Effect of Agricultural Price Volatility and Investment on the Economic Growth Of Nigeria A Case of Cocoa Production (1981-2013)

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ABSTRACT

One of the crucial factors of production identified in the production process is labour force. Its potential to enhance output growth is dependent on the level of capital investment by the public and private sectors. However, the major challenge facing policy makers is how to allocate limited resources across the range of preferences with an aim of reducing the level of poverty and unemployment, enhance economic growth vis-à-vis capital and recurrent expenditures in agriculture. The study therefore examines the relationship between agriculture expenditure and prices of agricultural commodities in Nigeria (i.e cocoa production). The Solow growth model was adopted and the analysis was based on time series data from 1981-2013. The OLS result showed that there exists a negative relationship between government capital and recurrent expenditures and price of cocoa on the level of Gross Domestic Product (GDP) in the short-run but showed a positive relationship in the long-run. However, the study recommended that the Nigerian government should pay attention to private sector investments in agriculture and improve regulations on pricing of agricultural commodities in Nigeria. The study recommended that government's attention is required in the sector as a whole.

1.0 INTRODUCTION

The agricultural sector is responsible for about 17.8% of the GDP of Nigeria and has about 42.7% of her total Labour force. Although its importance is deemphasized and its yields extremely volatile (Jensen 2000), we cannot but accord due reverence to its contribution to the making of Nigeria and countries that experienced their independence in the 1900's especially among African countries. Agriculture involving the habituation of plants began around 11,500 years ago; it has since contributed immensely to living. Although the subsistence method is still in practice, the mechanized farming is employed in almost all the countries of the world. It has

made the practice of agriculture easier. Cocoa, a commodity in the sector has been forecasted to rise in demand by 30% in the year 2020; yet without emancipating and investing in small cocoa farmers, the sector will contend to deliver ample supply.

Investment in any sector is crucial for the development of the sector, for instance, the connection between economic growth and education in some of the early work on economics of education was premised on the argument that a major effect of more education is that "an improved labour force has an increased capacity to produce" (Psacharopoulos, Georges. 1973). Investment can therefore be said to be almost identical with expenditures as there cannot be investment without expenditure. The significance of public investment in directing long term economic growth develops from the fact that it not only initiates positive spillovers in the economy through the provision of basic scientific research and physical infrastructure, but may also crowd in private investment thereby enhancing economic growth. (Ejaz G and Musleh-ud, 2006).

Price volatility in the agricultural sector is connected with the uncertainty and changes in prices which can be caused by a variety of reasons. In recent years, price movements and spikes in global commodity markets have continually and progressively come to the vanguard of public attention. The huge agricultural commodity price fluctuations noticed in past years - especially between 2006 and 2009 - raised a comprehensive debate on the principal determinants responsible for the unexpected fluctuations. As consequence, individuating the principal determinants of price swings becomes a major issue for policy-makers to intervene and reduce the possible negative effects relating to welfare (JRC Technical Reports).

As a result of the current state of falling oil prices caused by an increase in supply by America, the nation has been recording a fall in the demand for petroleum products and of course a fall in the revenue accruing from its export. The government of Nigeria has awoken from its slumber,

and has discovered reasons why the agricultural sector and other revenue viable sectors be brought back to limelight in terms of investment as part of strategies to contain these falling oil prices. It would therefore be necessary to look into certain factors affecting the productivity of agriculture in Nigeria, particularly by assessing the sector's impact on economic growth.

The purpose of this research work therefore, is to ascertain the relationship between investments, agricultural price, though volatile and economic growth and the magnitude and direction of the effect of investments and agricultural price volatility on economic growth. In regards, questions like, what is the relationship between agricultural price volatility, investments and economic growth? What effect does investments and agricultural price volatility have on economic growth? And what is the causal relationship between investments, agricultural price volatility and economic growth? Would be answered.

The paper covers from 1981-2013; though it would be quiet impossible to examine the whole agricultural sector of Nigeria and the volatilities in the sector. Respondents were purposively drawn from existing data on cocoa, and its price volatility was examined. The paper is made up of five sections organized as follows; section one deals with the introduction, section two contains the literature review, section three explains the theoretical framework and methodology, section four contains the analysis of data and discussion and the last section deals with conclusion and recommendation.

2.0 LITERATURE

The Solow-Swan model was developed by Swan Trevor and Solow Robert in 1956; it was the initial endeavour to model long-run growth logically. A significant characteristic of Solow model, which it has in common with similar models, is its simple, theoretical and philosophical description of a composite economy. Usually, it may seem too straightforward or too theoretical

or philosophical. Ultimately, to justify the operation of growth or macroeconomic balance, it will be pertinent to consider many non-identical individuals with dissimilar incomes, abilities, tastes and roles in the society, distinct sectors as well as several social interactions. As an alternative, the Solow model penetrates through these issues by constructing a plain one-good economy, with little credit to individual decisions (Peters and Liu, 2007). The model has been used in the analysis of various macroeconomic variables.

Mankiw, Romer and Weil (1992) instigated an augmented Solow model and empirically juxtaposed the operation of the basic Solow model and the augmented Solow model, by the application of real cross-country data. According to this study, "the dissimilarities among countries in per capita income should be described by inconsistency in physical and human capital investments and labour growth, that is, variables that are incorporated in the augmented Solow model". The augmented Solow model describes a considerable amount of income variation between countries and makes rational two deductions about the expanse with which human and physical capital investment outlays and labour growth ratios affects per capita income. Meanwhile, many theorists of endogenous growth model oppose taking the technological change as an exogenous variable, they focus on ascertaining the elements that leads to growth of technology and, that consequently, indirectly impact the increase in income (Jones 2002).

Robert Solow and Trevor Swan (1957) opined that unemployment does not have a long-run effect on the growth rate and level of output. The long-run efficiency is minimized if greater unemployment causes less learned education, although if endogenous growth is allowed, unemployment will reduce long-run productivity.

Shaw, Nordhaus and Mendelsohn (1994) employed Data on variables- land values, precipitation and temperature- collected from the country and city data book and National resource inventory. This study was based on 2,933 cross sectional observations from counties in the United States, which were used to examine the effect of global warming on agriculture. They used ordinary least squares to estimate the parameters in the regression model specified in this study. They observed a notably lower impact of global warming on United States' agriculture, compared to the conventional production function perspective and concluded that global warming may have economic benefit for agriculture, and that overall impact of climate change is largely the same across regions in the United States of America.

Olubanjo et al (2009) examined supply response of cocoa to changes in rainfall, producer prices and world average prices. They made use of secondary data sets, sourced from various reliable sources, making use of times series data set covering the period of 1970 to 2000. They employed the error correction model (ECM) which was estimated using ordinary least squares. They found that rainfall, producer prices, and world average prices had a positive relationship with output although didn't specify whether it is in the long and short runs or both. They concluded that deregulation of the Nigeria economy in 1986 had a positive impact on cocoa production, and that prices in the deregulated period were higher than that of the regulated period.

Anim-Kwapong I.G and Frimpong B.E (2004) employed a production perspective to examine the effect of climate change on cocoa production in Ghana. They used a global circulation model and simple climate model to predict the level of rainfall and temperature for the years 2020, 2050 and 2080. Estimated mean yearly rainfall values in the semi-evergreen forest region of Ghana will fall by -2.8%, -10.9%, -18.6%, while evergreen rainforest zones rainfall is to decline by -3.1%, -12.1% and -20% in the years 2020,2050 and 2080 respectively. While during the period,

mean annual temperature rises by 0.8oc, 2.5oc and 5.4oc in semi deciduous, and 0.6oc, 2.0oc and 3.9oc in evergreen rainforest zone. Cocoa output was found to be negatively related to preceding year's total annual rainfall and positively related to annual sunshine duration.

Oluyole *et al* (2013) examined the resultant effect on cocoa production the influence of climate change. Data on rainfall and other climatic elements collected were analysed with regression and correlation analysis as well as descriptive statistics. According to them, rainfall increased continuously while temperature decreased continuously between the periods of 1980-1994, while humidity decreased sharply in the 1980's. The regression analysis showed that humidity and rainfall significantly affects cocoa output while temperature does not. Meanwhile there was a significant correlation between cocoa output and humidity and cocoa output and rainfall.

Empirical tests of Wagner's law in the form of standard regression analysis (Georgakopoulos and Loizides, 1994; and Ganti and Kolluri, 1979) or in the form of error-correction mechanism (Wanab, Panik and Kolluri, 2000), have yielded results that vary significantly across countries.

Investment and Economic Growth

Investments and formation of human capital are the corner stones of amplifying well-being and altering the cycle of intergenerational transference of poverty, and they are also primary to economic growth and development. However, these investments may necessitate sizeable cash payments (Jensen R. 2000). The expanding significance of public expenditures in many countries has triggered a notable number of researches on the connection between the size of government capital outlays and economic growth (Antonio, 2013).

Bayraktar, et al. (2010) examined the impact on growth of dissimilar constituents of public spending for some developing countries and discovered that public spending can be an important determinant of growth for nations that are capable of using such resources for productive uses. In

other words if the funds are adequately channeled, economic growth would be guaranteed. Productive purposes of allocation of funds include public investment in sectors such as agriculture, education, oil and gas, transportation and other viable sectors.

Agricultural Price Volatility

There is very minute or no evidence that fluctuations in agricultural commodity price, as estimated using standard statistical measures, is increasing; in relation to real and nominal prices. Spikes have nonetheless risen during the period after 2000 than during the preceding two decades. Long term trend in volatility showed that long periods of comparatively low and stable prices are usually preceded by periods of high and volatile prices.

Business cycles changes in demand for non-food agricultural produce, for instance, cotton from mechanized, fast growing economies may also be adding to risen volatility. Factors contributing to price spikes include export restrictions, weather-related crop losses and high oil prices in contrast to a backdrop of sustained tight demand-supply equilibrium. The periods of pronounced price spikes of agricultural commodities are 2007/08 and 2010/11, although the situation in the latter period varies from the past occurrence in some regards. Firstly, harvest in many food-importing nations in Africa was very good, so that prices were more stable. Also, increase in prices was individually spread amid products such as sugar, dairy products and meats which were largely influenced.

Agricultural commodity volatility influence growth in the economy through two major channels. First, high volatility implies additional investment uncertainty in the agricultural sector; this often leads to discouraged investment in the agricultural sector and consequentially a slowdown in economic growth.

Secondly, high volatility also implies increased income uncertainty; this tends towards an increase in saving for precautionary purposes which as a consequence encourages investment in the agricultural sector and in turn boosts economic growth.

Cocoa Market

The primary growing regions are Africa which accounts for 68% of global cocoa production, Asia which accounts for 17% and Latin America which accounts for 15%. The largest producing country by capacity is Ivory Coast, which produces 33% of the world's supply. Leading producing countries include, Africa: Ivory Coast, Ghana, Nigeria and Cameroon, Asia-Indonesia, Malaysia and Papua New Guinea, and in the Americas - Brazil, Ecuador and Columbia, in this order. Over 80-90% of cocoa production comes from small, family-run farms with an approximate figure of 5 to 6 million cocoa farmers globally.

Total production of cocoa witnessed an increase by 13% between 2008 and 2012. It rose from 4.3 million to 4.8 million metric tonnes between 2008 and 2012. As the most pronounced countries for manufacturing chocolate, Europe and the United States are the major importers of post-processable cocoa products. Although between 2008 and 2011, China which was formerly the twelfth (12^{th}) largest importer of cocoa paste and fifteenth (15^{th}) largest importer of cocoa powder and cake moved to the 9^{th} and 9^{th} largest importer of both post-processes respectively, while Nigeria remain the 4^{th} largest producer and exporter of cocoa.

Nigeria is a principal producer of cocoa and has risen to a major exporter of the product over the last hundred years. Production of cocoa in Nigeria is majorly on a minimal-scale level and basically cultivated and produced in Ondo, Ogun, Osun, Ekiti and Oyo. The quantity of cocoa produce is determined amongst several features which differ in the weather or climate condition. Where the weather is conducive, output will increase and vice-versa. There are majorly the small

scale cocoa farmers and the large scale cocoa farmers in Nigeria. The main challenge facing the production of cocoa in the country is the procurement of land for cocoa farming.

According to Nkang Moses *et al* (2007), investment in cocoa production would be profitable irrespective of the three known cocoa management systems although investment in cocoa has taken a different dimension since the oil boom in the 1970's; the study therefore was of the view that investment in cocoa production given the profitability status, can be raised by providing greater chance to get cheap and flexible loans and land.

Agricultural institutions and policies that were established to spur cocoa production in Nigeria include, the establishment of Cocoa Research Institute of Nigeria (CRIN), Agricultural Development Projects (ADPs) part of which are feeder road networks, farm service centres and so on majorly funded by the world bank, Agricultural Credit Guarantee Scheme Fund established during military rule and the Presidential initiative on cocoa rehabilitation initiated in 1999, just to mention a few. The government controls the price through the monopoly of the internal and external marketing of the produce. In other words, immediately the cocoa is bought from the farmland, the government takes ownership of it (Adeyeye T, 2011).

Government took part in pricing decisions because;

- The cocoa price was still exogenously determined,
- Good income accrued from the production and sale of cocoa to the government.
- Because of *fluctuation* of cocoa price in the world market, government maintains cushion with which it stabilizes price so as to maintain stable price thereby encouraging Farmers to produce more.

3.0 THEORETICAL FRAMEWORK AND METHODOLOGY

The Solow growth model (1956) would be a supportive model to explain this study. The model acknowledged the role of capital stock being formed by investment and investment being made possible through savings. This model paid close attention to labour as well as the role of technology for growth although it does not give any information on how technology is formed; it only works on the assumption that technology is given as an exogenous variable. This model is often referred to as Solow-Swan model. It is a neo-classical growth theory of capital accumulation in a production economy hence its employment of a *production function* for its analysis.

The model presumes constant returns to scale and diminishing returns to scale to each input; it predicts conditional convergence which implies that, "the lower the launching position of per capita GDP, corresponding to the long-run unsteady state level, the more rapid the growth rate". The major reason for this is the proposition of diminishing returns to capital which implies that a country with minimal capita per head in relation to their long-run capita per head has the propensity to have favourable rates of return and sustainable growth rate.

The Solow model makes another prediction that in the lack of continuous improving technology, per capita growth will finally cease hence the neo-classicalist assume an exogenous technological progress, in other words, technology is assumed to be determined outside the model. This model is the commencing tip of nearly all study of the new growth model hence to comprehend other growth models, an understanding of the Solow growth model is essential.

Assumptions of the model include production of one composite commodity, which in this case is economic growth; constant savings ratio, neutral technical progress, *flexibility* of *prices* and

wages, perpetual full employment of labour and so on. On the basis of the aforementioned assumptions, we are employing the Solow growth model as a best fit for the study.

The model concentrates on four (4) variables, they are, Output (Y), Knowledge or effectiveness of labour (A), Labour (L) and Capital (K). It is assumed that at time 't' the economy comprise knowledge, labour and capital; therefore their combination would yield output/income. The production function is as follows,

$Y_{(t)} = F(A_{(t)}, L_{(t)}, K_{(t)})$

METHODOLOGY

Ordinary Least Square (OLS) estimation technique is the method of estimation adopted and following the specification of model below, a multiple regression analysis is employed. Unit root as well as co-integration tests were undertaken, while the former was undertaken on each variable (series statistic), the latter was undertaken on the models (group statistics) (Gujarati and Porter, 2004). The purposes of this is the examination of the time series features of the data as well as prevail over problems of spurious correlation common with time series data and find the existing relation between variables in the models.

The secondary data used in this study were sourced from CBN statistical bulletin, Africa Development Indicator and World Economic Outlook. The scope of the data employed covers the period 1981-2013. Data on agricultural employment for year 2013 was forcasted.

Model Specification

$GDP = \beta_0 + \beta_1 K + \beta_2 L + \beta 3 RIN + \beta_4 PC + \varepsilon$

Due to the perceived and verified presence of Multicollinearity, the main model is broken into two separate models on which analysis is based. Multicollinearity is an econometric problem which exists when there is exact linear relationship among the variables and it is indicated by the

correlation co-efficient in this case (Gujarati and Porter, 2004); therefore, it can be represented as follows;

$GDP = \beta_0 + \beta_1 K + \beta_2 L + \varepsilon$ ……..**i**

$GDP = \beta_0 + \beta_1 RIN + \beta_2 PC + \varepsilon$ ……..**ii**

Taking the log-linear transformation of the models above, it can be represented as follows;

$LGDP = \beta_0 + \beta_1 LK + \beta_2 LL + \varepsilon$ …….**i**

$LGDP = \beta_0 + \beta_1 LRIN + \beta_2 LPC + \varepsilon$ ……...….**ii**

Where:

LGDP= Log of Gross domestic product

LK= Log of Capital expenditure in agriculture

LL= Log of Agricultural employment

LRIN= Log of Recurrent expenditure in agriculture

LPC= Log of Cocoa price

ε =error term.

Capital expenditure in agriculture is proxied by capital expenditure on economic services in Nigeria.

Theoretical expectations of the parameters are as represented as;

$\frac{\Delta GDP}{\Delta K} > 0$; $\frac{\Delta GDP}{\Delta L} > 0$; $\frac{\Delta GDP}{\Delta RIN} > 0$; $\frac{\Delta \text{GDP}}{\Delta PC} > 0$

4.0 ESTIMATION OF RESULTS AND INTERPRETATION

Table 1: Result of ADF at level and difference

Variables	ADF at levels	t-Statistic	ADF at 1st Difference	t-Statistic	Result
LGDP	2.058444	-2.981038	-3.813579	-2.960411	I(1)

LK	-0.614273	-2.957110	-5.937017	-2.960411	I(1)
LL	-0.301495	-2.960411	-8.396440	-2.960411	I(1)
LRIN	-2.949981	-2.976263	-5.895544	-2.963972	I(1)
LPC	-1.106236	-2.963972	-5.120959	-2.963972	I(1)

Source: *Computed by Author* **Significance level:** *5%*

Unit root test

From the table above, it is evident that all the variables (LGDP, LK, LL, LRIN, LPC) are stationary at first difference, that is , integrated to order one, I(1). The decision rule states that we accept the null hypothesis which states that there is unit root, if the augmented dickey-fuller t-statistic value is less negative than the table value at 5% level of significance. The objective of the unit root tests are used to determine if trending data should be first differenced or regressed on deterministic functions of time to render the data stationary (Egunjobi and Olabode, 2014).

The positive ADF_T statistic for LGDP at level difference signified a problem hence the probability figure was used in its interpretation and since its probability is greater than 0.05, we accept the null hypothesis which states that there is unit root. The ADF_T statistic for LGDP, LK, LL, LRIN and LPC is more negative at first difference, than the table value at 5% significance and thus we reject the null hypothesis and accept the alternative hypothesis which states that there is no unit root, in other words, the variable can be said to be stationary. We can therefore conclude that the variables are stationary at first differencing for the Augmented Dickey-Fuller tests. Given the properties shown by the unit root test, we go further to establish whether or not there is a long-run co-integrating relationship among the variables in the model using the Johansen Co-integration tests.

Johansen Co-integration test

Co-integration test examines existence of long-run relationship between dependent and independent variables. Co-integration of dependent and independent variables form a dynamic basis of a functional relationship between two or more variables, thus help in forecasting purposes. In this study, the method established by Johansen (1991) is used to carry out the co-integration test. A long-run relationship exists if it can be established that at least one co-integrating equation exists among the variables under study.

Model 1

Sample (adjusted): 1983 2013
Included observations: 31 after adjustments
Trend assumption: Linear deterministic trend
Series: LGDP LK LL
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.413551	28.38375	29.79707	0.0721
At most 1	0.298622	11.83997	15.49471	0.1648
At most 2	0.026859	0.844010	3.841466	0.3583

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.413551	16.54378	21.13162	0.1947
At most 1	0.298622	10.99596	14.26460	0.1544
At most 2	0.026859	0.844010	3.841466	0.3583

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the table above, the test statistic indicates that the hypothesis of no co-integration among the variables can be accepted for Nigeria. The result shows that there exists no co-integration equation at 5% critical value. This means that there is no long-run relationship between economic growth proxied by LGDP, capital expenditure proxied by LK and agricultural employment proxied by LL in Nigeria. The reason for this is not far-fetched, the oil boom in the 1980's led to a total shift from the countries profound source of revenue (the agricultural sector) to the oil and gas sector, little attention was also paid to contribution of this sector during this period, infact we can say that investment was made in this sector so as to reduce the unemployment in the rural areas (due to its importance in such areas and since agriculture is not prominent in urban centres).

Model 2

Sample (adjusted): 1983 2013
Included observations: 31 after adjustments
Trend assumption: Linear deterministic trend
Series: LGDP LRIN LPC
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.412736	22.11273	29.79707	0.2923
At most 1	0.154975	5.612041	15.49471	0.7408
At most 2	0.012565	0.391987	3.841466	0.5313

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.412736	16.50069	21.13162	0.1969

At most 1	0.154975	5.220054	14.26460	0.7139
At most 2	0.012565	0.391987	3.841466	0.5313

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the table above, the test statistic indicates that the hypothesis of no co-integration among the variables can be accepted for Nigeria. The result shows that there exists no co-integration equation at 5% critical value. This means that there is no long-run relationship between economic growth proxied by LGDP, recurrent expenditure proxied by LRIN and agricultural commodity price case of cocoa proxied by LPC in Nigeria.

Therefore for both models, we assume a constant mean and variance for the variables. Hence, the regression analysis will be carried out at the level they are stationary excluding the error term (U_{t-1}), this is done in other to avoid a spurious result, however the co-efficient obtained will be the short-run co-efficient. There will however be no necessity of Error Correction Mechanism (ECM).

Interpretation of OLS Test Results

Model 1

Model Re-specification

$D(LGDP) = \beta_0 + \beta_1 D(LK) + \beta_2 D(LL)$

Variable	Coefficient	t-statistic	Prob
D(LK)	-0.000307	-0.026319	0.9792
D(LL)	0.432909	0.595940	0.5558
C	0.041973	5.809104	0.0000

SOURCE: OWN COMPUTATION **SIGNIFICANCE:** 5%

R^2 – 0.012246 Adjusted R^2 - -0.055875

Interpretation and Economic Implication

From the table above, a glaring contrast would be noticed compared to regressing the variables at level. The result shows that capital expenditure (LK) and agricultural employment (LL) is statistically insignificant independently at 5% critical level in the short-run. C is the intercept of the regression equation and it is given as 0.041973, it is found to be significant at 5% level. This intercept implies the value of D(LGDP) when all the independent variables are zero.

With an adjusted R^2 of approximately 0.06 in its absolute term, it is clear that the two variables explain only 6% of the systematic variations in Nigeria's gross domestic product during the period under study in the short-run which definitely is not the case in the long-run. This could be explained by the fact that during the years under study the governments focus was directed away from economic services, and agriculture by way of extension. This is also validated by the fact that capital investments cannot yield returns in a short period, in other words, it would take some years for capital investment to become as productive as expected. Hence in the short-run, capital expenditure in agriculture (economic services) and agricultural employment explain a little percentage of the variation in the economic growth of Nigeria.

Shuaib, Igbinosun and Ahmed (2015) revealed a positive relationship between expenditure on agriculture and economic growth. The study spanned from 1960 to 2012 and the long-run relationship was estimated using the OLS estimation technique. In comparison with this work, it is obvious that the study included years when agriculture played a prominent role in the Nigerian economy meanwhile this study spanned from 1981 to 2013, over a decade after the oil boom. Also, using the initial regression a positive relationship can be seen although concluding on such a result might be spurious since no co-integration exists between the variables, hence the short-run relationship.

LL can be justified in comparison to the economic situation of Nigeria in the period under survey because in the short-run farmers were able to gain profits on their proceeds while in the long-run the shifted attention led to a fall in the number of agricultural employment which in turn led to its insignificance in economic growth. The Durbin Watson test of serial correlation indicates the presence of weak positive serial correlation because the D-W statistic of 1.16 is far from zero but closer to two (2). The F-statistic of 0.18 is insignificant at 5% level. Thus, the hypothesis of a significant linear causal relationship between economic growth, capital expenditure and agricultural employment cannot be accepted in the short-run. Also, it is noticed that all variables except LK have correct signs but both LL and LK are not significantly different from zero, using 5% level of significance.

The result obtained based on the analysis which tried to evaluate the effect of capital expenditure on agriculture proxied by expenditure on economic services and agricultural employment on economic growth showed that as government's capital expenditure on agriculture increases, the value of the GDP reduces such that a hundred per cent (100%) increase in capital expenditure will lead to a 0.03% decrease in GDP, in other words, there is a negative relationship between capital expenditure and GDP in the short-run. This also implies that a 100% increase in capital expenditure will lead to a 0% decrease in GDP in the short-run. Economically, capital expenditure can almost be said to have no impact on economic growth because its impact in the short-run is almost 0%. Hence, in the short-run an increase or decrease in capital expenditure in agriculture has little or no effect on economic growth within the period under survey. This is also consequent, as explained earlier, that capital investments do not yield returns in a short run, in other words, the result of investment in capital is not gotten within a period where fixed costs are incurred, hence it would only take from the economy at the time of investing and yield back

years after the period of investment, when all costs are variable. In addition, a ten per cent (10%) increase in agricultural employment will lead to a 4% (4.3%) increase in GDP in the short-run. In other words, there is a positive relationship between agricultural employment and economic growth in the short-run. The economic implication of this is that in the period under study, in the short-run, investment in agriculture had no positive effect on economic growth of Nigeria which might not be the case in the long-run. The result shows the long-run influence of investment in agriculture on economic growth.

The result also opines that in the short-run, agricultural employment should increase for an increase in economic growth.

Model 2

Model Re-specification

$D(LGDP) = \beta_0 + \beta_1 D(LRIN) + \beta_2 D(LPC)$

Variable	Coefficient	t-statistic	Prob
D(LRIN)	-0.007465	-0.844239	0.4054
D(LPC)	-0.024136	-0.602769	0.5513
C	0.043644	5.982707	0.0000

SOURCE: OWN COMPUTATION **SIGNIFICANCE:** 5%

R^2 – 0.031850 Adjusted R^2 - -0.034919

Interpretation and Economic Implication

The result shows that both recurrent expenditure (LRIN) and price of cocoa (LPC) are statistically insignificant independently at 5% critical level in the short-run. C is the intercept of the regression equation and it is given as 0.043644, it is found to be significant at 5% level. This intercept simply implies the value of D(LGDP) when all the independent variables are zero.

With an adjusted R^2 of approximately 0.03, it is clear that the two variables explain only 3% of the systematic variations in Nigeria's gross domestic product during the period under study in the short-run which is definitely not the case in the long-run. The economic intuition of this is that the recurrent expenditure on agriculture and volatility in the price of cocoa has no share in the variation of rate of economic growth in Nigeria in the short-run. The Durbin Watson test of serial correlation indicates the presence of weak positive serial correlation because the D-W statistic of 1.16 is far from zero but closer to two (2). The F-statistic of 0.48 is insignificant at 5% level. Thus, the hypothesis of a significant linear causal relationship between economic growth, recurrent expenditure and price of cocoa cannot be accepted in the short-run.

Also, it is noticed that no variables has its apriori sign in the short-run and are insignificantly different from zero, using 5% level of significance. The result obtained based on the analysis which tried to evaluate the effect of recurrent expenditure on agriculture and price of cocoa on economic growth showed that as government's recurrent expenditure on agriculture increases, the value of the GDP reduces such that a hundred per cent (100%) increase in recurrent expenditure will lead to approximately 1% (0.7%) decrease in GDP in the short-run. Economically, recurrent expenditure can almost be said to have little or no impact on economic growth because its impact in the short-run is almost 0%. Hence, in the short-run an increase or decrease in recurrent expenditure in agriculture has little or no effect on economic growth within the period under survey. In addition, a hundred per cent (100%) increase in price of cocoa will lead to a 2% (2.4%) decrease in GDP in the short-run. This result implies the forces of demand and supply outplaying in the short-run, in other words, the higher the price of cocoa, the lower the demand, and the lower the demand for cocoa, the lower its contribution to GDP in terms of revenue, hence the increase in price leads to a decrease in GDP, although 2%. The economic

implication of the result as regards recurrent expenditure is that in the period under study, in the short-run, recurrent expenditure in agriculture had no positive effect on economic growth of Nigeria which is not the case in the long-run.

5.0 CONCLUSION AND POLICY RECOMMENDATION

This study aimed to establish the effect of agricultural investment and prices of agricultural commodities with a case study of cocoa on economic growth in Nigeria. The investigation indicates that both recurrent and capital expenditure on agriculture is not the type of expenditure pattern needed to solve the problems of the agricultural sector in the short-run although the reverse is the case in the long-run, hence it is important that other means or sources of investment be devised as well as implemented for the good of the economy in the short-run while strategies are put in place by way of more investment against the long-run.

In addition, price of agricultural commodities was noticed to have no effect whatsoever on economic growth in the short-run meanwhile in the long-run its impact is seen. Agricultural employment revealed that its importance can only be noticed in the sector in the short-run; in other words, in the long-run, the impact of the labour force in the sector is not noticed.

Furthermore, the quality of agricultural extension offered in Nigeria has resulted to poor performance and low morale on the part of farmers. Despite this condition, our result has shown that the price of agricultural commodity case of cocoa has been within range (fairly high though volatile) in Nigeria and has a significant and positive effect on economic growth in the long-run.

Policy Recommendations

Based on the findings of this research, investment and prices of agricultural commodities has a negative relationship with growth in the Nigerian economy in the short-run; therefore it is pertinent for policies to be designed to boost the level of agricultural productivity in the country.

The need for macroeconomic policy reforms; government should accelerate economic policy reforms to provide a conducive environment for research staff and stem the drift to staff a greener pasture in the sector.

Also, the funding sources of the sector should be diversified. Diversification of the funding sources of the sector should be encouraged, in other words, beyond capital and recurrent expenditures by the federal government other viable sources such as state and local governments disbursements as well as private sector and individual investments, although not limited to the aforementioned, should be allowed and effective channeling of such funds be ensured.

Furthermore should the National Agricultural Research Policy be strengthened; this body should be a major focus of the government. The absence of an explicitly formulated NARP has provided a conducive environment for frequent program shifts and institutional changes.

Also there is the need to not only employ available technicians but ensure their full utilization in contributing to production, preservation and distribution of agricultural commodities both nationally and globally.

Policies that will boost export should be adopted so as to improve foreign fund inflow which can be used further to develop the sector and other viable sectors for development.

Lastly and significant to the whole process is the necessity to strengthen the process of infrastructural development such as electricity, pipe borne water, railways, road construction, improved waterways transportation e.t.c; this is a fundamental precondition that will allow industrialization to impact positively on agricultural production, value added and accessibility.

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APPENDICES

DATA ON EFFECT OF AGRICULTURAL VOLATILITY AND INVESTMENT ON NIGERIA ECONOMIC GROWTH: A CASE OF COCOA PRODUCTION (1981-2013)

YEAR	GDP (Billion N)	L (Billion per unit)	K (Billion N)	RIN (Billion N)	PC (US$ Per Metric Ton)
1981	251.0522811	0.041	3.63	0.01	2076.55
1982	246.726571	0.041	2.54	0.01	1741.82
1983	230.380797	0.041	2.29	0.01	2118.69
1984	227.2547346	0.041	0.66	0.02	2395.72
1985	253.0132721	0.042	0.89	0.02	2254.55
1986	257.7844462	0.042	1.10	0.02	2068.31
1987	255.9969617	0.042	2.16	0.05	1997.76
1988	275.4095533	0.042	2.13	0.08	1583.75
1989	295.0908036	0.042	3.93	0.15	1242.20
1990	328.60606	0.042	3.49	0.26	1268.00
1991	328.6445392	0.042	3.15	0.21	1192.61
1992	337.2886393	0.042	2.34	0.46	1099.42
1993	342.54047	0.042	18.34	1.80	1111.27
1994	345.2284632	0.042	27.10	1.18	1395.68
1995	352.6462243	0.042	43.15	1.51	1432.54
1996	367.2180936	0.042	117.83	1.59	1455.25
1997	377.830798	0.042	169.61	2.06	1618.74
1998	388.4681151	0.041	200.86	2.89	1676.00
1999	393.1071674	0.041	323.58	59.32	1135.05
2000	412.3320085	0.041	111.51	6.34	903.91
2001	431.7831839	0.041	259.76	7.06	1088.38
2002	451.7856655	0.041	215.33	9.99	1779.04
2003	495.0071653	0.041	97.98	7.54	1753.07
2004	527.5760283	0.041	167.72	11.26	1550.74
2005	561.93139	0.04	265.03	16.33	1544.66
2006	595.82161	0.041	262.21	17.92	1590.62
2007	634.251142	0.04	358.38	32.48	1958.11
2008	672.2025541	0.04	504.29	65.40	2572.76
2009	718.977335	0.04	506.01	22.44	2895.02
2010	776.3322141	0.04	412.20	28.22	3130.60
2011	834.0008322	0.04	386.40	41.17	2978.49
2012	888.8929988	0.04	321.04	33.30	2377.07
2013	950.1140318	0.04	505.77	39.43	2439.09

DATA SOURCE

Gross Domestic Product (GDP) - Central Bank of Nigeria Statistical Bulletin 2014

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