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Beyond the threshold: Unraveling the effects of economic policy uncertainty on agricultural growth in Nigeria

Goodness C. Aye[1], Lydia N. Kotur[2], Josephine B. Ayoola[3]

1: University of Pretoria; Federal University of Agriculture, Makurdi, Nigeria. 2: Federal University of Agriculture, Makurdi, Nigeria. 3: Federal University of Agriculture, Makurdi, Nigeria

Corresponding author email: goodness.aye@gmail.com

Abstract

The study investigated the threshold effects of economic policy uncertainty on agricultural growth in Nigeria using annual time series data from 1970 to 2021. Descriptive analysis revealed positive mean, maximum, and minimum values for variables such as adult population (ADULTPOP), environmental degradation (ENVT), exchange rate uncertainty (EXRU), financial deepening (FINDEEP), government expenditure in agriculture uncertainty (GEAU), global economic uncertainty (GEU), inflation (INF), and interest rate uncertainty (INRU). However, agricultural growth (AG) showed a negative minimum value. Most variables exhibited low volatility, except for inflation and interest rate uncertainty, which demonstrated higher volatility. Unit root tests indicated that some variables initially had unit roots in levels but became stationary after first differencing (integrated of order one), while others were stationary in levels (integrated of order zero). The study employed a threshold regression model, revealing a threshold value of 0.034 for global economic uncertainty (GEU). Above this threshold, exchange rate uncertainty (EXRU) and interest rate uncertainty (INRU) significantly impacted on agricultural growth. Non-threshold variables, including adult population, financial deepening, environmental degradation, and inflation, also had significant effects on agricultural growth. The study provides policymakers and stakeholders with valuable insights into the optimal management of economic policy unc agricultural development. .

JEL Codes: E600, C220, Q560.

1.0 Introduction

The exploration of crude oil in commercial quantity and the "oil boom" experienced in Nigeria in the 1970s heralded an era of decay and decline in agricultural output and the overall contribution of the sector to the economy. The policies, strategies and schemes used to address issues relating to the contribution of agriculture to the country's development also changed with this perception making different dynamic strategies spelt out in policy programs overlap and difficult to separate into appropriate time phases (Oluwaseyi, 2017).

Economic policy uncertainty reduced agricultural growth as investment in agriculture was reduced when government's attitude to agriculture was relaxed. The agricultural policy during the structural adjustment period conceived agriculture as essentially a private-sector business in which the role of Government must be largely facilitating (Manyong et al., 2004.). Agricultural growth is a necessity as strong and efficient agricultural sector has the capacity to enable a country to feed its growing population, earn foreign exchange, generate employment and provide raw materials for industries. (Oluwaseyi, 2017).

The sustained decline in commodity prices has dealt a major setback, threatened recent progress and revealed sizable macroeconomic imbalances in some countries. Unless growth is restored, poverty rates will rise. Raising productivity growth in smallholder agriculture, and making smallholder farmers competitive, are central to improving the lives of the people and unleashing productivity improvements will require significant growth in agricultural industry (World Bank., 2017). The poor performance of the agricultural sector could be due to a myriad of factors including economic policy and its uncertainty and economic indiscretion of successive Nigerian government. Economic policy uncertainty occurs when an economic body cannot predict exactly whether, when, and how the government will change its current economic policy. (Guo et al., 2020).

Prospect theory is a psychology theory that describes how people make decisions when presented with alternatives that involve risk, probability, and uncertainty. It holds that people make decisions based on perceived losses or gains. Given the choice of equal probabilities, most people would choose to retain the wealth that they already have, rather than risk the chance to increase their current wealth which is a limitation to agricultural growth. The theoretical work through which economic policy uncertainty can affect agricultural growth as people are usually averse to the possibility of losing, such that they would rather avoid a loss rather than take a risk

to make an equivalent gain. The prospect theory is sometimes referred to as the loss-aversion theory (CIF, 2022). They are more concerned with avoiding further losses than they are with making additional gains (Nickerson, 2022). The general concept is that if two choices are put before an investor, both equal, with one presented in terms of potential gains and the other in terms of possible losses, the former option will be chosen (Alam, 2022). Therefore, economic policy uncertainty can significantly affect investors as the market is not perfect and is populated by irrational investors (Erdoğan, 2021). This proposition holds even if part of the market is fully rational as long as there are balance sheet and risk limits (Ralph, 2020).

The agricultural market is characterized by movements in the commodity prices that typically depend on several factors, both exogenous and endogenous. These movements may be upwards or downwards in response to changes in the predictors. However, the magnitude of positive and negative responses may differ for similar positive and negative variations in the predictors (Bahmani-Oskooee and Maki-Nayeri, 2019). In response to the current complex and changing global economic situation and the macroenvironment in which growth is gradually slowing, governments in various countries are playing an active role in macro control. Their involvement is critical for reversing the current economic policy uncertainty and steadily promoting domestic economic development. (Guo et al., 2020).

There is a rapidly growing literature on the effect of economic policy and its uncertainty on general economic activities. Lesame (2021) used firm-level data and a news-based measure of economic policy uncertainty and provided empirical evidence that economic policy uncertainty has a negative impact on firm-level investment in South Africa. Guo *et al.* (2020), explored the static and dynamic interactions among economic policy uncertainty, enterprise investment, and enterprise profitability. Xiao *et al*. (2019) employed a newly developed time-varying parameter vector autoregressive model to study and contrast the impact of different types of uncertainty on China's grain futures prices. Aye (2018) investigated whether economic policy uncertainty causes real housing returns in 8 emerging economies which economic policy uncertainty data are available.

Regarding the focus of this study which is on the link between economic policy and its uncertainty on agriculture growth, few studies have also been identified. For instance, Kotur et al., (2020) found a negative effect of economic policy uncertainty on poverty in Nigeria using ARDL model. Aye (2019) examined the short and long run asymmetric effects of monetary and

fiscal policy uncertainty on economic activity in the U.S. Wagan *et al.* (2018) analyzed the impact of macroeconomic policy on employment, food inflation, and agricultural growth. Aye and Kotur (2022) analysed the long and short run effect of economic policy uncertainty on agricultural growth in Nigeria.

Several existing empirical studies have examined the nexus between economic policy and or its uncertainty on different macroeconomic variables for several countries. Majority of these variables relate to the aggregate economy and even studies on agriculture ignore uncertainty surrounding economic policies and rather focused on economic policies. The few available studies on agriculture and food related variables largely ignore threshold effects of economic policy uncertainty. Therefore, this study intends to fill these gaps by examining the threshold effects of economic policy uncertainty on agricultural growth in Nigeria. In other words, this study addresses the need to understand the potential threshold effects of economic policy uncertainty on agricultural growth, recognizing that the impact may not be uniform across different levels of uncertainty. This study also innovates by considering disaggregate economic policy uncertainty including monetary policy uncertainty, fiscal policy uncertainty and trade policy uncertainty simultaneously.

The question which the research seeks to answer is: what is the threshold effect of economic policy uncertainty on agricultural growth? Therefore, the objective of the study is to analyse the threshold effects of economic policy uncertainty on agricultural growth. It is hypothesized that economic policy uncertainty has no threshold effect on agricultural growth. The study's significance lies in its potential to inform policy making, enhance stakeholders' decision-making, contribute to the academic understanding of economic policy effects, and support the realization of sustainable agricultural development goals in Nigeria.

2.0 Literature Review

There is growing literature on the effects of economic policy and its uncertainty on overall economic growth and economic activities. However, sectoral analysis of the effects of economic policy uncertainty is lacking. This is particularly the case of the agriculture sector. Existing studies include Akbar and Jamil, (2012) who examined the monetary and fiscal policies' effect on agricultural growth using simulation analyses, a model primarily based on input-output reduced form structural equations approach and data from agricultural sector of Pakistan for the period 1972-2010. Udah et al. (2015) analysed the contributions of agricultural

subsectors and various policy regimes in Nigeria from 1961 to 2010 with the goal of evaluating the performance of various agricultural subsectors in growing the agricultural sector. Using exponential and percentages on each of the agricultural subsector, the result confirmed deceleration of all the agricultural subsectors.

Abid and Rault (2020) examined the exchange rate volatility response to the economic policy uncertainty shocks from a panel VAR perspective focusing on emerging market economies. The findings that both home and foreign economic policy uncertainty shocks are highly significant in explaining the exchange rate volatility and the contribution of the foreign economic policy uncertainty to exchange rate volatility fluctuation overcomes the local economic policy uncertainty share. The findings are robust to different sensitivity analyses, provide novel insights into economic policy uncertainty international spillovers, and have interesting policy implications for emerging market economics decisions makers and investor.

Adedoyin *et al.* (2020) investigated export-led growth in Malaysia with a special focus on the absolute and mediating impact of economic policy uncertainties and geopolitical risks with data spanning the period 1980 to 2018. Empirical results from the autoregressive distributed lag model and the error correction models revealed that for Malaysia, economic policy uncertainty (EPU) exerts a negative impact on growth even as its moderating impact on exports leads to negative economic growth. Xiao *et al.* (2019) employed a newly developed time-varying parameter vector autoregressive model to study and contrast the impact of different types of uncertainty on China's grain futures prices. The directional volatility spillover index is used to measure the impact of economic policy uncertainty on China's grain futures prices and compare the differences among commodities. They found that economic policy uncertainty affects China's grain futures prices significantly, this could affect agricultural investment and in turn slow down agricultural growth.

Frimpong *et al.* (2021) employed wavelet coherence and partial wavelet coherence to investigate the time-frequency effect of global economic policy uncertainty on the comovement of five agricultural commodities such as maize, oat, rice, soybean, and wheat using monthly data from January 1997 to December 2019. Heterogeneity in comovement structures of the agricultural commodities market at different time-frequency scales which are profound at high frequencies from the bivariate wavelet coherence was observed. The partial wavelet coherence analysis shows that global economic policy uncertainty is a driver of agricultural commodity

market connectedness, implying that extreme changes in economic policy uncertainty have the tendency to influence commodity price comovement and could delay agricultural growth.

Aye and Kotur (2022) analysed the long and short run effect of economic policy uncertainty on agricultural growth in Nigeria using the autoregressive distributed lag (ARDL) model and the associated bounds test which result suggested that stable economic policy encourages agricultural growth. However, this study did not consider threshold effects.

Global economic uncertainty may not always have a negative effect or may even improve a country's net outward investment for a while, it may deter the international expansion of local firms. In the presence of high global economic uncertainty, local firms are less likely to become outward foreign direct investors, which implies stagnation in internationalization. This was the suggestion of Lagos and Wang (2022) as they investigated the threshold effects of global economic uncertainty on foreign direct investment in Dunning's investment development path framework. Using the dynamic panel threshold model from 76 developed and developing countries. Bawa and Ismaila (2021) utilized a quarterly time series data for the period 1981 – 2009 to estimate a threshold level of inflation for Nigeria. Using a threshold regression model developed by Khan and Senhadji (2001), they estimated a threshold inflation level of 13 percent for Nigeria. Below the threshold level, inflation has a mild effect on economic activities, while above it, the magnitude of the negative effect of inflation on growth was high.

Gozgor et al. (2021) empirically investigated the time-varying effect of economic policy uncertainty, considering the shock of the monetary policy implemented by China's central bank on different economic variables including interest rate, output gap, and inflationary gap using the latent threshold time-varying parameter vector autoregressive model from January 2015 through April 2021. Result revealed economic policy uncertainty has a significant threshold effect on the shock of quantitative monetary policy instrument and the shock of price-based monetary policy.

The foregoing literature review shows that there have been numerous studies on effects of economic policy and economic policy uncertainty on a number of economic variables. Studies on the threshold effects of economic policy uncertainty on agriculture seems to be completely lacking. This study, therefore intends to fill the gap by investigating the threshold effects of economic policy and its uncertainty on agricultural growth in Nigeria.

3.0 Data and Empirical Model

3.1 Data

Secondary data consisting of annual time series covering a period of 51 years (1970-2021) were used for the study. Particularly, data on interest rate, exchange rate, government expenditure on agriculture, and agricultural GDP were obtained from Central Bank of Nigeria and World Development Indicators. In addition, control variables such as inflation proxied by percentage change in consumer price index, environmental degradation, financial deepening and adult population were sourced from World Development Indicators. Data on world uncertainty index were sourced from Ahir *et al*. (2020). Economic policy (monetary, fiscal and trade) uncertainty was measured using the volatility in interest rate, exchange rate, government expenditure in agriculture. Volatility was computed as a three year moving standard deviation of each economic policy variable. Agricultural growth was measured as growth rate of agricultural GDP (%). Environmental degradation was measured as CO_2 emissions from manufacturing industries and construction (% of total fuel combustion). Financial deepening was measured as domestic credit to private sector (% of GDP). Adult population was measured as total number of adults (males and females) in the country. Inflation was measured as the percentage change in consumer price index (%). Global economic uncertainty is proxied by world uncertainty index which is a composite measure of global political and economic uncertainty.

3.2 Empirical model

A threshold regression model is used to achieve the objective of the study. A threshold regression with two regions (regimes) defined by a threshold γ, can be written as:

$$y_t = X_t\beta + Z_t\delta_1 + \varepsilon_t \qquad \text{if } -\infty < w_t < \gamma \tag{1}$$

$$y_t = X_t\beta + Z_t\delta_2 + \varepsilon_t \qquad \text{if } \gamma < w_t < \infty \tag{2}$$

The two equations can be written compactly as follows:

$$y_t = X_t\beta + Z_t\delta_1 I(-\infty < w_t < \gamma) + Z_t\delta_2 I(\gamma < w_t < \infty) + \varepsilon_t \tag{3}$$

where is y_t the dependent variable, X_t is a $1 \times k$ vector of covariates which may include the lagged values of y_t to capture the dynamics in the model, β is a vector of region-invariant parameters, Z_t is a vector of exogenous variables with region-specific coefficient vectors δ_1 and δ_2, w_t is a threshold variable that may also be one of the variables in X_t or Z_t, and ε_t is an IID error with mean 0 and variance σ^2. I is an indicator function which takes the value of 1 if $w_t \leq \gamma$, and 0 otherwise.

Following the above, the empirical threshold regression model for Agricultural Growth (AG) is given as:

$$AG_t = \beta_0 + INF_t + \beta_3 FINDEEP_t + \beta_4 ADULTPOP_t + \beta_5 ENVT_t + \delta_1 GEU_t I(GEU_t \leq \gamma) + \delta_2 GEU_t I(\gamma < GEU_t) + \delta_1 INRU_t I(GEU_t \leq \gamma) + \delta_2 INRU_t I(\gamma < GEU_t) + \delta_1 EXRU_t I(GEU_t \leq \gamma) + \delta_2 EXRU_t I(\gamma < GEU_t) + \delta_1 INFU_t I(GEU_t \leq \gamma) + \delta_2 INFU_t I(\gamma < GEU_t) + \delta_1 GEAU_t I(GEU_t \leq \gamma) + \delta_2 GEAU_t I(\gamma < GEU_t) + \varepsilon_t \quad (4)$$

where

AG = Agricultural Growth

INF = Inflation

FINDEEP = Financial Deepening

ADULTPOP = Adult Population

ENVT = Environmental Degradation

INRU = Interest Rate Uncertainty

EXRU = Exchange Rate Uncertainty

GEAU = Government Expenditure on Agriculture

GEU = is the Global economic uncertainty which is the threshold variable used to split the sample into two regimes, namely low economic uncertainty and high economic uncertainty regimes. The selection of this GEU as the threshold variable follows Che and Jiang (2021) and Lagos and Wang (2022).

4.0 Results

4.1 Summary statistics

The descriptive statistics showing the mean, median, minimum, maximum, standard deviation, skewness, kurtosis, and Jarque-Bera test on the variables used for analysis are presented in Table 1. The mean of the variables from 1970 to 2021 are 18.534, 0.052, 2.39, 0.150, 2.156, 7.643, 0.319, 0.072, 18.304 and 8.010 for Adult population (ADULTPOP), Agricultural growth (AG), Environmental degradation (ENVT), Exchange rate uncertainty (EXRU), Financial Deepening (FINDEEP), Government expenditure uncertainty (GEAU), Global economic uncertainty (GEU), Inflation (INF) and Interest rate uncertainty (INRU) respectively. The median which is useful for understanding the typical or central value especially when there are extreme values, suggests that the median of adult population is 18.535. The median values for AG, ENVT, EXRU, FINDEEP, GEAU, GEU, INF and INRU are close to 0.039, 2.499, 0.076, 2.104, 0.199, 0.051, 12.775 and 6.163 respectively. The minimum ADULTPOP is 17.887 while the maximum is 19.169 which showed that there is no substantial gap between the lowest observed value and the highest observed value. The minimum value of GEAU, GEU and EXRU are 0.000 which are the lowest observed value with the maximum value of 1.850, 0.234 and 0.860 respectively. The minimum value of AG (-0.045) is negative while the maximum value of AG is 0.442 indicating that no substantial difference in AG. There is no substantial difference between the maximum value of ENVT (2.914) and FINDEEP (2.977) and the minimum value of ENVT (1.447) and of FINDEEP (1.547). The maximum values for INF and INRU are 72.836 and 36.135 respectively with minimum values of 3.458. and 0.460. The maximum values for while the minimum values 7.611. ADULTPOP, AG, ENVT, EXRU, FINDEEP, GEAU and GEU with the value 0.378, 0.072, 0.316, 0.211, 0.348, 0.399 and 0.062, respectively has low volatility while the highest volatility was showed in the standard deviation of INF (15.619) and INRU (8.435).

A skewness value of 0 indicates a perfectly symmetrical distribution while a skewness value close to zero indicates a relatively symmetric distribution. In this case, the tail lengths on both sides of the distribution are roughly equal, and the data is distributed relatively evenly around the mean. ADULTPOP (-0.015), ENVT (-1.177) with a negative skewness value indicates a left-skewed relatively symmetry distribution This means that the tail of the distribution is longer on the left side, and the majority of the data is concentrated on the right side of the distribution. FINDEEP (0.347), GEU (0.846), (0.690) and INF (1.936) have positive skewness value indicating a right-skewed. This means that the tail of the distribution is longer on

the right side, and the majority of the data is concentrated on the left side of the distribution. The greater the positive skewness value, the more pronounced the right-skewness. AG (4.142), EXRU (2.109), INRU (2.120) and GEAU (2.145) with greater positive are more asymmetry and suggests a highly positively skewed distribution.

Kurtosis which measures the concentration of data points around the mean has a normal distribution of 3. High kurtosis values indicate a heavy concentration of data in the tails, resulting in fatter tails or more extreme values. The kurtosis of ADULTPOP (1.836), FINDEEP (2.359), and GEU (2.798), suggests a distribution that is less concentrated in the tails compared to a normal distribution, indicating a relatively moderate presence of extreme values. ENVT (4.229) indicates a distribution with a higher concentration of data points in the tails, resulting in more extreme values. The kurtosis of INF (5.949), EXRU (6.811), GEAU (7.665), INRU (7.316), indicates a distribution with a higher concentration of data points in the tails, resulting in fatter tails or more extreme values. The Jarque-Bera test statistic for AG (793.042), GEAU (83.699), EXRU (67.316), INF (49.350), and INRU (76.239), with the corresponding probability value of 0.000 and ENVT (14.697) with probability value of 0.001 all suggests that the distribution significantly deviates from a normal distribution. GEU (6.044) and the probability value of 0.049 suggests that the distribution deviates from a normal distribution at a significance level of 0. 05. ADULTPOP (2.823), FINDEEP (1.857), and the corresponding probability value is 0.244 and 0.395 respectively indicate that the distribution of ADULTPOP and FINDEEP are not significantly different from a normal distribution.

The graphical display of the various variables used for analysis are presented in Figure 2. With exception of adult population with clear positive trend, the rest of the variables fluctuated over the period under investigation. By construction, the economic uncertainty series and all variables in growth rates such as agricultural growth, inflation and interest rates reverts to the mean as expected.

Table 1: Descriptive Statistics of the Variables Used

	ADULTPOP	AG	ENVT	EXRU	FINDEEP	GEAU	GEU	INF	INRU
Mean	18.534	0.052	2.394	0.150	2.156	0.319	0.072	18.304	8.010
Median	18.535	0.039	2.499	0.076	2.104	0.199	0.051	12.775	6.163
Maximum	19.169	0.442	2.914	0.860	2.977	1.850	0.234	72.836	36.135
Minimum	17.887	-0.045	1.447	0.000	1.547	0.000	0.000	3.458	0.460
Std. Dev.	0.378	0.072	0.316	0.211	0.348	0.399	0.062	15.619	8.435
Skewness	-0.015	4.142	-1.177	2.109	0.347	2.145	0.846	1.936	2.120
Kurtosis	1.836	23.179	4.229	6.811	2.359	7.665	2.798	5.949	7.316
Jarque-Bera	2.823	793.042	14.697	67.316	1.857	83.699	6.044	49.350	76.239
Probability	0.244	0.000	0.001	0.000	0.395	0.000	0.049	0.000	0.000

Source: Authors' Computation

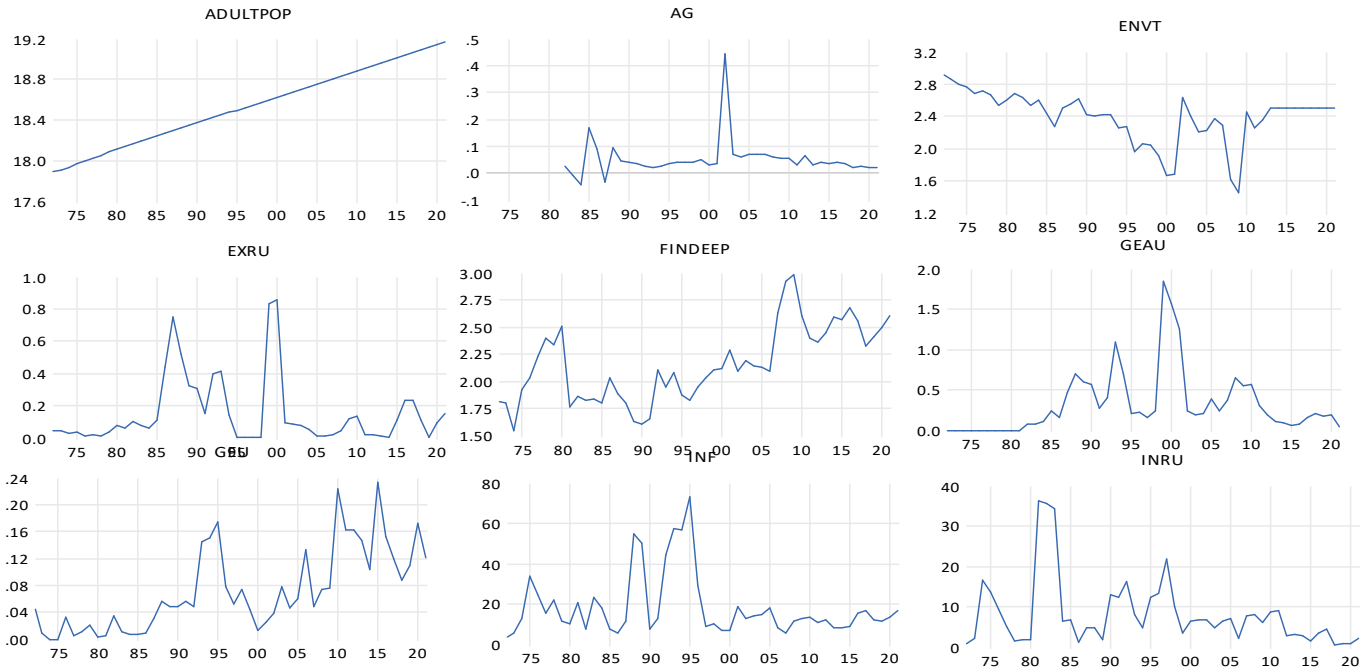

Figure 2: Graphical Representation of the Variables Used

4.2 Unit root tests

The results of the unit root tests are presented in Table 2. The Augmented Dickey-Fuller (ADF) unit root tests result revealed that ADULTPOP test statistic is -2.490, and p-value is 0.125, while the Phillips-Peron (PP) test result for ADULTPOP revealed that t-statistic is -1.140, and p-value is 0.693. With the p-value (0.125) and (0.693) which are greater than the commonly used significance levels (1%, 5% or 10%), the null hypothesis of a unit root cannot be rejected at level. However, at first difference of both ADF and PP, there is sufficient evidence to suggest that the variable D(ADULTPOP) is stationary with t-statistic (-4.077) and (-2.595), and p-value of 0.003 and 0.101 respectively. Therefore, it is concluded that ADULTPOP is integrated of order (1), since it became stationery after first differencing. For agricultural growth, (AG), there is strong evidence to reject the null hypothesis that AG has a unit root t-statistics values of (-4.511) and (-3.647) and associated p-values of 0.001 and 0.008 for ADF and PP respectively. Therefore, AG is integrated of order I(0) because it is stationery at level. The ADF and PP test statistics for FINDEEP is not significant at level but at first different the null hypothesis can be rejected for FINDEEP with p-value of 0.0000. ENVT, EXRU, FDI results revealed that the ADF test statistic is -3.234, -4. 537, -4.179 with p-value of 0.024, 0.001, 0.002 respectively. These variables fall in the rejection region at all conventional levels of significance and therefore, exhibits a stable, long-term behavior at level. The PP results further confirmed the rejection of null hypotheses at all level.

The result for GEAU revealed the test statistic for the ADF and PP test as -3.131 and -2.924, and p-value of 0.031 and 0.050. The p-values are less than the significance level of 0.05, suggesting enough evidence to reject the null hypothesis at 5% level of significance, suggesting that GEAU does not have a unit root and is stationary. The ADF test for GEU is -2.746, and p-value of 0.074, greater than the significance level of 0.1, suggesting that a rejection of the null hypothesis at the 10% level of significance. Similarly, the p-value for the PP test for GEU is 0.10. It implies that for both ADF and PP tests, GEU does not have a unit root and is stationary at only 10%. INFU has t-statistic of -4.106 and p-value of 0.002 while INRU has t-statistic of 4.517 with p-value of 0.001. This means the p-value is less than the significance level of 0.05. The high test statistic and low p-values provide support for the conclusion that INFU and INRU does not have unit root and are stationary based on both ADF and PP tests.

Table 2: Unit Root Test

Variables	ADF Test		PP Test		Decision
	T-Stat	P-Value	T-Stat	P-Value	
ADULTPOP	-2.490	0.125	-1.140	0.693	
D(ADULTPOP)	-4.077	0.003	-2.595	0.101	I(1)
AG	-4.511	0.001	-3.647	0.008	I(0)
ENVT	-3.234	0.024	-3.064	0.036	I(0)
EXRU	-4.537	0.001	-3.329	0.019	I(0)
FINDEEP	-2.061	0.261	-1.786	0.383	
D(FINDEEP)	-5.357	0.000	-9.156	0.000	I(1)
GEAU	-3.131	0.031	-2.924	0.050	I(0)
GEU	-2.746	0.074	-2.581	0.104	I(0)
INF	-4.106	0.002	-3.419	0.015	I(0)
INRU	-4.517	0.001	-3.285	0.021	I(0)

Source: Authors' Computation

4.3. Threshold effects of EPU on Agricultural growth

The result of threshold regression model examining the threshold effects of Economic Policy Uncertainty (EPU) on Agricultural Growth (AG) using economic uncertainty (GEU) as a threshold variable is shown on Table 3. The model's goodness of fit statistics suggests a high degree of explanatory power (R-squared = 0.989). The adjusted R-squared value accounts for the number of variables and observations in the model (adjusted R-squared = 0.985).

The threshold regression model divided and estimated the coefficients of observations for economic uncertainty (GEU) into two groups, which is less than 0.0342 or greater than or equal to 0.0343 separately. Below the GEU threshold value, none of the EPU variables have significant effect on agricultural growth. However, when GEU is greater than or equal to the threshold, the coefficient for INRU is -0.011, and it is statistically significant at 1% level (p-value = 0.008). This suggests that an increase in INRU has a negative effect on agricultural growth when GEU is above the threshold value of 0.0342. Intuitively, higher interest rate uncertainty increases the cost of capital for agricultural investments. When global economic uncertainty is elevated, investors

may become more risk-averse, leading to an increase in the required return on investment. This higher cost of capital can discourage agricultural investments, particularly in projects that require significant upfront capital. Central banks or policymakers may respond to heightened global economic uncertainty by adjusting interest rates. In some cases, interest rates may be raised to counter inflationary pressures or attract foreign capital. These policy responses can have direct implications for the cost of capital in the agricultural sector, influencing investment decisions and, consequently, agricultural growth. The finding of a threshold value (0.0342) suggests that the relationship between interest rate uncertainty and agricultural growth is not linear. Below the threshold, the impact may be less pronounced, while above the threshold, the negative effect becomes more significant. This nonlinear dynamic emphasizes the importance of considering specific levels of uncertainty when analyzing its impact on agricultural growth. In summary, the finding can be understood as a complex interplay between interest rate uncertainty, global economic conditions, investor behavior, and policy responses. The threshold effect adds an additional layer of nuance, highlighting that the impact of interest rate uncertainty on agricultural growth is contingent on the broader economic context surpassing a specific threshold.

Similarly, EXRU with coefficient of -0.325 and p-value of 0.056, is marginally statistically significant at the 5% level. The negative coefficient (-0.325) suggests that higher exchange rate uncertainty is associated with a decline in agricultural growth. This could be due to the adverse effects of currency fluctuations on export-oriented agricultural sectors, affecting pricing, demand, and profitability. Exchange rate uncertainty can significantly affect a country's agricultural exports. When global economic policy uncertainty is below the threshold, agricultural producers may be able to manage and adapt to moderate fluctuations in exchange rates. However, above the threshold, increased uncertainty could lead to more pronounced and unpredictable currency movements, impacting the competitiveness of agricultural exports and affecting the revenue of farmers. Elevated exchange rate uncertainty could affect the cost of importing agricultural inputs such as machinery, fertilizers, and pesticides. Above the threshold, the negative effect on agricultural growth may result from increased input costs, making production more expensive for farmers. Governments often respond to economic uncertainties by implementing policies to stabilize exchange rates. Below the threshold, such policies may be effective in managing moderate uncertainties. However, above the threshold, the negative coefficient suggests that the effectiveness of these policies diminishes, contributing to a more

significant negative impact on agricultural growth. In summary, the finding suggests that the impact of exchange rate uncertainty on agricultural growth is contingent on the broader context of global economic policy uncertainty. Above the specified threshold, the negative effect becomes more pronounced, indicating that stabilizing exchange rates and reducing uncertainty are crucial for fostering sustainable agricultural growth in such economic environments.

The result for the non-threshold variables revealed that ADULTPOP has a coefficient of 1.533 and is statistically significant with p-value of 0.0000. FINDEEP has a coefficient of 0.439 and is statistically significant with p-value of 0.0000. ENVT has a coefficient of 0.225 and is statistically significant with p-value of 0.009, implying that adult population, financial deepening, and environmental degradation have a positive effect on agricultural growth. The finding confirms the result of Kwakwa et al. (2022) with the exception of environmental degradation that agricultural development is negatively affected by aggregate carbon emission while financial development, labour and capital increases agricultural development. Further confirmation from Kwakwa *et al*, (2022) agreed that environmental degradation has positive effect on agricultural growth in situation where industrial development and emissions from trans forest area increase positively affect the cereal and vegetable production.

INF has a coefficient of -0.004 and is statistically significant (p-value = 0.002) implying that inflation has a negative effect on agricultural growth. High inflation can erode the purchasing power of consumers, lead to higher input costs for farmers, such as increased prices for seeds, fertilizers, and fuel (Çitçi and Kaya, 2023) . This can reduce profitability and deter agricultural investment. When people have less real income due to rising prices, they may reduce their spending on agricultural products, leading to decreased demand and potentially lower prices for agricultural goods. Uncertainty caused by high inflation can discourage long-term investment in agriculture. Farmers and agricultural businesses may be hesitant to make capital-intensive investments when prices are unstable which agreed with Carlson (2022) and Tarkom and Ujah (2023).

Table 3: Threshold Effects of EPU on Agricultural Growth

Variable	Coefficient	Std. Error	t-Statistic	Prob.
	GEU < 0.034-- 8 obs			
GEAU	0.043	0.098	0.435	0.667
INRU	0.002	0.003	0.851	0.402
EXRU	0.035	0.127	0.274	0.786
C	-0.731	2.939	-0.249	0.805
	0.034 <= GEU -- 33 obs			
GEAU	0.005	0.096	0.048	0.962
INRU	-0.011***	0.004	-2.848	0.008
EXRU	-0.325**	0.163	-1.993	0.056
C	-0.308	3.043	-0.101	0.92
	Non-Threshold Variables			
ADULTPOP	1.533***	0.17	9.006	0.000
FINDEEP	0.439***	0.091	4.833	0.000
ENVT	0.225***	0.08	2.801	0.009
INF	-0.004***	0.001	-3.43	0.002
R-squared	0.989			
Adjusted R-squared	0.985			

, * indicate significance at 5% and 1% respectively

Source: Authors' Computation

5.0 Conclusion and Policy Implications

The threshold regression model which divided and estimated the coefficients of observations for economic uncertainty (GEU) into two groups concluded that below the GEU threshold value, none of the EPU variables have significant effect on agricultural growth, when GEU is greater than or equal to the threshold, an increase in INRU and EXRU has negative effect on agricultural growth. The non-threshold variables, adult population (ADULTPOP), financial deepening (FINDEEP), and environmental degradation (ENVT) have a positive effect on agricultural growth while inflation (INF) has a negative effect on agricultural growth that is

high inflation can erode the purchasing power of consumers, and lead to higher input costs for farmers. Based on the findings of this study, the following recommendations are proffered: Policy makers should put into consideration the threshold line in implementation of policy to reduce the risk of economic policy uncertainty since the effect is more pronounced at higher uncertainty levels and economic policy uncertainty calls for the respective policy makers to consciously seek for strategies for reducing uncertainty in the economy by putting into consideration the threshold effects. The policy implications underscore the importance of proactive, adaptive, and sector-specific policy making that addresses the nuanced relationship between economic policy uncertainty and agricultural growth in Nigeria. Policymakers should strive to create an enabling environment that fosters sustainable and resilient agricultural development under varying levels of economic policy uncertainty. The study was limited by unavailability of existing database on economic policy uncertainty variables for Nigeria. However, this was overcome by constructing a three year moving standard deviation of each policy variable (monetary, fiscal and trade policies) which represents the volatility in the respective series. Future studies in this area may consider the asymmetric and threshold effect of economic policy uncertainty on agricultural investment and nutrition security.

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