



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Rural Economics and Development

Cassava Value Chain Commercialisation in Nigeria: How Effective and Efficient are Financial Institutions?

Victor O. Okoruwa^{a,*}, Adebayo Abass^{b,c}, Olaide A. Akin-Olagunju^a and Nurudeen A. Akinola^b

^a*Department of Agricultural Economics, University of Ibadan, Nigeria*

^b*International Institute of Tropical Agriculture (IITA), PMB 5320, Ibadan, Nigeria*

^c*International Institute of Tropical Agriculture (IITA), P.O. Box 34441, Dar es Salaam, Tanzania*

Abstract

Financial institutions (FIs) have key roles to play in the facilitation of value chain commercialisation for better earnings and improved food security. However, their performances with respect to cassava in which Nigeria is well-placed, has not been properly assessed. This study fills the gap by using a sample of fifty-four (54) FIs across selected states in Nigeria to examine the efficiency and effectiveness with which FIs provide credit to value chain actors and the determinants of FI use. Three (3) performance indicators were used to rank the FIs, namely Credit Effectiveness Index (CEI), Loan Performance Index (LPI) and Repayment Efficiency Index (REI). The study found out that out of the performance indicators, CEI had the highest value (0.8832) showing that the FIs performed best in loan coverage. Disaggregating by institution types, government-owned bank had highest CEI, followed by microfinance bank. Commercial bank led with respect to LPI and Repayment Efficiency Index (REI) which means it was the most successful in recouping credit given to cassava actors. This was also reflected in the Average Performance (AP) in which commercial bank led (0.9387) followed by microfinance bank (0.8272). The proportion of FI clients that are into agriculture and interest rate were the factors determining institution use. Government should continue to work with commercial banks through the various public sector credit schemes and strengthen the microfinance institutions as alternatives, in its quest for better credit.

Keywords: Cassava, Value chain, Commercialisation, Performance indicators, Agricultural credit.

JEL: C21, G21, Q14

* Corresponding author: Tel.: +2348037223832.
E-mail address: vokoruwa@gmail.com (V.O. Okoruwa).

1. Introduction

Nigeria remains the largest producer of cassava in the world with close to 90% of these roots sold by farmers directly to agro-processors in order to gain higher profit (Chemonics, 2017). Just as the primary producers see high returns as germane, other actors in the value chain are also oriented towards maximising gains (rational choice), a goal that is achievable with value chain commercialisation (Jaleta *et al.*, 2009). Commercialisation of cassava value chain through appropriate financing is a precursor to productivity enhancement, export drive and improved competitiveness in the sector (AfDB, 2013). Though Nigeria occupies a leading position in cassava production, converting tubers to high-end products for higher returns in the international market, requires investment in relevant techniques and technologies (IFC, 2014; World Bank, 2017). Thus, financing is key to increased production (inputs procurement) and industrial utilisation of cassava (capital-intensive value addition).

Despite its key role, the financial sector in Nigeria has not fully supported agricultural lending. Aside the conventional notions that agriculture is risk-prone and the sector suffers from small returns on investment, the institutional capacity in financial institutions towards agriculture is low. Figure 1 shows domestic credit provided by the financial sector to the various sectors as a share of GDP, a measure of capacity. The trend shows financial sector development reaching its lowest values in 2000 and 2006 (prior to period of financial liberalisation) and peak values in 1994 and 2009. In all, the values have not gone beyond the 50% mark and have been hovering within 20-25% range in recent times. The implication is that the financial sector is small in size, mirroring capacity problem of financial institutions in Africa (AfDB, 2013).

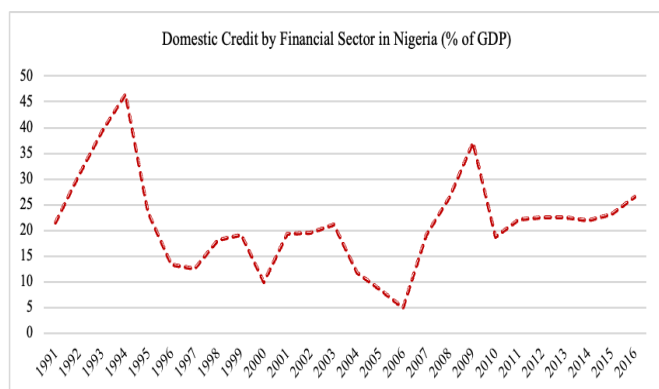


Figure 1: Trends of percentage share of domestic credit in the overall GDP

Source: World Development Indicators, WDI (2018)

The challenges facing agricultural financing through financial institutions is not limited to Nigeria or Africa. In China, for instance, problems of complex application process, high interest rate, short term repayment and high collateral requirement has limited the contributions of the financial institutions, especially the commercial banks (ADB, 2015). The ‘cold treatment’ that the agricultural sector receives from the financial institutions is not totally unexpected. Project financing, agricultural financing inclusive, is not engaged in as a philanthropic activity by the financial institutions, thus requiring that necessary regulatory safeguards be put in place to forestall loss of money (Ruete, 2015). It is in realisation of this that governments put guarantee schemes in place to give the financial institutions some peace of mind and hope of recovery of funds in the event of non-performance of the loan facility taken by agricultural actors.

Financial institutions have been central to the various lending programmes set up by the Nigerian government either as direct facilitators or channels through which funds are disbursed. In 2017, the Federal Government of Nigeria disbursed ₦27.5 billion to smallholder farmers (cassava being one of the eligible commodities) in the Anchor Borrowers’ Programme (ABP) through the participating financial institutions. Also, the Bankers Committee established the Agribusiness/Small and Medium Enterprises Investment Scheme (AGSMEIS) to support agricultural businesses and the Accelerated Agriculture Development Scheme (AADS) was also launched to combat youth unemployment through the instrument of agricultural value chain (CBN, 2017).

Population growth in Africa is projected to increase in folds with increasing need for food security (FAO/IFAD/UNICEF/WFP/WHO, 2017). This requires increased smallholder commercialisation: an array of upscaled production, processing and marketing activities with implications for input cost and marketing requirement which underscores huge finance requirement and alternative pathways to its provision (Haggblade, 2011 ADB, 2015). In these, the role of financial institutions is needed as much as other supporting institutions (NEPAD, 2013). Financial institutions hold the ace to cassava value chain commercialisation which is bound to have multiplier effect on scale of activities at the

different nodes and ultimately impact positively on actors' welfare.

The Nigerian government encourages commercial banks to set aside fund for agricultural lending in addition to the schemes in which it is directly involved. In fact, various programmes instituted by the Federal government has been with active involvement of the banks. It is worthy of note, however, that regular access to credit by value chain actors will, to a reasonable extent, depend on availability of fund in the pool as dictated by repayments (credit turnover). Unfortunately, various government-sponsored lending programmes are faced with repayment challenges. For instance, a total sum of ₦81.50 billion (for 858,896 loans) was repaid by ending of December 2017 out of ₦109.68 billion (1,101,188 loans) disbursed under Agriculture Credit Guarantee Scheme (ACGS) since inception in 1977, while about ₦273.6 billion was repaid out of ₦523.6 billion for Commercial Agricultural Credit Scheme (CACS) since inception in 2009 and ₦11.6 billion was repaid under ABP out of ₦55.5 billion since 2015 (CBN, 2017). Poor repayment has the tendency of stifling credit provision. Thus, factors responsible for lenders being able to meet up with the obligations of repayment, are worth studying. Considering institutional roles, Adebayo and Adeola (2008) assessed the credit use by farmers in Oyo state and found that cooperative society, an informal credit source was widely used and two-fifths of the respondents considered repayment mode as a serious constraint to credit access. Salami and Arawomo (2013) also identified interest rate as one of the significant factors affecting credit provision in Africa.

Based on these background settings, the following research questions were posed in this paper: What are the characteristics of the financial institutions engaged in cassava value chain financing? How effective and efficient are the financial institutions in the services being provided to the value chain actors? What are the factors determining financial institution type used by the actors? And what drives repayment of loans to financial institutions? Answers to the questions will showcase the status of the institutions with respect to agricultural credit provision thus paving way for appropriate policy responses. This becomes necessary in order to develop financial markets within the agricultural sector which is tantamount to developing the sector (Ruete, 2015). The paper is expected to also provide necessary ingredients for realising gains of cassava value chain financing and in charting a pathway for a sustainable agricultural

commercialisation with respect to the cassava value chain in Nigeria. In the rest of the paper, Section 2 addresses different aspects of the research methodology, Section 3 presents the results while Section 4 concludes and provide policy recommendations.

2. Methodology

2.1 Data

Primary data were collected from sampled financial institutions in Nigeria. The sample cut across government-owned institutions used mostly by government to disburse agricultural credit; commercial banks (including both old and new generation banks) and microfinance banks. A total of fifty-nine (59) institutions were given the research instrument out of which fifty-four (54) were finally utilised for analysis. Data were collected on institutional characteristics such as number of branches, average number of staffs per branch, number of loan officers, proportion of institution users that are into agriculture and number of cassava-based customers. Others include, number of actors that requested for loan, number served, average value of loan requested, total amount disbursed, interest rate, service charge, repayment status and loan duration. Performance characteristics of the financial institutions were generated from the data. These include effectiveness and performance indices generated with respect to loan disbursement and repayment, respectively. They were operationalised as follows:

$$\begin{aligned} &\text{Credit Effectiveness Index (CEI)} \\ &= \frac{\text{Number of actors served}}{\text{Total number of requests}} \quad \dots (1) \end{aligned}$$

$$\begin{aligned} &\text{Loan Performance Index (LPI)} \\ &= \frac{\text{Number of actors that repaid fully}}{\text{Total number served}} \quad \dots (2) \end{aligned}$$

$$\begin{aligned} &\text{Repayment Efficiency Index (REI)} \\ &= \frac{\text{Number of actors that repaid fully}}{\text{Total number of repayments}} \quad \dots (3) \end{aligned}$$

These three (3) indicators were aggregated into Average Performance (AP) using simple average. Information were also collected for groups that obtained credit from financial institutions. A sample of sixty-six (66) groups were used for the analysis.

2.2 Empirical model

Two models were employed in the study: multinomial logit (MNL) and probit models. The MNL was used to assess the determinant of use of financial institution while probit model was adopted to estimate the determinants of group repayment. The MNL is a choice model that operates in a situation where choices are unordered. Following Baum (2010), under such condition, the outcome y_i is one of m alternatives. If outcome is the j^{th} alternative, setting $y_i = j$ applies. The probability that an individual i chooses alternative j , conditional on regressors x_i , is given as:

$$P_{ij} = \Pr(y_i = j) = \frac{F_j(x_i, \theta)}{\sum_{j=1, \dots, m} F_j(x_i, \theta)} \quad \dots (4)$$

With different functional forms $F_j(\cdot)$ corresponding to different multinomial models.

It should be noted that parameters in MNL cannot be interpreted directly which calls for the estimation of the marginal effects for individual i , alternative j , and regressor k . Thus,

$$ME_{ijk} = \frac{\partial \Pr(y_i = j)}{\partial x_{ik}} = \frac{\partial F_j(x_i, \theta)}{\partial x_{ik}} \quad \dots (5)$$

The MNL model could be likened to series of pairwise logit models wherein each category is compared against the base category. In this study, each individual actor i is tested on the use of financial institutions j_n with k_n regressors. The financial institutions considered were government banks, commercial banks and microfinance with the government bank adopted as the base category. The regressors used in the MNL regression were: proportion of clients of the institutions that are into agriculture, number of loan officers, number of cassava-based customers, interest rate and loan duration.

In the probit model, the dependent variable represents occurrence of an event or choice between two alternatives. With expositions from IHS (2016), assuming the probability of observing a value of a value 1 is modelled as follows,

$\Pr(y_i = 1|x_i, \beta) = 1 - F(-x_i'\beta), \quad \dots (6)$
where F is a continuous, strictly increasing (cumulative) function that takes a real value and returns a value ranging from 0 to 1 with the assumption of linearity in parameters so that it is of form $x_i'\beta$. The choice of function F determines the type of binary model. Thus,

$$\Pr(y_i = 0|x_i, \beta) = F(-x_i'\beta) \quad \dots (7)$$

For a probit model, the F is standard normal. With such specification, parameters of the model can be estimated with the method of maximum likelihood whose function is given by,

$$l(\beta) = \sum_{i=0}^n y_i \log(1 - F(-x_i'\beta)) + (1 - y_i) \log(F(-x_i'\beta)) \quad \dots (8)$$

and the model specification could be interpreted as latent variable or as conditional mean.

The dependent variable for the probit model is the probability of timely repayment while the independent variables are: type of bank used by the group, group banking experience, collateral requirement, loan duration, interest rate, service charge, number of group branches, membership size, frequency of meetings, group loan efficiency and institution loan efficiency. Group loan efficiency is the ratio of number of actors served by each group to the number of actors that requested for credit while institution loan efficiency is the amount disbursed to group by financial institution as a fraction of the amount requested.

3 Results

3.1 Characteristics of the financial institutions

3.1.1 Institutional characteristics

Results from Table 1 show that government-owned banks had the highest average number of cassava-based customers and proportion of cassava-based clients that requested for loan compared to microfinance and commercial banks. Patronage of government banks in lieu others of may be due to the fact that they were specifically created and institutionally mandated to disburse agriculture-related loans. More so, there is a general notion that banks (especially commercial banks) do not support agricultural lending as a result of its risks and uncertainties (Raghunathan *et al.*, 2011). The results further showed that commercial banks had highest average number of staff per branch (21) while government banks had the least (8). Staff members in government banks were specifically employed to disburse agricultural loans while in the commercial and microfinance banks, there were other financial functions for which the extra staff members were employed. This is reflected in the number of loan officers which was approximately half of the staff strength in the commercial (9 to 21) and microfinance banks (8 to 17) but virtually the same in government-owned banks (7 to 8). Differences in institutional characteristics across the three (3) financial institutions were checked with the Kruskal-Wallis test of equality of population. The results of the tests, presented on Table A1 of the appendix, revealed that the institutions were only significantly different in numbers of branches and staff members per branch.

Table 1: Institutional Characteristics of the Financial Institutions

		No. of branches	No. of staff per branch	No. of loan officers	No. of cassava- based customers	Proportion of cassava- based customers that made loan requests (%)
Mean	Commercial	156	21	9	104	85.0
	Government	48	8	7	222	99.1
	Microfinance	5	17	8	178	85.6
	All	42	17	8	166	86.7
Standard deviation	Commercial	239	9	7	147	30.4
	Government	85	4	5	183	2.0
	Microfinance	12	10	6	198	23.0
	All	128	10	6	187	23.8
Minimum	Commercial	4	8	3	3	18.2
	Government	2	5	2	31	95.6
	Microfinance	1	3	2	2	22.9
	All	1	3	2	2	18.2
Maximum	Commercial	777	43	29	500	100
	Government	200	13	15	515	100
	Microfinance	75	50	28	750	100
	All	777	50	29	750	100

Number of banks: Commercial 12, Govt-owned 5, Microfinance 37.

Results from Table 2 indicate that government banks had the highest number of loan requests (220) and most (98.2%) of these requests were serviced. Microfinance banks (MF) also got appreciable loan requests (142) and high percentage (88.7%) of the requests were similarly met. Meanwhile, these two banks charged 5-folds of the interest rate charged by commercial banks. The high interest rate charged by the microfinance banks might be due to high supervision cost

associated with microcredit and the need to cover other costs associated with credit provision; with the clients also willing to pay such high interest rates (Rosenberg *et al.*, 2009; Rosenberg, 2010; NEPAD, 2013). Also, despite the low number of loan requests made to commercial banks, it had the highest number amount of average loan per year (₦1.24 million). This suggests that large sums were requested from commercial banks. Large variations were also discovered in the average loans disbursed by commercial and microfinance banks as reflected in the minimum, maximum and standard deviation values. This contrasts with what obtained in government banks where the minimum loan given was ₦140,000.00, maximum was ₦250,000.00 and the mean value was ₦170,400.00±45,175.21. The reason for this difference could be that loans from commercial and microfinance banks were secured for portfolio of high-end activities (e.g. processing, fabrication) and projects within the value chain, while loans from government banks were to attend to basic agricultural needs in the value chain (e.g. cultivation of cassava roots). Tests of equality of mean were also conducted for the loan characteristic variables and the results are presented in Table A2 of the appendix. Among the loan characteristics, only the average annual loan disbursed was significantly different across the financial institutions.

Table 2: Loan Characteristics of the Financial Institutions with respect to Cassava-based Clients

		No. of loan reque sts	No. of services	Loan/year (₦/annum)	Interest rate (%)	Loan duration (months)
Mean	Commercial	99	89	1 242 708.00	0.20	10.3
	Government	220	216	170 400.00	1.08	10.8
	Microfinance	142	126	584 452.10	1.06	11.5
	All	140	126	692 393.10	0.87	11.1
Standard deviation	Commercial	150	133	2 765 177.00	0.07	2.2
	Government	183	183	45 175.21	1.97	1.1
	Microfinance	169	163	999 540.90	3.25	6.8
	All	166	159	1 538 874.00	2.76	5.7
Minimum	Commercial	2	2	50 000.00	0.08	6
	Government	31	31	140 000.00	0.05	10
	Microfinance	2	2	15 000.00	0.03	1
	All	2	2	15 000.00	0.03	1
Maximum	Commercial	500	450	10 000 000.00	0.32	12
	Government	515	515	250 000.00	4.59	12
	Microfinance	750	750	5 000 000.00	20.00	36
	All	750	750	10 000 000.00	20.00	36

Exchange rate: \$1 = ₦164.64 (CBN, 2014)

3.1.2 Performance characteristics of financial institutions

Analysis of the performance characteristics of the financial institutions presented in Table 3 showed average scores of 0.883, 0.848 and 0.824 for Credit Effectiveness Index (CEI), Repayment Efficiency Index (REI) and Loan Performance Index (LPI) respectively, implying highest performance in disbursement, followed by efficiency in getting full repayment and lastly, efficiency in recouping loan from most of the actors served. The distributions of the indices are illustrated in Figures 2-4. The illustrations of the performance indices revealed that two of the indices, LPI (Fig. 3) and REI (Fig. 4) were clearly skewed to the left showing that there were few more lower values. The distribution of the aggregate index (Average Performance – AP) is given in Figure 5 while its summary statistics are given in the last row of Table 3. The AP was slightly skewed to the left while the average value of 0.852 indicated good general performance. On institution basis, commercial banks had the highest value, followed by the microfinance banks (Figure 6).

Table 3: Summary statistics of performance characteristics of financial institutions

Indicator	Observations	Mean	Std. dev.	Min.	Max.
CEI	54	0.88	0.16	0.48	1.00
LPI	54	0.82	0.18	0.17	1.00
REI	54	0.84	0.16	0.17	1.00
AP	54	0.85	0.12	0.44	1.00

CEI=Credit Effectiveness Index; LPI=Loan Performance Index; REI=Repayment Efficiency Index; AP=Average Performance

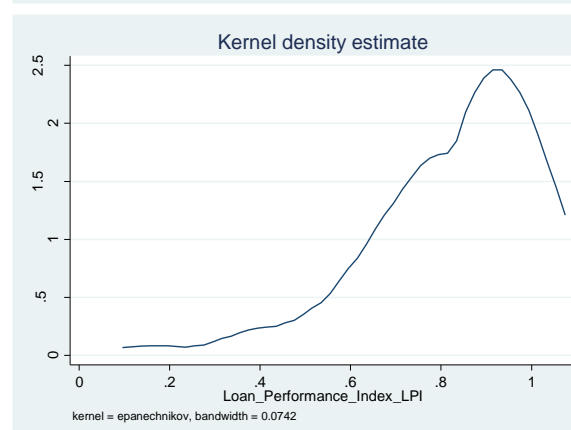
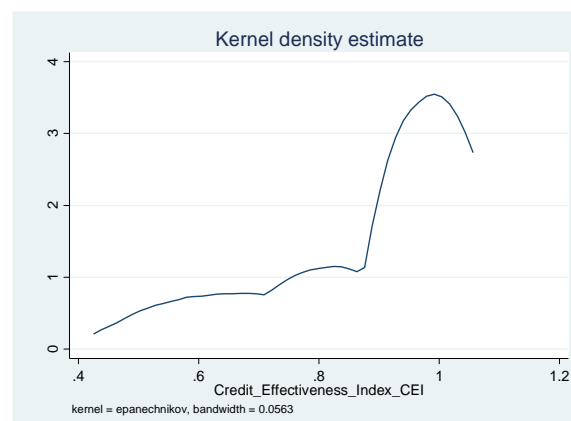


Figure 2: Distribution of the CEI of the financial institutions
Figure 3: Distribution of the LPI of the financial institutions

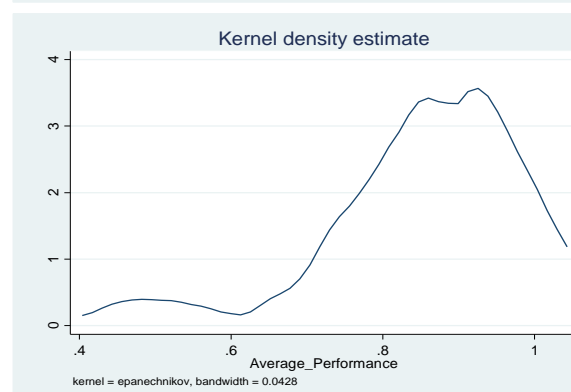
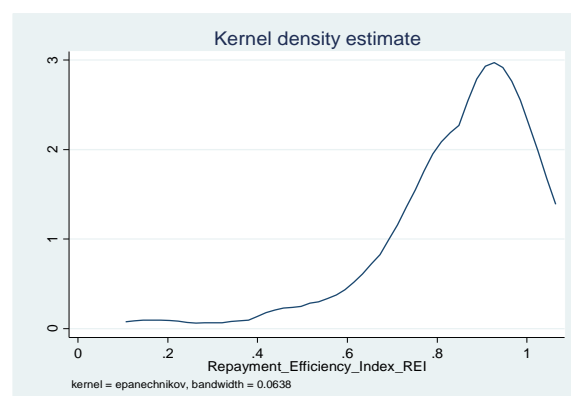


Figure 4: Distribution of the REI of the financial institutions
Figure 5: Distribution of AP of the financial institutions

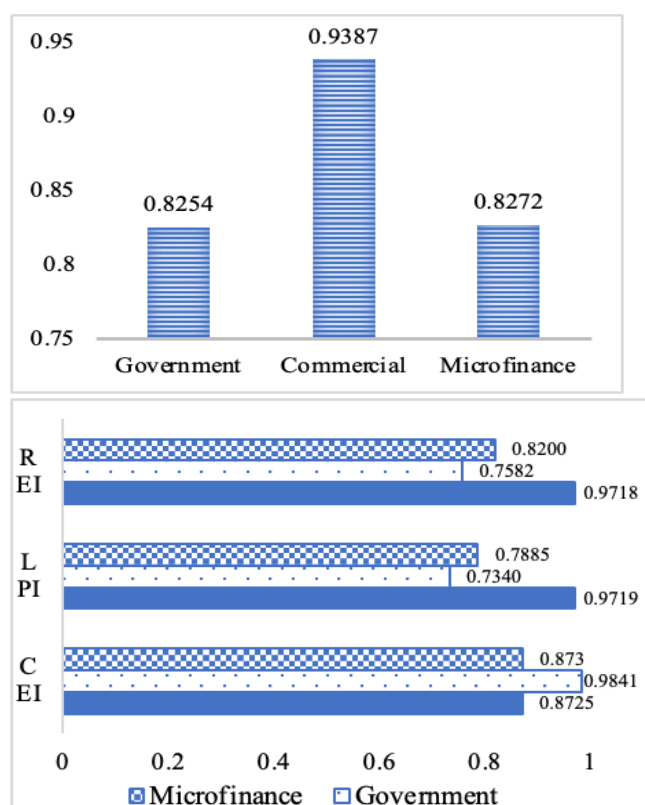


Figure 6: Average Performance by institution types

Figure 7: Mean values of performance characteristics by institutions

Further analysis was conducted by disaggregating the indices (CEI, LPI and REI) by financial institutions. The results, shown in Figure 7, had commercial bank leading in both LPI and REI, followed by microfinance bank and lastly, government bank. The commercial banks were thus the most successful in recovering loan disbursed probably due to better capacity, as evident in highest values of loan disbursement, number of branches and number of staff per branch (Tables 1&2). In contrast, government bank had the highest CEI value, followed by microfinance bank and lastly, commercial bank. MANOVA test was conducted to examine whether significant differences exist among the three (3) financial institutions with respect to the performance indicators. Rejection of the null hypothesis at 5% significance level (shown by the probability of F value with respect to each of the test statistics (Table 4)), indicated that differences exist among the financial institutions. This justifies separate explanations of the indicators for the financial institutions. The same values of the test statistics were also obtained using multivariate (MV) test of equality of group means with the default (homogenous) option. Results of the heterogenous

covariance and likelihood ratio options for the MV test are presented in Table 4. This test was also supported by Kruskal-Wallis tests which showed significant differences in LPI and REI but not in CEI across the institutions (Table A3 in appendix).

Table 4: MANOVA Test and MVTEST Statistics Results

MANOVA	Value	F	Prob>F	MVTES T*	Chi ² value	Prob > chi ²
Wilks' lambda	0.7	2.5	0.0255	Wald	76.32	0.000 (chi ² ; James')
Pillai's trace	497	3	0.0270	Likelihood Ratio	39.39	0.000
Lawley-Hotelling	608	0	0.0242	*The mvtest default (homogenous covariance) result is similar to manova results while the results with heterogenous covariance and likelihood-ratio options are the ones given here.		
Roy's largest root	200	6	0.0074			

3.2 Determinants of financial institution use

Results from Table 5 shows that only two factors: proportion of clients that are into agriculture and interest rate, significantly affect financial institution use at 10 and 1% levels, respectively. Proportion of clients into agriculture cut across the financial institutions while interest rate was specific to the commercial bank and both variables were negatively related to financial institution use. The results showed that as the proportion of clients that are into agriculture increases, the likelihood of commercial bank use relative to the government bank decreases by 0.02%. This relationship was also true as regards microfinance banks but at a decrease of 0.24%. On the second significant variable, if interest rate increases by a point, the likelihood of commercial banks' use relative to government banks is expected to also decrease by 4.9%.

Table 5: Parameter estimates of determinants of choice of financial institution use

	Commercial				Microfinance
	Coeff. (s.e)	z	P> z	dy/dx	Coeff. (s.e)
Proportion of clients into agriculture	-0.045* (0.026)	-1.75	0.079	-1.67E-04	-0.068*** (0.025)
Number of loan officers	0.204 (0.138)	1.48	0.140	9.86E-04	0.086 (0.122)
No. of cassava-based customers	-0.004 (0.004)	-0.84	0.400	-3.85E-05	0.001 (0.003)
Interest rate	-5.981*** (2.925)	-2.04	0.041	-4.91E-02	0.038 (0.277)
Loan duration	0.234 (0.225)	1.04	0.299	6.91E-04	0.155 (0.186)
Constant	1.227 (2.658)	0.46	0.644		2.340 (2.310)
Log likelihood:	-31.7394				
LR-chi2:	24.39				
Prob > chi2:	0.0066				
Pseudo R-squared:	0.2776				
No. of observations:	54				
Base category:	Government-owned				
Level of significance:	***1%, **5%, *10%				

Standard error in parenthesis.

Marginal effects after mlogit
 $y = \text{Pr}(\text{status_fin_3} = \text{govt_owned}) (\text{pr})$
 $= 0.03467566$
 $y = \text{Pr}(\text{status_fin_3} = \text{commercial}) (\text{pr})$
 $= 0.00821952$
 $y = \text{Pr}(\text{status_fin_3} = \text{microfinance}) (\text{pr})$
 $= 0.95710482$

3.3 Drivers of loan repayment obligations

It has been established that group-based credit provision helps in proper disbursement and recouping of loans provided (Khandker and Koolwal, 2016). More so, group membership is seen as a veritable tool in improving the lots of agrarian population (Verhofstadt and Maertens, 2014) and group funds represents a good form of collateralised loan since all members contribute in securing the loan (ADB, 2015). Therefore, this study proceeded to estimate the drivers of loan repayment obligations by various loan groups that bank with the financial institutions. About eight (8) variables were significant. Results in Table 6 shows that the use of microfinance bank, government bank, loan duration, number of group branches and group membership size influenced repayment positively while banking experience, group loan efficiency and institution loan efficiency affected repayment negatively, at 1% and 5% levels of significance. The table further shows that increase in the use of microfinance bank and government bank increased group repayment by 39% and 44%, respectively. This might be as a result of differing incentives from the two banks, considering the fact that government banks charge low-digit interest rate (CBN, 2017), whereas microfinance banks charge high interest rates (Rosenberg *et al.*, 2009) to cover transaction cost. In other words, microfinance banks might have better loan coverage than government banks since low interest rate might bring about credit rationing. The remaining three (3) variables that were positively related to repayment are intertwined. Longer loan duration and more branches meant that the groups will be able to gather more funds from many members and this will greatly assist repayment.

Table 6: Parameter estimates of the factors influencing group loan repayment

Group variables	Coefficient	Robust Std err.	z	P> z	dy/dx ¹
Bank used by group					
Commercial bank	-0.0031	0.5898	-0.01	0.996	-0.0008
Microfinance bank	1.3869**	0.5878	2.36	0.018	0.3934
Government bank	2.3371***	0.7226	3.23	0.001	0.4375
Group banking experience	-0.0661**	0.0331	-1.99	0.046	-0.0167
Collateral requirement	-0.4710	0.5366	-0.88	0.380	-0.1166
Loan duration	0.0980***	0.0359	2.73	0.006	0.0248
Interest rate	-0.2602	2.8861	-0.09	0.928	-0.0658
Service charge	6.53e-07	1.20e-06	0.55	0.585	1.65e-07
No. of group	0.1967*	0.1085	1.81	0.070	0.0497

¹ Discussions are based on marginal effects

branches					
Membership size	0.0004***	0.0001	3.16	0.002	0.0001
Frequency of meeting	0.2311	0.3187	0.73	0.468	0.0584
Group loan efficiency	-0.2067***	0.0565	-3.66	0.000	-0.0523
Institution loan efficiency	-3.7428***	1.1066	-3.38	0.001	-0.9464
Constant	-1.2314	0.9407	-1.31	0.190	
Number of observations=	66				
Wald chi2(13)=	31.41;				
Prob>chi2=	0.0029				
Pseudo R-squared =	0.3957				
Marginal effects after					
probit y= Pr (repayment)					
(predict)					
=	0.83020147				

Level of Significance: ***1%, **5%, *10%

Furthermore, an increase in year of group banking experience reduced repayment by 1.8%. The fact that a group had been transacting business with a particular financial institution might bring about 'familiarity' mentality unlike a new client that might want to impress the institution through timely repayment for better credit access. Similarly, an increase in group loan efficiency and institution loan efficiency reduces repayment by 5.2% and 95.0% respectively. The result establishes that the higher the extent to which group or individual requests are met, the lower will be the level of repayment. These could emanate from widespread allocation of funds and cumulative effect of individual group members' default.

4. Conclusion

The study sets out to assess the efficiency and effectiveness of financial institutions in cassava value chain financing. It also seeks to isolate the determinants of financial institution use and repayment obligations. Significant differences were established among the financial institutions with respect to the number of branches, number of staff members per branch and average amount of loan disbursed in a year. Credit Effectiveness Index (CEI) had the highest average value among the three (3) performance indicators but Loan Performance Index (LPI) and Repayment Efficiency Index (REI) were the only significantly different indicators among the financial institutions. Commercial bank was the leading financial institution going by the value of the Average Performance (AP). The type of financial institution used by the value chain actors was determined by the proportion of institution clients that were into agriculture and the interest rate charged by the institution. Thus, borrowing from financial institution that were agriculture-based boost repayment. Although, the capacity of loan-receiving groups should be a source of strength in agricultural lending, the higher the amount of fund given to the groups, the lower the level of

repayment which underscores the essence of putting all necessary measures in place prior to lending. Overall, private sector is still a veritable tool in agricultural lending and combining this with group solidarity will improve agricultural value chain financing.

References

- African Development Bank, AfDB 2013. Agricultural Value Chain Financing (AVCF) and Development for Enhanced Export Competitiveness, African Development Bank, Tunisia.
- Asian Development Bank, ADB 2015. PRC: Study on Modern Agriculture Demonstration Area Planning and Financial Support Mobilization – International Lessons on Financing Agricultural Modernization. ADB TA No. 8126. September 2015.
- Baum, C.F. 2010. Models for Count Data and Categorical Response Data. Boston College/DIW. June 2010.
- Central Bank of Nigeria, CBN 2014. *Monthly Average Exchange Rate of the Naira*, Data & Statistics. Abuja, Nigeria.
- CBN, 2017. *CBN Annual Report 2017*, Abuja, Nigeria.
- Chemonics, 2017. Maximizing Agricultural Revenue and Key Enterprises in Targeted Sites (MARKETS II), Feed-the-Future programme, United States Agency for International Development (USAID).
- FAO, IFAD, UNICEF, WFP and WHO, 2017. *The State of Food Security and Nutrition in the World 2017. Building Resilience for Peace and Food Security*. Rome, FAO.
- Haggblade, S. 2011. Financing Smallholder Commercialisation. Presentation at AAMP Seminar on “Smallholder-Led Agricultural Commercialisation”, 4-8 April, 2011, Kigali, Rwanda.
- International Finance Corporation, IFC 2014. Access to Finance for Smallholder Farmers: Learning from the Experiences of Microfinance Institutions in Latin America.
- IHS, 2016. EViews 9 User’s Guide II. IHS Global Inc., 4521 Campus Drive, Irvine, CA.
- Jaleta, M., Gebremedhin, B. and Hoekstra, D. 2009. Smallholder Commercialisation: Processes, Determinants and Impact. Discussion Paper No. 18, *Improving Productivity and Market Success of Ethiopian Farmers, Improving Market Opportunities*. International Livestock Research Institute (ILRI).
- Khandker, S.R. and Koolwal, G.B. 2016. How Has Microcredit Supported Agriculture? Evidence Using Panel Data from Bangladesh. *Agricultural Economics*, 47(2016): 157-168.
- New Partnership for African Development, NEPAD 2013. Agriculture in Africa: Transformation and Outlook. Accessed 3 May 2018.
- Raghunathan, U. K., Escalante, C. L., Dorfman, J. H., Ames, G.C.W. and Houston, J.E. 2011. The effect of agriculture on repayment efficiency: A look at MFI borrowing groups. *Agricultural Economics*, 42(2011): 465-474.
- Rosenberg R., Gonzalez A. and Narain, S. 2009. The New Moneylenders: Are the Poor Being Exploited by High Microcredit Interest Rates. CGAP, Washington, D.C.: USA.
- Rosenberg, R. 2010. Does Microcredit Really Help Poor People? Focus Note 59. Washington, D.C.: CGAP.
- Ruete, M 2015. Financing for Agriculture: How to Boost Opportunities in Developing Countries. International Institute for Sustainable Development (IISD), Investment in Agriculture Policy Brief No. 3.
- Salami, A. and Arawomo, D.F. 2013. Empirical Analysis of Agricultural Credit in Africa: Any Role for Institutional Factors? Working Paper Series No. 192, African Development Bank, Tunis, Tunisia.
- Verhofstadt, E. and Maertens, M. 2014. Smallholder cooperatives and agricultural performance in Rwanda: Do organizational differences matter? *Agricultural Economics*, 45 (2014) supplement 39-52.
- World Bank, 2017. *Enabling the Business of Agriculture 2017*. Washington, DC: World Bank. doi: 10.1596/978-1-4648-1021-3. License: Creative Commons Attribution CC BY 3.0 IGO.
- World Bank, 2018. *World Development Indicators (WDI) 2018*.

Appendix

Table A1: Results of Kruskal-Wallis Test of Equality of Populations for Institutional Characteristics of the Financial Institutions

Variables	Rank Sum Values			Chi-square	Probability	Decision
	Commercial	Government-owned	Microfinance			
No. of branches	546.0	192.5	746.5	26.173	0.001	S***
No. of staff per branch	408.5	49.5	1027.0	8.342	0.015	S**
No. of loan officers	348.5	132.5	1004.0	0.165	0.925	NS
No. of cassava-based customers	240.0	179.5	1065.0	4.404	0.111	NS
Proportion of cassava-based customers that made request	337.5	173.0	974.5	1.239	0.538	NS

Level of significance: ***1%, **5%, *10%.

Table A2: Results of Kruskal-Wallis Test of Equality of Populations for Loan Characteristics of the Financial Institutions

Variables	Rank Sum Values			Chi-square	Probability
	Commercial	Government-owned	Microfinance		
No. of loan requests	248.5	189.0	1047.5	4.478	0.107
No. of loan services	264.0	195.5	1025.5	4.192	0.123
Loan per year (N/annum)	446.5	109.5	929.0	6.059	0.048
Interest rate (%)	256.0	119.0	1110.0	3.055	0.217
Loan duration (months)	349.0	144.5	991.5	0.235	0.889

Level of significance: ***1%, **5%, *10%.

Table A3: Kruskal-Wallis Test of Equality of Populations for Performance Characteristics of the Financial Institutions

Variables	Rank Sum Values			Chi-square
	Commercial	Government-owned	Microfinance	
Credit Effectiveness Index (CEI)	326.0	179.0	980.0	1.551
Loan Performance Index (LPI)	514.5	75.5	895.0	16.206
Repayment Efficiency Index (REI)	511.0	63.5	910.5	16.706

Level of significance: ***1%, **5%, *10%