Deposit Money Bank's Credit and Agricultural Sector's Output in Nigeria:

Empirical Analysis

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Abstract
The study examined the impact of deposit money bank's credit on agricultural output in Nigeria and data used were sourced from the Central Bank of Nigeria (CBN) Statistical bulletin and World Bank Development Index for the period of 43 years covering 1981 to 2023. The Autoregressive Distributed Lag (ARDL) regression technique was employed in the estimation of the data to investigate the long run and the short run relationship between the variables. The findings revealed that deposit money banks credit to agriculture has direct and insignificant relationship with agricultural productivity in Nigeria both in the long run and the short run. The result also shown that a one-percent increase in government expenditure on agriculture and lending rate will raises agricultural output in Nigeria by 0.52% and 0.26% in the long run but in the short run it will raises agricultural output in Nigeria by 2.96% and 0.46% respectively. Based on the results, it was recommended that the Central bank of Nigeria (CBN) should encourage the deposit money banks (DMBs) to open more branches in all parts of the states particularly in the rural areas in order to encourage rural dwellers to have access to banks and save more of their funds for agricultural development.

Key Words: Agricultural Output, Lending Rate, Exchange Rate, Government Expenditure

1.0 Introduction

Historically agriculture served as a backbone for the Nigerian economy, providing employment and livelihoods for millions while significantly contributing to the country's gross domestic product (GDP). Before the discovery of oil in 1956, agriculture was the mainstay of the Nigerian economy as it accounted for more than 70% of the country's gross domestic product. It served as a major source of employment, a key foreign exchange earner for the nation, and the provider of raw materials to industries. By the 1970s, oil had replaced agriculture as the country's primary export. As crop exports declined, the nation became a net importer of basic food items. This change resulted in a decline of the agriculture sector's contribution to gross domestic product (GDP). However, the sector faces numerous challenges, including low productivity and inadequate financing, which hinder its potential for growth and development (Olayide & Heady, 2020). The need to increase food security, industrial development and the Nigeria's export base calls for a strong focus on agriculture since agriculture is a reliable source of industrial and food supply.

But in the Nigeria economy there has been a lot of concern over the poor performance of the agricultural sector especially in recent times where the violent crises between the Fulani's herdsmen and farmer have significantly reduced the agricultural

output. Anyanwu (2003) opined that increased production and exportation of crude oil in the 1970s led to vast increase in foreign exchange earnings and changed the structure of the Nigerian economy. Migration of youths to the urban areas in search of white-collar employment rendered the agricultural sector less competitive. During this period, currency overvaluation and importation of finished goods led to inappropriate pricing policies and scarcity of farm labour.

Deposit Money Banks are pivotal in addressing the financing gap within the agricultural sector by offering credit facilities to farmers and agribusinesses. These credits are intended to stimulate growth by enabling farmers to invest in quality inputs, advanced technology, and modern machinery. However, the actual impact of these credits on agricultural output remains a contentious issue. The effectiveness of credit provision often depends on various factors, such as lending rates (Osuji and Chigbu, 2019).

The effect of deposit money bank lending on the growth of the agricultural sector has well been examined and documented in literature. However, some of the studies failed to integrate into the model variables that affect deposit money bank lending and its impact on the growth of the agricultural sector output in Nigeria. For instance, Ogbuabor and Nwosu (2017) examined the impact of deposit money bank's credit on agricultural productivity in Nigeria. This study failed to integrate factors like lending rate that determines agricultural financing in Nigeria. Migration of youths to the urban areas in search of white-collar employment rendered the agricultural sector less competitive and leads to scarcity of farm laboures which have more impact on agricultural productivity.

The study of Obilor (2013) studied the impact of deposit money bank's credit to agricultural sector in Nigeria. The study failed to include in the model banks' lending to the agricultural sector. From the above knowledge gap, this current study seeks to examine the impact of deposit money bank's credit on agricultural sector output in Nigeria by integrating interest rate (bank's lending to the agricultural sector) labour force, government expenditure, exchange rate and inflation rate variables into the model.

The specific objectives of the study are: (i) to examine the impact of deposit money bank's credit on agricultural productivity in Nigeria, (ii) to ascertain the impact of banks' lending rate on agricultural sector output (iii) evaluate the effect of labour force employed on agricultural output in Nigeria. The time frame for the study is 43 years, covering the periods from 1981 to 2023. The rest of the paper covers literature review, research methods and discussion of results, conclusion and policy recommendations.

2.0 Literature Review

2.1 Conceptual issues

Deposit Money Bank (DMBs) may be defined as financial institutions which carries out retail banking services, set up for keeping and lending money to individuals, firms and organisations for the main propose of making profits (Enyioko, 2012). Examples of deposit money banks in Nigeria are Access Bank, Eco Bank, Diamond Bank, Fidelity Bank, Union Bank, UBA, Zenith Bank, e.t.c.

In recent times, there have been different policies developed by the government to help in financing the agricultural sector in Nigeria in order to boost productivity. Some of the policies include the Nigerian Agricultural and Co-operative Bank which was established as part of government efforts to agro-allied industries and inject oil wealth into the agricultural sector through the provision of credit facilities to support agriculture and the Agricultural Credit Guarantee Scheme Fund (ACGSF)

was also set up with the primary aim of inducing banks to increase and sustain lending to agriculture. Nonetheless, the actual utilization of these funds remains a point of contention, as many farmers lack the requisite collateral and financial literacy to navigate the complexities of the credit system (Ogbuabor & Nwosu, 2017).

One of the pivotal factors influencing agricultural productivity and growth is access to bank credit. Credit is essential for farmers to purchase inputs like seeds, fertilizers, and machinery, invest in irrigation systems, and adopt modern farming techniques. However, the agricultural sector in Nigeria has traditionally been underfunded, with farmers experiencing difficulties in securing loans from formal financial institutions. The idea that agriculture is a high-risk sector, the dearth of suitable collateral, and the limited bank presence in rural areas all contribute to this problem (Adedokun & Olowookere, 2023). Synthesis catalogue

2.2 Theoretical Literature

The study adopts the neoclassical theory of production in measuring agricultural output from efficiency use of Deposit Money Bank loans. The classical theory stipulates that the rate of interest is determined by the demand and supply of capital or by the intersection of the investment demand schedule and the supply/saving schedule and the neo-classical theory of production emphasizes that resource must be available and efficiency used in order to achieve optimum production level. This links directly to the goal of the Deposit Money Banks and agricultural output because loans given to farmers are meant for repayment.

However, it will be impossible for the Deposit Money Banks to recover such loans without first making the money available to the farmers, and ensuring that these resources are efficiently used in order to achieve optimum production. Moreover, it is due to the efficient use of resources that farmer's welfare can improve, and hence, the specification of the neo-classical theory of production can be used to achieve the mission of the Deposit Money Banks which is to make profit from the improved welfare of farmers in the study area.

2.3 Empirical literature

Asom and Ijirshar (2016) examined the impact of deposit money banks credit on the performance of agricultural sector in Nigeria using the Error Correction Model from 1986 to 2014. The result from the analysis revealed a positive and significant impact of deposit money banks credit on the growth of agricultural output in the long run. However, agricultural output in the country was negatively influenced by the lending rate. The study recommended that efforts should be made by the government and private individuals to encourage or increase investment in the agricultural sector at low lending rate through provision of more financial institutions while, the stringent conditions and pre-requisite required to be met by farmers to participate on the agricultural credits should be reviewed and made accessible to farmers.

Onuegbu, Ikeroa and Ogini (2022) examined deposit money bank credit and agricultural output in Nigeria. The main objective of the study was to examine the effect of commercial bank credit on agricultural output in Nigeria. Hence, below are the variables employed in the study; agricultural output (AGQ), credit to agricultural sector (CAS), agricultural credit guarantee scheme (ACGS), government spending to agricultural sector (GSAS) and interest rate (INTR). The data were analyzed using econometric techniques Augmented Dickey Fuller Tests

for Unit Roots and the Ordinary Least Squares (OLS). The study shows that bank credit on agricultural output, government spending on agricultural sector and Agricultural Credit Guarantee Scheme Fund has positive and significant effect on agricultural output while interest rate has negative and insignificant effect on agricultural output. The study therefore, concludes that deposit money bank credit have positive effect on agricultural output in Nigeria and has enhanced agricultural production in Nigeria within the period under review.

Agbanike, Onwuka, Enyoghasim, Ikuemonisan, Ogwuru, & Osigwe (2018) in their study on analysis of bank lending and economic growth in Nigeria, argued that commercial bank lending to general commerce, agriculture and construction industries have positive and significant impact on economic growth in Nigeria from 1981 to 2014. The study further revealed that bank credit to agriculture with the highest potential to stimulate economic growth was only about 3% of the total commercial banks' credit during the period under review.

Udoka, Mbat, Stephen and Duke (2016) examined the effect of commercial bank credit on agricultural production in Nigeria, and found that commercial bank credit has a significant positive impact on agricultural production in Nigeria. The study also concluded that high interest rates negatively affect agricultural output and recommended a review of credit access and government support for the sector.

Udih (2014) investigated banks credit and agricultural development. The study used secondary data for it analysis, the research findings include; that banks' credits and advances to agricultural entrepreneurs promote agricultural development and productivity, and that regulated banks credits to the agricultural entrepreneurs has little impact on the entrepreneurship performance , and thus, suggested that adequate bank credits should be granted to small scale agricultural farmers to increase productivity and their farm land should be used as collateral instead of the usual banks loan security to promote entrepreneurship performance.

Ekine and Onukwuru (2018) examined the effect of deposit money banks credit on agricultural sector performance in Nigeria from 1986 to 2016. The study used agricultural sector output (ASP) to proxy agricultural sector performance as the dependent variable whereas Deposit Money Banks' Credit to Agricultural Sector (BCA) was the major explanatory variable while Interest Rate (INR) and Government Expenditure on Agriculture (GEA) are the check regressors as to enhance the explanatory power of the model. The study employed descriptive statistic, Ordinary Least Squares (OLS), unit root test, co-integration and ECM methods of analysis as the analytical tools. The results revealed that there is no co-integrating (or long run) relationship between deposit money banks' credit to agricultural sector and the performance of agricultural sector in Nigeria during the period of study; Deposit money banks' credit to agricultural sector (BCA) had a positive and a significant impact on Agricultural Sector performance (ASP); Interest Rate (INR) had an inverse and insignificant relationship with Agricultural Sector performance (ASP). Also, the study revealed that government expenditure on agricultural sector (GEA) had a positive insignificant relationship on Agricultural Sector performance (ASP).

Osabohien, Mordi and Ogundipe (2020) delved into the availability of loans and the performance of Nigeria's agricultural sector. The Autoregressive Distribution Lag (ARDL) study results indicated that credit played a substantial and advantageous role in elucidating Nigeria's agricultural performance levels. Emphasizing the importance of farmers having sufficient

access to credit to enhance their ability to procure necessary agricultural inputs for increased output

Onyema and Agada (2018) examined the contribution of agricultural financing through the agency of deposit money banks to the growth of the agricultural sector in Nigeria, Co-integration test, Augmented Dickey Fuller test, granger causality test and error correction model are used to determine the short and long run relationships that exist between the dependent and the independent variables from 1981 to 2015. The result found that deposit money banks credit to agricultural sector is not done in such a volume that will guarantee a positive contribution to the growth of the agricultural sector while prime lending rate and maximum lending rate are found to contribute positively to the growth of the agricultural sector. It was concluded that agricultural financing has no salutary effect on the growth of agricultural sector in Nigeria. The study recommends that efforts should continue to be made to develop the sector through the use of modern tools and removal of other traditional constraints such as land fragmentation to make the sector more productive to attract more funding by the private sector.

In this current study, inclusion of these variables lending rate in agricultural sector, labour force on agriculture, government expenditure on agricultural sector, inflation rate and exchange rate to the model is to further demonstrate their impact on agricultural output, because they played significant roles in agricultural productivity in Nigeria.

3.0 Research Methods

3.1 Model Specification

The model for this study is to examine the impact of deposit money bank's credit on agricultural sectors output in Nigeria in implicit form is stated as:

$$AGRO = f(DMBA, LRA, GEA, LFA, INF, EXR) \quad (3.1)$$

The econometric form is

$$AGRO = \beta_0 + \beta_1 DMBA + \beta_2 LRA + \beta_3 GEA + \beta_4 LFA + \beta_5 INF + \beta_6 EXR + u_t \quad (3.2)$$

Where, AGOR = Agricultural Sector Output

DMBC = Deposit Money Banks Credit to Agricultural Sector

LRA = Lending rate in Agricultural sector, LFA = Labour Force on Agriculture

GEA = Government Expenditure on Agricultural sector, INF = Inflation Rate

EXR = Exchange Rate, U_t = Error term

Apriori expectations, $\beta_1, \beta_3, \beta_4 > 0$ and $\beta_2, \beta_5, \beta_6 < 0$

In order to make equation 3.2 computable, it is transformed into natural logarithm linear regression form and to have the same units of values for the variables.

Note that deposit money banks credit to agricultural sector, lending rate in agricultural sector, labour force on agriculture, inflation rate and exchange rate were not logged because they are in ratio and percentages.

$$LnAGRO_t = \beta_0 + \beta_1 DMBA_t + \beta_2 LRA_t + \beta_3 LnGEA_t + \beta_4 LFA_t + \beta_5 INF_t + \beta_6 EXR_t + u_t \quad (3.3)$$

The ARDL model for equation 3.3 is expressed thus:

$$\Delta LnAGRO_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta(LnAGRO)_{t-i} + \sum_{i=1}^{p} \alpha_2 \Delta(DMBA)_{t-i} + \sum_{i=1}^{p} \alpha_3 \Delta(LRA)_{t-i} + \sum_{i=1}^{p} \alpha_4 \Delta(LnGEA)_{t-i} + \sum_{i=1}^{p} \alpha_5 \Delta(LFA)_{t-i} + \sum_{i=1}^{p} \alpha_6 \Delta(INF)_{t-i} + \sum_{i=1}^{p} \alpha_7 \Delta(EXR)_{t-i} + \delta_1 (LnAGRO)_{t-1} + \delta_2 (DMBA)_{t-1} + \delta_3 (LRA)_{t-1} + \delta_4 (LnGEA)_{t-1} + \delta_5 (LFA)_{t-1} + \delta_6 (INF)_{t-1} + \delta_7 (EXR)_{t-1} + \beta ECM_{t-1} + \upsilon_t \quad (3.4)$$

The coefficients from α_1 to α_7 represent the short-run coefficients, whereas the coefficients from δ_1 to δ_7 represent the long-run coefficients of the ARDL model. Also, α_0 is the drift component, "n" is the maximum lag length, while v_t is the stochastic error term. β is the error correction term (ECM), and it measures the speed of adjustment towards the long-run equilibrium.

3.2 Sources of Data

The annual time series data which were real values was used for this study which span from the period of 1981 to 2023 and the data such as agricultural output, deposit money banks credit, exchange rate, interest rate, inflation rate, government expenditure on agriculture were obtained from Central Bank Nigeria (CBN) statistical bulletin 2024 and data on labour force was obtained from World Bank Development Index.

3.3 Method of data analysis

The Autoregressive Distributed lag (ARDL) methodology developed by Pesaran & Shin (1999) and Pesaran et al. (2001) was used to investigate the long and short-run relationship between deposit money bank credit and agricultural sector output in Nigeria. The ARDL method is applied to deal with the series having mixed stationary issues (ie the mixture of I(0) and I(1)). Hence, it relaxes the assumption that all series must be integrated in the same order. The ARDL test is relatively more efficient in the case of small and finite sample data sizes. The method produced unbiased estimates of the long-run model (Harris & Sollis, 2003). The bounds test is a simple technique because it allows the co-integration relationship to be estimated by OLS once the lag order of the model is identified, unlike other multivariate co-integration methods. Furthermore, the Cumulative Sum (CUSUM) of residual of the ARDL model test was conducted to verify the stability nature of the model.

3.3.1 Descriptive Statistics

The result of the descriptive statistics is depicted in Table 1

Table 1 Descriptive Statistics

	DMBA	EXR	INF	LFA	LNAGRO	LNGEA	LRA
Mean	231.1821	115.7064	17.50214	45.23738	3.206477	3.502995	17.19690
Median	48.97500	115.2550	17.96500	47.94000	3.466455	3.938470	17.53000
Maximum	1812.470	425.9800	29.80000	52.64000	4.680735	5.815571	29.80000
Minimum	0.590000	0.610000	7.500000	36.38000	1.231724	1.106191	7.750000
Std. Dev.	401.2637	119.0686	4.724655	5.608929	1.112338	1.302260	4.628363
Skewness	2.442373	1.020702	-0.007271	-0.398835	-0.418579	-0.616840	0.305276
Kurtosis	8.814416	3.221998	3.566426	1.554877	1.758115	2.144047	3.519145
Jarque-Bera	100.9193	7.379076	0.561837	4.768147	3.925446	3.945583	1.123998
Probability	0.000000	0.024984	0.755090	0.092174	0.140475	0.139068	0.570068
Sum	9709.650	4859.670	735.0900	1899.970	134.6721	147.1258	722.2700
Sum Sq. Dev.	6601514.	581270.3	915.2171	1289.863	50.72911	69.53112	878.2915
Observation	43	43	43	43	43	43	43

Source: Author compilation from regression output using E-view

Table 1 showed the individual descriptive statistic for each series. The mean and median for each of the series lied between the maximum and minimum values which was an indication of a consistent average. As such, it was inferred that the average (i.e. mean and median) of each series showed a good degree of consistency.

The spreads of the data point around the average was indicated by the standard deviation. The values of standard deviation for each of the series were low except for DMBA and EXR which have a high values, which is an indication of even spread. All the series were positively and negatively skewed, this indicated that the series is skewed to both right and lift. In term of the kurtosis, it indicated that DMBA, EXR, INF and LRA have kurtosis that is above 3 indicating that they are not normally distributed.

Finally, the jarque-Bera statistics revealed that INF, LFA, LNAGRO, LNGEA and LRA were normally distributed except DNBA and EXR. This conclusion was arrived at, since the reported p-values were greater than 0.05(5%). The high p-values indicated that there is a very high probability that the distribution of the data series is normal.

3.3.2 Unit Root Test

The Augmented Dickey-fuller Unit root was used to assess whether the variables are stationary or not and their order of integration. The test involved testing the null hypothesis of non-stationarity of variables against the alternative hypothesis of stationarity. The result of the ADF Unit root test is shown in Table 2

Table 2: Result of ADF Unit Root Test

Variables	ADF Value At Level	ADF Value At First Difference	Mckinnon 5% Critical Value	Order of Integration
LnAGRO	15.4987	-	-2.9350	I(0)
DMBA	4.3967	-	-2.9434	I(0)
LRA	2.1799	-6.0964	-2.9350	I(1)
LnGEA	-6.0539	-	-2.9350	I(0)
LFA	-0.5397	-4.6870	-2.9350 -	I(1)
INFR	2.9491	-6.4729	-2.9434	I(1)
EXR	2.8686	-4.2139	-2.9350	I(1)

Source: Regression output using E-view 12

The unit root in Table 1 shows that, lender rate in agriculture sector (LRA), labour force on agriculture (LFA), inflation rate (INF) and exchange rate are stationary at first difference since the calculated ADF is greater than the Mckinnon 5% critical values while agricultural output (AGRO), deposit money bank credit to agricultural sector (DMBA) and government expenditure on agricultural sector (GEA) are stationary at level because the ADF value of the variable at level is greater than the Mckinnon 5% critical values. The unit test show that there is a mixture of I(1) and I(0) of the accompanying regressors, hence the Auto Regressive Distributive Lag (ARDL) testing could be proceeded.

3.3.3 Lag length Criteria

This step is to determining the appropriate lag. The lad-length selection criteria such as sequential modified LR test statistic (LR), Final prediction error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hanna-Quinn information criterion (HQ) were employed to determine the appropriate lag length of the models. The test results of the

different lag selection methods are reported in Table 3. After a careful examination of the different lag length by estimating the VAR at each lag length and diagnosing the whiteness of resulting residuals, three (3) lag length was recommended by Aikaike Information Criteria AIC statistic, was selected for the model.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-823.9539	NA	7.57e+09	42.61302	42.91161	42.72015
1	-477.1774	551.2857	1842.020	27.34243	29.73113*	28.19948*
2	-435.3200	51.51673	3413.441	27.70872	32.18754	29.31568
3	-375.6467	52.02290*	4198.227*	27.16137*	33.73031	29.51825

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Regression Output using E-view 12

3.3.4 Bounds Test for Co-Integration

The next step after determining the order of integration and lag length of the variables is to apply the bound F-test to establish the existence or otherwise of long-run relationship among the variables. The summary results of the bounds test for co-integration for the model is shown in Table 4 alongside with critical values. The F-statistic from bound test for the model is 3.647. These values exceed the upper bounds critical value of 3.61 at 5% significance level. This implies that the alternative hypothesis of the existence of a unique co-integration (long-run) relationship between the agricultural sector output and the explanatory variables is accepted while null hypothesis of no co-integration is rejected.

Table 4: Summary of ARDL Bound Test Results

Model	Test Stat	Computed F-statistic	Lag	Significance level	Bound Critical values	
					Lower Bounds I(0)	Upper Bounds I(1)
Model	**F-stat**	**3.647**	**6**	**5%**	**2.45**	**3.61**

Source: Regression output using E-view 12

3.3. Long Run Regression Results of the ARDL Model

The results of the estimated long-run coefficients using the ARDL approach are presented in Table 5. The models selected by AIC are (2,1,1,3,3,3,3)

Table 5: Summary of the Long Run ARDL Regression Results

Variable	Coefficient	Standard Error	t-Statistic	Prob.value
Constant	1.5399	0.8602	1.7901	0.0924
DMBA	0.0004	0.0004	1.0360	0.3156
LnGEA	0.5180	0.5598	9.2536	0.0000
LRA	0.2644	0.1086	2.4343	0.0270
LFA	-0.0123	0.0158	-0.7814	0.4460
INF	-0.2456	0.1063	-2.3101	0.0346
EXR	0.0030	0.0009	3.1220	0.0066

Note: * is significant at 5% level of significance
Source: Regression Output using E-view 12

From Table 5, it was observed that all the estimated variables with the exception of LRA and LFA have the expected signs. However, deposit money bank credit to the agricultural sector (DMBA) is positively signed which indicate that a direct relationship exists between deposit money bank credit and the growth of the agricultural sector output in Nigeria. This is consistent with the a priori expectation. The value of the coefficient is 0.0004 this implies that one percent increase in DMBA leads to 0.0004 percent increase in the output of agricultural sector when other regressors are held constant. The coefficient of the variable is not significant at 5% level of significance with a probability value of 0.3156. However, the finding is not in conformity with the findings of Udoka, Mbat, Stephen and Duke (2016) which holds that deposit money bank credit to agricultural sector has direct and insignificance effect on the output of agricultural sector in Nigeria. But the insignificant of this variable according to Udih (2014) shown that the level of credit to the agricultural sector is so poor that it has little or no impact on the growth of the sector in Nigeria and also, farmers in the rural area find it difficulty in access credit from deposit money bank and this reduce effectiveness in the agricultural sector.

The coefficient of government expenditure on agriculture has direct and significant relationship with the agricultural sectors output, this means that one percent increase in government expenditure raises agricultural output by 0.52%.

Lending rates to agriculture and exchange rate have direct and significance relationship with the agricultural sectors output. This implied that one percent increase in these variables leads to further raises in agricultural sector output by 26.4% and 0.30% respectively. This result is not in conformity with the study of Asom and Ijirshar (2016) who findings revealed that lending rate has an inverse impact on the agricultural output. This positive relationship maybe due to higher interest rate attract more savings which increases loanable funds and deposit money banks shift toward lending to more productive sectors. The coefficient of labour force in agriculture and Inflation rate has an inverse and insignificance relationship with agricultural output in Nigeria; this implies that an increase in these variables will further decrease the agricultural output in Nigeria. This is not in conformity with the apriori expectation.

3.3.6 Short Run Parsimonious Estimation of the ARDL Model

In order to capture the short run deviations that might have occurred in estimating the long run co-integration equation, a dynamic parsimonious error correction estimate based on AIC of (2, 1, 1, 3, 3, 3, 3) is reported in Table 6.

Table 6: Summary of Short Run Parsimonious Estimation of the ARDL Model

ARDL Error Correction Regression

Dependent Variable: D(LNAGRO)

Variable	Coefficient	Standard Error	T-Statistic	Prob.
D(LNAGRO(-1))	0.304162*	0.077177	3.941100	0.0012
D(DMBA)	0.000164	8.04E-05	2.042109	0.0580
D(EXR)	-0.000854*	0.000321	-2.658581	0.0172
D(INF)	-0.010317	0.006528	-1.580320	0.1336
D(INF(-1))	0.050475*	0.010565	4.777451	0.0002
D(INF(-2))	-0.005144*	0.002018	-2.549066	0.0214

D(LFA)	-0.012474	0.009953	-1.253286	0.2281
D(LFA(-1))	-0.001718	0.010757	-0.159721	0.8751
D(LFA(-2))	0.030916*	0.010933	2.827715	0.0121
D(LNGEA)	0.029683*	0.014417	2.058839	0.0562
D(LNGEA(-1))	-0.106343*	0.019498	-5.454149	0.0001
D(LNGEA(-2))	-0.079561*	0.016021	-4.965898	0.0001
D(LRA)	0.004595*	0.001589	2.892623	0.0106
D(LRA(-1))	-0.084590*	0.010482	-8.069678	0.0000
D(LRA(-2))	-0.065208*	0.011140	-5.853543	0.0000
ECM(-1)*	-0.353888*	0.036143	-9.791404	0.0000

Note: * is significant at 5% level of significance
Source: Regression Output using E-view 12

Table 6 indicates that the difference in one lag period of agricultural sector output D(LnAGRO(-1)) has direct and significant impact on the growth of agricultural sector output in Nigerin in the short run. Furthermore, the difference in deposit money bank credit to the agricultural sector D(DMBA) in the current years has positive and insignificant impact on the growth of Nigerian agricultural sector, this result is in line with the apriori expectation which means that a 1% increase in deposit money bank credit to the agricultural sector leads to further increase in agricultural sector output by 0.0164%. This confirms the fact that continuous utilization of supply of credit to the agricultural sector has enhanced the sector performance in the short run and the long run. But the insignificant of this variable according to

Udih (2014) shown that the level of credit to the agricultural sector is so poor that it consistent to the apriori expectation. This implied that the one lag period of inflation rate induced the growth of agricultural sector output in Nigeria. However, lag two of the variable D(INF(-2)) has the expected sign and it is significant. This implied that the two lag period of inflation rate induced the growth of agricultural sector output.

The difference in labour force in agriculture D(LFA) and one lag D(LFA(-1)) have Inverse and insignificant impact on agricultural sector output in Nigeria. This is not consistent with the apriori expectation has little or no impact on the growth of the sector in Nigeria and also, due to difficulty in access credit from deposit money bank in the rural area reduce effectiveness in the agricultural sector.

The difference in exchange rate D(EXR) has a negative and significant impact on the growth of the Nigerian agricultural sector on the short run which conform to the apriori expectation. This implied that one percent increase in exchange rate D(EXR) lead to 0.09 percent decrease in the agricultural sector output in Nigeria. The difference in inflation rate D(INF) in the current year has negative and insignificant impact on agricultural sector output in Nigeria in the short run. This implied that one percent increase in inflation rate lead to 1.0317 percent decrease in the agricultural sector output in Nigeria. But the difference in the variable at lag one D(INF(-1)) has positive and significant impact on agricultural sector output. This is not
which means that one percent increase in labour force leads to 1.247 and 0.172 percent decrease in agricultural output. But lag two of the variable D(INF(-2)) has direct and significant impact on the output of agricultural sector in Nigeria. This is in conformity with the apriori expectation. The difference in government expenditure on agriculture D(LNGEA) has direct and significant impact on agricultural sector output in Nigeria. This is consistent with the apriori expectation, this means that one percent increase in government expenditure on agriculture leads to further increase in

agricultural sector output by 2.97%, this result is in conformity with study of Onuegbu, Ikeroa and Ogini (2022) whose find positive significant impact of government expenditure on agricultural sector output in Nigeria. But the lagged values D(LnGEA(-1)) and D(LNGEA(-2)) have an inverse and significant impact on agricultural sector output in Nigeria, This implied that prolonged reliance or other factors could reduce their effectiveness.

The interest rates (LRA) display a mixed impact. The current interest rate D(LRA) has a significant positive coefficient (0.004595, p= 0.0106), indicating that an increase in interest rates might initially stimulate agricultural output. This positive effect may be coursed by higher interest rate attract more savings which increases loanable funds and deposit money banks shift toward lending to more productive sectors. However, the lagged values D(LRA(-1)) and D(LRA(-2)), have an inverse and significant impact on agricultural sector output in Nigeria, demonstrate that rising interest rate eventually exert a negative effect on output, likely due to increased borrowing costs over time.

The error correction term (ECM(-1), with a coefficient of -0.353888 (p=0.0000), highlights the existence of a long run equilibrium relationship, with about 35.4% of the disequilibrium corrected each period.

3.3.6 Diagnostic Tests

To confirm the robustness of the model, the paper performs diagnostic tests as show in Table 7

Table 7: Key Regression and Diagnostic Statistics

R-squared	0.865668	Mean dependent var	3.352818
Adjusted R-squared	0.778060	S.D. dependent var	1.013406
S.E. of regression	0.038239	Akaike info criterion	-3.401413
Sum squared resid	0.023395	Schwarz criterion	-2.420339
Log likelihood	89.32756	Hannan-Quinn criter.	-3.049412
Durbin-Watson stat	2.101148		
Serial Correction LM Tests F(2,33)		1.7614 (0.1876)	
Heteroscedasticity F(6,35)		7.0241 (0.0001)	
Ramsay RESET Test F(1,35)		56.2077 (0.0000)	
Normality 2(2) (Jarque-Bera)		7.5119 (0.0234)	

Source: Regression Output using E-view 12

The dynamic model diagnostic tests show that the explanatory variables account for 87 percent of the variation in the agricultural sector output in Nigeria.

Similarly, 13 percent is unexplained due to the error term. Thus, the overall goodness of fit of the model is relatively satisfactory though some of them are not of the expected signs as earlier discussed. The Durbin-Watson statistic of 2.101 indicates absence of positive serial autocorrelation among the independent variable since the DW statistics is approximately 2.

The result of the diagnostic test as captured by Jarque-Bera, Ramsey RESET, Breusch-Godfrey and Heteroscedasticity among others revealed not only the robustness of the estimated equations results but the desired properties of an econometric model. The diagnostic tests confirm the suitability of the estimated model. Thus, the model residual series are normally distributed as suggested by the Jarque-Bera statistics, while the Breusch-Godfrey LM test

statistics indicated that the model does not have significant serial correlation problem. Moreover, the Breusch-pagan-Godfrey show that the residual are homoscedastic and the model has correct functional form while Ramsey RESET test shows that the ARDL models are correctly specified.

Table 8 Correlation Matrix of the Variables

	DMBA	*EXR*	*INF*	*LFA*	*LNGEA*	*LRA*	*LNAGRO*
DMBA	1						
EXR	0.896781	1					
INF	0.083471	0.169256	1				
LFA	-0.71885	-0.88797	-0.13853	1			
LNGEA	0.486505	0.734542	0.419604	-0.81791	1		
LRA	-0.28083	-0.15207	0.578154	0.089108	0.203497	1	
LNAGRO	0.629275	0.84983	0.341431	-0.9083	0.956027	0.092005	1

Source: Regression Output using E-view 12

3.3.7 Correlation Matrix Analysis

Table 8 shows the analysis of the correlation coefficient between agricultural output and the independent variables. The correlation coefficients between AGRO and the independent variables DMBA, EXR, INF, LFA, LNGEA, LRA are 0.629275, 0.84983, 0.341431, -0.9083, 0.956027 and 0.092005 respectively. The independent variables are all positive except LFA that is negative correlation with LNAGRO. However, the results show a strong correlation between LNAGRO and the independent variables except INF that shows a moderate correlation with LNAGRO and LRA which connotes a weak correlation with LNAGRO (0.092005).

3.3.8 The Stability Test

Stability test was also performed using cumulative sum (CUSUM) of residual of the ARDL model as shown in figures 1. The existence of parameter instability is established if the cumulative sum of the residual goes outside the area between the critical (dotted bounded) lines. It is estimated at 5 percent critical level. From figure 1, it can be inferred that the ARDL model at 5 percent level of significance has been stable over time

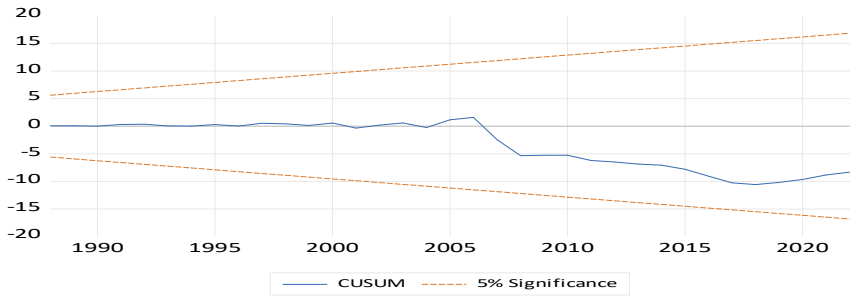

Figure I Cumulative sum (CUSUM)

4.0 Conclusion and Policy Recommendations

The important of financial system as a catalyst for agricultural sector growth and development cannot be over emphasized. The empirical findings revealed that deposit money bank credit to agriculture has a direct and insignificant effect on the growth of agriculture sector output in Nigeria both in the long run and the short run, and also

government expenditure on agricultural and exchange rate have significant impact on agricultural sector output in Nigeria.

Base on the empirical results in the study, the following recommendations are made:

(a) The monetary authority should adopt policies that would promote and develop the financial sector especially the Deposit money banks (DMBs) and open more branches in all parts of the states particularly in the rural areas in order to encourage rural dwellers to have access to banks and save more of their funds for agricultural development.
(b) The government should increase the budget allocations to the agricultural sector and this will significantly boosts the output of the sector, any policy militating against effective budget implementation in this regard should be eliminated.
(c) The monetary authority should pursued favourable exchange rate system that could increase agricultural sector output in Nigeria.

(d) Interest rate (Lending rate) policy should be put in place in order to reduce the cost of borrowing and this would enhance productivity and consequently growth in the agricultural sector.

Suggestion for Further Research: The author observed some limitations that may require further study such as inconsistent time-series data from CBN and NBS may affect accuracy, the agricultural output data may not fully capture the informal agricultural sector, econometric models may suffer from endogeneity, omitted variable bias and also, weather shocks, pests, disease outbreaks, global commodity prices, and insecurity in farming regions can distort agricultural output independently of bank credit hence there is needs for further study.

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