The Contribution of Agricultural Sector on the Economic Growth of Nigeria.

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Submitted to
Institute of Graduate Studies and Research
in partial fulfillment of requirement for the degree of

Masters of Science
in
Economics

Eastern Mediterranean University
July 2015
Gazimağusa, North Cyprus

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ABSTRACT

Agriculture is known as the engine and panacea for economic growth in most developing nations of the world. As once asserted by Nobel laureate in economics Gunner Myrdal "The battle for long-run economic growth is either won or lost in the agricultural sector". Nevertheless, how this path births economic prosperity has been the subject of debates among economist and development scholars. It is on this premise that this study is based. This study empirically examines the impact of agricultural sector on the economic growth of Nigeria. The study is conducted using annual time series data running from 1981 to 2013. The study employs Johansen multivariate cointegration test and Vector Error Correction model (VECM) as the estimation techniques. The results of the study reveals that Real Gross Domestic Product (RGDP), agricultural output and oil rents have a long-run equilibrium relationship according to the Johansen Multivariate cointegration test. Whereas, the VECM result shows that the speed of adjustment of the variables towards their long-run equilibrium path was low, estimated as 10.3042%. Based on the empirical outcomes of the result obtained, the following recommendations were offered: Firstly, government and financial institutions should make credit facilities readily available to farmers with little payback. Secondly, government should promote the diversification of the Nigerian economy to other non −oil sector and more allocation in terms of budgeting to the agricultural sector.

Keywords: Agriculture, Economic growth, Nigeria, Time series, Cointegration, Vector error correction model (VECM).

ÖZ

Tarım sektörü gelişmekte olan uygarlıklar için bir motor ve her derde deva olabilen bir ilaç vazifesini görmektedir. Nobel ödüllü ekonomist Gunner Myrdal'ın da belirttiği gibi "Uzun dönemdeki ekonomik büyüme tarım sektöründeki kazanma veya kaybetmenin mücadelesidir. Yine de bu kavramların ekonomik refahı nasıl doğuracağı ekonomist ve kalkınmacıların tartışma konusudur. Çalışmamız bu öncül tartışma üzerinde yükselmektedir. Bu çalışma ampirik olarak tarım sektörünün Nijerya örneğinde ekonomik büyüme üzerindeki etkisini ölçmeyi amaçlamaktadır. Bu çalışma 1981 yılından 2013 yılına kadarki zaman serilerini veri olarak kullanmaktadır. Çalışmada Johansen çok değişkenli eş bütünleşme modeli ile vektör hata düzeltme modeli (VECM) kullanılmıştır. Çalışmanın sonuçları reel GSYİH ile tarımsal üretim ve petrol kiraları arasında uzun dönem ilişkiye Johansen eş bütünleşim modeli aracılığıyla işaret etmektedir. Halbuki vektör hata düzeltme modeline göre değişkenlerin uzun dönem dengeye uyarlama hızı düşük olarak gerçekleşmekte yüzde 10,3042 olarak karşımıza çıkmaktadır. Ampirik verilere dayanarak şu tavsiyeler önerilebilir: ilk olarak devlet ve finansal kurumlar çiftçilere düşük geri ödemeli krediler sunmalıdır. İkinci olarak da hükümet Nijerya ekonomisini çeşitlendirmeyi seçmeli, petrol harici sektörlere de öncelik tanımalı, tarım sektörüne ayırdığı bütçeyi artırıp geliştirmelidir.

Anahtar sözcükler: Tarım, ekonomik büyüme, Nijerya, zaman serisi, eş bütünleşme, vektör hata düzeltme modeli (VECM)

I dedicate this work to Jehovah my maker.

ACKNOWLEDGMENT

All thanks to Jehovah, who gave me the strength, wisdom and good health throughout the period of this programme.

My Profound and endless gratitude goes to my supervisors Assoc. Prof. Dr. Sevin Uğural and Asst. Prof. Dr. Kamil Sertoğlu for their tireless coaching, tutelage and guidance through my thesis stage and my entire master programme.

I also seize this opportunity to sincerely extend my heartfelt gratitude to my wonderful parent Mr. /Mrs. Aihuagonbekun Victor for their prays and support all the way. My siblings are not left out Osaro Eric victor and my lovely sister (Mrs. Benjamin Nancy and her husband).

Finally, want to appreciate my spiritual source Bethesda Fellowship. Big thanks for all he uplifting messages that kept me. Thanks to the current Pastor Damilola Kolawole and the previous past pastors that ministered to my soul. My spectacular friends and office colleagues were also supportive through these programme (Elham, Hassan, Abubakar and Mariam). Hassan big thanks for the Turkish translation of my thesis. Seyiton, Seyi Akadiri, Martins among others and my personal person, my roommate Arc. Ejeng Ukabi also a graduant. Love you all. See you all at the top.

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LIST OF ABBREVIATIONS

MDG	Millenniums Development Goals
RGDP	Real Gross Domestic Product
VECM	Vector Error Correction Model
GDP	Gross Domestic Product
OLS	Ordinary Least Squares
NPC	Nigerian Population Commissions
UN	United Nations
FAO	Food and Agricultural Organization
CBN	Central Bank of Nigeria
ADF	Augment Dickey Fuller
PP	Phillip Perron
KPSS	Kwiatkowski Phillip Schmidt and Schin
PACF	Partial Autocorrelation Function
JJ	Johansen and Juselius
ECT	Error Correction Term
WDI	World Bank Development Indicators
OR	Oil Rent

Chapter 1

INTRODUCTION

1.1 Background to the Study

Agriculture is the bedrock for 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, "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 agricultural sector is reputed as the mainstay of the economy in the early 1960's. The agricultural sector is seen as the key driver for growth and development. In fact to further buttress the pivotal role the agricultural sector plays in the Nigerian economy, the agricultural sector is part of the Millennium Development Goals (MDG's) 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 (Okoro, 2011).

Studies reveal that 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. (Dim, 2013).

After the discovery of the black gold, oil (post-oil boom), a decline in the agricultural sector's share was recorded, in term of its contribution to Real Gross Domestic Product (RGDP). Empirical research shows that the proportion of the agricultural sector in Gross Domestic Product had been 29.2 percent and 33.3 percent between 1970 and 1980. According to Aigbokhan (2011) prior to the oil boom in the 1950s and 1960s the agricultural sector accounted for over 63 percent and 54 percent of RGDP respectively.

Emeka (2007) asserts that the agricultural sector creates jobs for a large number of the teeming unemployed population in Nigeria, which accounts for over 65 percent of the entire population. This high percentage comprises of subsistence farmers using crude and rudimentary implements like hoes, cutlass and shovel among others to cultivate fragmented farmlands as a source of livelihood. In affirmation of Emeka, Mackie (1964), Abayomi (1997), Abdullahi (2002); World Bank, (2007), all agree that, the agricultural sector contributes to the economy in four perspective areas namely; provision of products, contribution of inputs, market participation i.e. marketing and accrual from foreign exchange.

1.2 Statement of the Problem

According to Manyong et al. (2005) Nigeria is endowed with a large deposit of agricultural resources and huge arable land for the cultivation of crops and rearing of

animals. In the 1960s and 1970s the agricultural sector was constituting over 65 percent 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 reveals that over 31.5 million metric tons of yams was produced in the study areas overwhelmingly huge, enough to engage more than half of the population in the study area. Regardless of 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 percent at the end of the 1990s. The decline in the agricultural sectors' contribution is explained by the oil boom in the late 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 (energy sector). The sole dependence on oil (energy sector) turned Nigeria into 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 argue 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 gap is what this study aims to fill.

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 also try to identify the existence of a long-run relationship between the agricultural sector and economic growth using the Johansen co-integration test. In this study, we also, by extension, determine 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.

1.3 Objective of the Study

The primary purpose of this study is to investigate the impact of agricultural sector on the Nigerian economy's growth. The research aim to answer the following pertinent questions:

1. Why are there inconsistencies in the agricultural sector's contribution to economic growth?

2. Is there any long-run relationship among agricultural sector and the Nigerian economy?

3. What are the various challenges facing the development of the agricultural sector in Nigeria?

1.4 Research Methodology

This study employs a time series analysis to investigate the contribution of agricultural sector to the economic growth of Nigeria. Given the period under review (1981-2013), unit roots test was carried out with the widely used Augmented Dicky Fuller (ADF) and Phillips-Peron (PP) to check the degree of stationarity of variables employed in the study. Since it is a well-established fact that, GDP is usually difficult to be stationary at levels form. Also, co-integration test will be carried out to test the long-run equilibrium relationship between the variables and VECM will be used.

1.5 Organizational Structure

The make-up of this research work comprises of six chapters. Chapter one is the introduction, background of the study, statement of the problem, the objective of the study, research methodology, and organizational structure.

Chapter two comprises the literature review. It entails theoretical and conceptual framework of agricultural sector contribution to the economic growth of the Nigerian economy.

The next chapter is three which dwells on the Nigerian economy and its agricultural sector. Chapter four focuses on research methodology, nature of data, method of data collection, and method of data analysis.

While chapter five of this research focuses more on data presentation, data analysis, discussion of findings and interpretation of results, chapter six forms the summary, conclusion and policy implication from this study.

Chapter 2

LITERATURE REVIEW

This chapter comprises of the review of related studies carried out by other researchers, and a detailed summary will be made and fused into the subsequent section, given that there have been several views on the topic. Some of the researchers, (Okoro, 2011) find a positive causality that is, a positive relationship between the agricultural sector and the Nigerian economy while others (Dim, 2013) found contrary results from their study.

In the history, Aristotle, Aristarchus and Warren Anderson and many more others provide us with a frame that, agriculture is the key to the growth and development of any nation. The Physiocrats in their ideology are of the opinion that, agriculture is the sole engine that drives any economy to her promise land. That is, out of the poverty line and obscurity; these thinkers, the Physiocrats strongly have fate in the agricultural sector which serves as the propeller of an economy. In essence, the Physiocrats are of the opinion that productivity and prosperity of any nation either developed or less developed nation is hinged on the agricultural sector.

A study carried out by Oyetade and Oluwatoyese (2014) on the effect of the agricultural sector as the determinant of economic growth, using a time series econometric model from 1980 to 2011 covering the period of 30 years. The study modeled several agriculture sector variables namely food/crop production, fishery,

forestry, as the explanatory variables against the dependent variable, gross domestic product (GDP). The study revealed a positive relationship between the agricultural sector and economic growth. The study also discovered agricultural sector as the determinant for exportation, if given due attention in all ramification in terms of funding and enabling the environment to key actors in the sector. The study also summited that there are constraints to the full attainment of agricultural sector progress.

Going through the empirical work of Ahungwa et al., (2014) were they examined trend analysis of the impact of agriculture to GDP for a period of 53 years, precisely between 1960 and 2012 using time series data. The finding from their work revealed that the agricultural sector's share of GDP experiences a decline, Regardless of the retrogression. The agricultural sector still had a superior lead over other sector's, from 1960 to 1975.The study also depicts a fluctuation between the industrial sector around 1967 to 1989.The regression results, shows that there exist a positive and significant relationship between the agricultural sector with GDP accounting for 66.4 percent of the variation in the economy, and also displays the dominance of the agricultural sector relative to other sectors of the economy. The study recommended that there should be a conducive and enabling environment provided by the government and decision makers so that the full gains can be derived from the sector, and also the Nigeria state can realize the much-clamored Vision of being the among the top 20 leading economies in the year 2020.

A research conducted by Aremu (2014) covering a time span of 30 years within the period of 1981 to 2012, where he investigated the role of agriculture in economic growth and development. He examined the role that the agricultural sector played in

the advancement of the Nigeria economy, considering the years of neglect by government and decision makers. Aremu's research use of econometrics to validate his hypothesis where he used the Solow growth model that included gross capital formation (GCF) as the proxy for capital, labor proxy by post-secondary enrollment, while agricultural output and economic growth and development was proxy by real gross domestic product (RGDP). Restricted Error Correction Approach was employed for the long-run relationship. The study revealed that agriculture plays a remarkable role in economic growth and development of Nigeria. From his findings, it was shown that agricultural sector still contributed to gross domestic product, though, there has been a decline since the 1990's explained by the arrival of the new bride (oil discovery) in the late 1970's.

Ekiran et al. (2014) examined the relationship between agricultural export and economic growth in Nigeria: A multivariate Johansen co-integration analysis, within the period of 1980 to 2012. Ekiran et al. (2014) approach was adopted in the spirit of Hwa (1988) stationarity test was conducted using Phillips-Peron unit root test, Johansen cointegration and Error Correction Method was use to estimate long-run and short run relationship among agricultural export and economic growth. The findings from this research revealed that agricultural export and agricultural output has long run relationship and seen as a key driver of economic growth and development of Nigerian economy. It was advocated that government should pay attention to agricultural export, as it serves as a stimulant for the much canvass economic expansion and development in the Nigerian.

Laxmi (2014) empirically analyze the agricultural growth in India. The study answered the question of why the inconsistency in the agricultural sector contribution

to growth despite the series of contribution in the sector over the decades. The study employed panel corrected standard approach across the Indian states using beta convergence over 30 years precisely between 1980 and 2012. The discovery from Laxmi research revealed the existence of absolute beta convergence. Laxmi (2014) recommended a synergy between the public and private sector contribution. That is private sector involvement in the enhancement of the infrastructural facilities in India, which will, in the long run, boost growth and development.

Several scholars affirm in the spirit of Oyetade (2014) among which are Alkali (1997) all summited that Nigeria was the second producer and exporter of cocoa in the world and also the largest exporter of palm kernel as well as oil palm. Nigeria was renowned for the exportation of commodities ranging from cotton, groundnut, rubber, skin and hides. All those above were before the oil boom. Regardless of the dependence of Nigerian farmers on rudimentary tools such as hoes, cutlass and shovels among others, these farmers still accounted for over 70 percent of Nigeria production and 95 percent of its export needs (Lawal, 1997).

Olajide et al. (2012) in his studies of agricultural resources and economic growth in Nigeria also discovered a positive causality between GDP and agricultural output, where he used Ordinary Least Squares (OLS) econometrics techniques, precisely between 1970 and 2010. From his studies, it was revealed that agricultural sector accounted for about 35 percent of the variation in GDP. Even though the agricultural sector suffered a high level of setback, immediately after which oil was discovered in commercial quantity. He recommends that government should make available infrastructural facilities such as constant power supply, pliable road, opening of

feeder roads to rural farmers and access to financial support with small payback return.

The empirical study carried out by Ebere et al. (2012) on the impact of government spending on agriculture and economic growth, using the Ordinary Least Squares (OLS) econometrics technique on a time series data covering over 30 years between 1980 and 2012. The study revealed that there exist a positive and significant association between GDP and agricultural output. The study also figured out a couple of constraints among which are paucity of capital available to the rural farmers, poor infrastructure and emphasis was laid on timely and adequate agricultural extension services among all key agents in the agricultural sector.

Onunze (2012) in his empirical work examined the impact of agricultural development on Nigerian growth within (1980 to 2010) the period of 30 years. Over several decades, there have been many debates amidst development economist, whether agricultural sector holds the key to national development and industrialization. The study employ the use of OLS technique, by using agricultural development, capital formation, inflation rate and interest rate to investigate the question if agricultural sector serves as an engine room to drive growth and development. The study revealed empirically that, there exist a positive relationship between the agricultural sector and economic growth. The study also submitted that government should develop and apply contemporary policies to aid the industry match up with other sectors of the economy.

Going through the empirical analysis of Okoro (2011) where he investigated the contribution of agricultural sector on the Nigerian economy, using panel data for a

period of over twenty years, precisely between the year 1986 and 2007. Okoro (2011) discovered a positive relationship between agricultural sector and economic growth in GDP as dependent variable, while foreign direct investment (FDI) and domestic savings (DS) were the explanatory variables. From his findings, FDI and domestic savings were able to explain 81 percent of the variation in the economic growth, quite a robust model. He recommended, better improvement of the Nigerian agricultural sector, and that the government and Central Bank of Nigeria (CBN) should have accessible and low-interest rate loan plan for farmers and also strengthen the research institutions for noble findings.

According to Lawal (2011) in his study, where he analyzed government expenditure on agricultural sector contribution to growth (GDP) and subsequent development, for a period of 30 years between 1970 and 2007. His study was in affirmation with Okoro (2011) where it was revealed that a direct relationship exists between the agricultural sector and economic growth. Ukeji (2003) who also conducted a research on the relationship between the variables in question also agreed with (Lawal. 2011; Okoro, 2011) that there exist a positive relationship between gross domestic product and the agricultural sector. Ukeji (2003) x-rays that in the 1960's agriculture accounted for over 65-70 percent of the total gross domestic product. Nevertheless, there have been a nose dive to 48 percent in the 1970's and still decline to overwhelm 19 percent in the 1990's this outcome is explained by the oil boom.

Simeon (2009) opinioned in his paper titled, "the role of agriculture in Nigerian economic growth; general equilibrium analysis". He pointed out that, Nigeria is endowed with abundant resources. The agricultural sector has the prospect for growth, but this is not the reality as the Nigerian agricultural sector is characterized

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by small farm size, mainly subsistence base and also threatened by fluctuations in climatological agro conditions. The study also reveals that, numerous unsuccessful progress and policies that have not yielded the desired results were due to the misappropriation of funds budgeted to the sector. Simeon (2009) using the global trade analysis project (GTAP) approach found out a growth capacity of Nigerian agricultural sector. The study submitted that the bias towards the agricultural sector should be discarded and meaningful contribution in terms of funding and the entire well-being should be made available because, the agricultural sector holds the capacity for job creation, food sufficiency and foreign exchange earnings from exportation.

Ligon and Sadoulet (2008) in their analysis, using a panel data, investigated the contribution and impact of the agricultural sector and non-agricultural sector on GDP. Ligon and Sadoulet (2008) findings agree with other researchers that the agricultural sector is significantly a stimulant for the growth and development of an economy about other sectors.

Contrary to other researchers, Dim (2013) in his paper titled "Does agriculture matter for economic development, empirical evidence from Nigeria. Where he use unit root test and Newey-West method discovered a contrary outcome that agricultural output has a negative impact but statistically significant in Nigeria.

In a research carried out in Uganda by Niringiye (2009) on the patterns of agricultural growth and overall growth of Ugandan economy. The study examined the relationship between the share of agriculture and the agricultural subsector on GDP in Uganda. The study use of regression and trend approach to undertake the

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study. The findings was contrary with other scholars that there is inconsistent and also not significant relationship between the agricultural sector and gross domestic product (GDP), explicitly the subsectors such as livestock, fishery and food crops contribution GDP decline as GDP/capita rises while the fishing sector exhibited a positive and a significant relationship with the per capita income. These discrepancies are explained by poor policy. The study advocated the need for adequate and restructure of policy framework that will make the agricultural sector more competitive and thereby increasing productivity of the industry and also adopting the use of high vigor varieties, upgrading of the infrastructural facilities in the agricultural sector and ready availability of farm inputs as at when due especially fertilizers.

Chapter 3

DESCRIPTION OF THE NIGERIAN ECONOMY AND IT'S AGRICULTURAL SECTOR

From the African perspective, Nigeria is rated as the largest nation on the African continent, with a vast geographical landmass of 923,768 square kilometers. 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 percent of the GDP, manufacturing 11 percent and agriculture 30 percent. It is, therefore, obvious that the agricultural sector plays a significant role in the economic growth and extension 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 (Nwankuw, 1981).

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 to GDP in the most developing nations of the world like Nigeria. The statistics are much higher in the least developed countries (United Nation, 2007). According to the World Bank statistics (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) asserts that most African nations remain dominated by small-scale farmers who employ 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, accounting for overwhelming 80 percent of the labor force.

Daramola et al (2007) assert that agriculture constituted for 60-70 percent 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 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, but the growth rate increased sharply in the 1980s and 1990s. Between 1980s and 1990s agriculture contribution to GDP rose from 1.1 percent to 2.3 percent in the 1990s.

On the other hand, the Nigerian oil and gas sector plays a vital role. The petroleum sector comprises of mining, quarrying, and solid minerals. In general, the oil and gas industry in Nigeria has experience decline in the past years as results of the activities of vandalisms of petroleum pipelines and insulations in the Niger Delta region of the country. These activities account for the drastic decline in the accrual to the government. The contributions of oil and gas sector to gross domestic products accounts for 16.29 percent and 17.35 percent between 2008 and 2009. In terms of production volume in the barrel between 2008 to 2009 shows a 0.45 percent increase, from 768,745,932billion barrel to 780,237,940 billion barrel.

The chart below represents the trend of agricultural output, RGDP and oil prices over the period under review in this study. The chart reveals that agricultural output has an upward trend. The chart also shows that 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.
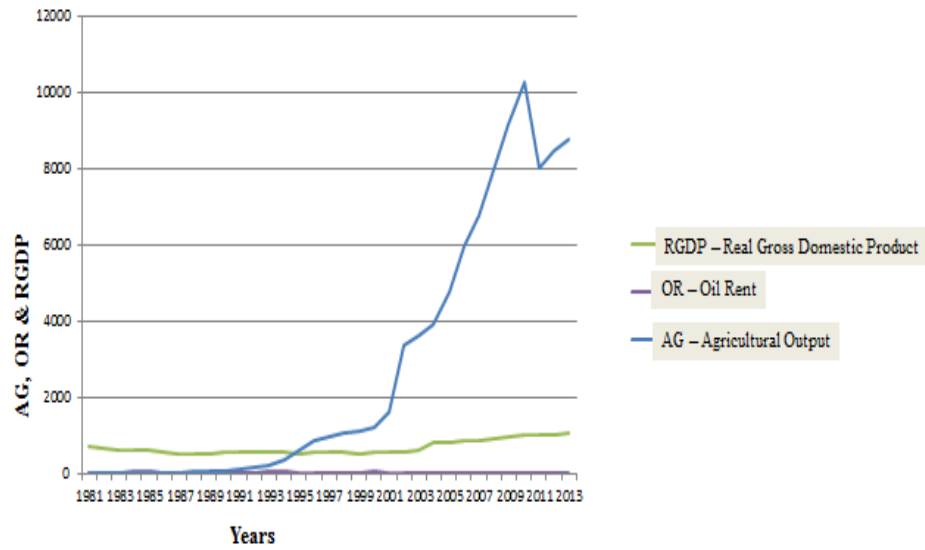

Figure 1. RGDP Per Capita and Agricultural Output Trend 1980-2013
Source: Authors Creation, data from WDI

Chapter 4

METHODOLOGY AND DATA

This research employs the use of time series econometrics technique to validate the objectives in this study. The study spans a period of 33 years, between 1981 and 2013. The sources of data are the World Bank development indicators and the Central Bank of Nigeria. The study employs the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, to test for stationarity of all variables involved in the model to avoid a spurious regression analysis. It is a well-known fact that most macroeconomic data exhibit trend and seasonality. Johansen cointegration test is also carried out to test for the long-run relationship between variables considered, and the VECM approach is the next test engaged in the study to capture the possible disequilibrium in the short run and the speed of adjustment of the variables considered towards their long run path. 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.

4.1 Model Specification and Variables

To analyze the impact of the agricultural sector on the Nigerian economy's growth, two variables are considered as the explanatory variables chosen on the basis of previous empirical studies and economic intuition. These variables are agricultural output (Agoutput) and oil rent (OR), Economic growth is measured by RGDP per capita (RGDP/CA). The data obtained from the World Bank Development indicator (WDI), Span the period of 1981-2013. The formulation of the model is given below.

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

The stochastic form of the model is as follows

$$RGDP/CA_t = \beta_0 + \beta_1 Agoutput + \beta_2 OR + \cup_t \qquad\qquad (2)$$

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),

- $\cup_t$ = Stochastic term (unobserved).

Log of Real gross domestic Product

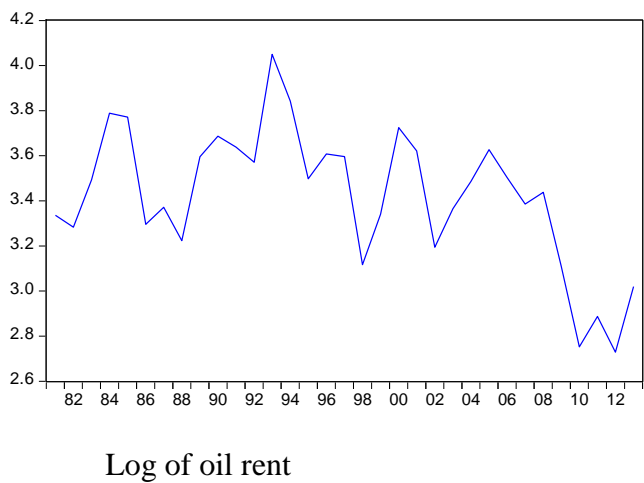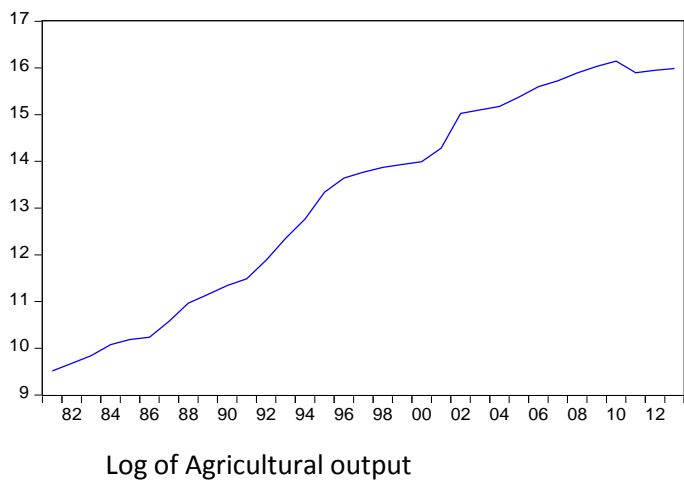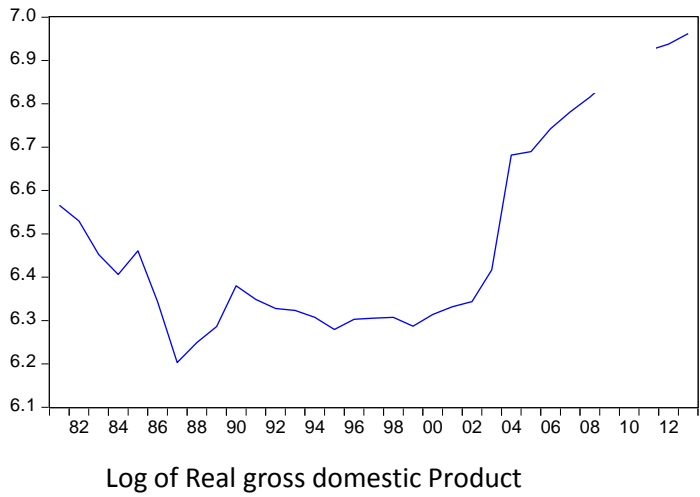Log of Agricultural output

Log of oil rent

Figure 2. Presents the data used in the empirical analysis

4.2 Stationary Test

According to Gujarati (2009), time series data are most of the times not stationary, which means that its mean, variance and covariance of such a data set are not time invariant. Non-stationary series pose threats to the econometrician, as they lead to spurious and misleading regression results. It is, therefore essential to test for the stationarity of each variable to ascertain the characteristics of the series. The stationarity test also gives us a chance to know whether both the regressor and regressands within the model are integrated at the same level.

To test for stationarity, there are several techniques that are used for both formal and informal test. The informal test approach includes the graphical inspection of the series, which gives a glimpse of the nature of the series. Alternatively, Partial Autocorrelation Function (PACF) correlogram techniques are used. The well-known formal techniques are the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. In this thesis we employ both the ADF and PP tests and also the Kwiatkowski Phillips Schmidt and Shin's (KPSS) test for the confirmation of the results of ADF and PP tests.

Augmented Dickey-Fuller (ADF) Test

The Augmented Dickey-Fuller (ADF) test is a modified form of Dickey-fuller test for stationarity, propounded by Dickey and Fuller (1981). The ADF test is developed to correct for the shortcomings of the Dickey-Fuller test to capture for higher order autocorrelation functions. The ADF makes the adjustment for the unit root test in cases where e_t is not white noise, indicating that there may be tendency of correlation in the error term. The ADF equation for testing unit root is given below.

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{r} \alpha_i \Delta Y_{t-i} + e_t \tag{3}$$

With,

$$\alpha_i = -\sum_{k=i+1}^{s} \delta k \quad \text{and} \quad \delta = \left(\sum_{i=1}^{s} \delta_i\right) - 1$$

where e_t signifies pure white noise disturbance term and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, *t is the time and* β stands for the intercept. In order to avoid the problem of serial correlation among our error term, we determine the number of lagged difference empirically. This is to avoid a biased estimation of δ. The merit of the ADF technique is that it allows for the accommodation of higher order auto regressive process (Greene, 2003). The above stated ADF equation can be carried out either as the widely used model with trend and drift, or only trend and also with the least used model none, with neither trend nor intercept. The null hypothesis in ADF test is H_o: $\delta = 0$ that is the series has unit root (not stationary) and alternative H_1: $\delta < 0$ which means the series is stationarity.

Phillips-Perron Test

The PP unit root test was developed by Philip (1987) and Perron (1988) for testing stationarity of series. It is an alternative to the Augmented Dickey-Fuller (ADF) test for stationarity. It is a non-parametric method for removing higher order serial correlation in a series, and it is used to ascertain the process of generating PACF and a simple first order autoregressive model, AR (1). It calculates the residual variance using the well-known newey-west method for correcting heteroscedasticity and autocorrelation. The newey-west (Barlett) equation for Phillips Perron unit root coefficient takes the form given below.

$$\omega_k = \frac{1}{T} \sum_{s=k+1}^{T} \ell_t \ell_{t-s} \qquad k = 0.......p = k^{\text{th}} \text{ auto covariance of residuals}$$

$$\omega_0 = [(T-K)/T]s^2 \qquad where \qquad s^2 = \frac{\sum\limits_{t=1}^{T} \ell_t^2}{T-K}$$

$$\gamma = \omega_0 + 2\sum_{k=i+1}^{n}\left(1 - \frac{k}{n+1}\right)\omega_k \qquad\qquad (4)$$

Where n represents the restricted lag form for estimating the PP test statistic and ω_k is the correlation coefficient of changes in residuals.

In order to specify a model correctly, to know whether the variables exhibit random walk or pure walk, we employ both ADF and PP to test the presence of unit root. Generally in unit root tests, the null hypothesis states, that there is unit root, which means the series is not stationary, on the contrarily, if we fail to reject the null hypothesis at levels (i.e. $\delta = 0$), the next step will be to take the first difference of the series to get a stationary series while the alternative hypothesis states there is no unit root, meaning the series is stationary. In situation where the null hypothesis is rejected, the series becomes stationary.

Kwiatkowski Phillips Schmidt and Shin's test

The KPSS is carried out to validate and to buttress the results of ADF and PP tests. This procedure was developed by Kwiatkowski et al. (1992). The KPSS test hypotheses are the direct inverse of ADF and PP, where the null hypothesis (H_0) states that the series is stationary while the alternative (H_1) says non stationary. The Lagrange Multiplier (LM) statistics is used to test the stationarity of the series. This is achieved by

$$Y_t = \rho t + r_t + \eta_t;$$

where t = (1, 2),….,t which represents observed series of Y_t. r_t depicts the random walk that was computed by "$r_{t-1} + v_t$" . To accept the null hypothesis, the error term variance of the random walk σ_v^2 is expected to be (0) zero (Kwiatkowski et al. 1992). Therefore, LM estimate is obtained as follows:

$$LM = \frac{\sum_{t=1}^{T} S_t^2}{\sigma_\varepsilon^2} \qquad (5)$$

The partial sum of the residual process is depicted by S, given below

$$S_t = \sum_{i=1}^{t} e_t$$

The KPSS unit root test can be estimated with trend and intercept model or only trend model. In the same light PP unit root tests and ADF unit root test is given below:

$$Y_t = \alpha_0 + \mu t + k \sum_{i=1}^{t} \xi_i + \eta_t \qquad (6)$$

4.3 Cointegration Test

It is a well-known fact that most macroeconomic variables like RGDP per capita, agricultural output and oil rent are not stationary at their levels form, since they may 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. Johansen and Juselius (1990) trace statistic shows the presence of cointegrating vector among multiple variables. The Engel-Granger (1987) technique is also a cointegration method which in general is accepted to be inferior to Johansen test. The Johansen and Juselius (J&J) statistic is also

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adopted to resolve the issue of endogeneity of explanatory variables by allowing vector auto regressive and or error correction model with lag restrictions. The J&J cointegration test with lags is defined as below.

$$\Delta Y_t = \Gamma_1 \Delta X_{t-1} + ... + \Gamma_{K-1} \Delta X_{t-K+1} + \Pi X_{t-K} + \mu + e_t \qquad (7)$$

where Π represents the number of cointegrating rank of vector (i.e. r) which is found by testing whether the eigenvalues (λ_i) are statistically different from zero. Johansen (1988) and Johansen and Juselius (1990) propose that using the eigenvalues of Π ordered from the maximum to the minimum is for computation of trace statistics. The cointegration test (Johansen) for a long run relationship can be carried out by comparing the null hypothesis (H_0) with its trace statistic estimated value and the related critical values found by Osterwald-Lenum (1992). If the trace statistics is greater than the critical value, we reject the null hypothesis meaning the series are cointegrated, otherwise we fail to reject and we accept the alternative hypothesis which means there is no cointegrating vector. The trace statistic (λ_{trace}) is computed as

$$\lambda_{trace} = -T \sum Ln(1 - \lambda_i)$$

4.4 Error Correction Model

For a long-run association, variables have to be co-integrated at the same level form. At first difference cointegration depicts that there exist a possible convergence in the long-run among series. Short run equilibrium is most likely to converge in the long-run by adjusting with time. The VECM procedure is employed with error correction term (ECT). The ECT which 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. The assumption that

all variables are I(1). They cointegrate in the long run, and the ECM is provided below

$$\Delta Y_t = \delta(\Delta X_t) + \tau(Y_{t-1} - \theta X_{t-1}) + e_t$$

(8)

The equation stated above represents the variation in Y_t towards its long-run trend as it is caused by corresponding variation in X_t, close to its long-run trend. The ECT is given as follows $\approx (Y_t - \theta X_{t-1})$.

Chapter 5

EMPIRICAL RESULTS AND DISCUSSION

This chapter presents the results and discussions of the study. The study employs unit root test, cointegration test and vector error correction model (VECM) test. The aforementioned tests are all conducted following the necessary conditions. Like unit root, to know the stationarity properties of the series, using the popular Augmented Dickey Fuller (ADF) and Phillip Perron (PP) to know if the series is stationary or not among variable considered. This is done to avoid a spurious regression or meaningless regression analysis. Johansen cointegration test is also conducted to see if long run relationship exists between the variables considered and subsequently the Error correction Model is carried out to ascertain the short run relationship and the speed of adjustment toward their long-run values.

The unit root test results are given below.

Table 1. ADF, PP and KPSS (unit root for Real GDP, Agric. output and oil rent).

Statistics (Level)	LRGDP	lag	LAgout	Lag	LOR	lag
τ_T (ADF) -1.8252		(0)	0.175	(0)	-3.0960	(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)	LRGDP	lag	LAgout	Lag	LOR	lag
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)

Note: 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

We observed from Table 1 above that all the variables are not stationary in their level form when tested with the three models of ADF and PP. In all models we could not reject the null hypotheses of ADF and PP test, indicting non stationarity. While for KPSS we rejected at model with drift and trend and drift without trend model at 5% which signifies the variables are non-stationary that is, has unit root. This is because KPSS has a reverse hypothesis relative to ADF and PP test.

The next step required is to take the first differencing to ensure the stationarity properties of the variables. 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). The next procedure is to validate if there exist any possible long run relationship among the series which is the next test engage in this study.

5.1 Cointegration Result

The differentiation of the variables considered in this study was necessary since all were not stationary at their level form using all conventional unit root test procedures. After the first difference, all variables were stationary. The need for possible long run relationship will be establish with the Johansen cointegration test.

Table 2. Johansen Multivariate Cointegration Results

Null Hypothesis H_0	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
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 2 shows that there exist two cointegrating vectors in the model. Since we could reject the null hypothesis, which states is no cointegrating vector and also the probability value helps us make rejection decision, otherwise we accept the alternative of there is one cointegrating vector equation. This implies we can deduce there is a long run relationship between RGDP per capita the dependent variable in the model and agricultural output and oil rent explanatory variables in the study area. This qualifies us to run the restricted VECM

5.2 Error Correction Model (VECM) Estimation

The VECM becomes necessary after all variable are integrated at the same level i.e. I(1) indicating a long run relationship. There is need to 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 must be negative and statistically significant indicating long run causality and possible convergence and the efficiency of the error correction mechanism.

Table 3. Error Correction Result

Cointegrating Eq:	CointEq1	CointEq2	
LGDP_CA(-1)	1.000000	0.000000	
LAGOUT(-1)	0.000000	1.000000	
LOR01(-1)	2.890556 (0.46248) [6.25009]	9.277573 (2.23877) [4.14405]	
C	-16.41810	-45.16982	
Error Correction:	D(LGDP_CA)	D(LAGOUT)	D(LOR01)
CointEq1	-0.103042 (0.02270) [-4.53866]	0.121078 (0.06899) [1.75492]	-0.137874 (0.09332) [-1.47738]
CointEq2	0.019733 (0.00611) [3.23127]	0.006857 (0.01856) [0.36948]	-0.047617 (0.02510) [-1.89688]
D(LGDP_CA(-1))	0.054615 (0.16005) [0.34124]	-0.878470 (0.48637) [-1.80616]	0.757323 (0.65789) [1.15114]
D(LAGOUT(-1))	0.125768 (0.05911) [2.12774]	0.139844 (0.17963) [0.77852]	0.547833 (0.24297) [2.25472]
D(LOR01(-1))	0.172063 (0.04909) [3.50500]	-0.118976 (0.14918) [-0.79752]	0.388291 (0.20179) [1.92421]

C	-0.009423	0.182846	-0.123613
	(0.01559)	(0.04738)	(0.06408)
	[-0.60442]	[3.85950]	[-1.92897]

R^2	0.526573	0.411964	0.439505
Adj. R^2	0.431888	0.294357	0.327406
Sum sq. resids	0.067069	0.619385	1.133248
S.E. equation	0.051795	0.157402	0.212908
F-statistic	5.561291	3.502884	3.920688
Log likelihood	51.12134	16.66464	7.300852
Akaike AIC	-2.911054	-0.688041	-0.083926
Schwarz SC	-2.633508	-0.410496	0.193620
Mean dependent	0.013956	0.203674	-0.008474
S.D. dependent	0.068718	0.187378	0.259607

Determinant resid covariance (dof adj.)	2.99E-06
Determinant resid covariance	1.57E-06
Log likelihood	75.20755
Akaike information criterion	-3.303713
Schwarz criterion	-2.193530

From the table 3 above all coefficients were positive in line with our apriori expectations. The ECT, technically named as the speed of adjustment, is 10.3042% as depicted by the Table 3 above. The ECT is estimated as negative and statistically significant at 1%, indicating that the short run value of RGDP per capita will converge to its long run value by 10.3042% per annum by the contributions of the agricultural output and oil rent as explanatory variables. The coefficient of determination was able to account for 53% of the variation in real gross domestic product per capita as explained by agricultural output and oil rent. This suggests that the remaining 47% is determined by other factors not included in the model. Also the F-statistic is greater than the critical level which allows us reject the null. Therefore the F-statistics value depicts the joint significant and correct specification of the model.

Chapter 6

CONCLUSION AND RECOMMENDATION

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

Table 1 depicts the unit root results, which reveals that all variables were non-stationary at their level form. After first differencing, all the variables became stationary at several critical levels with different lag selection criterion as provided by E-views. In summary, the table shows that all variables are integrated in the same order that is, I(1). Johansen cointegration test displays the existence of two cointegrating vectors, which depict the existence of a long run relationship among the variables of interest in this study. That is, in the long-run all the variables will

converge together. The ECT explains the speed of adjustment of the variables to their long run equilibrium value. The outcome of the ECT was negative which is expected indicating how far we are from the equilibrium value and also statistically different from zero which show the efficiency of the VECM approach. This study reveals that the speed of adjustment of the model was over 10 percent, precisely 10.3042, while the second ECT was approximately 2% as speed of adjustment with the contribution of agricultural output and oil rents.

In summary, the error correction model by implication is trying to say, 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 real gross domestic product 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.

6.1 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. The recommendations are:

(i)   This study reveals that in the short run, a positive statistical relationship exists between log value of agricultural output and RGDP. This shows that agriculture is a viable source of economic growth in Nigeria

(ii)   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.

(iii)   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.

(iv)   Finally, since there exist a long run relationship between RGDP and agriculture, more budgetary allocation will help revitalize the sector and the general economy at large.

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