

Full Length Research

An Econometric Modelling of the Effect of Armed Conflict on Agricultural Production in Nigeria: (1961-2017)

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This study provides evidence for the reality that sustained armed conflict in Nigeria may have significant effect on agricultural production and consequently food security in Nigeria in the long-run. The effect of armed conflicts on agricultural production in Nigeria was modeled in this research work with the use of Autoregressive Distributed Lags (ARDL) analytical technique while employing data which span the period of 1960-2017 and obtained from Central Bank of Nigeria (CBN) statistical bulletin, the statistical online database of the Food and Agricultural Organization (FAOSTAT) of the United Nations, the Polity IV Project of the Center for Global Policy School of Public Policy, George Mason University and Center for Systemic Peace. Augmented-Dickey unit root analysis of the data show that the price of crude oil (LP_o) in Nigeria and polity2 ($P2$) which is proxy for measuring for measuring governance and rule of law have order of integration of 0 ($I(0)$) while the other variables have unit root properties. Results of Autoregressive Distributed Lags analysis also show that ethnic violence (EV) which was the proxy for armed conflict and interaction of ethnic violence and price of crude oil (EVP_o) were found to have exerted negative and significant effect on agricultural production in Nigeria. The findings of this study amongst other things show that if armed conflict is not checked and quickly nipped in Nigeria, agricultural productivity would continue to decline with grave consequences on the nation's food and nutrition security.

Keywords: Armed Conflict, Crude Oil, Agricultural Production, Food Security, Boko-Haram

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INTRODUCTION

Agriculture plays an especially important role in many developing countries as “three out of every four poor people in developing countries live in rural areas, and most of them depend directly or indirectly on agriculture for their livelihoods” (World Bank 2008). More broadly, roughly 2.5 billion people live in households which depend on agriculture (World Bank, 2008).

According to Chikaire *et al* (2016), Nigeria is agrarian in nature and greater percentage of the farmers dwell in rural areas where farming activities happen to be their primary sources of livelihood. Agboola and Eniola (1991) stated that agriculture is by far the largest sector on which fast majority of Nigeria populace depends for their wellbeing and livelihood.

Conflict and the threat of violence may affect agricultural decision making in a variety of ways. For instance, (agricultural) assets that support peacetime livelihoods may become liabilities for conflicts (Lautze and Raven-Roberts, 2007). Assets such as livestock, are not only more likely be looted, but their very presence may also increase the risk of being attacked, especially if they are difficult to conceal.⁵ Similarly, the price of certain assets may be adversely affected by violence. During the Rwandan Genocide, cattle prices decreased by half suggesting that these types of assets may no longer be good ways to store purchasing power nor useful in coping in the aftermath of shocks (Verpooten 2009). Additionally, the composition of livestock portfolios may also respond to insecurity. Large livestock, such as cattle, need to graze and may further expose household members. In contrast, smaller livestock, such as goats or swine, can be kept within villages or individual compounds and are also more easily hidden.

In Nigeria, armed conflicts have become a threat to the nation’s national peace and security since she got her independence in 1960, due to the fact that it constitutes the highest contributor to humanitarian crises in the form of rise in human casualties, internally displaced persons, refugee debacles, food insecurity and the spread of various diseases (van creveld, 1996). As indicated by Akpaeti and Umoh (2012), Nigeria’s historical landscape like other parts of the world, is dotted with cases of ethnopolitical conflict and violence, which climaxed in Nigerian civil war 1967 to 1970. These conflicts result from different value systems, aggressive competition for land, water, political resources and the unhealthy competition of some community leaders. According to Banjo (1998), Obasanjo, (1999) and Etuk *et al.*, (2006) as cited in Akpaeti and Umoh (2012), there is hardly a year where there is no major violent conflict in Nigeria.

The last few decades have witnessed a lot of violent communal conflicts throughout Nigeria. Most of these conflicts have a long history and they keep resurfacing at all time, thereby creating conflicts zones all over the country. Integrated Regional Information Net-Work (IRIN) Report, (1999) asserts that thirty-one conflicts areas have developed in Nigeria in the last ten years. Some of them include: Jukun and Tiv Conflicts, in Taraba and Benue States, 1998 and 1999; Ijaw and Itsekiri Crisis in Delta State ,1998 and 1999; Ife and Modakeke Conflicts in Osun States, 1999; The Zangon-Kataf Crisis in Kaduna State ,1992; Ilaje Ijaw conflict in Ondo State; among others(Oji, 2014). Going by Chikaire *et al* (2016), Nigeria recorded several violent conflicts in many rural communities. Since 1999, conflict has caused over 10,000 deaths, and the internal displacement of over 300,000 people (Bolarinwa *et al.*, 2012). Such conflicts explain noticeable distortions in farmers’ livelihoods since they live and earn their living from rural areas. Agboola and Eniola, (1991) once reported that these conflicts are due to internal boundary dispute, rival interest of nomads and sedentary farmers as well as agitation for improved prices for agricultural commodities and improved standard of living by groups of farmers or peasants in some local government’s areas.

After Nigeria gained independence in 1960, the country witnessed years of tumultuous conflicts between the primary ethnic groups; the first Nigerian Democratic Republic was overthrown in 1966, and the Biafran War of 1967 lasted two and a half years and claimed one million lives; in the end, the secessionist movement failed and the Nigerian state held together. Inter-ethnic clashes around the country have continued ever since, with ebbs and flows in violence as the country has progressed into what is now the Fourth Democratic Republic. With the exception of the Islamist uprising of Boko Haram, the current landscape of violence in the north and the Middle Belt region of the country is dominated by clashes between Fulani pastoralists and farmer groups and sporadic inter-ethnic clashes in the major cities; in the south, the fight is between the oil companies and local communities, a decades-long battle that has spawned a number of rebel groups including the Bakassi Boys and the Movement for the Emancipation of the Niger Delta (MEND).⁹ In major cities around the country, youth groups known as “area boys” are also a cause of urban violence and crime. Terrorism in the north led by Boko Haram has intensified dramatically over the past few years, adding another element of destabilization. According to the Nigeria Watch database, the country as a whole has witnessed 11,640 violent deaths in 2014 (up until August, at the time of writing), more than in all of 2013.¹⁰ (Udemudie and Ite, 2006)

Several factors have been responsible for conflicts generation, these factors vary with the nature and location of conflicts. It is difficult to isolate which conflict is primarily engendered by economic, ethnic, religious and political competitions (Alemika, 2002). The report of internal conflicts by the Federal Ministry of Information and National Orientation, (FMINO, 2002) identify the sources/causes of conflicts to be: (i) perceived marginalization (ii) Improper

delineation of boundaries, (iii) Seeming insensitivity and slow response of government to security issues, (iv) neglect of responsibilities by leaders at local levels and (v) Over-dependence on government for provision of basic infrastructure. Others are (vi) Increased pressure on land, (vii) Rising influence of settler population, (viii) Fear of political domination, (ix) Unemployment and (x) Poverty.

The causes of conflict are as varied as the nature of conflict and the roots of war are multifaceted, with important historical contexts. There are a number of potential factors that can be identified including colonial legacy; military governments and militaristic cultures; ethnicity and religion; unequal development; inequality and poverty; bad leadership and/or polity frailties and inadequacies; external influences; greed/opportunity/feasibility; and natural resources. Very few conflicts are simple, they are often a combination of factors and this fact can have important implications for the achievement of peace and the success of post conflict reconstruction policies.

The regular conflicts over the years have led to the destruction of lives, property worth billions of naira and destruction of basic infrastructural facilities in place thereby worsening the already bad condition of the displaced inhabitants, hence, negating their abilities to relate functionally with their urban counterparts. Boko- haram insurgency, Fulani herdsmen, Niger delta militant and other armed conflicts activities in Nigeria has destabilized socio-economic activities, increased crime and destruction of both life and property of Nigerian citizens. This situation has made it impossible for the citizens to carry out their legitimate activities such as farming, livestock production to mention a few. It is also scaring foreign investors out of this part of the country. Students have been forced to flee their schools. Agricultural sector has been destabilized. The gravity of the crisis has brought about decline in productivity that escalates the prices of agricultural output and reduces the per capita income of an individual (Ezema, 2013).

Productivity of peasant farmers is essential and fundamental to any society or nation. In fact, agricultural sector is the driving force of a national economy in the world. Nations do not only plan for production, but also heavily invest in agricultural sector to boost food production, increase gross domestic product and by extension, secure the citizens from hunger and subsequent malnutrition. However, more often than not, insecurity constituted by armed conflict in Nigeria has to a large extent tampered with tens of thousands of people whom major activities are farming. The protracted violence in the affected zone has forced large scale farmers to abandon their farming activities in search for their dear lives. This has to some extent crippled economic activities and also affected agricultural production.

This great loss cannot be without having negative effect on agricultural production, income levels and a rise in poverty level of the people, consequently stimulating movement of displaced persons to other areas. It is worthwhile to determine the effects of long history of conflicts on the development and the well being of the people in the study area. The remaining part of this paper is organized as follows: Section two is the methodology of the research work, section three deals with the presentation and discussion of obtained results while section four is the conclusion and policy recommendation from the study.

METHODOLOGY

Data and Data Source

The data used in this study were obtained from secondary sources. This study used mainly the time series data spanning from 1960 to 2017. Data on Agricultural gross domestic product which is the proxy for agricultural production in Nigeria, crude oil price and foreign exchange rate were sourced from the Central Bank of Nigeria (CBN) statistical bulletin. Data of tractors which is machinery employed in agricultural production, agricultural land, rural population (used as proxy for agricultural labour) and fertilizer were all sourced from the statistical online database of the Food and Agricultural Organization (FAOSTAT) of the United Nations. Data ethnic violence which is the proxy for armed conflict and polity 2 which is the proxy for governance were sourced from the Polity IV Project of the Center for Global Policy School of Public Policy George Mason University and Center for Systemic Peace.

Analytical Techniques

The data were analyzed using inferential and identification method. The inferential method involves the use of Auto-regressive distributive lag (ARDL) approach. The identification method involves identifying from literature.

Stationarity test

The study involves the use of time series data. These series are not deterministic variables. They share some stochastic properties. Charles. R. Nelson and C.I. Plosser (1982) hold that macro-economic time series usually behave like random walks. These series are not '*trend reverting*'. More specifically, these variables do not tend to revert back to

a long-run trend after a shock. In such case, standard regression with *non stationary* data makes all regression coefficients misleading and, therefore, leads to spurious relationships with erroneous conclusions. In this case the results may suggest statistically significant relationships between the variables in the model, when in fact this is just evidence of contemporaneous correlation. In the light of the foregoing, it becomes pertinent to enquire into the nature of the stochastic processes of the macroeconomic time series and to know the underlying process that generates our time series variables: that is, whether the variables are stationary or non-stationary.

The Augmented Dickey–Fuller (ADF) test was used to examine the selected variables for the presence of unit root to determine their appropriateness for the analysis or not. Non-stationarity of time series has always been regarded as a problem in econometric analysis. Philip (1986) shows that, in general, the statistical properties of regression analysis using non-time series are dubious notwithstanding promising diagnostic test statistics from such regression analysis. The order of integration is given by the number of times a series needs to be differenced so as to make it stationary. According to Charemza and Deadman (1992), a stochastic process is said to be stationary if the joint and conditional probability distributions of the processes are unchanged if displaced in time.

A data series that does not have a unit root is said to be stationary and is said to have an order of integration of (0). The order of Integration, usually written as $O(1)$ is the number of times a data series is to be differenced before it becomes stationary. If the data set is stationary at levels, it means that it does not have a unit root and it cannot be used for analysis. Series with order of integration of 1 will be differenced once before it is brought into the equation.

As a first step it important in time series study to ascertain the stationarity or otherwise of the time series data. A non-stationary series requires differencing to become stationary. As such, there is the need to assess the order of integration of both the dependent and independent variables in the model under analysis. The order of integration ascertains the number of times a variable will be differentiated to arrive at stationarity. A stationary series is an $I(0)$ series while non-stationary series are $I(1)$. But it is also possible for non-stationary series to be of order 2, that is $I(2)$, or even of a higher order. X_t is integrated of order D_x or $X_t \sim I(D_x)$, if it is differentiated D_x times to achieve stationarity (Dickey and Fuller, 1981).

Engle and Granger (1987) provided appropriate tests for stationarity of individual series. Specifically the test procedure includes the estimation of the Dickey-Fuller (DF) and the Augmented Dickey-Fuller (ADF) statistics. The DF and ADF are tests for the null hypothesis that the variable of interest is non-stationary. Specifically, the ADF unit root test adopted for this study assumed that the data generating process is autoregressive to the first order. This is done so that the autocorrelation in the error term does not bias the test. The ADF includes first-difference lags in such a way that the error term is distributed as a white noise. The test is formulated as follows: A unit root test implies testing the significance of δ against the null that $\delta = 0$.

Thus,

H_0 : The variables are not stationary at their levels, i.e. $I(1)$

H_a : The variables are stationary at their levels, i.e. $I(0)$.

The test procedure is usually indicated in the following type of equation:

$$\text{For ADF test, } \Delta X_t = \alpha_0 + \delta X_{t-1} + \sum_{i=1}^k \Delta X_{t-i} + e_t \quad (1)$$

H_0 is rejected if the t-statistic on δ is negative and statistically significant when compared to appropriate critical values established for stationarity tests.

Autoregressive Distributive Lag approach (ARDL)

This study applied the ordinary Autoregressive Distributive Lag (ARDL) model to analyse the effect of armed conflicts on agricultural production in Nigeria. This allow software to automatically select the number of lags in the model for time series data in which a regression equation is used to predict current values of a dependent variable based on both the current value of an explanatory variable and the lagged(past period) values of this explanatory variable.

The Autoregressive Distributed Lag (ARDL) model provides a general distributed lag structure without explicitly specifying a dynamic optimization. According to Mbagha and Coyle (2003), this approach can provide a relatively parsimonious approximation to a general dynamic process. An ARDL model can be written as:

$$X_{1t} = a + \sum_{j=i}^j \beta_j X_{1t-j} + \sum_{k=0}^k \gamma_k Y_{i-k} + T + \phi_t + \ell_t \dots\dots\dots (33)$$

Where X_{1t} , are series of variable X , a is an intercept, T is a time trend, and e_t is the error term.

A key issue in estimating ARDLs is the identification of the correct number of lag length. Under-parameterization can lead to misspecification, whilst over-parameterization limits the degree of freedom and increases forecast variance. Normally the relevant j and k are selected by means of information criteria such as the Akaike, Schwartz-Bayes, the Hannan Quinn and log likelihood. In running the regression, up to four lags will be imposed and the estimation proceeded by dropping those variables with low t-values. Moving from the general to specific modelling of the ADL model improves the information criteria namely Schwart criterion (SC), Hannan and Quiun (HQ) and the Final prediction error (FPE). They decline as less significant variables and lags were dropped based on low t-values. At the same time, the equation standard error(s) increase.

Model Specification and Variable description

The model to be estimated was specified as;

$$LAGDP = (LEX, LTR, LRP, LLD, LF, LP_o, EV, P2)$$

- $LAGDP =$ Agricultural GDP which is the proxy for agricultural production in Nigeria
- $LEX =$ Exchange rate
- $Lk =$ Agricultural machinery
- $LLB =$ Rural population which serve as the proxy for agricultural labour
- $LLD =$ Agricultural land in Nigeria
- $LP_o =$ Price of crude oil in Nigeria
- $EV =$ Ethnic violence

Ethnic Violence (EV) is classified as one of the *Major episodes of political violence* (MEPV) on the Polity 4 website and are defined by the systematic and sustained use of lethal violence by organized groups that result in at least 500 directly-related deaths over the course of the episode. Each episode is designated to span a certain number of years and judged to have been of a certain, general magnitude of societal systemic impact (an eleven-point scale, 0-10) magnitude scores are considered consistent and comparable across categories and cases, that is, approximating a ratio scale). The episode’s magnitude of impact score is entered for each year of the designated time span and for each country considered to have been directly affected by the warfare experience. When more than one episode of a particular MEPV category occurs in a single country in a single year, the episode scores are summed and the sum is entered for that category variable in the data set. Hence, 0 is entered for a year when there is no episode of conflict resulting in death of up 500 persons in a country while values of 1-10 are recorded for the no of episodes of killings that took place in the year (CSP, 2017).

- $EVPO =$ Interaction between ethnic violence and crude oil price
- $P2 =$ A proxy for measuring governance and rule of law

All the variables were expressed in their natural logarithm form except for the Ethnic violence and Polity 2 variables that were not logged.

RESULT AND DISCUSSION

Unit Root Test

The result of the unit root tests is shown in table 1 below. The null hypothesis of the presence of a unit root (non-stationary) was tested against the alternative hypothesis of the absence of a unit root (stationary). The variables: Ethnic Violence (*EV*), Interaction between Ethnic Violence and Price of Crude oil (*EVPO*), Agricultural Gross Domestic Product (*LAGDP*), Exchange rate (*LEX*), Agricultural Land (*LLD*), Agricultural capital (*LK*), Agricultural Labour (*LLB*) are all stationary after first differencing and are said to be integrated of order 1 i.e. they all have unit root processes. However, Price of Crude oil (*LP_o*) and polity 2 (*P2*) are stationary at level.

The variables were thereafter used in the ARDL model at the level at which they become stationary.

Table 1: Result of Unit root test for selected variables.

Variables	T-Statistics		Orders of integration O(I)
	At level	First difference	
<i>LAGDP</i>	-3.179	-8.283***	1
<i>LEX</i>	-3.091	-4.653***	1
<i>LP_o</i>	-3.773***	-6.833***	0
<i>EVPO</i>	-2.887	-6.629***	1
<i>LLD</i>	1.873	-4.974***	1
<i>LLB</i>	-1.172	-5.510***	1
<i>LK</i>	-1.163	-5.509***	1
<i>EV</i>	-2.543	-5.772***	1
<i>P2</i>	-4.797***	-7.055***	0

Source: Data analysis, 2018; *** Indicates Significant at 1% level.

Relationship Between Armed Conflict and Agricultural Production in Nigeria

The estimated ARDL model fitted to examine the relationship between armed conflict and agricultural production in Nigeria passes a battery of diagnostic tests. The graphical evidence (CUSUM and CUSUMQ graphs) indicates that the model is fairly stable during the sample period. The analysis of the stability of the long-run coefficients together with the short-run dynamics, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUM) point to the in-samples stability of the model (see CUSUM and CUSUMQ in Figures 1 and 2).

The Autoregressive Conditional Heteroscedasticity (ARCH) and Breusch – Godfrey test for testing heteroscedasticity in the error process in the model have F-statistic of 1.417 and 0.0007 respectively and both are statistically insignificant. These show that there is the absence of heteroscedasticity in the model. The Breusch – Godfrey Serial correlation Langrange Multiplier (LM) test for higher order serial correlation has a calculated F – statistic of 0.0614 with an insignificant F-ratio of 0.555 which confirms the absence of serial correlation in the residuals. The Jargue – Bera Normality test on the residuals also shows that the error process is normally distributed. From the battery of diagnostic tests presented and discussed above, this study concludes that the model is well estimated and that the observed data fits the model specification adequately, thus the residuals are expected to be distributed as white noise and the coefficient valid for policy discussions.

The result of this study is also explained on the basis of R^2 , t-test and the signs and magnitude of the coefficient that follow a-priori expectation. Adjusted R^2 is 0.888, this imply that the explanatory variables explain 88.8% of the variation in the agricultural output in Nigeria with respect to the fitted model is accounted for by the fitted independent variables, leaving the 11.2% to the error term.

Result analysis from table 2 shows that agricultural gross domestic product in the immediate past period ($\Delta LAGDP(-1)$), has a negative effect on agricultural production in the current period and it is statistically significant at

10% level. This is contrary to expectation since we expect agricultural production in a previous year to be a booster to production in current year. But the result obtained could be due to unfavourable environments especially the market. Poor agricultural prices and unfriendly investment climate will serve as disincentive to agricultural production.

Ethnic Violence in the current period (ΔEV), the immediate past period ($\Delta EV(-1)$) and two years lag ($\Delta EV(-2)$) has a negative relationship with agricultural production. The coefficients of armed conflict variable are -0.133 (significant at 1% level), -0.122 (significant at 1% level) and -0.025 (significant at 5% level) respectively. These results are in line with a-priori expectation. Ethnic violence which is the proxy for armed conflict in this study unarguably impacts agricultural production negatively. Some of the direct effects of armed conflicts are deaths, emotional shocks, and abandonments of farmlands, loss of crops, rural-urban migrations and reduction in agricultural investments. All these will eventually result in reduction in productivity. This result is supported by Arias *et al*, (2013), Akpaeti and Umoh, (2012) among many others.

Ethnic violence interacted with the price of crude oil ($\Delta EVPO$) has a positive relationship with Agricultural production and it is not significant at any level. However, ethnic violence interacted with the price of crude oil in the immediate past period ($\Delta EVPO(-1)$) and immediate past two periods ($\Delta EVPO(-2)$) have negative and significant relationships with agricultural production. The coefficient of ($\Delta EVPO(-1)$) is -0.062 and it is significant at 10% level while the coefficient of ($\Delta EVPO(-2)$) is -0.048 and it is significant at 5%. Crude oil price and ethnic violence are two primary movers of agricultural production in Nigeria although on a negative direction. While crude oil price is usually known to have a negative feedback effect on agricultural production; ethnic violence many times have resulted in several loss of lives, emotional shocks and trauma, loss of agricultural produce and rural-urban migrations. An interaction of these two variables are expected to only have negative effects on Nigeria agricultural production, the two have the capacity to cause major crisis should it be allowed to linger if both should take place simultaneously.

Exchange rate (ΔLEX) has a positive relationship with agricultural production and it is statistically significant at 5% level. This result is in line with theoretical expectation. The coefficient of exchange rate is 0.076 and suggests that a unit increase in the exchange rate will cause an increase in agricultural production by 7.60%. An increase in exchange rate is expected to boost local production and exports while it reduces imports. This is one of the major goals of adoption of structural adjustment programme in Nigeria. Although the programme was not properly implemented especially with respect to the export crop sector, it nevertheless boosted local production.

Rural population was used as the proxy for agricultural labour (ΔLLB) in the Nigeria. In this study, the coefficient of labour in the present year and in the immediate past period is 5152.164 and 6652.213 respectively and both are significant at 1%. This result is in line with a-priori expectation and it suggests rural population will significantly boosts agricultural production in Nigeria. Rural-urban migration had been a major concern for agricultural production in the past. However, with the commitment and investment of the Nigerian government into the agricultural sector, many of the youths who are those in the active labour force are now taking to agricultural production.

Agricultural land (ΔLLD) represents the total hectareage of land that is put to use in agricultural production in Nigeria. The coefficient is 3.322 and 3.517 in the current period and the immediate past period respectively and both are significant at 1%. The result which is in line with a-priori expectation reveals the importance of land in agricultural production in Nigeria. Nigeria is blessed with vast expanse of cultivable and productive land that if well managed can significantly improve our foreign exchange earnings.

Agricultural Capital (ΔLK) has a negative relationship with agricultural production and it is statistically significant at 5% level. The coefficient is -207.126 suggests that a unit increase in capital employed in agricultural production will cause a 207.126 unit decrease in agricultural production. Although this is not in line with theory, capital invested in agriculture in the current period might not necessarily reflect in production in the current period especially if the agricultural investment involved have more than one year cycle. Capital invested into agricultural production in the immediate past period ($\Delta LK(-1)$) have a positive relationship with agricultural production and it is statistically significant at 1% level. This is in line with theoretical expectation. The coefficient is 269.21 and it suggests that a unit increase in capital in the previous period will cause an increase in agricultural production by 26921%.

Polity 2 ($P2$) which is a proxy for governance and rule of law, have a positive relationship with agricultural production and it is not statistically significant. Meanwhile, polity2 ($P(-1)$) in the previous period $P2(-1)$ have a positive relationship with agricultural production and it is statistically significant at 1% level. The coefficient of polity 2 in the immediate past period $P2(-1)$ is 0.019 and it suggests that increase in the level of governance and the rule of the law in immediate past period in Nigeria will cause a significant increase in agricultural production in the present period.

Good governance and rule of law are expected to have a positive feedback mechanism on the Nigerian agricultural sector. While the effect might not be seen in the present year, it is expected to be much more feasible in the years following because of the period of time it takes agriculture to mature.

Table 2: Relationship Between Agricultural Production and Armed Conflicts in Nigeria.

Model Selection Method: Akaike Information Criterion (AIC)

Selected model: ARDL(1,2,1,1,2,1,2,0,2)

Sample Period (1981-2017)

Variables	Coefficient	T-ratio
Constant	0.008	0.066
$\Delta LAGDP(-1)$	-0.241	1.848*
ΔEV	-0.133	-3.159***
$\Delta EV(-1)$	-0.122	-3.275***
$\Delta EV(-2)$	-0.025	-2.285**
$\Delta EVPO$	-0.028	-2.492**
$\Delta EVPO(-1)$	-0.037	3.530***
ΔLEX	0.068	2.712**
$\Delta LEX(-1)$	-0.027	-1.106
ΔLLB	5152.164	2.340**
$\Delta LLB(-1)$	6652.213	3.359***
$\Delta LLB(-2)$	2071.895	1.588
ΔLLD	3.322	3.623***
$\Delta LLD(-1)$	3.517	4.004***
ΔLK	-207.126	-2.312**
$\Delta LK(-1)$	269.21	3.347***
$\Delta LK(-2)$	-78.533	-1.473
LP_o	-0.034	-0.901
$P2$	0.004	0.674
$P2(-1)$	0.016	4.352***
$P2(-2)$	0.010	3.169***
$R^2 = 0.888$		
$F - Statistics = 4.790$		
$Prob(F - Statistics) = 0.004$		
NB:*** indicates significant at 1%; ** indicates significant at 5%; * indicates significant at 10%		

Source Data Analysis, 2018

CONCLUSION AND POLICY RECOMMENDATIONS

Conclusion

This study concludes that armed conflicts in Nigeria, ranging from ethnic violence – arising from resource control (Niger delta militant for example), land conflicts and all other forms of armed conflict has significantly affected agricultural production and will persist or the rather gets worse if it goes unchecked. This implies that the more the conflict occurs in Nigeria, the greater the risk or chances for the productive population to flee the troubled regions to a safer places for fear of being caught up in the crises. This invariably will lead to abandonment of productive farmland and subsequent decrease in food production from the communities in question and the rest of the society. The findings of this study

amongst other things have several implications for food security and agricultural growth in Nigeria. If armed conflict is not checked and quickly nipped in Nigeria, agricultural productivity would continue to decline in the face of violent conflict in the country. Nigeria as of today is not a food secure country. Annually, a large portion of our external reserve is spent on food importation. This situation will not only persist but could worsen and inadvertently assume a crisis dimension unless serious steps are taken to stem armed conflicts in Nigeria.

Policy Recommendation

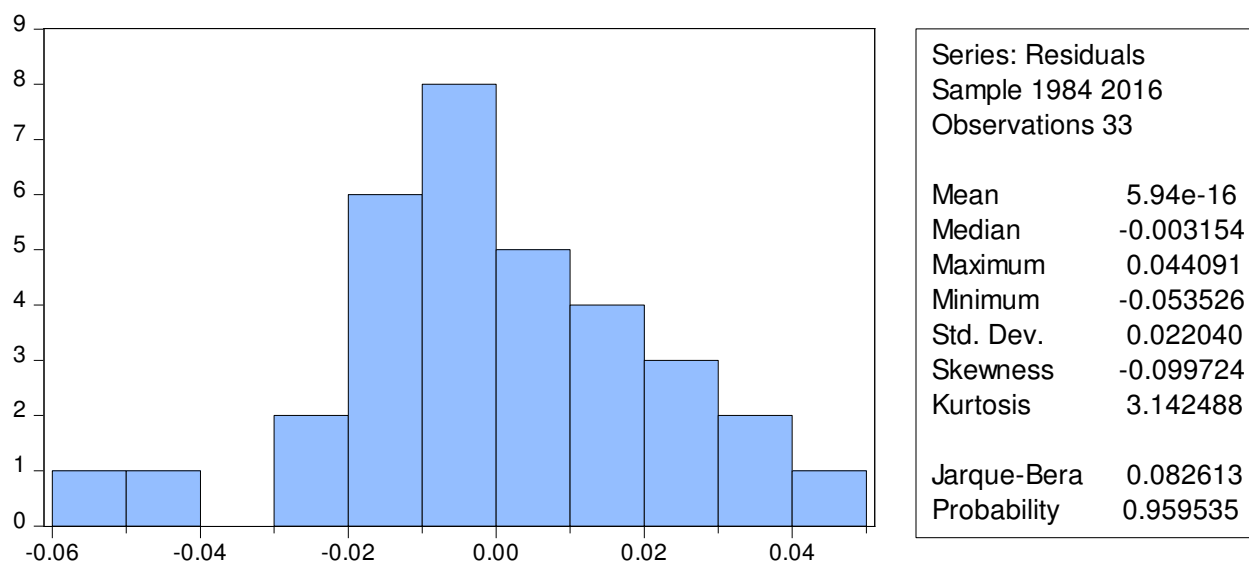
In the light of the above conclusions from this study, we therefore recommend as follows:

There should be a formulation of a workable land tenure system in Nigeria. This will allow for easy access to land for agricultural use without infringing on the well being of others.

Government is a major player in ending armed conflict in Nigeria. One of the major responsibilities of government in ending incessant armed conflicts in Nigeria is through equitable and just distribution of resources. For as long as people feel cheated in the distribution and share of natural resources and participation in governance, there will be conflicts.

Government should as much as possible improve the rule of law. Where there is no justice, there cannot be peace.

The government, communities and tribal leaders should take full responsibility towards ending armed conflicts in Nigeria by recalling coming to a round table discussion to discuss issues precipitating conflicts, resolve them and coming up with peace agreements which all parts must be bound by the law to execute. This will go a long way to build the confidence and peaceful co-existence.



Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

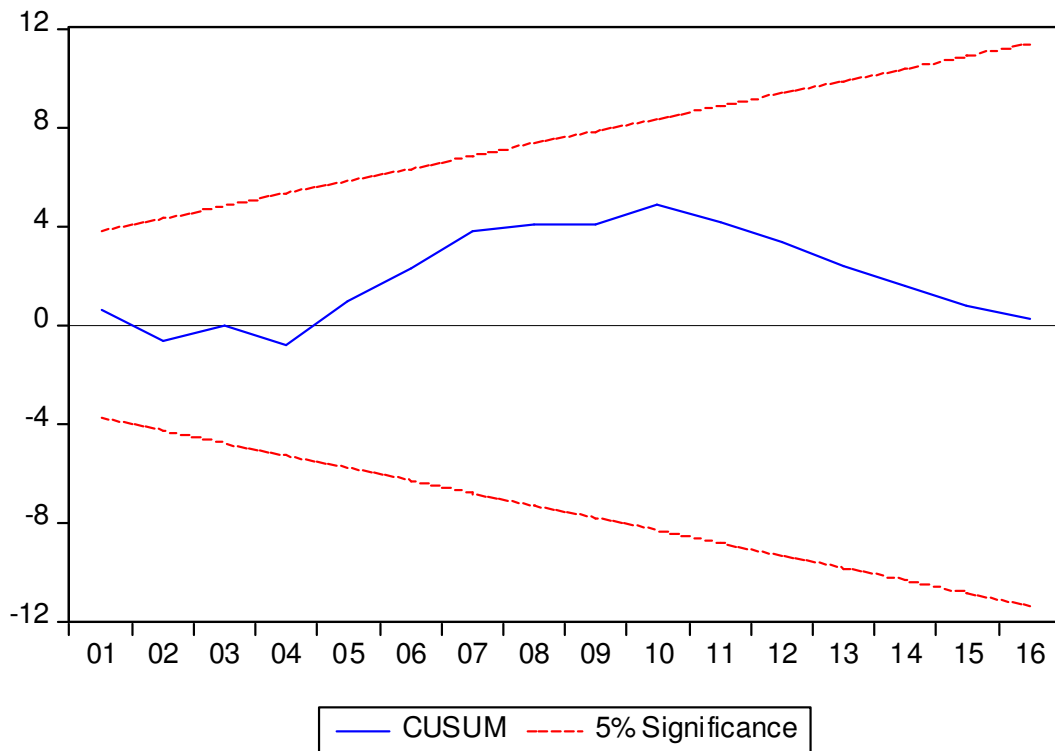
F-statistic	0.614099	Prob. F(2,14)	0.5551
Obs*R-squared	2.742197	Prob. Chi-Square(2)	0.2538

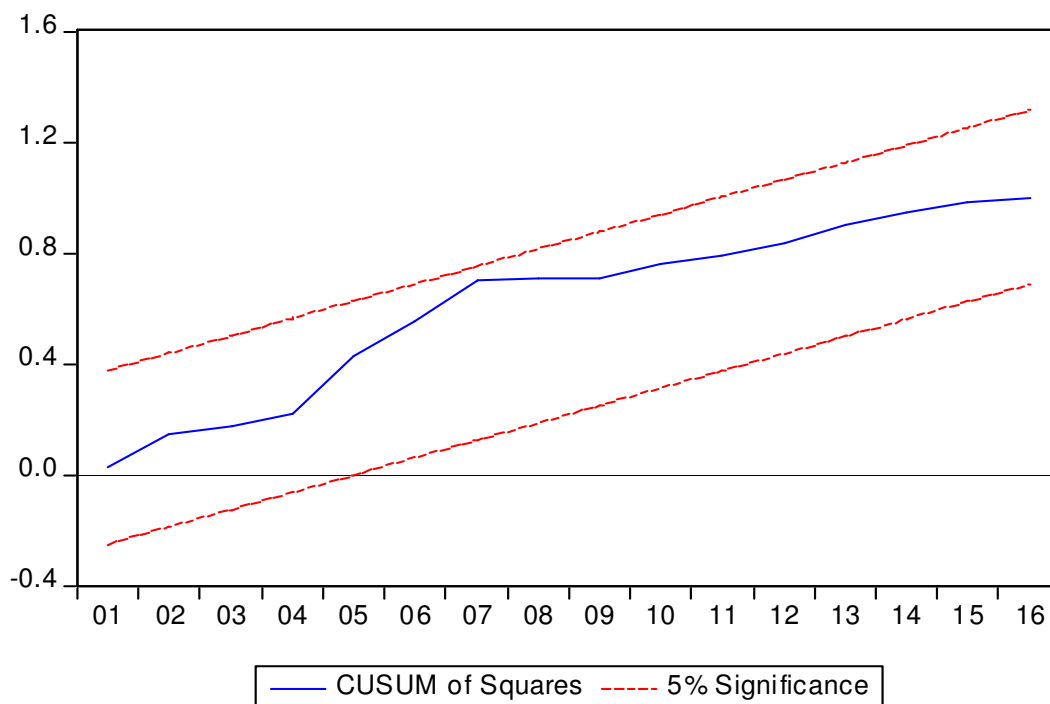
Heteroskedasticity Test: Breusch-Pagan-Godfrey
 Null hypothesis: Homoskedasticity

F-statistic	1.417499	Prob. F(17,16)	0.2452
Obs*R-squared	20.43307	Prob. Chi-Square(17)	0.2527
Scaled explained SS	5.292279	Prob. Chi-Square(17)	0.9968

Heteroskedasticity Test: ARCH

F-statistic	0.000774	Prob. F(1,31)	0.9780
Obs*R-squared	0.000824	Prob. Chi-Square(1)	0.9771





REFERENCES

- Agboola, A.A. and Eniola, H.T. (1991). Technology generation for small scale farmers in Nigeria in Olukosi Ogbungbile and Kalu. Proceeding of Nigerian National Farming Systems Research Network held in Calabar, Cross River State, Nigeria. pp.1-8
- Akpaeti, A.J. and Umoh, G.S., Does conflict affect agricultural productivity? Evidence from agrarian communities in Akwa Ibom State, Nigeria, Res., 2012, vol. 4, no. 12, pp. 77–83.
- Alemika, E. O. (1992). Sociological Analysis of Ethnic and Religious Conflicts in the middle Belt of Nigeria in Ethno Religious conflicts and Democracy in Nigeria; Challenges, Kaduna: Human Rights Monitor Press.
- Arias, M. A., Ana M. I., and Z. Andres (2014) "Agricultural Production Amid Conflict: The Effects of Shocks, Uncertainty and Governance of Non-State Armed Actors" Serie Documentos CEDE No. 2014-08
- Bolarinwa, K.K.; Oluwakemi, E.F. and I. A. Foloruso (2012). Conflict resolution strategies among farmers in Taraba State, Nigeria. pp.1-8
- Charemza, W.W. And D.F. Deadman (1992), New Directions In Econometric Practice, Edward Elgar, England
- Chikaire, J.U., Orusha, J.O., Irebuisi, D.C., Amanze, P.C. and N. C. Asonye (2016). Effects of Communal Conflicts on Marketing and Distribution of Agricultural Produce in Imo State, Nigeria. *Journal of Agricultural Economics, Extension and Rural Development*, 4(6): 456-462
- Dickey, D.A. and W.A. Fuller (1981). "Likelihood ratio statistics for autoregressive time series with a unit root," *Econometrica* 49, 1057-1072.
- Ezema, O. O. (2013) The Socio-Economic Implications Of The Boko Haram Insurgence In Nigeria: 2009- 2013. Unpublished BSc. Thesis, Caritas University, Enugu.
- Idemudia, U., and U.E. Ite. (2006) "Demystifying the Niger Delta conflict: towards an integrated explanation." *Review of African Political Economy* 33 (109): 391-406.
- Lautze, S. and A. Raven-Roberts (2007). "Violence and Complex Humanitarian Emergencies: Implications for Livelihoods Models", *Disasters*, 30: 383-401
- Marshall, M. G., Jagers, K. and T. R. Gurr. (2011). Polity IV Project of the Center for Global Policy School of Public Policy George Mason University and Center for Systemic Peace. <http://www.systemicpeace.org/inscrdata.html>
- Mbanga, M. and B.T. Coyle (2003). "Beef Supply Response under Uncertainty: An Autoregressive Distributed Lag Model". *Journal of Agricultural and Resource Economics* 28(3): 519 – 539

- Nelson, C., and C. Plosser (1982). Trends and Random Walks In Macroeconomic Time Series: Some Evidence and Implications. *Journal of Monetary Economics* 10 (1982) 139-162. North-Holland Publishing Company
- Oji, R. O. (2014). Communal Conflicts in Nigeria: An Examination of Ezillo and Ezza-ezillo Conflict of Ebonyi State, (1982-2012). *Kuwait Chapter of Arabian Journal of Business and Management Review Vol. 4, No.1*;
- Verpoorten, M. (2009): "Household Coping in War- and Peacetime: Cattle Sales in Rwanda, 1991-2001." *Journal of Development Economics*, 88(1): 67-86.
- World Bank, 2008. "The World Development Report 2008: Agriculture for Development" World Bank. Washington, DC.