Effect of Insecurity on Agriculture Sector Performance in Nigeria

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Abstract

This study investigated the effect of insecurity on agriculture sector performance from 1990 to 2021. Analytical data for the study were obtained from Central Bank of Nigeria (CBN), World Banks World Development Indicators, (WDI) and National Bureau of Statistics (NBS) 2022. Augmented Dickey Fuller unit root method was used to determine if the variables were stationary. Consequently, some variables were stationary at order zero [I(0)] and others became stationary at order one [I(1)]. In light of this circumstance, the Auto-Regressive Distributive Lag (ARDL) Model was used in the research. Result from the ARDL bound test indicated that there is a long-run relationship between insecurity and agriculture sector performance on the evidence of the F-Statistic. Empirical result from the ARDL analysis found that kidnaping rate and armed forces personnel expenditure had a positive and significant effect on agriculture sector contribution to gross domestic product in the long-run. However, armed robbery rate and military expenditure had a detrimental effect on agriculture sector contribution to gross domestic product in the short-run. Hence, it was concluded that insecurity had a significant effect on agriculture sector performance in Nigeria. It was recommended amongst others that federal government through the ministry of defense should initiate new device on how to tackle kidnappers and eliminate the menace completely. This will help restore farmers and investors' confidence.

Keywords: *Kidnaping Rate, Arm Robbery Rate, Military Expenditure, Armed Forces Personnel Expenditure*

1. Introduction

In Nigeria, agriculture serves as a cornerstone of the economy, employing a significant portion of the population and contributing substantially to the nation's Gross Domestic Product (GDP). Therefore, the agriculture sector refers to the segment of the economy that encompasses activities related to the cultivation of crops, raising of livestock, harvesting of fisheries, forestry, and other related activities aimed at producing food, feed, fiber, and other raw materials for human consumption, industrial use, or export. This sector includes both primary production activities such as farming and fishing, as well as downstream activities such as processing, distribution, and marketing of agricultural products. According to Amadi-Robert and ThankGod (2023) agriculture sector refers to sector of the economy which includes; crop and animal production as well as agricultural engineering, production of agricultural machinery, fertilizers, and other kinds of products to support farming. The agriculture sectors is a countries major developmental tool that ensures a constant food supply and security for the population, and also guarantees that the workforce feed with energy to supply labour to industries.

Agriculture is a significant source of employment in Nigeria, particularly in rural areas where the majority of the population resides. The sector provides livelihoods for millions of smallholder farmers, farm labours, and agribusiness involved in various activities along the agricultural value chain by creating employment opportunities, agriculture helps alleviate poverty reduce unemployment, and enhance household incomes thereby stimulating economic growth through increased consumption and investment. However, the sector faces a myriad of challenges, chief among them being insecurity. Over the past decade, Nigeria has grappled with various forms of insecurity, including insurgency, banditry, farmer-header conflicts and communal violence, which have had profound implications for agricultural activities across the country. Accordingly, this paper conceptualized insecurity as a feeling of uncertainty, inadequacy, or vulnerability about oneself or a situation, often stemming from a lack of confidence, fear or rejection, or comparison with others.

ThankGod and Nwikina (2024) noted that insecurity encompasses a range of threats to individuals, communities and nations. These include but not limited to crime, conflict, economic instability, and vulnerabilities to external pressures. According to Okonkwo *et al.* (2015), the term "insecurity" describes a condition of vulnerability that may result in threats to one's life, property, and means of subsistence. A condition of anxiety that arises from the absence of protection from an assault or threat, or from a lack of freedom from danger, is thus referred to as insecure**.** It is important to note that insecurity is a menace to growth of the economy. Therefore, understanding and addressing it, is paramount as it not only impacts the safety and livelihoods of individuals but also influences economic development, social cohesion, and the overall stability of regions and nations. Insecurity in Nigeria, has manifested in several ways that directly impacted the agriculture sector.

Farmers have faced threats to their lives and property, resulting in displacement, loss of livelihoods, and a decline in agricultural productivity. Furthermore, the disruption of supply chains due to insecurity has led to reduced access to markets, increased post-harvest losses, and constrained agricultural trade both domestically and internationally. These challenges not only

jeopardize food security but also hinder the sector's potential to contribute significantly to economic growth and poverty alleviation in Nigeria. Consequently, available statistical data in the past six years based on the scope of the study showed worrying information. For instance the rate of kidnapping stood at 532 in 2016 but rose to 1014 in 2017. Also, the rate of kidnapping further increased to 1421 and 3870 between 2018 and 2019. Sadly, despite government increment in budgetary allocation of military expenditure kidnaping rate continue to upsurge owing to stagnation of salaries and wages of armed forces personnel expenditures which stood at 0.3% for the past nineteen years (2004-2021). This might also be the situation to other law enforcement agencies.

It is on this premise, this paper seek to answer the following question. How has kidnapping rate affected agriculture sector performance, to what extent has armed robbery rate hampered agriculture sector performance? The extent to which internal defense expenditure promoted agriculture performance, and how has armed forces personnel expenditure enhance agriculture sector performance. To this end, this paper empirically examined the effect of insecurity on agriculture sector performance in Nigeria.

2. Literature Review

Conceptual Literature

Agriculture Sector Performance

Agriculture sector performance refers to the effectiveness and efficiency of activities related to the production, distribution, and utilization of agricultural goods and services within an economy. It encompasses factors such as crop yield, livestock production, farm income, technological advancements, market competiveness, sustainability practice, and overall contribution to economic growth and food security. It is important to note that the agriculture sector and it performance plays a pivotal role in driving economic growth due to its multifaceted contributions to across different stages of development. Initially, in agrarian economies, agricultural activities serves as a primary source of livelihood for a significant portion of the population, contributing to poverty reduction and income generation. As the sector evolves, improvements, in agricultural productivity, driven by technological advancements, infrastructure development, and institutional reforms, lead to increased output and efficiency gain. The dynamic impact of agriculture sector performance to a nation particularly economic growth becomes evident through several channels. Firstly, agricultural productivity growth stimulates rural development by generating surplus income, which when reinvested locally, stimulates demand for non-agricultural goods and services, thereby fostering rural industrialization and economic diversification. Conclusively, the dynamic impact of agriculture sector performance on an economy is evident through its role in poverty reduction, rural development, industrialization, trade expansion and environmental sustainability.

Insecurity

Insecurity refers to a state characterized by uncertainty, vulnerability, and a lack of stability or safety, often stemming from divers factors such as political instability, economic volatility, social unrest, or environmental hazards. According to ThankGod and Nwikina (2024), insecurity encompasses a range of threats to individuals, communities and nations. These include but not

limited to crime, conflict, economic instability, and vulnerabilities to external pressures. According to Okonkwo *et al.* (2015), the term "insecurity" describes a condition of vulnerability that may result in threats to one's life, property, and means of subsistence. A condition of anxiety that arises from the absence of protection from an assault or threat, or from a lack of freedom from danger, is thus referred to as insecure**.** In the context of agriculture sector, insecurity manifest in various forms, ranging from political instability and conflict to climate change-induced uncertainties. These factors create a volatile environment that directly influences agricultural production, distribution, and market dynamics. For instance, in regions affected by conflict, farmers may face challenges accessing their land, agricultural inputs and markets, leading to decreased productivity and food insecurities. Conclusively, the dynamic nature of insecurity further complicates its impact on agriculture sector performance. Fluctuation in insecurity condition can disrupt supply flows, and undermine confidence amongst farmers and investors leading to decrease in agricultural productivity and market volatility.

It is important to note that insecurity is a menace to growth of the economy. Therefore, understanding and addressing it, is paramount as it not only impacts the safety and livelihoods of individuals but also influences economic development, social cohesion, and the overall stability of regions and nations. Insecurity in Nigeria, has manifested in several ways that directly impacted the agriculture sector.

Theoretical Literature

Frustration-Aggression-Displacement Theory

Frustration-Aggression-Displacement Theory was used to guide the study. In 1939, John Dolland, Neal Miller, Leonard Doob, Orval Mowrer, and Robert Sears proposed this notion. Aggression, according to the theory, is the outcome of a person's encountering obstacles, interference, or frustration in achieving their aims. The hypotheses were applied to scapegoating and hate crimes, indicating that as sources of frustration accumulate during economic crises, frustrated groups will be forced to unleash their aggression on a minority group (scapegoat), which may lead to criminal acts such as kidnapping, robbery, and killing, among other things. According to the hypothesis, dissatisfaction leads to violence, but when the origins of frustration aren't addressed, the aggression is directed against an innocent target (scapegoat). The expanding unemployment rate in the economy had been a key issue when this theory was applied to the study. As a result, some residents are compelled to transfer animosity on innocent people by engaging in illegal acts such as banditry, kidnapping, and terrorism. This situation majorly affects farmer leading to low output

Cobb-Douglas Production Theory

The Cobb-Douglas production theory was propounded by Cobb-Douglas (1928). The theory states that production function is normally applied to denote the association of outputs to inputs overtime. Cobb-Douglas acknowledged an abridged economic view whereby productive activities are based on the quantity of labour and capital used. The equation they adopted to represent production was in this form: Y = P(L,K) = Where; P = Aggregate outputs (representing the financial value of all final good and services created in a year)

L = Labour input (the aggregate number of man hour per year) K = Capital input (the financial value of all machinery, equipment as well as buildings) A = Aggregate factor output and β are the production elasticity of labour as well as capital. These values are static which are based on the existing know-how. Given the stated production function, the marginal productivities of factors will be given as: MPPk =∂y/∂k =AaK a-1Lβ and MPPL = ∂y/∂L = AβK aLβ-1
Therefore, the productivity of the factor inputs is what can propel output growth. However, it is important to note that output (productivity) is largely dependent on not only capital (K) but cost of capital (interest rate) and labour (L). Therefore, interest rate is a major determinant of the level of capital and agriculture sector productivity.

Empirical Literature

Thankgod and Nwikina (2024) examined bank operation, insecurity and agriculture sector productivity in Nigeria for a period of 37 years (1985 to 2022). The study found that Lending rate is negative but substantial link with agriculture sector contribution to gross domestic product in the prior and second year period. On the other hand, kidnaping rate likewise indicated a negative but significant relationship with AGDP in the long-run, deposit rate have a positive but negligible association with AGDP in the near term. Last but not least, the analysis of the link between armed robbery rate and AGDP indicated that it is both negative and negligible in the long run, as well as in the second year period of the short run.

Otuisi et al. (2023) examined the effect of kidnapping and theft on the output of arable crops among households. A multistage random sampling technique was applied in sample selection. Data were collected through the aid of questionnaire and analysed using descriptive statistics, regression models and Likert scale. The findings of this study were summarized to include majority of the respondents were males while most of the respondents were between the age range of 21 to 31 years having household sizes of 5 persons. It was showed that the effect of kidnapping had a negative impact on productivity at 1% level and negatively related to production output. This implies that the higher the incidences of kidnapping the lower the production output. The coefficient of theft was statistically significant at 1% level and negatively related to the production output. This indicates that the higher the incidence of theft the lower the production output. It is recommended that government should make security of the people a priority, also religious and ethnic leaders should continuously educate and enlighten their ethnic groups against kidnapping and theft which have negative effects on production output.

Bashir and Mustapha (2022) assess the impact of armed banditry and kidnapping on the nutrition status of the under-five children in Katsina State, Nigeria. Cluster sampling was used to select the study area, where six among the worst affected local governments drawn from two senatorial districts in Katsina State were selected. Respondents have cut across wards, villages and towns from each local government. Finding reveals that armed banditry and kidnapping has contributed to malnutrition of the under-five children, as most children were observed to be underweight and lack adequate nourished food, consequent upon to the negative impact of armed banditry and kidnapping on food security in the study areas. The study further reveals dearth of adequate health care centres and low staffing in the rural areas, low income, unsafe drinking water, illness (such

as malaria, anaemia, diarrheal), low quality of food and poor eating habits among the factors that cause the death of under-five children in the state.

Ilesanmi and Odefadehan (2022) examined the impact of insecurity on agricultural food loss in Nigeria using the time series data from 2011 –2020. The relationship examined was between the dependent variable: Agricultural gross domestic product (AGDP) which serves as a representative of agricultural food production. The explanatory (independent) variables are poverty rate, unemployment rate, crime rate, and federal government expenditures on internal security in Nigeria. The result revealed that CIR and UNEMP were negatively related to Agricultural productivity (AGDP) i.e. contribution to food loss whose coefficients indicate (-0.27) and (-0.67) respectively. It is therefore recommended that Government and policymakers should make an unrelenting effort to improve the agriculture sector with the aid of modern mechanized equipment in order to reduce the level of unemployment, poverty, and crime rate in Nigeria and solve issues of insecurity in the country.

Odunsi-Oyewole (2022) examined impact of insurgency on Nigeria's agricultural industry. The researchers used an ex-post facto research design and a purposive sampling technique. Secondary data was gathered from the CBN Statistical Bulletin and the website of the Council on Foreign Relations. The data is in the form of a time series that spans seven years on a monthly basis from 2014 to 2020, with a total of 84 observations. The estimating technique employed was Toda and Yamamoto VAR. The study discovered that insurgency and the agriculture sector have a causal link, and that insurgency may be utilized to forecast the future trend or behavior of agricultural output in the economy. As a result, the study stated that reducing the rate of insurgency by providing funds and implementing effective and efficient initiatives to reinvigorate the economy in order to give job opportunities might benefit the agriculture sector.

Adewusi and Jibril (2022). (2022) examine the impact Bokoharam insurgency on agriculture in Adamawa State. Data for the study are primary were sourced through the administration of 400 structured questionnaires designed in five Likert scale format out of which 320 were return for analysis. Structural Equation Model (SEM) was employed in identifying the Bokoharam insurgency on Agriculture (Livestock farming, poultry farming, fish farming, crop farming) in Adamawa state. The reliability results, normality results and the goodness of fit results revealed that the model is found to be reliable; the data was normally distributed as indicated by confirmatory factor analysis and normality test. The coefficient of Livestock farming, poultry farming, crop farming are significantly and negatively related to Bokoharam insurgency. On the other hand there is significant and positive relationship between Bokoharam insurgency in Adamawa State and fish farming. The study concluded that Bokoharam insurgency has significantly affected the agricultural activities in Adamawa state because sub- sectors of agriculture (fish farming, livestock farming, poultry farming and crop farming) have significantly affected in Adamawa state.

Enimu *et al.* (2019) examined the impact of insurgence on agricultural growth and transformation in Nigeria using secondary time series data from 1960-2017. The results from the econometric analysis showed that Gross Domestic Product (GDP) is affected directly by food production level

and government agricultural expenditure, while insurgency such as Boko-Haram, Niger-Delta, Herders/Farmers and ethno-religious crisis affects GDP negatively. In the food production equation, insurgence of Boko-Haram, Herders/Farmers and Ethno religious crisis negatively impact food production level by -12.11, - 4.90 and 2.37% respectively, while in the government agricultural expenditure equation; GDP, food production level, positively affects government expenditure on agriculture by 0.25 and 0.039% respectively, Boko-Haram, Niger- Delta, Herders/Farmers and Ethno-religious crisis negatively affects government agriculture expenditure by -0.35, -0.78, -6.20 and -3.51% respectively.

Ojo et al. (2018) analysed the effect of Insurgency on food crop Farmers' productivity in Borno and Gombe States, Nigeria. The results revealed that the in Borno State, the mean pesticides, fertilizer, seed and farm size required were 3.37 litres, 88.58kg, 3.30kg and 2.83ha, while the quantity used were 0.58 litres, 11.51kg, 0.06kg, and 1.35ha respectively and the differences were statistically significant ($p<0.05$).Also in Gombe State, the mean pesticides, fertilizer, seed and farm size required were 3.5litres, 178.6kg, 6.6 and 5.3ha, while the quantity used were 1.3 litres, 39.3kg, 1.7kg, and 2.4ha respectively and the differences were statistically significant ($p<0.05$).The study also revealed a significant difference between the output produced in Borno and Gombe States with a mean value of 706.85kg/ha and 2846.19kg/ha respectively. The result of the regression analysis showed that farm size ($p<0.10$), fertilizer ($P<0.01$), farming experience ($P<0.05$), level of education ($p<0.10$) and age of the farmer ($P<0.01$) increased to productivity. While insurgency ($P<0.01$) was inversely related to productivity in the study area.
Yusuf *et al.* (2018) examine the effects of insurgency on agricultural output in Biu local Government Area of Borno State, Nigeria.". The objective of the study is; to assess the effects of insurgency on agricultural output in Biu local Government Area of Borno state. The Frustration-Aggression Theory was used as theoretical base. Primary data were used; questionnaire was distributed and collected from a sample of 400 persons in the study area. Yes or No options was used, mean value, multinomial logistic regression technique, bars, charts and tables was used in the analysis . This study reveals a weak negative correlation between Agricultural output (AGO) and Numbers of livestock's (NLST), Numbers of Grain per bags. (NOBG) and Numbers hectors of land. (HTL) before insurgency. The study reveals that there is a strong positive correlation between AGO and NLST, NOBG and HTL during insurgency.

Adebisi et al (2017) investigated the effect of Boko Haram's insurgency on the agriculture sector of the Nigerian business environment. A time series analysis research method was adopted, while descriptive statistics and t-test were used to analyse the secondary data before and during the insurgency. The result of the findings showed that agricultural valued added to the GDP was high before Boko Haram disruption and has reduced during the period of insurgency.

Gaps in Literature and Value Addition

Consequently, this research paper evaluated numerous related past studies on insecurity in relation to agriculture sector performance. However, these studies reported varying and contradicting findings Otuisi *et al.* (2023); Ilesanmi and Odefadehan (2022); Odunsi-Oyewole (2022); Enimu *et al*. (2019); Ojo *et al.* (2018); and Adebisi *et al.* (2017) establish that insecurity such kidnaping,

armed robbery, Bokoharam negatively affect agriculture sector productivity. In contrasts Yusuf *et al.* (2018) in their study submit that there is a strong positive correlation between agricultural output and number of grain per bags and number of hectors of land during insurgency. In a related study ThankGod and Nwikina (2024) reported some components of insecurity such as kidnapping rate had a negative significant effect on agriculture sector productivity but armed robbery rate do not have any effect on agriculture sector productivity.

Additionally, it was discovered that prior studies proxy insecurity with Bokoharam insurgency, kidnapping rate, and armed robbery rate but failed to consider the effect of military expenditure and armed forces personnel expenditure on agriculture sector performance. This suggest a gap in literature. Therefore, this paper would empirically investigate the effects of kidnapping rate, armed robbery rate, military expenditure and armed forces personnel expenditure on agriculture sector performance in Nigeria.

3. Methodology

This study utilized secondary data obtained from World Banks World Development Indicators, and Central Bank of Nigeria Statistical Bulletin, for the period, 1990 to 2021. Kidnapping Rate, (KNR), Armed Robbery Rate (ARR), Military Expenditure (MXE), and Armed Forces Personnel Expenditure (AFPX), were used to proxy "insecurity" while, agriculture sector contribution to gross domestic product (AGDP), was adopted to capture "agriculture sector productivity. The formulated model was subjected to unit root test using Augmented Dickey Fuller (ADF) approach. Based on the outcome of the ADF, the study employed both the Auto-regressive Distributive Lag (ARDL).

Model Specification

This study was based on the modification of ThankGod and Nwikina (2024), who investigated "bank operations, insecurity and agriculture sector productivity in Nigeria". Their model is specified as follows:

$$AGDP = f(LR, DR, KPR, ARR) \quad (1)$$

Where: AGDP represents Agriculture Sector Contributions to GDP, LR = Lending Rate, DR = Deposit Rate, KPR = Kidnaping Rate, ARR = Armed Robbery Rate.

The model was modified by introducing Military Expenditure (MXE), and Armed Forces Personnel Expenditure (AFPE), as new variables. The model is specified as follows:

$$AGDP = f(KNR, ARR, MXE, AFPX) \quad (2)$$

The mathematical model could be symbolically expressed as;

$$AGDP = \beta_0 + \beta_1 KNR + \beta_2 ARR + \beta_3 MXE + \beta_4 AFPX \quad (3)$$

Equation (3.2) above is transformed into an econometric model by incorporating the disturbance term (ε) as follows:

$$AGDP = \beta_0 + \beta_1 KNR + \beta_2 ARR + \beta_3 MXE + \beta_4 AFPX + e \quad (4)$$

Logarithmic transformation are also a convenient means of transforming a highly skewed variable into one that is more approximately normal (Kenneth 2011)

The modified version of the model adopted for this study now take the form of

$$LAGDP = \beta_0 + \beta_1 LKNR + \beta_2 LARR + \beta_3 LMXE + \beta_4 LAFPX + e \quad 5$$

Where:

AGDP = Agriculture Sector Contribution to GDP, KNR = Kidnapping Rate, ARR = Armed Robbery Rate, MXE = Military Expenditure, AFPX = Armed Forces Personnel Expenditure, f = functional relationship β_0 = Intercept of relationship in the model/constant B_1-B_4 = Coefficients of each independent or explanatory variable e= Stochastic or Error term.

Description of Variables in the Model

Agriculture Sector contribution to GDP (AGDP): This represents the value added by all agricultural activities within a country's economy. By implication, it reflects the economic output generated by farming, forestry, fishing and related activities. Agriculture sector contribution to gross domestic product is used to proxy the dependent variable "Agriculture Sector Productivity" and it's measured in billions of naira annually.

Kidnaping Rate (KPR)**:** This refers to the frequency or incidence of kidnapping within a specific population or geographical area over a given period. Kidnapping rate is used in this paper to proxy the independent variable "insecurity". It is assumed in this study that increase in kidnapping will create an atmosphere of insecurity, deterring, both domestic and foreign investors. Therefore an inverse relationship is expected between kidnapping and agriculture sector productivity.

Armed Robbery Rate (ARR): This denotes the frequency or incidence of armed robbery within a specific population or geographical area over a given period. It is a statistical measure that quantifies the number of armed robbery incidents relative to a standard unit, and measured as a rate per 100,000. Armed robbery rate is used in this paper to proxy the independent variable "insecurity". It is assumed in this study that increase in armed robbery rate create an atmosphere of insecurity, deterring, both domestic and foreign investors. Therefore an inverse relationship is expected between kidnapping and agriculture sector productivity.

Military Expenditure (MXE): This refers to the financial resources allocated by government by government to fund its defense activities including weapons procurement, maintenance and infrastructure to protect its interest domestically and internationally. This means that increase in military expenditure will domestically ensure security of lives and properties of farmer's which will lead to improvement in output. Therefore, a negative relationship is expected between military expenditure and agriculture sector productivity. Military expenditure is measured in USD.

Armed Forces Personnel Expenditure (AFPX): this refers to financial resources devoted to the salaries, benefits, training and other expenses associated with maintaining military personnel's. By implication, increase in financial allocation to armed forces personnel expenditure will enhance the capacity of the personnel and improve the security situation of the country particularly the

agriculture sector. This means that a negative relationship is expected between armed forces personnel expenditure. Also, armed forces personnel expenditure is measured in % of total labour force.

4. Empirical Data Analysis

Unit Root Test

The study employed the Augmented Dickey Fuller (ADF) unit root test to identify the order of integration of the variables. The result of the unit root test is given in Table 1.

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

Variables	Levels		First Difference		Order of Integration	P-value
	T. Statistics	5% Critical Value	T. Statistics	5% Critical Value		
LAGDP	-3.473808	-2.960411			I(0)	0.0157
LKNR	-0.539990	-2.960411	-5.638932	-2.963972	I(1)	0.0001
LARR	-1.282724	-2.960411	-4.191404	-2.963972	I(1)	0.0027
LMXE	-1.812201	-2.960411	-7.654038	-2.963972	I(1)	0.0000
LAFPX	-1.680785	-1.952066	-2.740311	1.953858	I(1)	0.0081

Source: Extracts from E-view 10. * Level of significance at 5%

The variables included in the study were put through Augmented Dickey Fuller (ADF) unit root tests to assess if they are stationary series or non-stationary series, from the results in Table 1, LKNR, LARR, LMXE, and LAFPX were stationary at first difference I(1), whereas LAGDP was stationary at level I(0). This suggests that the variables exhibited mixed order of integration or stationarity. Consequently, this justified the use of the Autoregressive Distributive Lag (ARDL) method, which can handle the analysis variables stationary at level I(0) and first difference I(1).

Co-integration Test

Co-integration test was next determined after proving the stationarity and order of integration status of each variable. The result of the ARDL bound test for cointegration is presented in Table 2.

Table 2: ARDL Bound Test

Test Statistics	Value	K
F-statistics	5.588915	4
Significance	**I (0)**	**1(1)**
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Authors computation from E-view 10 Output

As indicated in Table 2, value of the F-statistic of 5.588915 at a significance level of 0.05, is greater than both the lower and upper limits of the critical values, which are 2.86 and 4.01, respectively. It follows that there is a degree of co-integration between insecurity and agriculture sector

productivity in Nigeria; implying that there is a long run relationship between the former and the later.

Model Estimation

The result from the estimation of the model is presented in Table 3.

Table 3: ARDL Long-run Result (Dependent Variable = LAGDP)

Variable	Coefficient	Std. Error	t-statistics	Prob
LKNR	0.687533	0.301482	2.280573	0.0435
LARR	1.580062	0.620933	2.544659	0.0273
LMXE	0.042745	0.045585	0.937706	0.3685
LAFPX	1.902840	0.860205	2.212077	0.0490
EC = LAGDP - (0.6875*LKNR + 1.5801*LARR + 0.0427*LMXE + 1.9028*LAFPX)				

Source: Authors computation from E-view 10 Output

The long-run result in Table 3 suggests a positive (0.687533) relationship between the log value of kidnaping rate (LKNR) and the log value of agriculture sector contribution to gross domestic product (LAGDP) as a proxy for agriculture sector productivity. This means that at 5 percent level of significance, increase in KNR is associated with an increase in annual LAGDP of 0.68 percent yearly. Furthermore, the p-value of 0.0435 indicates that there is a statistical significant relationship between LKNR and LAGDP. The log value of armed robbery rate (LARR) has a positive (1.580062) relationship with the log value of agriculture sector contribution to gross domestic product (LAGDP) as a proxy for agriculture sector productivity. The result denotes that a unit rise in LARR is related to an increase in annual LAGDP of 1.6 units per year. The p-value of 0.0273 shows that there is a statistical significant relationship between LARR and LAGDP.

The log value of military expenditure (LMXE) has a positive (0.042745) relationship with the log value of agriculture sector contribution to gross domestic product (LAGDP). This implies that a unit increase in the log value of military expenditure (LMXE) will result to about 0.04 percent in annual LAGDP per yearly. Conversely, the p-value of 0.3685 suggests that there is no statistical significant relationship between LMXE and LAGDP. Finally, the log value of armed forces personnel expenditure (LAFPX) has a positive (1.902840) relationship with the log value of agriculture sector contribution to gross domestic product (LAGDP) as a proxy for agriculture sector productivity. This implies that a unit increase in the log value of armed forces personnel expenditure (LAFPX) will result to about 1.9 units in annual LAFPX per yearly. In addition, the p-value of 0.0490 indicates that there is a significant relationship between LAFPX and LAGDP.

Table 4: ARDL Short-run Result (Dependent Variable = LAGDP)

Variables	Coefficient	Std. Error	t-Statistics	Prob
C	1.862676	0.414291	4.496054	0.0099
D(LKNR)	0.110420	0.060715	1.818646	0.0963
D(LKNR(-1)	-0.007701	0.055431	-0.138930	0.8920
D(LKNR(-2)	-0.035425	0.054774	-0.646742	0.5311

D(LARR)	0.458496	0.145320	3.155084	0.0092
D(LARR(-1)	0.020822	0.145429	0.143176	0.8887
D(LARR(-2)	-0.394971	0.143701	-2.748555	0.0189
D(LMXE)	-0.004535	0.004587	-0.988724	0.3440
D(LMXE(-1)	-0.016825	0.005435	-3.095699	0.0066
D(LMXE(-2)	-0.002906	0.004996	-0.581720	0.5725
D(LAFPX)	0.058295	0.223637	0.260669	0.7992
D(LAFPX(-1)	-0.396356	0.226135	-1.752739	0.1074
D(LAFPX(-2)	-0.305625	0.125519	-2.434888	0.0291
ECM(-1)	-0.285119	0.057638	-4.946703	0.0004
Adj R^2 =0.543187, F-statistics = 3.561096, Prob(F-statistic) = 0.010663, DW =2.152932				

Source: Authors computation from E-view 10 Output

From the result of the Auto-regressive Distributive Lag (ARDL) model in Table 4 above, it is obvious that the coefficient of the error correction term is significant and negative. In other words, the negative sign justifies its significance. The coefficient of the ECM of -0.285119 indicates that the speed of adjustment to long run equilibrium is 29%. This means that the present value of LAGDP adjust quickly to changes in LKNR, LARR, LMXE, and LAFPX.

From the results of the ARDL short-run, it is obvious that the constant parameter (βo) is positive at +1.862676. This means that if all the independent variables are held constant, LAGDP as will increase by 1.8 units in annual-wide basis. For the log value of kidnaping rate (LKNR), the coefficient is -0.007701 and -0.035425. This means that LKNR is negatively related to LAGDP in the previous and second year period. This result conforms to the apriori expectations. The negative result shows that a unit increase in kidnaping rate will consequently lead to decline in LAGDP by 0.008 percent and 0.04 percent. Moreover, the log value of armed robbery rate (LARR) is negative (-0.394971) in the second year period. This means that a negative relationship exist between LARR and LAGDP.

Also, the log value of military expenditure (LMXE) is negative (-0.394971) in the previous and year period. This means that a negative relationship exist between LMXE and LAGDP. Finally, the log value of armed forces personnel expenditure (LAFPX) is negative -0.305625 in the second year period. This infers that a negative relationship exist between LAFPX and LAGDP.
Further findings in respect to the coefficient of adjusted R-Square (R^2) confirmed the level of the relationship by recording 54% variation in dependent variable which implies that there is true relationship between the variables. The result of the Prob(F-statistic) of 0.010663 indicates that the whole model is highly significant. The Durbin Watson of 2.152932 shows that the model is free from the problem of auto correction. The whole results points to the fact that, insecurity had a significant effect on agriculture sector performance in Nigeria within the period under consideration.

Diagnostic Tests

Diagnostic tests were carried out to confirm the reliability of the estimated ARDL model. The test includes Ramsey Reset test, serial correlation LM test, heteroskedasticity test, normality test, and CUSUM test. They are presented in table 5, Figure 1 and Figure 2 respectively.

Table 5: Ramsey Reset Test, Serial Correlation LM Test and Homoscedasticity Test Results

	F-Statistic	Prob.Value
Ramsey Reset Test	0.356367	0.5638
Breusch-Godfrey Serial Correlation LM Test	1.510335	0.2714
Breusch-Pagan-Godfrey Heteroskedasticity Test	1.666874	0.1958

Source: *Author's Computation using E-view 10*

According to Table 5, above, the results of the diagnostic test reveal that the Ramsey reset test's linearity test revealed that the f-statistic (0.356367) with a computed p-value of 0.5638, which is greater than the 5 percent (0.05) critical value, indicates that the model is correctly specified. The study therefore rejected the null hypothesis.

Breusch-Godfrey Serial Correlation LM Test results for the serial or autocorrelation test indicate that the f-statistic is 1.510335 and the Chi-Square probability value is 0.2714. As a result, the investigation demonstrates that there is no serial correlation in the model, with a probability value of roughly 27 percent (0.2714) being more than the 5 percent (0.05) threshold value.

The outcome of the Breusch-Pegan-Godfrey test for heteroscedasticity reveals that the F-statistic is 1.666874, and the Chi-Square probability value is 0.1958. Since the probability Chi-square value is more than 5% (P > 0.05), the result shows that there is no indication of heteroskedasticity in the model. Therefore, residuals are homoscedastic because they have constant variance, which is desired in regression.

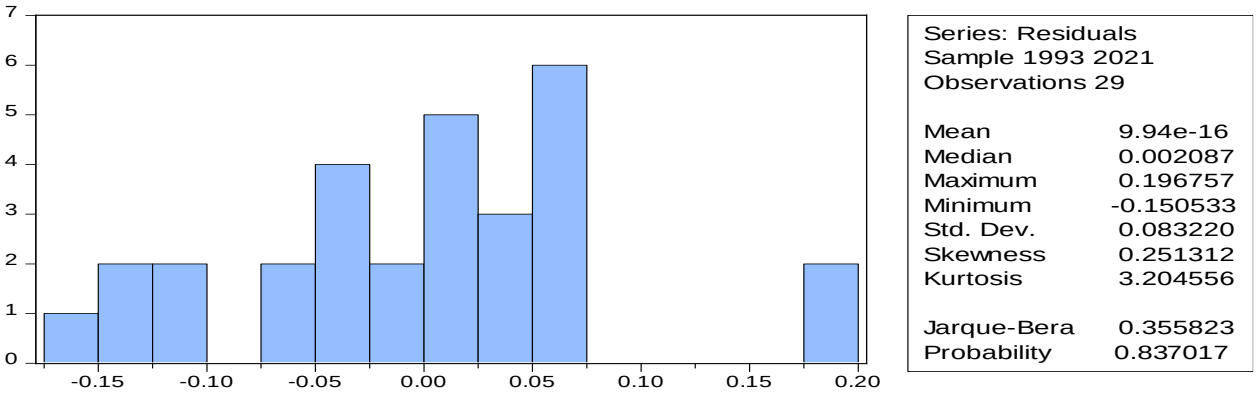

Figure 1: Normality Test

Figure 1, shows summary of the normality test with Jarque-Bara value of 0.355823 and a corresponding probability value of 0.837017 more than 0.05 level of significance, indicating that the residuals were normally distributed.

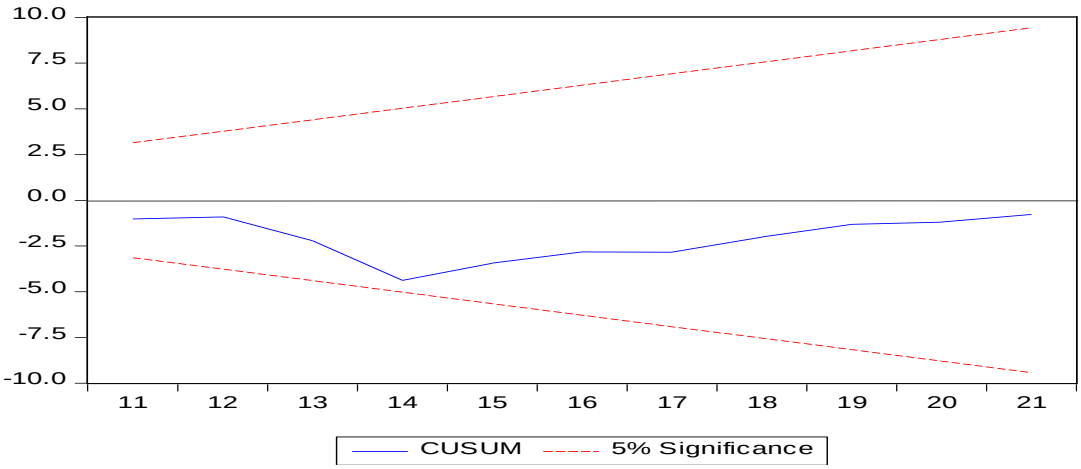

Figure 2: Stability Test

Figure 2, shows the summary of the stability test, the result shows that the model was stable. This is because the Recursive estimate of the CUSUM plot lies within the two critical bounds at 0.05 level of significance, showing that the model is stable as the figures shows the blue lines lying within the two red lines.

5. Conclusion and Recommendations

Conclusion

This paper investigated the effect of insecurity on agriculture sector performance in Nigeria spanning from 1990 to 2021. Kidnapping rate, armed robbery rate, military expenditure and armed forces personnel expenditure were used to capture the explanatory variables while a agriculture sector contribution to gross domestic product was used to proxy the dependent variable. Based on the findings, it is therefore concluded that kidnaping rate and armed forces personnel expenditure had a positive and significant effect on agriculture sector contribution to gross domestic product in the long-run. However, armed robbery rate and military expenditure had a detrimental effect on agriculture sector contribution to gross domestic product in the short-run. Hence, it was concluded that insecurity had a significant effect on agriculture sector performance in Nigeria.

Recommendations

Based on the findings, the study makes the following recommendations, that;

i. Federal government through the ministry of defense should initiate new device on how to tackle kidnappers and eliminate the menace completely. This will help restore farmers and investors' confidence.
ii. As a key obligation, government should equip the Nigerian police force both in terms salary increment, wage awards and purchases of arm equipments and others to police officers. This will enable them fight crime in the country. This scenario will boost farmers' confidence.
iii. Federal government in other to motivate, equip and reduce insecurity in the country should on annual basis increase the budgetary allocation of military expenditure.
iv. Salaries and wages of armed forces personnel's should be periodically reviewed. This will motivate them to be more committed to their duties in terms of fighting crimes particularly insurgency, kidnaping and armed robbery.

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