

Exchange Rate and Agricultural Exports: Evidence From Nigeria (1981-2019)

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Abstract: Exchange rate has become one of the major issues Nigerian economy has been confronted with in the recent times especially since one of the goals of all economies is to have a stable exchange rate. The concept of exchange rate was introduced into the analysis of economic growth and development. This study examined the impact of exchange rate on agricultural exports in Nigeria from 1981 to 2019. The Auto regressive distributed lag (ARDL) model and Granger causality test were employed as analytical tools to test for the existence of a relationship between the variables. This research generally places importance on the effect of interest rate, exchange rate, total exports, inflation rate and loans to the agricultural sector on agricultural exports. However, it is mainly concerned with the relationship between exchange rate and agricultural exports. The study establishes that exchange rate significantly affects agricultural exports and there is no causality between them. By implication, exchange rate has a direct or positive relationship with agricultural exports in Nigeria in the long run. This therefore implies that an increase in exchange rate will lead to an increase in the level of agricultural exports in the long run.

Keywords: Exchange Rate, Agricultural Export, Economic Growth, Nigeria

I. INTRODUCTION

Exchange rate is a major tool for macroeconomic policy and its fluctuations may have major effects on prices of tradeable and non-tradeable commodities (Bobai, Ubangida & Umar, 2013). Most importantly, there has been a recurring argument concerning which exchange rate policy should be adopted in developing countries (Kandil, 2004). It is likely for exchange rate changes to determine to a certain degree, economic performance. Therefore, in determining whether or not exchange rate fluctuations are of benefit or not, it becomes necessary to check the effects the exchange rate movements on the economic sectors.

Before Nigeria gained her freedom in 1960 and up until the early 1960s, the exports of Nigerian economy consisted of mostly agricultural exports, which contributed more than 60% to GDP and claimed about 70% of total exports. Agriculture is the major source of nutrition as well as income in Nigeria; therefore, it is an important part of the measures of poverty reduction and food security in Nigeria. Research has shown

that increase in income stems from productivity and increased investment as they both have a direct positive relationship with income and therein lies the interest in improving agricultural productivity. Estimates of agricultural productivity in Nigeria have shown a reduction between the 1960s and 1980s. In the past years, Nigeria has experienced major improvement with the real annual GDP growth averaging 8.8% between the years 2000 to 2007. However, the agricultural sector has failed to experience such growth as the GDP, growing at a rate of 3.7% in 2007 (Onunze, 2012). In 2013, agricultural production grew by 4.5 percent, as an outcome of favorable climate and continuous implementations of the initiatives brought about by the Agricultural Program (ATAP) (CBN, 2014).

The principle of comparative advantage as propounded by David Ricardo implores countries to specialize in the production of the goods that they can produce at less comparative cost to the country and exchange with products of other countries. Hence, the concept of exchange rate was introduced into the analysis of economic growth and development. Exchange rate has become one of the major issues we have in Nigeria especially since one of the goals of all economies is to have a stable exchange rate. In Nigeria however, this goal has not been realized and this has been as a result of the weak productive base of the sector and the almost regular devaluation of the naira. A number of exchange rate policies to stabilize the exchange rate were established by the monetary authority but very little was achieved because of the absence of a framework to review the performance of the sector holistically and as a result, the issue of fluctuations of the exchange rate continued to persist. In the 1960's, exports in Nigeria were majorly non-oil products which were mainly agricultural. Some other non-oil exports were tin ore, columbite, and hides.

However, the dominance of the oil sector in Nigeria's exports began in 1973 and had increased greatly by 1980 with petroleum accounting for 32.1% of GDP on the average and with oil accounting for more than 70% of the total revenue. Efforts were directed towards the growth of the oil sector as a result of the large revenue it brought into the economy and

this resulted in a decline in the foreign trade of non-oil products. Since the oil discovery in Nigeria, crude oil has become the major export, most proficient source of revenue and foreign exchange earner (over 90%) in Nigeria (Oluwa 2012). Consequently, the export of non-oil products has become discarded and neglected and all reliance is focused on revenue gotten from crude oil. Thus, the country has recorded deficits in the trade balance continuously in foreign trade (e.g. -3.9USD billion in March 2011). This has become a great barrier to the progress and development of the nation (Oluwa, 2012). Oladipo, Nwanji, Eluyela, Godo and Adegboyegun (2022) Government is expected to generate adequate revenue which will be used to finance its activities in order to enhance economic growth and development and also boost gross domestic product (GDP) in the country from manufacturing sector due to its size and nature.

Today, the conclusion is that prolonged and substantial exchange rate skewness can create severe disequilibria in the economy (mainly among the macroeconomic variables) and the restoration of balance will require both exchange rate devaluation and management policies. On this note, this study makes research concerning the extent of the result of the instability in exchange rate over the years on agriculture export performance. The Nigerian economy has continued to be dependent on imports and directs resources to promote oil exports and in Nigeria, exchange rate is highly volatile with crude oil price which acts as the dominating source of foreign income in Nigeria, meaning that fluctuations in price of oil affects the country's currency and with this there is a high tendency of an unstable exchange rate (Tule, 2015).

The inability to appropriately deal with the exchange rate variations is enough to incite instabilities in existing patterns of production and consumption resulting in uncertainties and destabilizing the entire economy (Mordi, 2006). The exchange rate therefore puts pressure on the Nigerian agricultural sector as Nigerian farmers are not able to compete favorably globally and this has caused the agricultural sector to perform below expectation. The tendency for the agricultural sector to compete with the foreign agricultural produce is very low as a result of the low international competitiveness and there is need to correct these distortions in the structure of the economy by boosting agricultural exports so as to promote sustainable growth.

It is expected that this study contributes to the well of knowledge available to confirm the findings on exchange rate and its effects on agricultural exports by including all variables which may affect or be significant to the growth of agricultural exports as well as the fluctuations in exchange rate. This study is important to make policies leading to the promotion of exportation of agricultural products in Nigeria and will be beneficial to boost the GDP of Nigeria and increase the foreign revenue of the country.

The main objective of the research is the examination of the results and impacts of exchange rate on agricultural export performance in Nigeria and to ascertain the significance of

exchange rate in agricultural trade flows. Specifically, the study aimed at investigating how exchange rate impacts on agricultural export in Nigeria. In addition to that, it also aimed at examining the causal relationships that exist between the exchange rate and agricultural exports in Nigeria.

The findings from this study will provide policy direction for government based on empirical investigation strategies to adopt in order to manage the exchange rate in Nigeria so as to be able to an economically viable outcome. Furthermore, it will also be an eye opener on which policy direction will be able to aid agricultural exports to diversify from the oil sector and boost economic growth. Also, by identifying exchange rate fluctuations and their negative or positive effects on agricultural exports, this study will also help to revamp the trade balance and balance of payments of Nigeria thereby maintaining a favorable economic performance in the world economy by ensuring price stability.

II. LITERATURE REVIEW AND CONCEPTUAL ISSUES

Concept of Exchange Rate

Exchange rate is the estimation of a nation's currency corresponding to another nation's. It is one currency's value for conversion purposes to another. Rates of exchange are decided in the foreign exchange market that is available to a wide scope of various kinds of purchasers and merchants, and where currency exchange is persistent. Exchange rate is one value of a country's currency as an incentive for conversion purposes to another. It tends to be expressed as units of local currency per units of remote currency or as units of outside currency per units of local currency (Charles, 2006). According to Lipsey and Crystal (1999), when one currency appreciates, the other must depreciate. The rate by which local goods can be interchanged for those produced in foreign countries is referred to as the real rate of exchange. A rise in the real rate of exchange will lead to lower country net exports holding other factors of exports and imports demand constant (Abel & Bernanke, 1998).

Exchange rate variations are an outcome of the free floats of exchange rates against one another and the estimation of money is controlled by the progressions of cash all through the nation. Expanded interest of a nation's cash brings about expanded money valuation. Consistent changes in the exchange rate routinely result in disintegration of the estimation of the cash and these vacillations can some of the time be typical or abrupt. The sudden fluctuation can have more prominent impacts as it decides total demand through foreign trade and local currency demand. The exchange rate between monetary standards is generally connected with cross outskirt capital developments, and is in this manner related with cross fringe streams of merchandise and ventures. Exchange rate appreciation happens when less units of the local currency trade for higher units of the foreign currency while exchange rate deterioration happens when higher units of the local money trade for less units of the foreign currency. Movements in the exchange rate (increase or decrease)

essentially influence the international trade of a nation and therefore trade balance. Domestic currency devaluation brings about increased exports of the home country, and help to accomplish a great parity of exchange.

The various types of exchange rate are explained below:

1. Fixed Exchange Rate: This type of exchange rate is dependent on the value of a foreign currency to determine its own value. When it is linked to a stable currency, stability is ensured and it is thereby protected against fluctuations in the inflation rate. However, any country that adopts this type of exchange rate must own a large foreign reserve so as to maintain its value. An alias for it is “Pegged Exchange Rate”.

2. Dual Exchange Rate: Here, the rate of currency has two values- one is to carry out foreign transactions while the other is for the domestic transactions. This exchange rate system is usually adopted by countries which are in a transitioning phase. Countries that operate this system can use different rates for capital and current account transactions. It is easier to manage international trade and protect domestic market simultaneously when using this type of exchange rate system. However, this system may cause misallocation of resources in industries.

3. Flexible Exchange Rate: Here a country's currency value is dependent on the demand and supply market forces. Some individual economists believe that this exchange rate system is advantageous because it allows for the shock of world crisis and can instinctively adjust to result in equilibrium. However, since the currency value is influenced by the demand and supply market forces, there is additional volatility which expands the risk quotient, thereby discouraging foreign investment. It is also known as “Floating Exchange Rate”.

4. Spot Rate: Refers to the present exchange rate for any nation's currency. That means the regular exchange rate. Although it doesn't require a deep statistical analysis, it could be misleading during economic crisis, or temporal transition phases in an economy.

Agricultural Growth Constraints in Nigeria

Agriculture is the science and specialty of making of nourishment, feed and different merchandise by composed planting and animal rising. Agriculture is the advancement of plants and tamed animals for economic purposes. Agribusiness is the key ingredient in the growth and development of humanity, whereby cultivating and rearing of tamed animals made food surpluses that were traded and enabled individuals to live in urban communities.

The main resources of agriculture in Nigeria are land, labor, water and capital and the Nigerian agricultural sector performance has been influenced over time because of the change in the economy resulting from the oil sector boom in the 1970s. As such, there have been hindrances to the growth of the agricultural sector including shortage of labor, low level of technology and poor infrastructural facilities. The

inadequacy of labor served as a major blockage to the expansion and improvement of the agricultural sector. There has been high cost of labor and little supply of labor and this has posed as one of the factors contributing to agriculture's poor performance. However, since the Nigerian agriculture is labor intensive, the problem of labor shortage continues to deteriorate but at the same time, the development in the rest of the economy such as primary education which increased rural-urban migration and creating income opportunities without working on the farm in the 1970s also contributed to the shortage of labor supply in agriculture at the detriment of the agricultural sector.

Agricultural Export

Agricultural exports refer to those outputs produced as a result of engagement in agricultural activities which are then sold to foreign countries. Agricultural outputs include production, livestock, fishing and forestry (CBN bulletin 2012). Agricultural output can be seen as the end products derived from engagement in agricultural activities. According to Babalola (2001), Nigeria was the lead producer and exporter of cocoa, palm produce, groundnuts, rubber and timber. He further clarified that the level of farm products exported in relation to total exports fluctuated from 92% to 64% somewhere in the range of 1938 and 1965 and food imports comprised distinctly about 0.1% of the complete amount of consumption of food. According to the CBN (2012), agricultural output is grouped into four categories:

Crop production refers to the cultivation of plants. It is a part of agribusiness that manages the developing of crops for use as nourishment or fiber. Crops cultivated in Nigeria for export includes rubber, cocoa, citrus crops, maize, wheat, cassava etc. These crops are grouped into cereals, vegetable oil, nuts, fruits and tropical crops (Babalola 2002). The diversities in temperature, rainfall and general weather conditions in different zones of the country make it possible for these crops to be grown throughout the country.

Forestry is the science and specialty of making, regulating, using, sparing, and fixing forests, and related resources for human and characteristic advantages. Nigeria had 2.5% of its GDP contributed by woodland assets in 2010 (FAO report 2010). A few products of forestry activities which are traded are cocoa beans, natural rubber, coconut oil, palm kernel and nuts (OEC 1987).

Fishing involves the act of getting fish and other water resources and the products derived from this activity. Nigeria has over 900km of coastal waters and another 320km of Exclusive Economic Come (EEC) in the Atlantic Ocean (Babalola 2002). Exports under fishing are crustaceans and molluscs, bones, ivory and horns as well as fresh fish (OEC 1987).

Livestock refers to the rearing of animals for consumption and commercial purpose. Premised on the survey by Federal Ministry of Agriculture (1996), some livestock products that are exported include meat, eggs, milk and cheese.

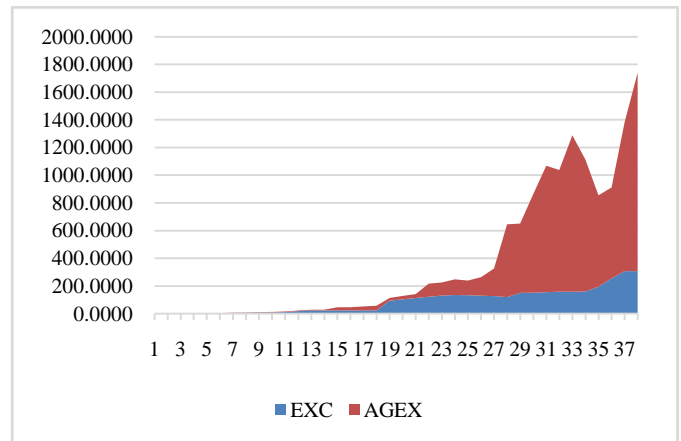
Trends of Agricultural Development in Nigeria

Agriculture being the economic backbone of most Nigerian homes (Udoh 2000), the stability and growth of the sector is therefore of grave importance to the economy. The trajectory of agricultural development in Nigeria is filled with various interesting policies and programs with a rising and falling pattern of implementation since the 1980s. Policies, programs and projects concerning agriculture were key parts of the development plan until mid-1980s when SAP was instigated. The initial post-independence policy which was launched in 1988 could not be reviewed up to 10 years following its execution before the beginning of civilian regime in 1999.

In 2001, a new policy emerged and was implemented during the strategic planning period illustrated by NEEDS I and II (2001-2007). It was quickly followed by the Seven-point Agenda (2007-2010) which emphasized the importance of value chain approach to economic development. These periods of strategizing also saw the formulation of policies such as the Land Policy (1978), National Cooperative Development Policy (2002), National Agricultural Mechanization Policy (2002) and the National Seed Policy (2002). The projects implemented between 2001 and 2009 spread across various aspects of agricultural development such as production, marketing and storage and financing, some include the Fadama II Program (2004), the National Special Program for Food Security (SPFS) (2002), the Fertilizer Revolving Fund (FRF), the Presidential Initiatives on Cassava, Rice, Vegetable Oil, Tree Crops and Livestock, the restructuring and recapitalization of the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB). The premier execution plan of vision 2020 which commenced in 2009 was in play from 2010 to 2013 when the Agricultural Transformation Agenda (ATA) came up in 2011 till 2015.

In 2016 August, the Green Alternative also known as the Agricultural Promotion Policy was implemented to reshape the process of agricultural development in Nigeria. Also, to curb the problems of hunger and malnutrition in Nigeria, the president Muhammadu Buhari took appropriate measures by implementing a new Agricultural Promotion Policy from 2016-2020. However, as these different stages of plans and policies pass, there has been the absence of a framework to review the performance of the sector holistically and so despite these achievements and programs, challenges in agricultural development still prevailed, challenges like low productivity, under-investment by the free sector, land ownership and tenure inflexibilities, poor research facilities, weak infrastructure, lack of accessible credit, aging farming population and low return to investment, persistent rural-urban migration and short planning horizons (Aderibigbe 2018).

The trends of the relationship between agricultural exports and exchange rate can be shown in the graph below:



This shows the relationship in the trend of agricultural exports and exchange rate between the years 1981 to 2018 with data obtained from the CBN statistical bulletin (2018) and FAOSTAT. It shows that as exchange rate increases, agricultural exports increase as well but not at the same proportion. Thus there is a direct connection between agricultural exports and exchange rate.

III. THEORETICAL REVIEW

Many theories have been postulated by several scholars explaining issues in line with economic growth and agricultural export and exchange rate. The theories included here are of major explanatory value to this research work. The exchange rate is the rate at which the currency of a nation is supplanted by that of another (Dornbusch, 2004). It is likewise characterized as the cost at which trade happens between two nations by Mankiw (2009). In Nigeria, the issue of having a steady and realistic conversion standard in accordance with other macroeconomic objectives of the nation is faced by monetary specialists in light of the fact that the precariousness of the exchange rate unfavorably influences costs, investments and foreign trade. Exchange rate courses of action in Nigeria have evolved from a fixed system during the 1960s, 1970s and the mid-1980s then to the different variations of the floating system from 1986 with the deregulation a reception of the Structural Adjustment Program (SAP).

Models of Exchange Rate Determination

The theoretical models for determining exchange rate include the mint parity theory, the purchasing power parity theory, the balance of payments theory, the monetary approach model and the portfolio balance approach.

Mint Parity Theory

This is the oldest known theory of foreign exchange and was propounded by Professor Gustav Cassel of Sweden. It was appropriate in nations that had a similar metallic standard of gold or silver. The estimation of a nation's cash under the best quality level was regarding the heaviness of gold of a particular virtue in it. The mint price is the price at which the standard currency unit of the country could be converted to gold. In this way the mint parity is the rate of exchange

decided on a weight premise of the metallic substance of the two nations' monetary standards.

The Purchasing Power Parity Theory

This theory was propounded by Professor Gustav Cassel of Sweden in 1918. This demonstrates the price-to-exchange relationship. It depicts the exchange rate assurance between two unexchangeable paper monetary standards. The theory expresses that, "the equilibrium rate of exchange is controlled by the equality of the purchasing power of two unexchangeable paper monetary standards". This infers that the exchange rate between two inconvertible paper monetary standards is decided through the value levels inside the two nations. Although this theory can be dated back to Wheatley and Ricardo, the credit for developing it in a more systematic way goes to the Swedish economist Gustav Cassel. There are two forms of the PPP which are the Absolute version and the Relative version. However, the easiest and most powerful version is the Absolute PPP which visualizes that, due to market forces driven by negotiation, the exchange rate should be adjusted to match the prices of national baskets of goods and services between the two countries.

The Balance of Payments Theory

The Keynesian balance of payment theory was developed in 1951. It holds that the price of foreign money in terms of domestic money is determined by the free forces of demand and supply in the foreign exchange market. It consist of imports and exports of good. It comprises of three components, namely: Current account; Capital account and Financial account.

This theory insists that the rate of exchange of a nation's currency to the currency of another country is significantly influenced by the position of the payments balance of the home country. An unfavorable balance of payments implies a situation where the demand for currency is higher than the supply of that currency at a particular rate of exchange. Foreign exchange demand comes about as a result of the demand for foreign products while foreign exchange supply is as a result of the supply of domestic products to the foreign country. This means that when foreign exchange demand is higher than foreign exchange supply there is deficit balance of payments and the pressure arising from the excess demand leads to a gradual increase in the value of exchange of the foreign currency while the exchange value of the domestic currency depreciates. Reverse is the case when there is excess supply of the foreign currency. Therefore, the equilibrium of the exchange rate occurs when there is no excess supply or excess demand of the foreign currency and this means that the exchange rate equilibrium corresponds with the equilibrium of the balance of payment.

Some disadvantages of this approach are:

1. The theory assumes free trade but there are different restrictions imposed by various countries.

2. The BOP exchange rate theory is only a cliché. On the off chance that it is perceived that the BOP should essentially maintain a condition of balance, the chance of progress in the exchange rate will stand totally precluded. The equilibrium exchange rate doesn't, truth be told, fundamentally correspond with BOP equilibrium. There might be equilibrium rates of exchange compatible with the BOP shortage or excess.
3. This theory maintains that the rate of exchange is an element of balance of payments. The varieties in the rate of exchange, simultaneously, should achieve change in the BOP shortage or excess. It suggests that the BOP itself is a component of the rate of exchange. From this, it follows that the BOP rate of exchange theory is uncertain. It presumes some given rate of exchange and can't clarify how that previous rate of exchange was resolved.

Monetary Approach to Exchange Rate

This approach states that the determination of exchange rate occurs at the equilibrium of the aggregate demand and supply of the national monetary standard in each country. According to this theory, the money demand is a function of the level of price, real income and the interest rate. The money demand is a positive function of the level of real income and price level and an inverse or negative function of interest rate and the supply of money is autonomously determined by the monetary authority in each of the countries. The money related approach to exchange rate determination has certain deficiencies which are talked about underneath.

Initially, this approach mostly neglected to clarify the developments in the exchange rates of significant monetary forms during the time of currency floatation since 1973. Also, it holds that residential and outside money related resources, for example, securities are flawless substitutes which as a matter of fact are not valid. Another deficiency is that the monetary approach to the exchange rate determination has not succeeded well exactly as the assessed parameters have been found either inconsequential or they have an inappropriate signs. The monetary exchange rate models have not fared well additionally in regard of their forecasting capacity. The tests on market productivity have will in general reject this approach.

Portfolio Balance Approach

This approach postulates that an increase in the supply of the local currency of a country will immediately result in a fall in the rates of interest. Its states that any fluctuation in the economy will automatically impact the demand and supply for domestic and foreign bonds and this will ultimately result in an effect on the exchange rate between these countries. This model however does not predict the exchange rate correctly based on empirical evidence. This is so because the model views exchange rate as the result of the replacement of money with financial assets and as such there is no room for the

current movements to have any impact on the stated exchange rate. In this method, the exchange rate is realized in the short run by the wide range demand and supply for financial assets.

IV. EMPIRICAL REVIEW

Several researchers have attempted explaining the relationship that exists between exchange rate and agricultural export or economic growth and development. Tomlin (2014) ascertained that movements in the real exchange rate could have an effect on total productivity by changing the plant turnover. A model was used capturing the effects of plant level productivity and real exchange rate fluctuation using NPL algorithm and method of simulated moments. The research concluded that both permanent and transitional decline had long-term impacts on the average productivity of industry in a small open economy (Gabriel, Jayme & Oreiro 2016; Menzies, Xiao, Dixon, Peng & Rimmer 2016).

Habanabikize (2020) carried out a research on the effect of economic growth and exchange rate on imports and exports. The study highlighted the pertinence of economic growth and emphasized the role played by the exchange rate in maintaining the balance between imports and exports. The study recommended that both currency value and economic growth should be given urgent attention in order to revive the deteriorating economy of South Africa.

Ufoeze, Okuma and Nwakoby (2017) examined the impact of foreign exchange rate variations on the Nigerian economy. In this study, the pegged and floating exchange rate periods were analysed to know which one works best for the Nigerian economy. The study covered in the time period 1970 to 2012 and employed the tool of Ordinary Least Square (OLS) multiple regression for the research. In their result, it was revealed that the floating exchange rate era is more applicable in ascertaining the economic trend in Nigeria and that the rate of exchange has direct impact on the GDP during the fixed exchange era and negative effect on the GDP in the floating era. The conclusion of the study is that the exchange rate volatility is a good pointer for observing the economic growth in Nigeria and the floating exchange rate regime is the better economic regime for sustainable economic growth in Nigeria.

Akinniran and Olatunji (2018) studied the effects of rate of exchange on agricultural export performance in Nigeria. The study examined the agricultural exports in the pre-SAP and SAP era in Nigeria. Based on the data collected from the CBN statistical bulletin, FAO statistical data and World Bank, the unit root test and regression analysis were employed for the analysis of the agricultural exports' trend. The result of this study stated that exchange rate devaluation has a positive impact on agricultural exports and the agricultural exports in Nigeria is dependent on the exchange rate and prices of crude oil in the long run. Therefore, exchange rate devaluation should be encouraged and more resources channeled into the agricultural sector to boost productivity.

Akpan (2008) focused on the impacts of exchange rate movement on monetary advancement and development. The

ordinary least square (OLS) technique was utilized using time series data on exchange rate movement and volatility (EXCHR), labour force, gross domestic investment and technology. The paper presumes that in perspective on the positive connection between exchange rate instability and economic development in Nigeria, exchange rate policy ought to be intended to improve government income and decrease the fiscal gap by abridging deficiency planned for rising and sustained economic growth.

A research was carried out by Kasman (2003) on the connection between export performance and variations in exchange rate. He used monthly data for the 1989-2002 period utilizing error correction model and co-integration technique. Based on the outcomes of his analysis, he affirmed that exchange rate is significant in the determination of export level and in both long and short run; exchange rate variations had negative or adverse effects on total export performance.

Fidan (2006) engaged in a research concerning the effects of exchange rate on agricultural export and import performance using the Granger causality test, the Vector Autoregressive Model and co-integration test to analyze annual data from 1970 to 2004. Based on the outcomes of this examination, there is a single direction causality from exchange rate to agricultural exports and a one unit shock in exchange rate which influences agricultural exports positively within the initial five years. Notwithstanding, there is a lesser impact of exchange rate on trades in the short term than during the long run.

Ibrar, Jawad, Arshad-Ali and Yahya (2019) examined the analysis of the indirect effect of exchange rate movements on GDP in Pakistan. In this study the Non-linear ARDL technique was employed to test the possible asymmetric effect of exchange rate on GDP. The study was carried out using data from period of 1972 to 2014. From the results, it was discovered that there was an asymmetric impact of the exchange rate on GDP growth in Pakistan.

Saatcioglu and Karaca (2004) used monthly data from 1981 to 2000 period to carry out research concerning the relationship between exports and exchange rate instability using the co-integration method. The outcomes of the research indicated a negative connection between both variables. The error correction model was used to ascertain the short run connection between exchange rate volatility and exports and the results showed a significant relationship of 10% in a negative direction. Tarawalie, Sissoho, Conte, and Ahortor (2013), conducted a study on exchange rate uncertainty and performance of exports in the West African Monetary Zone countries by applying the Dynamic Ordinary Least Square (DOLS) technique. The outcomes especially demonstrated a negative connection between these variables in Liberia, Nigeria and Sierra Leone and a symmetrical relationship with the exports of the Gambia, and no impact on exports of Ghana and Guinea.

Falana (2019) conducted a research on exchange rate regime and performance of the real sector in Nigeria. The research was carried out between the periods of 1961 to 2017. Autoregressive Distributive Lag and pair wise Granger Causality methods were applied in the examination of the connection between exchange rate regime and real sector performance. The study arrived at a conclusion that there was a negative relationship between exchange rate and real sector performance in regulated regimes and positive relationship in deregulated regimes. Tchokote, Uche and Agboola (2015) also found results for some specific West African Countries in their research concerning the effects of exchange rate volatility and exports, using the Johansen co-integration estimation technique and the outcomes indicated a significant symmetrical connection between exchange rate and non-Oil exports.

Olufayo and Babafemi (2014) studied the effects of exchange rate instability on oil and non-oil exports in Nigeria from 1980 to 2011. They made use of Generalized Autoregressive Conditional Heteroschedasticity (GARCH) to examine exchange rate instability and utilized the Seemingly Unrelated Regression (SUR) for the investigation. The outcomes of this analysis ascertained that exchange rate volatility had a negative yet inconsequential association with both the oil and non-oil exports. The work of Adelowokan, Adesoye and Balogun (2015) which examined the impacts of movements in the exchange rate on Nigerian investment and growth utilized the Vector Error correction technique. The results ascertained an asymmetrical relationship between exchange rate and investment and growth and a direct relationship between exchange rate and inflation and interest in Nigeria.

Oye, Lawal, Eneogu and Iseolorunkanmi (2018) studied on the effects of devaluation of exchange rate on agricultural output. Data from Nigeria was conducted for the period of 1986 to 2016. The research made use of the Johansen Cointegration test and the VECM which indicated that there is an inverse relationship between real effective exchange rate, a proxy for devaluation and gross agricultural output. This means that a devaluation of the exchange rate will have a negative impact on agricultural output. Bakare (2011) carried out a research on the impacts or effects of the foreign exchange reforms on private investment in Nigeria. With the application of the ordinary least square multiple regression method of analysis, the results showed a negative significant relationship between the two variables. The conclusion was that there was need for Government to adopt the method of purchasing power parity which is considered by social scientists and researchers as a better fit in the determination of a stable exchange rate for naira and impactful contribution to the achievement of macroeconomic goals in Nigeria.

Oji-Okoro (2011) in his work analyzed the contribution of agricultural sector to economic growth and development. The work made use of panel data from the CBN statistical bulletin and National bureau of Statistics to examine the relationship between the variables using multiple regressions. The results

indicated a positive relationship between agriculture and the GDP. Ogundipe (2012) sought to ascertain if there was a significant long run connection between agricultural exports and Nigerian economic growth by utilizing models of export-led growth hypothesis and using OLS regression method to analyze and obtain outcomes which showed a weak positive relationship between the variables.

Yougbare (2008) carried out an analysis on the relationship between growth, volatility and the exchange rate system. The results show that fixed exchange rate regimes raise the level of growth heterogeneously, the impact being focused at lower growth rates. Apanisile and Oloba (2020) carried out research on the asymmetric impacts of changes in exchange rate on cross-border trade in Nigeria. The research came to a conclusion that the association between real effective exchange rate and cross-border trade is negative or inverse. (Decrease and increase of equal proportions do not have the same impact on cross-border trade in Nigeria.) The research recommends that policy makers should adopt models which make room for nonlinear adjustment of rates of exchange which may produce results that support an effective policy at least against some partners in trading.

Previous studies indicate that exchange rate has a significant inverse relationship with exports in Nigeria. The empirical results revealed that the coefficients of most major explanatory variables like inflation rate, interest rate, and exchange rate have negative signs. This is the motivation of this study as it seeks to broaden the view of this analysis and includes additional variables like the level of Total Exports and Loans to the Agricultural Sector which have been ignored by previous researchers but may have significant effects on agricultural exports and exchange rate. The economic a priori expectations of the relationship between these independent variables and agricultural exports are discussed in chapter three. Combined with the emphasis placed on the impact of exchange rate on agricultural growth as seen in various Nigerian government policies, this is the importance of this study.

V. THEORETICAL FRAMEWORK AND METHODOLOGY

This study makes use of the econometric estimation technique, concerned with the estimation parameter of economic variables. Time series secondary data, sourced from the Central Bank of Nigeria (CBN) statistical bulletin (2018), Food and Agriculture Organization of the United Nations (FAOSTAT) and World Development Indicators (WDI) ranging from 1981-2018 will be employed in the estimation of the relationship between these economic variables. This chapter seeks to indicate the means to define the impact of exchange rate fluctuation on agricultural exports.

The Monetary Approach

The monetary approach is one of the pre-existing means of defining exchange rate and it is also a means of connecting the

other exchange rate determination methods. It is assumed that originally the foreign exchange market is in equilibrium and the monetary authority determines the supply of money. The exchange rate is obtained as the quotient from the division of domestic price level by foreign price level according to the absolute purchasing power parity. $P = eP^*$; Where, P represents domestic price level; P^* represents foreign price level and e represents the exchange rate

If the price level in a country increases and foreign price level remains unchanged, exchange rate raises leading to the depreciation of the naira relative to dollar over the long run, most likely resulting in a fall of the interest rate given the demand for money. This decrease in interest rate will result in an increased demand for loans from banks thereby affecting the financial markets of the home country. This increased demand for loans will increase productivity to satisfy the demand for domestic goods in the foreign market as a result of the devalued currency which makes the goods cheaper in the foreign market while imported goods become more expensive. This results in a favorable Balance of Payments.

Model Specification

Exchange rate, Interest rate, Inflation rate, Balance of Payments and Loans to the agricultural sector are used as the independent variables while Agricultural Exports is used as the dependent variable.

Exchange Rate (EXC)

A high exchange rate in Nigeria results in the devaluation of the local currency (Naira). However, a weaker currency will improve agricultural exports as the domestic goods will become relatively cheap in the international market.

Interest Rate (INT)

An increase in interest rate on loans will reduce spending as well as the demand for loans by the agricultural sector. This will result in limited productivity and hence a decrease in agricultural products for exports.

Total Exports (TE)

An increase in agricultural exports will result in an increase in total exports and the level of total exports may or may not have an effect on agricultural exports. This will be tested in this research.

Loans to the Agricultural Sector (AGL)

When there is an increase in the level of loans granted to the agricultural sector, it will result in increased productivity and increased agricultural output. This increase in agricultural output will increase the amount of agricultural commodities for exportation.

Inflation Rate (INFL)

Inflation rate measures the increase the mean price level in an economy continuously over time. Inflation usually indicates a decrease in the purchasing power of domestic currency and as

stated earlier, a decrease in domestic currency increases the demand for domestic goods in the foreign market even though the demand for agricultural products within the economy will reduce. An increased inflation rate can also affect agricultural exports through its direct impact on input costs (raw materials).

Thus the model is:

$$AGEX_t = f (EXC_t, INT_t, TE_t, AGL_t, INFL_t) \dots\dots\dots (1)$$

In equation (1), Agricultural Export is expressed as a function of Exchange Rate, Interest Rate, Total Exports, Agricultural Loans and Inflation Rate.

The economic relationship can be specified in a linear form as

$$AGEX = \beta_0 + \beta_1 EXC + \beta_2 INT + \beta_3 TE + \beta_4 AGL + \beta_5 INFL + \mu_t \dots\dots\dots (2)$$

Where:

EXC_t = Exchange rate at time t

INT_t = Interest rate at time t

TE_t = Total exports at time t

AGL_t = Agricultural sector loans at time t

$INFL_t$ = Inflation rate at time t

BOP_t = Balance of Payments at time t

μ_t = Error term at time t

β_0 is the intercept parameter and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the coefficients of the variables to measure their effects on agricultural exports.

Priori Expectation

This assessment is directed by economic theory to determine whether the estimation of the parameter follows expectations.

The expected signs of the variables are:

$dAGEX/dEXC > 0$ Positive relationship

$dAGEX/dINT < 0$ Negative relationship

$dAGEX/dTE > 0$ Positive relationship

$dAGEX/dAGL > 0$ Positive relationship

$dAGEX/dINFL > 0$ Positive relationship

Estimation Techniques

In this research, unit root tests for stationarity are conducted on each variable. To test for the relationship of causality between the endogenous and exogenous variables, the Granger Causality test is employed. The Autoregressive-Distributed Lag (ARDL) is used to establish a co-integration, short term and long term relationship between the dependent and independent variables. Other necessary diagnostic tests are carried out. In any economic research of the relationship between two or more variables using time series data, the attributes of the time series data are of utmost importance in concluding which analytic technique to employ. Thus the estimation technique in this research will be established based

on the test of stationarity of the time series data used. All the techniques used are explained below.

Unit Root Test

Unit root test is a tool of statistics for testing the stationarity in a time series. A time series is stationary if a slight movement in time results in no change in the shape of the distribution. One of the causes of non-stationarity are unit roots. If a time series has a unit root it will show a systematic pattern that is unpredictable. This test must be carried out to avoid getting spurious results. Unit root tests have low statistical power and as such there are various types of unit root tests. Some of them include: Augmented Dickey-Fuller (ADF) tests, Phillips Perron (PP) test, Zivot-Andrews test and so on. The ADF test would be used to test for stationarity in this research.

Granger Causality Test

The Granger Causality test is a concept of statistics of causality that is based on prediction. It is used to ascertain if one time series can be applied in forecasting another. For example, if *m1* “Granger-causes” *m2* it means that *m1* should have data useful in the prediction of *m2*. If we take a test involving the dependent variable AGEX and an independent variable EXC, a test involving both is stated below

$$\Sigma \alpha_1 AGEX_{t-1} + \Sigma \beta_1 EXC_{t-1} + \mu_1$$

$$\Sigma \alpha_2 EXC_{t-1} + \Sigma \beta_2 AGEX_{t-1} + \mu_2$$

This equation shows the pair wise granger causality. The error terms μ_i {*i*=1,2,3,...,n} is assumed to be uncorrelated. Scenarios derived can be Unidirectional (one variable granger causes the other), Bi-directional (the two variables granger cause each other) and Independent relationships (the two variables do not granger cause each other).

Autoregressive-Distributed Lag (ARDL)

Compared to other techniques, ARDL is better when involving variables that are integrated in both I(0) and I(1) order. The long term association between the significant variables is shown by the F-statistic (Wald test) and the long term relationship is established when F-statistics is above the critical value band. The main advantage of ARDL is that it identifies the co-integrating vectors where multiple co-integrating vectors exist. In line with the above econometrics model, the ARDL model is expressed as:

$$D(AGEX)_{(t-1)} = \alpha_0 + \alpha_{11}(AGEX)_{(t-1)} + \alpha_{12}(EXC)_{(t-1)} + \alpha_{13}(INT)_{(t-1)} + \alpha_{14}(AGL)_{(t-1)} + \alpha_{15}(INFL)_{(t-1)} + \alpha_{16}(TE)_{(t-1)} + \Sigma \beta_{1i} D(EXC)_{(t-1)} + \Sigma \beta_{2i} D(INT)_{(t-1)} + \Sigma \beta_{3i} D(AGL)_{(t-1)} + \Sigma \beta_{4i} D(INFL)_{(t-1)} + \Sigma \beta_{5i} D(TE)_{(t-1)} + \mu_t$$

VI. ESTIMATION AND DISCUSSION OF RESULTS

The stationarity test on the variables is carried out using Augmented Dickey Fuller with the assumption of trend and intercept. Where the absolute value of the t-Statistic is greater than the critical values then the time series is stationary. The

results derived show that our times series are integrated at first difference and level. This is shown in table 4.1

Table 4.1 Augmented Dickey Fuller Unit Root Test

Variables	ADF Unit Root (at Level)	ADF Unit Root (at First Difference)	Integration
AGEX	-5.736659***	-	I(0)
AGL	3.756796**	-	I(0)
TE	-1.257668	-5.999181***	I(1)
EXC	-1.945782	-4.548282***	I(1)
INFL	-3.962475**	-	I(0)
INT	-7.396455***	-	I(0)

Note: *** indicate stationary at 1% level of significance, ** Indicates stationarity at 5% level of significance. Lag length selection was automatic based on Schwarz Information Criterion.

Sourced: Computation by Authors using E-views 9

6.1 Auto-Regressive Distributed Lag

The basic ARDL model is applied intesting for long term relationship between the variables. The ARDL bound test is shown below sourced from computation using E-views 9.0.

6.2.1 ARDL Bound Test

Null Hypothesis: No long-run relationships exist			
Test Statistic	Value	k	
F-statistic	67.86185	5	
Critical Value Bounds			
Significance	I0 Bound	I1 Bound	
10%	2.26	3.35	
5%	2.62	3.79	
2.5%	2.96	4.18	
1%	3.41	4.68	

Sourced: Computation by Authors using E-views 9

The above is the presentation of the ARDL bounds test which indicates the presence of a long run relationship between the variables. The F-statistic is higher than the upper boundary at all significance levels and therefore we reject the null hypothesis. This shows that there is a long run relationship between the variables using AGEX (Agricultural Export) as the dependent variable.

6.2.2

Variables	Coefficient	Standard	t-Statistic	Prob
AGL	0.006358	0.000722	8.802099	0.0001
EXC	0.017476	0.003592	4.864946	0.0028
INFL	0.004697	0.004937	0.951284	0.3782
INT	0.006836	0.008038	0.850443	0.4277
TE	-0.000267	8.26E-05	-3.234093	0.0178

Sourced: Computation by Authors using E-views 9

$R^2 = 0.998450$
Adjusted $R^2 = 0.991478$

The R^2 indicates that the independent variables jointly explain about 99% of the variation in the endogenous variable. The Adjusted R^2 is most times lower than the value of R^2 and it takes into account the degree of freedom. It therefore shows that after taking into consideration the degree of freedom and readjusting the variables, the independent variables still explain about 99% of the variation in the dependent variable.

Interpretation of Variables

- A unit change in AGL, other variables held constant, will averagely bring about a 0.006358 change in AGEX.
- A unit change in EXC, other variables held constant, will averagely bring about a 0.017476 change in AGEX.
- INFL is not significant because its probability is greater than 0.05 and therefore does not need to be interpreted.
- INT is not significant because its probability is greater than 0.05 and therefore does not need to be interpreted.
- A unit change in TE, other variables held constant, will averagely lead to a -0.000267 change in AGEX

From the hypothesis 1:

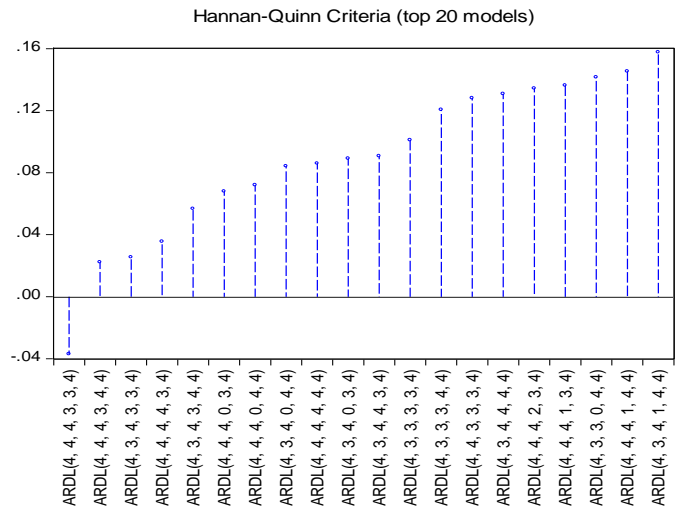
H_0 : Exchange rate has no significant effect on agricultural export

H_A : Exchange rate has a significant effect on agricultural export

Therefore, we reject the null hypothesis since exchange rate has a significant effect on agricultural export as a unit increase in exchange rate, other variables held constant, will on average bring about a 0.017476 change in agricultural exports.

The study establishes that exchange rate significantly affects agricultural exports and there is no causality between them. The exchange rate has positive relationship with agricultural exports in Nigeria in the long run. This finding is in agreement with Oladipo, Iyoha, Fakile, Asaleye and Eluyela (2019), in their study on Tax revenue and agricultural performance: evidence from Nigeria. They found a positive and significant relationship between revenue obtained in the agricultural sector. Capital in agricultural sector proxy by loan and agricultural output in the country.

6.2.3 Model Selection Summary Results



6.4 Granger Causality Test

6.4.1 Granger Causality Pair-wise

Null Hypothesis:	Obs	F-Statistic	Prob.
EXC does not Granger Cause AGEX	36	2.36523	0.1107
AGEX does not Granger Cause EXC		0.31248	0.7339

Sourced: Computation by Authors using E-views 9

The result of the pairwise Granger Causality test indicates that AGEX and EXC are not statistically significant as their probabilities are greater than 0.05. This shows that exchange rate cannot be used to predict the behavior of agricultural exports in Nigeria. The other results are available in the appendix but since the objective of the study only concerns the causality between exchange rate and agricultural exports, hence it is only these two that are presented above.

From the hypothesis 2:

H_0 : There is no causality between exchange rate and agricultural export

H_A : There is causality between exchange rate and agricultural export

The above analysis shows that there is no causality between exchange rate and agricultural export. Hence, we accept the null hypothesis (H_0).

6.5 Serial Correlation LM Test

Null Hypothesis: There is serial correlation between the variables.

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	4.772474	Prob. F(2,4)	0.0872
Obs*R-squared	23.95936	Prob. Chi-Square(2)	0.0000

Sourced: Computation by Authors using E-views 9

Table 4.5 above represents the Breusch-Godfrey Serial Correlation LM Test and the result shows that the Prob. Chi-Square is 0.0000 which is less than 0.005 and this indicates significance. Therefore, we reject the null hypothesis and this means that there is no serial correlation between the variables.

6.6 Heteroskedasticity Test: ARCH

Null Hypothesis: There is no heteroscedasticity between variables.

Heteroskedasticity Test: ARCH			
F-statistic	5.001701	Prob. F(1,31)	0.0327
Obs*R-squared	4.584676	Prob. Chi-Square(1)	0.0323

Sourced: Computation by Authors using E-views 9

The above table represents the result of the Heteroschedasticity test and from the result of the Prob. Chi-Square which is less than 0.05 and indicates significance; therefore we reject the null hypothesis.

Normality Test

Variable Test	Value
Jacque-Bera	7.272749
Probability	0.026348

Sourced: Computation by Authors using E-views 9

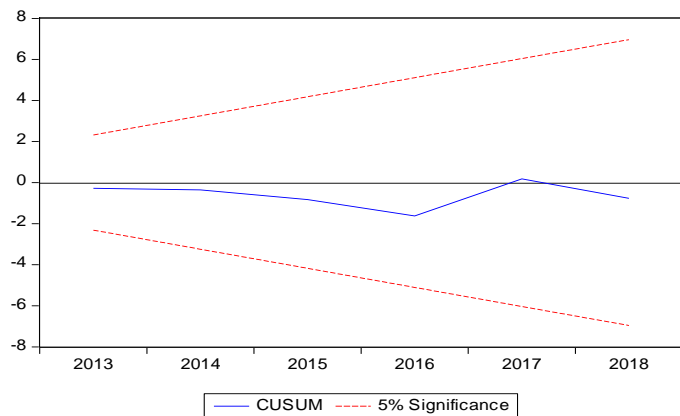
This test is carried out to ascertain whether or not the error term follows a normal distribution. The Jacque-Bera test of normality is used.

Null Hypothesis: The error term does not follow a normal distribution.

DECISION RULE: Reject null hypothesis is absolute terms if the probability of the Jacque-Bera is less than the level of significance.

From the result presented above, the probability of the Jacque-Bera is 0.026348 which is less than 0.05 level of significance. Therefore, we reject the null hypothesis and this means the error term follows a normal distribution.

4.8 Stability Test



Above is the CUSUM stability graph and it shows that the model is stable as all the points are within the upper and lower lines.

VII. CONCLUSION AND RECOMMENDATIONS

The study examined the impact of exchange rate on agricultural exports in Nigeria from 1981 to 2018. The Auto regressive distributed lag (ARDL) model and Granger causality test were employed as analytical tools to test for the existence of a relationship between the variables.

This research generally places importance on the effect of interest rate, exchange rate, total exports, inflation rate and loans to the agricultural sector on agricultural exports. However, it is mainly concerned with the relationship between exchange rate and agricultural exports and the study establishes that exchange rate significantly affects agricultural exports and there is no causality between them as seen in chapter four.

Based on the results of this research work, it is shown that exchange rate has a direct or positive relationship with agricultural exports in Nigeria in the long run. This therefore implies that an increase in exchange rate will lead to an increase in the level of agricultural exports in the long run. The Government through the Central Bank of Nigeria should direct efforts to attain sustainable exchange rate of the Nigerian Currency (Naira). This would result in achievement of economic growth and improve the trade balance as through an increase in investment in the agricultural sector which would culminate in an increase in agricultural output for exportation.

The results show a positive relationship between loans to the agricultural sector (AGL) and agricultural exports. Therefore more credit should be made available to rural as well as urban farmers to increase their productivity and output which would lead to increased agricultural exports. Also, the results show that an increase in total exports result in a decrease in agricultural exports. This indicates that the increase in total exports has been in the exportation of other goods and neglecting the agricultural sector. The Nigerian government should therefore focus on the exportation of agricultural products in which we have comparative advantage as propounded by David Rica

Based on the findings of this study, the following policy were recommended:

- i. Government to provide adequate loan facility to farmers in the country to boost more agricultural produce for export in order to enhance balance of trade;
- ii. Since the finding of the study establishes positive and significant relationship between exchange rate and agricultural exports. Therefore, it gives direction for government on strategies to adopt in order to achieve stable exchange rate in the economy.

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