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AGRICULTURE FOREIGN DIRECT INVESTMENT (AFDI) AND AGRICULTURAL OUTPUT (AGDP) IN NIGERIA (1986-2017)

BY

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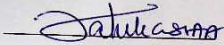
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BEING A DISSERTATION PRESENTED TO THE DEPARTMENT OF ECONOMICS IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN ECONOMICS OF ADEKUNLE AJASIN UNIVERSITY, AKUNGBA-AKOKO, ONDO STATE, NIGERIA.
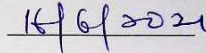
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2021.

CERTIFICATION

This is to certify that this research study was carried out by **Adetula, Rotimi** with Matric number**159501021** of the Department of Economics, Adekunle Ajasin University Akungba Akoko, Ondo State.

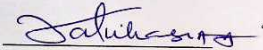_____   16/6/2021
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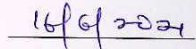_____   16/6/2021
Professor A.A. Fatukasi   **Date**

Head of Department

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DEDICATION

This dissertation is dedicated to God, Almighty for His grace, guidance and blessings over me throughout my programme at the University.

To God be all the Glory.

ACKNOWLEDGEMENTS

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ABSTRACT

Agricultural sector in Nigeria is an important and strategic sector that is waiting to be properly developed and harnessed for Nigerians and the nation at large. Despite the potentials in the sector, Nigeria faces acute food shortage and unfavourable agricultural exports as a result of low productivity. It is in the light of this, that this study examined the relationship between agriculture foreign direct investment inflows and agricultural output in Nigeria from 1986 to 2017.

The study employed secondary data from the Central Bank of Nigeria (CBN) statistical bulletin and World Bank publications. Augmented Dickey Fuller unit root test and Johansen Co-integration test were adopted for the preliminary analysis while Granger Causality test and Vector Autoregression (VAR) techniques were used to analyze the data collected.

The unit root test showed that the variables of the study were stationary at 5% significant level and the co-integration test confirmed a long run relationship between the variables. The granger causality test showed unidirectional causality from agricultural output to agricultural foreign investment. This implies that the foreign direct investment to the agricultural sector helps in the prediction of agricultural output in Nigeria. The VAR estimation revealed that agricultural output in Nigeria was significantly influenced by exchange rate, trade openness, level of investment and the labour force in the agricultural sector of the economy with influence of 0.054%, 0.56%, 5.20% and 12.15% respectively. Also, the estimation revealed that 1% increase in agricultural foreign direct investment led to about 0.033% increase in agricultural sector output.

The study concluded that the agricultural output in Nigeria is positively hinged on the level of foreign investment and the number of active labour force in the agricultural sector. The study also concluded that the level of international trade determined the volume of agricultural output during the study period. The study recommended that government of Nigeria should formulate policies and programmes that can encourage foreign investors to invest in the agricultural sector. Incentives such as tax holiday should be given to investors so as to motivate them to invest in the sector. Similarly, government should sensitize and create awareness to the international community concerning the agricultural potentials that can be harnessed in Nigeria.

Keywords: **Agricultural output, agricultural foreign direct investment, granger causality, vector autoregression**

CHAPTER ONE

INTRODUCTION

1.0   Background to the Study

The importance of Foreign Direct Investments (FDI) to developing economies underscores the reason for the upward flow of Foreign Direct Investments (FDI) into Nigeria which has continued to be on the increase since the 80s. A total of N1725.0 billion of Foreign Direct Investments (FDI) came into the country in 1981 and later increased to N7,188.6 billion, an increase of 316.73 in percentage in 10 years. The increase in trend continued 10 years after to N50,253.9 billion in year 2000. In 2013, the total inflows of Foreign Direct Investments (FDI) into the country stood at N148,365.3 billion representing an increase of 195.23 in percentage, but a greater percentage of this inflows over the years has been mainly channeled to some sectors of the economy like Oil & Gas, Telecommunication and Construction sector. Whereas, agricultural sector's share of FDI inflows has been low. For example, sectoral decomposition of FDI inflows to agriculture between 1980 – 2017 on a four year average were 7.6%, 1.4%, 2.3%, 0.9%, 0.7%, 0.4%, 0.58% and 0.41% respectively.

It has been established from earlier study Preffermann and Madarassy (1992) that, for foreign direct investment to flow into an economy , there are some explaining factors behind the flow. These factors are identified as the size of domestic markets; capital utilization; fiscal deficits, inflation, exchange rate volatility, interest rate, macroeconomics policies, international factors etc. Whenever these factors create an environment that is not conducive to foreign direct investment , the chances are that the affected economy suffer from capital flight.

Nigerian government had to embark on policies and structural reforms leading to increased openness, lowered barrier to trade, liberalized its domestic financial markets, removed

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restriction on capital movements but foreign direct investment flows into the country has continued to be mainly into the Oil & Gas sector, Construction and , recently the Telecommunication sector. Over 90% of the country's export is from the Oil sector. Other important sectors in Nigerian economy like Agriculture sector may require a robust flow of foreign direct investment too to stimulate the output of the sector, so as to contribute substantially to the exports of the country.

Nigeria like many developing countries now, more than ever before needs to urgently transit her economy from the predominantly agrarian sector, to commercial agriculture. Her over dependence on Oil can be reduced if the output from agriculture sector increases in its leap and bounds. It is only commercial agriculture that can help to achieve this goal. Undoubtedly, commercial agriculture involves considerable application of modern techniques, including machinery and other farm inputs of which foreign direct investment may be a good source. Foreign direct investment into agriculture sector can come in the form of capital equipment, training to use machinery, the transportation equipments for produce, storage and preservation of produce, skills of modern day farmers etc. It is a known fact that in economies dominated by traditional agriculture , output are essentially seasonal depending wholly on clemency of weather and crude farm equipment. Therefore, the right mix and quantity of foreign direct investment into agriculture sector may help increase the output of the sector and economic growth of the economy at large.

1.1   Statement of the Research Problem

Agriculture was the pivot that the Nigerian's economy once revolved round. Its contributions to the development of Nigerian economy had been very enormous before, and shortly after independence. In terms of employment, it remains the sector that employs the highest number of labour since independence. Oji-Okoro (2011) stated that agricultural sector is the largest sector in Nigerian economy with its dominant share of GDP, employment of more than 70% of the active labour force and generation of labour with 88% of non-oil foreign exchange earnings. In the 1960s, agriculture accounted for 65-70% of total exports; but fell to about 40% in the 1970s, and crashed to less than 2% in the late 1990s. Among the role of agriculture, is the provision of food for the teeming population and the supply of adequate raw materials to the growing industrial sector of the Nigerian economy (NISER, 2002). The above assertions attest to how important agriculture is to Nigeria.

However, the systematic decline in the productivity of this sector since the discovery of Oil in commercial quantity in Nigeria has been a source of concern. Inspite of the fact that the contribution of agriculture to the GDP rose slightly to 41.84% in 2009, it is on record that, of the 84 million hectares of Nigeria's arable land only 40% is cultivated and of this, not more than 10% percent is optimally cultivated (FGN, 2013). The sector in the recent decades is characterized with low yields and with limited areas under cultivation. This have brought about low productivity. Okorie (1998) confirmed that Nigerian economy has since independence seems to be experiencing a downward trend due to mainly inadequate finance of the agriculture sector. In the same vein, Okoiliya, (2003) posited that Nigeria faces acute food shortage as a result of its low agricultural productivity. The gravity of the dismal performance of this sector can best be imagined in the light of the huge food import bill of the Nation in recent years.

According to the Nigerian Bureau of Statistics (NBS), Nigeria spent $2.9bn on food and drink import in 2015 and by 2017, the import bill on food and drink has risen to $4.1bn. Remarkably top on the list of this food import bill to Nigeria was rice, of which the country is seen as second largest importer of rice in the world. Supporting the above , the US Department of Agriculture recently in one of its publication predicted that " China and Nigeria are projected to remain the largest rice importing countries in 2019, followed by European Union, Cote d'Ivoire and Iran" And sadly Nigeria major agricultural export products have reduced because of the neglect of the sector. The groundnut pyramids that we used to know in the North had disappeared. Cocoa, for which Nigeria is known to be the major exporter dwindled. So also, was Palm Oil from the old Midwestern Region of the country. This, certainly is worrisome for a resource-rich country like Nigeria that is endowed with large expanse of arable land, good climatic conditions, abundant streams, lakes and active population that can promote and maintain a highly productive agriculture.

Given that agricultural sector plays a very important and strategic role in the Nigerian economy, and inspite of the various agricultural policies of successive governments in the past to develop this sector, the level of successes that we have had from these efforts are generally believed not to have been commensurate with the abundant potentials that the sector holds for this country. The Nigerian Telecommunication sector was once in this sorry state that agriculture sector is until there was massive injection of FDI into the sector. Today, the Telecommunication sector has enjoyed some level of development. Its contribution to the country's GDP has gone up considerably, the number of employee in the sector has increased with tremendous improvement on service delivery of the sector, just as the number of subscribers (telephone users) have gone up. The question to ask now is, in the light of the above discovery, can FDI help reverse the

downward trend of agricultural sector's fortunes and develop it to its full potentials? Perhaps, if we can establish the kind of relationship that exists between agriculture FDI and agriculture output, then the question asked can properly be addressed. For example, If there exist a strong relationship between the two i.e. agriculture FDI and agricultural output, then proper design of growth enhancing policies with workable policy instruments can then be encouraged from policy makers and other stakeholders of the sector towards developing the sector to its full potentials. This must have been the thinking of Msuya (2007) when he argues that growth in productivity in the agricultural sector which is enhanced by adoption of modern and sophisticated technologies has become imperative in view of falling per capita arable land, rising costs of production, increasing population and increasing migration to urban centers.

Some earlier researches on this topic by Yusuff, Afolayan and Adamu(2010), Moses, Okpanachu and Ojonugwa (2010), Oloyede (2012) and Iddrisu, Mustapha and Babamu (2013) wrote on FDI into the economy in relation to agricultural output. While Moses, Okpanachu and Ojonugwa (2010), Oloyede (2012) and Iddrisu, Mustapha and Babamu (2013) were particular about the total FDI that came into the economy, Yusuff, Afolayan and Adamu(2010) restricted its research work to just two variables – agric GDP and agric FDI. Iddrisu, Mustapha and Babamu (2013) research work was also done on Ghana economy. Therefore, this study shall investigate the link between agriculture FDI and agricultural output using more variables that directly affect agricultural output like labour force and capital formation in Nigeria.

1.2 Research Questions

This study shall provide answers to the following research questions

i.   What is the relationship between agricultural FDI inflows and agricultural output ?

ii.   Do FDI inflows into agricultural sector have a corresponding growth effect on agricultural output ?

iii. What is the causal relationship between agricultural FDI inflows and agricultural output in Nigeria ?

1.3   Objectives of the Study

The main objective of the study is to assess the relationship between Agriculture FDI inflows (AFDI) and agricultural output (AGDP) in Nigeria.

The specific objectives are

i. to examine the relationship that exists between agriculture Foreign Direct Investment (AFDI) and agricultural output in Nigeria.

ii. to establish the causality between agriculture FDI (AFDI) and agriculture output in Nigeria

1.4   Significance of the Study

The study shall examine the relationship that exists between agriculture FDI and agriculture output in Nigeria. Agricultural sector in Nigeria is an important and strategic sector that is waiting to be properly developed and harnessed for Nigerians and the nation at large. Agriculture's contribution to Nigeria in terms of employment and to the country's GDP is enormous. Therefore, the knowledge of this study will enable the policymakers to formulate appropriate policies that will aim at improving on the growth of this sector of the economy.

1.5   Scope of the Study

The extent to which the empirical findings of this study can be seen to be reliable will depend largely on the genuineness and accuracy of the data sourced from Statistical Bulletin and

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Annual Report by CBN, Nigerian Bureau of Statistics and World Bank Development Indicators and Investment Report. Secondary data is used for the period under review. The period under review for this research work shall be 31 years, spanning 1986 – 2017. The choice of 1986 as base year for the research work was because it represented the beginning of Structural Adjustment of the Nigerian government that encouraged opening up of the economy for foreign investments. The analysis of the identified variables shall be limited to the aforementioned publications.

1.6   Definitions of terms

Foreign Direct Investment (FDI): An investment made to acquire a lasting management interest (normally 10% of voting stock) in a business enterprise operating in a country other than that of the investor

Agricultural Foreign Direct Investment(AFDI): This will be the Foreign Direct Investment (FDI) into agricultural sector during the period under review. .

Trade Openness (TOP): Export and Import as a percentage of GDP is used to represent Trade Openness.

Exchange Rate (EXR): An exchange rate (also known as foreign exchange rate) between two currencies is the rate at which one currency will be exchanged for another. It is regarded as the value of one country's currency in terms of another currency.

Real Gross Domestic Product (RGDP): This is the macroeconomic measure of the value of economic output adjusted for price changes (that is, inflation or deflation), This adjustment transforms the money-value measures, nominal GDP, into an index for quantity of total output.

Labour Force: The number of persons employed in the agricultural sector of the Nigerian Economy

CHAPTER TWO

LITERATURE REVIEW

This chapter did a comprehensive review of literature relating to Foreign Direct Investments (FDI) theoretically and empirically. It began by defining FDI according various international organizations, then tracing the histories and the origins of these theories, classifying FDI theories and lastly, did a review of the empirical studies on agriculture FDI and agriculture output

2.0 Definition of Foreign Direct Investments (FDI)

FDI is defined as international investment made by one economy's resident entity, in the business operation of an entity resident in a different economy, with the intention of establishing a lasting interest (IMF 1993). According to World Trade Organization (1996) foreign direct investment (FDI) occurs when an investor based in one country (the home country) acquires an asset in another country (host country) with the intent to manage that asset. The management dimension is what distinguishes FDI from portfolio investment in foreign stocks, bonds and other financial instruments.

According to the World Bank (2004), foreign direct investment is that foreign investment that establishes a lasting interest in or effective (active) management control over an enterprise. In its publication on the Benchmark Definition of FDI, the OECD

(2008) defined FDI as the inflows of investment undertaken to acquire a lasting management interest (10% or more of the voting stock) in a firm conducting business in any other economy but the investor's home country.

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2.1 History and Origins of Foreign Direct Investments (FDI) theories

There are many schools of thought that have tried to explain FDI as a phenomenon but with no consensus on any superior or general theory of FDI

Earliest theory on FDI could be traced back to the works of Smith (1776) { as cited in Smith 1937}, and that of Ricardo (1817) which were both related to international specialization of production. Smith's theory of absolute advantage posited that trade between nations will occur if one country is able to produce and export goods using a given amount of capital and labour, more than its closest competitor (absolute advantage). But this theory failed to explain how trade arose between countries where one country was not in the business of production. Following this, the work of Ricardo emerged to explain FDI using the theory of comparative advantage. Here, Ricardo was more interested in international factor movements. In his opinion, labour and capital were mobile domestically but not across borders. His theory was however faulted on the ground that it assumes there are two countries, two products and perfect factor mobility, but still could not justify international capital movements. This is therefore a direct contrast to the notion that, in a world typified by perfect competition, FDI does not exist in anyway (Kindleberger, 1969). According to Denisia (2010), if markets were efficient with no barriers to trade or competition; international trade would be the only mode of participation in global markets. Hymer (1976) in his published 1960 thesis laid down the foundation for other authors to come up with plausible theories of FDI. He found that FDI was motivated by the need to reduce or eliminate international competition among firms as well as Multinational Corporations (MNCs) wishes to increase their returns gained from using special advantage.

Boddewyn (1983), in the early 1980s concluded that a cohort of researchers such as Casson (1979), Calvet (1981), Grosse (1985) and Rugman (1980) put forth their own versions of

FDI theories. According to him, some of these researchers made concerted effort to incorporate capital, location, industrial organization, growth of the firm, market failure, foreign exchange parity, investment portfolio and product life cycle theories into one whole theory to attempt to explain the motives and patterns of FDI, but most credit should be given to Dunning's eclectic paradigm. The best known theory of FDI is Dunning's 1977 Eclectic Paradigm in which he states that FDI occurs under different scenarios of ownership, location and international advantages (OLI). It is for the above reasons that Popvici and Calin (2014) concluded that FDI theory is based on three theories – the theory of international capital market, the firm theory and the theory of international trade. As such, it further necessitates the examining of FDI theories from 2 economic perspectives: the macroeconomic and microeconomic views of FDI.

2.1.1 Classifying Foreign Direct Investments (FDI) theories

According to Denisia (2010), the macroeconomic perspectives on FDI is that FDI itself is a type of cross-border capital flow, between home and host countries and its captured in balance of payments statements of countries with variables of interest being capital flows and stocks, revenues obtained from such investments. The microeconomic perspectives on the other hand relates to the motives for investments across national boundaries as seen from the investor's point of view. This follow on from Shin (1998) who critically review existing theories of FDI and cited various scholars who classified FDI theories in a similar manner. Petrochilles (1983) classified macroeconomic FDI decisions based on variables which determine the investment decision (as cited in Shin 1988 p. 186) and mimic corporate investment behavior, under the importance of the market size of the host country as measured by the GDP, growth of the market size, factor prices, interest rates, profitability and investor protection against tariffs and other such elements. According to him, the microeconomic determinants, drawn from the theory of

industrial organization (theory of firm), are more concerned with firm and industry features which would give MNCs certain advantages over domestic firms. Calves (1971) gives examples of these features as including product differentiation, technology, the product life cycle and the size of the firm as measured by its sales or the value of its assets. Another author who classify FDI theories along micro and macro economic views was Gray (1981). According to him, macroeconomic FDI theories emphasise country specific factors and more aligned to trade and international economics, whereas microeconomics FDI theories are firm specific, relate to ownership and international benefits and lean towards and industrial economics, market imperfections bias.

2.1.2 Macroeconomic FDI theories

Lipsey (2004) describes the macroeconomic view as seeing FDI as a particular form of capital across national borders, from home countries to host countries, measured in balance of payments statistics. These flows give rise to a particular form of stocks of capital in host countries, namely the value of home-country investment in entities, typically corporations, controlled by a home country owner, or in which a home country owner holds a certain share of voting rights. Lipsey further explains that the variables of interest are the flow of financial capital, the value of the stock of capital that is accumulated by the investing firms, and the flow of income from the investments. Macro-level determinants that impact on a host country's ability to attract FDI include market size, economic growth rate, GDP, factors such as the political stability of the country, among others. The various macro economic FDI theories are discussed below.

(i) Capital Market Theory

This theory, also sometimes referred to as the "currency area theory" is considered one of the earliest theories which explained FDI. Based on the work of Aliber (1970; 1971), it postulated the foreign investment in general arose as a result of Capital imperfections. FDI specifically was the result of differences between the source and host country currencies (Nayak and Choudhury, 2014). According to Aliber (1970;1971), weaker currencies have a higher FDI-attraction ability and are better able to take advantage of differences in the market capitalization rate, compared to stronger country currencies. Aliber (1970;1971) further adds that source country MNCs based in hard currencies area can borrow at lower interest rate than host firms because portfolio investors overlook the foreign aspect of source country MNCs. This give the source country firms the borrowing advantage because they can access cheaper source of Capital from their overseas affiliates and subsidiaries than what local firms would access the same funds for.

While this Capital Market Theory holds true in the case of developed countries such as the USA, United Kingdom and Canada, it was challenged by later scholars on the basis of ignoring basic currency management fundamentals. A major criticism of Aliber's theory was made by Lall (1979) when he highlighted that theory does not apply in the case of the LDCs with highly imperfect or non existent capital markets, and those with heavily regulated foreign exchange rates. Also, (Nayak and Choudhury, 2014) alluded to the fact the Aliber's theory does not explain investments between two countries with similar strength currencies, nor how developing country MNCs with weaker currencies are able to invest in developed countries with much stronger currencies. This they exemplified by using the case of Chinese firms with sizeable investments in the USA and the UK.

(ii) Locational-based approach to FDI theories

Although FDI location is influenced by firm (a microeconomic element) insofar as the motives of its location, that is whether it is resource-seeking, market-seeking, efficiency-seeking or strategic asset seeking; the overarching decision is in fact taking on the basis of economic geography, which is a macroeconomic decision as it takes cognizance of country-level characteristics (Popovici and Calin 2014). According to them, the theory explained the success of FDI among countries based on the national wealth of a country, such as labour, local market size, infrastructure and government policy regarding these national resources. An off shoot of this locational-based theory is the gravity approach to FDI wherein it was assumed that FDI flows between two countries is highest, if those country are similar geographically, economically and culturally. Gravity variables such as size, level of development, distance and common language and additional institutional aspects such as shareholders protection and trade openness were regarded as important determinants of FDI inflows (Popovici and Calin 2014). This however is a very basic approach to the economics of FDI, because FDI inflows are more complicated than just being about commonalities between nations. Being close together may reduce transportation costs, but not necessarily the cost of labour, for example. Also, sharing same culture may not necessarily result in increased profitability or trade between the two countries.

(iii)Institutional FDI fitness theory

Developed by Wilheim and Witter (1988), the term fitness focuses on the country's ability to attract, absorb and retain FDI. It is this country's ability to adapt, or to fit to internal and external expectations of the investors, which gives countries the upper-hand in harnessing FDI inflows .

The theory itself attempts to explain the uneven distribution of FDI flows between countries. Wilheim's institutional FDI fitness rests on four pillars.

At the base of the pyramid is the Socio-cultural factor. This is the oldest and most complex of all the institutions.

Next to socio-cultural factor in the pyramid is Education – This is necessary in ensuring an attractive environment for FDI as educated human capital enhances R&D creativity and information processing ability. Basic education may impact on productivity and efficiency of FDI operations, making formative education such as the ability to speak, hear, understand, interpret and implement instructions key for attracting FDI.

Markets – This accounts for the economic and financial aspects of institutional FDI fitness in the form of machinery (physical capital) and credit (financial capital). Developed and well-functioning financial markets are hence a prominent feature in the MNCs investment decision-making process.

Government – The role of a country's political strength plays the biggest role in the FDI game. Government fitness requires the adoption of protective regulation to manage market fitness. Popovici and Calin (2014) add that government is considered to include economic openness, a low degree of trade and exchange rate intervention, low corruption and greater transparency.

In conclusion, although the pyramid is represented in a specific order, the four institutional pillars in fact inter-related and interact in unionson in different forms. Interestingly, the theory of institutional FDI fitness has been empirically tested mainly in African context. Muthoga (2003) as cited by Popovic and Calin (2014) investigated FDI determinants in Kenya for the period 1967 – 1999. Musonera, Nyamulinda and Kururanga (2010) evaluated the

institutional FDI fitness model in the East African community bloc, using Kenya, Tanzania and Uganda as their sample, and data drawn from 1995 – 2007

2.1.3 The Eclectic Paradigm

This is probably the most well-known theory of FDI. Dunning (1980) integrated various theories – the international trade, imperfect markets (monopoly) and internalization theories, and complemented these with location theory. According to Dunning (2001), in order for a firm to engage in foreign direct investment, it must simultaneously fulfill three conditions

The firm should possess net ownership advantages over the firm serving particular markets. These ownership advantages are firm-specific and exclusive to that firm, in the form of tangible and intangible assets such as trademarks, patents, information and technology, which will result in production cost reductions for the firm, enabling it to therefore compete with firms in a foreign country. These advantages were also emphasized by Hymer (1976) and Kindleberger (1969) in markets imperfections'theories of firm-specific and monopolistic advantages, respectively.

It must be more profitable for the firm possessing these ownership advantages to use them for itself (internalisation), rather than to sell or lease them to foreign firms licensing or management contracts (externalization). Boddewyn (1985) refers to this as internalization condition.

Assuming the preceding conditions are both met, it will be profitable for the firm to exploit these advantages through production, in collaboration with input factors such as national resources and human capital outside its home country; failing which, the foreign markets would then be served through exports, and local markets by domestic production. Location specific

factors have to be taken into consideration by the investing firms, as per the economic geography and the institutional FDI fitness theories under the macroeconomic FDI theories.

2.2   Empirical Review

Quite a number of research works have been done on the relationship that exists between foreign direct investment and economic growth. The conclusions from these works suggest that foreign direct investment and economic growth could be broadly categorized into two. The first being that foreign direct investment is believed to have direct impact on trade through which the growth process is assured (Markussen and Venables , 1998). And secondly, foreign direct investments is assumed to argument domestic capital thereby stimulating the productivity of domestic investments (Borensztein , 1998). These two arguments are in agreement with endogenous growth theories (Romer, 1990) and cross models on industrialization (Chenery *et al.*, 1986). In these theories, the quantity and quality of factors of production as well as the transformation of the production process were considered important factors in developing a competitive advantage.

More recently, empirical research works on foreign direct investments and its impacts/effects have been sector specific in focus with a view to having clear understanding of how FDI works, particularly in the developing economies. In the study conducted by (Basu & Guariglia, 2007), a sample of 119 developing countries were used in the study for the period of 1970 – 1999 using the Generalized Methods of Moments (GMM) and the study revealed that foreign direct investments enhanced both educational inequalities and economic growth in developing countries. However, it reduced the share of agricultural sector in gross domestic product.

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Alaba (2003) examines specifically the impact of exchange rate variabilty on Foreign Direct Investment (FDI) in Nigeria's manufacturing and agricultural sectors and finds that while it attracts investment in agriculture it deters Foreign Direct Investment (FDI) in the manufacturing sector.

Udeaja, Udoh, and Ebong (2008) writing on the determinants of Foreign Direct Investment (FDI) inflows into various sectors of the Nigerian economy concluded in their empirical study that of the six sectors considered in the study, namely mining and quarrying, manufacturing and processing, agriculture, forestry and fisheries, transport and communication, building and construction and trading business services, it is only in building and construction sector that the Foreign Direct Investment (FDI) do not depend on past inflows of Foreign Direct Investment (FDI), rather it depends on the state of the infrastructure and trade openness. The results of the regression analyses show past foreign investment flows could significantly stimulate current flows in the other five sectors. Apart from this general finding, the results also show that trade liberalization is the key to Foreign Direct Investment (FDI) inflows in the agricultural sector. Most investors in the sector are export-oriented firms; a restrictive trade policy would reduce the competitiveness of their products in international market and, therefore acts as a disincentive to invest in Nigeria.

Ogbanje, Okwu and Sarror (2010) in their analysis of FDI in Nigeria – The fate of Nigeria's agriculture, revealed that agricultural sector got the least average net flow of investment using Ducan Multiple range Test.

Moses, Okpachu, and Ojonugwa, (2010) empirically examined the relationship between foreign direct investments and performance of agriculture sector in Nigeria. The results of the study revealed that Co-integration test show stable long-run equilibrium between FDI and

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explanatory variables in the model, Ordinary least square revealed positive relationship between the performance of agricultural sector and FDI, Gross Domestic Savings and Credit to Agriculture sector. The investigation also revealed that Degree of openness and interest rate had a negative relationship with performance in agriculture in Nigeria.

Coefficient of Gross Domestic Savings & Credit to agriculture sector were significant in explaining the variations in the growth of the agriculture sector in Nigeria.

Akande, and Biam, (2011) conducted an inflation based scenario analysis of causal relationship between FDI in agriculture and agricultural output in Nigeria and reported absence of long relationship between FDI in agriculture and agricultural output in Nigeria both in the presence and absence of inflation shock.

Izuchukwu, Huiping, Abubakar, and Olufemi,, (2014) attempts to evaluate the impacts of FDI, trade and its effects on agricultural sector development in Nigeria between the periods of 1980 – 2009. In analysing the variables, VAR model was used employing three step procedures to determine the relationship between Gross Domestic Product (GDP), Government Expenditure, Labour Force, Agricultural Output, China FDI inflow into Nigeria, Total China Trade volume and Exchange rate. Granger causality test was conducted to identify causal relationship between the variables and to determine whether the current lagged value of one variable affect another. Unit root test and co-integration test was equally conducted. The estimated result obtained from the Granger causality test shows that the GDP and Nigeria-China trade volume (TV) has bi-directional relationship with Agricultural Output (AG). The result further indicated unidirectional relationship as causality runs from Agricultural Output (AG) and Government Expenditure, no any causal relationship between labour force and agricultural output, no causal relationship between China FDI inflow to Nigeria Agricultural output and lastly, that Exchange

rate does not granger cause agricultural output but agricultural output granger cause exchange rate.

On Foreign Direct Investment (FDI) and the agricultural sector, Oloyede (2014) in his inferential approach evaluated the impact of Foreign Direct Investment (FDI) on the development of the agricultural sector in Nigeria using time series data covering the period 1981 and 2012. Employing Ordinary Least Square (OLS) estimation technique through stepwise regression in order to avoid multi-colinearity of explanatory variables, the empirical results showed that FDI and exchange rate have positive impact on agricultural sector, while interest rate have negative impact. Another important finding of the study is that FDI to Nigeria is majorly driven by natural resources.

Iddrisu, Mustapha, and Babamu, (2015) looked at the impact of FDI on the performance of agricultural sector in Ghana with data over the period of 1980 – 2013 using Johansen co-integration test. Vector error correction mechanism model was employed to look at the long run relationship between the variables as well as the dynamic and error correction in the short run. The estimated results show that FDI negatively impacts the agricultural sector productivity in the long run but with positive relationship in the short run. Trade openness on the other hand had positive and significant impact on the agricultural sector. The result also show that exchange rate negatively impact the agrieultural sector.

According to Fabayo, (2003), the role that Foreign Direct Investment (FDI) has been playing in capital formation in the Nigerian economy has risen over the years. Foreign Direct Investment (FDI)/GCF rose from 7.3% in 1974 to about 17% in 1985. This ratio was low in the 1970s and 1980s because the country's policy was to discourage Foreign investments' contribution to capital formation at the time so as to protect infant industry, local content rules

etc. For example, Foreign Direct Investment (FDI) contributed 1.5% to GDP growth in 1976 and 0.5% in 1982 respectively. The recent increase in the share of Foreign Direct Investment (FDI) in capital formation in the country since 1993 has been due to rapid loosening of controls and regulations on the activities of multinational corporations in Nigeria. As a result, Foreign Direct Investment (FDI)/GCF ratio rose from 6.4% in 1986 to 32% in 1993 and 49% in 1998.

2.3   Summary, gaps in literatures

The relationship between FDI inflows and economic growth has encouraged a lot of empirical works by researchers focusing on developed and developing countries. Suffice to say, that the debate on this relationship is still ongoing due to the fact that different results were found from different countries.

Some previous studies that have examined the link between FDI agriculture in Nigeria include the works of Alaba (2003), Akande, and Biam, (2011), Yusuff, Afolayan, and Adamu, (2010), Moses, Okpachu, and Ojonugwa, (2010), Akande, and Biam, (2011), Izuchukwu, O., Huiping, Abubakar, and Olufemi, (2014) and Oloyede, (2014) .

Alaba (2003) examines specifically the impact of exchange rate variability on Foreign direct investment (FDI) in Nigeria's manufacturing and agricultural sectors and finds that while it attracts investment in agriculture it deters foreign direct investment (FDI) in the manufacturing sector. For Moses, Okpachu, and Ojonugwa, (2010), using OLS approach the study examined FDI and performance of Agriculture in Nigeria and concluded that there is positive relationship between performance of agriculture and the following fundamental variables – FDI, Gross Domestic Savings & Credit to agriculture sector. The study equally found out that degree of openness and interest rate had negative relationship with the performance of agriculture. Writing on FDI Trade and its effects on agricultural development in Nigeria, Izuchukwu, Huiping,

Abubakar, and Olufemi, (2014) discover there was no Granger causality between FDI and agriculture output. The study also concluded that the variables estimated have bidirectional and unidirectional movements. Oloyede, (2014) wrote on the impact of FDI on agricultural sector developments in Nigeria. His work reveals that FDI positively impacted agriculture both in the short run and long run and that political instability adversely affected agricultural investment in the long run. He concluded by saying FDI to Nigeria is majorly driven by natural resources.

Izuchukwu, Huiping, Abubakar, and Olufemi,(2014) employed Vector auto regressive technique in estimating the parameters in their model , as against the OLS method that Oloyede (2014) used. But the FDI in consideration in the study of Izuchukwu, Huiping, Abubakar, and Olufemi, (2014) was restricted to China Trade as against FDI that went into agriculture sector in the years under review and secondly, the time frame was between 1980 – 2009. This study will investigate relationship between agriculture FDI and agricultural output both in the short run and long run in Nigeria using expansive variables which will include agriculture FDI, GFCF, Exchange rate (EXR), Labour (LAB) & Trade Openness (TOP) covering 1986 - 2017

From the literature reviewed, there are contradicting results concerning the relationship of FDI and agricultural growth. Agriculture is a very important sector in Nigeria, and its growth must be of paramount importance to policy makers and other stakeholders. But the relationship between this sector and FDI as a catalyst of growth has not received sufficient survey and attention in Nigeria. It is therefore important to empirically investigate this relationship so as to design workable polices as related to FDI.

Based on this, this study will analyse the contribution of agricultural FDI to agricultural output using expansive data with more relevant variables with a view to providing useful

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information to policy makers to improve the output of agricultural sector of the Nigerian economy. Hence, the need for this study.

Summary of related empirical studies

Title	Authors	Period under review	Methodology	Variables Estimated	Findings	Remark & Gap
Analysis of FDI on Agric Sector and its contribution to GDP in Nigeria	Yusuff, M.A, Afolayan, O.T and Adamu, A.M	1977 – 2010	OLS and VAR	Agric GDP Agric FDI	Shows a significant direct relationship between agric FDI and its contribution to GDP Shows that a proportionate increase in agric FDI will result into a more than a proportionate increase in agric sector contribution to GDP	The variables estimated in this study are good but should not be limited to these two only. There is need to have a recent review of this study with inclusion of other variables.
FDI Trades and its Effects on Agricultural Developments in Nigeria: Evidence from Time Series Analysis	Izuchukwu, O., Huiping, H., Abubakar, A. & Olufemi, E.A.	1980 – 2009	Vector Auto Regressive Model employing three step procedure	Agric Output (AG) Government Expenditure (GE) Labour Force China FDI into Nigeria Total Volume of China trade into Nigeria Exchange rate	Co-integration indicates there is a present co-integration Granger causality test shows that variables employed have a bi-directional, unidirectional and no causal relationship.	FDI and Trade in view here is restricted to that of China & Nigeria only. The total FDI inflows from all countries into agriculture should be more appropriate in our estimation of agriculture FDI and agriculture output.
Impact of FDI on Productivity growth &	Msuya	2007	Methodology employed was based on the		Found that productivity growth in agric sector is impacted positively.	The methodology employed here is a review of existing

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poverty reduction in Tanzania			review of existing literature as opposed to empirical modeling			literature and not empirical
FDI and agric sector performance in Nigeria	DR. J D Moses Steve Okpachu Usman Ojonugwa	1970 – 2010		AGDP Gross FDI Gross GDS Gross Openness Gross Credit to Agric Interest rate	Positive relationship between the performance of agriculture & the following variables - FDI - GDS - Credit to agric sector Degree of Openness and interest rate had negative relationship to the performance of agric sector Coefficient of GDS & Credit to agric were significant	
Impact of FDI on Agircultural sector development in Nigeria	Oloyede , B B	1981 – 2012	Ordinary Least Square	Agric Output FDI EXR INT	FDI positively impacted on agriculture not only in the short run but also in the long run Political instability adversely affected agric investments in the long run FDI into Nigeria is majorly driven by natural resources	Although Exchange rate and interest rate are important when investments is been considered, capital formation and labour force are direct variables that affect output and as such should be included in the estimation. The choice of VAR as technique for estimation in this study over OLS will help to

| Impact of FDI on performance of Agircultural sector in Ghana | Iddrisu, A., Mustapha, I & Babamu, O | 1980 – 2013 | Vector Error Correction Model | Agric Output FDI Gross Fixed Capital Formation Imports & Exports Exchange rate Inflation | FDI negatively impacts the agricultural sector productivity in the long run but with positive relationship in the short run. Trade openness on the other hand had positive and significant impact on the agricultural sector.
1. Exchange rate negatively impact the agricultural sector. | confirm the relationship btw AGDP & AFDI better. This study considered a considerable number of important variables in its estimation but left out an important variable like labour force. It also centers on Ghana economy. |

CHAPTER THREE

METHODOLOGY

This chapter will discuss the method that will be used in carrying out the research. It will contain issues that have to do with the theoretical framework, model specification, definitions and measurement of variables, sources of data and method of analysis.

3.0   Conceptual and Theoretical Framework

Theories in economics as a discipline are valuable and imperative tools use in studying the course. Usually, they evolve because of the need to solve policy problems. As such, it remains the sole concern of development economics to continue to search for intellectual frameworks to solving societal policy problems. Hence the need for the use of theories.

Investment – domestic or foreign, growth and development are important theories in development economics. To this end, this study examines the theoretical background of FDI as an agent of growth needed in the agricultural sector of the Nigerian economy. The theoretical links and relationships that will be established between agriculture FDI and agricultural output (growth) in Nigerian economy will help in providing basis for improvement on the existing relevant policy.

According to Scott (1991), growth is proximately caused by only two things: material investment and the growth of quality-adjusted employment, which essentially includes the effects of human investment. Both the old and new growth theories agree that the rate of growth of an economy depends on the accumulation of physical and human capacity. The notable difference between the two theories being what constitutes capital and how it interacts with the

growth process. The new growth theories broadened the meaning and composition of capital in the growth process, as against the orthodox view that capital is restricted to physical capital only. In line with this thought, Anderson(1990) found that changes in output arising from technological progress turn out, to be due to the deployment of labour brought about by investment in human and material resources. According to him, output gains from technical progress are due to investment. Schmidt – Hebbel et al (1996) also found that investment is a principal determinant of growth. It can be deduced from the above that physical capital accumulation and other complimentary inputs such as human capital and technological knowledge are the major components of the FDI inflows been transferred to many of the developing countries of the world. In the year 1999/2000 when Nigerian Telecommunication sector was opened up for foreign investors/investments to come in, we saw a massive injection of FDI into the sector and the subsequent transformation of the sector. Multinational companies like MTN blazed the trail to be followed by other Telecomm giants. Ogbanje, Okwu, and Sarror, (2010) defined it as a major component of international capital flows, been investment by multinational companies with headquarters in developed countries. The investment came in by way of transfer of funds to a whole package of physical capital, techniques of production, managerial and marketing expertise, products, advertising and business practices for the maximization of global profits

Traditionally, three school of thoughts hold on FDI – the dependency, modernization and integrative schools of thought. The dependency as represented by the neo-Marxist states that the developing countries are exploited through international trade resulting to deteriorating terms of trade of multinationals corporations through profits repatriation. Modernization as represented by neo-classical theorists believes in a natural order through which countries ascend to what is seen

as higher developmental stages. This school's perfect market approach sees FDI as a prerequisite and catalyst for sustainable growth and development. In the case of integrative school of thought, it attempts to transform the thinking on FDI by analyzing it from the angle of micro and macro economic variables that determine FDI Specifically, the school is concerned about the institutional arrangement in the host countries and the day-to-day challenges in FDI policy implementation where structural rigidities may be revealed.

3.1 Variables of the Study

This study examined the relationship that exists between agricultural foreign direct investment inflows and agricultural output in Nigeria from 1986 – 2017. Time series data that span 31 years is used to explain the relationship between agriculral foreign direct investment inflows and agriculture output in Nigeria using a set of variables that provided the basis for drawing conclusions based on the findings deduced from the data collected on the variables, and after subjecting the data to various required relevant investigations.

3.2 Identification of variables

To analyse the relationship between agricultural FDI inflows and agriculture output in Nigeria, annual time series data from 1986 – 2017 shall be used. As a result, in this study AGDP will be used as the proxy to agriculture output, other independent variables will be agricultural FDI (AFDI), Exchange rate, Capital Formation and Trade Openness within the period. The agricultural sector in this study is defined according to CBN's classification of where Crop production, Fisheries, Livestock and Hunting are subsectors. The total output of these subsectors will add up to the AGDP (proxy to agricultural Output) for the number of years under review.

3.2.1 Measurement of Variables

Agricultural Gross Domestic Production (AGDP): The total output is measured by the total agricultural gross domestic production. Output in the agricultural sector is made up of crops production, animal farm production, forestry, fishing and hunting. We employed real aggregate output of these subsectors of agriculture to proxy for agricultural production. We expect that Foreign Direct Investment (FDI) to have positive relationship with the sector.

Gross Fixed Capital Formation (GFCF): This variable is made up of machinery, plant, purchases of equipment, industrial buildings, construction of railways & roads. It is expected that GFCF would positively impact the growth in agricultural sector.

Agricultural Foreign Direct Investment (AFDI): This is the Foreign Direct Investment (FDI) inflows into agricultural sector. It is measured as Foreign Direct Investment (FDI) net inflows as a percentage of GDP. AFDI is expected to have positive impact on the production in the agricultural sector.

Trade Openness (TOP): Export and Import as a percentage of GDP is used to represent Trade Openness. We expect Trade Openness to have positive impact on agricultural production.

Exchange Rate (EXR): The exchange rate between Nigeria Naira and the United States Dollars for this variable. The choice of Naira-Dollar exchange rate is because United States Dollars is the most actively traded foreign currency in Nigeria.

3.3   Types and sources of data

The data used for this study was time series (secondary) data. The data

is derived from various issues of publications from Central Bank Statistical Bulletin, National Bureau of Statistics (NBS), World Bank's World Development Indicators as well as World

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Investment Reports published by United Nations Conference on Trade and Development (UNCTAD)

3.4 Method of Data Analysis

This study employed Vector auto regressive technique. The VAR processes are popular in economics because they are flexible and simple models for multivariate time series data. In econometrics, they became standard tools when (Sims 1980) questioned the way classical simultaneous equations models were specified and identified and advocated VAR models as alternatives. VAR models are useful tools for forecasting. They can also be used for analyzing variables involved. VAR is used to capture relationship between multiple quantities as they change over time

In addition, there shall be a need for pre-test (stationary and co-integration) in the estimated model to examine the relationship between variables. The stationary test and co-integration test will be used to show the short and long run equilibrium relationship respectively. The short run and long run dynamic in the co-integration series shall be required in the model. Similarly, Granger Causality test will be employed to determine the direction (either bi-directional or uni-directional relationship) of influence and causality between the variables in the model.

3.5 Model Specification

The model specification of this study is in line with that of Iddrisu (2014) but with slight modification. This study will modify its explanatory variables to include labour force in estimating the relationship between agriculture Foreign Direct Investment (AFDI) and agricultural output in Nigeria and, be specified as follows:

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AGDP = f(AFDI, EXR, TOP, GFCF, LAB, μ)................................... eqn 1

Where;

AGDP   =   Agricultural Output

AFDI   =   Agriculture Foreign Direct Investment

EXR   =   Exchange Rate

TOP   =   Trade Openness

GFCF   =   Gross Fixed Capital Formation

LAB   =   Labour Force

μ   =   Disturbance term

The dependent variables in the model is the agricultural output as proxied by AGDP and the independent variables include Foreign Direct Investment (AFDI), Capital Formation/GFCF, Trade Openness (TOP), Exchange Rate(EXR) and Labour Force (LAB) in Nigeria.

To make equation 1 linear and stochastic, we have

$AGDP = \beta_0 + \beta_1(AFDI) + \beta_2 GFCF + \beta_3 EXR + \beta_4 TOP + \beta_5 LAB + \mu$.......eqn 2

The natural log of equation 2 then gives;

$InAGDP = \beta_0 + \beta_1 InAFDI + In\beta_2 GFCF + In\beta_3 EXR + In\beta_4 TOP + In \beta_5 LAB + \mu$ .. eqn 3

The independent variables in equation 3 have their coefficients representing their individual long run elasticities with regards to the dependent variable.

Where $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the parameters to be estimated while μ is the error term.

Test for Unit Root

Using time series data on econometric analysis of this nature requires, first of all, that we test for the stationarity properties of the variables, we will employ the Augmented Dickey Fuller (ADF) for the unit root test and Johansen co-integration test for long run relationship. root. The ADF approach to unit root takes form of the equation below:

$$\Delta = \beta_i \partial X_{t-1} + \sum_{i=1}^{m} \alpha \Delta X_{t-1} + \epsilon_t \dots\dots\dots\dots eqn\ 4$$

Null Hypothesis $H_0 : \partial = 0$ (Implying that the series are not Stationary)

Alternative Hypothesis $H_1 : \partial < 0$ (Implying that the series are stationary)

Test for Co integration

When the stationarity properties of the variables are tested, we will then employ Johansen co-integration test to test between independent variables and the agricultural output as detailed below:

From VAR (k), Let X_t be a vector that is integrated of order one/ I(1) variable as in equation 5 below

$$X_t = B_t\ X_{t-1} + B_t\ X_{t-2} + B_t\ X_{t-3} + \dots\dots\dots B_k X_{t-k} + \epsilon_t \dots\dots\dots eqn\ 5$$

such that X_t and ϵ_t are n x 1 vectors

If we remodel eqn (5) we get ;

$$\Delta X_t = \sum_{i=1}^{k=1} \Gamma\ X_{t-1} + \pi X_{t-1} + \mu_0 + \epsilon_t \dots\dots\dots\dots eqn\ 6$$

where $\pi = \sum_{i=1}^{k} B - I$ and $\Gamma = -\sum_{j=i+1}^{k} B$

Having tested for co-integration, we use vector autoregressive model to look at the at the short run and the long run relations between variables as stated in the set of equations below. We

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estimated the long run impact of the agriculture Foreign Direct Investment (AFDI) on agricultural output as follows:

$$\ln AGDP_t = \alpha_0 + \sum_{i=1}^{n} \Phi \ln AFDI_{t-1} + \sum_{i=1}^{n} \Omega \ln GFCF_{t-1} + \sum_{i=1}^{n} \varphi \ln EXR_{t-1} + \sum_{i=1}^{n} \psi \ln$$

$$TOP_{t-1} + \sum_{i=1}^{n} \psi \ln LAB_{t-1} + \epsilon_t \quad \text{.................. eqn 7}$$

$$\ln AGDP_t = \alpha_0 + \sum_{i=1}^{n} \Phi \Delta \ln AFDI_{t-1} + \sum_{i=1}^{n} \Omega \Delta \ln GFCF_{t-1} + \sum_{i=1}^{n} \varphi \Delta \ln EXR_{t-1} +$$

$$\sum_{i=1}^{n} \psi \Delta \ln TOP_{t-1} + \sum_{i=1}^{n} \psi \ln LAB_{t-1} + \epsilon_t \text{ ...eqn 8}$$

we then looked at AFDI's impact on agriculture in the short run as follows:

$$\ln AGDP_t = \beta_0 + \sum_{i=1}^{n} \beta_1 \ln AFDI_{t-1} + \sum_{i=1}^{n} \beta_2 \ln GFCF_{t-1} + \sum_{i=1}^{n} \beta_4 \ln EXR_{t-1} +$$

$$\sum_{i=1}^{n} \beta_5 TOP_{t-1} + \sum_{i=1}^{n} \psi \ln LAB_{t-1} + \varepsilon_t \text{ ... ...eqn 9}$$

$$\Delta \ln AGDP_t = \beta_0 + \sum_{i=1}^{n} \Delta \beta_1 AFDI_{t-1} + \sum_{i=1}^{n} \Delta \beta_3 \ln GFCF_{t-1} + \sum_{i=1}^{n} \Delta \beta_4 \ln EXR_{t-1} +$$

$$\sum_{i=1}^{n} \Delta \beta_5 TOP_{t-1} + \sum_{i=1}^{n} \psi \ln LAB_{t-1} + \text{.......eqn 10}$$

CHAPTER FOUR

ANALYSIS OF DATA AND DISCUSSION OF RESULTS

This chapter discusses the analysis and interpretation of data collected to investigate the relationship between Agriculture Foreign Direct Investment inflows and agricultural output in Nigeria for the period 1986-2017. The analysis intends to examine the econometric relationship between some variables: - Agricultural output (AGDP), agricultural foreign direct investment (AFDI), exchange rate (EXR), trade openness (TOP), gross fixed capital formation (GCFC) and labour force in the agricultural sector (LAB) in the model for the period of the study. The study used preliminary test: - unit root test and co-integration test are adopted to examine the stationarity and long run relationship between the variables respectively. In addition, the granger causality test was used to detect the direction of causality while vector autoregression (VAR) was applied to establish the coefficients or the types of relationship that exist and the degrees of the relationship in the model in Nigeria.

4.1   Preliminary Test

The unit root and co-integration tests were carried out as preliminary test in this study in order to examine whether the variables were stationary and co-integrated for the period 1980-2017.

4.1.1   Unit Root Test

In order to test for the stationarity of the time series data used in this study, the Augmented Dickey Fuller (ADF) unit root test was employed in this study. The ADF test decision rule is that the ADF test statistic must be greater than or equal to any of its critical values in absolute terms before we can accept stationarity. In this study, 5% critical value is used. The result of the unit root test is presented in Tables 4.1 and 4.2:-

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Table 4.1: Test for Unit root at Level

Variables	Test Statistics	5% critical level	Level	Prob	Decision
AGDP	1.887080	-2.960411	1(0)	0.9997	NS
AFDI	-2.657204	-2.960411	1(0)	0.0929	NS
EXR	1.853096	-2.960411	1(0)	0.9996	NS
TOP	-3.040928	-2.960411	1(0)	0.0420	S
GCFC	2.123764	-2.960411	1(0)	0.9998	NS
LAB	-2.557081	-2.976263	1(0)	0.1140	NS

Source: Researcher's computation, 2019.

Where: S .   = Stationary/significant

NS   = Non-stationary/not significant

1(0)   = at Level.

Table 4.1 revealed that trade openness (TOP) is stationary at level; the absolute value of the ADF test statistics of TOP /-3.040928/ is greater than its 5% critical value /-2.960411/. The probability value also revealed that TOP is significant because the probability value of TOP is less than 0.05.

However, Agricultural output (AGDP), agricultural foreign direct investment (AFDI), exchange rate (EXR), gross fixed capital formation (GCFC) and labour force in the agricultural sector (LAB) were not stationary at level; the absolute values of the ADF test statistics of AGDP, AFDI, EXR, GCFC and LAB are less than the 5% corresponding critical value.

Table 4.2: Test for Unit Root at 1st Difference

Variables	Test Statistics	5% critical level	Level	Prob	Decision
AGDP	-4.597971	2.963972	1(1)	0.0010	S
AFDI	-8.834581	2.963972	1(1)	0.0000	S
EXR	-3.143912	2.963972	1(1)	0.0339	S
GCFC	-4.115152	2.963972	1(1)	0.0033	S
LAB	-4.510798	-2.981038	1(1)	0.0015	S

Source: Researcher's computation, 2019.

Where: S   = Stationary/significant

1(1)   = at first difference

The result from table 4.2 showed that Agricultural output (AGDP), agricultural foreign direct investment (AFDI), exchange rate (EXR), gross fixed capital formation (GCFC) and labour force in the agricultural sector (LAB) are stationary at first difference; the absolute values of each ADF test statistics of AGDP, AFDI, EXR, GCFC and LAB are greater than the 5% corresponding critical value at 1st difference. This can be revealed by comparing the ADF test statistics in absolute terms with the 5% critical values in absolute terms. The probability values reveal that AGDP, AFDI, EXR, GCFC and LAB are less than 0.05; this therefore confirms that the variables are significant at 5% level of significance. Thus, there is need to test whether the variables were co-integrated and there is need to verify whether a long run relationship exists between the variables of the model.

4.1.2 Johansen Co-integration Test

Going by the result of the ADF unit root test, some of the variables were not stationary at level. Hence, it is necessary to verify whether the regression residuals are co-integrated, that is, to test if there is any long run relationship(s) between the response and explanatory variables in the estimated within the models. For this, the study applied the Johansen Co-integration test using Trace and Maximum Eigenvalue statistics by comparing their values with the critical values at 5% significance level. If the values of the trace and maximum Eigen value were greater than the critical value, then we conclude that there existed a long run equilibrium relationship otherwise the regression residual is not co-integrated. Thus, this is presented in tables 4.3 and 4.4.

Table 4.3: Empirical Results of Unrestricted Co-integration Rank Test (Trace)

Trace Statistic	0.05 Critical Value	Eigenvalue	Hypothesized No. of CE(s)	Prob.**
274.0013	103.8473	0.998354	None *	0.0000
100.9511	76.97277	0.772336	At most 1 *	0.0000
60.99425	54.07904	0.599242	At most 2 *	0.0003
36.30553	35.19275	0.454603	At most 3 *	0.0107
19.93702	20.26184	0.438368	At most 4	0.0378
4.360511	9.164546	0.149134	At most 5	0.0554
				0.3611

Source: Researcher's Computation, 2019.

Trace test indicates 4 co-integrating equations at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
** Mackinnon Haug-michelis (1999) p-values.

Table 4.4: Empirical Results of Unrestricted Co-integration Rank Test (Max-Eigen Value)

Max-Eigen Statistic	0.05 Critical Value	Eigenvalue	Hypothesized No. of CE(s)	Prob.**
173.0502	40.95680	0.998354	None *	0.0001
39.95684	34.80587	0.772336	At most 1 *	0.0111
24.68871	28.58808	0.599242	At most 2	0.1456
16.36851	22.29962	0.454603	At most 3	0.2729
15.57651	15.89210	0.438368	At most 4	0.0560
4.360511	9.164546	0.149134	At most 5	0.3611

Source: Researcher's Computation, 2019.

Maximum Eigenvalue test indicates 2 co-integrating equations at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
** Mackinnon Haug-michelis (1999) p-values

Tables 4.3 and 4.4 showed the Trace and Maximum Eigenvalue test statistics, with the values of unrestricted co-integration test, Trace and Maximum Eigenvalue were greater than the value of the critical value at 5% level of significance. The test statistics indicate that the Hypothesis of no co-integration among the variables can be rejected. The finding implies that there is a long run relationship between Agricultural output, agricultural foreign direct investment, exchange rate, trade openness, gross fixed capital formation and labour force in the agricultural sector within the estimated model in Nigeria. The test result suggests that a long run relationship exists among

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the variables in the model. Thus, the study proceeds to estimate the long run parameters of the models.

4.2: Optimal Lag Selection

The lag length selection is necessary for estimating the optimal lag number that is required for a significant test in causality test or autoregression analysis. Table 5 reports the optimal lag length of one (1) as selected by four different criteria: Final Prediction Error (FPE), Akaike information criteria (AIC), Schwarz Information Criterion (SIC) and Hannan-Quinn Information Criterion (HQ).

Table 4.5: Optimal Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-5.885298	NA	9.38e-07*	3.102615*	4.830397*	3.616375*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion

4.3: Causality Test

In order to determine whether one time series variable is useful in forecasting another, the pairwise granger causality test was employed for this study as presented in table 4.6.

Table 4.6: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
AFDI does not Granger Cause AGDP	31	0.01009	0.9207
AGDP does not Granger Cause AFDI		20.2583	0.0001
EXR does not Granger Cause AGDP	31	4.24001	0.0489
AGDP does not Granger Cause EXR		0.58773	0.4497
TOP does not Granger Cause AGDP	31	0.25119	0.6202
AGDP does not Granger Cause TOP		1.35214	0.2547
GCFC does not Granger Cause AGDP	31	1.59404	0.2172
AGDP does not Granger Cause GCFC		7.51965	0.0105
LAB does not Granger Cause AGDP	27	2.80520	0.1069
AGDP does not Granger Cause LAB		4.66807	0.0409
EXR does not Granger Cause AFDI	31	19.1365	0.0002
AFDI does not Granger Cause EXR		0.17775	0.6765

Null Hypothesis	Obs	F-Statistic	Prob.
TOP does not Granger Cause AFDI	31	0.59282	0.4478
AFDI does not Granger Cause TOP		0.36057	0.5530
GCFC does not Granger Cause AFDI	31	17.7593	0.0002
AFDI does not Granger Cause GCFC		1.21227	0.2803
LAB does not Granger Cause AFDI	27	0.09754	0.7575
AFDI does not Granger Cause LAB		3.16987	0.0877
TOP does not Granger Cause EXR	31	0.02840	0.8674
EXR does not Granger Cause TOP		2.72888	0.1097
GCFC does not Granger Cause EXR	31	5.30483	0.0289
EXR does not Granger Cause GCFC		2.64646	0.1150
LAB does not Granger Cause EXR	27	2.11701	0.1586
EXR does not Granger Cause LAB		1.76112	0.1970
GCFC does not Granger Cause TOP	31	0.45629	0.5049
TOP does not Granger Cause GCFC		0.15835	0.6937
LAB does not Granger Cause TOP	27	0.61322	0.4412
TOP does not Granger Cause LAB		3.26838	0.0832
LAB does not Granger Cause GCFC	27	1.27234	0.2705
GCFC does not Granger Cause LAB		3.01905	0.0951

Source: Researcher's Computation, 2019

Table 4.6 showed the pairwise granger causality test on the variables of the study. The table revealed a unidirectional causality between agricultural foreign direct investment and agricultural output in Nigeria. That is, granger causality test showed unidirectional causality from agricultural foreign direct investment to agricultural output on a probability value of 0.0001. This is in conformity with the findings of Akande and Biam (2011) and Izuchukwu *et al* (2014). This implies that foreign direct investment to the agricultural sector helps in the prediction of agricultural output in Nigeria. Similarly, the granger causality test revealed a unidirectional causality between agricultural output and exchange rate in Nigeria. This implies that value of exchange rate can help in the prediction of the volume of agricultural output in Nigeria.

In the same vein, unidirectional causality exists between agricultural output and gross fixed capital formation in Nigeria with a probability value of 0.0105. This implies that the value of agricultural output is useful to forecast the level of investment in the economy of Nigeria. The table also revealed a unidirectional causality from number of labour force in the agricultural

sector of the economy to agricultural output in Nigeria; this implies that the numbers of the labour force can help in forecasting the quantity of agricultural output in Nigeria.

Also, a unidirectional causality exists between foreign direct investment in the agricultural sector and the foreign exchange rate in Nigeria with a probability value of 0.0002. This implies that the rate of exchange in the foreign exchange market helps in the prediction of the amount of foreign direct investment in the agricultural sector in Nigeria. Similarly, a unidirectional causality exists between gross fixed capital formation and the agricultural foreign direct investment in Nigeria. This implies that agricultural foreign direct investment is useful to forecast the volume of total investment in the Nigerian economy.

The causality test result also revealed a unidirectional causality between exchange rate and gross fixed capital formation in Nigeria. Meaning that, the rate of exchange is significant to predict the volume of investment in an economy.

4.4   Vector Autoregression (VAR) Model Estimation

In order to investigate the long run relationship between agriculture foreign direct investment inflows and agricultural output in Nigeria, the study adopted the vector autoregression (VAR) technique because it estimates all the variables independently thus each variable is explained by its own lag and the lag of other variables in the Model. To avoid spurious regression, each variable was estimated based on its log value except for variables in rate or proportions. The result is presented in table 4.7:

Table 4.7: Results of Vector Autoregression Model

	LOG(AGDP)	LOG(AFDI)	EXR	TOP	LOG(GCFC)	LOG(LAB)
LOG(AGDP(-1))	0.730852	0.638637	17.85569	-0.837920	1.024623	0.051700
	(0.05137)	(0.58561)	(15.6197)	(0.16869)	(0.18780)	(0.04823)
	[14.2262]	[1.09054]	[1.14315]	[-4.96723]	[5.45587]	[1.07199]
LOG(AFDI(-1))	0.003267	-0.032169	0.525300	0.004923	0.017690	-0.003336
	(0.00762)	(0.08918)	(2.35620)	(0.02496)	(0.02838)	(0.00731)
	[0.42889]	[-0.36074]	[0.22294]	[0.19719]	[0.62334]	[-0.45642]
EXR(-1)	0.000537	-0.000320	0.345272	0.000633	0.001884	-0.000228
	(0.00027)	(0.00304)	(0.08170)	(0.00087)	(0.00097)	(0.00025)
	[2.01947]	[-0.10538]	[4.22603]	[0.72435]	[1.94446]	[-0.91620]
TOP(-1)	0.005613	-0.087415	-2.639694	0.011443	-0.053209	0.024093
	(0.00964)	(0.09317)	(2.48610)	(0.03239)	(0.03038)	(0.00787)
	[0.58201]	[-0.93827]	[-1.06178]	[0.35330]	[-1.75140]	[3.06197]
LOG(GCFC(-1))	0.052012	0.306973	14.52950	0.238690	0.572699	-0.010852
	(0.01641)	(0.18780)	(5.00382)	(0.05388)	(0.06053)	(0.01555)
	[3.16894]	[1.63461]	[2.90368]	[4.43030]	[9.46074]	[-0.69807]
LOG(LAB(-1))	0.121149	0.042031	-10.58614	0.359138	-0.380794	0.979790
	(0.02234)	(0.25091)	(6.69176)	(0.07352)	(0.08058)	(0.02071)
	[5.42354]	[0.16752]	[-1.58197]	[4.88485]	[-4.72585]	[47.3055]
R-squared	0.982278	0.622878	0.865181	0.092909	0.984622	0.737533
Adj. R-squared	0.978058	0.533087	0.833081	-0.123065	0.980961	0.675041
F-statistic	232.7932	6.936974	26.95285	0.430184	268.9176	11.80201

Source: Researcher's Computation, 2019

The results of the VAR estimates from Table 4.7 shows agricultural output, exchange rate, trade openness, gross fixed capital formation and the number of labour force in their immediate past periods have significant positive influence on the agricultural output in the current period in Nigeria. This implies that increase in the agricultural output, exchange rate, trade openness, gross fixed capital formation and the number of labour force in their immediate past periods led to about 0.73%, 0.0005%, 0.006%, 0.05% and 0.12% increase in the agricultural output in the current period respectively. Hence, it is statistically significant at 5% significance level.

The results also revealed that agricultural foreign direct investment in Nigeria was significantly influenced by agricultural output, trade openness and gross fixed capital formation in their immediate past periods. The results showed that while agricultural output and gross fixed capital

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formation positive influenced agricultural foreign direct investment at 0.64% and 0.31% respectively, trade openness negatively influence the level of foreign direct investment in the agricultural sector in Nigeria at 0.09%. The negative effect of trade openness on agricultural foreign direct investment might be as a result of unfavourable net exports of agricultural product in Nigeria. This agrees with the assertion of Denisia (2010) that foreign direct investment reflects the position of a country's balance of payment.

Furthermore, the VAR results also showed that agricultural output, exchange rate, trade openness, gross fixed capital formation and the number of labour force in their immediate past periods have significant effect on the rate of exchange in the current period. This implies that increase in the agricultural output, exchange rate, gross fixed capital formation in their immediate past periods led to about 17.86%, 0.35% and 14.53% increase in the rate of exchange in the current period respectively. While one percent increase in trade openness and the number of labour force in their immediate past periods led about 2.64% and 10.59% decrease in the rate of exchange in the current period in Nigeria. Meaning that, trade openness is significantly negative because unfavourable international trade affects the value of the Nigerian currency (Naira) leading to a negative consequence on the rate of exchange in the international market. This conforms to the findings of Okpachu, and Ojonugwa (2010) that opined that the degree of trade openness had negative relationship with the performance of agricultural sector in Nigeria.

The VAR estimates showed that trade openness in the current period in Nigeria is significantly influenced by agricultural output, exchange rate, gross fixed capital formation and the labour force in their immediate past periods. The findings revealed that agricultural output has an inverse effect on trade openness in the current period. This implies that a percent increase in agricultural output led to about 0.84% decrease in the level of trade openness in Nigeria.

Meaning that, despite increase in the quantity of agricultural output in recent time, international trade is still not favourable to agricultural product. The findings also shows that one percent increase in the rate of exchange, gross fixed capital formation and number of labour force in the agricultural sector led to about 0.0006%, 0.24% and 0.36% increase in trade openness respectively.

More so, the results showed that agricultural output, agricultural foreign direct investment, exchange rate, trade openness, gross fixed capital formation and the number of labour force in their immediate past periods have significant influence on the gross fixed capital formation in the current period in Nigeria. The implication of this is that increase in the agricultural output, agricultural foreign direct investment, exchange rate and gross fixed capital formation in their immediate past periods led to about 1.02%, 0.018%, 0.002% and 0.57% increase in the level of total investment in the current period respectively. While a percent icrease in trade openness and the number of labour force in their immediate past periods led about 0.05% and 0.38% decrease in the level of total investment in the current period in Nigeria respectively.

The results also revealed that the number of labour force in the agricultural sector in the current period in Nigeria was significantly influenced by total agricultural output, exchange rate, trade openness, gross fixed capital formation and the number of labour force in their immediate period. Meaning that, the value of agricultural output, trade openness and the labour force in the preceding year positively influenced the number of labour force in the current year with an individual effect of 0.051%, 0.024% and 0.98% respectively. However, the rate of exchange and gross fixed capital formation in the preceding year had negative effects on the number of labour force in the current year with about 0.0002% and 0.01% inverse effect respectively.

The F-statistics

The F-statistics is used to test for stability in the regression parameter coefficient when sample sizes increase, as well as the overall significance of the estimated regression model. Thus, the calculated F^* is compared to the critical value at 5% level at K-1 and N-K degree of freedom (df_1 and df_2). Where; K is the number of parameters (explained variables) and N is the number of observed years. For this study, K is equal five (5) while N is 32 for all the variables except for labour force where N is 28 due to available data. df_1 is equal to K-1 (i.e. 5-1 = 4), df_2 is equal to N-K (i.e. 28-5 =23 for number of labour force and 32-5 = 27 for other variables). The decision rule is to reject the null hypothesis (H_0) if $F^*>F(0.05)$.

From the statistical table, F(0.05) at (4, 23) degree of freedom is 2.80 while F(0.05) at (4, 27) degree of freedom is 2.73 for number of labour force and other explained variables respectively.

Table 4.8: F-statistics Test Result

Variables	F^*	F(0.05)	Decision
AGDP	232.79	2.73	Reject H_0
AFDI	6.94	2.73	Reject H_0
EXR	26.95	2.73	Reject H_0
TOP	0.43	2.73	Accept H_0
GFCF	268.91	2.73	Reject H_0
LAB	11.80	2.80	Reject H_0

Source: Researcher's Computation, 2019

From the VAR results F^* is estimated at 232.79, 6.94, 26.95, 0.43, 268.91 and 11.80 for Agricultural output, agricultural foreign direct investment, exchange rate, trade openness, gross fixed capital formation and labour force in the agricultural sector respectively. Obviously, $F^*>F(0.05)$ in all the estimated variables except for trade openness, thus we reject the null

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hypotheses and assert the lagged explained variables significantly influenced their explanatory variables.

Test for Goodness of the Model (Coefficient of Determination, R^2)

The R-square (R^2) shows the predictive power of a model and it is derived to be 0.982278, 0.622878, 0.865181, 0.092909, 0.984622 and 0.737533 using the VAR approach. This implies that the lagged variables of the study explain about 98%, 62%, 87%, 9%, 98% and 74% systematic variation on agricultural output, agricultural foreign direct investment, exchange rate, trade openness, gross fixed capital formation and labour force in the agricultural sector in Nigeria for the period of 1986-2017 respectively while the random stochastic term accounts for the remaining 12%, 38%, 13%, 91%, 2% and 26% variation in agricultural output, agricultural foreign direct investment, exchange rate, trade openness, gross fixed capital formation and labour force in the agricultural sector outside the estimated model respectively. Obviously, only trade openness showed low level of goodness of fit. Agricultural output, agricultural foreign direct investment, exchange rate, gross fixed capital formation and labour force in the agricultural sector showed a significant level of goodness within the estimated model.

4.5   VAR Model Fitness Tests

A number of fitness tests were carried out in this study to ensure that the estimations do not violate any of the conditions establishing the model. This test includes the Roots of Characteristic Polynomial, which is used to check whether VAR models satisfied the stability condition.

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Model Stability/Fitness Test Result

The Roots of Characteristic Polynomial (stability) results are presented in tabular as well as graphic format in Table 4.9 and Figure 4.1.

Table 4.9: Roots of Characteristic Polynomial

Root	Modulus
0.959515	0.959515
0.436143	0.436143
0.394512	0.394512
0.216781	0.216781
-0.055546	0.055546
0.042668	0.042668

No root lies outside the unit circle
VAR satisfies the stability condition

Inverse Roots of AR Characteristic Polynomial
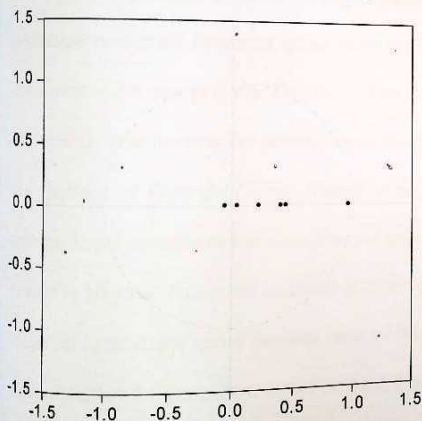
Figure 4.1: Inverse Roots of AR Characteristic Polynomial Result

Table 4.9 and Figure 4.1 showed that no root lies outside the unit circle, a condition that confirmed that the model satisfies the stability condition and exhibits good fit.

4.6   Discussion of Findings

Preliminary analysis (unit root and co-integration tests) confirmed that the variables are stationary and co-integrated in the study. Trade openness is stationary at level while Agricultural output, agricultural foreign direct investment, exchange rate, gross fixed capital formation and labour force in the agricultural sector are stationary at first difference. The granger causality test revealed unidirectional causality between agricultural output and agricultural foreign direct investment, exchange rate and agricultural output, gross fixed capital formation and agricultural output, labour force and agricultural output, exchange rate and agricultural foreign direct investment, gross fixed capital formation and agricultural foreign direct investment, and gross fixed capital formation and the rate of exchange. The vector autoregressive (VAR) estimation showed that agricultural output in Nigeria was significantly influenced by agricultural output, exchange rate, trade openness, gross fixed capital formation and the number of labour force in their immediate past periods. This implies that the total agricultural product produced in Nigeria in previous year impacts the current level of output in the agricultural sector. More so, similar to the findings of Oloyede (2014), Yusuff *et al* (2011) and Ogbanje *et al* (2010), agricultural foreign direct investment had a positive but slightly significant impact on the level of agricultural output in Nigeria. This trend might be as a result of low or inadequate foreign investment on the Nigerian agricultural sector because most of the foreign direct investments in Nigeria are geared towards either the petroleum sector or the industrial sector of the economy (Udeaja *et al,* 2008). It is evident from this study and supported by Iddrisu *et al* (2013) that increase in the level of investment in the agricultural sector tends to improve its productivity thereby leading to increase in the total agricultural outputs. In the same vein, increase in the number of workers in the agricultural sector tends to improve the average product per worker in the sector. In agreement

with Izechukwu *et al* (2014), it was estimated that the numbers of labour in the agricultural sector significantly determine the level of outputs because one percent increase in the agricultural workforce tends to increase the agricultural output by at least 0.12%. Also, the agricultural foreign direct investment in Nigeria was significantly influenced by agricultural output, trade openness and gross fixed capital formation in their immediate past periods. The estimation showed that while agricultural output and gross fixed capital formation positive influenced agricultural foreign direct investment at 0.64% and 0.31% respectively, trade openness negatively influence the level of foreign direct investment in the agricultural sector in Nigeria. Trade openness is significantly negative because unfavourable international trade affects the value of the Naira leading to a negative consequence on the rate of exchange in the international market. According to Denisia (2010), foreign direct investment itself is a type of cross-border capital flow, between home and host countries and its captured in balance of payments statements of countries. Therefore, Nigeria's unfavourable balance of payment tends to distort the effectiveness of trade openness to the agricultural sector.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The study assessed the relationship between agriculture foreign direct investment inflows and agricultural output in Nigeria for the period 1986-2017. The main and specific objectives of the study were to examine and establish the relationship that exists between Agric FDI and Agric Output during the period under review. Relevant literature on the topic was exhaustively reviewed and gaps identified to justify the need for the Study. Secondary data sourced from Central Bank of Nigeria, Nigerian Bureau of Statistics (NBS) and World Bank Publications were adopted for the preliminary analysis while Granger Causality test and Vector Autoregressive (VAR) techniques were used to analised the data. The VAR estimation revealed that agricultural output in Nigeria was significantly influenced by exchange rate, trade, openness, level of investment and the labour force in the agricultural sector of the economy 0.054%, 0.56%,5.2% and 12.15% respectively. Also, the estimation revealed that 1% increase in Agric FDI led to about 0.033% in Agric Output.

The findings from the study revealed that trade openness, agricultural output, agricultural foreign direct investment, exchange rate, gross fixed capital formation and labour force in the agricultural sector are stationary in the model. This implies that there is a short run equilibrium relationship among the variables of the study.

The study also established a long run equilibrium relationship among the variables considered in the model through Johansen Co-integration test using Trace and Eigen value at 5% level of significance.

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The granger causality test revealed unidirectional causality between agricultural output and agricultural foreign direct investment in Nigeria. The implication of this is that agricultural foreign direct investment is useful to forecast the variation in agricultural output in Nigeria.

The causality test also revealed a unidirectional causality between exchange rate and agricultural output, gross fixed capital formation and agricultural output, labour force and agricultural output, exchange rate and agricultural foreign direct investment, gross fixed capital formation and agricultural foreign direct investment, and gross fixed capital formation and the rate of exchange.

The study also confirmed that agricultural foreign direct investment had a positive but slightly significant impact on the level of agricultural output in Nigeria.

The findings of vector autoregression (VAR) showed that agricultural output in Nigeria was significantly influenced by agricultural output, exchange rate, trade openness, gross fixed capital formation and the number of labour force in their immediate past periods.

Direct relationship is found to exist between number of labour force in the agricultural sector, gross fixed capital formation and agricultural output while inverse relationship exists between trade openness and agricultural foreign direct investment in Nigeria.

The F-statistics also revealed the agricultural output, agricultural foreign direct investment, exchange rate, gross fixed capital formation and labour force were statistically significant in the study. Hence, the lagged explained variables significantly influenced their corresponding explanatory variables in the study.

The R-square (R^2) confirmed the goodness of fit of the estimated model. Meaning that, the lagged independent variables explained an acceptable proportion of the systematic variation in the dependent variables.

Finally, the VAR model fitness tests confirmed that the model satisfies the stability condition and exhibits good fit.

5.2 Conclusion

Based on the empirical findings in the study; It is established that the volume of agricultural foreign direct investment helps to predict the volume of agricultural output in Nigeria. It is also established that agricultural sector output in Nigeria was influenced by agricultural foreign direct investment, exchange rate, trade openness, gross fixed capital formation and the number of labour force in the agricultural sector in Nigeria for the period 1986 to 2017. In agreement with conceptual and theoretical assumptions, the study justified that an increase in the level of investment in a sector of the economy tends to improve the level of productivity and effectiveness of such sector. The study also established that in the long run the level of international trade determined the volume of agricultural sector output during the study period. Meaning that, favourable international trade particularly on agricultural products tends to increase the level of production in the agricultural sector thereby improving the agricultural sector output in the long run.

Apparently from the findings, increase in the number of active workforce in the agricultural sector is expected to increase the agricultural output. In other word, increase in the number of workers tends to increase the level of production or output in the agricultural sector in Nigeria. This conforms to the move of the federal government, state government and the local government areas in Nigeria; which encouraged youths' participation in agricultural practices

in order to boosts the level of production thereby increasing the agricultural sector output in Nigeria in the long run.

5.3 Recommendations

The aim of any rational policy maker or stakeholders in the agricultural sector is to actualize an optimal level of production that will boost the agricultural sector output in the economy. Based on the findings of the study, the following recommendations are made:

i. The government of Nigeria should formulate policies and programmes that will encourage foreign investors to invest in the agricultural sector. Incentives such as tax holiday, provision of arable land at a discounted price, etc should be given to investors so as to motivate them to invest in the sector.

ii. More so, the government should sensitize and create awareness to the international community concerning the agricultural potentials that can be harnessed in Nigeria. The inherent qualities and resources in the agricultural sector should be marketed to the world so as to make the agricultural investors aware of the potentials in the sector.

iii. Based on the findings of the study, positive relationship exists between the number of labour force in the agricultural sector and agricultural output in Nigeria. Government at all levels (Federal, State and Local) should encourage the youths to participate in the sector. This can be achieved by encouraging to youths to participate in mechanized farming and provision of incentives such as subsidizing agricultural inputs and easy access to agricultural credit facilities.

iv. In order to improve the quality of the labour force in the agricultural sector, the government should organize free or subsidized training programmes on the modern

agricultural trends and practices for the farmers so as to increase the level of their efficiency in production.

v. Based on the findings, favourable international trade policies particularly on agricultural products tends to increase the level of agricultural sector output. Therefore, the government should encourage export promotion policies and programmes by increasing the availability of credit – short and (especially) long term credit, simplifying regulation, improving cooperation among economic actors and combining short term and long term export economic growth policies. This, among other benefits will help to improve the productivity and technological content of domestic agricultural products , and provide incentive to nurturing innovation. It will also help to build the country image in foreign markets (through marketing, information provision, advocacy.

5.4   Contributions to Knowledge

Nigeria's agricultural sector is an important and strategic sector that is waiting to be properly developed and harnessed for Nigerians and the nation at large. The study contributes to the existing body of knowledge by investigating the relationship between agricultural sector output and foreign direct investment that is specifically directed to the agricultural sector of Nigeria. Therefore, the findings and recommendations from the study are useful to the government and stakeholders in the agricultural sector for policy formulation that tends to improve the growth of the agricultural sector of the economy.

5.5   Limitation of the Study

This study assessed the relationship between agriculture foreign direct investment inflows and agricultural output in Nigeria. The study could not exhaust all the possible

factors that can influence agricultural sector output. Factors such as level of rainfall, policy somersault in the agricultural sector, corruption and some other social indices are ignored in this study.

5.6 Suggestions for Further Studies

The agricultural sector of any economy requires continuous investigation and research that can improve the sector because of immense contribution to the welfare of the populace and economy at large. Further researches could be done on other factors that determine the level of agricultural sector output in the economy. Particularly, further investigations could be carried out on how some social factors such as agricultural policy somersault and corruption in the agricultural sector affect the level of productivity in the agricultural sector in Nigeria.

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APPENDIX 1
DATA ON THE VARIABLES OF THE STUDY, 1986-2017

YEAR	AGDP (N)	AFDI (N)	EXR	TOP	GCFC	LAB
1986	2,986.84	150.75	2.02	0.001	11.355	
1987	2,891.67	139.85	4.02	3.1578	15.229	
1988	3,174.57	221.09	4.54	3.2438	17.562	
1989	3,325.95	263.5	7.39	5.1345	26.826	
1990	3,464.72	443.65	8.04	8.0598	40.121	11,516,034.60
1991	3,590.84	494	9.91	0.01	45.19	15,019,912.00
1992	3,674.79	698.88	17.3	0.0178	70.809	15,461,868.00
1993	3,743.67	1,823.99	22.95	0.0193	96.916	16,008,822.00
1994	3,839.68	1,805.44	21.9	0.0185	105.575	16,549,982.00
1995	3,977.38	1,807.65	81	0.0838	141.92	16,909,527.00
1996	4,133.55	1,807.65	81.3	0.0884	204.048	17,316,916.00
1997	4,305.68	1,819.90	81.6	0.0986	242.9	17,747,794.00
1998	4,475.24	1,904.00	83.8	0.0712	242.256	18,412,557.00
1999	4,703.64	1,903.96	92.7	0.0914	231.662	18,633,267.00
2000	4,840.97	1,907.83	102.1	0.1237	331.057	18,537,168.00
2001	5,024.54	1,910.78	111.9	0.1277	372.136	19,232,746.00
2002	7,817.08	1,913.91	121	1.399	499.682	20,815,258.00
2003	8,364.83	1,913.91	129.4	0.163	865.876	20,657,939.00
2004	8,888.57	1,913.91	133.5	0.1882	863.073	19,162,539.00
2005	9,516.99	1,913.91	132.1	0.2681	804.401	20,141,256.00
2006	10,222.47	2,553.53	128.7	0.2609	1,546.53	20,987,928.00
2007	10,958.47	33,824.40	125.8	0.2847	1,936.96	21,887,627.00
2008	11,645.37	3,171.78	118.6	0.3473	2,053.01	20,618,828.00
2009	12,330.33	11,217.90	148.9	0.2826	3,050.58	19,372,020.00
2010	13,048.89	1,588.90	150.3	0.3694	9,183.06	14,926,910.00
2011	13,429.38	6,815.50	153.8	0.4561	9,897.20	14,920,511.00
2012	14,329.71	14,219.70	157.5	0.4156	10,281.95	15,064,834.00
2013	14,750.52	13,756.80	159.3	0.3907	11,478.08	14,949,112.00
2014	15,380.39	3,943.50	164.9	0.3499	13,595.84	14,813,292.00
2015	15,952.22	19,005.22	195.5	0.2886	14,112.17	15,174,724.00
2016	16,607.34	5,695.92	253.5	0.2696	15,104.18	16,058,657.00
2017	17,179.50	59,827.81	305.6	0.0362	16,908.13	16,449,686.00

SOURCE: CBN Statistical Bulletin, 2017.

APPENDIX 2
UNIT ROOT TEST

Null Hypothesis: AGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.887080	0.9997
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(AGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.597971	0.0010
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: AFDI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.657204	0.0929
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(AFDI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.834581	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: EXR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.853096	0.9996
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(EXR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.143912	0.0339
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: TOP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.040928	0.0420
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: GCFC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.123764	0.9998
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(GCFC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.115152	0.0033
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LAB has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.557081	0.1140
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LAB) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.510798	0.0015
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

APPENDIX 3

COINTEGRATION TEST

Date: 11/05/19   Time: 09:22
Sample (adjusted): 1991 2017
Included observations: 27 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: AGDP AFDI EXR TOP GCFC LAB
Lags interval (in first differences): No lags

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.998354	274.0013	103.8473	0.0000
At most 1 *	0.772336	100.9511	76.97277	0.0003
At most 2 *	0.599242	60.99425	54.07904	0.0107
At most 3 *	0.454603	36.30553	35.19275	0.0378
At most 4	0.438368	19.93702	20.26184	0.0554
At most 5	0.149134	4.360511	9.164546	0.3611

Trace test indicates 4 cointegrating eqn(s) 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 *	0.998354	173.0502	40.95680	0.0001
At most 1 *	0.772336	39.95684	34.80587	0.0111
At most 2	0.599242	24.68871	28.58808	0.1456
At most 3	0.454603	16.36851	22.29962	0.2729
At most 4	0.438368	15.57651	15.89210	0.0560
At most 5	0.149134	4.360511	9.164546	0.3611

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

APPENDIX 4

OPTIMAL LAG SELECTION

VAR Lag Order Selection Criteria
Endogenous variables: LOG(AGDP) LOG(AFDI) EXR TOP LOG(GCFC) LOG(LAB)
Exogenous variables:
Date: 11/05/19   Time: 09:32
Sample: 1986 2017
Included observations: 27

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-5.885298	NA	9.38e-07*	3.102615*	4.830397*	3.616375*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

APPENDIX 5

CAUSALITY TEST

Null Hypothesis:	Obs	F-Statistic	Prob.
AFDI does not Granger Cause AGDP	31	0.01009	0.9207
AGDP does not Granger Cause AFDI		20.2583	0.0001
EXR does not Granger Cause AGDP	31	4.24001	0.0489
AGDP does not Granger Cause EXR		0.58773	0.4497
TOP does not Granger Cause AGDP	31	0.25119	0.6202
AGDP does not Granger Cause TOP		1.35214	0.2547
GCFC does not Granger Cause AGDP	31	1.59404	0.2172
AGDP does not Granger Cause GCFC		7.51965	0.0105
LAB does not Granger Cause AGDP	27	2.80520	0.1069
AGDP does not Granger Cause LAB		4.66807	0.0409
EXR does not Granger Cause AFDI	31	19.1365	0.0002
AFDI does not Granger Cause EXR		0.17775	0.6765
TOP does not Granger Cause AFDI	31	0.59282	0.4478
AFDI does not Granger Cause TOP		0.36057	0.5530
GCFC does not Granger Cause AFDI	31	17.7593	0.0002
AFDI does not Granger Cause GCFC		1.21227	0.2803
LAB does not Granger Cause AFDI	27	0.09754	0.7575
AFDI does not Granger Cause LAB		3.16987	0.0877
TOP does not Granger Cause EXR	31	0.02840	0.8674
EXR does not Granger Cause TOP		2.72888	0.1097
GCFC does not Granger Cause EXR	31	5.30483	0.0289
EXR does not Granger Cause GCFC		2.64646	0.1150
LAB does not Granger Cause EXR	27	2.11701	0.1586
EXR does not Granger Cause LAB		1.76112	0.1970
GCFC does not Granger Cause TOP	31	0.45629	0.5049
TOP does not Granger Cause GCFC		0.15835	0.6937
LAB does not Granger Cause TOP	27	0.61322	0.4412
TOP does not Granger Cause LAB		3.26838	0.0832
LAB does not Granger Cause GCFC	27	1.27234	0.2705
GCFC does not Granger Cause LAB		3.01905	0.0951

VAR ESTIMATE

Bayesian VAR Estimates
Date: 11/05/19   Time: 10:06
Sample (adjusted): 1991 2017
Included observations: 27 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Full VAR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	LOG(AGDP)	LOG(AFDI)	EXR	TOP	LOG(GCFC)	LOG(LAB)
LOG(AGDP(-1))	0.730852	0.638637	17.85569	-0.837920	1.024623	0.051700
	(0.05137)	(0.58561)	(15.6197)	(0.16869)	(0.18780)	(0.04823)
	[14.2262]	[1.09054]	[1.14315]	[-4.96723]	[5.45587]	[1.07199]
LOG(AFDI(-1))	0.003267	-0.032169	0.525300	0.004923	0.017690	-0.003336
	(0.00762)	(0.08918)	(2.35620)	(0.02496)	(0.02838)	(0.00731)
	[0.42889]	[-0.36074]	[0.22294]	[0.19719]	[0.62334]	[-0.45642]
EXR(-1)	0.000537	-0.000320	0.345272	0.000633	0.001884	-0.000228
	(0.00027)	(0.00304)	(0.08170)	(0.00087)	(0.00097)	(0.00025)
	[2.01947]	[-0.10538]	[4.22603]	[0.72435]	[1.94446]	[-0.91620]
TOP(-1)	0.005613	-0.087415	-2.639694	0.011443	-0.053209	0.024093
	(0.00964)	(0.09317)	(2.48610)	(0.03239)	(0.03038)	(0.00787)
	[0.58201]	[-0.93827]	[-1.06178]	[0.35330]	[-1.75140]	[3.06197]
LOG(GCFC(-1))	0.052012	0.306973	14.52950	0.238690	0.572699	-0.010852
	(0.01641)	(0.18780)	(5.00382)	(0.05388)	(0.06053)	(0.01555)
	[3.16894]	[1.63461]	[2.90368]	[4.43030]	[9.46074]	[-0.69807]
LOG(LAB(-1))	0.121149	0.042031	-10.58614	0.359138	-0.380794	0.979790
	(0.02234)	(0.25091)	(6.69176)	(0.07352)	(0.08058)	(0.02071)
	[5.42354]	[0.16752]	[-1.58197]	[4.88485]	[-4.72585]	[47.3055]
R-squared	0.982278	0.622878	0.865181	0.092909	0.984622	0.737533
Adj. R-squared	0.978058	0.533087	0.833081	-0.123065	0.980961	0.675041
Sum sq. resids	0.151100	12.89254	15494.97	1.711098	1.467150	0.113697
S.E. equation	0.084825	0.783537	27.16350	0.285448	0.264318	0.073581
F-statistic	232.7932	6.936974	26.95285	0.430184	268.9176	11.80201
Mean dependent	8.971580	8.127237	121.6615	0.241493	6.965199	16.67668
S.D. dependent	0.572649	1.146678	66.48642	0.269355	1.915582	0.129078

POST TEST

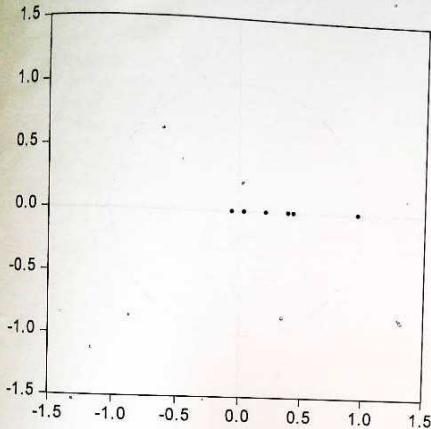### Inverse Roots of AR Characteristic Polynomial

Fig. 1:Inverse Roots of AR Characteristic Polynomial Result

Roots of Characteristic Polynomial
Endogenous variables: LOG(AGDP) LOG(AFDI) EXR
TOP LOG(GCFC) LOG(LAB)
Exogenous variables: C
Lag specification: 1 1
Date: 11/05/19   Time: 10:23

Root	Modulus
0.959515	0.959515
0.436143	0.436143
0.394512	0.394512
0.216781	0.216781
-0.055546	0.055546
0.042668	0.042668

No root lies outside the unit circle.
VAR satisfies the stability condition.