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Do Geopolitical Risks and Economic Uncertainty Matter for Fiscal Sustainability in Nigeria?

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Abstract

This paper attempts to answer the question about whether geopolitical risks and economic uncertainty matter for fiscal sustainability in Nigeria. The paper employs the ARDL model and bounds test approach to cointegration to analyse quarterly data for the period 2010Q1 to 2021Q4. The main finding indicates that geopolitical risks significantly enhance fiscal sustainability in the short- and long-run, while economic uncertainty does not. Accordingly, the study recommends the implementation of policies aimed at maximising the benefits of rising oil price triggered by geopolitical risks to improve fiscal sustainability in Nigeria.

Keywords: geopolitical risks, economic uncertainty and fiscal sustainability
JEL Classification: G11, G18, H69, H87

I. Introduction

The study is motivated by the increasing level of geopolitical risks and uncertainties, as nations become increasingly integrated through trade and globalisation. There is also growing research focusing on the impact of these developments on the different spheres of the economy and markets (Pástor & Veronesi, 2013; Ko & Lee, 2015; Ndako et al., 2021; Adedoyin et al., 2022). The rising research efforts has been bolstered by the availability of indices, especially, those related to text-mining procedures like economic policy uncertainty index of Baker et al. (2016), world uncertainty index of Ahir et al. (2021) and the geopolitical risks index developed by Caldara and Iacoviello (2018). The study investigates whether geopolitical risk and economic uncertainty matter for fiscal sustainability in an oil-exporting and developing economy like Nigeria.

Nigeria relies on oil and gas as key sources of revenue, which accounted for about 41.0 per cent of total federally collected revenue and 55.0 per cent of export earnings in 2021 (CBN, 2021). This implies that domestic and global developments that affect the oil market have far-reaching consequences for fiscal operations in Nigeria. Although Nigeria still grapples with domestic

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challenges in the oil sector, including oil theft, vandalism, low refining capacity and unsustainable subsidy regime on Premium Motor Spirit (PMS); recent global developments like the COVID-19 pandemic and the Russia-Ukraine war have further compounded these woes. The foregoing, therefore, provides a compelling motivation for a study on the effects of shocks from geopolitical risks and economic uncertainty on fiscal sustainability in Nigeria. The impact of geopolitical risks on some macroeconomic variables has been demonstrated in the recent literature (Ndako et al., 2021; Adedoyin et al., 2022).

The concept of fiscal sustainability relates to the capacity of a government or fiscal authority to meet its current and future expenditure obligations without the need for special financing or adjustment in fiscal operations (Rapu et al., 2017). This implies that both current and future fiscal operations would not require some form of extra-ordinary measures to achieve sustainability. In another dimension, Oshikoya and Tarawalie (2010) consider fiscal sustainability as the capacity of the government to generate a debt stabilising primary balance.

Policy uncertainty can be explained as the economic risk arising from indeterminate future regulatory regimes and government policies. This development also increases the chance of economic agents delaying investments and spending due to market uncertainty (Baker et al., 2016). Following the 2008 Global Financial Crisis (GFC), uncertainties related to government policies have reached high levels as households and businesses were unsure about spending, monetary policies, taxes, healthcare, and future regulatory regimes (Baker et al., 2016). The slowdown in economic activities occasioned by the COVID-19 pandemic elevated uncertainty in the global oil market, triggering a fall in global crude oil demand accompanied by supply glut, thereby, plunging the average annual crude oil price to US$41.47 per barrel in 2020, from US$64.04 per barrel in 2019 (OPEC, 2020). This has potential implications for fiscal sustainability in Nigeria, due to her dependence on oil revenue for fiscal operations.

In this study, we hypothesise that both geopolitical risks and economic uncertainty weaken fiscal sustainability in Nigeria on account of their influence on oil market developments. The study primarily seeks to extend the frontier of knowledge on fiscal sustainability by accounting for the role of geopolitical risks and economic uncertainty in its dynamics. In achieving the objective, we contribute to the literature in two aspects. First, the extant literature does not address issues related to the role of geopolitical risks and economic uncertainty in fiscal sustainability, thus, unveiling a significant gap for the present study. Second, our study advances the literature by undertaking a dynamic analysis of

the role of geopolitical risks and economic uncertainty on fiscal sustainability within the context of an oil-exporting and developing economy.

Following from the introduction, Section II focuses on a brief review of the literature; while Section III addresses data issues and methodology. Section IV presents and discusses the results, and Section V presents the conclusion and recommendation.

II. Literature Review

The main theoretical underpinning of fiscal sustainability is the intertemporal budget constraint of Domar (1944). In this theory, sustainability is said to hold when the discounted value of future primary surpluses surpasses the discounted value of primary deficits, enough to meet the difference between the initial debt stock and the discounted value of the end period debt stock (Vella, 2017). The implication is that the debt level can only be stabilised when real economic growth exceeds real interest rate. Simply meeting the intertemporal budget constraint translates to a sustainable fiscal policy infinitely as it requires that the government achieves future surpluses to offset current deficits (Jha et al., 2009).

There are several strands of literature on the empirical impact of geopolitical risks on the macroeconomy. For instance, Bilgin et al. (2020) finds that geopolitical risks boost government investment in a panel of 18 countries. Gupta et al. (2019) reports that geopolitical risks exert a negative influence on trade flows in a panel of 164 developed and developing countries. Chiang and Chen (2021) submit that geopolitical risks yield adverse effects on Chinese stock prices. Su et al. (2019) shows by means of wavelet analysis that there exists a relationship between oil price and financial liquidity in the time when geopolitical risk is high, implying that oil prices are dependent on geopolitical risks in Saudi Arabia. Analysing the joint connectedness among BRIC's geopolitical risks and the US macroeconomy, Zhang and Hamori (2022), submits that shocks emanating from geopolitical risks have a significant impact on emerging economies. The study also concludes that geopolitical risks in China and Russia significantly impact the stock market return and volatility. However, geopolitical risks in China have more impact on Russia, Brazil, and India than on the US macroeconomy. Ndako et al. (2021) finds that, even though geopolitical risks amplify stock return volatility in Malaysia and Indonesia, the impact is greater in Indonesia. Akadiri et al. (2020) reports significant evidence of a unidirectional causality between geopolitical risks, economic growth and tourism in Turkey.

The literature is also replete with studies on geopolitical risks and developments in the oil market. Ivanovski and Hailemariam (2022) reports that both oil price and oil price volatility have a time-changing effect on geopolitical risks in a panel of 16 countries. In a wavelet analysis on time-varying co-movement and causal relationship between oil prices and geopolitical risks, Li et al. (2020) finds high level of co-movement between oil prices and geopolitical risks at high frequencies for the sampled period. However, such a relationship does not exist at low frequencies for most of the reviewed period. Zhang et al. (2022) reports that geopolitical risks trends can significantly enhance oil price predictability for both in-sample and out-of-sample scenarios. Lee et al. (2021) also concludes that geopolitical risks sufficiently predict global oil price volatility.

The relationship between economic policy uncertainty and the macroeconomy has received considerable attention in the literature. For instance, Karnizova and Li (2014) find that economic uncertainty index exert high predictive power for recessions, while Handley and Limao (2015) report that economic policy uncertainty is a significant predictor of economic growth. The literature also shows that fiscal policy uncertainties, like volatilities exert a significant negative impact on output (Fernandez-Villaverde et al., 2015). In the case of financial market, studies report a significant negative relationship with economic policy uncertainty (Ko & Lee, 2015; Pástor & Veronesi, 2013).

The study contributes to knowledge by introducing the impact of geopolitical risks and economic uncertainty in the analysis of fiscal sustainability in Nigeria. Furthermore, the dynamic model accounts for both the short-run and long-run impact of geopolitical risks and economic uncertainty on fiscal sustainability.

III. Data and Methodology

III.1 Data

The study seeks to investigate whether geopolitical risks and economic uncertainty matter for fiscal sustainability in Nigeria, for the period 2010Q1 to 2021Q4. Following Zandi et al. (2011) and building on the proposition that improving fiscal space is a step towards achieving fiscal sustainability, we construct a measure of fiscal sustainability ($fsus$) which is calculated as the deviation of actual debt-to-GDP ratio from its threshold[2]. The procedure for its construction follows equation (1).

$$fsus = d^* - d \quad (1)$$

[2] The threshold for debt-to-GDP ratio has been set at 40.0 per cent in the DMO 2020-2023 Debt Management Strategy (DMS).

where, d^* represents the debt-to-GDP threshold and d indicates the actual debt-to-GDP ratio. A positive gap indicates available fiscal space that allows additional borrowings, while a negative gap points to a breach of fiscal rule and unsustainable fiscal policy.

One of the two main explanatory variables, geopolitical index is measured by the recent global geopolitical risk index[3] developed by Caldara and Iacoviello (2018). The index was generated through text-mining procedure that covers 10 international newspapers and analyses words such as geopolitical tension, risk, uncertainty, war, military, nuclear threats, terrorism, among others. The index relates to geopolitical developments at a global level. A quarterly average of the monthly index from 2010M01 to 2021M12 was used.

For economic uncertainty, we employed the quarterly observations of the World Uncertainty Index (WUI)[4] of Ahir et al. (2021). The Index reflects the regularity of the word "uncertainty" in the quarterly Economist Intelligence Unit country reports, with spikes associated with major developments like the Gulf War, the Euro debt crisis, the Brexit vote and the COVID-19 pandemic (Ahir et al., 2021). To account for the peculiarity of Nigeria as an oil dependent country, we control for oil price using the global average quarterly price (in US dollars) of Brent crude from the Federal Reserve Bank of St. Louis Database (2022)[5]. The inclusion of oil price is justified by the importance of oil to the Nigerian economy on the premise that the impact of geopolitical risks falls directly on the oil market.

III.2 Methodology

To achieve the objective of the study, we used the Autoregressive Distributed Lag (ARDL) model/bounds test approach to cointegration in the spirit of Pesaran et al. (2001). This technique offers versatility irrespective of the level of integration of the variables. It is useful where the series are stationary at level, at first difference or mutually integrated. Following the objective of the study, we specify the ARDL model as shown in equation (2):

$$\Delta FSUS_t = \sigma_0 + \sum_{i=1}^{p} \varphi_i \Delta FSUS_{t-i} + \sum_{j=0}^{q1} \gamma_j \Delta LGPRI_{t-j} + \sum_{l=0}^{q2} \partial_l \Delta \mathrm{LWUI}_{t-l} + \sum_{m=0}^{q3} \omega_m \Delta LOP_{t-m} + \sigma_1 LFSUS_{t-1} + \sigma_2 LGPRI_{t-1} + \sigma_3 LWUI_{t-1} + \sigma_4 LOP_{t-1} + \varepsilon_t \quad 2)$$

where: FSUS represents fiscal sustainability; LGPRI is the logarithmic transformation of Geopolitical Risks Index; LWUI is the logarithmic transformation of the World

[3] Data found on https://www.policyuncertainty.com/gpr.html.
[4] The data for the index can be found on https://worlduncertaintyindex.com/.
[5] (https://fred.stlouisfed.org/series/MCOILBRENTEU).

Uncertainty Index; LOP indicates logarithmic transformation of oil price. Δ is the difference operator, ε_t stands for the stochastic error term. σ_0 is the intercept term. φ, γ, ∂ and ω represent short-run parameters. σ_1- σ_4 are the long-run parameters. The optimum lags are represented by $q1$, $q2$ and $q3$.

We apply the bounds test in equation (2) and upon the confirmation of a co-integration relationship among the variables, we estimate the error correction form of the model as specified in equation (3).

$$\Delta \mathrm{FSUS}_t = \sigma_0 + \sum_{i=1}^{P} \varphi_i \Delta \mathrm{FSUS}_{t-i} + \sum_{j=0}^{q1} \gamma_j \Delta LGPRI_{t-j} + \sum_{l=0}^{q2} \partial_l \Delta \mathrm{LWUI}_{t-l} + \sum_{m=0}^{q3} \omega_m \Delta LOP_{t-m} + \lambda ECT_{t-1} + \varepsilon_t \quad (3)$$

where, ECT represents the Error Correction Term and λ denotes parameter of the adjustment term. Finally, the study conducts post-estimation diagnostic tests to ensure that the fundamental assumptions of the Ordinary Least Squares (OLS) estimator are not violated.

IV. Results and Discussions

IV.1 Descriptive Statistics

Here we consider the measures of central tendency, dispersion and variability of the variables of interest. Specifically, the mean values indicate that the average values for FSUS, GPRI, WUI and OP are approximately -18.68, 91.78, 24399.04 and 75.68, respectively. The WUI exhibits the largest deviation from its mean, reflecting a higher volatility compared to other variables, while the standard deviation value for GPRI indicates the least volatility. All the variables, except FSUS, are characterised by positive skewness. Whereas FSUS and OP are platykurtic, GPRI and WUI are leptokurtic. Finally, the probability values of the Jarque-Bera statistic indicate evidence of normal distribution for only FSUS and OP.

Table1: Descriptive Statistics

	FSUS	GPRI	WUI	OP
Mean	-18.68468	91.77915	24399.04	75.68193
Median	-16.78000	88.46667	21449.03	68.62687
Maximum	7.860000	135.5867	55684.71	118.5416
Minimum	-50.31000	69.69333	11888.73	31.42977
Std. Dev.	16.27745	14.92423	9654.358	26.34657
Skewness	-0.171633	1.030118	1.318635	0.240859
Kurtosis	1.868751	3.841428	4.834831	1.689230
Jarque-Bera	2.736878	9.698789	20.21353	3.819087
Probability	0.254504	0.007833	0.000041	0.148148
Sum	-878.1800	4313.620	1146755.	3557.051
Sum Sq. Dev.	12187.95	10245.70	4.29E+09	31930.52
Observations	47	47	47	47

Source: Authors' computation.

IV.2 Correlation Matrix

To account for the degree of association among the variables and test for multicollinearity among the variables, we carried out a correlation analysis and present the result in Table 2. The result indicates evidence of weak negative association among the variables except for oil price and fiscal sustainability which show moderate correlation. On the whole, there is no evidence of multicollinearity among the variables.

Table 2: Correlation Matrix

Correlation	FSUS	GPRI	WUI	OP
FSUS	1.000000			
GPRI	0.019638	1.000000		
WUI	-0.316062	-0.093330	1.000000	
OP	0.643527	-0.201861	-0.238579	1.000000

Source: Authors' computation.

IV.3 Unit Root Test

To ascertain the time series properties of the variables, we carry out both the Augmented Dickey-Fuller and Phillips-Perron unit root tests and present the results in Tables 3 and 4, respectively. From the results, we observe a similar outcome in both tests. Specifically, FSUS and LOP are stationary at first difference, while the rest of the variables are stationary at levels. The mixed order of integration among the variables indicates the appropriateness of the ARDL/bounds test technique in achieving the objective of the study.

Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	Level		First difference		Order of integration
	Intercept	Trend and intercept	Intercept	Trend and intercept	
FSUS	-1.629	-0.669	-6.570***	-6.871***	I(1)
LGPRI	-3.849***	-4.008**	-9.657***	-9.691***	I(0)
LWUI	-3.796***	-4.052**	-6.671***	-6.594***	I(0)
LOP	-1.460	-1.815	-5.965***	-5.900***	I(1)

Source: Authors' computation.
Note: *** and ** represent statistical significance at 1% and 5%, respectively.

Table 4: Phillips-Perron (P-P) Unit Root Test

Variables	Level		First difference		Order of integration
	Intercept	Trend and intercept	Intercept	Trend and intercept	
FSUS	-1.749	-0.624	-6.560***	-6.881***	I(1)
LGPRI	-3.849***	-4.008**	-10.194***	-10.261***	I(0)
LWUI	-3.871***	-4.137**	-8.718***	-8.685***	I(0)
LOP	-1.631	-2.085	-5.965***	-5.900***	I(1)

Source: Authors' computation.
Note: *** and ** represent statistical significance at 1% and 5%, respectively.

IV.4 Bounds Test

We present the bounds test result in Table 5 and note the existence of cointegration among the variables in the model. Comparing the computed F-statistic value (14.796) with the upper bound critical values, we observe that the null hypothesis of no cointegration cannot be upheld. Hence, we conclude that there is cointegration among the variables in the model.

Table 5: Bounds Test

Sign. Level	Upper bound	Lower bound
10%	3.2	2.37
5%	3.67	2.79
2.5%	4.08	3.15
1%	4.66	3.65
F-Stat.	14.796	

Source: Authors' computation.

IV.5 ARDL Long-run Estimates

Having established the presence of cointegration among the series, we proceeded to estimate the ARDL long-run model and present the result in Table

6. The result indicates that geopolitical risks (measured by the global Geopolitical Risk Index) enhance fiscal sustainability in Nigeria. In other words, events relating to conflicts, war, threats of war, terrorism, among others, have a long-run significant positive influence on fiscal sustainability in Nigeria. Specifically, the result shows that a 1.0 per cent increase in geopolitical risks improves fiscal sustainability by about 37.0 per cent, all things being equal. This implies that geopolitical developments around the world matter for fiscal sustainability given that Nigeria relies mostly on oil revenue to drive her fiscal operations. A simple explanation of this finding is that when geopolitical developments trigger an increase in oil price, oil exporting countries maximise oil revenue, and stabilise their debt levels, thereby, ensuring fiscal sustainability. However, the finding further shows that economic uncertainty (measured by World Uncertainty Index) exerts a negative but insignificant impact on fiscal sustainability in Nigeria. The long-run impact of oil price on fiscal sustainability is revealed to be positive and significant. The finding further corroborates that of geopolitical risks.

Table 6: ARDL Long-run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGPRI	37.46968	14.21632	2.635680	0.0135
LWUI	-4.487784	5.206589	-0.861943	0.3960
LOP	47.47759	5.407848	8.779387	0.0000
C	-356.3439	107.6892	-3.309003	0.0026

Source: Authors' computation.
Note: D(FSUS) is the dependent variable.

IV.6 ARDL Short-run Estimates

The outcome of the short-run estimation presented in Table 7 indicates that fiscal sustainability in the previous one, two and three quarters negatively and significantly inhibit the contemporaneous level. Consistent with the long-run estimates, the result also shows that the impact of geopolitical risks on fiscal sustainability for the current quarter and the one-quarter lags are positive and significant at the five per cent level. The impact of economic uncertainty on fiscal sustainability is negligible, implying that it does not matter for fiscal sustainability in the short-run. The short-run contemporaneous impact of oil price on fiscal sustainability is positive and significant. However, the one-quarter, two-quarter and three-quarter lags impact of oil price on fiscal sustainability are negative and significant.

The adjusted R-squared value (0.825) indicates that about 83.0 per cent of variations in fiscal sustainability during the review period has been jointly

explained by the by all the regressors. This shows that the model has a good fit and a high explanatory power. Furthermore, the error correction coefficient which measures the speed of adjustment from short-run disequilibrium to long-run equilibrium reveals a slow adjustment speed of about 30.0 per cent per quarter.

Table 7: ARDL Short-run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FSUS(-1))	-0.393374	0.097965	-4.015450	0.0004
D(FSUS(-2))	-0.617440	0.071241	-8.666871	0.0000
D(FSUS(-3))	-0.598326	0.115815	-5.166221	0.0000
D(LGPRI)	11.24748	2.797076	4.021156	0.0004
D(LGPRI(-1))	7.255133	2.616337	2.773012	0.0098
D(LWUI)	1.583819	1.192541	1.328105	0.1949
D(LOP)	7.398409	2.718839	2.721164	0.0111
D(LOP(-1))	-6.073101	2.754687	-2.204643	0.0359
D(LOP(-2))	-7.808307	2.861581	-2.728669	0.0109
D(LOP(-3))	-10.57609	3.148105	-3.359511	0.0023
CointEq(-1)*	-0.303833	0.033043	-9.195007	0.0000
Adjusted R-squared	0.825411			

Source: Authors' computation.
Note: D(FSUS) is the dependent variable.

IV.7 Diagnostic Tests

We subject the estimated ARDL model to some diagnostic tests to ensure that the estimates conform with the assumptions of the Ordinary Least Squares (OLS) estimator. We present the diagnostic tests result in Table 8, where we observe the absence of serial correlation and establish that the residuals are homoscedastic and normally distributed. Finally, the Ramsey reset test result indicates that the model has been correctly specified.

Table 8: Diagnostic Tests

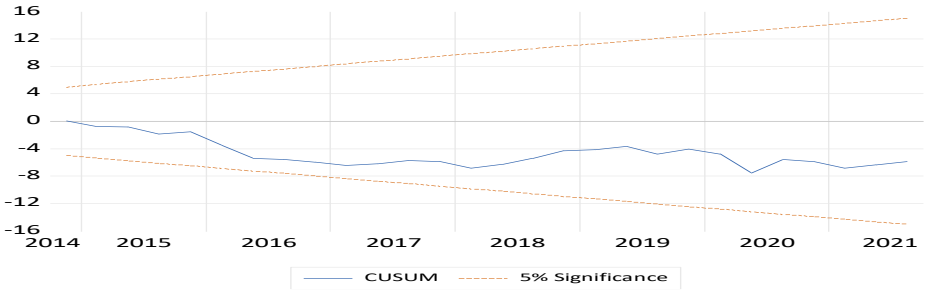
Test	Test type	Test statistic	P-value
Serial correlation	Breusch-Godfrey Serial Correlation LM Test	0.995060	0.6080
Heteroscedasticity	Breusch-Pagan-Godfrey	20.25817	0.1222
Normality	Jarque-Bera test	0.255461	0.880091
Specification	Ramsey RESET test	1.090033	0.3057

Source: Authors' computation.

IV.8 Stability Test

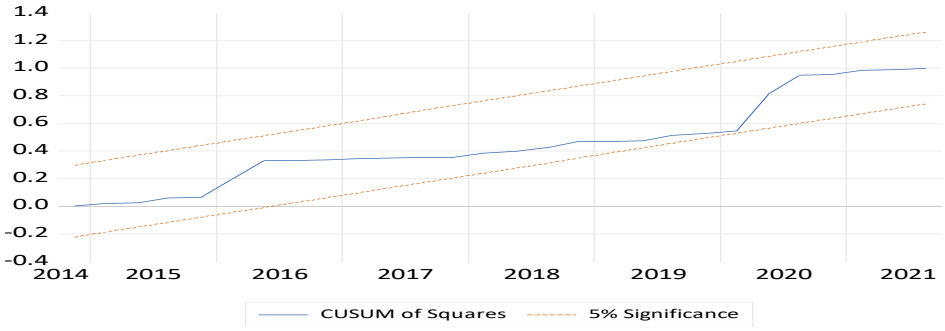
To ensure that the parameter estimates are not susceptible to gradual or sudden structural instability, we subject the model to stability test which guarantees the policy relevance of the estimates. The CUSUM and CUSUM of Squares tests for gradual and sudden parameter instability presented in Figures 1 and 2 show that the parameters of the estimated model are stable and there is no evidence of structural breaks.

Figure 1: CUSUM Test



Source: Authors' computation.

Figure 2: CUSUM of Squares Test



Source: Authors' computation.

V. Conclusion

This study answers the question about whether geopolitical risks and economic uncertainty matter for fiscal sustainability in Nigeria for the period, 2010Q1 to 2021Q4. In other words, the study assessed the dynamic impact of geopolitical risks (measured by the Geopolitical Risks Index) and economic uncertainty (measured by the World Uncertainty Index), while controlling for oil price. Following the establishment of the existence of cointegration among the

variables in the model, the study employed the ARDL technique to estimate the short-run and long-run specifications in line with the objective.

The findings show that geopolitical risks significantly improve fiscal sustainability in Nigeria, both in the short-run and long-run. It suggests that developments and events that lead to spikes in geopolitical risks, especially those with a direct impact on the oil market, contribute in enhancing fiscal sustainability in Nigeria. In other words, geopolitical risks that trigger improvement in oil price are likely to boost oil revenue, improve the primary balance, stabilise the debt level and boost fiscal sustainability, all things being equal. In reality, Nigeria spends a substantial amount of oil windfalls in subsidising the importation of premium motor spirit, which inhibits fiscal sustainability. For instance, the geopolitical tension related to the Russia-Ukraine war has resulted to increase in oil price and improvement in oil revenue which is expected to stabilise the debt level and ensure fiscal sustainability, all things being equal. However, the revenue challenge in Nigeria persists, while the debt level has continued to rise.

The findings also indicate that economic uncertainty exerts a negative but insignificant influence on fiscal sustainability in Nigeria for both the short-run and long-run. This implies that issues related to uncertainty do not provide sufficient information on fiscal sustainability in Nigeria. In other words, economic uncertainty does not matter for fiscal sustainability in Nigeria. The outcome of the short-run and long-run impact of oil price on fiscal sustainability corroborates that of geopolitical risks, implying that oil price positively and significantly boosts fiscal sustainability in Nigeria.

In conclusion, the finding has answered the puzzle about whether geopolitical risks and economic uncertainty matter for fiscal sustainability in Nigeria. The paper reveals that, while geopolitical risks enhance fiscal sustainability in Nigeria, economic uncertainty does not. Following the outcome of the study, it is recommended that fiscal authorities should implement policies aimed at maximising the benefits of rising oil price triggered by geopolitical risks to improve fiscal sustainability.

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