

## Impact of Bank Loans on Agricultural Output Growth in Nigeria

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**Abstract:** This study evaluates the effect of lending by financial institutions on Agricultural Gross Domestic Product (AGDP) in Nigeria from 1981-2016. The specific objectives of the study were to compare the volume of loans to agricultural sector from commercial and microfinance banks, compare the impact of commercial and micro finance loans on farm output, assess the impact of bank loans on agricultural sector output in Nigeria. Data used were collected from Central Bank of Nigeria Statistical Bulletin, Annual Reports and National Bureau of Statistics. The data were subjected to unit root, co-integration and error correction tests. The results show that the commercial bank loan was consistently larger than that of the microfinance bank loans. The microfinance bank loan to agriculture was consistently below 5% of the total loans over the period of this study, commercial loans had a positive and significant impact both in the long-run (136.1508) and short-run (11.4509) on agricultural output, the micro loans relate negatively with output, the number of commercial lenders relate positively with agricultural output both in the short and long run periods where as the number of micro finance banks had no significant effect on agricultural output both in the short but in long run periods. On the whole, this study shows that agricultural loans impact positively on agricultural sector output but the extent of that impact has not resulted in a steady and sustained growth that ensures the development of the sector enough to support economic development.

**Key words:** Commercial banks, microfinance banks, agricultural loans, agricultural output, AGDP, economic development

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### INTRODUCTION

In Nigeria, the agricultural sector remains important in sustaining economic growth and development contributing over 60% of the GDP in the 1960's and about 20% in late 1990's, (Adebiyi and Babatope-Obasa, 2004; Abayomi and Salami, 2008; Akpaeti, 2015). This drop in contribution, attributed to limitation of technology and agricultural credit by Eyo, (2008a, b), culminated in efforts to reverse the trend. One such effort have been to develop the Nigerian financial sector to provide satisfactory financial services, particularly the provision of credit facilities that supports output growth and promote agricultural development. To ensure that the Nigerian agricultural sector successfully supports economic development, government has over time introduced Agricultural Credit Guarantee Scheme Fund (ACGSF) in 1977 to induce banks to increase and sustain lending to agriculture. The rural banking scheme was also, introduced to compel the commercial banks to disburse at least 45% of savings mobilized as loans to agriculture. There was also, the Central Bank of Nigeria (CBN) credit guidelines on minimum proportion of commercial and merchant bank loans that must be allocated to agriculture. Other efforts included the introduction of the People's bank in 1988 as well as the

community banks, the NACB established branches in all the states by 1990 with the goal of encouraging locally-owned savings and loan institutions to meet the needs of the rural population not served by the commercial banks. In 1991, Nigeria experimented with yet another effort to make sure that more commercial loans were extended to the sector. This brought about the micro finance schemes, the Self Help Group (SHGs) linkage with the commercial banks, interest draw back and the trust fund model under the ACGSF (Eyo, 2002). The launching of the micro finance policy regulatory and supervisory framework in 2005 and its recapitalization and the launching of the 20 billion Naira fund in February, 2008 to complement poverty and micro-credit intervention efforts of government and the inauguration of the committee on micro finance banks on May, 2008 by the Apex Bank. One common consequence of this was the proliferation of micro finance subsidiaries by Universal banks to expand their market such that by the year 2019 as many as 898 micro finance banks operate in the Nigerian financial market. On the whole, between 1978 and 2016 there has been consistent increase in the lending portfolios of banks to the agricultural subsector. In fact, bank credits to the agricultural sector in nominal terms from N230 million (then about \$233 million) in 1978 to over N509 billion in 2016. Financial institutions which are

operating specifically in the rural region have engaged in delivering credit services and other financial schemes to farmers individually and in groups.

**The practice of agricultural financing in Nigeria overtime:** Overtime the practice of agricultural lending in Nigeria included: borrowers apply for collateralized loans, borrowers apply for uncollateralized loan guaranteed by the ACGFS or borrowers access the loan as a member of group. Lenders generally target the individual farmer's enterprise in extending loans. Once the loan is approved, the cheque is raised as evidence and the money is paid into the beneficiaries accounts. Where government agencies provide the credit, some is given in kind. The inputs (Hoe, matchete, seeds, fertilizers) supplied at a cost by the lending agency and the borrower is compelled to repay. The majority of banks give short term loans.

Invariably, the banks give mostly short term loans over this period and the existing mix of lending institutions suggest that the situation has not changed significantly overtime. Loans having 1 year maturity are operating loan, they do not encourage growth in capital stock.

Where there are no moratorium, loan repayment commences monthly after release of funds. Where there is moratorium repayment is done monthly after the period of grace. When loan maturity is too short and not coordinated with time pattern of earnings, it not only creates liquidity problem for the borrower but exerts pressure on his cash flow. When there is liquidity problem and cash flow pressure, the ability to meet the monthly obligation for principal and interest is reduced. Those who meet those obligations do so by getting funds from other sources. Those who cannot get funds elsewhere default. The moratorium is given arbitrarily based on the gestation period of the activity being financed.

Lending generally targets the entire farm or agribusiness and allows the farmers freedom in the use of borrowed fund. As long as the borrower makes the monthly repayments, the lenders appear satisfied. Allowing borrowers extra freedom in the use of borrowed funds does not ensure that borrowed fund are used for the purpose it were meant. This results in the problem of loan diversion. When loan funds are diverted, it will contribute nothing to economic development. Other, outcome of the existing lending programmes include, making it impossible to properly price loans, stifles development of the sector and encourages the problem information asymmetry, adverse selection as well as moral hazard in the financial market. Credit is widely acclaimed to be a major component of agricultural production and access to it ensures increased output and food security

(Diagne and Zeller, 2001; Olagunju and Adeyemo, 2008). The question is how has this approach to agricultural financing encourage output growth in Nigeria?

**Objectives of the study:** The broad objective of the study was to evaluate the effect of lending by banks on agricultural sector output in Nigeria. The specific objectives of the study were to: compare the volume of loans to agricultural sector from commercial and microfinance banks; compare the impact of commercial and micro finance loans on farm output; assess the impact of bank loans on agricultural sector output in Nigeria.

### **Conceptual issues**

**The financial system and economic development:** The financial system has the primary role of facilitating the allocation of resources across space and time in an uncertain environment. This primary role consists of five basic functions: ameliorating risk, allocating resources, monitoring managers and exerting corporate control, mobilizing savings and facilitating the exchange of goods and services. When these functions are performed well, they contribute to economic growth through two channels: capital accumulation and technological innovation. The emergence of financial systems and especially, banking can therefore be expected to influence the speed and pattern of capital accumulation and technological innovation in Nigeria (Awotide *et al.*, 2013).

The efficient functioning of financial markets affects the pace, speed and pattern of economic development. Financial institutions-formal, semi-formal and informal represent an essential part of the institutional infrastructure required for an efficient market economy. Financial systems provide vital services in an economy (Akinlade *et al.*, 2011). They provide payment services; they mobilize savings and allocate credit and they price, pool and trade risks. In this way they make it cheaper and less risky to trade goods and services and to borrow and lend. Without finance, economies would be reduced to the inefficiency of barter. Investors would be limited to self-financing their investments. Households with surpluses but without good investment alternatives, would be forced to store their savings under the mattress or hold them in less productive assets. Limited access to financial services due to inefficient financial markets constrains economic development (Ngugi, 2001). For these reasons, governments and donors have devoted vast resources to developing financial systems in low income economies over time.

Financial services are important for the development of agriculture. Rural transformation provides

opportunities for investments in farm enterprises. Technological changes often require complementary investments that increase demand for working and investment capital. Some of this demand is self-financed, some is serviced by informal sources but still others require longer-term loans provided by formal institutions. Supplying reasonably priced loans, therefore can speed the adoption of technology, expand the production of food supplies and increase farm incomes. When a reliable supply of formal finance is established, farmers may alter their perceptions about the risks of investing. They may choose to invest more of their own funds knowing that their unused borrowing capacity will be available to meet future cash needs (Adegbite and Adeleye, 2011). The widespread use of informal finance, self-help and village-level savings groups and funeral funds is evidence of demand for savings services (Mohamed, 2003) and (Ryan and Koenig, 2001).

**Government intervention in financial markets:** The government has viewed control of finance as an important means to speed industrial development, expand exports, promote small business, fight poverty and assure cheap food supplies to urban areas (Jensen, 2000). Rather than rely on financial institutions to use market mechanisms to mobilize savings and allocate resources, they have intervened in markets to direct credit for specific purposes (Briggeman *et al.*, 2009).

Five main types of interventions have been used: lending requirements and quotas imposed on banks refinance schemes, loans at preferential interest rates, credit guarantees and lending by development finance institutions. These actions are intended to increase lending by reducing the costs and risks to lenders of making loans to preferred clients and sectors. Loan waivers and forgiveness programs are also, used to reduce the debt burden of priority borrowers (Johnson, 2009; Hartarska *et al.*, 2015). The management of natural resource windfalls is also, central short to medium-run challenge for government (Gelb and Grasmann, 2010).

Resource windfalls can generate macroeconomic pressures e.g., on inflation and the real exchange rate. What distinguishes resource windfalls from other external shocks is that their impact depends directly on the fiscal policy response because the government is typically the main recipient of resource revenue Berg *et al.* (2007). The experience of Nigeria can be separated into two distinct periods: the 2004-2008 period is marked by a more successful phase of fiscal, monetary and exchange rate policy coordination with limited aggregate demand pressures and falling inflation and the 2008-2010 period coordination of fiscal, monetary and exchange rate policy

was challenged by the aftermath of the global financial crisis and oil price shock. Macroeconomic management in Nigeria is complicated by the country's dependence on volatile and uncertain oil revenues. Oil revenues which account for about 75% of total revenue is shared among the three tiers of government (federal, state and local). About half of oil revenues go to the federal government and the rest to state and local governments. The Central Bank of Nigeria (CBN) targets single-digit inflation while keeping the naira-US\$ exchange rate within a narrow band and supporting financial sector stability. To attain its objectives the CBN uses a policy interest rate corridor, open market operations, monetary targeting, Foreign exchange sales and regulatory requirements. However, high economic volatility, partly caused by oil price volatility has meant that at times it has struggled to attain its multiple objectives. The Nigerian authorities have made many attempts to improve management of oil and gas revenues. In 2004 they introduced an oil price-based budget rule and established an oil stabilization fund, the Excess Crude Account (ECA). Oil revenues in excess of budgeted benchmark revenues-determined ex ante by the assumed oil price in the budget and projected oil and gas production-went into the ECA. Between 2004 and 2008, the economy was stabilized and the procyclicality of aligning public spending with oil price fluctuations was substantially reduced (Araujo, 2012).

As oil prices rose, the budgeted oil price helped contain public spending, especially, agriculture. Significant oil savings were also, generated which helped fund debt buyback operations in 2005-06 and build up the ECA to about US\$20 billion by the end of 2008 (Dagher *et al.*, 2012).

The countercyclical fiscal policy complemented the CBN anti-inflationary stance, dramatically suppressing inflation which dropped from 17.9% in 2005 to 8.2% in 2006 and 5.4% in 2007. Despite large oil-related liquidity inflows, the CBN stayed vigilantly anti-inflationary, mopping up liquidity through open market operations but it also, showed flexibility in its management of the exchange rate, allowing some appreciation in the naira-US\$ exchange rate and accumulated substantial international reserves. Since, 2008, due to large external shocks, the CBN has found it much harder to stabilize prices, the exchange rate and the financial system WAVES (2012). In 2008 the Nigerian stock market plunged by 70%, partly because of the flight to quality when the global crisis began and partly because world oil prices collapsed, falling by 75% peak-to-bottom. These events deflated the credit bubble that had been generated during the oil windfall years. In the banking crisis that followed, 10 out of 24 banks-accounting for about 40% of banking

system assets were found to be either insolvent or undercapitalized. In response, the CBN relaxed monetary policy and used its reserves to offset the depreciation pressures on the naira. However, it could not fully resist those pressures, after a US\$10 billion drain on reserves in the last 4 months of 2008, in December 2008 and January 2009 the CBN allowed the naira to depreciate by 20% (Shen and Yang, 2012).

Solid safety buffers, built from pre-crisis oil savings allowed Nigeria to implement a countercyclical fiscal policy that cushioned the economy against the impact of the banking crisis and the oil price shock. In 2009 government oil revenues declined by 15% points of GDP but consolidated public expenditures increased by about 2% points financed partly through draw-downs from the ECA. The consolidated government balance swung from a surplus of 6% of GDP in 2008 to a deficit of 9% in 2009, though real GDP growth was largely unchanged. Caught up in this procyclical fiscal expansion, the CBN faced difficult trade-offs. Although, double-digit inflation and continued reserve drainage justified tightening monetary policy, the CBN kept interest rates low (with highly negative real interest rates) in order to support the still-fragile banking system and intervened in the Foreign exchange market to support the currency. Expansionary policy contributed to a steady decline in international reserves (to below 5 months of imports by year-end 2010) despite high oil prices. However, in 2011, as the banking crisis was clearly being resolved, the CBN gradually tightened monetary policy, increasing policy rates and hardening regulatory requirements and later allowed a small, much-needed, depreciation of the Naira. By end-2010 these measures helped reduce inflation and stabilize reserves.

A windfall may also, result in a boom in the domestic financial system. As a windfall improves a country's external outlook, appetite for domestic assets may increase and the country may experience capital inflows. These inflows could feed into the domestic financial system, increasing the availability of domestic credit for farmers to increase agricultural productivity. When borrowing constraints are prominent, profitable investment opportunities are foregone because the premium on borrowing is too high or credit is unavailable. In this case the resource windfall helps drive down the country risk premium because resource revenue is used to repay debt. A lower risk premium drives down interest rates, raising private and public investment and non-resource production, also, financed by the windfall. The lower interest rates also, promote frontloading of consumption relative to an economy with no capital

market imperfections. As a result, natural resource wealth is partly converted into productive capital and partly consumed with very little saved abroad.

Credit growth may stem from an accommodating monetary policy but may also, arise, if monetary policy is relatively neutral. In these cases, the windfall may be associated with very large expansions in credit, broad money and the money multiplier. While some expansion in credit is beneficial, contributing to financial deepening, there is a risk that excessive credit growth could expose the domestic financial system to a reversal in Foreign investor appetite for domestic assets and to a bust in credit quality as Nigeria's experience suggests. If that happens, monetary authorities may decide to tighten policy but must consider the associated policy tradeoffs.

## MATERIALS AND METHODS

**The study area:** The study area is Nigeria. It is located between latitudes 4°N and 14°North longitudes 2°E and 15° East covering a geographical area of 923,768 km<sup>2</sup>. The population is well over 150,003,542 million (NPC., 2006). The climate is semi-arid in the North and becomes increasingly humid in the South. Rainfall is one of the important climatic factors influencing agriculture and three broad ecological zones are commonly distinguished, namely the Northern Sudan Savannah with 500-1000 mm of rainfall, the Guinea Savannah zone or middle belt with 1,000-1,500 mm of rainfall and the Southern rainforest zone with 1,500-4,500 mm of rainfall. Generally, rainfall patterns are marked by an alteration of wet and dry seasons of varying duration. Agriculture is a major occupation of the people.

**Data collection and analysis:** The research made use of secondary data. The data employed in this research were annual time series data spanning from 1981-2016 assembled using Central Bank of Nigeria (CBN) Statistical Bulletin. The data obtained were subjected cointegration analysis.

**Model specification:** Objective 2 impact of commercial and microfinance banks loans:

$$AGDP_t = \beta_0 + \beta_1 CBAL + \beta_2 MFAL + \beta_3 NCBK + \beta_4 NMF BK + \epsilon_t \quad (1)$$

Where:

- AGDP = Agricultural Gross Domestic Product (₦)
- CBAL = Commercial Bank Agric Loans (₦)
- MFAL = Microfinance Agric Loans (₦)
- NCBK = Number of Commercial Banks

NMFBK = Number of Microfinance Banks  
 €t = Error term

When co-integration was verified the short-run relationship was confirmed using the Error Correction Model (ECM). This was then stated thus:

$$\Delta AGDP_t = \beta_0 + \beta_1 (\Delta CBAL_{t-1}) + \beta_2 (\Delta MFAL_{t-1}) + \beta_3 (\Delta NCBK_{t-1}) + \beta_4 (\Delta NMFBK_{t-1}) + \pi ECM_{t-1} + \epsilon_t$$

where, ECM is Error Correction Model and  $\pi$  is the speed of adjustment coefficient. Objective 3-impact of loans on farm output:

$$AGDP_t = \beta_0 + \beta_1 TLA + \beta_2 MS + \beta_3 CRR + \beta_4 LR + \beta_5 INT + \beta_6 INF + \beta_7 NBKS + \beta_8 EXR + \epsilon_t \quad (2)$$

Where:

- AGDP = Agricultural Gross Domestic Product (₦)
- TLA = Total loan accessed by farmers from commercial banks and microfinance banks (₦)
- MS = Total money supply (₦)
- CRR = Cash Reserve Ratio of commercial banks (%)
- LR = Liquidity Ratio of commercial banks (%)
- INT = Interest rate (lending rate) (%)
- INF = Annual rate of inflation (%)
- NBKS = Number of Banks
- EXR = Nominal Exchange Rate in Naira per USD (₦/\$)
- €t = Error term

When co-integration was verified the short-run relationship was confirmed using the Error Correction Model (ECM). This was then stated thus:

$$\Delta AGDP_t = \beta_0 + \beta_1 (\Delta TLA_{t-1}) + \beta_2 (\Delta MS_{t-1}) + \beta_3 (\Delta CRR_{t-1}) + \beta_4 (\Delta LR_{t-1}) + \beta_5 (\Delta INT_{t-1}) + \beta_6 (\Delta INF_{t-1}) + \beta_7 (\Delta NBKS_{t-1}) + \beta_8 (\Delta EXR_{t-1}) + \pi ECM_{t-1} + \epsilon_t$$

where, ECM is Error Correction Model and  $\pi$  is the speed of adjustment coefficient.

Table 2: Index of agric GDP, commercial and microfinance bank loans

Years	Index of mean commercial bank loans to agriculture [Mean = N 94.1 billion]	Index of mean microfinance bank loans [mean N 2.5 billion]	Index of mean agric. gross domestic product [mean = N7140.6 billion]
1981-1984	100	0	100
1985-1988	257.1429	0	124.0045
1989-1992	585.7143	100.00	147.9123
1993-1996	2570.4762	1500.00	165.1823
1997-2000	3785.7143	9000.00	192.8361
2001-2004	7308.3333	23000.00	316.6849
2005-2008	10532.1427	35700.00	445.5720
2009-2012	24871.4286	54800.00	559.1085
2013 - 2016	50839.2857	96800.00	653.7082

Field work 2018

## RESULTS AND DISCUSSION

**Compare the volume of loans to agricultural sector from commercial and microfinance banks:** This study shows that between 1981 and 2016 the average commercial bank loan to agriculture was 94.1 billion Naira while average microfinance loan to agricultural was 2.5 billion Naira, mean total loans to the agricultural sector was 96.6 billion Naira and the mean AGDP was 7140.6 billion Naira (Table 1).

In fact, Table 2 shows that the index Commercial Bank Loan (CBL) continually increased from 100 in 1981-1984 to 50839.2857 in 2013-2016; the index of Microfinance bank Loans (MFL) to the agricultural sector shows a consistent increase from 100 in 1989-1992 to 96800 in 2013-2016. Also, there was a steady increase in the index of Agricultural sector Gross Domestic Product (AGDP) from 100 in 1981-1984, to 653.71 in 2013-2016.

However, Table 3 shows that the means growth rates of commercial bank loans to agriculture decreased from 157.14% in 1985-1988 to 127.78% in 1989-1992, it increased to 342.28 in 1993-1996 after which it decreased to 46.14 in 1997-2000 and then fluctuated 104.41 in 2013-2016. Similarly, the mean growth rates of microfinance bank loans to agriculture continuously decreased from 1400% in 1981-2012 to 76% in 2013-2016.

On the whole, the AGDP growth rate was less than proportional to the total loan growth rate overtime. On the other hand, the total loan index steadily increases from 100 between 1981-1984 to 51926.23 in 2013-2016. This resulted in a steady increase in the AGDP index from 100 between 1981 1984 to 653.7 in 2013-2016.

The volume of commercial bank loans to agriculture was consistently higher than that from the micro finance

Table 1: Mean values of loans, AGDP and growth rate (1981-2016)

Variables	Mean [N'B]	Mean growth rate
Cover Bank Agric Loans (CBAL)	94.1	24.9
Micro Finance Agric Loans (MFAL)	2.5	46.4
Agricultural Gross Domestic Product	7,140.6	5.8
Total Loan Accessed by farmers (TLA)	96.6	24.9

Field work, 2018

banks. Table 4 shows that microfinance loan was consistently below 5% of the total loan and that of the commercial banks was consistently above 96% over time. On the whole the commercial banks loans contributed 97.41% of the total agricultural output.

**Impact of commercial and microfinance loans on agricultural output:** Variables in the model were

subjected to unit root test. Table 5 shows that the entire variables became stationary at first difference. The results of Johansen co-integration test on the variables have been summarized in Table 6 and 7. The trace test in Table 6 showed that the hypothesis of no co-integration among the variables can be rejected and at least one co-integrating equation at 5% exists. The maximum eigen-value test in Table 7 confirmed the presence

Table 3: Growth rates for loans and AGDP

Years	Growth rate in mean commercial bank loans	Growth rate in mean microfinance loans	Growth rate in mean total Total loans to agriculture	Agricultural gross domestic product growth rate
1981-1984	-	-	-	-
1985-1988	157.14	0	157.14	24.00
1989-1992	127.78	0	127.78	19.28
1993-1996	342.28	1400.00	345.53	11.68
1997-2000	46.14	500.00	49.18	16.74
2001-2004	93.05	155.56	94.74	64.22
2005-2008	44.11	55.22	44.54	40.70
2009-2012	136.15	53.50	132.92	25.48
2013-22016	104.41	76.64	103.70	16.92

Field survey 2018

Table 4: Comparison of commercial and microfinance loans with output

Years	Portion of mean commercial bank loan [%]	Portion of mean microfinance bank loan [%]
1981-1984	100	0
1985-1988	100	0
1989-1992	99.8	0.2
1993-1996	99.5	0.5
1997-2000	97.25	2.75
2001-2004	96.39	3.61
2005-2008	96.12	3.88
2009-2012	97.44	2.56
2013-2016	97.78	2.22

Field survey 2018

Table 5: Unit root tests: impact of commercial and microfinance bank loans

Variable L	ADF stat.	Critical V	Variable D	ADF stat.	Critical V	Decision
AGDP	-1.4657	-3.5443	• AGDP	-5.4007	-3.5485**	1(1)
CBAL	0.5772	-3.5443	• CBAL	-6.7380	-3.5485**	1(1)
MFAL	-2.3161	-3.5443	• MFAL	-7.6409	-3.5485**	1(1)
NCBK	-1.8599	-3.5443	• NCBK	-5.4540	-3.5485**	1(1)
NMFBK	-2.7410	-3.5578	• NMFBK	-3.8552	-3.5485**	1(1)

\*\*Denotes rejection of the null hypothesis at 5%; authors computation from e-Views 9.0

Table 6: Trace test result-impact of commercial and microfinance bank loans

Hypothesized No. of CE(s)	Eigen-value	Trace statistic	Critical value 0.05	Probability
None *	0.683431	82.12729	69.81889	0.0038*
At most 1	0.464824	43.02004	47.85613	0.1321
At most 2	0.383332	21.76460	29.79707	0.3118
At most 3	0.129134	5.328144	15.49471	0.7730
At most 4	0.018274	0.627073	3.841466	0.4284

\* = Significant at 1%, \* = at least one co integrating equation exist; author's computation from e-Views 9.0

Table 7: Maximum eigen-value-impact of commercial and microfinance bank loans

Hypothesized No. of CE(s)	Eigen-value	Maxi-Eigen statistic	Critical value 0.05	Probability
None **	0.683431	39.10725	33.87687	0.0108**
At most 1	0.464824	21.25544	27.58434	0.2611
At most 2	0.383332	16.43645	21.13162	0.2004
At most 3	0.129134	4.701071	14.26460	0.7790
At most 4	0.018274	0.627073	3.841466	0.4284

\*\* = Significant at 5% , \* = at least one co integrating equation exist; author's computation from e-Views 9.0

of long run relationship among the variables of interest with at least one co-integrating equation at 5%. The result showing the impact of loan by commercial banks and microfinance banks on output is presented in the table below, the result indicate that the Commercial Loans (CBAL) had a positive and significant impact on output both in the long run (136.1508) and short run (11.4509). The coefficient of the variable statistically significant at 1% level of significant, respectively, this implies that a ununit increase in commercial loans will increase farm output by 136.2 and 11.5%, respectively, both in the long-run and short run. The variable micro loans had a negative impact on farm output both in the long and short-run. The long-run coefficient was -7119.349 while the short-run, coefficient was -690.1656. Both long-run and short run coefficients were statistically significant at 1%. The contribution of Microfinance bank Loans (MFAL) affected output negatively both in the short and the long run. Invariably, micro loans do not enhance agricultural output growth in Nigeria. More, so, the Number of Commercial Banks (NCBK) had a positive and significant impact on output both in the long-run (99.6476) and short-run (73.1998) the coefficients of the variable were statistically significant at 1% level of significant, respectively, this implies that a unit increase in NCBK

will increase farm output by 99.6 and 73.2%, respectively, both in the long-run and short-run. However, the number of microfinance banks had a negative impact on farm output both in the long-run (-6.6614) and short-run (-0.3708). The impact was only significant in the long run. This implies that an increase in the number of microfinance banks will only affect agricultural output significantly in the long run and the effect is likely to be negative, if appropriate measures are not taken to enhance to volume of loans to the farmers Table 8. The error correction coefficient, -0.1616 was significant at 1%. The coefficient indicates a feedback of about 16.2% of the previous year disequilibrium from the long-run elasticity of farm output. The strong significance of ECM supports co-integration.

**Impact of bank loans on agricultural sector output in**

**Nigeria:** Nigeria witnessed growth in total loan disbursed to the agricultural sector averaging about 25% from 1981 to 2016 with the highest rate, about 65% in 1996. The economy also, witnessed a steady growth in farm output over the period 1981-2016 averaging 5.8% with the highest growth rate of about 56% in 2002. Table 9 shows index of mean loans to the agricultural sector. According to this table, the index of mean total loans to the agricultural

Table 8: Impact of commercial and microfinance bank loans

Regressor	Coefficient	SE	Z-ratio
<b>Long-run</b>			
CBAL	136.1508	5.10531	26.6685**
MFAL	-7119.349	274.372	-25.9478**
NCBK	99.64759	8.42893	11.8221**
NMFBK	-6.661436	0.43487	-15.3183**
<b>Short-run</b>			
• CBAL	11.45085	3.23575	3.53885**
• MFAL	-690.166	128.300	-5.37932**
• NCBK	73.1998	10.2385	7.14948**
• NMFBK	-0.370373	0.44371	-0.83471
C	359.4695	94.3051	3.81177**
ECM (-1)	-0.161670	0.02471	-6.54276**
R <sup>2</sup>	0.827568		
Adj. R <sup>2</sup>	0.643640		

\*\* = Significant at 5% author's computation from e-Views 9.0

Table 9: Index of mean loans and GDP

Years	Index of mean total loan to agriculture	Index of mean agric. gross domestic product	Growth rate in mean agric. gross domestic product [%]
1981-1984	100	100	-
1985-1988	257.1429	124.0045	24.00
1989-1992	586.9048	147.9123	19.28
1993-1996	2606.3333	165.1823	11.68
1997-2000	3892.8571	192.8361	16.74
2001-2004	7582.1429	316.6849	64.22
2005-2008	10957.1429	445.5720	40.70
2009-2012	25523.8095	559.1085	25.48
2013-2016	51920.2381	653.7082	16.92
1981-2016	N96.6b	N7,140.6b	5.8

Field survey 2018

Table 10: Unit root tests: impact of loans on farm output

Variable L	ADF stat.	Critical V	Variable D	ADF stat.	Critical V	Decision
AGDP	-1.4657	-3.5443	• AGDP	-5.4007	-3.5485**	1(1)
TLA	0.6899	-3.5443	• TLA	-6.8435	-3.5485**	1(1)
NBKS	-2.6593	-3.5578	NBKS	-3.8301	-3.5485**	1(1)
MS	2.8042	-3.5443	• MS	-5.1294	-3.6032**	1(1)
INT	-4.7938	-3.5684**	• INT	-	-	1(0)
INF	-3.8430	-3.5485**	• INF	-	-	1(0)
EXR	-1.3860	-3.5443	• EXR	-3.9951	-3.5485**	1(1)
LR	-3.5870	-3.5443**	• LR	-	-	1(0)
CRR	-2.2629	-3.5443	• CRR	-6.1826	-3.5485**	1(1)

\*\*Denotes rejection of the null hypothesis at 5%; authors computation using e-Views 9.0

Table 11: Co-integration test: impact of loans on farm output

Critical value (%)	Lower bound	Upper bound
10	1.95	3.06
5	2.22	3.39
2.5	2.48	3.70
1	2.79	4.10

Computed F-statistic: 3.82 authors computation from e-Views 9.0

sector increased steadily from 100 in the base year period to 51920 in the period 2013-2016. Similarly, the index of mean agricultural output increased steadily from 100 in the base year period to 653.71 in the 2013-2016 period. Unfortunately, there was no steady growth in agricultural output over the periods. In fact the growth rate in mean agricultural output fluctuated between 11.68 and 64.74%.

**Unit root test result on impact of loans on farm output:**

This research made use of Augmented Dickey Fuller (ADF) to ascertain, if the data of the variables were stationary with respect to time. The result indicated in Table 3 showed that the absolute values of Mackinnon critical value at 5% were lower than the ADF statistical value in all stationary variables. The result of the ADF showed that at levels, presence of unit root can be rejected for Inflation rate (INF) Interest rate (INT) and Liquidity Ratio (LR) (Table 10). They were found to be integrated of the order 1(0). At first difference all the other series became stationary.

The ARDL Model was estimated with selection of optimum number of lags of variables using different selection criterion mentioned above. Table 11 showed that the value of F-statistic is 3.82. As the value of F-statistic exceeds the upper bound at the 5% significance level, it is concluded that there is evidence of a long-run relationship between the time-series at this level of significance.

**Long-run coefficients-impact of loans on farm output:**

Table 12 showed that the estimated coefficients of the long-run relationship are significant for Number of Banks (NBKS) and Exchange Rate (EXR). This indicates that only NBKS and EXR have a positive and significant impact on farm output at 5 and 1% level, respectively. In

Table 12: Long-run coefficients on the impact of loan on farm output

Variable	Coefficient	SE	T-statistic	Prob.
TLA	7.650442	9.233767	0.828529	0.4196
NBKS	2.020401	0.954798	2.116050	0.0504**
MS	0.032805	0.178844	0.183426	0.8568
INT	23.051850	66.653889	0.345844	0.7340
INF	-16.339771	16.373619	-0.997933	0.3332
EXR	53.700872	9.783804	5.488752	0.0000****
LR	-29.360162	23.605240	-1.243799	0.2315
CRR	-106.040059	65.408133	-1.621206	0.1245
C	5164.097074	1975.214255	2.614449	0.0188**

\*\*\*\*, \*\*, Denotes 1, 5, 10% level of significance, respectively authors computation from e-Views 9.0

Table 13: Error correction -impact of loans on farm output

Variable	Coefficient	SE	T-statistic	Prob.
D (TLA)	-0.637203	2.816691	-0.226224	0.8239
D (NBKS)	2.488671	1.147163	2.169413	0.0455**
D (MS)	0.014025	0.078359	0.178988	0.8602
D (INT)	9.739632	27.394857	0.355528	0.7268
D (INT(-1))	39.865086	25.633853	1.555173	0.1395
D (INF)	-6.985876	6.924393	-1.008879	0.3280
D (EXR)	-2.996777	5.363726	-0.558712	0.5841
D (EXR (-1))	-21.858765	6.809426	-3.210075	0.0055****
D (LR)	-12.552589	9.647653	-1.301103	0.2116
D (CRR)	-38.555356	18.375805	-2.098159	0.0521*
D (CRR (-1))	36.195462	16.740001	2.162214	0.0461
CointEq(-1)	-0.427538	0.128499	-3.327178	0.0043****

R<sup>2</sup>: 0.895190; Durbin-Watson; 2.612326; Adj. R<sup>2</sup>: 0.783829; F-statistic: 8.038649\*\*\*\*; authors computation from E-views 9.0 \*\*\*\*, \*\*, \* Denotes 1, 5, 10% level of significance, respectively

specific terms a 1% increase in NBKS and EXR will lead to increase in farm output by 2.02 and 53.7%, respectively. TLA, INF, LR and CRR were appropriately signed.

**Error correction on the impact of loans on farm output:**

Table 13 the ECM shows how much of the disequilibrium is being corrected that is the extent to which any disequilibrium in the previous period is being adjusted. A positive coefficient indicates a divergence while a negative coefficient indicates convergence. EC = 0, shows that there is no adjustment. As expected, the EC term, here represented as Coint Eq (-1) is negative and significant with an associated coefficient estimate of -0.427538 meaning that there is a short run relationship.

It also, confirms that all the variables are co-integrated. This implies that about 42.75% of any movements into disequilibrium are corrected for within

one period, given the t-statistic (-3.327178), it is concluded that the coefficient is highly significant. In the short run, NBKS is significant (5%) and positive, this shows that an increase in the number of banks giving out loans by 1% will increase output by 2.5%. The result also shows that in the short-run EXR lagged by one period is significant at 5%. This shows that currency depreciation by 1% will reduce farm output by 21.85%. LR (X8) is significant at 5%, indicating that a 1% increase in liquidity ratio of banks will reduce farm output by 38.56% in the current period. Result also, indicated that LR lagged by one period will increase farm output by 36.12%. Result also, showed that the model had a good fit (F-statistic = 8.038649) is significant at 1%. The adjusted ( $R^2$ ) indicates that cumulatively the variables explained about 78.4% of the total variation in farm output. The Durbin Watson (DW) is a test for autocorrelation indicates a value of 2.6 implying that there is no auto serial correlation among the variables.

### CONCLUSION

Beginning 1992, micro loans have been encouraged as a panacea to the credit problems of the vast majority of microenterprises in the Nigerian agricultural sector. From inception to date the number of microfinance banks have grown and their effect on agricultural output growth would have been expected to match that of the commercial lenders. Unfortunately, this study shows the commercial bank loan was consistently larger than that of the microfinance bank loans. The microfinance bank loan to agriculture was consistently below 5% of the total loans over the period of this study. More so, the commercial loans to agriculture increased output better. In fact, commercial loans had a positive and significant impact both in the long-run (136.1508) and short-run (11.4509) on agricultural output. The coefficient of the variable statistically significant at 1% level of significant, respectively, this implies that a unit increase in commercial loans will increase farm output by 136.2 and 11.5%, respectively both in the long run and short run. On the other hand, the micro loans relate negatively with output, an indication that micro loans do not encourage agricultural output growth over time. The number of commercial lenders relate positively with agricultural output both in the short and long run periods where as the number of micro finance banks had no significant effect on agricultural output both in the short but in long run periods. This implies in the long run, the number of microfinance banks serving the agricultural sector will have impact on agricultural sector output.

Loan to agriculture is important in enhancing agricultural output and lending variables like interest rate, liquidity ratio, exchange rate, cash reserve ratio, money supply share a non significant relationship with agricultural output growth. Although, the index of mean agricultural sector GDP and mean total loans increased steadily over time, the increase in index of total agricultural loan were far greater than the increase in the index of agricultural output. This indicates low turnover from loan funds invested in the sector. Besides, there was no steady growth in the index of agricultural sector GDP. The absence of sustained growth in the agricultural sector GDP is an indication of absence of development in the sector.

On the whole, this study shows that agricultural loans impact positively on agricultural sector output but the extent of that impact has not resulted in a steady and sustained growth that ensures the development of the sector enough to support economic development.

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