis was employed to determine the profitability of the cassava processing enterprise in Oyo State. Profitability ratios including gross margin, benefit cost, operating expense and return on investment ratios were computed.

Gross margin = $P_iQ_i - rC_i$ (7)

Net income/profit (π_i) = $P_iQ_i - (rC_i + K_i)$ (8)

where Pi = price per unit of cassava produce sold (naira), Qi = quantity of cassava produce sold (kg). The variable costs include expenditures on labor, processing equipment, purchase of raw cassava, and transportation. K_i is the cost of i^{th} fixed inputs, including rent, firm tax, and depreciation on cassava processing equipment.

Results and Discussion

Socio-economic characteristics of cassava processors

Table 3 presents socio-economic characteristics of cassava processors. The results in Table 2 show that respondents had a mean age of 41.1±7.5 years, indicating that respondents were active physically and belonged to the economic age category. These processors were female (0.72±0.45) on average. This shows that the female gender dominates the small-scale cassava processing industry in Oyo State, which may constrain loan access among the processors. This is because, in agrarian societies like Nigeria, traditional values and customs, which tend to promote gender inequality, are still prevalent. Thus, the female gender is at a disadvantage point in asset acquisition and possession. This view is supported by Oluwasola (2009) and Eze and Nwigbo (2014). On average, cassava processors did not have access to agricultural loans (0.30±0.42) and did not belong to trade associations (0.42±0.23). Of the few that had loan access, informal loan sources, preferably rotatory contribution and highly volatile, agricultural non-friendly microfinancing options dominate their loan profile. With this, it becomes clear that the formal agricultural loan is not a common practice among cassava farmers. In agreement with Adegbite (2009) and Adeyonu et al. (2017), the low patronage of the agricultural loan may be due to poor awareness and stringent loan requirements. With the increasing capital commitments, motivation through farmers' group financing and other supportive efforts to transform the industry under the agricultural promotion policy, there is still a great deal of work to be done for the cassava processing sub-sector to gain significantly from the renewed credit policies in Nigeria.

Table 3 also revealed that the respondents were averagely married (1.96±0.50). This submission follows an assertion by Eze and Nwigbo (2014) that cassava processors have a large responsibility size and are willing to use loans. The mean years spent in acquiring education were 8.05±5.89. This is an indication that most of the respondents were learned and, as such, should be articulate in making loan decisions. This view agrees with Ibrahim and Bauer (2013) that educated households adapt to new agricultural methods, cope with risks and increase loan access more readily than their less-educated counterparts. Processors had a mean household size of 5.04±2.48 members per household. It suggests that cassava processors could gain from the moderate availability of cheap family labor. The

average number of years spent processing cassava was 8.05±5.89 years, meaning that respondents had been involved in this practice for a considerable number of years.

Moreover, Table 3 revealed that, on average, cassava processing was the primary source of income (1.47±0.50) for the households with an average monthly income of ₦47,216.67±₦19,200.05 (US$131.16±US$53.33). The wide variation in household income may be relevant to loan behaviour among cassava processors. On average, cassava processors were ignorant of government loan policies (0.27±0.47). Going by this, it becomes obvious that cassava processors are poorly informed about government loan policies. As such, measures should be put in place to enlighten processors on farmers' friendly loan policies that can significantly improve farm comparative advantage and performance. This submission complies with the findings of Kuye (2015), who advocated for the development and implementation of cassava friendly loan packages in Nigeria.

Table 3. Socio-economic characteristics of cassava processors in Oyo State.

Socio-economic characteristics	Mean	Standard deviation
Age (years)	41.15	7.46
Gender	0.72	0.45
Loan access	0.30	0.42
Loan source	0.75	1.57
Membership of trade associations	0.42	0.231
Marital status	1.96	0.50
Education qualification	8.05	5.89
Household size	5.04	2.48
Years of experience	8.37	5.89
Occupation type	1.47	0.50
Monthly income (naira)	47,216.67	19,200.05
Knowledge of Government loan policies	0.27	0.47

Profitability of small-scale cassava processing in Nigeria

Table 4 shows the profitability of small-scale cassava processing. The results in Table 3 reveal that cassava processors spent ₦113,853.17 ($3.6.26) on average as a total variable cost per production cycle**.** The variable cost component alone accounted for 93.9% of total costs, of which the cost of raw cassava alone constituted about 54.1%. This indicates that for every ₦100.00 (US$0.28) invested in cassava processing, an average sum of ₦93.87(US$0.26) is spent on variable input alone. Total revenue was ₦131,739.65 (US$365.94), and a total sum of ₦121,289.78 (US$336.92) was incurred in a production cycle. On average, processors received a gross margin of ₦17,886.48 (US$49.68) and earned a net income of ₦10,449.87 (US$29.03) per production cycle. On a monthly basis, an

average of 4 cycles was made, equivalent to a ₦41,799.48 (US$116.11) net farm income. This earning capacity is far above the current national minimum wage of ₦30,000.00 (US$83.33) of the nation and is an indication that cassava processing could be a useful farm venture for alleviating poverty in Nigeria. Table 3 further reveals that GMR and OER were 0.14 and 0.82, respectively. From this, it is clear that for every ₦100 ($0.28) invested in cassava processing, processors spent about ₦82.0 (US$0.24) on operating input alone. This is an indication that operating expenses in cassava processing are high, as such, expanding cassava processing output may require financial support. Similarly, BCR and ROI were 1.09 and 0.09, which reveals that for every ₦100 ($0.28) investment made in cassava processing, an average gain of ₦9.00 ($0.03) is earned, amounting to 9% returns per production cycle. This return on capital invested is less than the conventional interest rate in Nigeria and could discourage capital commitments to cassava processing among potential investors.

Table 4. Budgetary analysis showing the profitability of small scale cassava processing.

Item	Amount (₦)	% contribution
Total revenue from cassava products (TR)	131,739.65	
Variable costs (VC)		
Cost of harvested/purchased cassava	61,650.01	54.15
Transportation cost (fufu and gari)	2,619.25	2.30
Processing cost (fufu and gari)	47,489.62	41.71
Labor cost	2,094.29	1.84
Total variable costs (TVC)	113,853.17	93.87
Fixed costs (FC)		
Business tax	1,440.36	19.37
Depreciated on gari processing equipment	1,979.60	26.62
Depreciated on fufu processing equipment	4,016.65	54.01
Total fixed costs (TFC)	7,436.61	11.96
Total costs (TC)	121,289.78	
Gross margin (TR – TVC)	17,886.48	
Net income/profit (GM − TFC)	10,449.87	
Profitability ratio		
Gross margin ratio (GMR)	0.14	
Benefit cost ratio (BCR)	1.09	
Operating expense ratio (OER)	0.82	
Returns on investment (ROI)	0.09	

Statistically significant at 5%; currency conversion rate= **US$1.00 = ₦360.00.

Determinants of access to agricultural loans among cassava processors

Table 5 presents the determinants and marginal effects of access to agricultural loans on the net farm income of small-scale cassava processors. The ESR model has a significant Wald-test, chi-square likelihood ratio (LR) test (5.59, -69.856, p=0.018), depicting that the model is a better fit than the exogenous model at predicting loan access. The Wald-test depicted that predictor variables significantly contributed to changes in the outcome variable. Moreover, the significance of $?_1$implies that the sample was affected by selection bias, and the regression estimate would be spurious if the OLS regression model was used. Since $?_1$ was positive (p<0.01), processors that had access to agricultural loans had a higher net farm income than those that did not have loan access. The positive $?_0$ confirmed that there was a clear difference between the net farm income of the cassava processors that had access and lacked access to agricultural loans in Oyo State.

The first column in Table 5 presents the probit result of the ESRM selection model for the socio-economic factors affecting access to agricultural loans. In conformity with the *a priori* expectations, coefficients of farmers' education (β=0.072, p<0.01), marital status (β=0.706, p<0.1) and enterprise size (β=0.002, p<0.05) had a positive correlation to agricultural loan access while the coefficients of access to off-farm income (β=-0.164, p<0.01) and membership of trade associations (β=-1.686, p<0.01) were negatively signed. By implication, cassava processors that were married, highly educated, socially inclusive, earned meager off-farm income and had a large processing unit were more likely to access agricultural loans in the study area. This finding agreed with the submissions by Ibrahim and Bauer (2013) and Omodara et al. (2021) but contradicted Eze and Nwibo (2014) and Kiplimo et al. (2015).

The significant positive relationship between the number of years cassava processors spent in formal education and agricultural loan access indicates that cassava processors with high education status are at a vantage point when approaching agricultural loan sources. As shown in Table 5, a unit increase in processors' years of education will likely increase the possibility that cassava processors will access the loan by 7.6%. As indicated earlier, the mean number of years each cassava processor spent acquiring formal education was 8 years. This suggests that the highly educated cassava processors are more likely to access loans much faster than the poorly educated ones, probably because literate processors understand the procedures necessary for loan access at thrifts and microfinance banks that are dominant sources of agricultural loan facilities in the study area. This finding conformed with Ibrahim and Bauer (2013) but contradicted the submission by Eze and Nwibo (2014). In the same vein, a unit increase in the enterprise size will increase the likelihood of accessing agricultural loans by 0.2%.

This is because farms with large processing capacity, all things being equal, have needs for more loans to meet the operational requirement, as emphasized by Oluwasola (2009). Such firms may leverage on farm physical assets as collateral to secure loans. Increasing agricultural loan access is, therefore, germane to expanding the cassava processing industry in Oyo State.

On the other hand, off-farm income is a proxy for household wealth, a unit increase in the off-farm income of cassava processors would decrease the possibility of accessing agricultural loan facilities by 16.4%. Thus, low income earning processors have a higher tendency to access agricultural loans than their high income earning counterparts. This suggests that as the income from other sources rises, the likelihood that a cassava processor will access agricultural loans declines rapidly, indicating that, in smallholder agribusiness, off-farm income tends to serve as working capital and provides an incentive for cassava processors to expand their business portfolio. This is because income from other sources can serve as processors' equity capital and become handy for meeting financial obligations arising from the enterprise operation, thereby discouraging the need for the loan. This submission disagreed with Kiplimo et al. (2015) that high income earning processors are more likely to have access to agricultural loans than their low-income counterparts.

In the same vein, a unit increase in the marital status of processors from the single to the married would increase the possibility of accessing agricultural loan facilities by 70.6%. This suggests that when the responsibilities of processors increase, the drive for loan acquisition will rise correspondingly. It should be recalled that the majority of the processors had a medium household size and invariably had access to cheap labor. So, there was likelihood that net household labor contribution to cassava processing was positive which should be a possible drive for loan acquisition. The finding disagreed with the findings of Ololade and Olagunju (2013).

Trade association membership was a proxy for social capital and had a positive and significant correlation with access to agricultural loans. According to Table 5, there were high tendencies that processors that were members of one or more trade associations would have access to agricultural loans. It is reasonable to say that, during the loan process, processors that belong to farmers' groups may probably leverage their membership status as collateral for loan acquisition. Further, traders' group membership may improve information awareness, lower loan transaction costs and other loan barriers to loan access. Thus, trade association membership can be an effective tool against poor agricultural loans in Nigeria. There is a continuous effort to develop farmers' capital base through a farmer group system. This finding, therefore, does not only embrace group loan system, but further admits that socio-inclusiveness is an important factor in overcoming the problem of persistent poor credit access among small-scale cassava processors.

This study thus agrees with the findings of Omodara et al. (2021) that association membership limits credit constraints among Nigerian farmers.

The marginal effect of access to agricultural loans on the net farm income of small-scale cassava processors

The second stage of ESRM in Table 5 captures the factors determining the net farm income of small-scale cassava processors that had loan access and those that did not have loan access, as presented in columns 4 to 7 of Table 5. This result reveals that the net farm income of cassava processors that had access to agricultural loans was influenced mainly by education (β=0.019; $p<0.1$), number of family members working (β=0.241 $p<0.01$), processors' experience (β=0.028, $p<0.05$) and enterprise size (β=0.001, $p<0.01$). On the other hand, the processor's age (β=-0.017, $p<0.01$), the number of working family members (β=0.060, $p<0.05$) and the processors' experience (β=0.005, $p<0.01$) influenced the net farm income of cassava processors that lacked access to agricultural credits.

According to Table 5, the insignificance of age, gender, family size, and occupation of cassava processors that accessed agricultural credit implies that the role of these variables is negligible to improving the net-farm income of processors that had access to agricultural loans. Also, the insignificance of years of education and enterprise size in the net farm income equation for processors that lacked access to agricultural loans and the significance of these two variables in the net farm income equation for the processors that had access to agricultural loans is an indication that, in credit constraint conditions, cassava processors with a higher level of education increase their net farm income significantly and agricultural loans can help cassava processors that have small processing farms to equal the net farm income of those that have large processing farms. Table 5 further reveals that if processors that have agricultural loan access have an additional working household member, their net farm income will increase by about 24%, whereas it will decline by 6% if cassava processors have no access to agricultural loans. This reflects the fact that processors whose family members earn income may probably have access to family loans for cassava processing operations. Similarly, an additional year of experience in cassava processing increases the net farm income of processors that had loan access by about 3%, whereas it increases the net-farm income by 0.5% among processors that lacked access to agricultural loans. Furthermore, the coefficient of the processor's age had a negative correlation with the net farm income of only the processors that lacked loan access. So, if the age of processors that lacked loan access increases by 1%, their net farm income will decline by 1.7%. This suggests that loan access impacts more negatively on the net farm income of prime-aged than young borrowers that lack access to loans, probably due to farm management practice differentials. This study, therefore,

disagreed with the findings of Lin et al. (2019) that credit constraint affects the income of young farmers more readily than the old processors. It should be noted that the average sample age of cassava processors is 41 years, meaning there were a handful of prime-aged individuals among the processors. Unless pragmatic decisions are made to address this issue, poor access to agricultural loans will continue to hamper agribusiness growth in the study area.

Table 5. Full information likelihood estimates for determinants of agricultural loan access and its effects on the net-farm income of small-scale cassava processors in Oyo State.

Variable	Access to agric. loan		Net farm income of cassava processors			
			Loan access		No loan access	
	Coef.	Std.err.	Coef.	Std.err.	Coef.	Std.err.
AGE	-0.042	0.028	0.005	0.009	-0.017***	0.006
GENDER	-0.235	0.344	0.135	0.133	-0.055	0.076
EDU	0.072***	0.028	-0.019*	0.011	0.000	0.007
FAMSZ	0.008	0.074	-0.014	0.028	0.012	0.018
OCCUP	1.875	1.999	0.224	0.144	-0.015	0.071
WORKHH	0.088	0.143	0.241***	0.069	-0.060**	0.027
EXP	0.022	0.032	0.028**	0.013	0.005***	0.008
ENTSIZE	0.002**	0.001	0.001***	0.000	-0.001	0.000
OFF_INCOME	-0.164***	0.061				
MARSTRT	0.706*	0.390				
LOANPOLICY	-0.028	0.341				
EXT. VISIT	-1.067	1.918				
ASS. MEM	-1.686***	0.649				
CONSTANT	8.251	3.821	11.401***	0.619	9.494***	0.301
/lns1	1.158***	0.338				
/lns2	1.141***	0.088				
ρ_0	1.156***	0.376				
ρ_1	-0.743***	0.274				
sigma_1	-0.314	0.106				
sigma_2	-0.319	0.028				
rho_1	0.820	0.254				
rho_2	0.631	0.165				
LR test of indep. eqns.: chi2(1) = 5.59, Prob > chi2 = 0.0181						

N.B. – Log likelihood ratio = -69.856, ***significant = 1%, ** significant = 5%, and *significant = 10%.

Income effects of access to agricultural loans in cassava processing

Table 6 presents the result of the difference in the annual net-farm income of cassava processors due to access to agricultural loans. The income treatment effect value (ATT) of processors accessing agricultural loans is ₦79,350.68 ($220.42);

the income treatment effect (ATU) for those that did not access agricultural loans is ₦33,967.68 ($94.35). If the processors that accessed agricultural loans had not done so, their income treatment effect would have been ₦55,140.39 ($153.17); if processors that did not access loans had accessed agricultural loans, their income treatment effect would have been ₦55,325.41 ($153.68). Hence, the average treatment effect (ATT) on the income of processors that accessed loans was ₦24,140.29 ($67.06). In other words, cassava processors that had access to agricultural loans earned additional ₦24,140.29 ($67.06) monthly, mainly due to loan access. Similarly, cassava processors that did not have access to agricultural loans would earn additional ₦21,357.73 ($59.33) if access to agricultural loans was secured. The transitional heterogeneity effect was ₦2,852.56 ($7.92). This implies that only about ₦2,852.56 ($7.92) of the total income effects discussed above was attributed to other interventions aside agricultural loan access.

Table 6. Heteroskedasticity effects of agricultural loan access on the net farm income of small-scale cassava processors.

Outcome	Loan access status	Predictions		Treatment effect (naira)
		Loan access	No loan access	
Net farm income (naira)	Processors with agricultural loan access	79,350.68	55,140.39	24,140.29***
	Processors without agricultural loan access	55,325.41	33,967.68	21,357.73***
	Heterogeneity effect	24,025.27	21,172.71	2,852.56***

N.B.*** means significant at $p<0.01$.

Further, the results from Table 6 show positive and significant effects of access to agricultural loans on the net farm income. In intervention studies, relying solely on the predicted difference in income effects between cassava processors that had access to agricultural loans and those that did not have access to loans may be misleading because there is no provision for the control of differences in the group attributes (Omodara et al., 2021; Ojo et al., 2020). Therefore, though it accounts for endogeneity resulting from the inability to account for missing data (counterfactual scenario), parameter estimates from the endogenous switching regression model may not be sufficient, even if not misleading. Thus, direct coefficients from the model may not be appropriate as the ATT. To estimate the causal effects of access to agricultural loans on the net farm income of cassava processors, average treatment effect (ATE) and average treatment on the treated (ATT) were estimated by complementing endogenous treatment with augmented inverse-probability-weighted regression adjustment (AIPWRA) as a robustness check. Hence, the estimates from the endogenous switching regression model were discussed. Endogenous switching regression was first fitted with endogenous treatment effects, and ATE and ATT were then estimated. As indicated in Table 7,

the estimated average treatment effect (ATE) of access to agricultural loans on the net farm income of average cassava processors was about 4.5%, positive and statistically significant (p<0.01). This estimate predicts that an average cassava processor's net farm income in the study area would be impaired with about 4.5% of the net farm income if he/she lacked access to agricultural loans. Similarly, the conditional treatment effects which measure the ATT of access to agricultural loans on the net farm income of the treated group are about 35% (p<0.01). It suggests that cassava processors that had access to agricultural loans in the study area would improve the net farm income by about 35% more than it would be if he/she had no access to agricultural loans. This submission agreed with Omodara et al. (2021) and Abdallah et al. (2018), who reported that removing credit constraints could result in more than 24% improvement in farmers' net worth.

The *ex-post* estimates of the causal effects of access to agricultural loans on the net farm income of cassava processors from the AIPWRA model are presented in Table 7. The result from the augmented inverse probability weighted regression adjustment estimation indicates that lack of access to agricultural loans impaired the net farm income of cassava processors in the study area. From Table 7, the ATT and POM were approximately 4.9% and 37%, respectively, meaning that the average treatment effect of agricultural loan access on the net farm income of processors that had loan access was positive and significant (p<0.001). Similarly, access to agricultural loans boosted the net farm income from cassava processing and translated to spill-over effects on the welfare of cassava processors in the study area. The positive impact of access to agricultural loans on the net farm income of cassava processors is consistent with the studies of Omodara et al. (2021), Ojo and Baiyegunhi (2020), Ojo et al. (2019) in Nigeria, whose findings have agreed that credit constraints have a negative impact on farmers' welfare and income.

Table 7. Robustness check tests for income treatment effects of access to agricultural loans in cassava processing (Endogenous switching regression model and inverse-probability-weighted regression adjustment).

Model	Endogenous switching regression		Augmented inverse-probability-weighted regression adjustment	
Treatment effects	Average treatment effect (ATE)	Average treatment on the treated (ATT)	Average treatment on the treated (ATT)	Potential-outcome mean (POM)
Coefficient	0.045***	0.351***	0.049***	0.371***
Std. err.	0.012	0.199	0.0050	0.082

Note: data used 500 replications to bootstrap the standard errors after changing bootstrap replications between 100 and 1,000 with no significant changes.
*** means significant at p<0.01.
A post-estimation analysis of ATE and ATT was carried out after fitting the Stata command *movestay* for endogenous switching regression. The TT is the conditional treatment effect, while ATE estimated after *movestay* is the potential outcome.

Constraints facing the cassava processing industry in accessing agricultural loans

Ranked in decreasing order of importance, Table 8 shows that respondents agreed that business risks (3.96±1.04; RSI=0.79), enterprise size (mean=3.75±0.80; RSI=0.75), and high interest rate (mean=3.18±1.56; RSI=0.64) mainly constrained effective access to agricultural loans in cassava processing, while high collateral requirement (Mean=2.36±1.06, RSI=0.47) was disregarded as a constraint to loan access in cassava processing. There is a general perception that business risks and interest rates pose great threats to the ability of cassava processors to access loan facilities despite the various agribusiness financing strategies implemented in the cassava value chain. This study is supported by the findings of Ayegba and Ikani (2013).

Table 8. Constraints facing cassava processors in accessing agricultural loans.

Constraint	WMS	Std. dev.	RSI	Rank
Business risks	3.96	1.036	0.79	1st
Enterprise size	3.75	0.799	0.75	2nd
High interest rate	3.18	1.565	0.64	3rd
High collateral requirement	2.36	1.062	0.47	4th

Conclusion

This study presents findings on how socio-economic attributes of cassava processors determine access to agricultural loans and evaluates the implications of agricultural loan access on the net farm income from cassava processing. The results showed that access to loan facilities was limited among cassava processors mainly due to poor education and membership of trade associations; small processing capacity, and low earnings from off-farm sources. Cassava processors had limited access to agricultural loans. Funds are sourced mainly from informal and non-farm friendly loan issuers. However, cassava processing remains a profitable venture in Oyo State. The study deduced that the net farm income of processors that had access to agricultural loans was affected by education, number of working household members, processing experience, and enterprise size while only age of processors, number of working household members and processing experience influenced the net farm income of those that lacked access to agricultural loans. However, the roles of age, gender, family size and occupation of the processors were negligible in determining the net farm income of processors that had access to agricultural loans. More so, access to agricultural loans positively impacted farm income from cassava processing and had a spillover

welfare effect in the cassava processing industry. Given favorable loan access conditions, the cassava processing industry in Nigeria is poised to gain tremendously from agricultural loans through the expansion of processing scale, cassava output, farm income, and good returns on investment. It was, however, gathered that business risks, enterprise size, and interest rate militate against the realization of improved access to agricultural loans among cassava processors in Nigeria. On this note, certain recommendations were made.

1. It is necessary to activate farm support service for cassava processors in Oyo State. Cassava processors should be given high priority in the ongoing agricultural loan programs in Nigeria to ease loan access and technical constraints limiting the capacity of the industry.
2. Government credit interventions in the cassava processing sub-sector should target young processors. This is because, processors' age was paramount to loan access and young processors had the edge in credit use in the study area.
3. The membership of trade networks has become a key factor in accessing loans. Findings from this study have shown that majority of the processors do not belong to a trade association, therefore, enlightenment programs about the benefits of inclusive social membership are necessary to help cassava processors gain social collateral and capital that will enhance chances of benefiting optimally from the renewed farmers' friendly agricultural loan facilities in Nigeria.
4. The fact that the net farm income of cassava processors with lower education and a large processing capacity is more likely to be affected by access to loans provides a basis for more training on the use of agricultural loans for cassava processors. Furthermore, lenders and policymakers must protect the interests of the less educated cassava processors in loan policies in Nigeria.

References

Abass, A.B., Mlingi, N., Ranaivoson, R., Zulu, M., Mukuka, I., Abele, S., Bachwenkizi, B., & Cromme, N. (2013). *Potential for commercial production and marketing of cassava: Experiences from the small-scale cassava processing project in East and Southern Africa.* Ibadan, Nigeria: International Institute of Tropical Agriculture.

Abdallah, A.H., Ayamga M., & Awuni, J.A. (2019). Impact of agricultural credit on farm income under the Savanna and Transitional zones of Ghana, *Agricultural Finance Review*. https://doi.org/10.1108/AFR-02-2018-0009

Adegbite, D.A. (2009). Repayment performance of benefi ciaries of Ogun State Agricultural and Multipurpose Credit Agency (OSAMCA) in Ogun State, (2004-2007). *American-Eurasian Journal of Sustainable Agriculture, 3*, 117-125.

Adekanye, T.A., Ogunjimi, S.I., & Ajala, A.O. (2013). An Assessment of Cassava Processing Plants in Irepodun Local Government Areas, Kwara State, Nigeria. *World Journal of Agricultural Research, 1* (1), 14-15.

Adeyonu, A., Ajiboye, B., Isitor, S., & Faseyi, S. (2017). An Analysis of the Factors InfluencingAccess to Credit by Poultry Farmers in Abuja. Nigeria.*Agriculturae Conspectus Scientificus, 82* (1), 55-62.

Awotide, B.A., Abdoulaye, T., Alene, A., & Manyong, V.M. (2015). Impact of Access to Crediton Agricultural Productivity: Evidence from Smallholder Cassava Farmers in Nigeria. *International Conference of Agricultural Economists (ICAE)*. Milan, Italy 210969.

Ayegba, O., & Ikani, D. (2013). An impact assessment of agricultural credit on rural farmers in Nigeria. *Research Journal of Finance and Accounting*, *4* (18), 80-89.

Baiyegunhi L. J. S., Fraser G. C. G., & M. A. G. Darroch (2010). Credit constraints and household welfare in the Eastern Cape Province, South Africa. *African Journal of Agricultural Research*, *5* (16), 2243-2252.

Bidzakin, J. K., Fialor, S. C., Awunyo-Vitor, D., & Yahaya, I. (2019). Impact of contract farming on rice farm performance: Endogenous switching regression. *Cogent Economics and Finance 7*, 5-17.

City Population (2021). Projected population for Oyo State, Nigeria. Retrieved from http://www.citypopulation.de/php/nigeria-admin.php?adm1id=NGA031.

Dzadze, P., Osei, M., Aidoo, R., & Nurah, D. (2012). Factors determining access to formal credit in Ghana: A case study of smallholder farmers in the Abura Asebu Kwamankese district of central region of Ghana. *Journal of Development and Agricultural Economics, 4,* 416-423.

Eze, A.V., & Nwigbo, S.U. (2014). Economic and technical efficiency of cassava production in Ika North East Local Government Area of Delta State, Nigeria. *Journal of Development and Agricultural Economics*, *6* (10), 429-436.

Food and Agriculture Organization of the United Nations (FAO) (2019). FAOSTAT Statistical Database, Statistical Division. Rome.

Ibrahim, A.H., & Bauer, S. (2013). Access to Micro Credit and Its Impact on Farm Profit among Rural Farmers in Dryland of Sudan. *Global Advanced Research Journal of Agricultural Science, 2* (3), 88-102.

Kayani, A.S., Saqib, M.M., Muddassir, M., & Zia, M.A. (2017). Impact of Agricultural loan on Agricultural Farm Productivity: Evidence from district Parachinar, Kurram agency, Pakistan. 10.22194/JGIASS/4.4.757.

Kiplimo, J.C., Ngenoh, E., & Bett, J.K. (2015). Evaluation of Factors Influencing Access to Credit Financial Services: Evidence from Smallholder Farmers in Eastern Region of Kenya. *Journal of Economics and Sustainable Development, 6* (17), 97-106.

Kuye, O.O. (2015). Comparative analysis of constraints to cassava production by cassava farmer loan beneficiaries and loan non-beneficiaries in South-South Nigeria*. Global Journal of Agricultural Research*, *3* (3), 38-52.

Lin, L., Wang, W., Gan, C., & Nguyen, Q.T.T. (2019). Credit Constraints on Farm Household Welfare in Rural China: Evidence from Fujian Province. *Sustainability,* 11, 3221.

Lokshin, M., & Sajaia, Z. (2004). Maximum likelihood estimation of endogenous switching regression models. *Stata Journal, 4,* 282-289.

Nweke, F.I. (2003). New challenges in the cassava transformation in Nigeria and Ghana. In *Proceedings of the ImWEnt, IFPRI, NEPAD, CTA conference on Successes in African Agriculture* (pp. 6-11). Pretoria, South Africa.

Ololade, R.A., & Olagunju, F.I. (2013). Determinants of Access to Credit among Rural Farmers in Oyo State, Nigeria. *Global Journal of Science Frontier Research Agriculture and Veterinary Sciences, 13* (2), 16-21.

Oluwasola, O. (2009). Stimulating Rural Employment and Income for Cassava (*Manihot spp*.) Processing Farming Households in Oyo State, Nigeria through Policy Initiatives. *Journal of Development and Agricultural Economics, 2* (2), 018-025.

Omodara, O.D., Fayemi, O.G., Ojo, T.O., Oluwasola, O., & Ngidi, M.S.C. (2021). Determinants of Institutional Credit Rationing Impact on the Net Farm Income of Catfish Processors in Nigeria, *Agricultural Conspectus Scientificus, 86* (4), 361-373.

Ojo, T.O., Baiyegunhi, L.J.S., & Salami, A.O. (2019). Impact of Credit Demand on the Productivity of Rice Farmers in South West Nigeria. *Journal of Economics and Behavioral Studies, 11* (1), 166-180.

Ojo, T.O., & Baiyegunhi, L.J.S. (2020). Determinants of credit constraints and its impact on the adoption of climate change adaptation strategies among rice farmers in South-West Nigeria. *Journal of Economic Structures, 9* (28), 8-15.

Oyelade, O., Ayeni, B.O., Ogundipe, M.O., Salisu, T.Q., Tijani, O.D., & Umah, I.E. (2019). Challenges and Prospects of Commercial Bank Loan Extended to Farmers in Lagelu Local Government of Oyo State, Nigeria. *Asian Development Policy Review, 7* (1), 31-42.

Tanimonure, V.A., Omodara, O.D., Fayemi, O.G., & Osifo, A.J. (2020). Determinants of lack of credit access among indigenous vegetable producers in Nigeria: Implications for policy interventions. *Agricultura Tropica et Subtropica*, *53* (3), 149-155.

Tran, M.M.C. (2014). *Credit Constraints and Impact on Rural Farm Household Welfare: The case of Vietnam's North Central Coast region.* M.Sc. Thesis*,* Lincoln University, New Zealand.

Received: July 7, 2021
Accepted: March 14, 2022

VEZA IZMEĐU PRISTUPA POLJOPRIVREDNIM KREDITIMA I PRIHODA GAZDINSTAVA MALIH PRERAĐIVAČA MANIOKE U DRŽAVI OJO, NIGERIJA: REGRESIONI MODEL IZMENE ENDOGENE PROMENLJIVE

Olabisi D. Omodara[1*], Oluwaseun E. Adetunji[1,2] i Oluwemimo Oluwasola[1]

[1]Odsek za agroekonomiju, Univerzitet Obafemi Awolowo, Ile-Ife, Nigerija
[2]Odsek za ekonomiju, Univerzitet u Nju Hempširu, Daram, Nju Hempšir, SAD

R e z i m e

Poljoprivredni kredit je suštinsko sredstvo za transformaciju komercijalne poljoprivrede u profitabilni poslovni poduhvat. Imajući to u vidu, ovim istraživanjem su ispitivane determinante pristupa poljoprivrednim kreditima i profitabilnosti prerade manioke u malom obimu. Takođe je testirano da li je pristup poljoprivrednim zajmovima uticao na dobit gazdinstava prerađivača manioke u državi Ojo uz pomoć analitičkih kalkulacija, regresionim modelom izmene endogene promenljive (engl. *endogenous switching regression model* – ESRM) i prilagođavanjem regresije proširenim ponderisanjem inverznom verovatnoćom (engl. *augmented inverse probability weighted regression adjustment* – AIPWRA) za proveru robusnosti modela. Za prikupljanje informacija od 120 prerađivača manioke korišćena je tehnika višeetapnog slučajnog uzorkovanja. Rezultati su otkrili da se preradom manioke pretežno bave žene, i da je prosečna starost prerađivača 41,1±7,5 godina. Samo 23% ispitanika je imalo pristup poljoprivrednim zajmovima, koji su prvenstveno dobijani neformalno. Analitičkom kalkulacijom je utvrđeno da su prerađivači ostvarili prosečnu dobit gazdinstva od 10.449,87₦ (29,03 USD) u proizvodnom ciklusu. Regresiona analiza izmene endogene promenljive pokazala je da je verovatnije da obrazovani prerađivači manioke i oni u braku koji su bili društveno uključeni i koji su imali veliku jedinicu za preradu i zarađivali oskudne prihode van gazdinstva pristupe poljoprivrednim zajmovima. Pored toga, obrazovanje (β=0,019, $p<0,1$), broj članova porodice koji rade (β=0,241, $p<0,01$), iskustvo prerađivača (β=0,028, $p<0,05$) i veličina prerađivačke jedinice (β=0,001, $p<0,01$) uticali su na dobit gazdinstava prerađivača koji su imali pristup poljoprivrednim zajmovima. Efekat tretmana iz rezultata AIPWRA otkrio je da su ATT i POM za prerađivanje manioke bili 4,5% odnosno 37%. Poslovni rizici, mala veličina prerađivačke jedinice i visoka kamatna stopa bili su glavna ograničenja za pristup poljoprivrednim zajmovima. Iz navedenog sledi da je potreba za sistemom tehničke podrške među prerađivačima manioke neizbežna. Štaviše, prerađivače manioke treba podsticati da se pridruže trgovačkim

[*]Autor za kontakt: e-mail: omodarao@oauife.edu.ng

udruženjima, a mladim prerađivačima treba dati prioritet u kreditnim inicijativama za preradu manioke.

Ključne reči: poljoprivredni kredit, kreditna politika, mali poljoprivrednik, prerada manioke, profitabilnost, ESRM, AIPWRA.

Primljeno: 7. jula 2021.
Odobreno: 14. marta 2022.