Effect of Oil Price Shock on Small Scale Agro Allied Enterprise from 1984-2014 in Benue State, Nigeria

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***Abstract*: - The impact of oil price shock on the performance of small scale agro allied enterprise in Benue State from 1984 to 2014 was examined. The long and short run relationship between world price, inflation rate, domestic oil price, exchange rate and other variables on small scale agro-allied enterprise was investigated. It was revealed that oil price shock affect small scale enterprise due to the increase in exchange rate, inflation rate and domestic oil price. The data used for the study were obtained from Central Bank of Nigeria (CBN) Bulletins and CBN porter. The result revealed that on the average values of the products; fish farming, garri, sesame, soybean and oil palm enterprise were ₦325,4158.217, ₦375,1207.576, ₦215, 1771.360, ₦846,672.655 and ₦1, 749,958.733 respectively. Investigating the active promotion of agro allied industry to strengthen the linkage effect of agriculture on the economy is recommended for future research.**

I. INTRODUCTION

Oil price shocks are predominantly defined with respect to price fluctuations resulting from changes in either demand or supply side of the international oil market (Wakeford, 2006; Agbede, 2013). Oil being the mainstay of the Nigerian economy plays a vital role in shaping the economic and political destiny of the country. Although Nigeria's oil industry was founded at the beginning of the century, it was not until the end of the Nigeria civil war (1967-1970) that the oil industry began to play a prominent role in the economic life of the country (Kwanashie et *al*., 1998; Energy Information Administration, 2013).

Agriculture by 1970s lost its pre-eminent position to mining and particularly to Petroleum due to the oil boom in the period (1970s). Oil was discovered in Nigeria in 1956 at Oloibiri in the Niger Delta after half a century of exploration (Hamilton, 2009; Bowler, 2014). Oil prices have witnessed profound fluctuations and this has implications on the performance of macroeconomic variables, posing great challenges for policy making. The transmission mechanisms through which oil prices have impact on real economic activity include both supply and demand channels. The supply side effects are related to the fact that crude oil is a basic input to production and consequently an increase in oil price leads to a rise in production costs that induce firms to lower output (Agbede, 2013).

Despite the oil sector's dominance, agriculture remains an important contributor to the economy accounting for 24% of GDP in 2016 (CBN, 2016). Since oil was discover in commercial quantity in Nigeria, oil has dominated the economy of the country. Thus, a small oil price changes can have a large impact on the economy. For instance a US$1 increase in the oil price in the early 1990s increased Nigeria's foreign exchange earnings by about US$650 million (2 % of GDP) and its public revenues by US$320 million a year (Agbede, 2013). Nigeria's reliance on oil production for income generation clearly has serious implications for its economy (Agbede, 2013).

Oil price shock is unexpected or unpredictable events that affect an economy either positively or negatively, technically it is refers to an unpredicted change. Therefore it is not a new phenomenon: it has been a dominant feature in the oil market during the last two decades (Baumeister and Peerman, 2009; Bowler, 2014). The market has been characterized by erratic movement of oil price since the 1970; moreover, there have been very large and sharp swings in the nominal price of oil since the collapse of oil price in 1986 (Sauter and Awerbuch, 2003). Therefore this study examined the impact of oil price shock on various enterprises in the study area.

The trend of demand and supply in the global economy coupled with activities of Organization of Petroleum Exporting Countries (OPEC) consistently affects the price of oil. The recent changes in oil prices in the global economy are so rapid and unprecedented. This is partly due to increased demand of oil by China and India. However, the current global economy melt down suddenly counteracted the skyrocketing oil price. At the beginning, the price of oil began to rise more slowly during the second quarter of 2014 and it has fallen into the first quarter of 2015, oil price crashed below $48/b in the world market which had serious consequences on Nigeria fiscal budget which led to the downward review of the budget (World Bank, 2015).

Enterprise is small-scale business that employs a small number of workers and does not have a high volume of sale. It forms the bedrock of the economic growth of every nation which has always been in the fore front of the development strategies of every nation. Thus, the quest of any nation's development must be centred on small scale enterprise, due to its importance the following enterprise were selected for this study – Soybean, oil palm, garri, sesame and fish farming, (Joshua, 2008).

Agricultural sector as at 2016 contributed 24 % to GDP of Nigeria prior to rebasing, however, it is now estimated to contribute only 22% of GDP (CBN 2016). Over the past two

or three decades, the dormant role of agriculture in the economy, especially in terms of ensuring food security, gave way to massive importation of basic food items such as rice, beans and wheat. This is a clear indication of the failure of the agricultural sector to keep pace with the demand for its products (Essien, 2005). This blatant neglect of agricultural sector and the attendant dependency of the economy on a mono-cultural product-petroleum have not augured well for the wellbeing of the economy as a whole (Itodo *et al***.,** 2012). Moreover, the agricultural sector is no longer performing the lead role it was known for. By mid-1970's Nigeria's agriculture started to experience problems, agricultural exports began to decline and food shortages started emerging (Itodo *et al***.,** 2012). From 1975, emboldened by considerable increase in revenue from petroleum, government assumed heavier responsibilities for agricultural production, input supply and marketing; in addition to adopting credit control and other locative policies in favour of agriculture (Ojo and Akanji, 1996).

However, the effect of oil price shock is not new in agricultural market because over the last years it has hurt millions of people undermining nutritional status, increased food insecurity, losses in economic efficiency and possible social unrest (Gogoi, 2014). It is also feared to have a ravaging impact on the poor as greater percentage of their family budget is spent on food. Crude oil is used to power agricultural machines, processing machines and to transport inputs increase in the oil therefore add serious pressure on the cost of these operation which affect the small scale agro allied enterprise (Gogoi, 2014).

Studies carried out by Ubogu (2006) on the impact of oil on Nigeria economy and Akpan (2009) Investigated oil price shock and Nigeria micro economic from 1970-2007. Both found that oil has effect on the economic. For instance, Binuomote and Odeniyi (2013) empirically studied the agricultural productivity growth and crude oil price relationship in Nigeria and found that oil industries have major contribution to the Nigeria economy unlike agricultural products using time series data from 1981-2010. Therefore this studies aim at filling the gap of knowledge by decomposing small scale agro-allied enterprise into different component in Benue state. This investigation will be useful in the sense that it will promote greater understanding of the implications of the link between oil price shock and small scale Agro allied enterprise in Benue State. The present mono-cultural economy as a result of over dependence on crude oil (petroleum) makes it necessary to focus on small scale agro-allied enterprise. The contribution of the enterprise to the economy, nutrition and health of the people makes the study imperative. The findings would be useful to policy makers, researchers for the overall improvement and to restore the lost opportunity on the small scale enterprise.

The interactions between crude oil price shocks and economic growth have received a lot of attention of researchers. Binuomote and Odeniyi (2013) empirically studied the agricultural productivity growth and crude oil price relationship in Nigeria. According to them, oil industry has major share on the economy of Nigeria as it is an oil exporting country. The oil industry dominants the agricultural sector in Nigeria. They collected time series data from 1981-2010.They formulates model by using agricultural GDP, Land and Fertilizer. They utilize Johnson Co-integration Technique and Error-Correction Model. They find crude oil prices and agricultural productivity growth have a negative association. The crude oil prices mainly affect the agriculture productivity in the short run. While exchange rate, capital and labour mainly affect the agriculture productivity in the long run. They suggested that the negative consequences of oil price can be compensated by rising agricultural production and its exports. The agricultural sector should be provided social services and subsidized input, both private and government sector should contribute in new production method and technologies, all these raise the agricultural growth.

Shaari *et al*. (2013) explore oil effect on different economic sectors in Malaysia. They include agriculture, construction, manufacturing and transportation sectors for analysis. They have gathered time series quarterly data from 2000-2011. They apply Johnson Co-integration Maximum Likelihood Method to observe the long run relationship after measuring the stationary of the variables with ADF unit root test. They defect long run dynamics among variables, to discover the causality direction, they utilize Granger causality test. The agriculture sector induces by oil prices and construction sector relies on oil prices. They suggest Government of Malaysia to control oil prices in order to avoid negative effects on different economic sector.

Lu *et al.* (2012) observed the effectiveness of agriculture input in development process in China. They adopt the Efficiency Decomposition Model. They use Monthly data from Nov 1998-to Jan 2009 of prices of crude oil, corn and wheat future prices. They consider the factors: Scalping, Speculation and Petroleum inventories within the model and analyse their impact on oil price fluctuations using Bayesian Markov Chain Monte Carlo. As oil price increases, agricultural food price also increases. They reported that, wheat and corn are the major victims of oil price shocks.

Jad (2013) determined the relationship of oil price and economic growth in Pakistan for the period of 1973-2011 using time series. To check the stationary, he uses Augmented Dickys Filler (ADF). All variable are integrated at level one. He adopt linear regression model for estimation, the results shows that trade balance and private sectors investment are the key determinants of gross domestic product in Pakistan. Oil prices and public sector investment are insignificant determinant of gross domestic product.

Hanson *et al.* (2013) investigated consequence of oil prices shock on agriculture sector in United State. Using Ordinary Least Square (OLS) regression method for the period 1970-2005 the finding revealed that crude oil consumption and

export had contributed positively to the improvement of the economy. The authors recommended the need for urgency in diversifying the export market, especially the oil market, fight corruption and the encouragement of private sector participation in crude oil activities. A flaw observed in the analysis is the absence of some diagnostic tests on the specification to ascertain the appropriateness of the specification, similarly unit root test were not conducted on the series to determine their stationary or otherwise. The argument for spurious regression results arises as a result of trends in series theory investigated (Engle and Granger, 1987).

Jin (2008) discovered that the oil price increases exerts a negative impact on economic growth in Japan, China and a positive impact on economic growth of Russia. Specifically, a 10% permanent increase in international oil prices is associated with a 5.16% growth in Russian GDP and a 1.07% decrease in Japanese GDP. On the one hand, an appreciation of the real exchange rate leads to a positive GDP growth in Russia and a negative GDP growth in Japan and China.

Darby (1982) had one of the earliest econometric studies that attempted to estimate the economic effects of oil shocks. His study determines what had caused the 1973-1975 recessions in the US. He figured that, oil shock's effect on the economy was statistically significant and estimated the 1973 oil shock caused a total cumulative decrease in GNP of 2.5%.

Using the VAR methodology, Akpan (2009) investigated oil price shocks and Nigeria Macro economy for the period 1970-2007. The study pointed out the asymmetric effects of oil shocks, for instance positive as well as negative oil price shocks significantly increased inflation and also directly increased real national income through higher export earnings though part of this gain was seen to be offset by losses from lower demand for export, generally due to the economic recession suffered by trading partners. The finding of this work further showed the "Dutch Disease" syndrome was observed through significant real effective exchange rate appreciation. The result confirmed the neglect of the agricultural sector.

Ubogu (2006) sought to establish the impact of oil on the Nigerian economy. Examining the growth and development of the oil industry, government participation and the stages of the development of the industry, government revenue, foreign exchange earnings, employment generation and industry linkages effects, he noted that oil has been responsible for the radical increase in revenue and further buttressed the stronger dependence on oil revenue as envisaged in our development plans due to the unanticipated decline in oil earnings. He was however, strongly in support of diversification and the need for judicious use of the current limited revenue.

Taking an analytical view of the impact of oil on the Nigerian economy Obadan (1983) sought to evaluate the impact of the development in the oil sector on the Nigerian economy through government finances, he found that effect of oil on government revenue is positive. That is, there is a positive relationship between oil price and government expenditure, claiming that this relationship is significant and have fiscal implications and linkages. And these linkages arise from the use of increasing oil revenue by the government to develop other sectors of the economy such as Agriculture, Education, and Infrastructures etc. which are components of various government capital and recurrent expenditures (Ubogu, 2006).

Nkomo (2006) explored three eras in the determination of international crude oil prices. Prices were determined chiefly by multinational oil companies until the 1970s when the Organization of Petroleum Exporting Countries (OPEC) asserted its capacity to influence (to varying degrees) the price via its output decisions. Since the late 1980s, however, "world oil prices have been set by a market-related pricing system which links oil prices to the 'market price' of particular reference crude".

In addition, Olomola (2006) used the variance decomposition approach to investigate and found that oil price shocks in Nigeria explained about 48% of the shocks to the real exchange rates in the 1st quarter, 33% in the 8th quarter, and about 32% in the 10th quarter. This confirms the fact that oil price shock affects the government monetary policy significantly through the exchange rate but that this effect may become insignificant as we move into through the 4th quarter, but by the 8th and 10th quarters oil price shock contributed about 10% and 17% respectively to change in the domestic money supply.

Ayadi *et al.* (2000) examined the effects of oil production shocks on a net oil exporting country, Nigeria. The impact responses show that a positive oil production shock was followed by rise in output, reduction in inflation and a depreciation of the domestic currency. With the same methodology and set of variables (except that oil price replaces its level of production).

Ayadi (2005) found negligible responses of output, inflation and the real exchange rate following an oil price shock. Olomola and Adejumo (2006) studied the effects of oil price shocks on output, inflation, real exchange rate and money supply in Nigeria within a VAR framework. They found no substantial role for oil price shocks in explaining movements in output and inflation. Only the long run money supply and the real exchange rate are significantly affected following a shock to oil prices. Based on all these findings, very limited studies have been done to assess the direct effects of oil price fluctuations on the economic growth. This study fills this gap by investigating the extent and magnitude of the shocks, contributions to some selected small scale agro enterprise in Benue State Nigeria.

This study investigates the extent to which oil price shock affects the performance of each component of small scale agro allied enterprise in Benue State from 1984-2014.

From the foregoing the following research questions were raised:

1. What is the long run relationship between oil price shock and performance of small scale agro allied enterprise?

2. What is the short run relationship between oil price shock and performance of small scale enterprise agro allied enterprise?

The main objective of this paper is to analyse the impact of oil price shock on the performance of small scale agro-allied enterprise in Benue State from 1984-2014 by examine the long run relationship between oil price shocks on performance of small scale agro-allied enterprise and determine the short run relationship between oil price shocks on performance of small scale agro-allied enterprise.

1.1 Research Hypothesis

The following null hypotheses were tested for objectives of the paper:

$H0_1$**:** There is no short-run relationship between oil price shock and performance of small scale agro-allied enterprise.

II. METHODOLOGY

The study uses Keynesian inflation theory which states that inflation can be caused by increase in demand and or increase in cost. In response to the deficiencies of the classical theory, Keynes developed a new theory of inflation, this theory stressed rigidity in the economy most importantly in the labour market; structural theory of inflationwhich is not based on excess-demand influence on the economy. In this theory of inflation, a host of non-monetary supply oriented factors influencing the price levels in the economy are considered. Thus cost-push causes of inflation result when cost in production increases independently on aggregate demand;mint parity theory is associated with the working of the international gold standard under this system which implies that the exchange rate is determined by the demand for and supply of foreign exchange; the currency in use was made of gold or was convertible into gold at a fixed rate Jhingan (2004). Here, the value of the currency unit was defined in terms of certain weight of gold and the Central Bank of the Country concerned was always ready to buy and sell gold at the specified price. The rate at which the naira could be converted into gold is called the mint price gold Jhingan (2004); and purchasing power parity theory stated that spot exchange rate between currencies will change to the differential in inflation rate between countries. The theory states that the equilibrium exchange rate between two inconvertible paper currencies is determined by the equality of their purchasing power. That is, the exchange rate between two countries is determined by their relative price levels (Obadan, 2006).

The data used for this study was obtained from the Central Bank of Nigeria Bulletin, and CBN Portal on the variables such as; world oil price, domestic oil price, Inflation rate, exchange rate and agricultural gross domestic product. The validation data was obtained from Benue State Agricultural and Rural Development Authority.

2.1 Data Analysis

Data was analysed using Johansen cointegration and Vector error correction model, according to (Sloman and Hinde, 2008; Blanchard, 2007).

Model Specification and Variable Measurement

Specification of econometric model was based on economic theory. Unit root test was used to determine if the time series variable under observation is stationary or not. This is because most time series data are often found not to be stationary and estimation with such data produces a spurious result.

The model of the Augmented Dickey Fuller test (ADF) with the constant term and trend is as follows:

$$\Delta Y_t = \varphi_1 + \varphi_2 t + \gamma Y_{t-1} + \sum_{i=1}^{n} \gamma_i + \Delta Y_{t-1} + \varepsilon_t \ldots\ldots\ldots (1)$$

The dependent variable, $\boldsymbol{Y_t}$**,** is regressed with its own lags, $\boldsymbol{n}$. Is defined as the first different operator, $\varepsilon_t$and is a Gaussian white noise error term. The null hypothesis (H_0: γ= 0) implies that the series has a unit root (non-stationary or integrated of order zero) and the alternative hypothesis (H_1: γ< 0) indicates that the series is stationary. The decision rule is to accept the null hypothesis assuming the calculated ADF statistic is less than the Mackinnon critical values, with the null hypothesis being rejected otherwise.

A linear combination of two or more *I* (1) series may be stationary or *I*(0), in which case the series are co-integrated. The null hypothesis for the Johansen Co-integration test ($H!: r$ = 0) implies that co-integration does not exist, while the alternative hypothesis ($H!: r$> 0) implies that it does. If the null for non-co-integration is rejected, the lagged residual from the cointegrating regression is imposed as the error correction term in a Vector Error Correction Model (VECM) given below as:

$$\Delta Y_t = \prod Y_{t-1} + \sum_{i=1}^{k-1} \tau_i \, \Delta Y_{t-1} + u + \varepsilon_t \ldots\ldots\ldots\ldots (2)$$

where,

$\Delta Y_t =$ first difference of a $(n \times i)$ vector of the n variables of interest (Domestic Oil Price, World Oil Price, Inflation and Exchange Rate).

$\prod = (n \times n)$ Coefficient matrix

$Y_{t-1} =$ Lagged values of Y_t

$\tau = (n \times (k-1))$ Matrix of short term coefficients

$u = (n \times 1)$ Vector of constant

$\varepsilon_t = (n \times 1)$ Vector of White Noise Residuals

The underlying principle of the Johansen Cointegration Test is that, if the coefficient matrix (Π) has been reduced in rank (r<n), than there exist (nxr) matrices α and β each with rank r such that Π = $\alpha\beta'$and $\beta' yt$is stationary' r is the number of

co integrating relationships, the element of α are known as the adjustment parameter in the vector error correction model (VECM) and each column of β is a cointegrating vector. This represents the causality in the system and the direction of the causality flows, while the co-integrating vectors represent the long-term equilibrium relationship. Johansen (1988) considered two likelihood ratio tests, namely the Trace and the Maximum Eigen Value statistic tests, which are used to determine the number of cointegrating equations given by the co-integration rank (r). The Trace statistic tests the null hypothesis of r-cointegrating relations against the alternative of k-co-integrating relations, where maximum Eigen Value statistic tests the null hypothesis of r-cointegrating vectors against the alternative of (r + 1) co-integrating vectors.

2.2 Equation for long-run relationship

Long run is a period when the general price level contractual, wage rate and expectations adjust fully to the state of the economy or a period in which all factors of production and cost are variable, and firms are able to adjust all cost. In the long run firms can adjust all cost it's not a set period of time but rather the time needed for a producer to have flexibility on the overall production decision (Wikipedia, 2017a).

The model for the long-term relationship between the variables was adapted from the work of Ismail (2013) is given as:

$$lnAGP_t = a_0 + a_1 lnEX_t + a_2 lnINF_t + a_3 lnP0_t + a_4 lnPW_t + u_t \quad \ldots\ldots (3)$$

AGP =Agricultural Performance on returns of different small scale agro-allied enterprise.

EX = Exchange rate (is price of a nation currency in term of another currency).

INF = Inflation rate (increase in the general level of price for goods and service).

P0 = Price of oil at domestic level measured in Naira

PW = Price of oil in the world market measured in US dollar.

Agro-allied enterprise was decomposed into it various component, this is with a view to investigate the impact of oil price shock on each of the component. This is necessary because the impact of oil price on this component may be asymmetry rather than symmetry. Therefore assuming the same level of impact on various component of agro-allied enterprise may result into making wrong inferences that are not policy relevant. Thus small scale agro-allied enterprise was proxy by performance of fish farmers, garri enterprise, sesame enterprise, soybean enterprise, and palm oil enterprise. Expressing each component of the sector as a function of the explanatory variables gave us the following equations labelled as model (4) to (8) as specified below.

$$lnFish\ farming_t = a_0 + a_1 lnEX_t + a_2 lnINF_t + a_3 lnP0_t + a_4 lnPW_t + u_t . Model\ (4)$$

$$lnGarri_t = a_0 + a_1 lnEX_t + a_2 lnINF_t + a_3 lnP0_t + a_4 lnPW_t + u_t \ldots Model\ (5)$$

$$Insesame = a_0 + a_1 lnEX_t + a_2 lnINF_t + a_3 lnP0_t + a_4 lnPW_t + u_t \ldots Model\ (6)$$

$$Insoybean = a_0 + a_1 lnEX_t + a_2 lnINF_t + a_3 lnP0_t + a_4 lnPW_t + u_t \ldots Model\ (7)$$

$$Inoil\ palm = a_0 + a_1 lnEX_t + a_2 lnINF_t + a_3 lnP0_t + a_4 lnPW_t + u_t \ldots Model\ (8)$$

Equation for short-run relationship

Short run, in economic, expresses the concept that an economy behaves differently depending on the length of time it has to react to certain stimuli they influence price through adjustment made to production level. Short run does not refer to a specific duration of time but rather is unique to the firm, industry or economic variable being study (Wikipedia 2017b).

In order to estimate the short-term relationship between the variables, the corresponding error correction equation was estimated as Follows:

For model (I) we have:

$$\Delta lnAGP_t = a_0 + \sum_{i=1}^{p} a_1 \Delta\, lnEX_{t-1} + \sum_{i=1}^{p} a_2 \Delta\, lnINF_{t-1} + \sum_{i-1}^{p} a_3 \Delta lnP0_{t-1} + \sum_{i=1}^{p} a_4 \Delta lnPW_{t-1} + \varphi ECM_{t-1} + u_t \quad (9)$$

AGP = Agricultural Performance on returns of different small scale agro-allied enterprise.

EX = Exchange rate (is the price of a nation currency in terms of another currency).

INF = Inflation rate (increase in the general level of price for goods and service).

P0 = Price of oil at domestic level measured in Naira

PW = Price of oil in the world market measured in US dollar

Ln = Natural Logarithm

Δ= difference operator

t-1= Lag variable

To express each of the components of agro-allied enterprise which resulted into model (i) to (v) in VAR form gives the following equations:

Error correction equation was estimated as Follows:

For model (I) we have:

$$\Delta lnFish\ Farming_t = a_0 + \sum_{i=1}^{p} a_1 \Delta\, lnEX_{t-1} + \sum_{i=1}^{p} a_2 \Delta\, lnINF_{t-1} + \sum_{i-1}^{p} a_3 \Delta lnP0_{t-1} + \sum_{i=1}^{p} a_4 \Delta lnPW_{t-1} + \varphi ECM_{t-1} + u_t \quad (10)$$

$$\Delta lngarri_t = a_0 + \sum_{i=1}^{p} a_1 \Delta\, lnEX_{t-1} + \sum_{i=1}^{p} a_2 \Delta\, lnINF_{t-1} + \sum_{i-1}^{p} a_3 \Delta lnP0_{t-1} + \sum_{i=1}^{p} a_4 \Delta lnPW_{t-1} + \varphi ECM_{t-1} + u_t \quad (11)$$

$$\Delta lnsesame = a_0 + \sum_{i=1}^{p} a_1 \Delta\, lnEX_{t-1} + \sum_{i=1}^{p} a_2 \Delta\, lnINF_{t-1} + \sum_{i-1}^{p} a_3 \Delta lnP0_{t-1} + \sum_{i=1}^{p} a_4 \Delta lnPW_{t-1} + \varphi ECM_{t-1} + u_t \quad (12)$$

$$\Delta lnsoybean = a_0 + \sum_{i=1}^{p} a_1 \Delta\, lnEX_{t-1} + \sum_{i=1}^{p} a_2 \Delta\, lnINF_{t-1} + \sum_{i-1}^{p} a_3 \Delta lnP0_{t-1} + \sum_{i=1}^{p} a_4 \Delta lnPW_{t-1} + \varphi ECM_{t-1} + u_t \quad (13)$$

$$\Delta lnoil\ palm = a_0 + \sum_{i=1}^{p} a_1 \Delta\, lnEX_{t-1} + \sum_{i=1}^{p} a_2 \Delta\, lnINF_{t-1} + \sum_{i-1}^{p} a_3 \Delta lnP0_{t-1} + \sum_{i=1}^{p} a_4 \Delta lnPW_{t-1} + \varphi ECM_{t-1} + u_t \quad (14)$$

III. RESULTS AND DISCUSSION

Time series properties of all variables used in the estimation were examined in order to obtain reliable results. Thus this exercise was carried out through Augment Dickey Fuller. Before estimating the models specified above, the first test was the stationarity properties of our variable. Table shows the unit root result of our variable.

Table 1: Augmented Dickey Fuller (ADF) Unit Root Test

	ADF RESULTS				
	AT LEVEL		**FIRST DIFFERENCE**		**DECISION**
	t-Statistic	**Probability**	**t-statistic**	**probability**	
Domestic Oil Price	-2.672	0.090	-5.563	0.0000***	I(1)
World Oil Price	1.176	0.997	-6.232	0.0001***	I(1)
Sesame	-2.420	0.144	-6.955	0.0000***	I(1)
Fish farming	-1.852	0.348	-10.556	0.0000***	I(1)
Palm Oil	-1.345	0.245	-4.487	0.0002***	I(1)
Garri	-2.649	0.094	-6.082	0.0001***	I(1)
Soybean	-1.689	.0275	-5.214	0.0017***	I(1)
Inflation	-2.531	0.118	-4.765	0.0034***	I(1)
Exchange Rate	0.311	0.975	-4.854	0.0028***	I(1)

Source: Author's Computation from E-View 7.

*** indicate stationarity at p< 0.001 level of significance

The performance of agricultural has been captured by various components as mention earlier. The results in Table 1 present the summary of unit root tests conducted under the ADF at level and first difference. The results indicate that all the variables under study were stationary except World oil price which is not stationary at level but was stationary at first difference at p< 0.001 level of significant. Therefore, by analysing the Table shows that all the variables are stationary at first difference and are therefore characterized as I (1) process. Next is to test if there is co-integration among variables. The result obtained correlate with the report of (Ale, 2015).Who reported that variable were stationary at first difference.

3.1 The cointegration analysis result and interpretation

The Johansen (1990) cointegration method was adopted in the testing for cointegration, which is an econometric property of time series variables, if two or more series are themselves non-stationary, but a linear combination of them is stationary then the series are to be co-integrated. The purpose of the co-integration test is to determine whether groups of non-stationary series are co-integrated or not.

Table 2: Johansen Maximum Likelihood Cointegration Test

		Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**	No of Cointegrating equation
Fish farming	Model 1	None*	0.716132	36.51817	33.87687	0.0236	1
Garri	Model 2	None*	0.662766	77.87926	69.81889	0.0099	1
Sesame	Model 3	None*	0.704655	83.19191	69.81889	0.0030	1
Soybean	Model 4	None*	0.691781	88.35859	69.81889	0.0008	1
Oil palm	Model 5	None*	0.818958	84.69708	69.81889	0.0021	1

Trace statistics indicates 1 cointegrating equation(s) at the p< 0.05 level

* denotes rejection of the hypothesis at the p< 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 2 revealed that both trace test statistics and Eigen valve indicate one co-integration equation at p< 0.05 level of significance. The hypothesized numbers of cointegrating Equation (CEs) is from None* to At most 4, but only None* was used on the table while others will be seen on the appendix. The unrestricted cointegration test is based on the trace statistic at p< 0.05 level of significant, the Table 2 shows that trace statistic value for model 3.10 to 3.14 are (36.51) (77.87), (83.19), (88.35) and (84.69) is greater than the critical value (33.87), (69.81), (69.81),(69.81), and (69.81) respectively which implies the presence of cointegration which indicate the long run relationship among variables ,but in the subsequent cointegration equation, critical value are greater than the trace statistic based on the evidence above it implies the rejection of the null hypothesis that there is no cointegration. Trace test indicate one (1) cointegration equation at p< 0.05 level of significant.

Table 3: Cointegration Test: The Long Run Relationship among Variables from Models 5to 9

		Domestic oil price (-1)	exchange rate(-1)	inflation rate(-1)	world price(-1)	C
Fish farming	Model 5	-167713.9***	-121740.2***	65055.48	338505.8***	786149.2
	t-statistic	-5.61712	-5.33037	1.31172	4.80207	
Garri	Model 6	-12663.24	-57952.59***	13729.85	50022.00	-958939.7
	t-statistic	0.96255	-5.67734	0.62582	1.60621	
Sesame	Model 7	1348.783	-3818.250**	5306.639	-746.4545	-2021661
	t-statistic	0.69626	-2.56732	1.46938	-0.16355	
Soybean	Model 8	5012.391***	-5132.127***	-27134.20***	-5403.368	23617.74
	t-statistic	2.88026	-3.79728	-8.94474	-1.29629	
Oil palm	Model 9	-234186.1***	-74321.57***	-91783.70*	246942.2***	93264.09
	t-statistic	-7.98626	-3.26644	-1.68925	3.54359	

Source: Author's Computation from E-View 7.

NB ***, **, *significant at p< 0.001, p< 0.05 and p< 0 .01% respectively.

3.2 Relationship between fish farming and economic variable

In Table 3, it is assumes lag 1 for each of the explanatory variable of the performance of agro allied enterprises. The result of the long run relationship between performance of fish farming it shows that domestic oil price, exchange rate, World price were the variables that significantly affect performance of fish farming enterprise, however, the coefficient of domestic oil price, exchange rate were negative and significant at p< 0.001, implying that unit increase in domestic oil price, exchange rate decreases performance by ₦167,713.9 and ₦121,740.2 in the long run. While the coefficient of world oil price was positive and significant at p< 0.001 implies a unit increase in world oil price increases the performance of fish farming by ₦338,505.8 in the long run.

Soybean

In Table 3, the coefficient of exchange rate and inflation rate are the variable that significantly affects soybean enterprise the coefficient of exchange rate and inflation rate was negative and significant at p< 0.001 implying that a unit increase in exchange rate, and inflation rate decreases performance by ₦51,321.27 and ₦27,134.20 in the long run. This agreed with the work of Oluwatomilola (2015), who found that the coefficient of exchange rate is negative and significance at p < 0.01 implies that there is a negative relationship between inflation and exchange rate in the long run. This may be due to importation of equipment at higher price which reduces their performance, however the coefficient of domestic oil price, inflation rate, and world oil price were not significant on the performance of soybean enterprise in the long run. While in short run domestic oil price is negative ₦2, 0605.82 and not significant, exchange rate is negative ₦38,596.76 and not significant, world price is negative ₦16,882.14 and not significant which means it has no effect in the short run.

Garri

In Table 3, the coefficient of exchange rate is the only variable that significantly affects performance of garri enterprise, the coefficient of exchange rate was negative and significant at p< 0.001 implying that unit increase in exchange rate affect performance by ₦57,952.59, this could be due to high cost in purchase of garri which reduce their performance, however the coefficient of domestic oil was negative and not significant inflation rate, World oil price were positive and not significant, and has no significant effect on the performance of garri performance. In the short run inflation rate is negative ₦12,133.93 but significant at p< 0.05 which implies that the unit increase will decrease the performance of garri by ₦12,133.93 in the short run.

Sesame

Table 3 shows that the coefficient of exchange rate was the variable that significantly affects sesame enterprise, the coefficient of exchange rate was negative and significant at p < 0.05 which implies that a unit increase in exchange rate, decreases the yield of sesame by ₦3818.250, respectively in the long run. But domestic oil price, inflation rate were positive and not significant, world price was positive and not significant which have no effect on the performance of sesame.

Oil palm

Table 3 shows that domestic oil price, exchange rate, inflation rate and world oil price were the variable that significantly affect performance in the long run, their coefficient were negative and significant at p< 0.001 and p< 0.01 respectively. Implying that unit increase in domestic oil, exchange rate, and inflation rate decrease performance by ₦234,186.1, ₦74,321.52 and ₦91,783.70 in the long run, which may be due to increase in domestic oil price which increase cost of production, increase in exchange rate, increase the price of importation of machineries, increase in inflation rate reduce the purchase power of consumers whereby affecting the performance of oil palm. Also the coefficient of world price was positive and significant at p< 0.001 implying that unit increase in world oil price by ₦246,942.2 in the long run. This may be due to the facts that increase in world oil price increase government revenue which may in turn give subsidies in the subsector to encourage their activities. In the short run domestic oil price, exchange rate, inflation rate and world price is negative p< 0.001 and p< 0.01 but world price is negative and not significant implying that unit increases of domestic oil price, exchange rate, inflation rate decrease the performance by₦ 60,619.46; ₦29,280.19 and ₦23,851.92 in the short run.

3.3 Vector Error Correction Mechanism (VECM)

The result of the VECM coefficient, the estimated coefficient for the error correction term reveals which of the variable adjust to the correct imbalance in the economic situation whilst the variables coefficient shows the short run effect of the changes in the explanatory variable on the dependent variable. The error correction mechanism (ECM) in Table 4, ECM serves as a means of reconciling short run disequilibrium behaviour of an economic variable with its long run behaviour (Sule and Momoh, 2009). The two criteria in the use of the error correction model are the coefficient and the t-statistics. The coefficient is expected to be negatively signed showing a convergence of the variables back to equilibrium path following every period of disequilibrium. The t-statistics on the other hand is used to check the significance of the variable and the absolute value of the t-statistics must at least be zero.

Table 4: A Summary of Result of Error Correction Model (ECM) among Variable for

	Fish Farming (-1)	**Soyabean (1)**	**Gari (-1)**	**Sesame (-1)**	**Oil Palm (-1)**
Domestic oil price(-1)	0.5619***	0.2292	0.16890	-0421721**	-0.765594
	-3089.613	-20605.82	1849.292	408.6708	-60619.46***
Exchange rate(-1)					
Inflation rate	9219.879	-38596.76	1538.767	126.763	-29280.19*
(-1)					
World oil price(-1)	17916.47	13762.91	-12133.93**	5508.972*	-23851.92*
C					
	53659.30*	-16882.14	-3277.722	5961.981	-5260.886
ECM					
	25426.91	402709.3	19474.19	35119.87	910134.7***
R^2					
Adj R^2	0.009	-1.0366	0.7703	-0.1394	-0.2403
S.E equation	(-0.1597)	(-3.3120)	(-2.96375)	(-1.0714)	(-7.90974)
F. statistic	47.76	39.51	56.44	40.66	81.78
	33.61	23.02	44.56	24.48	76.81
	16739	3757946	429496.6	214598.3	1159158
	3.3524	2.395601	4.752276	2.513055	16.4600

Source: Author's Computation from E-View 7.

NB ***,**,* are significant at $p< 0.001$, $p< 0.05$ and $p< 0.01$ respectively

Short Run Relationship between Fish Farming and Economic Variable

The results of ECM is presented in Table 4, shows the short run relationship among the variable the coefficient of the world price is positive and significant at $p< 0.01$ level of significant, the analysis shows that one naira appreciation will result in ₦53,659.30 increase, and increase in the world price will lead to an increases in domestic price and inflation rate the ECM is positive but not significant the coefficient shows that 0.009 of the discrepancy between the long run and the short run value of the world price is corrected in the current period, we can say the speed of adjustment from the short run value of the world price to its long run value is 0.9%. Its negative sign suggests the present of long-run equilibrium relationship among the variable. This implies that it takes a period of time for the error component to be corrected. The short run coefficient domestic oil price, exchange rate and inflation rate are positive but not significant meaning it has no effect on the enterprise.

The Table also shows that, the short run relationship for the performance of fish farming enterprise shows that the coefficient of determination (R^2) was 0.4778 which implies that 47.76% of the variation explains the performance of fish farming enterprise, in the previous domestic oil price, exchange rate, inflation rate and world price. The results show that the performance of fish farming enterprise and world oil price were the variable that significantly affect performance of fish farming enterprise in short run. The coefficient of fish farming enterprise was negative and significant at $p< 0.001$ implying that the unit increase in the performance of fish farming enterprise decrease performance of fish farming by ₦0.561911 in the short run. This may be explained that the enterprise should strategize their business plan based on the past experience without considering interaction between market forces which may lead to decrease in their performance. Coefficient of world oil price was positive and significant at $p< 0.01$ implying that the unit increase in world oil price increases the performance of enterprises by ₦53, 659.30 in the short run meaning it has a positive effect on the enterprise. The coefficient of domestic oil price, exchange rate and inflation rate were not significant and has no effect on the enterprise in the short run.

Relationship between Soybean and Economic Variable in the Short Run

In Table 4, the ECM shows the short run relationship among the variable, the coefficient of domestic oil price, exchange

rate, inflation rate and world oil price were not significant on the enterprise in the short run. The error correction model coefficient is negative but not significant the coefficient shows that -0.0366 of the discrepancy between the long run and the short run value or we can say the speed of adjustment from the short run value is 3.67%. . Its negative sign suggests the present of long-run equilibrium relationship among the variable.

Soybean shows that the coefficient of determination (R^2) was 0.3951 implying 39.51% variation in the performance, this explain the performance of soybean enterprise, domestic oil price, exchange rate, inflation rate and world oil price was not significant on the enterprise in the short run.

Relationship between Garri and Economic Variable in the Short Run

In Table 4, the ECM for garri is positive and show that the coefficient of inflation rate is negative and significant at $p < 0.05$. The analysis shows that one naira depreciation will result to N12, 133.93 decreases in inflation rate, but domestic oil price, exchange rate are positive and not significant. The ECM coefficient is 0.7703 of discrepancy between the long run and the short run or the speed of adjustment is 77%.which suggests the long run equilibrium relationship among variable.

Garri result shows that the coefficient of determination (R^2) was 0.5644 implying 56.44% of the variation in the performance of small scale garri enterprise, it shows that inflation rate in the previous year is the only variable that affect significantly in the short run and its coefficient was negative and significant at $p < 0.05$ implying that the unit increase in inflation rate decrease performance by ₦12,133.93 in the short run, this explained that increase in inflation rate reduces consumer purchase power which affect directly the performance of the enterprise. However the coefficient of garri, domestic oil price, exchange rate and world oil price were not significant and have no effect on the enterprise in the short run.

Relationship between Sesame and Economic Variable in the Short Run

Table 4, the ECM is negative and shows that the coefficient of inflation rate is positive and significant at $p< 0.01$. It shows that one naira which shows that one naira increase will result in ₦5,508.972 increases, an increase in inflation will lead to increase in domestic oil price, exchange rate, the coefficient shows that -0.1394 of discrepancy between the long run and short run or speed of adjustment is 13.9%. It negative sign suggests the present of long-run equilibrium relationship among the variable

Table 4 shows the coefficient of determination (R^2) was 0.4066 implying 40.66% of the variation in the performance of sesame enterprise this explained the performance of sesame enterprise in the previous year. Result showed that the performance of sesame enterprise and inflation rate were the variable that significantly affect the performance of sesame in the short run. The coefficient was negative and significant at $p < 0.05$, implying that the unit increase in the performance of sesame enterprise decreases the performance by 0.42171 in the short run. While the coefficient of inflation rate was positive and significant at $p< 0.01$ meaning a unit increase in the inflation rate performance by ₦5,508.972 in the short run. This explains that whenever there is increment in price there is tendency that sesame enterprise takes advantage on the consumers which lead to increases in their performance. The coefficient of domestic oil price, exchange rate and world oil price were not significant and has no effect on the performance of sesame.

Relationship between Oil Palm and Economic Variable in the Short Run

Table 4, the ECM shows that the coefficient of domestic oil price, exchange rate and inflation rate are negative and significant at $p< 0.001$ and $p< 0.01$ but world price is negative and not significant this means that one naira depreciation will result to ₦60,619.46, ₦29,280.19 and ₦23,851.92 decrease in the short run. The coefficient shows that 0.2403 of discrepancy or the speed of adjustment is 24%. It negative sign suggests the present of long-run equilibrium relationship among the variable

It also shows that the coefficient of determination (R^2) was 0.8178 implying 81.78% of the variation in the performance of palm oil enterprise; these explain the performance of palm oil. Results shows that domestic oil price, exchange rate, inflation rate were the variable significantly affect enterprise and their coefficient were negative and significant at $p< 0.001$ and $p< 0.01$. A unit increase in the domestic oil price, exchange rate and inflation rate decreases the performance by ₦60, 619.46, ₦23,851.92 respectively. The finding agree with Farzanegan and Markwardt (2009); that oil price shock impact significantly affect output, and confirm with the finding of Hajko (2012) and Agbede (2013). That price fluctuation resulting from changes in either demand or supply side of the international oil market.

The Granger Causality

The granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another (Wikipedia, 2017).

Table 5: Granger Causality Test for Short Run and Long Run

Variables	F-Statistic
Fish farming	3.352369***
Garri	4.752276***
Soybean	2.395601**
Sesame	2.513055**
Palm oil	16.46004***

*** And ** are significant at $p< 0.001$ and $p < 0.05$ respectively

The results of hypotheses are summarized as shown in the Table 5, the F-statistic for the impact of oil price shock on the

performance of fish farming, garri and palm oil were significant at p< 0.001 which implies that the effect is higher at p< 0.001on the small scale.

IV. CONCLUSION

This study showed that inflation and exchange rates were the variables that significantly affect the performance of agro allied enterprises under the period under review. Finally, oil price shock significantly affects the performance of agro allied enterprises in both long and short run. Subsidies should be given to agro allied enterprise through reduction of taxes in order to increase their performance which will in turn encourage local production. Also, price control should be set up to control inflation rate, since it affects both negatively and positively the performance of agro allied enterprises.

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