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Geopolitical Risk and Institutional Quality on Crop Production in Nigeria

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Abstract

This study examines the impact of geopolitical risk and institutional quality on agricultural output in Nigeria using the Autoregressive Distributed Lag (ARDL) framework developed by Pesaran, Shin, and Smith. Empirical results indicate a long-run relationship among geopolitical risk, institutional quality, and agricultural output. Institutional quality exerts a significant positive influence on crop production over the long term, highlighting the importance of stable governance, rule of law, and effective institutions in promoting agricultural productivity. In contrast, geopolitical risk does not have a statistically significant effect on agricultural output, suggesting that domestic institutional strength may buffer the agricultural sector from external shocks. Access to credit also plays a vital role in supporting agricultural growth, reinforcing the need for robust financial systems that enhance farmers' resilience and productivity.
Overall, the findings underscore that strong institutions are fundamental to sustaining agricultural output and ensuring food security, while weak governance, corruption, and political instability hinder progress.

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1. Introduction

Agriculture has always been the mainstay of the Nigerian economy, just like in any other low- and middle-income countries. Agriculture in Nigeria has been a key driver of economic growth and human development, as the sector is important to achieving the Sustainable Development Goal of reducing poverty level in a country (**Sertoglu et al., 2017**). **Adebisi et al. (2017)** stated that within the time before oil boom, agriculture provided employment to over 70% of Nigerians, especially in rural environment and also contributes over 70% to export earnings. Also, the development of the agricultural sector would lead to increase in the growth of national output and its effect on rural incomes and provision of materials and resources for shifting into an industrialized economy (**Awokuse & Xie, 2014**). Hence, agriculture has proven that it is a reliable contributor to economic growth and development.

Geopolitical risk and institutional quality are two powerful forces shaping the fate of global crop production often in ways that are invisible until harvest fail, or oil prices soar

In the intricate web of global agriculture, geopolitical risk and institutional quality act as both disruptors and stabilizers. Geopolitical tensions ranging from armed conflicts and trade wars to sanctions and political instability can abruptly sever supply chains, inflate input costs and restrict access to critical agricultural markets. For instance conflicts in the middle Esast or disruptions in Russian natural gas exporter have been known to spike fertilizer prices, directly impact crop yields and food prices worldwide.

Meanwhile, institutional quality – the strength of government, rule of law, bureaucratic efficiency and democratic accountability play a pivotal role in determining how resilient a country's agricultural sector is to shocks. Nations with stable government, transparent policies and robust frameworks tend to foster environment where farmers can invest confidently, access credit and adopt innovations. In contrast, corruption, ethnic tensions and weak bureaucracies often lead to misallocation of resources, poor infrastructure and chronic food insecurity.

The interplay between these two dimensions is especially critical in regions where agriculture is the backbone of livelihoods. A country may have fertile land and favourable climate, but without institutional support and geopolitical stability, its agricultural potential remains stunted. As global temperature rises and political landscape shifts, understanding and mitigating these risks become essential not for farmers but for the future of food security itself.

Agriculture in Nigeria has been a key driver of the economic growth and human development, as the sector is an important to achieving sustainable development goal of reducing poverty level in a country (**Sertoglu et al., 2017**) and as such, its economic performance has significant implications for the region. However, agriculture, a key tool available to promote economic growth, has been overlooked due to overdependence on oil in the region and other factors including Geopolitical risks. Therefore, a study on how Geopolitical risks and institutional quality have affected agricultural output in Nigeria can provide insights for policy makers in Nigeria and other countries facing similar Geopolitical risks.

Examining how institutional quality affects agricultural productivity in Nigeria is important for a number of reasons, including policymakers, researchers, farmers, and professionals in development. Policymakers and government organizations in charge of creating and carrying out agricultural policies must have a thorough understanding of how institutional quality affects agricultural productivity. Policymakers can create focused actions to raise institutional quality and boost agricultural performance by determining the precise institutional elements that support or impede agricultural productivity (OECD, 2020).

The intersection of geopolitical risk, institutional quality and agricultural output in Nigeria from 1996- 2023 is rich with complexity but also riddled with underexplored territory. Based on the recent literature and analysis here are the key gaps that stand out. Most studies focus on institutional quality (e.g., corruption, regulatory effectiveness) but rarely incorporated standardized geopolitical indices like Caldara and LA Coviello GPR index, there is a gap in quantifying geopolitical shocks (e.g., insurgency, border tension ,farm destruction , global conflicts) and linking them to agricultural production, Nigeria geopolitical and institutional landscape varies dramatically across regions, few studies disaggregate data to explore regional level impact on agricultural production, missing localized insights, many paper established correlation not causation. There is a need for models like ARDL with Granger causality test or structural equation modelling (SEM) to uncover directional relationships. Despite the availability of data from 1999 to 2023, some studies relies on cross sectional or panel data ignoring the long run dynamics and lagged effect that ARDL or VECM model can capture. There is a gap in analyzing how crop farming respond differently to institutional and geopolitical pressures. Few studies stimulates policies intervention (e.g., anti-corruption reforms, conflict resolutions) to estimate their potential impact on agricultural production, this limit the practical reference of finding form policy makers. Events like the Russian – Ukraine war or Covid- 19 have ripple effect on Nigeria agricultural sector (e.g., fertilizer import, food inflation) but these are rarely model in the existing models suggested for further directions.

2.0 Literature review

2.1 Geopolitical Risk

Salisu et al. (2023) carried out a computation of the geopolitical risk index (GPRI) for Nigeria. The study relied on secondary data from articles and relevant news articles from eight notable newspapers in Nigeria. Data were collected by creating a list of keywords relating to geopolitical risk factors that impact Nigeria between January 1, 2012 and June 19, 2023. The in-sample analysis showed that there is a positive relationship between the index and the behaviour of the chosen variables. The out-of-sample estimation also revealed that further suggests an out-performance of the index-based estimation above the benchmark model. The study showed that a rising GPR index increase the condition of market for both exchange rate and stock returns, which signifies its potential to dampen these markets. The study therefore concluded that there is a significant positive relationship between the rising geopolitical tensions and the volatility of the currency and stock markets. As such, financial stability is dependent on how well geopolitical tensions are curbed in Nigeria (**Salisu et al., 2023**).

Saint-Akadiri et al. (2020) conducted a case study of Turkey in examining the direction of causality geopolitical risks, tourism, and economic growth. The study utilized the Granger-causality analysis. The findings showed that Granger-causality runs from GPR to economy and then to tourism. It showed further that a one-standard-deviation shock to geopolitical risk have negative impact on tourism and economy in the short and long run.

Hasan et al. (2020) conducted a study on the chances of geopolitical risks in determining return of tourism equity. The study discovered that in most developing nations, returns and volatility of tourism stocks is significantly impacted by both local and global geopolitical risks when the market is in a normal condition. A good number of studies also affirms the above studies across many countries. In studying Energy consumption, economic policy uncertainty and carbon emissions; causality evidence from resource-rich economies, **Adams et al. (2020)** utilized Energy consumption, economic policy uncertainty and carbon emissions; causality evidence from resource-rich economies. The study discovered that energy use and real GDP per capita leads to an increase in CO_2 emissions. **Hashmi et al. (2021)** in a study investigated the environmental Kuznets Curve hypothesis amidst geopolitical risk: Global evidence using bootstrap ARDL approach. The study showed that while Geopolitical risk negatively, World carbon dioxide emissions in the short run, it has a positive impact in the long run.

Rasoulinezhad et al. (2020) utilized ARDL bounds testing method to examine Geopolitical risk and energy transition in Russia between 1993 and 2018. It was discovered that Geopolitical Risks have a positive impact on Energy transition. **Olanipekun and Alola (2020)** utilized Non-Linear Autoregressive Distributed Lag (NARDL) to examine the possible inference between Crude oil production in the Persian Gulf amidst geopolitical risk, cost of damage and resources rents. The study adopted Non-Linear Autoregressive Distributed Lag (NARDL) and found that positive shocks in Geopolitical Risks and average damage cost has negative impact on Oil production while negative shock in crude oil price negatively affects Oil production.

Hailemariam and Ivanovski (2021) in a study of the US economy between January 1999 and August 2020, utilized the Structural Vector Autoregression (SVAR) in finding out the impact of geopolitical risk on tourism. The study showed that Tourism exports and imports (TNX) are negatively affected by geopolitical risk. **Sweidan (2021)** examined the geopolitical risk effect on the US renewable energy deployment using USA as the study area over the period of 1973Q1-2020Q1. The study adopted Autoregressive distributed lag and discovered a positive relationship between Geopolitical Risk and renewable energy. **Li et al. (2022)** utilized a global perspective in studying the correlation between equity and the price of agricultural commodities in light of geopolitical risk. The study adopted the DCC-GARCH model. The study showed that the positive correlational relationship between equity and agricultural commodity prices was affected by geopolitical risk. The study showed that an increase in geopolitical risk weakens the relationship between the two variables. Furthermore, by making a comparison between the import and export of agricultural relative to GDP, the study revealed the dynamic impact of geopolitical risk.
Chatellier (2017) carried out a study on the impact of geopolitical risks on the importation of beef and veal in major importing countries. The study discovered that market demand, sanitary conditions and geopolitical risk in exporting nations affect the importation of beef and veal in major importing countries like the United States, China, Japan, and Russia. Using the context of the Russia-Ukraine war, **Hudecová and Rajčániová (2023)** explored the impact of geopolitical risk on agricultural

commodity prices. The study adopted linear and nonlinear regression, and discovered that the price of agricultural commodities became significantly volatile during higher uncertainties over the period covered in the ARDL (autoregressive distributed lag) model. This revealed the negative impact of geopolitical risks on agriculture.

2.2 Institutional quality

Olagunju and Fakayode (2017) used panel data analysis to examine the connection between agricultural productivity in Nigeria and institutional quality. The researchers examined institutional quality factors such government efficacy, regulatory quality, and protection of property rights. The results point to a strong and favourable correlation between agricultural productivity and institutional quality. Higher agricultural output is linked to better institutional quality, especially in terms of the protection of property rights and the efficiency of government.

Oseni and Aromolaran (2017) investigated how loan availability affected Nigerian agricultural output, taking institutional elements including property rights, regulatory frameworks, and credit availability into account. According to this study, increased loan availability has a favourable correlation with agricultural output. To optimise the impact on agricultural output, the report also emphasizes the significance of institutional reforms in expanding loan availability and guaranteeing the protection of property rights. The impact of agricultural extension services on farm productivity among Nigerian small-scale farmers was evaluated by **Ajibefun and Iwokwagh (2018)**. They took into account institutional elements like governance frameworks, technology assistance, and the calibre and availability of extension services. The study's findings show a favourable correlation between farm productivity and agricultural extension services. Nonetheless, the analysis highlights the necessity of institutional changes to improve extension services' efficacy and reach, especially for small-scale farmers.

2.3 Agricultural output

Ibrahim and Mustapha (2020) examined the relationship between agricultural output and institutional quality in a few chosen Northern States. They examined the dynamic link between agricultural productivity and institutional quality measures over time using time-series data and vector auto-regression (VAR) models. The findings showed that greater levels of agricultural productivity in Nigeria were linked to increases in institutional quality, namely in terms of the efficacy of governance and the rule of law. The study emphasised how crucial it is to implement policy changes that improve institutional quality in order to support sustainable agricultural development.

Olanipekun and Ijeh (2022) carried out a study using an autoregressive distributed lag (ARDL) model over the period of 1984 to 2019 to determine the influence of conflict on agriculture in Nigeria. The study discovered that security challenges pose significant threat to agriculture in Nigeria. Accordingly, the study recommended that each geopolitical zone in Nigeria should take practical steps in addressing security challenges

Adelaja and George (2019) examined the effects of Boko Haram insurgency on agriculture. With the Boko Haram Insurgency as a case study, the study investigated how conflict affect agriculture using descriptive statistics. The study identified two categories of effects. Output, input, infrastructure and human capital effects were categorized as direct effects while loss of talent and other environmental factors were regarded as the indirect effects to Boko Haram insurgency. The study further identified effects on product and input prices, as well as increased risk as market effects. Data from the study showed that an increase in the intensity of Boko Haram insurgence leads to significant reduction in the overall productivity and output in the agricultural sector specifically, crops like sorghum, cassava, soya and yam. The study also showed that conflict affects the work time for hired labour and significantly reduced agricultural wages.

Tiwari et al. (2021) in a study, examined Structure Dependence between Oil and Agricultural Commodities Returns: The Role of Geopolitical Risks. The study explored the effects of geopolitical risks (GPRs) on the relationship between crude oil prices and agricultural commodities. The study adopted the copula method. The correlations for the agricultural commodities with oil under the positive correlation regime were used as dependent variables to assess the effect of geopolitical risks as well as the ability of agricultural commodities to hedge in the wake of increased geopolitical risks. The study showed a negative coefficient at 1% level of significance. In summary, the findings on geopolitical risks and threats indicate that these factors impact the interplay between the energy and agricultural markets. Moreover, it is noteworthy that agricultural markets have the ability to mitigate the risks associated with the oil market, as geopolitical risks have an adverse effect on the latter. **Tiwari et al. (2021)** also noted that the outcome on the potential of agricultural commodities, specifically corn, oats, and wheat, to hedge against the oil market is consistent with the previous reliance findings for both bullish and bearish oil markets, where a negative correlation was shown.

Candau et al. (2021) in their own study discovered a pacifying effect of exporting agricultural products in Africa. The study noted that ethnic conflict in farming communities is often reduced when their farm produce gets exported and the reward comes to them. Cengiz and Manga (2021) in their study examined the impact of geopolitical risk on climate change. The study collected annual data for 12 selected Latin American and Asian countries from 1990 to 2015. The study carried out cross-sectional dependence tests, CIPS unit root test, and slope homogeneity test), and second-generation estimator – the AMG (Augmented Mean Group) method to explore the long-run relationship between geopolitical risk and CO_2 emissions per capita. The findings of the study showed that a 1% rise in geopolitical risk escalates CO_2 emissions per capita by 0.001%. Furthermore, it was revealed that while CO_2 emissions per capita is fostered by economic growth and fossil energy consumption, renewable energy reduces CO_2 emissions per capita. It was therefore concluded that environmental degradation can be impeded by reduction in geopolitical risk and conflicts in the countries of Latin America and Asia countries (**Cengiz & Manga, 2022**). **Adesina and Zinnah (2013)**, increasing financial inclusion through focused interventions, like microfinance projects and agricultural loan programs, can improve farmers' access to financing and increase agricultural productivity. Nigerian farmers' income and market involvement are threatened by market inefficiencies such as price swings and middlemen's exploitation. Increased agricultural output and farmer welfare can result from enacting trade policies that support agricultural exports, fortifying market rules, and reforming market institutions.

3.0 Methodology

The study employed the Auto Regressive Distributed lag (ARDL) model technique to examine the impact of selected variables on Agricultural output in Nigeria. It was primarily developed and popularized by M. Hashem Pesaran and Yonhcheol Shin with significant contributions from Richard Smith. Their seminar work in 2001 laid the foundation for what is now widely known as the PSS approach (Pesaran, Shin & Smith) to cointegration analysis using ARDL models. **Pesaran and Shin (1998)** introduced ARDL modelling approach to cointegration analysis testing for long run relationships regardless of whether variables are 1(0), 1(1) or both mix. ARDL stands out because it is flexible with small size, it handles variables with mixed integration orders, it is easy to implement using standard OLS techniques. It is particularly well suited for geopolitical risk and institutional quality on agricultural output especially in developing economies like Nigeria .it can be used when variables are a mix 1(0) (stationery), 1(1) (non-stationery). This is crucial because geopolitical risk and institutional quality indicators often have different risks and institutional quality indicators often have statistical properties than agricultural output or production. Many developing countries have limited time – series data, it performs well even with small datasets making it practical for countries with short or inconsistent records. It separates short run shocks (like conflicts or policy changes) from long run trends (like institutional reforms or climate adaptation. This is essential when analyzing how temporary geopolitical tensions differs from structural governance issues.it allow to test for long run relationship even unsure about the integration order of the variables. The method provides reliable estimates in the short run and long run (**Chandhry et al., 2023**), it is suitable even in case of small size of data (**Hussain et al., 2024**). The study explained the nexus between independent and dependent variables in an empirical study. This study fit into these criteria using descriptive statistics, Phillips-Peron Test, Bounds Test, Augmented Dickey-Fuller Unit Root Test and Autoregressive Distributed Lag (ARDL).

Based on the major objective of this study, the semi-aggregate model was specified as follows:

$$\sum_{j,t=1}^{3,28} AP_t = \beta_0 + \beta_1 GPR_t + \beta_2 \sum_{j,t=1}^{3,28} IQl_t + \beta_3 AC_t + \mu_t \quad 3.1$$

Where,

$\sum$ this means sum of all values in the model.

AP denotes Agricultural output. It comprises Livestock Production, Crop Production and Fishery Production.

GPR depicts Geopolitical Risk Index

IQl stands for Institutional Quality Index. It is a composite index of Control of corruption, Regulatory Quality, Rule of Law, political stability, Accountability and Voice. Institutional quality derived from the multiple governance indicators and its short-term impact on crop production is generally positive though its long term may vary. It is typically constructed using Principal Component Analysis (PCA) to combine several governance indicators into a single index.

$$Z_{ij} = \frac{X_{ij} - \mu_j}{Ʊ_j}$$

Where $_{ij}$ is the normalized score for counting i on indicator j

Xij is the raw score

μ_j & $Ʊ_j$ are the mean and standard deviation of indicator

AC represent Access to credit

β_0 depicts intercept term, it is the value of the dependent variable (AP) when the values of dependent variables (AP, IQl, AC) are equal to zero.

β_1 is the coefficient of GPR. It quantifies the change in the dependent variable (AP) for a one unit change in independent variable (GPR), holding other factors constant.

β_2 typically represents the coefficient of (IQl). It measures the changes in the dependent variable (AP) for a one unit change in the second independent variable (IQl), holding other variable constant.

β_3 represents the coefficients of (AC). It measures the change in dependent variable (AP) for a one unit change in the third independent variable (AC), while holding other variables constant.

j(j=1,2.3) denotes the identification for the components of Agricultural output(AP)

t(t=1, 2, . . . 28) depicts the regulatory time inferred at which the data values were considered.

μ denotes the error term. It represents the unexplained variation in the dependent variable (AP). It accommodates the influence of effect of AP but which are not directly include in the model.

Disaggregating the model yields the following models corresponding to the specified objectives of the study:

$$CP_t = \lambda_0 + \lambda_1 GPR_t + \lambda_2 IQl_t + \lambda_3 AC_t + \mu_t$$

Where,

GPR, IQl, AC, $\sum$, μ, t, j are as define earlier. CP depicts Crop Production

λ_0 represents the intercept term of the model. It is the value of the dependent variable (CP) when the values of independent variables (CP, IQl, AC) are equal to zero.

λ_1 depicts the coefficient of (GPR) in the model. It quantifies the change in the dependent variable (CP) for one unit change in the independent variable (GPR), holding other factors constant.

λ_2 denotes the coefficient of the second independent variable (IQl) in the model.it measures the changes in the dependent variable (CP) for a one unit change in the second independent variable (IQl) holding other variable constant.

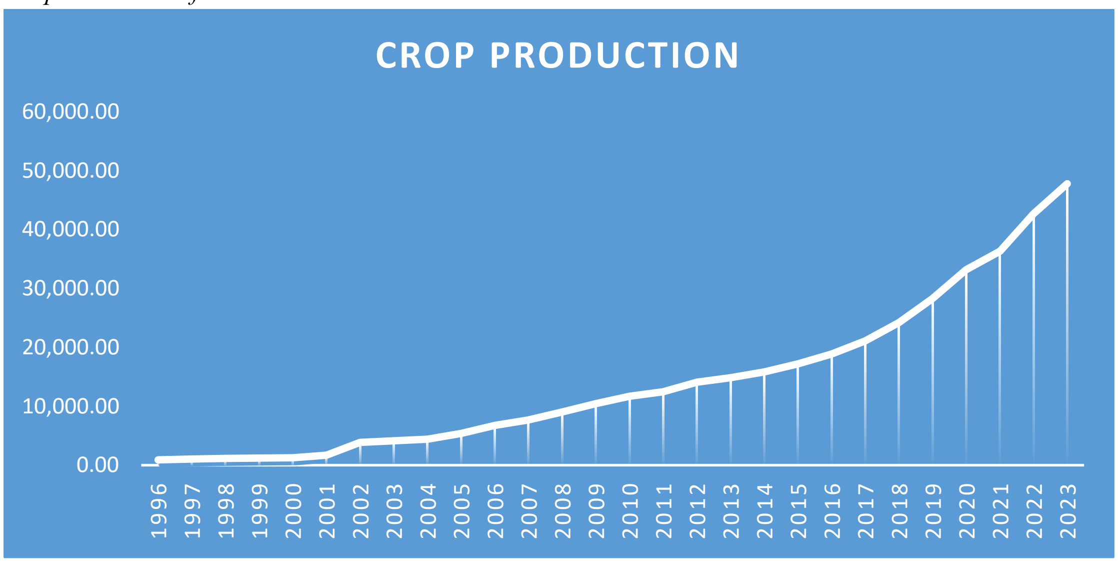
λ_3 depicts the coefficient of (AC)in the model. It measures the change in independent variable (CP) for the change in dependent variable (CP) while holding other variable constant.

3.1 Data Description

This study utilized yearly time series spanning from 1996 to 2023, covering agricultural outputs (Crop production) in Nigeria.

Figure 3.1

Crop Production from 1996 to 2023



Source: Researchers' Computation, 2025

3.2 Descriptive statistics

Table 3.1 gives a summary of descriptive statistics of the series for the model. The reported statistics include the mean with their corresponding maximum, minimum, and standard deviation. The distributional properties are also examined through their skewness and kurtosis, while the Jarque-Bera test statistic is used to test for normality in the distribution.

Table 3.1

Summary of Descriptive Statistics

	AGOUT	GPR	IQ	AC
Mean	9.207	-0.930	3.074	15.013
Median	9.476	-0.917	4.000	15.571
Maximum	10.883	-0.682	4.000	16.337
Minimum	7.099	-1.293	-7.000	12.303
Std. Dev.	1.157	0.173	2.961	1.301
Skewness	-0.480	-0.509	-3.074	-1.062
Kurtosis	2.139	2.311	10.732	2.701
JaGPRue-Bera	1.871	1.701	109.772	5.176
Probability	0.392	0.427	0.000	0.075
Sum	248.614	-25.112	83.000	405.360
Sum Sq. Dev.	34.811	0.779	227.852	44.036

Observations	27	27	27	27

Source: Author's Computation from EViews 12

Table 3.1 presents a descriptive analysis of total agricultural output (AGOUT), geopolitical risk (GPR), institutional quality (IQ), and credit access (AC).

The mean values indicate that access to credit has the highest mean with the value of 15.013, implying relatively good availability of financial resources for farm businesses, followed by agricultural output with the value of 9.207, indicating good general agricultural performance. Geopolitical risk is weakly negative with a mean value of -0.930, which may impact destabilisation for farming activities, while institutional quality (IQ) is an average situation of governance with a mean value of 3.074.

Standard deviation captures the variability of the variables. However, institutional quality has the highest standard deviation value among the variables with a figure of 2.961. In the same vein, all the variables in the model exhibit a negative skewness. Kurtosis statistics reflect that institutional quality is considerably peaked and implies possible outliers, i.e., most observations are clustered at the mean.

3. 3 Unit Root Test

The study tests for unit roots on Agricultural output (AGOUT), Institutional quality (IQ), Geopolitical risk (PolityIV) and Access to credit (AC). In order to test for the unit root of the variables, the Augmented Dickey-Fuller (ADF) unit Root Test was employed. The study employs unit roots to ensure that our inference regarding the important issue of stationarity is not driven by the choice of testing procedures used.

However, the results of the stationarity tests of variables at the level and first difference are presented in Table 3.2 below.

Table 3.2

Unit root Test Results

Variable	Level		First Difference		Status
	ADF Critical Value	P.Value	ADF Critical Value	t*	
AGOUT	-3.595026	0.8006	-3.612199	0.0074**	I(1)
IQ	-3.595026	0.0030	-	-	I(0)
GPR	-3.595026	0.2113	-3.603202	0.0003*	I(1)
AC	-3.595026	0.8453	-3.603202	0.0020	I(1)

Source: Author's Computation from R Studio

Notes: ** Statistical significance at 1% level; * Statistical significance at 5% level; ** Statistical significance at 10% level.*

The above results in Table 3.2 showed that one of the variables is stationary at levels. The unit root tests applied to the variables at levels reject the null hypothesis of stationarity of all the variables used. The variables are therefore different once to perform stationarity tests on different variables. After differencing the variables once, all the variables were confirmed to be stationary except institutional quality (IV) which is stationary at level in ADF test. The ADF test applied to the first difference of the data series accepts the null hypothesis of stationarity for all the variables used. It is, therefore, worth concluding that the variables are integrated of order zero and one, which is the combination of I(0) and I(1). Therefore, the variables will be co-integrated to ascertain the existence of a long-run relationship of the variables.

3.4 Optimal Lag Structure Selection

The optimum lag structure is used to determine which lag will be most appropriate based on the recommendations of certain information criteria.

Table 3.3

Optimal Lag Length Criteria

Lag	AIC	HQ	SC	FPE
1	-3.615415	-3.558745	-3.268548	2.251485
2	-4.475158	-4.365148	-3.851255*	1.995248*
3	-2.195258	-2.178545	-2.084521	4.521254

* indicates lag order selected by the criterion

AIC: Akaike information criterion (each test at 5% level)

HQ: Hannan-Quinn information criterion

SC: Schwarz information criterion

FPE: Final prediction error

Source: Author's Computation from EViews 12

Table 4.3 shows the recommended optimal lag selection by various information criteria. This analysis makes use of the Akaike information criteria (AIC) with the minimum optimum lag. However since the Akaike information criteria (AIC) has no asterisk and minimum values from the optimal lag length criteria results we hereby make of use final prediction error criteria (FPE) because it has the lowest optimal lag value at lag 2, which implies that , at lag 2 prediction error criteria(FPE) has the lowest criteria at 1.99 which also implies that agricultural output has the lowest optimal value and best optimal lag in the model. Thus, since all the variables have been integrated in mixed order, ARDL is the most appropriate for the study. The moves to estimate serial correlation for the model are in Table 4.4.

Table 3.4

Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.641986	Prob. F(2,19)	0.5373
Obs*R-squared	1.645795	Prob. Chi-Square(2)	0.4392

Source: Author's Computation from EViews 12

The result of the serial correlation is presented in Table 3.4. The probability value of the chi-square shows that there is no serial correlation among the regressors with a value of 0.4392. Hence, there is no autocorrelation in the model.

4.0 Data analysis, interpretation and discussion of findings

4.1 Impact of Geopolitical Risk and Institutional quality on crop production in Nigeria

Table 4.1

Bound Test of Hypothesis Two

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.545201	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Author's Computation from EViews 12

Table 4.1 provides the results of the F-Bounds test, which is used in the context of an Autoregressive Distributed Lag (ARDL) model to test for the presence of a long-run (levels) relationship between variables. The null hypothesis of the F-Bounds test is that there is no level of relationship (no cointegration) among the variables. However, the F-Bounds test results indicate that the F-statistic (5.545201) is greater than the upper bound critical values at all common significance levels (10%, 5%, 2.5%, and 1%). Therefore, the study rejects the null hypothesis of no levels relationship and concludes that there is a significant long-run relationship among the variables in the model. This suggests that the variables are cointegrated and there is a long-term equilibrium relationship between them.

Table 4.2

Parsimonious Long-run and Short-run ARDL-ECM Results (2)

	Dependent Variable: Crop Production (CP)	
Variables	Long-run	Short-run
IQ	0.265252 (0.0012)*	00.000570 (0.9861)
GPR	0.233866 (0.6693)	-0.208590 (0.4044)
AC	0.512666 (0.0000)*	0.050018 (0.3523)
ECT	-	-0.085104(0.000) *
R-Square	0.984294	
Adj R-Square	0.981302	
F-Statistics	329.0183 (0.000) *	
M Akaike info criterion (AIC)	0.760035	
Schwarz criterion (SIC)	0.518093	
Durbin-Watson Stat.	0.690364	
Hannan-Quinn (HIC)	2.197329	

Source: Author's Computation from EViews 12

Table 4.2 above shows the result of a parsimonious ARDL-ECM in which crop production (CP) is the dependent variable and both long-run and short-run dynamics are taken into account are reported in the table.

Institutional quality (IQ) positively and significantly influences crop production in the long run, with a coefficient of 0.265252 and p-value of 0.0012. The implication is that an increase in institutional quality is strongly linked to increased production of crops. However, geopolitical risk (GPR) is not statistically significant with a coefficient of 0.233866 and a p-value of 0.6693, indicating that it does not have significant effect on crop production even in the long term. Access to credit (AC) also records a significant relationship, with a coefficient of 0.512666 and a p-value of 0.0000, indicating how important it is in boosting crop production.

For the short term, the results vary. Institutional quality has insignificant effect, having a coefficient of 0.000570 and a p-value of 0.9861, showing that its effect does not manifest immediately. Geopolitical risk has insignificant effect in the short run as well, with a coefficient of -0.208590 and a p-value of 0.4044. Access to credit continues to have a positive coefficient of 0.050018 but is still statistically insignificant, as denoted by a p-value of 0.3523. Conversely, the effect of geopolitical risk (GPR) on agricultural production is insignificant in both the short and long run. This is a somewhat surprising result considering previous studies such as those by **Onyekachukwu and Clinton (2024)** and **Suza et al. (2024)**, which have shown that political instability and conflict tend to mercilessly discourage agricultural production. However, the result might indicate the strength of Nigeria's agricultural sector, possibly due to resilient farming practices or availability of substitute support avenues, such as community channels and informal networks.

Zhao et al. (2019) explain that while institutional reforms would take some time to come through as productivity gains, access to credit on time can result in quicker returns. That means policies for enabling greater credit availability would directly benefit farmers. More importantly, research by **Shuaibu and Nchake (2021)** shows that access to credit not only raises productivity but also enhances farmers' ability to cope with market volatility. Similarly, **Siankwilimba et al., (2025)** set that financial institutions immensely increase short-term agricultural production, necessitating special interventions for immediate financial accessibility. Overall, it has the potential to stimulate rapid agricultural productivity increases to stress credit access. Further, **Soko et al., (2023)** point out that productivity in agriculture is enhanced significantly through good governance and institutional quality by creating a favourable environment for investment and innovation. This argument is further supported by **Taramuel-Taramuel et al., (2023)**, who posit that institutions determine economic performance and agricultural development by creating well-defined rules and minimising uncertainties for farmer. Further, **Soko et al., (2023)** point out that productivity in agriculture is enhanced significantly through good governance and institutional quality by creating a favourable environment for investment and innovation. This argument is further supported by **Taramuel-Taramuel et al., (2023)**, who posit that institutions determine economic performance and agricultural development by creating well-defined rules and minimizing uncertainties for farmers. Moreover, **Abaidoo and Agyapong (2022)** emphasize that the quality of institutions plays a crucial role in determining economic outcomes, especially in developing nations. As such, institutionalization in Nigeria is essential to improve agricultural productivity and foster sustainable growth in agriculture.

4.3.2 Access to Credit as a Catalyst

Access to credit (AC) is a significant determinant of agricultural production with a major influence on Crop. The coefficients exhibit a strong positive relationship with all three areas of production, indicating the invaluable role played by financial input in agricultural success. This finding corroborates the arguments of **Balana and Oyeyemi (2022)**, which established that access to credit significantly enhances farmers' ability to invest in necessary inputs and technologies, ultimately leading to improved outputs. In addition, **Boucher et al. (2024)** point out that financial capital allows farmers to smooth risks associated with farming, such as crop failure or uncertain prices, while taking up improved technologies that may boost yields. Access to credit supports not only short-term production needs but also enables longer-term investment in sustainable practices. Improving access to credit, therefore, must be high on the priority list of policymakers seeking to improve agricultural productivity and economic resilience in rural area.

5.1 Conclusion

This study examined geopolitical risk and institutional quality on agriculture outputs in Nigeria, from 1999 to 2023 using different diagnostic tests. This study underscores the critical role of agricultural credit in enhancing the resilience of Nigeria's agricultural sector to geopolitical risks. This study brings to the fore the greatest significance of credit availability and quality of institutions in boosting agricultural output in Nigeria.

This study brings to the fore the greatest significance of credit availability and quality of institutions in boosting agricultural production in Nigeria. The evidence is clear that the two dimensions exercise significant influence on crop sector outputs, with credit availability conferring immediate benefits that enable farmers to take up required inputs and technologies. Geopolitical risk surprisingly does not have distinguishing influence on output levels, reflecting resilience in the agriculture sector. With these findings, policymakers should ensure that they place high emphasis on institutionalizing and increasing access to credit. By addressing these vital sectors, Nigeria will be in a position to increase agricultural productivity, increase economic resilience, and build sustainable development, finally developing a more resilient agricultural sector which will ensure food security and economic stability for the country. The study calls for specific interventions to focus on financial accessibility and good governance to unlock the full potential of Nigeria's agricultural sector.

5.2 Recommendations

The following recommendations are made based on the findings of the study:

1. Enhance Access to Credit: Implement policies that improve access to credit for farmers, particularly smallholders. This can involve establishing low-interest loan programs and financial literacy initiatives to ensure effective Utilization of funds.

2 Strengthen Regulatory Frameworks: Develop and enforce robust regulatory frameworks 2that ensure transparency and efficiency in agricultural governance. This will help mitigate the negative impacts of geopolitical risks on agricultural practices.

3. Strengthen rural security: insecurity in farming regions due to banditry, communal clashes and insurgency has led to displacement and reduced farm labour. Investing in community policing and rural surveillance can stabilize agricultural production.

4. Promote regional and peacebuilding: Support inter-ethnic dialogue and conflict resolution programs especially in agrarian hotspots like middle Belt and Northest. This will fosters trust and cooperation among farming communities.

5. Climate resilient infrastructure: Geopolitical instability often coincides with climate shocks. Building resilient roads, irrigation systems and storage facilities can mitigate disruptions and ensure continuity in food supply chains.

6. Expand agricultural credit access: The agricultural guaranteed scheme fund (ACGSF) and other lending programs have shown strong positive effect on output. Scaling this initiative with better oversight and reduce interest rates can boost productivity.

7. Increase public agricultural spending: Nigeria agricultural budget remains below 10% commitment of the 2025 Kampala Declaration. Raising this allocation and ensure transparent disbursement can drive sectoral growth.

Limitations of the Study

This study has several limitations. Firstly, the reliance on historical data may not fully capture the dynamic nature of geopolitical risks impacting agriculture, as these risks can evolve rapidly. Secondly, the scope is limited to Nigeria, which may affect the generalizability of the findings to other contexts or regions facing different geopolitical challenges. Additionally, the study focuses primarily on quantitative analysis, potentially overlooking qualitative factors such as farmer perceptions and local socio-economic conditions. Lastly, the analysis may not account for all relevant variables influencing agricultural production, which could lead to an incomplete understanding of the complex relationships at play. Further research can still be conducted along this line by using another model aside from the model used in this study. Also, other studies can make use of some other methods in the process of the research which can indicate some other variables or factors that dictate the determinant of foreign direct investment of firms.

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