The Effect of Selected Financial Indicators on Formal Agricultural Credit Supply in Nigeria

Author's Details:

Bassey, Nsikan Edet[1]*,Ibok, Otu William[1] and Amba, Esu-Amba Antakikam [2]

[1]Department of Agricultural Economics and Resources ManagementAkwa Ibom State University, Ikot Akpaden, Mkpat Enin, P.M.B. 1167, Uyo, Akwa Ibom State, Nigeria.[2]Department of Economics Akwa Ibom State University,Ikot Akpaden, Mkpat Enin, Akwa Ibom State, Nigeria.

Abstract

This study examines the effect of selected financial indicators on formal agricultural credit supply in Nigeria. Time series data obtained from CBN covering the period 1970-2011 were employed in the study. Data were analyzed using Co-integration and error correction model. The data was first examine for unit roots using the Augmented Dicky Fuller (ADF) test, result which shows that only loan to deposit ratio was stationary at level while the other variables were stationary at first difference. Findings further revealed that loan to deposit ratio, loan to other sectors and previous volume of loan to other sectors all exerted significant negative impact on formal agricultural credit supply in Nigeria. Surprisingly, lending rate carried the expected negative sign but fail to explain the variation in formal agricultural credit supply during the period under investigation. The study advocated for appropriate short and long-run financial policies that would reduce the volume of loan given to other sector. This can be achieved by making agriculture a priority sector in financial Institution's loan disbursement and funding schedule. If possible, the mandatory Commercial bank sectoral credit allocation to agriculture should be increased and adequate monitoring carried out to ensure that bank's disbursement targets are met in line with CBN's prescribed conditions. Also, policies that would reduce the loan to deposit ratio of banks should be pursued. Such policies should be directed towards increasing the interest rate on savings deposit. This would increase the volume of bank deposit and savings which would, invariably, enhanced their liquidity position.

Keywords: Credit supply, loan to deposit ratio, formal credit, agricultural sector

1.0 INTRODUCTION

Numerous studies have reiterated the need for formal financial sector to ensure credit availability and proper funding of Agricultural sector. Funding of agricultural sector is important because of the enormous potential and contribution of agriculture towards the economic development of several countries of the world. In Nigeria, for instance, apart from employing about 51.3% of labour force, it account for 70% of GDP of the non oil sector (Bureau of Statistics, 2010). Its contribution to GDP as percentage of total GDP of the economy increased from 35.92 percent in 1981-1985 period to 41.68 percent in 2006-2010 periods, respectively. In spite of this huge potential, the sector is still bewildered with numerous challenges prominent among which is poor access to formal credit supply. Efficient formal financial system can foster credit availability to agricultural sector. Access to credit increases farm size, farm productivity and income and facilitates adoption of improved farm practices, marketing efficiency and smoothens farm family consumption (FAO, 1988,). Other studies such as Nwanna,(2000), FAO,(1988) and Zeller *et al*.(1997) documented that availability of credit increased productivity and income. Oyatoye (1983) classified formal sources of credit to farmers into Institutional and non –Institutional sources. Ojo,(1988) listed the formal credit sources actively involved in providing credit to farmers in Nigeria to include: banks, non-governmental Associations which include Commercial and Cooperative banks, Microfinance banks and other bodies under the Agricultural Credit Guarantee Scheme Fund operating under the guidelines of the Central Bank of Nigeria

To boost the flow of formal credit to agricultural sector, government and other financial stakeholders have evolved and implemented numerous financial schemes. A summary of such financial schemes include but not limited to: the introduction of the mandatory sectoral allocation of 4% commercial bank loans to agricultural sector in 1977, which has now grown to about 18%, establishment of the Nigerian Agricultural Cooperative Bank in1973, launching of the National Agricultural Development Fund (NADF) with the initial grant of N10.0 billion, the disbursement of the N200 Billion Commercial Agricultural Support Scheme (ACACS) which provided N50.0 billion financing to Small and Medium Scale farmers, merger of the Nigerian Agricultural Cooperative bank with the People's Bank

and the Family Economic Advancement Programme (FEAP) to form the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) as well as the launching of the Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1977.

Despite the existence of many financial Institutions and government financial policy objectives, Commercial banks and other formal financial Institutions fail to carter for the credit needs of farmers. Access to formal loan by farmers continues to be low. Most banks operate stringent loan conditions and policies, charges higher interest rates that discourage borrowers. This is evidenced in the form of prescribed minimum loan amount, complicated application procedure and restriction on credit for specific purpose (Schmid and Kropp, 1987) which characterized our formal lending system. Empirical evidences from studies like Egbe,(2002), Juma,(2007), Haruna,(2007), Adenuga and Akpan,(2007), Shekhar and Shekhar,(2005) and Okorie, (1985) are all pointers to the failure of formal financial institutions in meeting the credit need of farmers. This accounts for the epileptic and unproductive state of agriculture in Nigeria, in spite, of the favorable environment and vast resources endowment. Shekhar and Shekhar, (2005) attributed the bank's inability to loan to agricultural sector to the uneconomical size holdings, the poor resource of agriculturists and the lack of securities acceptable by banks. Atieno,(1994) likened it to the preferential interest rate change by banks which according to her, have limited the amount of credit available to farmers and the efficiency with which the available funds are use. Ogiogio, (1992) reported that a huge part of the amount reported as loans and advances by Commercial banks are often not actually allocated as indicated. Among the array of bank related factors earmarked as responsible for the poor supply of credit to the sector include: rigorous loan access procedure, lack of collateral, short-term repayment period, high rate of interest, late arrival of disbursed credit (Awoke and okorji, 2004) and bad debts (Alade *et al*.(2003). In response to high rate of loan default characterizing developing countries, banks in most cases require collateral which most rural farmers cannot afford due to poor income of farming households. Adegeye and Dittoh (1985) posited that farmers hardly have a landed property to pledge and the land tenure systems in most areas do not allow mortgaging of community or family lands. To worsen their plight, most agricultural lands that would have been mortgage for loans are located in rural areas with no approved land tittles. These, in addition to certain financial related factors such as their cash reserve ratio, liquidity ratio, prevailing interest rate, lending rate, loan to deposit ratio as well as total volume of credit given to other sectors interact together to determine banks ability to create and disburse credit to agricultural sectors. As evidenced in Table 1 below, Commercial bank credit to agricultural sector as a percentage of total commercial bank credit decreased from 2.64% in the 1970-1975 periods to 1.44% in the 2006-2010 periods while lending rate increased from 9.5% in 1970 -1975 periods to 20.19 in the 2006-1010 periods. Within the same time, loan/deposit ratio increase from 62.75 in the 1970-1975 periods to 75.25 in the 2006-2010 periods. Also, in 1970-1975 periods loan to other sectors and liquidity ratio fell from 97.36% and 71.22% to 98.56% and 20.14% in the 2006-2010 periods, respectively. It is clear from the table that Commercial bank loan to agricultural sector decrease with an increase in lending rate, loan to debt ratio as well as loan to other sectors and increase with increase in liquidity ratio. Therefore, increasing formal credit supply to agricultural sector would require an empirical examination of those financial related factors that affects bank liquidity position. Hence, this study examines the effect of selected financial indicators (lending rate, loan to deposit ratio and total loan to other sectors of the economy) on the supply of formal credit to agricultural sector in Nigeria.

Table 1: Central bank credit to agriculture, lending rate, Loan to deposit ratio, Loan to other sectors and liquidity ratio

Year	TAC (%)	LR (%)	L/DR	LTOS (%)	LIR (%)
1970-1975	2.64	9.5	62.7	97.36	71.22
1976-1980	6.82	9.5	61.4	93.18	48.58
1981-1985	8.58	11.55	78.3	91.42	52.76
1986-1990	14.52	20.14	73.9	85.48	42.50
1991-1995	18.39	25.97	58.4	81.61	38.30
1996-2000	11.89	22.85	65.9	88.11	30.68
2001-2005	5.07	20.18	65.9	94.93	22.94
2006-2010	1.44	20.17	75.2	98.56	20.14

Note: TAC = Total credit of commercial bank to agricultural sector as a percentage of total community bank's credit; LR = Lending rate of commercial banks; L/DR = Loan to deposit ratio

LTOS = Loan to other sectors of the economy; LIR = Liquidity ratio of commercial banks
Source: Author's computation using data from CBN.

2.0 RESARCH METHODOLOGY

2.1 Study area

The study was carried out in Nigeria, which lies between Latitude 4^0 and 14^0 N of the Equator and between Longitude 3^0 and 15^0 East of the Greenwich meridian. The country has a population of 140 million people (NPC, 2006) and a total land area of about 923,769 Km^2 (FOS, 1989).

2.2 Sources of data collection

Secondary data which covered the period 1970 -2011 were sourced from various issues of the Central Bank of Nigeria Statistical Bulletins and employed for the study. Data series of interest were: Commercial bank credit to the agricultural sector, lending rate of commercial banks, Loan to deposit ratio of commercial banks as well as total commercial bank loan to other sectors.

2.3 Analytical Techniques

This study uses the cointegration and error correction model for the analysis. Before then, the variables were first examined for stationarity using the unit root rest as discussed below

2.3.1 Test for stationarity

It has become common knowledge that a large number of time series data use in econometric analysis are non-stationary meaning they have the tendency to either decrease or increase over time. Engle and Granger (1987) and Philips (1986) averred that such data if use for regression analysis would lead to spurious regression. Therefore, in examining each of the time series variables for the presence of a unit root (an indication of stationality), an Augmented Dickey Fuller (ADF) test was used to carry out the unit root. The ADF test minimizes autocorrelation in the error term since it involves the first difference in lags such that the error term is distributed as white noise. The test formula for ADF is shown as;

$$\Delta Yt = \alpha + \rho Yt - 1 + \sum_{t-1}^{j} Y\Delta Yt - j + Ut \ldots \quad (1)$$

Here the lag length j chosen for ADF ensure U_t is empirical white noise. The significance of ρ is tested against the null that ρ = 0 based on the t statistics obtained from the OLS estimated in equation (3). If the null hypothesis of non stationarity cannot be rejected, the variables are difference till they become stationary, that is, till the existence of a unit root is rejected. Having established that the variables were stationary, we proceeded to carry out the co-integration test.

2.3.2 Co-integration Analysis

The study employed cointegration approach including Error Correction Mechanism (ECM) to analyze the data. Cointegration was adopted in order to overcome the problem of spurious correlation associated with non- stationary time series data, which eventually generate long run relationship (Maddala, 2002). Co-integration is said to exist between non-stationary variables if their linear combinations, namely the residuals of the co-integrating regression are stationary (Granger, 1986; Hendy, 1986). Engle and Granger (1987), averred that when two variables are co-integrated there exist a valid error correction model describing their relationship, with the implication that co integration between variables involved is a precondition for the error correction model. In testing for the Cointegration, the Maximum Likelihood method developed by Johansen (1988 and 1991) was employed. In line with the approach, both Trace and the Maximum Eigenvalue statistics were used to test the number of cointegrating vectors. The null hypothesis for the trace test was that there are at most *r* cointegrating vectors, while for the Max Eigenvalue test, the null of *r* = 0 was tested against the alternative that *r* = 1; *r* = 1 was tested against the alternative that *r* =2 and so on. The Schwarz Information Criterion (SIC) was also employed in selecting the optimal lag length for the cointegration test.

The empirical model for study is presented thus:

$$\Delta LnTAC_t = \theta_0 + \theta_1 \Delta LnLR_{t-2} + \theta_2 \Delta LnLTDR_{t-2} + \theta_3 \Delta LnLTOS_{t-2} + \theta 4 ECMt_{-1} + U_t \quad \ldots\ldots\ldots\ldots (2)$$

Where equation 1:

TAC_t = Total Commercial Bank credit to agricultural sector in period t (Nmillion)

$LTDR_t$ = Commercial Bank loan to deposit ratio in period t (Nmillion)
$LTOS_t$ = Total Commercial bank loan to other sectors in period t (Nmillion)
LR_t = Lending rate in period t(Percentage)
U_t = Stochastic error term
t = time period

2.3.3 Testing for the short- run relationship

To examine the short-run effects of bank credit finance and other policy-variables on agricultural output in Nigeria, an error correction modeling (ECM) analysis is conducted. The essence of the ECM is to capture the dynamics in the growth of agricultural GDP in Nigeria in the short-run through the speed of adjustment to the deviation from the short-run equilibrium. The parsimonious error correction model is shown in equation 3.

$$\Delta LnAGDP_t = \beta_1 - \beta_2\Delta LnCBF_{t-1} - \beta_3\Delta LnCBF_{t-2} + \beta_4\Delta LnEXR_t - \beta_5\Delta LnEXR_{t-1} - \beta_6\Delta LnEXR_{t-2} + \beta_7\Delta LnINF_t + \beta_8\Delta LnINF_{t-1} - \beta_9\Delta LnINF_{t-2} - \beta_{10}\Delta LnLR_t - \beta_{11}\Delta LnLR_{t-2} + \beta_{12}\Delta LnAGDP_{t-1} - ECM_{t-1}\ldots..(3)$$

Where the variables are as defined in equation 2.

3.0 RESULT AND DISCUSSION

3.1 Result of unit root test

Table 2 present the result of the Augmented Dickey Fuller unit root test that was carried out to ascertain the level of integration of the time series variables used for the regression with view to overcoming the problem of spurious regression that is associated with most time series data (Engle and Granger, 1987). The test result was compared with the Mackinnon (1991) critical values for the rejection of the null hypothesis of the unit root. Result revealed that, all variables (in logs) were not stationary at levels except loan to deposit ratio (LNLDR). Hence, any attempt to specify their dynamic functions in the level of series would have led to spurious regression (Mesike et al.,2010). All other variables were, however, stationary at first difference, thereby justifying the use of OLS regression in the analysis.

Table 2: Result of unit root test

logged Variable	Augmented Dickey- Fuller Level	First Difference	Level of integration
LnTAC	-2.6992	-5.7265**	1(1)
LnLR	-2.0483	-9.1359 **	1(1)
LnLTDR	-3.3605**	-	1(0)
LnLTOS	-1.5766	-8.7854 **	1(1)
5%	2.935	2.9369**	

Note: Critical values (CV) are defined at 5% significant levels and asterisks
** represent 5% significance levels. Variables are as defined in equation 2.

3.2 Co-integration test

Table 3 and 4 presents the results of the Johansen's Maximum Likelihood Co-integration carried out to examine the existence of co-integration among the variables. The test result which were based on Trace and Maximum Eigen value tests showed the existence of 1 and 2 co-integrating vectors for the Trace and Maximum Eigen value tests and the rejection of the null hypothesis of r = 0, respectively. This shows sufficient proof of the existence of a long run

relationship between agricultural credit supply and the selected financial indicators. This validates the use of error correction model (ECM).

Table 3: Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.540982	61.14107	54.07904	0.0103
At most 1	0.333512	29.99444	35.19275	0.1633
At most 2	0.220634	13.76512	20.26184	0.3059
At most 3	0.090494	3.794159	9.164546	0.4436

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4: Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.540982	31.14663	28.58808	
At most 1	0.333512	16.22932	22.29962	0.2823
At most 2*	0.220634	15.89210	9.970957	0.0170
At most 3	0.090494	3.794159	9.164546	0.4436

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

3.3 Parsimonious error correction estimates

Table 5 presents the result of the parsimonious error correction model carried out to determine the short-run impact of the explanatory variables on the supply of formal credit to agricultural sector. The choice of the model was informed by the conformity of the estimated parameters with the theoretical postulation and goodness of fit. Result shows R^2 of 0.631, implying that about 63.1 percent of the variability in agricultural credit supply is explained by the explanatory variables. The Durbin Watson statistic's value of 2.222 reveals the absence of auto correlation in the model. The Coefficient of the error correction term carried the expected negative sign and is significant at 5% probability level, thereby authenticating the existence of a short-run steady state equilibrium relationship between agricultural credit supply and the selected financial ratios (explanatory variables). The coefficient of the ECM (-0.232054) indicated a feedback of about 23.21 percent of the previous year's disequilibrium from long-run elasticity of agricultural credit supply and the explanatory variables, implying that about 23.21% of the disequilibrium in the *long-run* relationship was corrected in the current year. It also implies that it will take (1/0.232054), about 4 years and 3 months to restore back the equilibrium position after a short-run distortion. This shows that the speed of adjustment was low.

With respect to the significance of variables, the coefficient of lending rate (LNLR) carried the expected negative sign but was not significant. This conflicts with the findings of Amonoo et al. (2003) who reported a negative significant relationship between lending rate and credit demand. Empirical result further revealed that the coefficient for loan to deposit ratio (LNLTDR) was negative and significant at the 10 percent significance level, implying that a percentage increase in the loan to deposit ratio would lead to a reduction in agricultural credit supply by 0.66 percent. This is expected because a higher loan to deposit ratio would imply a lower liquidity for banks, hence, low capital at their disposal to loan out to agriculturists. Studies such as Holmstrom and Tirole (1997), Altunbas et al.(2002), Kashyap and Sten (2000) and Brooks (2007) reported that bank's liquidity position is a significant variable in determining the lending behavior of banks. The variable for loan to other sectors (LNLTOS) was negative and significant at 5%, thereby conforming to theoretical postulation. Its coefficient (-0.091883) shows that increasing loan to other sectors by one percent would reduce formal agricultural credit supply by 0.091883 percent. This account for the inverse relationship

between loan to other sector and agricultural credit supply trend as presented in Table 1. Increase in the volume of credit to other sectors would reduce the financial capacity of the bank to loan to agriculture. Alper et.al (2012), reported that any monetary policy that alters liquidity is potentially effective in credit supply. The variable for past loan to other sector (LNLTOS (-2)) also had an inverse significant relationship with agricultural credit supply at the 1 percent significant level of probability. This implies that increasing the volume of loan to other sectors in the previous period would reduce the credit supply to agricultural sector in the current period. The plausible explanation for this result is that most banks make use of last period's credit allocation as a guide to future credit disbursement.

Table 5: Parsimonious error correction model estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob**
C	0.250736	0.077203	3.247753	0.0033
D(LNLR)	-0.297395	0.227724	-1.305945	0.2035
D(LNLR(-2))	-0.215496	0.223616	-0.963684	0.3444
D(LNLTDR)	-0.660879	0.341708	-1.934046	0.0619
D(LNLTDR(-1))	-0.431664	0.316040	-1.365852	0.1841
D(LNLTDR(-2))	-0.364609	0.298919	-1.219759	0.2339
D(LNLTOS)	-0.091883	0.042724	-2.150617	0.0554
D(LNLTOS(-1))	-0.147337	0.089351	-1.648967	0.1117
D(LNLTOS(-2))	-0.146485	0.075255	-1.946513	0.0629
D(LNTAC(-1))	0.202056	0.167322	1.207586	0.2385
D(LNTAC(-2))	0.096322	0.153096	0.629165	0.5349
ECM(-1)	-0.232054	0.111177	-2.087246	0.0472
R-squared	0.631684	Mean	0.240064	
Adjusted R-squared	0.517108	S.D. dependent var		0.260348
S.E. of regression	0.277623	Akaike info criterion		-1.130620
Sum squared resid	0.463242	Schwarz criterion		-0.886470
Log likelihood	27.10353	Hannan-Quinn criter.		-1.042239
F-statistic	3.426410	Durbin-Watson stat		2.222204
Prob(F-statistic)	0.000000			

4.0 CONCLUSION

The paper examined the impact of selected financial indicators on formal agricultural credit supply in Nigeria using time series data from CBN for the period 1970-

2011. Data were analyzed using Co-integration and error correction model. Result of the unit root test shows that only loan to deposit ratio was stationary at level while the other variables were significant at first difference. Findings further revealed that loan to deposit ratio, loan to other sectors and previous volume of loan to other sectors all exerted significant negative impact on formal agricultural credit supply in Nigeria. Surprisingly lending rate carried the expected negative sign but fail to explain the variation in formal agricultural credit supply in Nigeria during the period under investigation. Hence, formal agricultural credit supply in Nigeria can be enhance by reducing total loan to other sectors as well as loan to deposit ratio.

5.0 RECOMMENDATION

The following policy implications are offered base on the result finding:

(1) Appropriate short and long-term financial policies that would reduce the volume of loan given to other sector should be pursued. This can be achieved by making agriculture a priority sector in financial sector's credit and funding schedule. If possible, the mandatory Commercial bank sectoral credit allocation to agriculture should be increased and adequate monitoring carried out to ensure that bank's disbursement targets are met in line with CBN's prescribed conditions

(2) Also, policies that would reduce the loan to deposit ratio of banks should be pursued. Such policies should be directed towards increasing the interest rate on savings deposit. This would increase the volume of bank deposit and saving, which would invariably, enhanced their liquidity position

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