Agriculture Financing and Growth Performance in Nigeria: Pre-2000 and Post-2000 Analyses

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Abstract
This study examines the role of different types of finance in the development of the Nigerian agricultural sector and two-period (1986-2000 and 2001-2017) analyses are carried out to ascertain this effect. The study adopts the Auto-Regressive Distributed Lag (ARDL) analytical technique. Findings show that there exists a positive and significant relationship between Agricultural Credit Guarantee Scheme Fund (ACGSF) and agricultural output; and industrial output and agricultural output in the pre-2000 analysis. However, only industrial output positively impacted the agricultural sector in the post-2000 analysis while two major sources of finance (ACGSF and Rural Commercial Bank Credit) negatively impacted the agricultural sector during this period. The study recommends an urgent need for effective and well-implemented disbursement of the ACGSF and rural commercial bank credit to the agricultural sector. It is also necessary to strengthen the linkage between the industrial and agricultural sectors so as to sustainably increase the productivity of the agricultural sector.

Keywords: Agricultural Credit Guarantee Scheme Fund, Rural Commercial Bank Credit, Industrial Output, Agricultural Output, ARDL

JEL Classification: G0, N5, Q1

Introduction

The relationship between agriculture and development, especially in sub-Saharan Africa (SSA), cannot be overemphasized (Gowing and Palmer, 2007; Olukunle, 2013; Odetola & Etumnu, 2013; Adenle, Azadi & Manning, 2017; McArthur & McCord, 2017). Stewart (2000) also asserted that the agricultural sector can serve as the industrial and economic springboard upon which a country's development can take off. In the different sectors of developing countries, there is a wide variation in activities. However, in most African and Asian countries, a large share of employment is provided by the agricultural sector. The situation is worse in Africa. Although African economies have grown over the years, the production and employment structures are not so much different from what it was two decades ago (Page & Shimeles, 2015). More than 75% of the poor in the developing world live in rural areas, with most of them earning their livelihoods

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directly or indirectly from agriculture (Oboh & Adeleke, 2016); and this is done using traditional and obsolete means of farming. Asia has experienced many key changes in the structure of its economies and this has led to growth and poverty reduction (Page & Shimeles, 2015).A major argument is that diverse sources of finance have contributed to the advancement experienced in Asia (KPMG, 2013; Tortajada, 2016).It is thus true that agricultural transformation will foster economic development and, as rightly opined by Ume et al. (2017), the role of financing cannot be taken for granted in the reawakening of any sector.

Development has traditionally meant achieving sustained rates of growth of income per capita to enable a nation expand its output at a rate faster than the growth rate of its population. Economic development in the past has been typically seen in terms of the planned alteration of the structure of production and employment so that agriculture's share of both declines and that of the manufacturing and service industries increases. Development strategies have usually focused on rapid industrialization, often at the expense of agriculture and rural development. However, development has recently been seen as an economic phenomenon which guarantees gains and per capita Gross National Income (GNI) growth that will "trickle down" to the masses through job creation and other economic opportunities, and create a platform for the wider distribution of economic and social benefits of growth (Todaro, 2012).Therefore, while industrialization is being encouraged, an economy should focus more on that activity that will ensure "economic opportunities" for the citizenry.

Prior to the oil boom era in Nigeria (1930-1965), agriculture was the mainstay of the economy. It was employing about 80% of the labour force (Odetola & Etumnu, 2013) and about 60% of the Gross Domestic Product (GDP) was agricultural and foreign exchange earnings (Central Bank of Nigeria, 1980). The oil boom era in Nigeria (1966-1977), however, led to the neglect of the agricultural sector (NISER, 2015). Prices of oil started to drop in the post oil boom era (1977 to early 2000), but the nation still depended much on the oil sector during this period (Ugwu & Kanu, 2012). As a result of this overdependence on oil, dwindling oil prices, triggered by unrest in the Middle East and America's reduced oil importation after the discovery of Shale Oil, negatively affected the Nigerian economy (see Aigbedion & Iyayi, 2007; Ugwu & Kanu, 2012; Uzonwanne, 2015; Olowofeso et al., 2017). This has led the Nigerian government to consider diversifying the economy to generate revenue from non-oil activities. In their study, McArthur and McCord (2017) excluded Nigeria in their analysis on how agricultural input can foster economic development in SSA. This was done on the basis of Nigeria being an oil producing economy. However, over the years, dwindling oil prices has not made the economy perform up to expectation as an

oil producing nation. In order to successfully diversify the economy, it is necessary to actively participate in a wide range of sectors and engage in regional integration (Uzonwanne, 2015). Scholars have recommended that in diversifying the Nigerian economy, it is necessary to shift focus back onto the agricultural sector because of the greater prospects it possesses (Okuneye, 2002; Aigbedion & Iyayi, 2012; Olukunle, 2013; Olowofeso et al., 2017). Increased agricultural productivity will provide food, human resource, and even savings to fast-track the process of urbanization and industrialization (Oboh& Adeleke, 2016); and thusserve as an engine of growth for the overall economy (Awokuse, 2009; Dorosh & Thurlow, 2018).

Over the years, there have been different policies developed by the government to aid financing of the agricultural sector in Nigeria in order to boost productivity (Akinleye, Akanni & Sekumade, 2005; Ogbuaborand Nwosu, 2017). Some of these finance policies include: Agricultural Credit Guarantee Scheme Fund (ACSGF), Agricultural Credit Support Scheme (ACSS), Small and Medium Enterprises Equity Investment Scheme (SMEEIS), Large Scale Agricultural Credit Scheme (LASACS), Refinancing and Rediscounting Facility (RRF), Supervised Agricultural Loans Board (Akinleye et al, 2005; Eze, Lemchi, Ugochukwu, Eze, Awulonu & Okon, 2010).

Many studies have examined the effect of financing on agricultural productivity (Awotide et al., 2015; Nnamocha and Eke, 2015; Agunuwa, 2015; Ogbuabor and Nwosu, 2017). However, many of these previous studies neglected some important contributing factors in agricultural financing, such as the activities of rural banks and industrial output that uses agricultural raw materials in its production process. These two factors serve as viable finance methods for the agricultural sector and will be considered in the analysis of this study. Again, it is paramount at this juncture to have a comparative analysis of agricultural financing pre-2000 (era before the major oil fall) and post-2000 (era after the oil fall and diversification move). This research is important as it will bring to limelight to what extent financing impacted the agricultural sector before and after the oil price fall. Again, the outcome of this study will prove if the government and other finance stakeholders are taking proactive measures in financing the agricultural sector or if they are only paying lip-service towards revitalizing the sector.

1. Literature Review

Agriculture is seen as the cultivation of land, and raising animals for the purpose of production of food for man, feed for animals, and raw materials for industries. It also consists of crop production, forestry, livestock and fishing. Research on agriculture is crucial because it helps inform domestic and international policy decisions regarding how resources that are scarce are allocated to agricultural research and infrastructure (Awokuse, 2009).

According to Oboh and Adeleke (2016), agriculture plays a critical role in promoting inclusive growth by stimulating economic growth, reducing poverty, and creating employment for a large number of people particularly in developing countries. All these, if sustained, will lead to economic development. The main criterion for sustainable development is the growth in the production of safe food to meet the needs of a population, ensuring economic efficiency, which will stimulate expanded reproduction (Gryshovaet al., 2016). Bila (2011) affirmed that the concept of sustainable development of the agricultural sector as a whole is inextricably linked with the growth of such factors as food production, efficient use of economic and intellectual resources, improving the quality of life of the rural population, and sustainable use of natural resources.

As cited in Awokuse (2009), Johnston and Mellor (1961) noted that agriculture contributes to economic growth and development through five inter-sectoral linkages. The sectors are linked via: (i) supply of surplus *labour* to firms in the industrial sector; (ii) supply of *food* for domestic consumption; (iii) provision of *market* for industrial output; (iv) supply of domestic *savings* for industrial investment; and (v) supply of *foreign exchange* from agricultural export earnings to finance import of intermediate and capital goods. In addition to these direct, market-based linkages, Timmer (1995) emphasized the importance of indirect non-market linkages that improve the quality of the major production factors, i.e. labour and capital. The agricultural sector, if properly linked with the industrial sector, will spur the growth of the latter and vice versa.

Despite the potential embedded in the agricultural sector, there are some challenges facing the sector which, if not addressed, will continue to drag the sector backward. Increase in food prices, service charges and cuts in public expenditure, severe product price volatility, virtual neglect of the sector and erratic climatic conditions constitute a serious impediment to the adoption of improved agricultural technologies and financial investment in agricultural production (Enyim, et al., 2013; Awotideet al., 2015).Obsolete technology is also in vogue in the sector in many developing countries. In Benin Republic, for example, more than 60% of people work in the agricultural sector and are small farmers engaging

in un-mechanized agriculture primarily for household subsistence (Moumouni and Streiffeler, 2010). However, in developing countries, Nigeria inclusive, there is inadequate means to finance both agricultural and non-agricultural activities. Commercial banks are not willing to lend farmers funds for fear that they will default in paying back.

Credit is a crucial factor in agricultural production. In the formal setting of most developing countries, including Nigeria, commercial banks and other specialized agencies are charged with the responsibility of providing credit to farmers. Land Bank in South Africa and the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB) are typical examples of specialized bodies established for the purpose of advancing agricultural credit. (Salami and Arawomo, 2013). Agricultural Credit Guarantee Scheme Fund (ACGSF) is an important agricultural financing scheme by the Central Bank of Nigeria (CBN) set up to promote lending to the agricultural sector by providing guarantee to commercial banks (Olaitan, 2006; Eze et al., 2010; Adetiloye, 2012; Ammani, 2012; Anetor et al, 2016). Here, the bank complements the scheme with an operation of interest drawback programme in the payment of interest rebate of 40% to farmers that make timely repayment (CBN, 1985). The ACGSF is fraught with many challenges ranging from increased loan defaults to government and bank-related problems (Akinleye et al, 2003). Again, Olubanjo, Akinleye & Soremekun (2007) opined that many people are unaware of the scheme and, therefore, cannot access it. However, Ugoani et al. (2015) argued that Nigerian farmers face many constraints in accessing the credit, while Eseyin et al. (2016) noted that the credit available under the scheme is not sufficient to serve the poor farmers. The importance of credit to different sectors of the economy cannot be overemphasized. Credit enables farmers to purchase necessary agricultural inputs needed in growing and expanding agricultural output (Adeola & Ikpesu, 2016). Chimhow (2013) noted that there was agricultural productivity 'blast off' in Asia as a result of green revolution-type interventions propelled by investments.

The lending system in Nigeria hinges on the modern finance theory. The provision of relative information and incentive portfolio to the parties involved in a financial contract is the basis of this theory. The theory suggests that major concerns that hinder the financial institution from lending are: i) whether the borrower is riskier than he is believed to be; and ii) whether the borrower will acquire greater risks before the lending period lapses (Barry & Robinson, 2001). Again, information asymmetric affects the lending rates. In one way, it has been suggested that fast-growing firms who are well-informed tend to be more sensitive to credit conditions unlike the upcoming firms (Nilsen, 2002). In another perspective, borrowers may lack the needed information about borrower's goals

and risks (Barry & Robinson, 2001). As a result, the intentions, skills and previous experiences of borrowers serve as underlining factors in issuing loans by the lender.

Moreover, credit allocation in agriculture is premised on difficulties farmers encounter in establishing credit worthiness with the finance institutions (Calomiris & Himmelberg, 1994). This is because agricultural production requires capital financing requiring large amounts and long repayment periods. Proponents of this theory also opine that distribution of funds is motivated by political and self-interest, and not economic interest (Braverman & Guasch, 1986). A more disturbing challenge is that government credit programmes are not "rich" compared to that of private lenders; therefore, some "worthy borrower" may be denied access to government funds.

Another issue raised by the theorists on agricultural financing is that commercial banks and institutions that specialize in issuing farm credit are often not situated in rural areas where they are mostly needed. Thus, these institutions lack necessary information about their customers, i.e. rural farmers. Financial institutions tend to allocate credit more based on observable wealth and/or ability to provide collateral securities. It is therefore necessary to target formal credit to small farmers and reduce channelling credit to non-agricultural activities (Braverman & Guasch, 1986).The modern finance theory thus provides a better perspective in evaluating the financial performance of the agricultural sector as well as that of the financial body serving the agricultural sector (Barry & Robinson, 2001).

Mbutoret al. (2013) examined the impact of finance to Nigerian agricultural production. The vector error correction methodology was applied following the nature of data properties. The results showed a positive effect of finance on agricultural output. However, variance decomposition revealed the poor state of agricultural financing with a disproportionate dependence of the sector on weather conditions. Following the same research line, Eze et al. (2010) examined the impact of financing policies on agricultural development in Nigeria. They observed that agricultural financing policies are weak and finance schemes' executions are poor due to inadequate budgetary allocation and corruption. Thus, agricultural financing has been insignificant in impacting production in Nigeria. Again, Anetor et al. (2016) examined the impact of credit (ACGSF and bank loans) on agricultural productivity. Using Vector Autoregressive (VAR) approach, the study found out that ACGSF has poorly affected the performance of the agricultural sector while bank loans significantly and positively impacted the sector. From a different perspective, Adetiloye (2012) opined that provision of credit (ACSGF) to the agricultural sector has grown significantly between 1978 and 2006, but the growth is not relative to the growth of the economy. Contrary

to the conclusions drawn from the previous studies, Ammani (2012) found a positive relationship between the two variables. The study employed three regression models to estimate the impact of formal credit (ACGSF) supply on agricultural productivity in Nigeria. The Ordinary Least Squares (OLS) method was used. The findings from the study showed that formal credit positively and significantly improved agricultural production in the following specific areas: crop, livestock and fishing sub-sectors.

In establishing if agriculture matters for economic growth, especially in developing countries, Awokuse (2009) found that the oil producing developing nations in the sample (Nigeria, Indonesia and Venezuela) showed stronger evidence of causal flow from agriculture to Gross Domestic Product (GDP) growth and very little or no evidence of the reverse causal flow from GDP growth to agriculture. This is consistent with the finding made in Odetola and Etumnu (2013) in their study on the contribution of agriculture to economic growth in Nigeria. They found out that agriculture growth granger-caused GDP growth but GDP growth did not granger-cause agriculture growth. Growth in agriculture had resulted in economic growth; however, there was no evidence for reverse causal flow from GDP growth to agriculture, suggesting that even though resources from agriculture are utilized for economic growth, there is little or no effort to add value to the sector from the returns of economic growth. Along similar research lines, Hartaska, Nadolnyak and Shen (2015) examined the impact of agricultural financing on rural development. The study used two alternative panel sets to examine the causal relationship between credit supply and agricultural production of rural farmers. Findings from the study showed that there was a positive relationship between increase in agricultural lending and economic growth of the rural areas during the period under study. From a different perspective, Oboh and Adeleke (2016) carried out a study on accelerating agricultural growth that is inclusive in Nigeria. An assessment was carried out on the agricultural sector's potential in accelerating sustainable broad-based growth and key strategies for realizing inclusive agricultural growth in Nigeria were examined. Results indicated that agriculture's significant contribution to economic growth is a necessary (but not sufficient) condition for achieving inclusive growth.

On examining the importance of agricultural development to poverty reduction, Barichello (2004) observed that poverty reduction was experienced in some parts of Asia as a result of non-agricultural development and not due to agricultural development. This is because low average income was earned in rural areas where agriculture thrives, thus, income level was insufficient to bring people out of poverty. It is therefore true that it is not enough to engage in agricultural practices, but it is important to ensure that agricultural productivity improves the lives of the

farmers and the citizenry at large. The finding by Barichello (2004) is somewhat similar to that of Cervantes-Godoy and Dewbre (2010). Cervantes-Godoy and Dewbre (2010) adopted 25 countries and these included some of the poorest and some of the richest developing countries in the world. Findings from time-series, cross-section regression analysis revealed that although economic growth was an important contributor to poverty reduction, the sector mix of growth mattered substantially, with growth in agricultural incomes being especially important.

Toby and Peterside (2014) analysed the role of banks in financing the agriculture and manufacturing sectors in Nigeria between 1981 and 2010. Using descriptive statistics combined with multiple regression analysis, the study revealed that there exists a significantly weak correlation between commercial bank lending and the contribution of agriculture to GDP on the one hand, and a significantly positive correlation between merchant bank lending and agricultural contribution to GDP, on the other hand. Nnamocha and Eke (2015) also carried out a research on bank credit and agricultural output in Nigeria between 1970 and 2013. Following the empirical findings in their study, in the long-run, bank credit and industrial output contributed a lot to agricultural output in Nigeria, while only industrial output influenced agricultural output in the short-run. Following the same research line, Agunuwa et al.(2015) researched on the impact of credit from commercial banks on agricultural productivity in Nigeria between 1980 and 2013. The results of their research showed a positive relationship between commercial banks' credits and agricultural productivity. However, Olowofeso et al. (2017) observed an insignificant relationship between agriculture financing and output in the short run, different equilibrium relationships existed in the long run.

According to a study carried out by Narayanan (2015), parallel to transformation in the structure of agricultural credit (increasing trend of credit flow) is the equally rapid transformation of the agricultural sector in India. Recently, there has been an increase in the share of livestock relative to crops, with extraordinary growth in poultry and dairy sectors.

In sum, most of these studies have examined the relationship between agricultural output and economic growth. They also examined the relationship between one or two sources of finance on agricultural performance, but they failed to examine the role industrial output plays in impacting agricultural output. Also, none of these studies has done a comparative analysis of the periods before and after the oil price fall, to examine what role financing has played in the agricultural sector. This study thus seeks to fill this identified gap.

2. Methodology

2.1 Data Source and Model Specification

The study uses annual time series data for the periods 1986-2000 and 2001-2017. These periods cover the post Structural Adjustment Programme (SAP), and represent respectively periods before and after dwindling oil prices and diversification drive in Nigeria. All the data are sourced from the National Bureau of Statistics (2018). Variables include Agricultural Gross Domestic Product as the dependent variable and the independent variables as Agricultural Credit Guarantee Scheme Fund (ACGSF), some components of industrial output that use agricultural raw materials in their production process (food, beverage and tobacco, textile, apparel and footwear, wood and wood products, pulp, paper and paper products, plastic and rubber products) and rural commercial bank credit. (This is preferred above the commercial bank credit because agricultural activities in Nigeria are mostly carried out in rural areas and farmers in rural areas are beneficiaries of rural commercial bank credit {Bryceson, 2002; Nchuchuwe & Adejuwon, 2012; Awotide, Karimov & Diagne, 2016}.)

The data series have been transformed into log-forms because log-linear specification is superior and empirical findings from such series are consistent (Shahbaz, 2010). This will also reduce the problem of heteroscedasticity (Ozturk & Acaravci, 2010). We thus have the following model specification:

$$lAGDP = \beta_0 + \beta_1 lACGSF + \beta_2 lIO + \beta_3 lRCBC + \mu \text{----------1}$$

Where β_0= Constant

$\beta_i, where i = 1, 2, 3$ are coefficients

$lACGSF$= natural log of ACGSF

lIO= natural log of industrial output

$lRCBC$= natural log of rural commercial bank credit

μ= error term

2.2 Estimation Technique

This study adopts the Auto-Regressive Distributive Lag (ARDL) approach by Pesaran, Shin and Smith (2001). This approach has been adopted based on its flexibility to handle data. It is robust for finite and small sample sizes (as applicable to this study) and allows conclusions to be drawn about the variables in the study. We thus have the following ARDL equation:

$$\Delta lAGDP_t = \beta_0 + \sum_{i=1}^{k} \beta_1 \Delta lAGDP_{t-1} + \sum_{j=1}^{k} \beta_2 \Delta lAGCSF_{t-1} + \sum_{j=1}^{k} \beta_3 \Delta lIO_{t-1} + \sum_{j=1}^{k} \beta_4 \Delta lRCBC_{t-1} + \delta_1 lAGDP_{t-1} + \delta_2 lAGCSF_{t-1} + \delta_3 lIO_{t-1} + \delta_4 lRCBC_{t-1} + \mu_t \quad \text{----------2}$$

Wherek, Δ and μ_t are the lag order, first difference operator and white noise respectively. The Akaike Information Criterion (AIC) is the basis for lag selection. The bounds testing procedure is based on both F-statistics or Wald Statistics that tests the null hypothesis of no cointegration; that is, H_0: δ_1=δ_2=δ_3=δ_4= 0 against the alternative hypothesis H_1: $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$.If the calculated F-statistics thus lies above the upper level of the band, the null hypothesis is rejected, which indicates cointegration. However, if the calculated F-statistics is below the upper critical value, we cannot reject the null hypothesis of no cointegration (Pesaran et al., 2001) among $lAGDP, lAGCSF$, lIO and$lAGDP$.

3. Data Analysis and Result Discussions

3.1 Descriptive Statistics

This section presents the descriptive statistics of the variables used in this study.

Table 1.1A. Descriptive Analysis (Pre-2000)

	AGDP (N'billion)	ACGSF (N'million)	IO (N'billion)	RCBC (N'billion)
Mean	3,808.61	155.16	1,215.48	5,671.89
Median	3,743.67	118.61	1,211.84	4,730.80
Maximum	4,840.97	361.45	1,404.26	11,852.70
Minimum	2,891.67	68.42	990.25	373.60
Std. Dev.	599.5365	84.5836	103.3827	4269.708
Skewness	0.181332	1.027863	-0.510294	0.187278
Kurtosis	2.039717	3.183362	3.382962	1.553037
Jarque-Bera	0.658543	2.662267	0.742663	1.396247
Probability	0.719448	0.264178	0.689815	0.497518
Sum	57129.19	2327.45	18232.13	85078.4
Sum Sq. Dev.	5032216	100161.4	149631.7	2.55E+08
Observations	15	15	15	15

Source: Authors' Computation

Table 1.2B. Descriptive Analysis (Post-2000)

	AGDP (N'billion)	ACGSF (N'million)	IO (N'billion)	RCBC (N'billion)
Mean	12,085.09	6,527.65	3,002.81	178,143.30
Median	12,330.33	7,840.50	2,634.72	24,274.60
Maximum	17,179.50	12,456.25	4,966.03	988,587.90
Minimum	5024.54	728.55	1304.72	8942.2
Std. Dev.	3453.34	3711.486	1309.995	315260.2
Skewness	-0.292359	-0.279501	0.287983	1.734209
Kurtosis	2.186848	1.839942	1.545127	4.306968
Jarque-Bera	0.710538	1.174571	1.734277	9.731147
Probability	0.700985	0.555834	0.420152	7.71E-03
Sum	205446.6	110970.1	51047.68	3028436
Sum Sq. Dev.	191000000	220000000	27457375	1.59E+12
Observations	17	17	17	17

Source: Authors' Computation

The average contribution of agricultural output to GDP between 1986 and 2000 was N3, 808.61 billion while that of years after 2000 was N12, 085.09 billion. The sources of funds also follow a similar trend with rural commercial bank averaging N5, 671.89 billion in the pre-2000 period and averaging N178, 143.30 billion in the post-2000 period. As the modern finance theory rightly posits, credit from commercial banks is much higher compared to that of the ACGSF for the two periods. The sum of ACGSF for the two periods are N2, 327.45 million and N110, 970.10 million respectively. However, rural commercial bank credit summed N85, 078.40 billion and N3, 028, 436 billion in the two periods respectively. A total of 15 observations exist in the first period and 17 observations in the second period. The AGDP and ACGSF have a long-left tail, i.e., negatively skewed while IO and RCBC have a long right-tail, i.e., positively skewed. The Jacque-Bera tests also show a normal distribution across the two periods.

3.2 Unit Root Test

The unit root test is necessary to test for the stationarity of the variables. The Augmented Dickey-Fuller (ADF), which is the conventional test, has been complemented with the Phillip-Perron (PP) test for more accuracy (see Appendix 1). Both tests reveal that mixed stationary levels (I(0) and I(1)) exist for both periods. This shows that the ARDL is thus the appropriate technique for this analysis based on the mixed stationary levels.

3.3 ARDL Regression Analysis

Table 2. ARDL Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Pre-2000 Period				
lAGDP(-1)	0.783881	0.102949	7.614239	0
lACGSF	0.069562	0.028416	2.447956	0.0369
lIO	0.282712	0.135313	2.089325	0.0663
lRCBC	0.004078	0.010371	0.393262	0.7033
C	-0.461065	0.439108	-1.050005	0.3211
R-squared	0.98289	Mean dependent var		3.582899
Adjusted R-squared	0.975286	S.D. dependent var		0.065182
S.E. of regression	0.010247	Akaike info criterion		-6.051203
Sum squared resid	0.000945	Schwarz criterion		-5.822968
Log likelihood	47.35842	Hannan-Quinn criter.		-6.07233
F-statistic	129.2531	Durbin-Watson stat		2.292382
Prob (F-statistic)	0			
Post-2000 Period				
lAGDP(-1)	0.349267	0.080485	4.339519	0.0012
lACGSF	-0.018586	0.020686	-0.898458	0.3882
lGIO	0.404508	0.063095	6.411115	0.0001
lRCBC	-0.01488	0.009368	-1.588459	0.1405
C	3.420171	0.370827	9.223093	0
R-squared	0.987521	Mean dependent var		7.08519
Adjusted R-squared	0.982983	S.D. dependent var		0.109926
S.E. of regression	0.01434	Akaike info criterion		-5.401257
Sum squared resid	0.002262	Schwarz criterion		-5.159823
Log likelihood	48.21005	Hannan-Quinn criter.		-5.388893
F-statistic	217.6185	Durbin-Watson stat		1.416237
Prob(F-statistic)	0			

Source: Computed from E-views 10

The ARDL result shows that the relationship between log of agricultural output, log of Agricultural Credit Guarantee Scheme Fund (ACGSF), log of industrial output is positively and significantly related in the first period. The previous values

of agricultural output for periods before 2000 are important determinants of the current agricultural output in Nigeria. However, in the second period, the different sources of finance (ACGSF and Rural Commercial Bank Credit) negatively impacted agricultural output at 5% and 1% level of significance respectively. Although the rural commercial bank credit positively impacted the agricultural output in the first period, this impact is not significant. Only industrial output positively and significantly impacted agricultural output in the second period. lACGSF and log of rural commercial bank credit negatively impacted the agricultural output (though insignificantly). This is in line with the outcome from Toby and Peterside (2014), and Adeola and Ikpesu (2016). Nnamocha and Eke (2012), however, observed a positive relationship between industrial output and agricultural output in the short run, while Agunuwa et al. (2015) observed a positive relationship in the long run. Our findings also contradict findings by Hartaska et al. (2015). Their study was carried out in rural places in USA and policy implementation in advanced countries is quite different from developing countries. This study focuses on the following industrial sub-sectors: food, beverage and tobacco, textile, apparel and footwear, wood and wood products, pulp, paper and paper products, plastic and rubber products. The positive relationship between industrial output and agricultural growth possibly stems from the fact that the raw materials of the agricultural sector are used up in the identified industrial sub-sectors.

The R-squared for the periods (98%) show that the model is of good fit. Again, major sources of finance to the agricultural sector have been considered in this study, thus the high R-squared. The remaining 0.2% account for the exogenous variables not examined. The Durbin-Watson test also shows that the study does not suffer from serial correlation.

3.3.1 Long Run Form and Bounds Test

Appendix 2 shows that the variables (lAGDP, lACGSF, lIO and lRCBC) are co-integrated for long run relationship. This is because the F-stat is greater than the critical value at the upper bound in the two periods under study. Therefore, we cannot reject the null hypothesis of no long-run co-integration at 10%, 2.5% and 1% level of significance. This implies that in the long run, all the sources of finance are critical to the development of the agricultural sector.

3.3.2 Error Correction Model

Following the long run test, it is necessary to carry out the error correction form of the model. This result is seen in appendix 3. The ECM shows that the error correction term (ECT) is negative (-0.216) for pre-2000 period and -0.6507 for the post-2000 period. These negative coefficients further validate the long run

relationship among the variables. Disequilibrium in the first period converges to equilibrium by 22% speed of adjustment. However, in the second period, disequilibrium experienced converges to equilibrium in the long run by 65% level of adjustment. This implies that disequilibrium experienced in the second period will take a longer time to converge back to equilibrium.

3.4 Diagnostic Tests

To estimate the goodness of fit of the ARDL model, serial correlation, heteroscedasticity, normality and stability tests are conducted using the Breusch-Godfrey Serial correlation LM test (LM), Breusch-Pagan-Godfrey heteroscedasticity test (HET), Jacque-bera test (JB) and CUSUM test respectively (see appendix 4).

These tests show that the model used in this study is not mis-specified and that the model is of good fit. Results show that the null hypothesis cannot be rejected at 5% level of significance for serial correlation, heteroscedasticity and Jacque-Bera tests. This implies that no serial correlation exists, no heteroscedasticity exists and residuals are normally distributed.

The CUSUMtests also show the stability of the model. The cusum lines fall within the acceptance region at 5% level of significance, which confirms the stability of the estimated parameters for the two periods.

Conclusions and Policy Implications

This study empirically examines the relationship between the agricultural output in Nigeria and different sources of finance. The agricultural sector plays an important role in the development of economies and the importance of finance to the growth of the sector cannot be overestimated. Although findings reveal that the different sources of finance examined have grown remarkably in the two periods under study, the impact of finance on agriculture in the second period is not significant. Infact, findings show that all the sources of finance positively impacted agriculture in the first period but two key sources of finance (Agricultural Credit Guarantee Scheme Fund and rural commercial bank credit) negatively impacted agriculture in the second period. This study has also shown that the negative impact of ACGSF accounted for in previous studies have resulted significantly from periods under the falling oil price, and not before the fall in price. Inadequacies and diversion of funds may have contributed to this negative relationship. Moreover, the issue of "godfatherism" and favouritism are common in the Nigerian public sector. These practices will hinderthe purpose of disbursed funds from being achieved as there is every likelihood that beneficiaries will only expend such funds on personal consumption or other causes in the economy.

Furthermore, across the two periods, it was evident that the industrial output positively impacted agricultural performance. This shows that there is a form of linkage between these two sectors. If this linkage is sustained, there is a possibility for balanced and increased development in the Nigerian economy as these two sectors form part of the largest sectors of the economy.

It is also evident that the Nigerian government still needs to take proactive measures regarding the diversification of the economy. The agricultural sector cannot rely on credit from commercial banks only. The government should endeavour to focus on significant funding of the sector. In the past, the ACGSF was highly impactful in ensuring agricultural productivity was significant and this impacted the agricultural sector positively. If the agricultural sector must perform optimally, government funding such as ACGSF should be strategically implemented such that only farmers who have need for this fund and will not divert it will have access to it.

Moreover, stringent conditions for accessing loans from the government and commercial banks should be addressed so that the effect of financing can be felt on the sector. Easy access to finance will enable the agricultural sector perform optimally through investment in appropriate and adequate technology. This will increase productivity in the sector and in the long run, development will be achieved.

Although it is encouraging to note that agricultural funds have increased over the years, the use of such funds needs to be monitored effectively to avoid diversion. It may be necessary to have an updated database of farmers for constant follow-up on the use of incentives received. Whenloansare given, necessary follow-up should be done to ensure that such loans are not diverted to other purposes. If this is judiciously practised, the agricultural sector will perform more productively.

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Appendix 1

Unit Root Tests for Both Periods

Variable	ADF T-Stat	ADF Critical value @5%	Order of integration	PP T-Stat	PP Critical value @5%	Order of integration
Pre-2000 Period						
lAGDP	-3.9004	-3.9334	I(0)	-5.9572	-3.1199	I(1)
lACGSF	-2.1607	-1.9710	I(1)	-2.2334	.1.9710	I(1)
lIO	-6.5105	-3.1754	I(0)	-2.0877	-1.9710	I(1)
lRCBC	-4.0610	-3.9334	I(0)	-3.7458	-3.7912	I(0)
Post-2000 Period						
lAGDP	-3.7524	-3.1190	I(0)	-4.1598	-3.0656	I(0)
lACGSF	-4.7476	-3.1199	I(0)	-4.5423	-3.0656	I(0)
lIO	-4.0751	-3.1445	I(1)	-3.7257	-3.0810	I(1)
lRCBC	-4.1487	-3.0989	I(1)	-5.5388	-3.0810	I(1)

Source: Authors' Computation

Appendix 2

Long Run Form and Bounds Test

Pre-2000 Period				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.461065	0.439108	-1.050005	0.3211
lAGDP(-1)*	-0.216119	0.102949	-2.099272	0.0652
lACGSF**	0.069562	0.028416	2.447956	0.0369
lIO**	0.282712	0.135313	2.089325	0.0663
lRCBC**	0.004078	0.010371	0.393262	0.7033
		Significance	**I(0)**	**I(1)**
F-statistic	7.392121	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.50%	3.15	4.08
		1%	3.65	4.66
Post-2000 Period				
C	3.420171	0.370827	9.223093	0
lAGDP(-1)*	-0.650733	0.080485	-8.085122	0
lACGSF**	-0.018586	0.020686	-0.898458	0.3882
lIO**	0.404508	0.063095	6.411115	0.0001
lRCBC**	-0.01488	0.009368	-1.588459	0.1405
		Significance	**I(0)**	**I(1)**

F-statistic	41.85094	10%	2.37	3.2
K		5%	2.79	3.67
		2.50%	3.15	4.08
		1%	3.65	4.66

Source: Authors' Computation

Appendix 3

Error Correction Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Pre-2000				
CointEq(-1)*	-0.216119	0.029578	-7.306678	0
Period post 2000				
CointEq(-1)*	-0.650733	0.038523	-16.89223	0

Source: Authors' Computation

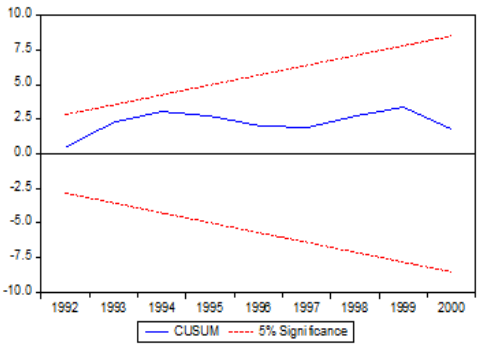
Appendix 4

Diagnostic Test

Period	LM	HET	JB
Pre-2000	1.7242	2.8879	0.0809
	(0.2461)	(0.0859)	(0.9604)
Post-2000	0.2251	0.9052	0.7419
	(0.8028)	(0.4939)	(0.6901)

Source: Authors' Computation

Cusum test (Pre-2000 Analysis)



Cusum test (Post-2000 Analysis)