

Agricultural Financing for the Diversification of the Nigerian Economy: The Needful

Adofu Ilemona

Department of Economics, Federal University Lafia, Nigeria

Email – ilemonaadofu@yahoo.com

Abstract

The study “agricultural financing for the diversification of the Nigerian economy: the needful” shows by a way of robust statistical analysis, the influence of finance in increasing agricultural output in Nigeria. Using data from 1981 to 2015, cointegrating regression (fully modified OLS) was applied to the time series data. The unit root test show that annual rainfall data is stationary at level ($I(0)$) while data for agricultural credit guaranteed scheme fund, commercial banks’ loan to agricultural sector and agricultural output are $I(1)$). We found that commercial banks loan to agricultural sector and annual rainfall are positively and significantly related to agricultural productivity in Nigeria for the period concerned in this study. Agricultural Scheme Fund is negative but significant in its relation with agricultural output. This might not be unconnected with political ills that impede policy measures in implementing funds allocated for use of the sector which might drive away real targets of such funds. The study therefore recommends that political ills that negatively affect policies should be done away with for policies to have it desired effect.

INTRODUCTION

Agriculture is the oldest industry to mankind, and it is the source of our food and raw materials for many industries. In fact, it can be justifiably referred to as the world’s primary industry. However, progress in agriculture had been slow until the industrial revolution in Europe and United State of America. While countries like the USA and Britain have dispensed with primary and laborious methods of farming by developing and adopting mechanized and more productive technological methods, many parts of the world especially Africa are still groping in the pre-industrial revolution era. This is because the means to achieving this revolution is available. The conveyor is money or funds. As Lot, (1998) noted, technology cannot reach the entrepreneur unless funds are available for him to acquire it.

Government policies in Nigeria since independence have been directed towards accelerating economic development with the ultimate aim of transforming the economy into an industrialized one as well as increasing the standard of living of the populace and also rescuing the nation from its over dependence on oil. Agriculture has been identified as one of the sectors expected to act as catalyst for the realization of the government goal of diversification, industrialization and raising the standard of living of the people.

The traditional role of agriculture in economic development provides the premise for this position. The role includes; product, market, factor, and foreign exchange contributions (Johnson and Mellor, 1961).

Despite the enviable position of the oil sector in the Nigerian economy over the past three decades according to Obiechina, 2007, the agricultural sector has remained the largest and arguably the most important sector of the economy. The contribution of agriculture to the Gross Domestic Product (GDP) has remained stable at between 30 and 42 percent, and employs 65 percent of the labour in Nigeria (Aigbokhan, 2001). It is estimated to be the largest contributor to non-oil foreign exchange earnings in Nigeria. It remains the most readily available and viable option for the diversification of the Nigeria economy.

As Anyanwu, Oyefusi, Oaihkeam, Dimono, (1997) posited, more than 80 percent of the rural population of Nigeria is engaged in one type of agricultural activity or the other, it therefore translate to the fact that, most of the employment generated by the agricultural activities are in the rural areas. Apart from those engaged in subsistence farming, the bulk of the agricultural export crop producers are small holder farmers. This goes a long way to confirm the result of past studies which show that large percentage of the rural farmers is among the poor (FOS, 1999). The level of poverty in the rural areas is high and has continued to be determined, largely by the fortunes of agriculture. The poverty situation has affected the standard of living of the rural dwellers, who are mostly farmers and hence their saving habit. Without savings, there cannot be investment in improved method of farming.

Government has embarked on various policies and programmes aimed at strengthening the sector in order to continue performing its roles. One of such polices is government intervention in agricultural financing by establishing financial institutions like the Nigerian Agricultural and Co-operative bank (NACB) which became the Nigerian Agricultural Co-operative and Rural Development Bank (NACRDB) and later Bank of Agriculture (BOA).This have generated different scholarly reactions as to the efficacy of government policies and programme in improving the agricultural sector. While Olaitan (2006) maintained that agricultural output, especially, the food crop production has responded positively to the policy reforms,

others like Obiechina, (2007) suggested that there has been a general failure of the sector to respond appropriately to the policies like agricultural financing.

The aim of agricultural financing is to prop up farmers to make substantial investment in agriculture and stimulate increased productivity. Since traditional agriculture cannot sustain any capital formation, the capital required for investment in agriculture must necessarily be injected from outside. Thus, an agricultural credit scheme is considered an important component of the Nigerian agricultural development programme, if productivity must increase. It is also asserted that, the increasing recognition of the need for agricultural financing stems from the desirability to enhance the position of on-farm capitalization in Nigeria agriculture and the fact that the farmers own saving are normally inadequate to finance the various farming activities. Thus, capital injection into the agricultural sector is imperative in view of the unfavourable terms of trade facing agriculture, declining productivity, low level of adoption of improved technologies and the fact that many investors are in favour of low cost quick returns and less risky business ventures compared to agriculture (Oni and Olomola, 1989).

Nigeria is endowed with huge expanse of fertile agricultural land, as well as a large active population that can sustain a highly productive, and profitable agricultural sector. This enormous resource base if well managed could support a vibrant agricultural sector capable of ensuring self-sufficiency in food crop production and raw materials for the industrial sector as well as, providing gainful employment for the teeming population and generating foreign exchange through export. The Nigeria agricultural sector is our readily available alternative to oil. The issue of agricultural finance could easily be said to be the most critical of the constraints in achieving this position, as it is vital to the development and procurement of appropriate technology, design and construction of necessary infrastructure, development and maintenance of adequate marketing system, as well as modernization of the land tenure system. Agricultural financing in its broadest sense, involves pre-project planning and feasibility evaluation, taking investment decisions, actual investment and funding of projects, profitable management of project and post project evaluation. This broad concept of agricultural financing ensures that funds channeled to

agriculture are profitably used for its development, with a concomitant spillover and multiplier effect to the other sectors of the economy.

Considering the importance of the agricultural sector exposed by various past studies, and considering the Nigeria quest for diversification occasioned by the frequent fluctuations in the international oil market, this research attempt to show the effect of finance in accelerating agricultural productivity in Nigeria.

LITERATURE

Definition of Concepts

The Concept of Agricultural Finance

Horne (1977) defines finance by looking at what finance managers do. He argues that finance managers take three main decisions which are: financing, investment and dividend decisions. He went further to define financing decision as that aspect of the finance manager's work that has to do with raising funds needed, what instruments to use and what price to pay for fund. We can then, define finance as a body of principles and theories that deals with raising and employing funds for individuals and organization in private and public sectors of the economy.

According to Igben and Eyo, (2002), agricultural finance is an aspect of agriculture where the principles and tools of finance are used in solving management problems in agriculture. They further defined agricultural finance as an area of study, which exposes the tools and principles, which guide the acquisition and the use of financial resources in the agricultural sector and the protection of owners' equity capital from risk and uncertainties of the sector.

Adegeye and Ditto, (1985), define agricultural finance as the economic study of the acquisition and use of capital in agriculture. It deals with the demand and supply of funds in the agricultural sector. Agricultural finance need not imply the credit (process of obtaining control over the use of money, goods and services in the present in exchange for a promise to repay at the future date) obtained, even though it almost always does. It can refer to financing of agriculture at the national level or at the farm level. At the

national and state level, agricultural finance is concerned with agriculture's contribution to, and share of, the national or state resources as well as the role banks and other financial institutions play in the financing of agriculture as a sector of the economy. At the farm level, agricultural finance refers to the financial management of the farm. The terms agricultural finance and agricultural credit are commonly used interchangeably. This is because the study of the acquisition and use of capital naturally leads to the process of obtaining and using credit. The present study intend to align itself with the position of Adegeye and Ditto, (1985), that agricultural finance is the economic study of the acquisition and use of capital in agriculture, and also with the extension they gave their viewpoint that, the term agricultural finance and agricultural credit are commonly used interchangeably.

Conceptual Framework for Agricultural Financing.

Directed credit Programmes (DCPs) have always been used as a convenient policy tool to direct the flow of financial resources to a specific sector of the population for a specific purpose. In most cases, the targeted sectors are those perceived by the policy makers to be in need of financial resources to conduct a specific activity considered essential for development (e.g, production loan, Agricultural loan and working capital loan). Direct credit programmes are thus used as a policy tool. They are deemed essential in alleviating the plight of the perceived disadvantaged sector of the economy like agriculture in the in the developing economy (Raheem, 1996).

For the purpose of this study, DCPs are defined as credit programmes directed towards the agricultural sector, with funding coming from sources external to the implementing Organization which in this case is the NACRDB. In most cases, DCPs funds are budgetary allocation, grants or loan proceeds from bilateral or unilateral donor organizations. Direct credit programme use subsidized interest rate and hence the adoption of Mckinnon, (1973) and Shaw, (1973), propositions that the structure of the system in most developing countries is characterized by market distortion and financial repression and for the poor to have access to credit, DCPs has to be adopted as a policy. The provision of fund by the government to the BOA for onward distribution to farmers as subsidized credit is in the sense of directed credit.

Theoretical Literature

Subsidized credit provision is based on Shaw, (1973), and McKinnon (1973), propositions that the structure of financial system in most developing countries is characterized by market distortions and financial repression which is the main reason why poor and small borrowers do not have access to financial services. In Nigeria, like in most developing countries, the small scale farmers constitute the core of the agricultural sector, and produce the bulk of the food and fiber used in the country. As observed by Williams and Ogunniyi, (2007), the critical factors that affect productivity at the farm level include, but are not limited to the factors of production such as land and capital, agricultural research, technology, infrastructures and access to support services such as extension service and credit.

The government most often may think it's necessary to intervene in the operation of the financial system with the intention of correcting the short comings of the price fixing mechanism to ensure that what is commercially rational for an individual bank is approximately rational for all. Socially, interest rate charged by banks could be regulated to encourage savings mobilization, ensure and foster adequate investment for rapid growth and development, bearing in mind the view of Goldsmith (1969), that, the financial superstructure of an economy accelerates economic performance to the extent that it facilitates the migration of funds to the best user i.e., to the place in the economic system where the funds yield the highest social return. The opinion of Greenwood and Jovanorie (1990) clearly approximate the view of Goldsmith (1969). They stated that financial intermediation promotes growth because it allows a higher rate of return to be earned on capital and growth, in turn, provides means to implement costly financial structure.

According to Akiri and Adofu, (2007), the existence of externalities and imperfection in the financial markets of most developing economies has often called for intervention by the government through its appropriate agent to encourage investment and to re-channel credit to those economic units with social rate of returns but low commercial rate of returns like agriculture.

Adofu, Abula and Audu, (2010) opined that, agricultural credit enhances productivity and promotes standard of living by breaking vicious cycle of poverty. In the words of Adegaye and Ditto (1985), agricultural credit is the process of obtaining control over the use of money, goods and services in the present in exchange for a promise to repay at a future date. The crucial state of interest rate and credit in agricultural production and development can also be appraised from the perspective of the quantity of problems emanating from the lack of it. In modern farming business in Nigeria, provision of agricultural credit is not enough but efficient use of such credit has become an important factor in order to increase productivity.

It is important to state that one of the important support services for increased agricultural productivity is credit. This is because, a credit enables the producer to procure inputs, hire labour and process equipment, etc. Credit is also important because equity capital is seldom sufficient to meet the expenditure on production. This need for credit is more acute in the rural areas because access to local financial resources is restricted by the low productivity and widespread poverty of rural people which has led to the dualistic structure of developing countries – a large traditional agricultural sector with low productivity and a small modern sector of industrial and other highly productive export related activities. Because rural people are thought to be too poor to save or receive credit, efforts to mobilize savings and provision of credit have, for far too long, been concentrated in the modern sector (Adegaye and Ditto, 1985).

The usefulness of credit to the various area of agriculture cannot be over-emphasized, but the supply of agricultural credit has been inadequate. As Olayide (1979), opined, inadequate credit hamper small holder farmer's adoption of mechanical, biological and chemical innovation necessary for structural transformation and expansion of rural agricultural productions. In the view of Chidebelu (1983), one of the major constraints to increase agricultural production is lack of credit. Lack of credit does not only affect increased production but also adoption of mechanical innovations.

Nwosu and Ogunfowora (1977) described the economy of the peasant farmers as a vicious web of low productivity. For the cycle to be broken, the farmers must be helped to realize their productive potentials

through the provision of required productive resources, especially capital, when lacking, has been identified as one of the factors militating against rapid agricultural modernization in Nigeria. In the opinion of Chidebelu (1983), the inadequate and often times dearth of credit for financing agriculture in Nigeria has been a major impediment to the country's agricultural development over the years. This major impediment has resulted in the economy of the peasant farmers being described as a vicious cycle.

As Ortese and Yaopera (2004), noted, agriculture and food production seem to be important elements in national economy and human existence. It is on the basis of this that the then President Obasanjo said on a television interview on 30th June, 1999 that agriculture was the first priority of his administration. Over the years the planning, formulation and implementation of agricultural programmes and policies have not yielded expected positive results. According to Akin-Aina (1993), the Central Bank of Nigeria's Annual Reports for 1990 showed that agricultural export which totaled 33.9% of all export earning in 1970 had fallen to 1.9% in 1981. At the present, of the country's 71 million cultivatable hectares, only 34 million hectares have been cultivated. Consequently this has resulted to inadequate supply of food items to the teeming population of over 140 million people. This is a pointer to serious food insecurity in the country.

According to Akin-Aina (1993), the issue of government under-funding of agriculture in Nigeria has been the bane of food production in the country. For instance, for the 1993 fiscal year, the recurrent expenditure estimate for agriculture was put at ₦93.5 million as against ₦27.6 million for 1992, an increase of 239 percent. While the allocation for the agricultural sector in 1992 was 4.83% of total expenditure, it dropped drastically in 1993 to 1.23 percent. In another direction, the 1994 Central Zone of Nigeria Report on National Agricultural Research Strategic Plan, highlighted poor funding of Agricultural Research Centers as the main problem facing the linkage of new technologies with the requirements of the self-sufficiency and self reliance policies. It is against the backdrop of inadequate fund, (₦305.5 million) allocated to NALDA in the 1993 budget to clear 1,500 hectares of land in 30 states that Akin-Aina (1993) observed that, going by the current rate of inflation "if the whole amount (₦305.5 million) is

used for land clearing at the rate of ₦2, 000 per hectare, six to ten years will be required to implement government policy”.

Lack of credit facilities has been identified as an important constraint to food production and modernizing agriculture, especially, among the poverty-stricken small-scale farmers who need cash credit to purchase farm inputs such as organic fertilizers, herbicides and insecticides, farm equipment and to hire labour, Odoemenem (1998). To worsen matters, Akin-Aina (1993) laments that farmers cannot afford to take loans from commercial banks because of high interest rates which sometimes go as high as 30%. Even before then, such banks require collateral from farmers who cannot afford it.

Commenting on the issue of collateral, Miller (1975) opined that the problem here has been that of farmer's inability to provide collateral rather than availability of the loan itself. Banks often require additional security for the loan beyond the borrower's integrity. This becomes a problem to Nigerian small holder farmers because farmland is generally held in communal ownership.

The pauperization of Nigerian farmers is as a result of government policies. For instance, the General Babangida's economic policies of Structural Adjustment with attendant deregulation programme adversely affected farmers. This precipitated hyper-inflation and the prices of support equipment for agriculture increased over ten fold (Akin-Aina 1993). European Economic Community report of 1990 rightly quoted that while it costs two tones of cocoa to buy a tractor in 1976, it would require over 20 tones of cocoa in 1990 to buy the same tractor. While prices of farming equipment have continued to rise, those of export commodities have continually declined. Herbicides, for instance, which sold for ₦250 per liter in 1978, cost about ₦8, 000 per gallon of 5 liters in 1990. It is against this back drop that Akin – Aina, (1993) concluded that, “the deregulation of the economy has only succeeded in marginalizing farmers”. The above picture seems to work against the strategies outlined in the agriculture policy launched in 1987 for sustained development in the next 15 years.

Similarly, the government policy of withdrawal of fertilizer subsidy as well as its distribution process affects poor farmers. The policy of distribution and subsidization did not reduce the gap between supply and demand, nor did they result in lower prices for most farmers. To Akin – Aina (1993) the shortage due to poor distribution and diversion, even by government agencies, forced farmers to turn to black or underground market to buy fertilizer at exorbitant price. Thus, the United Nation’s Report on Nigeria (1996) observes that “the low efficiency of the programme combined with the budget deficits of the last several years, mandates a phase out of this subsidy”. As a result, merchants procure from NAFCON and sell freely to poor farmers at exorbitant prices nationwide.

Against the financial realities farmers face, all hands are on deck to help them. For instance, Odoemenem (1998) reports that commercial banks in the country have now placed emphasis on group loan approach in which small-holders are required to form themselves into co-operative societies or farmers council in order to qualify to obtain loan without additional collateral. In 1998, the Union Bank in another approach experimented on lending without collateral to staff of the University of Agriculture, Makurdi. The sum of N5, 000 was given as loan to the staff. The only condition attached is that the staff must be on the payroll of the University and receive his or her salary through Union Bank.

Rational for Rural Agricultural Financing

The characteristics of most developing economies and by extension, the farming communities of these economies are a vicious cycle of low level output, low level income, low level savings and low investments resulting again in low level output. To break this vicious cycle of poverty of farmers is one of the main aims of government the world over. Therefore, caught up in this vicious cycle of low productivity, small holdings and low income, farmers have limited capacity for capital accumulation on which the development of their farm greatly depends. Given therefore their low resource base, the need to create a system capable of financing capital formation in agriculture becomes important to a discussion on agricultural development in Nigeria.

Over 90 percent of Nigeria's rural population derives their income from agriculture, and almost the entire agricultural food crops grown in Nigeria are from rural areas (Anyanwu, 1998). Rural farming is peasant oriented and small scale. With an agricultural growth rate of 1 percent, the shortfall in meeting our food production requirement is obvious. We are already experiencing the effect of food shortages, prices of staple food are almost out of the reach of the poor as well as the middle class in society. Therefore, doing something dramatic to salvage the situation is the opinion of Anyanwu (1998).

Currently, agricultural production in Nigeria is labour intensive and the land tenure system, particularly in the south, does not encourage extensive large scale farming. The onerous task of satisfying the bulk of this country's food needs ultimately rest therefore on the smallholder rural farmers. The rural farmers need assistance especially in form of credit and how to profitably manage credit. Credit is an essential input factor in agricultural production, considering that the small-scale farmers lack capital.

The reason for financing agriculture and rural development by government is based on four interrelated considerations. First, in Nigeria as in other developing countries of the world, the rural sector is populated by more than 70 percent of the entire population. Secondly, the majority of the rural population derives its income from agricultural and livestock production. Thirdly, apart from the entire rural population, there is also a large portion of the low – income population in the urban sector, which depends primarily on the employment generated by agro-allied industries or businesses. Fourthly, the entire population in the urban and rural areas depends, for their sustenance on the food and supplies that come mainly from the rural sector. All these therefore make rural development a central issue to the overall growth and development of the economy and for improving the living standards of the entire population that derives its livelihood from agricultural production, (Ajakaiye, 1998).

Agu, (1987) observed that no meaningful development in the developing countries can take place without the development of the rural areas. But one can not talk of rural development without the development of agriculture, because agriculture is the mainstay of the rural economy in the developing countries. Agriculture development is a process involving the adoption by farmers of new and better agricultural

practices leading to increase productivity and over all welfare of the economy. It should be noted that credit is not an end in its self, but a means for increasing productivity or expanding production or even increasing consumption. There must therefore be viable income generating activities to invest at the farm level or agro-processing one. Borrowing for production makes sense only if the returns from production can pay for the cost of capital borrowed, and this must apply to poor farmers. Access to market as well as an orientation to produce marketable products is therefore essential for profitable utilization of credit, (Alhassan, 1998).

The provision of credit must be part of a long-term strategy at developing the rural area through the harnessing of relevant resources. This is relevant because credit is not an end in itself, but a means to an end. With finance it becomes possible to harness other factors of capital, technology, infrastructure and extension.

It is asserted that the increasing recognition of the need for agricultural financing stems from the desirability to enhance the position of on-farm capitalization in Nigeria agriculture and the fact that the farmers own savings are normally inadequate to finance the various farming activities. Thus, capital injection into the agricultural sector is imperative in view of the unfavourable terms of trade facing agriculture, declining productivity, low level of adoption of improved technologies and the fact that many investors are in favour of low cost quick returns and less risky business ventures compared to agriculture (Oni and Olomola, 1989).

Role of Finance in Agricultural Development

The principles of economics and finance have shown us that by using other people's fund along with his own, an entrepreneur is most likely to improve his business substantially than if he had depended solely on his equity. As this principle applies to commerce, so does it apply to agriculture in the developed as well as developing countries like Nigeria. The aim of agricultural development is to prop up farmers to make substantial investment in agriculture and stimulate increased productivity. Since the present

economic threshold of traditional agriculture cannot sustain any capital formation, the capital required for investment in agriculture must necessarily be injected from outside. Thus, an agricultural credit scheme is considered as important component of the agricultural development programme (Lot, 1998).

There is no doubt about the crucial role of credit in economic development. Credit can be considered from its ability to energize or motivate other factors of production. For example, it can make the latent potential or under used capacities functional. In such situations, credit acts as a catalyst or elixir that activates the engine of growth, enables it to mobilize its inherent potentials and to advance in the planned or expected direction. It follows therefore that the greater the influx of capital the more the propensity of the economy to move in its given path. Conversely, if the economy receives less than its due share of credit input, its potentials would be dormant (Ijere, 1998).

The emphasis on credit as an instrument of agricultural development according to Hayami and Ruttan (1971) is based primarily on four perspectives. First, the Schumpeterian perspective, which identified innovation as critical element in economic development and credit as essential organizing instrument, which enables the innovations bid resources away from other activities. The second perspective is based on the view similar to that of market reform. The farmers obtain credit and sell his output to the same middleman and are exploited in each transaction. The third perspective is closely related to the second, which views public credit institution as part of the supervised education and credit package designed to induce traditional farmers to adopt modern inputs. The fourth perspective view credit as an income transfer mechanism to remove inequalities in income distribution in rural areas where intermediate credit institutions obtain their funds from external agencies under concessional arrangement. It is generally held that these institutions are not justified in charging the higher market rate in their own lending operations. As Ijere, (1998) rightly put it; credit therefore constitutes the power or key to unlock latent talents, abilities, visions and opportunities, which in turn act as the mover of economic development.

METHODOLOGY

Modelling Agricultural Output

Production function relates inputs to output. Traditionally, output of any sector depends on labour and capital. In modern day output modelling, other factors have been included depending on the nature of the production, circumstance and time frame. While there are proxies for employment (labour) and capital (Gross Fixed Capital Formation), we do not have local data that identifies what quantities of each of these factors go into each sector, say agricultural sector. For this reason, labour and capital tend to be excluded in the estimation of agricultural output in Nigeria. It is hoped that being necessary factors, they are treated as constants and are captured by the error term.

Assessing role of finance on agricultural output, we identified two major sources of finance-private sector financing which includes personal contribution and commercial banks loan to agricultural sector and secondly public sector which we have restricted to Agricultural Credit Guaranteed Scheme Fund. Since personal contribution is not available to the public, we model agricultural output as follows:

$$AGOUTP = f(L_a, K_a, ACGSF2, CBLAX, C_a) \dots\dots\dots \text{Implicit Specification}$$

AGOUTP= Agricultural Output

L_a = Labour to Agricultural Sector

K_a = Capital to Agricultural Sector

ACGSF2= Agricultural Credit Guaranteed Scheme Fund

CBLAX= Commercial Banks Loan to Agricultural Sector

C_a = Other control variable(s), for which we used annual rainfall data (AARAIN)

In explicit terms, the model is written as thus:

$$AGOUTP_t = ACGSF2_t + CBLAX_t + AARAIN_{t-1} + u_t \dots \dots \dots \text{Explicit Specification}$$

The choice of 1-year lag value of AARAIN is premised on the fact that previous season's rainfall determines current agricultural yield. It is also believed that u_t captures left-over variables.

Data Sources

Secondary data was used for this study. Variables used in the study include agricultural output (dependent variable), Agricultural Credit Guaranteed Scheme Fund (ACGSF, independent variable), Commercial Banks' Loan to Agricultural Sector (independent variable) and annual rainfall statistics (main control variable). While there are other control variables worthy of use, we believe that rainfall statistics remains a major climatic factor that drives agricultural output in Nigeria as evident in some previous findings in this area of agricultural productivity

Results and Discussion

Descriptive Statistics

	AGOUTP	ACGSF2	AARAIN	CBLAX
Mean	3.58E+12	2.59E+09	1120.188	3.93E+12
Median	1.60E+12	2.42E+08	1124.546	3.23E+11
Maximum	1.47E+13	1.00E+10	1311.704	3.64E+13
Minimum	1.95E+10	24654900	876.1770	8.58E+09
Std. Dev.	4.37E+12	3.61E+09	83.63719	8.22E+12
Skewness	1.109504	1.015208	-0.485806	2.924870
Kurtosis	2.984928	2.307271	4.023677	11.15427
Jarque-Bera	7.181159	6.711923	2.904918	146.8709
Probability	0.027582	0.034876	0.233994	0.000000
Sum	1.25E+14	9.07E+10	39206.57	1.37E+14
Sum Sq. Dev.	6.50E+26	4.42E+20	237836.1	2.30E+27
Observations	35	35	35	35

Sources: Authors' Computation (2016)

Table 4.1A presents descriptive statistics of data of variables engaged in this study. Essentially, the table provides us with information that tells us about normality status of our variables. Jarque-Bera Test is the test of normality adopted here. The null hypothesis says no variable is significantly different from normal. At 5% level of significance, only annual rainfall (mm) is normally distributed as p-value of 0.2340 suggests that we cannot reject the null hypothesis. However, other variables-agricultural credit guaranteed scheme fund, commercial banks' loan to agricultural sector and agricultural output are not normally distributed because their JB test statistics are significant, implying rejection of null hypothesis.

Trend Analysis

Below are the trends of annual rainfall(mm), agricultural output, Agricultural Credit Guaranteed Scheme Fund and Commercial Banks Loan to Agricultural Sector in Nigeria for the years 1981-2015.

Figure 1: Annual Rainfall (mm)

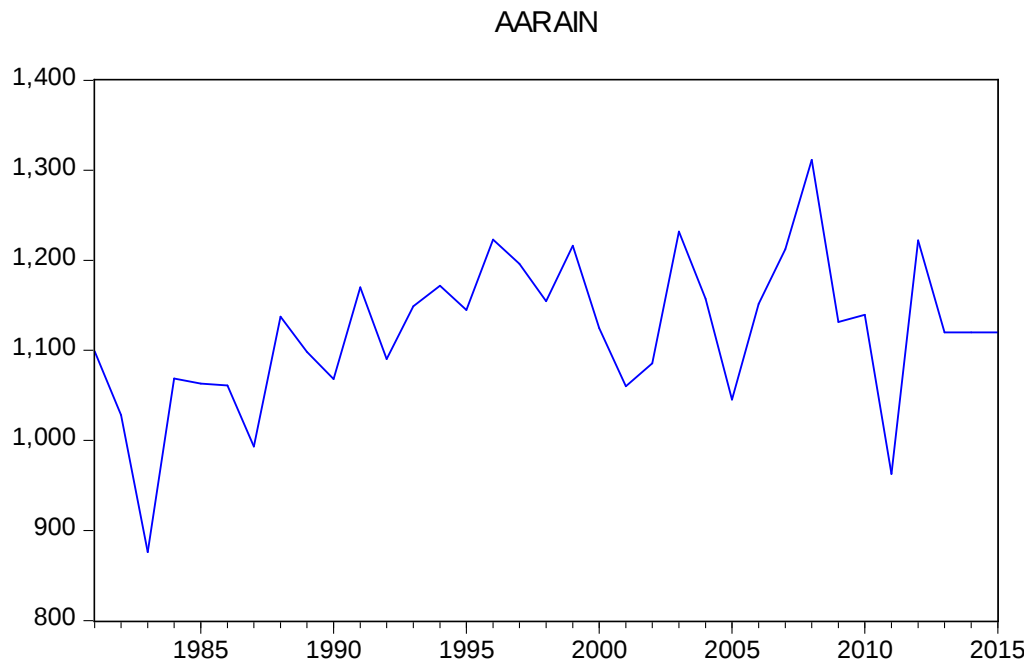


Fig. 1 above shows the trend in annual rainfall over the period of study. From the above, it can be inferred that annual rainfall has been on progressive trend over the years. As expected in a natural phenomenon, the trend is characterised with continuous ups and downs (natural shocks) but overall picture says rainfall shocks are still, on the average, progressive.

Figure 2: Agricultural Credit Guaranteed Scheme Fund ('#)

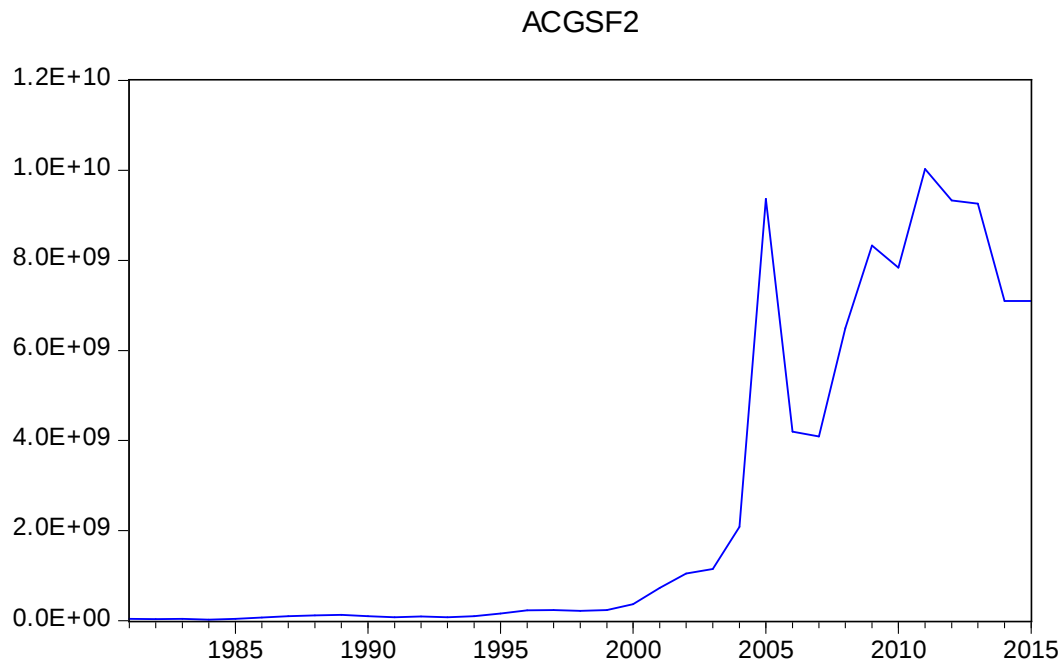


Figure 2 above depicts trend in Agricultural Credit Guaranteed Scheme Fund. The fund was on the increase until 2005 when it fell only to continue its rising trend from 2007. Following this, the fund experienced ups and downs till date.

Figure 3: Commercial Bank Loans to Agricultural Sector ('#)

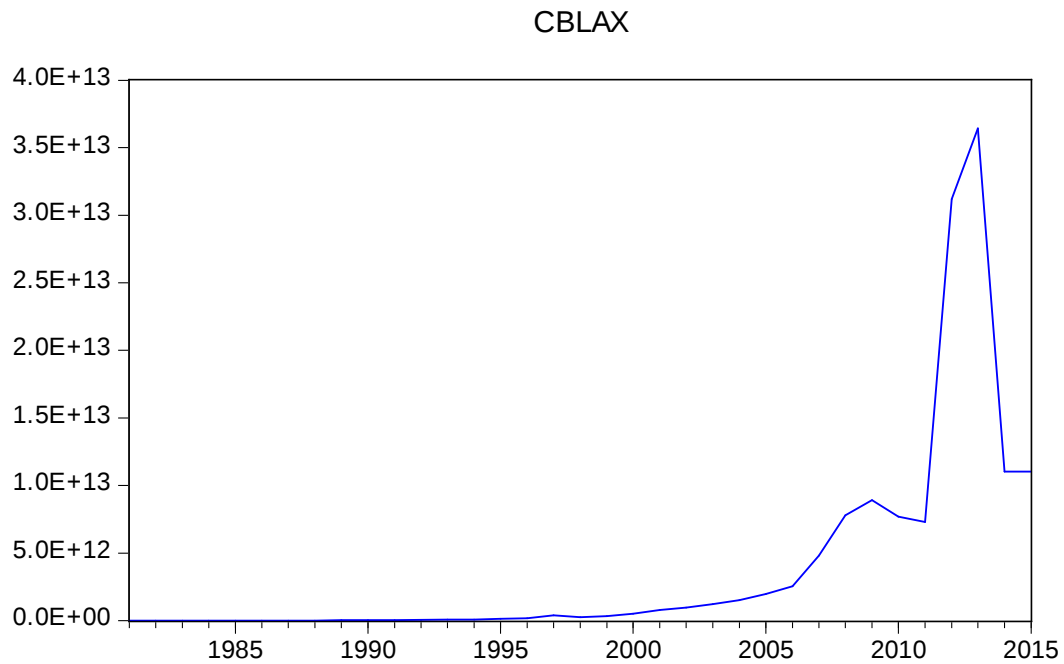


Figure 3 shows volume of Commercial Banks' loans available to Agricultural Sector over the period of 1981-2015. One key observation is that from 1995, a noticeable increase was observed until 2013 when a major continuous decline was experienced.

Figure 4: Agricultural Output ('#)

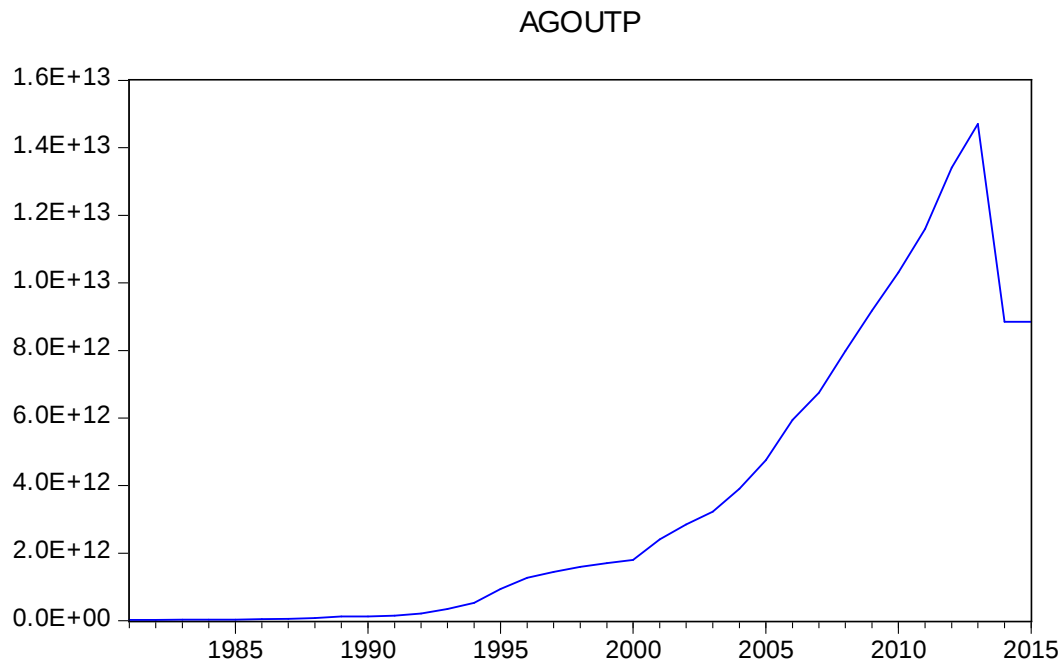


Figure 4 presents trend in agricultural productivity. From 1986, obviously agricultural productivity experienced a rise which was sustained until 2013. The peak of this rise is coincidental with a major and only peak in commercial banks' loan to agricultural sector and also with a peak in Agricultural Scheme Fund. Could this mean that the trend in agricultural financing is an indicator of changes in agricultural productivity? This is a question among questions that this paper intends to address.

Unit Root Tests

We conducted unit root tests on the variables used in our estimation. The essence is to check their stationary status as it matters for the choice of further estimation techniques in our analysis. Using Augmented Dickey-Fuller Test and Philip-Perrons Unit Root Tests, we found the following results presented in the table below.

Figure 5: Unit Root Tests

Variable		Augmented Dicky Fuller (ADF) unit root Test		Order of Integration	Philip-Perron's Unit Root Test		
		Intercept	Intercept & trend		With Intercept	With intercept & Trend	Order of Integration
AARAIN	Level	-4.2823*	-4.8460*	I(0)	-4.2607*	-4.8504*	I(0)
	1 st difference						
ACGSF2	Level	-1.1982	-2.7500	I(1)	-1.1982	-2.5963	I(1)
	1 st difference	-7.6746*	-7.5885*		-8.2359*	-8.4435*	
CBLAX	Level	4.0401	3.6096	I(1)	-2.1412	-2.9762	I(1)
	1 st difference	3.9670	3.8078		-10.7392*	-11.1551*	
AGOUTP	Level	-0.5244	-1.9547		-0.5729	-2.0304	
	1 st difference	-5.4191*	-3.1044		-5.1501*	-5.0697*	

*denotes the rejection of the null hypothesis at 1%, ** at 5% and *** at 10%

Source: Authors' Computation (2016)

From the above table, we found that annual rainfall data is stationary at level (I(0)) while data for agricultural credit guaranteed scheme fund, commercial banks' loan to agricultural sector and agricultural output are I(1)). When variables' stationarity statuses are of different levels, Bounds test becomes necessary. Consequently, these variables were subjected to Bounds Test in an attempt to test for the presence of long run relationship among the variables.

Figure 6: Bounds Tests for Long Run Relationship

	F-STATISTICS	5.0072***
CRITICAL VALUES	LOWER BOUND 1(0)	UPPER BOUND 1(1)
1%	5.17	6.36
5%	4.01	5.07
10%	3.47	4.45

Source: Authors' Computation (2016)

Bounds test result conducted above reveals F-statistics of 5.00072, significant at 10%. As a rule thumb, when F-Statistics of Bounds test exceeds upper bound value, then there is long-run relationship. If less than lower bound value, then there is no long-run relationship. If it falls within the range of the bound values, then there is the result becomes inconclusive. As it can be seen from our result above, long-run relationship exists at almost 5% and more obviously at 10% level of significance. This informs us that we can assess long run impact of our explanatory variables on the main independent variable.

Long-Run Impact

Dependent variable: LOG(AGOUTP)		
Variables	Coefficient	Standard Error

Log(ACGSF2)	-0.2800***	0.1432
Log(AARAIN(-1))	3.1898***	1.0611
Log(CBLAX)	0.3578***	0.2033
C	-1.4252	8.9007
@TREND	0.1608*	0.0525
R-square	0.9538	
Adjusted R-sq.	0.9492	
P(F-Statistics)	0.0000	

*denotes rejection of the null hypothesis at 1%, ** at 5% and *** at 10%

The major results of this study are contained in the table above. The choice of log values were intended to harmonisedifferences in various units of the variables adopted in the study. The decision to use one year lag value of annual rainfall (which itself is a sum of 12 months annual rainfall) in the estimation of current agricultural output is premised on the natural phenomenon that rainfall season usually precedes season of agricultural engagements.

From the above, the small size of finance co-efficient implies under-financing of the sector on general notes. We found that commercial banks loan to agricultural sector and annual rainfall are positively and significantly related to agricultural productivity in Nigeria for the period concerned in this study. Agricultural Scheme Fund is negative but significant in its relation with agricultural output. This might not be unconnected with political ills that impede policy measures in implementing funds allocated for use of the sector which might drive away real targets of such funds. It is also predicted that the negative sign in the co-efficient of agricultural scheme fund might suggest a crowding-out effects between the two sources of finance as more money to the Scheme Fund might mean farmers will demand less agricultural loans from commercial banks.

This is in the light of the fact that the two sources emanate from two different sectors which are public sector and private sector. Hence, we conclude that a priori, all our variables are well-behaved.

In terms of diagnostics, R^2 and its adjusted value both confirm that about 95% variation in agricultural output is accounted for by the explanatory variables used in the study. The significance of F-Statistic value also suggests that the model here estimated is well-fitted and that our variables are jointly significant.

Conclusion

We conclude that adequate financing from both sources and sectors matter for rising agricultural productivity in Nigeria, essentially in terms of agricultural scheme fund.

We recommend that proper monitoring and implementation is a key to successful policy measures aimed at improving agricultural yield in the country. Also, the study therefore recommends that political ills that negatively affect policies should be done away with for policies to have it desired effect.

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