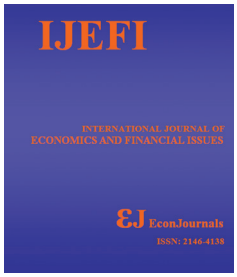

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The Contribution of Agricultural Sector on Economic Growth of Nigeria

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ABSTRACT

Agriculture is a panacea for economic growth (Myrdal, 1897). The battle for long-run economic growth is either won or lost in the agricultural sector. However, how this path births economic prosperity has been the subject of debates among economist and development scholars. This study empirically examines the impact of agricultural sector on the economic growth of Nigeria, using time series data from 1981 to 2013. Findings revealed that real gross domestic product, agricultural output and oil rents have a long-run equilibrium relationship. Vector error correction model result shows that, the speed of adjustment of the variables towards their long run equilibrium path was low, though agricultural output had a positive impact on economic growth. It was recommended that, the government and policy makers should embark on diversification and enhance more allocation in terms of budgeting to the agricultural sector.

Keywords: Agriculture, Economic Growth, Time Series, Cointegration and Vector Error Correction Model
JEL Classifications: O13, Q32, Q33

1. INTRODUCTION AND CONCEPTUAL FRAMEWORK

Agriculture is the bedrock of economic growth, development and poverty eradication in the developing countries. Agriculture has also regarded as the engine and panacea to economic prosperity. In the words of Gunner Myrdal (1984), the battle for long-term economic growth will be won or lost in the agricultural sector. However, how this path leads to economic prosperity is still subject to debate among development specialists and economists.

Nigerian economy in past decades strives on the agricultural sector. The sector is reputed as the mainstay of the economy in the early 1960's. It is seen as the key driver for growth and development. In fact, to further buttress the pivotal role the sector plays in the Nigerian economy, the agricultural sector is part of the Millennium Development Goals program of poverty reduction in Nigeria. In most developing countries (low and middle-income countries), the agricultural sector remains, the largest contributor providing inputs, food, employment opportunities, raw materials for other industries, provision of foreign earnings from exportation of the surpluses, and more importantly the enormous advantage of the value added in the various production process (Izuchukwu, 2011).

Besides, some researchers (Gardner, 2005 ; Chebbi, 2010) have raised a lot of questions regarding the impact of agricultural sector on economic growth. Lavorel et al. (2013) addressed the question raised by Gardner (2005) for 85 countries "is agriculture an engine of growth" by investigating causality relationship between agricultural value added per worker and gross domestic product (GDP) per capita. Though, their findings revealed enormous claim. According to them, they find a causality relationship between agricultural valued added and growth for the developing countries while that of developed countries remained unclear. This fact, buttress the assumption stated earlier, that agricultural sector has been a backbone of developing economies.

Moreover, Matahir (2012) took a different stand on his study on the role of agriculture on economic growth and how it interplays with other sectors in the economy. Time series Johansen cointegration techniques was employed to investigate the non-causality relationship between agriculture and other economic sectors of

Tunis. From their findings, it was posited that, policy makers should see agricultural sectors as vital tools in their analysis of inter-sectorial growth policies. Though, agricultural sectors has not benefited immensely from the growth of service and commerce sector of Tunisia but it contribution to economic growth of the economy can never be overemphasized. This lend support from the study carried by out on Thailand economy by Jatuporn et al. (2011). They are also of the opinion that, policy makers should embrace agriculture and see it as a major contributor to Thailand economy.

Furthermore, despite the political issues in a small island of Northern Cyprus, Katircioglu (2006) in his analysis on the impact of agricultural sector on the economy of Cyprus posited the importance of the agricultural sector on the economy of Northern Cyprus. According to his findings, agricultural sector has a crucial role to play in the development of any economies, especially that of a tiny island of Northern Cyprus. His study revealed that, there exist bi-directional and long-run dynamic causality relationships between the macroeconomic variables. That is, the feedback from agricultural sector has a huge role to play in the development of the economy.

However, studies revealed that (Katircioglu, 2006; Dim and Ezenekwe, 2013; Jatuporn et al, 2011; Tiffin et al., 2013) most developing countries of the world are predominantly agrarian and rural in nature. A substantial proportion of the Nigerian population dwells in the remote areas, and this brought the countryside to the attention of policy and decision makers.

After the discovery of oil in the 1970's, a decline in the agricultural sector's productivity/output was recorded, in term of its contribution to real GDP (RGDP). Empirical research shows that the share of the agricultural sector in GDP increased from 29.2% to 33.3% between 1970 and 1980. According to Aigbokhan (2001) prior to the oil boom in the 1950s and 1960s the agricultural sector accounted for over 63% and 54% of RGDP respectively.

There been no consensus in the literature on the subject of agricultural sectors contribution on economic growth. Izuchukwu (2011) found a positive causality i.e. a positive relationship between the agricultural sector and the Nigerian economy while Dim and Ezenekwe (2013) found contrary results. Several scholars found positive causality using varying econometric techniques ranging from cross sectional to panel approach (Oluwatoyese, 2013; Ahungwa et al., 2014; Olajide et al., 2012; Ebere , 2014) while (Dim, 2013; Aggrey, 2009; Oluwatoyese & Applanaidu 2013) found a negative relationship between agriculture and economic growth.

According to Alene et al. (2005) Nigeria is endowed with a large deposit of agricultural resources, arable land for the cultivation of crops and rearing of animals. In the 1960s and 1970s the agricultural sector constituted over 65% of total export. The Nigerian agricultural sector was renowned for the export of cash crops (agricultural crops and produce with export value) namely cocoa, rubber, hides and skin, groundnut palm among a host of many others. The agricultural sector holds an enormous potential for the growth and economic development of the country.

In a similar study carried out by Bekun (2011) titled "Economics of Yam Marketing in Minna, Nigeria." The study revealed that over 31.5 million metric tons of yams were produced in the study areas. This is overwhelmingly huge, enough to engage more than half of the population in the coverage area. Regardless of the vast potentials the agricultural sector possesses, the industry endowment has not been fully harnessed. There has been a downturn in the late 1970s and figures have dropped significantly to 20% at the end of the 1990s. The decline in the agricultural sectors' contribution is explained by the oil discovery in the 1970s. The 1970s outlined the period when oil was discovered in commercial quantity. This discovery has led to the neglect of the agricultural sector and more focus on the petroleum sector (oil sector). This is one way or the other turned Nigeria into an oil dependent and a monoculture economy.

With the agricultural sector being so productive with arguably massive potential, why then has it been neglected? The answer to this question prompts the motivation for this study. Recent literature is attempting to estimate the relationship between the agricultural sector and economic growth, do so using cross-sectional data. We argued that this methodology is flawed in the sense that the relationship between the agricultural sector and economic growth is best captured over time. Given the so few studies done using time-series data, there is a gap in explaining the real effect of the agricultural sector on economic growth in Nigeria. This study aims to fill this gap.

This study seeks to estimate the effect of the agricultural sector on economic growth under the time series framework, using the vector error correction model (VECM) approach. We seek to investigate the existence of a long-run relationship between the agricultural sector and economic growth using the Johansen co-integration test. By extension, we would evaluate the possible reasons for the neglect of this sector beyond the oil boom in 1970s and the impediments to the growth of the sector in Nigeria.

The next section covers overview of the Nigerian economy in view of its agricultural sector perspective, followed by methodology, empirical results and discussions, then conclusion and policy implications.

2. OVERVIEW OF NIGERIAN ECONOMY AND ITS AGRICULTURAL SECTOR

Nigeria is rated as the largest nation on the African continent, with a vast geographical landmass of 923,768 km^2. Nigeria has an estimated population of over 170 million inhabitants (NPC, 2011 Est.). The country adjoined across the tropics of Guinea Gulf on the western Coast of Africa and also the Republic of Benin, Chad, and Cameroon in the east. Nigeria is endowed with a variety of vegetation, dynamic topography, and viable agro-climatological conditions. Nigeria is also one of the few in the continent blessed with good arable farmland for agricultural activities. Among the Nigerian industries, service accounts for 32% of the GDP, manufacturing 11% and agriculture 30%. Therefore, it is obvious that the agricultural sector plays a significant role in the economic growth and development of the Nigerian economy.

Agriculture deals with the cultivation of land for crop production and rearing of animals for the use of man and also for the feed of animals (livestock). Agriculture has several other sub-sectors like forestry, fishery, processing and marketing of the agricultural products. The agricultural sector provides job opportunities and raw materials for many agro-allied industries.

Agriculture is known to be an extended age practice in the third world and developing nations. The importance of agricultural development to socio-economic growth and development in many third world countries is keen on their transition to economic prosperity. Agriculture contributes over one quarter of the GDP in the most developing nations of the world, especially in Nigeria. The statistics are much higher in the least developed countries (United Nation, 2007). According to the World Bank development report (2007, 2008), agriculture serves as a haven for source sustenance of life, for over 2.5 billion people in the world. The agricultural sector engages a large number of the world population directly or indirectly in the value chain.

Beinteman and Stadt (2006) asserted that, most African nations remain dominated by small-scale farmers who employed crude tools and the use of largely fragmented land to cultivate the crop and rear animals for man's advantage. Most of these peasant farmers dwell in the rural communities in Africa. These account for the overwhelming 80% of the labor force.

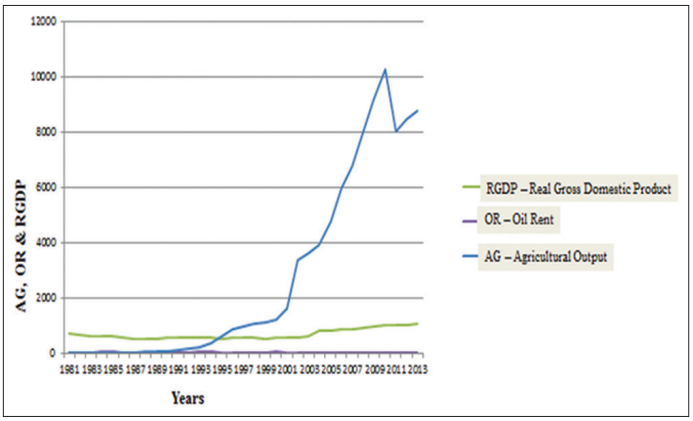
Daramola et al. (2007) asserted that agriculture constituted for 60-70% of the nation's export in the early 1950s and 1960s. Nigeria was viewed as a net exporter of most agricultural products like cocoa, rubber, oil palm, palm kernel, groundnut among many other cash crops with economic value. The accrual from the exports serves as a core source of revenue generation for the government. The above mentioned period was when Nigeria was referred to as food secured; that is self-sufficient in food production with the surplus for export.

However, there been a contrast to this trend, after the discovery of oil in commercial quantity in the late 1960s, which lead to the high influx of foreign exchange earnings for the country. The implication of the oil boom was the gradual decline in the other non-oil sectors especially the agricultural sector that received less attention. Much focus was geared toward the oil exploration, extraction and the returns it brought (Ifeanyi et al., 2008).

Nevertheless, the trend of agriculture in Nigeria over the past decades has not been favorable (FAO, 2006). The growth of agriculture in the sixties and seventies has been experiencing a downward trend. However, the growth rate increased sharply in the 1980s and 1990s. Between this periods, agriculture contribution to GDP rose from 1.1% to 2.3%.

Figure 1 represents the trend of agricultural output, RGDP and oil prices over the period. The chart reveals that agricultural output has an upward trend. The RGDP was higher in the 1980s and 1990s just shortly before agricultural output peaked. The diagram shows a sharp decline in agricultural output in 2009. The possible explanation for this could be the decline in government allocation to the sector.

Figure 1: Real gross domestic product per capita and agricultural output trend 1980-2013



Source: Authors own calculation based on WDI data.

3. DATA AND METHODOLOGY

The annual data used for the study were sourced from the World Bank Development database. The series spans over 30 years. The choice of the time lag was because of availability of data. The variables used in the model specification are RGDP per capita which is used to measure economic growth as the dependent variable while agricultural output and oil rent are the explanatory variables.

The formulation of the model is given below.

$$RGDP/CA = F(Agoutput, OR) \quad (1)$$

The stochastic form of the model is as follows

$$RGDP/CA_t = \beta_0 + \beta_1 Agoutput + \beta_2 OR + U_t \quad (2)$$

Where, our apriori expected sign for β_1 and β_2 is positive,

- RGDP/CA = Real gross domestic product per capita,
- β_0 = intercept (constant),
- Agoutput = Agricultural output (% GDP),
- OR = Oil rent (% GDP),
- U_t = Stochastic term (unobserved).

3.1. Econometric Procedures

3.1.1. Unit root test

Empirical research based on time series presumes that observed data are stationary. That is, such a series has a mean; variance and auto covariance at several lags are time invariant. However, most macroeconomic variables exhibit trends. That is, they grow over time. Thus, the implication of working with non-stationary series results in spurious regression, Granger and Newbold (1974) and Nelson and Plosser (1982). Thus, forecasting and policy implication drawn from such spurious regression analysis would be misleading. A possible way out is to employ the use of unit root testing procedure to ascertain the stationarity of the series and order of integration of the series. This study employs the well-known tests, namely augmented Dickey Fuller (ADF) propounded by Dickey and Fuller (1981) test, Phillip–Perron (PP) test by Phillip and Perron (1988). The general form of the unit root test is given below:

ADF equation:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \epsilon_t$$

Where, ϵ_t denotes Gaussians white noise that is assumed to have a mean value of zero, and possible auto correlation represents series to be regressed on the time t. The ADF has two hypotheses. Where, the null states series has unit root and the alternative states stationary. The study also engages an alternative test for unit root propounded by PP in 1988. The PP test is a semi-parametric test and has similar hypotheses to the ADF. This study for validity of the stationarity properties of the series uses the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test to confirm the outcome of ADF and PP test.

3.1.2. Cointegration test

Most macroeconomic variables like RGDP per capita, agricultural output and oil rent are not stationary at their levels form, since they exhibit trend or/and seasonality. In order to analyze the long-run relationship between the variables in the model, a cointegration test is employed. Granger (1981) and Engel and Granger (1993) recommended a cointegration test to determine the long run relationship among series. The Johansen (1988) cointegration test with lags is defined as below.

$$\Delta Y_t = \Gamma_1 \Delta X_{t-1} + \ldots + \Gamma_{K-1} \Delta X_{t-K+1} + \Pi X_{t-K} + \mu + e_t$$

3.1.3. Error correction model (ECM)

For a long-run association, variables have to be integrated at the same order. Cointegration depicts that there exist a possible convergence in the long-run among series. Series reach their equilibrium level in the long-run by adjustment with time. The VECM procedure is employed with error correction term (ECT). The ECT coefficient is required to be negative and statistically different from zero indicating the functionality of the error correction mechanism. It shows the speed of adjustment of the variable toward their long run values.

4. EMPIRICAL RESULTS AND DISCUSSIONS

4.1. Unit Root Test Result

The study employs unit root test, cointegration test and VECM test. The aforementioned tests are all conducted following the necessary conditions.

The unit root test results are given below.

ttmtIn Table 1, all the variables were not stationary at their level forms. We could not reject the null hypotheses of ADF and PP test, indicting non stationarity. While testing for KPSS, we rejected the null hypothesis at 5%, and concluded that the variables were non-stationary. This is because; KPSS has a reverse hypothesis relative to ADF and PP test.

In order to establish stationarity properties of the variables, we proceeded in differentiating the series. After first differencing all variables became stationary that is to say, we were able to reject the null hypothesis for both ADF and PP at different critical level. Like RGDP was rejecting at 1% critical level for both ADF and PP while agricultural output was rejected at 5% critical level. The outcomes of KPSS were also in support of the results of ADF and PP, as we fail to reject the null hypothesis, meaning the series was also stationary. In summary, Table 1 shows that all the series used in this study are all stationary after first differencing and they are integrated of order I(1). Since the series are of order I(I), this necessitate us to carry out Johansen cointegration test. This is done is order to investigate, if possible long-run relationship exist among the series.

Table 2; present the cointegration results for the series.

From Table 2, we found two cointegrating vectors for the model. We could reject the null hypothesis of no cointegrating vector. Thus, we accept the alternative hypothesis two cointegrating vector using Johansen trace statistic. This implies an existence of a long-run causality relationships between RGDP per capita, agricultural output and oil rent. Therefore, this qualifies us to run the restricted VECM.

4.2. VECM RESULT

The VECM establish, if the variables are cointegrated, indicating a long run relationship. We can also check for short run causality and the dynamics which is the necessity of the VECM test. The VECM approach aid to know the speed of adjustment of the variable considered toward their long-run equilibrium path. The coefficient of the ECT should be negative, though not necessary and statistically significant indicating long run causality and possible convergence and the efficiency of the error correction mechanism.

The study traces a long-run equilibrium relationship by employing Johansen estimation technique. The optimum lag length P (=2) was obtained using Akaike information criterion. The ECM estimates as seen above show 2-folds of causation, i.e., the short-run and long-run dynamic causality relationship. The short run dynamics causality relationship shows a positive causal interaction between oil rent and GDP per capita as expected while agricultural output was normalized. However, the long run dynamics causality relationship in Table 3 shows negative causality relationship (speed of adjustment) for both agricultural output and oil rent. This implies that, deviation of agricultural output and oil rent over long run equilibrium would have a significant impact on growth of the Nigerian economy.

There have been several debates among development specialist on whether agriculture contributes to the development of any nation. In the spirit of Nobel laureate in economics Gunner Myrdal, who asserted that the foundation for economic growth and development is joined in the agricultural sector (Higgs, 1897). It is on this premise that this study is based.

This study empirically examined the contribution of agricultural sector to economic growth in Nigeria and the much-awaited development. The study also queries if there exists a long-run relationship among the variables in the study. Prior to the establishment of a long-run relationship, the stationarity properties

Table 1: Unit root for RGDP, agricultural output and oil rent

Stationarity	LRGDP	Lag	LAgout	Lag	LOR	Lag
Statistics (level)						
τ_T (ADF)	−1.8252	(0)	0.175	(0)	−3.096	(0)
τ_μ (ADF)	0.4239	(0)	−1.657	(0)	−2.328	(0)
τ (ADF)	1.0414	(0)	2.139	(0)	0.4057	(0)
τ_T (PP)	−1.824	(0)	0.175	(0)	−2.981	(3)
τ_μ (PP)	0.140	(3)	−1.657	(0)	−2.289	(3)
τ (PP)	0.847	(2)	4.043	(3)	−0.428	(3)
τ_T (KPSS)	0.19**	(3)	0.159**	(4)	0.1730**	(2)
τ_μ (KPSS)	0.48**	(5)	0.644**	(5)	0.433***	(3)
Statistics (first difference)						
τ_T (ADF)	−4.893*	(0)	−3.884**	(4)	−5.842*	(1)
τ_μ (ADF)	−4.201*	(0)	−3.587**	(0)	−5.786*	(1)
τ (ADF)	−4.144*	(9)	2.585**	(2)	−5.837*	(1)
τ_T (PP)	−4.843*	(4)	−3.750**	(3)	−6.172*	(3)
τ_μ (PP)	−4.187*	(1)	−3.621**	(3)	−6.084*	(3)
τ (PP)	−4.092*	(2)	−2.246**	(4)	−6.191*	(3)
τ_T (KPSS)	0.082	(4)	0.180	(5)	0.050	(1)
τ_μ (KPSS)	0.499	(4)	0.3040	(2)	0.135	(1)

LGDP means natural log value of real gross domestic product, Agoutput-natural log of agricultural output and OR-also natural logarithm of oil rent.τ_T represents the commonly used model with a drift and trend; τ_μ signifies the next model with a drift and without trend; τ is the rarely applied model without a drift and trend. The numbers in brackets represents the various lag length as selected by E-views. *, ** and *** stands for null rejection at 1%, 5% 10% repectively. The compuptation was done using E-view 8.0. RGDP: Real gross domestic product, ADF: Augmented Dickey Fuller, PP: Phillip–Perron, KPSS: Kwiatkowski–Phillips–Schmidt–Shin

Table 2: Johansen multivariate cointegration results

Null hypothesis: H_0	Eigenvalue	Trace statistic	0.05 Critical value	P
r=0	0.567578	43.20402*	29.79707	0.0008
r≤1	0.368360	17.21504*	15.49471	0.0273
r≤2	0.091435	2.972546	3.841466	0.0847

*Rejection of the hypothesis at the 0.05 level

Table 3: ECM result

Short –long-run Causality	Coefficient	Standard error	t-statistic
Short-run causality			
LNOR01 (−1)	52.45315	(14.2658)	[−3.67684]
LA output (−1)	<0.00000	<0.00000	<0.00000
Long-run causality			
LGDPC	0.007747	(0.00265)	[2.92346]
LAgoutput	−0.004961	−0.004961	[−0.58057]
LOR	−0.023798	(0.01197)	[−1.98740]

ECM: Error correction model, GDP: Gross domestic product

was also tested with the conventional unit root testing approaches of ADF, PP and KPSS was used as a confirmatory test for the precision our regression analysis.

In summary, the ECM by implication indicates that it takes the economy a long period to adjust to economic shocks as propagated by oil exploration and agricultural crowding out and that in the long run an increase in oil rent would bring about a decrease in agricultural output and thus a decline in RGDP per capita too. This study reveals the pivotal and essential role of the agricultural sector to the economic growth of Nigeria if given full attention.

5. CONCLUSIONS AND POLICY IMPLICATIONS

Nigeria is known as a developing nation and strived in agrarian activities that is, agricultural production. Oil discovery in the late 60s in Nigeria brought mixed effects on the Nigerian economy. The oil boom brought about competition among several industries fighting to gain the attention of government. The energy (oil) sector over the past decades has been the focus of the subsequent government regimes while other area like agriculture, service and the likes are neglected. This study seizes this medium and highlights the following recommendation for the attainment of the total gains of the agricultural sector and by extension development of the Nigerian economy.

This study reveals that in the short run, a positive statistical relationship exists between natural logarithm value of agricultural output and RGDP. This shows that agriculture is a viable source of economic growth in Nigeria. The study also found out that from the Johansen multivariate test that, there is a long run relationship between all variables. We observed in the long run, the effect of agriculture on RGDP is restricted to zero when oil rent is controlled for, meaning that the neglect of the agricultural sector for the oil sector in Nigeria has negative long run implication as oil has a negative statistical relationship with RGDP.

Finally, the study also posited that adequate information system provided by government will help bridge the gap that exists between the local farmers and research institution for the dissemination of innovation. This will in no small measure restore the lost glory of the agricultural sector in Nigeria since the study was able to trace a long-run relationship with the help of Johansen cointegration test between agricultural output and oil rent more budgetary allocation will help revitalize the sector and the general economy at large.

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