Deposit Money Banks Loans and Advances and Agricultural Productivity in Nigeria: A Disaggregated Approach (1986 – 2021)

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A B S T R A C T

The proper functioning of the banking system is pivotal for the growth of agriculture. The rural sector is generally seen as very central to Nigerian's development strategy, while agriculture continues to play a key role in rural growth. However, financial markets in Nigeria have continued to be too fragmented and urban biased, thereby being inadequate to meet the rural demands for its services thus the banking system is relied upon to finance productive activities in the country. This study ascertained the effect of deposit money banks loans and advances to agriculture on agricultural productivity in Nigeria over a period of thirty six years from 1986 to 2021. The study employed the traditional Ordinary Least Square (OLS) regression technique. The results of the analysis revealed that deposit money banks loans and advances to agriculture has no significant effect on crop production GDP, livestock GDP, and forestry GDP. The results of this study have shown the importance of agricultural financing in spurring economic growth and development in general. Taking into consideration the findings of this study, there is the critical need for deposit money banks to increase loans and advances to agricultural enterprises through reduction in interest rate charged, which in turn permits for greater economic growth and development. The management of deposit money banks should strengthen their policies on loans and advances and interest rates on such credits. Reliable, effective and efficient supervision, regulation and audit technique would lead to the actualization of this.

Keywords:*Deposit money banks loans and advances; agricultural productivity*

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INTRODUCTION

Eboh, Ujah and Nzeh [1] noted that the contemporary economic significance of agricultural sector is even more remarkable. They were of the perspective that in the past half a decade, the impressive growth rate of the nation's economy has been driven by the non-oil sector, particularly the agricultural sector. Prior to 1980 in Nigeria as well as in many developing countries, successive governments have implemented various agricultural and rural development policies, all in an effort to address perceived shortfall in rural credit, stimulate rural employment and enhance agricultural productivity. Under these rural credit schemes, institutional resources, programme efforts and government agencies-based top-bottom interventions, to implement mostly supply-led financial development strategies. That is the channelling of government funds to rural entrepreneurs and small farmers to enhance the contribution of agriculture to economic development [2].

The above aim prompted the government in Nigeria to establish the defunct Agricultural and Co-operative Bank (NACB). The objective of NACB is to finance agricultural project through loans to farmers. Others like the Nigeria Bank for Commerce and Industry (NBCI), People banks for Nigeria (PBN) were established for similar objective and purpose. Government also made it mandatory for commercial banks and merchant banks to finance agricultural sector through loans. There was also the rural banking scheme of the Central Bank of Nigeria, the Nigeria Agricultural guarantee Scheme, National Agricultural Scheme, National Agricultural Land Development Authorities, the Family Economic Advancement Programme (FEAP) and the National Economic Empowerment Development Strategies (NEEDS), which were all formed in lieu of promoting agricultural and rural development. The Nigeria's Vision 20:2020which was launched in September 2009 by late president Umaru Yar'Adua's administration amidst fanfare was designed to make the country among the first twenty developed nations by the year 2020. Although, manufacturing and the service sectors are set up as a driving force of the economy, but the agriculture sector will still remain an important contributor, especially in the good production. The percentage contribution of agriculture to gross domestic product (GDP) is declining, in terms of absolute value, perhaps the amount is increasing geometrically. The agriculture sector has

contributed significantly to the growth of the Nigerian economy and for it to continue to significantly contribute to the national economy; it has to be globally competitive.

Undoubtedly, the future of the rural and agricultural finance institutions in Nigeria including Nigerian Agricultural Co-operative and Rural Development Bank (NACRDB) now Bank of Agriculture (BOA) rest on its ability to meet the challenges for the purpose in which it was established and to as well as to remain a sustainable development and competitive in the global financial institution. With the liberalization of the world trade including the financial sector though the World Trade organization (WTO) agreement the trade competition will be stiff amongst existing players and new competitors from within and outside the nation. NARCRDB must find ways to strengthen its existence by having enough capital, improving its operation, expanding its scope of business and operating normal banking business. The bedrock of agriculture and agricultural development in developing countries of sub-Saharan African is rural development, without which all efforts towards agricultural development will be futile. A large majority of the farmers operate at the subsistence (small holder level), while intensive agriculture being uncommon. A characteristic feature of the agricultural production system in such countries, Nigeria inclusive, is that a disproportionately large fraction of the agricultural output is in the hands of these small-holder farmers whose average holding is about 1.0 - 3.0 hectares [2]. Again, there is very limited access to modern improved technologies and their general circumstance does not always merit tangible investments in capital, inputs and labour.Evidently, development, food security and poverty alleviation will not be truly achieved without rapid agricultural growth. Assisting the rural poor to enhance their livelihoods and food security in a sustainable manner is therefore a great challenge. Broadly put, increases in agricultural productivity are central to growth, income distribution, improved food security and alleviation of poverty in rural Africa. Against this backdrop, this study examines the effect of deposit money banks loans and advances and agricultural productivity in Nigeria following a disaggregated approach. Specifically, this study seeks to examine the effect of deposit money banks loans and advancesto agriculture on crop production GDP, livestock GDP, and forestry GDP.

Section one introduces the background to the study, section two precisely reviews related literature, section three discloses the methodology, section four discusses the result of the analysis, whereas section five showcases the findings and policy implications.

LITERATURE REVIEW
As of 31st December, 2021 as reported by the Central Bank of Nigeria (CBN), deposit money banks lend less than 7% of their loans and advances to agricultural sector. In 2020, agricultural lending was only 5.15% of deposit money banks total portfolio, however, it increased to 5.9% in 2021. Still yet, most of the poor still live in rural areas because of not having access to agricultural credit. Access to credit especially agricultural sector, however, has an economic benefit only if and when that access generates a broadly defined net economic surplus after having deducted the private and social costs of loan provision (including the opportunity costs of scarce public funds in alternative poverty reduction policies).While the evidence on the impact of credit on household welfare, agricultural technology adoption, and on agricultural sector growth is mixed, many practical constraints (i.e. time and money) and methodological difficulties in estimating the impact of a policy or project with a reasonable probability of error exists. Simple common sense tells us that savers who continue to deposit money for different motives, borrowers who continue to repay their loans and clients paying regular premiums for heal and life insurance over long period actually derive an economic benefit [3].The neglect of the agricultural sector and the dependence of Nigeria on a mono-cultural, crude oil-based economy have not augured well for the well-being of the Nigerian economy. In a bid to address this drift, the Nigerian government as from 1975 became directly involved in the commercial production of good crops. Several large scale agricultural projects specializing in the production of grains, livestock, dairies and animal feeds, to mention but a few were established [4].

Many theories have been advanced on the nexus between finance and economic growth. These include financial intermediation theory, financial liberalization theory and the classical theory of political economy and development among others. This study is anchored on the theory of political economy and development. The theory of financial intermediation is of the perspective that credit is an important aspect of financial intermediation that provides funds to those economic entities that can put them into the most productive use. Theoretical studies have established the relationship that exists between financial intermediation and economic growth. For instance[5], Goldsmith [6], McKinnon [7] and Shaw [8], in their studies, strongly emphasized the role of financial intermediation in economic growth. In the same vein, Greenwood and Jovanovich as cited in Akiri and Adofu [9] noted that financial development can lead to rapid growth. In a related study, Bencivenga and Smith [10] explained that development of banks and efficient financial intermediation contributes to economic growth by channelling savings to high productive activities and reduction of liquidity risks. They therefore concluded that financial intermediation lead to growth.Based on this assertion, this study examines the extent to which intermediation or credit to agricultural sector of the economy has influenced economic growth in Nigeria. This means that a financial institution can effect economic growth by efficiently carrying out its functions, among which is the provision of credit. Similarly, the financial liberalization theory as proposed by McKinnon [7] and Shaw [8]. Under this theory, the consideration is central on the part played by government

intervention in the financial markets as a critical setback to growth, investment and savings mobilization. The role of government in interest rate control and credit allocation to the productive economic sectors in developing countries hinders the mobilization of savings and discourages financial assets holding, economic growth and capital formation. Interest rate ceiling on deposit indirectly inhibited financial saving which resulted in excess liquidity outside the banking industry.Government pervasive intervention and financial system involvement through the supervisory and regulatory framework, especially interest rate control and credit allocation tends to facilitate financial market distortions [7,11]. As such, the intervention of government is adversely affecting the market players' decision regarding investment and savings and resulted in financial mediation fragmentation. The resultant effect of this scenario is an economy that is financially repressed. On the other hand, this study also adopts the classical theory of political economy and development in an attempt to understand the relationship between agricultural finance and agricultural development. The famous scholars projecting this theory are Adam Smith, David Ricardo, Thomas Malthus and others. The theory believes that the banking sector plays an important role in channelling finance and investment to the productive agents like agriculture and industry within the economy and therefore acts as a catalyst of economic growth and development. The main implication of this theory, therefore, is that banking policies such as credit schemes and financial programmes which embrace openness and competition will promote economic growth and development. Classical political economy approach however is concerned with economic growth and the development of an economic system, the factors both socio-economic, financial and political which impedes or facilitates this growth and development such as development finance policy or agricultural credit policy of an economy. According to Smith adequate capital such as finance, technology and machines are the major factors that enhanced agricultural, industrial and entrepreneurial growth and development. However, sufficient supply of finance and credit to agricultural sector expands farmers' input, output, potentialities, income and employment. These would invariably expand an economy.Collectively, the classical theories of political economy pointed out the significant important of adequate financial assistance and credit from capital lending programme like agricultural credit scheme to the farmers' agricultural production, agricultural growth and development and of course economic growth and development of an economy.

Obi-Nwosu, Ananwude and Ezeaku [12] analysed the effect of commercial banks' credit to agriculture on the agricultural sector's contribution to Nigerian real gross domestic product from 1986 to 2020. Specifically, this study ascertained the effect of commercial banks' credit to agriculture, inflation rate and interest rate on the agricultural sector's contribution to real gross domestic product. The Autoregressive Distributive Lag (ARDL) was the econometric tool of analysis employed using data sourced from the statistical bulletins of the Central Bank of Nigeria (CBN). The findings of this study in its totality unveiled statistically that commercial banks' credit to agriculture does not affect the sector's contribution to real gross domestic product.

Okore and Nwadiubu [13] examined the impact of agricultural financing on agricultural output. Data were collected from the Central Bank of Nigeria Statistical Bulletin. The period of study covered 1986 to 2020. Agricultural financing was proxied by commercial bank loan to agriculture and the disbursement of the Agricultural Credit Guarantee Scheme Fund. Agricultural output was proxied by the contribution of agriculture to overall GDP. Trend analysis and the Ordinary Least Square (OLS) Method were used in the data analysis. Evidence from the regression results shows that commercial bank loan to agriculture and the disbursement of the Agricultural Credit Guarantee Scheme Fund had positive and significant impact on agricultural output.

Onuegbu, Ikeora and Ogini [14] studied the effect of bank credit on the agricultural output in Nigeria, investigate the effect of government expenditure on agricultural output in Nigeria, evaluate the impact of Agricultural Credit Guarantee Scheme Fund on agricultural output in Nigeria and examine the effect of interest rate on agricultural output in Nigeria. The data were analysed 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 achieved agricultural production in Nigeria within the period under review within the period under review.

Adewale, Lawal, Aberu and Toriola [15] determined the effect of farmers' credit on agricultural productivity from 1981 to 2016 using data from World Bank Development Index (WDI). The result of the Ordinary Least Squares (OLS) estimation shows that agricultural bank credit ($\beta=0.667173$, $t=5.961095$ & $P0.05$) and foreign exchange rate ($\beta=0.124297$, $t=0.437929$ & $P>0.05$) do not show a significant effect on agricultural output. It was submitted that bank credit has a significant positive effect on agricultural productivity in Nigeria.

Ngong, Onyejiaku, Fonchamnyo and Onwumere [16] investigated the impact of bank credit on agricultural productivity in the Central African Economic and Monetary Community (CEMAC) from 1990 to 2019. Agricultural value added (AGRVA) to the gross domestic product (GDP) proxies agricultural productivity while domestic credit to

the private sector by banks (DCPSB), broad money supply, land, inflation (INF), physical capital (PHKAP) and labour supply are explanatory variables. The autoregressive distributed lag technique is utilized. The co-integration test results show a long-run co-integration among the variables. The findings disclose that DCPSB, land and PHKAP impact positively on the AGRVA. Broad money supply, INF and labour impact negatively on the AGRVA to the GDP.

Marafa [17] investigated the relationship between agricultural production and agricultural financing variables in Nigeria using the Autoregressive Distributed Lagged (ARDL) bounds test. Annual time series data for bank private sector credit to agriculture, value of agricultural credit guarantee scheme fund, government spending on agriculture and agriculture growth domestic product were used in the analysis. The result indicates the existence of long run relationship between agricultural production and agricultural financing variables in Nigeria. The result of the short run analysis shows that all the variables are significant in influencing agriculture production while, in the long run, bank private sector credit to agriculture and agricultural credit guarantee scheme fund are the only variables that influences agriculture production. However, the result of the granger causality test shows that agricultural credit guarantee scheme fund lead to change in agricultural production while bank private sector credit to agriculture and the government spending on agriculture cannot be used to predict changes in agricultural production.

Uremadu, Ehimare and Okhuebor [18] reviewed impact of government expenditure and bank credit on domestic agricultural sector output in Nigeria. It used OLS regression analytical method to evaluate relationship between agricultural output and several factors influencing agricultural productivity in Nigeria such as government expenditure to agriculture, bank loans and advances to agriculture and index of agricultural production. Results showed that there existed a negative and significant relationship between government expenditure and agricultural output in Nigeria, while banks credit to agriculture and index of agricultural production had a positive and significant correlation with agricultural productivity.

Oyelade [19] investigated the impact of commercial bank credits on agricultural output in Nigeria over the period 1980 to 2015. The study employed Fully Modified Ordinary Least Squares (FMOLS) approach. It was evidenced that interest rate on commercial banks' credit to agriculture and deposit money bank's assets are statistically significant in determine agricultural output in Nigeria within the period considered. Also, commercial bank loan on agriculture and deposit money bank's assets determine the output of crop production in Nigeria; commercial bank loan on agriculture and interest rate on commercial banks' credit to agriculture determine the output of livestock production in Nigeria and commercial bank loan on agriculture and interest rate on commercial banks' credit to agriculture determine the output of forestry in Nigeria while commercial bank loan on agriculture and interest rate on commercial banks' credit to agriculture determine the output of fishing in Nigeria.

Bulama, Shettima, Bukar and Tachia [20] evaluated the impact of the Bank of Agriculture (BOA) in financing farming activities of farmers in Maiduguri (which comprises Maiduguri Metropolitan Council and Jere Local Government Area). Specifically, the study described the socio-economic characteristics of the beneficiaries, examined the impact of loans on farmers' performances during the last 8years (2010 – 2017), analysed the rates of loan recovery of Maiduguri branch of the Bank of Agriculture, examined the causes of poor repayment and described the constraints encountered in loan disbursement by BOA and in acquisition of loans by farmers. The study was based on primary source of data collected through use of structured questionnaires. The analytical techniques used included descriptive statistics and logistic (logit) regression model. The results on the socio-economic characteristics of the farmers showed that majority of the farmers were adult literate men with large household size and low income. It was also discovered that household size, income of the household, education of the farmers, amount of credit, short term and long term loans have significant positive impact on agricultural productivity. The results of BOA's loan recovery rates showed fluctuating rates over the last 8 years. The average recovery rate was 70.45% which was high and indicates low default. Poor loan repayment was caused by low price of products, insurgency and poor supervision by BOA staff. The constraints encountered in loan disbursement by BOA were inability of farmers to meet up Bank requirements and untimely release of funds from the BOA Head Office while constraints encountered by farmers in loan acquisition were the cumbersome nature of forms and proceedings and delay in disbursement.

Enilolobo and Ode-Omenka [21] analysed the impact of credits on agricultural output in Nigeria over the period of 1978 to 2016. The data were sources from various edition of Central Bank of Nigeria Statistical Bulletin. Johansen co-integration test and Multivariate Ordinary Least Squares regression estimation were applied to the data to achieve the objective of the study. The findings of the study revealed no long-run relationship between deposit money bank credit to the agriculture sector in Nigeria and agriculture sector output. The findings of the study are further in line with a priori expectations as deposit money bank credit to the agriculture sector in Nigeria has a positive and significant impact on agriculture sector output in Nigeria.

Samson and Obademi [22] ascertained the determinants as well as impact of agricultural credit accessed by farmers in Oyo State on productivity, using Ibarapa region as a case study. Descriptive statistics, Probit model and Regression analysis as estimation techniques were used and data were sourced through structured questionnaire. The results obtained from the probit model shows that the model is well fitted for the analysis by revealing the factors that influence farmers' access to Microfinance bank loan while the results obtained from the regression model revealed that the independent variables engaged in the equation for crop enterprise namely, farm size, labour cost, cost of seeds and amount of credit obtained have positive impact on productivity. Also, Chow-test result shows that the output of Microfinance bank credit beneficiaries is significantly different from that of non-beneficiaries of Microfinance bank credit.

Ajayi, Nageri and Akolo [23] evaluated the impact of agricultural financing policy and deposit money bank loans to agricultural sector on agricultural productivity. The study used time series linear regression model employing data covering the period of 1981 and 2015. The result revealed that deposit money bank loans (CBF) and agricultural financing policy proxy by Agricultural Credit Guarantee Scheme Fund (ACGSF) have significant positive impact on agricultural productivity in Nigeria while lending rate (LR) shows a significant negative impact on agricultural productivity.

Ogbuabor and Nwosu [24] looked at the impact of deposit money bank agricultural credit on agricultural productivity in Nigeria using an error correction model and annual time series data for the period 1981-2014. The results indicate that an equilibrium relationship exists between the variables. In addition, we find that deposit money bank's agricultural credit impacts positively and significantly on agricultural productivity in the long-run, but this impact is quite negligible in the short-run. We also find that agricultural land and labour force impact negatively on agricultural productivity both in the long-run and short-run. However, the impact of climate change variables, namely annual rainfall and average temperature remained negligible throughout.

Anetor, Ogbechie, Kelikume and Ikpesu [25]examined the impact of the credit supply, and various commercial bank loan schemes on agricultural sector production using vector autoregressive (VAR) approach. Using time series data sourced from Central Bank of Nigeria Statistical Bulletin over the sample period of 1981-2013, the study found ACGSF to have performed poorly in explaining agricultural sector performance while commercial loans to agricultural sector had a significant impact on agricultural production.

Agunuwa, Inaya and Proso [26] assessed the relationship between commercial banks credit and agricultural productivity in the Nigeria economy. The statistical tool of analysis is the Ordinary Least Squares (OLS) techniques. However the variables were subjected to the Unit Root Test to ensure stationarity before the application of the OLS. On the whole, three hypotheses were tested; all the alternative hypotheses were validated by the OLS result. The t-calculated of commercial banks credit has a value of 6.28 which is greater than the t-critical of 1.96. This is an indication of positive relationship between commercial banks' credit and agricultural productivity. The t-calculated of interest rate on commercial banks credit has a value of -9.38 as against 1.96 t-critical. This is an indication of a negative relationship between interest rate and agricultural productivity. While the t-calculated of government spending, as a complimentary variable, has a value of 3.42 as against the 1.96 of t-critical.

RESEARCH METHODOLOGY
The effect of deposit money banks loans and advances to agricultural productivity in Nigeria over a period of thirty six (36) years, that is, from 1986 to 2021 was ascertained using an ex-post facto research design. The data in this type of research design is devoid of manipulation by the researcher as such data are published by established government agencies and parastatals.The secondary data were obtained from the Central Bank of Nigeria (CBN) statistical bulletin of 2021. Crop Production Gross Domestic Product (CPGDP), Livestock Gross Domestic Product (LGDP) and Forestry Gross Domestic Product (FGDP) are the dependent variables and proxies for measuring Nigeria's agricultural productivity. Deposit Money Banks Loans and Advances to Agriculture (DMBLA), Interest Rate (INTR), Implicit Price Deflator for Crop Production (IPDCP), Livestock (IPDL) and Forestry (IPDF) are the independent variables. The implicit price deflator for crop production, livestock and forestry were induced to control for the probable effect of inflation on agricultural productivity. The Ordinary Least Square (OLS) estimation method was employed.

The modified model of Ayeomoni and Aladejana [27] was adopted in this research work. The original model of Ayeomoni and Aladejana [27] is stated as:

$$LnECONOG = f(LnCRTA, LnREER, LnINTR, LnPDI, LnINFR) \qquad (1)$$

In an attempt to evaluating the effect of deposit money banks credit to agriculture on agricultural productivity in Nigeria, the following models were developed and sated as thus:

$$CPGDP = f(DMBLA, IPDCP, INT) \qquad (2)$$

$$LGDP = f(DMBLA, IPDL, INT) \quad (3)$$
$$FGDP = f(DMBLA, IPDF, INT) \quad (4)$$

To ensure that the dependent and independent variables are in uniform numerical base to allow for easy interpretation of coefficient, the variables models were logged as follows:

$$LogCPGDP_t = a_0 + a_1 LogDMBLA_t + a_2 LogIPDCP_t + a_3 LogINT_t + u_t \quad (5)$$
$$LogLGDP_t = a_0 + a_1 LogDMBLA_t + a_2 LogIPDL_t + a_3 LogINT_t + u_t \quad (6)$$
$$LogFGDP_t = a_0 + a_1 LogDMBLA_t + a_2 LogIPDF_t + a_3 LogINT_t + u_t \quad (7)$$

Where:

$CPGDP$=Crop production gross domestic product;
$LGDP$=Livestock gross domestic product;
$FGDP$=Forestry gross domestic product;
$DMBLA$= Deposit money banks loans and advances to agriculture;
INT=interest rate;
$IPDCP$=implicit price deflator for crop production gross domestic product;
$IPDL$=implicit price deflator for livestock gross domestic product;
$IPDF$=implicit price deflator for forestry gross domestic product;
a_0= constant coefficient;
u= a random error term;
t= the time trend

RESULT OF ANALYSIS AND FINDINGS

Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) test for stationarity in Tables 1 and 2 show that all the variables are stationary and have no stationarity defect that affects most time series data. Stationarity would not be achieve for all the variables at level form but was later confirmed at first difference.

Table 1: ADF Test Result

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
CPGDP	-4.737900 (0.00)*	-3.646342	-2.954021	1(1)/Stationary
LGDP	-3.948619 (0.02)**	-4.262735	-3.552973	1(1)/Stationary
FGDP	-2.125081 (0.03)**	-2.639210	-1.951687	1(1)/Stationary
CBCA	-6.496867 (0.00)*	-4.262735	-3.552973	1(1)/Stationary
INF	-3.684672 (0.03)**	-4.262735	-3.552973	1(0)/Stationary
INT	-5.753427 (0.00)*	-4.252879	-3.548490	1(0)/Stationary
IPDCP	-5.299927 (0.00)*	-4.273277	-3.557759	1(1)/Stationary
IPDL	-4.693212 (0.00)*	-4.273277	-3.557759	1(1)/Stationary
IPDF	-9.019188 (0.00)*	-3.653730	-2.957110	1(1)/Stationary

Source: Data output E-views 10.0

Table 2: PP Test Result

Variables	PP Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
CPGDP	-4.781532 (0.00)*	-3.646342	-2.954021	1(1)/Stationary
LGDP	-3.796240 (0.02)**	-4.262735	-3.552973	1(1)/Stationary
FGDP	-6.363590 (0.00)*	-4.262735	-3.552973	1(1)/Stationary
CBCA	-6.497385 (0.00)*	-4.262735	-3.552973	1(1)/Stationary
INF	-9.616803 (0.00)*	-2.636901	-1.951332	1(1)/Stationary
INT	-5.610403 (0.00)*	-2.634731	-1.951000	1(0)/Stationary
IPDCP	-1.956876 (0.04)**	-2.636901	-1.951332	1(1)/Stationary
IPDL	-5.391974 (0.00)*	-4.262735	-3.552973	1(1)/Stationary
IPDF	-9.260476 (0.00)*	-4.273277	-3.557759	1(1)/Stationary

Source: Data output E-views 10.0

The serial correlation LM test assesses if the variables in a model are serially correlated, and when such exist, the regression result is assumed to be biased. The null hypothesis of serial correlation LM test assumes no autocorrelation in the model up lag order 2. From Table 3, the variables in the models are not serially correlated judging by the insignificant p-values of the F-statistics.

Table 3: Breusch-Godfrey Serial Correlation LM Test

Equations	F-statistic	Prob. F(2,29)
Equation 5	2.778947	0.0799
Equation 6	0.511093	0.6055
Equation 7	0.017783	0.9824

Source: Data Output E-views 10.0

The variance of the error terms should not differ across observation, that is, a model should be free from heteroskedasticity problem which might distort result of analysis. Table 4 shows that the p-value of the Chq. statistic for the models areinsignificant at 5% level of significance. This is an inference that there is noheteroscedasticity in the models.

Table 4: Heteroskedasticity Test

Equations	F-statistic	Prob. F(1,31)
Equation 5	0.798964	0.3783
Equation 6	1.527593	0.2203
Equation 7	0.123080	0.7281

Source: Data Output E-views 10.0

Ramsey Reset corrects the functional form of a model and ensures that a model is statistical well specified. Thenon-linear combinations of the independent variables should not predict the dependent variable. Table 5 shows that all the models were well specified ass the p-values are insignificant at 5% level of significance.

Table 5: Ramsey RESET Test

Equations	Value	df	Probability
Equation 5	0.048643	(1, 28)	0.8270
Equation 6	1.057154	(1, 28)	0.3127
Equation 7	2.579628	(1, 28)	0.1195

Source: Data Output E-views 10.0

To ensure there is no problem of multicollinearity in the model, the correlation matrix for the variables were performed and presented in Table 6. It is observed that there is no problem of multicollinearity between the control variables introduced in the model. The correlation between inflation, interest rate, implicit price deflator for crop production, livestock and forestry GDP are -0.05, -0.40, -0.39 and -0.41 respectively.

Table 6: Correlation Matrix

	CPGDP	LGDP	FGDP	DMBLA	INF	INT	IPDCP	IPDL	IPDF
CPGDP	1.000000	0.987888	0.954948	0.882421	-0.386321	0.062123	0.989717	0.985365	0.994792
LGDP	0.987888	1.000000	0.972604	0.906956	-0.376061	-0.000243	0.984036	0.989368	0.990537
FGDP	0.954948	0.972604	1.000000	0.945266	-0.373401	-0.052767	0.944557	0.972765	0.966570
DMBLA	0.882421	0.906956	0.945266	1.000000	-0.313356	-0.029536	0.869758	0.927825	0.897962
INF	-0.386321	-0.376061	-0.373401	-0.313356	1.000000	-0.050760	-0.401823	-0.389404	-0.409251
INT	0.062123	-0.000243	-0.052767	-0.029536	-0.050760	1.000000	0.056800	0.011353	0.029912
IPDCP	0.989717	0.984036	0.944557	0.869758	-0.401823	0.056800	1.000000	0.988843	0.991386
IPDL	0.985365	0.989368	0.972765	0.927825	-0.389404	0.011353	0.988843	1.000000	0.993108
IPDF	0.994792	0.990537	0.966570	0.897962	-0.409251	0.029912	0.991386	0.993108	1.000000

Source: Data output E-views 10.0

From Table 7, deposit money banks loans and advances to agriculture has insignificant negative relationship with crop production GDP while interest rate and implicit price deflator have positive relationship crop production GDP, statistically significant relationship existed between crop production GDP and implicit price deflator for crop production

GDP. If deposit money banks loans and advances to agriculture, implicit price deflator for crop production GDP and interest rate are held constant, crop production GDP would stand at ₦682, 262.8 million. Crop production GDP would rise by ₦37376.71 million and ₦44.58 million respectively following a percentage increase in implicit price deflator for crop production GDP. With inference from the Adjusted R-square, deposit money banks loans and advances to agriculture e coupled with interest rate and implicit price deflator for crop production GDP explained 99.18% changes in crop production GDP, and this is statistically significant following the F-statistic p-value of 0.00 (significant at 5% level). The Durbin Watson statistic of 1.82 is close to 2.0 benchmark which implies that there is no autocorrelation in the model.

Table 7: Deposit Money Banks Loans and Advances to Agriculture and CPGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	682262.8	204663.8	3.333579	0.0024
DMBLA	-0.354042	1.197885	-0.295556	0.7697
IPDCP	37376.71	8509.035	4.392591	0.0001
INT	44.57658	190.6508	0.233813	0.8168
R-squared	0.992769	Mean dependent var		6137776.
Adjusted R-squared	0.991772	S.D. dependent var		4175895.
S.E. of regression	378796.5	Akaike info criterion		28.66244
Sum squared resid	4.16E+12	Schwarz criterion		28.88690
Log likelihood	-482.2615	Hannan-Quinn criter.		28.73899
F-statistic	995.3810	Durbin-Watson stat		1.824277
Prob (F-statistic)	0.000000			

Source: Data output E-views 10.0

The regression result in Table 8 shows that deposit money banks loans and advances to agriculture and interest rate have insignificant negative relationship with livestock GDP while implicit price deflator has statistically significant positive relationship livestock GDP. It would be deduce from the coefficient of the constant that if deposit money banks loans and advances to agriculture, implicit price deflator for livestock GDP and interest rate are held constant, livestock GDP would be ₦70, 265.23 million. Livestock GDP would fall by ₦1329.007 million and ₦1, 329.007 million following a unit appreciation in deposit money banks loans and advances to agriculture and interest rate respectively. Deposit money banks loans and advances to agriculture, implicit price deflator for livestock GDP and interest rate explained 99.54 changes in livestock GDP by looking at the Adjusted R-square, and this is statistically significant at 5% level of significance as evidenced by the F-statistic and p-value of 1,563.48 and 0.00 respectively. The Durbin Watson statistic of 1.61 is not far from the benchmark of 2.0 which suggest no autocorrelation. Nevertheless, the deficiency that be connected with the Durbin Watson value of 1.61 was corrected with the serial correlation LM test in Table 3 which reveals that the variables in the model are not serially correlated.

Table 8: Deposit Money Banks Loans and Advances to Agriculture and LGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	70265.23	35928.58	1.955692	0.0602
DMBLA	-0.129932	0.063699	-2.039795	0.0506
IPDL	1329.007	442.9889	3.000091	0.0055
INT	-2.989784	8.467804	-0.353077	0.7266
R-squared	0.995384	Mean dependent var		632050.0
Adjusted R-squared	0.994748	S.D. dependent var		233913.3
S.E. of regression	16952.41	Akaike info criterion		22.44926
Sum squared resid	8.33E+09	Schwarz criterion		22.67373
Log likelihood	-376.6374	Hannan-Quinn criter.		22.52581
F-statistic	1563.477	Durbin-Watson stat		1.618930
Prob (F-statistic)	0.000000			

Source: *Data output E-views 10.0*

Looking at the regression output in Table 9, deposit money banks loans and advances to agriculture and implicit price deflator for forestry GDP have positive relationship with forestry GDP, implicit price deflator for forestry GDP relationship with forestry GDP is significant. Interest rate has insignificant negative relationship with forestry GDP. Keeping deposit money banks loans and advances to agriculture, interest rate and implicit price deflator for forestry GDP constant, forestry GDP would be ₦29, 325.55 million. A unit rise in deposit money banks loans and advances to agriculture and implicit price deflator for forestry GDP increase forestry GDP respectively by ₦0.026 million and ₦208.93 million. A percentage rise in interest rate leads to ₦2.6 million depreciation in forestry GDP.The Adjusted R-squared shows that only 97.75% variation in forestry GDP was jointly was as a result of changes in deposit money banks loans and advances to agriculture, implicit price deflator for forestry GDP and interest rate. The independent variables

significantly explained the changes in forestry GDP as shown by the F-statistic of 359.9609 significant at 5% level. The Durbin Watson statistic of 2.0 indicates no autocorrelation problem. In other words, the regression result is not spurious.

Table 9: Deposit Money Banks Loans and Advances to Agriculture and FGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	29325.55	11031.43	2.658363	0.0126
DMBLA	0.026154	0.019811	1.320178	0.1971
IPDF	208.9338	57.65959	3.623574	0.0011
INT	-2.597083	2.187393	-1.187296	0.2447
R-squared	0.980257	Mean dependent var		98960.29
Adjusted R-squared	0.977533	S.D. dependent var		28363.74
S.E. of regression	4251.407	Akaike info criterion		19.68294
Sum squared resid	5.24E+08	Schwarz criterion		19.90741
Log likelihood	-329.6100	Hannan-Quinn criter.		19.75949
F-statistic	359.9609	Durbin-Watson stat		2.000383
Prob (F-statistic)	0.000000			

Source: Data output E-views 10.0

The effect of deposit money banks loans and advances to agriculture on crop production GDP, Livestock GDP and Forestry GDP, was examined using the pairwise granger causality test as summarized in Tables 10 – 12. From Table 10, there is no one way or two way causal relationship between deposit money banks loans and advances to agriculture and crop production GDP. Causality does not run from deposit money banks loans and advances to agriculture to crop production GDP at a 5% level of significance. This finding implies that deposit money banks loans and advances to agriculture has no significant effect on crop production GDP. Nevertheless, implicit price deflator for crop production GDP was found to exert significant effect on crop production GDP.

Table 10: Granger Causality Test for CPGDP, DMBLA, IPDCP and INT

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
DMBLA does not Granger Cause CPGDP	35	0.16618	0.6863	No Causality
CPGDP does not Granger Cause DMBLA		3.42028	0.0740	No Causality
IPDCP does not Granger Cause CPGDP	35	8.06447	0.0079	Causality
CPGDP does not Granger Cause IPDCP		1.65060	0.2084	No Causality
INT does not Granger Cause CPGDP	35	0.00332	0.9544	No Causality
CPGDP does not Granger Cause INT		0.09434	0.7608	No Causality

Source: Data output E-views 10.0

The output data in Table 11 evidences that there is unidirectional relationship between livestock GDP and deposit money banks loans and advances to agriculture at a 5% level of significance. This is to say that livestock GDP has significant effect on deposit money banks loans and advances to agriculture whereas livestock GDP is not significantly affected by deposit money banks loans and advances to agriculture. Furthermore, implicit price deflator for livestock GDP significantly influenced livestock GDP.

Table 11: Granger Causality Test for LGDP, DMBLA, IPDL and INT

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
DMBLA does not Granger Cause LGDP	35	0.00033	0.9857	No Causality
LGDP does not Granger Cause DMBLA		6.52746	0.0158	Causality
IPDL does not Granger Cause LGDP	35	10.6883	0.0026	Causality
LGDP does not Granger Cause IPDL		3.42059	0.0739	No Causality
INT does not Granger Cause LGDP	35	0.70544	0.4074	No Causality
LGDP does not Granger Cause INT		0.00225	0.9625	No Causality

Source: Data output E-views 10.0

In Table 12, forestry GDP granger cause deposit money banks loans and advances to agriculture at a 5% level of significance. This shows that deposit money banks loans and advances to agriculture has no significant effect on forestry GDP on one hand, while forestry GDP has significant effect on deposit money banks loans and advances to agriculture on the other hand. A bidirectional relationship was observed between implicit price deflator for forestry GDP and forestry GDP as causality runs in both direction.

Table 12: Granger Causality Test for FGDP, DMBLA, IPDF and INT

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
DMBLA does not Granger Cause FGDP	34	0.29248	0.5925	No Causality
FGDP does not Granger Cause DMBLA		9.56074	0.0042	Causality
IPDF does not Granger Cause FGDP	34	13.2126	0.0010	Causality
FGDP does not Granger Cause IPDF		19.5066	0.0001	Causality
INT does not Granger Cause FGDP	34	2.01735	0.1655	No Causality
FGDP does not Granger Cause INT		0.09322	0.7622	No Causality

Source: Data output E-views 10.0

With respect to discussing the findings, the granger causality test has proving that deposit money banks loans and advancesto agriculture has no significant effect on crop production GDP, livestock GDP, and livestock GDP. This may be attributed to the neglect of the agricultural sector and the dependence of Nigeria on a mono-cultural, crude oil-based economy which have not augured well for the well-being of the Nigerian economy. The macroeconomic fundamentals such as interest rate and inflation are not helping matters which is evident as forestry and livestock output of agriculture were negatively correlated with interest rate, and this supports the findings of Udoka, Mbat and Dave [28] and Ayeomini and Aladejana [27] that interest rate charged by deposit money banks for loan facilities does improve agriculture production resulting in poor agricultural performance. Implicit price deflator having significant and negative effect on output of agriculture is an insinuation that the level of inflation in the country is not favourable for agricultural growth. Sometimes, when loan are sourced for farming enterprises, the level of inflation would erode the purchasing power of the fund thus farmers having difficulty in repayment of loans.

CONCLUSION AND POLICY IMPLICATIONS

The proper functioning of the banking system in pivotal for the growth of agriculture. The rural sector is generally seen as very central to Nigerian's development strategy, while agriculture continues to play a key role in rural growth. However, financial markets in Nigeria have continued to be too fragmented and urban biased, thereby being inadequate to meet the rural demands for its services thus the banking system is relied upon to finance productive activities in the country. This study ascertains the effect of deposit money banks loans and advances to agriculture on agricultural productivity in Nigeria over a period of thirty six years from 1986 to 2021. The results of the analysis revealed that deposit money banks loans and advances to agriculture has no significant effect on crop production GDP, livestock GDP, and livestock GDP. The results of this study have shown the importance of agricultural financing in spurring economic growth and development in general.

Taking into consideration the findings of this study, there is the critical need for deposit money banksto increase loans and advances to agricultural enterprises through reduction in interest rate charged, which in turn permits for greater economic growth and development.The management of deposit money banksshould strengthen their policies on credits and interest rates on such credits. Reliable, effective and efficient supervision, regulation and audit technique would lead to the actualization of this.Deposit money banks should lower in the interest rate charged on loans and accepted collaterals to encourage more farmer especially, rural farmers to have access to finance for agricultural production.The Central Bank of Nigeria should reduce the monetary policy rate to a single digit (range of say 5% to 9%) as against the current rate of 14% to ease the interest rate charged by deposit money banks.

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