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Geopolitical Risk and Its Effect on Nigeria's Energy Inflation

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This study investigates the effect of geopolitical risk on energy inflation in Nigeria from 2012 to 2023. Utilizing a time-varying causality methodology, we examine the influence of geopolitical events, as measured by the Salisu et al. (2023) index, on gas inflation and fuels for transport. The results indicate that geopolitical tensions substantially contribute to energy inflation, underscoring the necessity for proactive policies to alleviate the economic impacts of such risks.

I. Introduction

Geopolitical risk presents considerable challenges to economic stability, particularly in regions prone to political unrest and security threats. Nigeria, as a leading oil producer in Africa, faces unique vulnerabilities to these risks, frequently resulting in volatility within critical sectors such as energy. This study aims to empirically evaluate the impact of geopolitical risk on energy inflation in Nigeria, covering the period from January 2012 to June 2023. Utilizing a recently developed geopolitical risk index (Salisu et al., 2023), the analysis encompasses risks arising from events including insurgencies, terrorism, militancy, and civil unrest, which significantly affect energy markets.

The relationship between geopolitical risks and macroeconomic variables, such as inflation and energy prices, has been extensively studied (see Ghosh, 2021; Khan et al., 2021; Kumar et al., 2021; Lee et al., 2021a, 2021b; G. O. Olasehinde-Williams & Balcilar, 2022). Geopolitical risks, often characterized by political instability, conflicts, and terrorism, have been found to disrupt energy markets, causing price volatility (Kang et al., 2017). In oil-producing economies like Nigeria, the consequences of geopolitical risks are particularly severe due to the country's heavy dependence on oil exports and energy imports (Abubakar & Akadiri, 2022).

Geopolitical risk is generally recognized as a significant determinant of global energy prices. The energy sector is sensitive to both domestic and international geopolitical events. Several studies have investigated the connection between geopolitical risk and energy inflation. For instance, Lee et al. (2021a) indicate that geopolitical risks lead to higher oil prices, which subsequently contribute to broader inflationary trends. Their findings suggest that energy inflation is closely associated with periods of heightened geopolitical tension, particularly during times of political unrest in oil-exporting regions. Similarly, Olasehinde-Williams et al. (2023) report that energy prices increase when European nations experience elevated geopolitical tensions, with the inflationary effect being more pronounced in countries already facing relatively high inflation rates. Additionally, Salisu et al. (2023) highlight that geopolitical tensions often result in supply chain disruptions, creating inflationary pressures in energy markets. Their research emphasizes that in countries with unstable political environments, these risks are amplified, leading to greater volatility in energy prices. This is especially relevant to Nigeria, where terrorism, insurgencies, and militancy significantly affect the country's economic stability, as depicted in the geopolitical risks trend in Figure 1.

It is notable that a significant challenge in examining the nexus between geopolitical risk and energy inflation is accounting for the time-varying nature of these relationships. Rossi and Wang (2019) propose a time-varying Granger causality test that considers structural breaks and instabilities in the data, enabling researchers to observe the effects of geopolitical risks on energy prices over specific periods. This study extends the work of Akpan and Abubakar Sani (2024) by employing a time-varying causality framework to investigate how geopolitical risks influence energy inflation, providing period-specific insights that underscore the necessity for adaptive policy responses.

Driven by Nigeria's reliance on energy imports and the vulnerability of energy prices to geopolitical disruptions,

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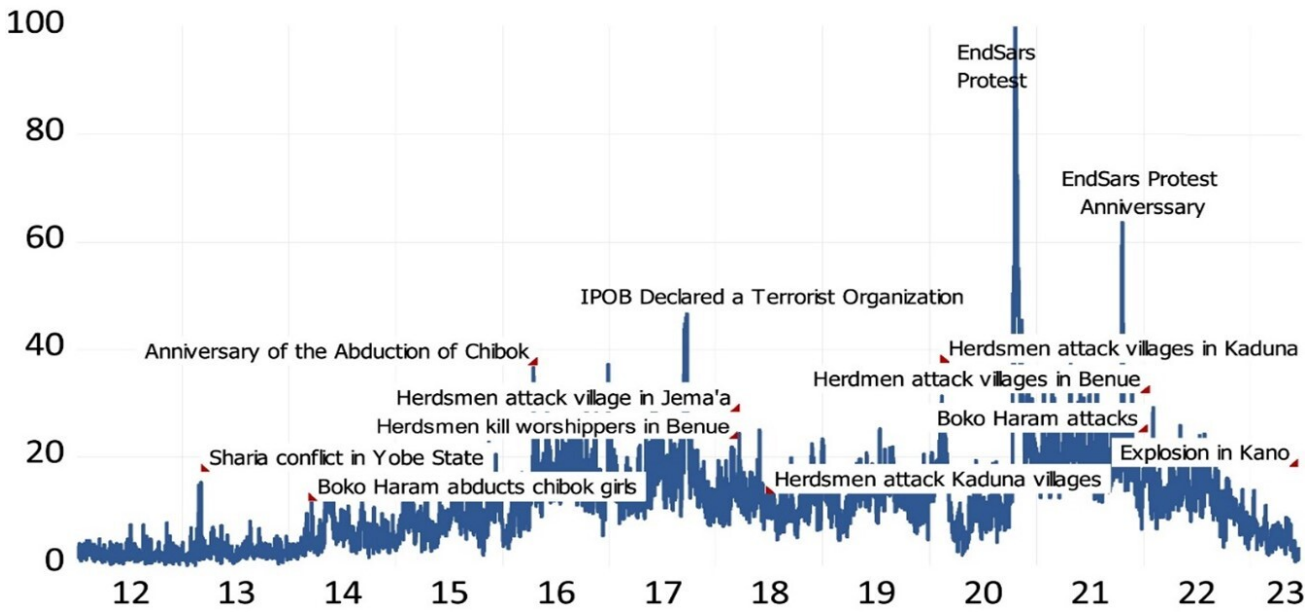

Figure 1. Trend in the geopolitical risk index for Nigeria (Salisu et al., 2023)

this research addresses a critical gap in the literature by exploring the predictive relationship between geopolitical risks and energy inflation. By utilizing a time-varying causality approach, the study not only identifies structural breaks but also elucidates period-specific causality patterns between geopolitical tensions and two primary categories of energy inflation: gas inflation and fuels and lubricants for personal transport equipment.

The contribution of this research lies in its innovative application of time-varying methods within a geopolitical risk context, offering a dynamic understanding of how geopolitical instability impacts energy inflation. The findings are expected to assist policymakers in managing energy price volatility and formulating strategies to mitigate the adverse effects of geopolitical risks on Nigeria's economy.

The remainder of the paper is organized as follows. Section II describes the data and methodology. Section III presents the main findings, followed by the conclusion in the final section.

II. Data and Methodology

A. Data

This study empirically analyzes monthly data on geopolitical risk and energy inflation from January 2012 to June 2023. Geopolitical risks in Nigeria are documented using the geopolitical risk index developed by Salisu et al. (2023). This index is a news-based measure that encompasses events related to geopolitical tensions, war risks, military threats, and terror attacks. To accurately capture the unique geopolitical risks in Nigeria, Salisu et al. (2023) selected specific keywords for their newspaper search: geopolitical risk, geopolitical concern, geopolitical tension, geopolitical uncertainty, Boko Haram, Islamic State in West Africa, ISWA, Islamic State's West Africa Province, ISWAP, criminal gangs, kidnapping, insurgence, insurgent, farmer-herder conflict, farmer-herder clash, militant, militancy, Biafra, separatist, IPOB, Indigenous People of Biafra, OPC, Oodua People's Congress, piracy, pirates, EndSARS, bandits, terrorists, terrorism, secessionists, and cultism. The prominent Nigerian newspapers utilized in constructing the index include The Punch, This Day, The Guardian, Business Day, Daily Trust, Nigerian Tribune, PM News, and Leadership Newspaper.

For the empirical analysis, two types of disaggregated energy inflation data are employed: "gas inflation" and "fuels and lubricants for personal transport equipment". Gas inflation comprises prices of energy items such as town gas, natural gas, and liquefied hydrocarbons (e.g., butane, propane). Fuels and lubricants for personal transport equipment cover prices of energy goods including petrol, diesel, liquid petroleum gas, alcohol, lubricants, transmission fluids, coolants, and additives. Data on these energy inflation variables are obtained from the Statistical Department of the Central Bank of Nigeria.

B. Time-varying causality in the presence of instabilities

To evaluate the predictive ability of geopolitical risk on energy inflation in Nigeria, this study uses the time-varying causality test by Rossi and Wang (2019). Traditional vector autoregressive-based Granger causality methods often overlook structural changes that can lead to errors in the generated estimates (Rossi, 2005). To address this issue, Rossi and Wang (2019) propose a time-varying Granger causality test based on a time-varying parameter VAR model. This alternative method accounts for structural changes, resulting in more accurate outcomes compared to conventional Granger causality methods. Additionally, its resilience to instabilities and time-varying nature allows for the analysis of period-specific connections between

Table 1. Time-varying parameter Granger causality test results

Statistics	ExpW	MeanW	Nyblom	SupLR
GPR→GAS	6.713*	11.642*	3.957**	17.838**
	(0.051)	(0.055)	(0.033)	(0.047)
GPR→FLT	18.328***	15.075**	3.298*	45.486***
	(0.000)	(0.013)	(0.062)	(0.000)

Note: GPR stands for geopolitical risk, GAS represents gas inflation, and FLT refers to fuels and lubricants for personal transport equipment inflation. The four alternative test statistics reported are exponential Wald, mean Wald, Nyblom, and Quandt Likelihood Ratio tests. *p*-values are provided in parentheses. The arrows show the direction of causality. ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

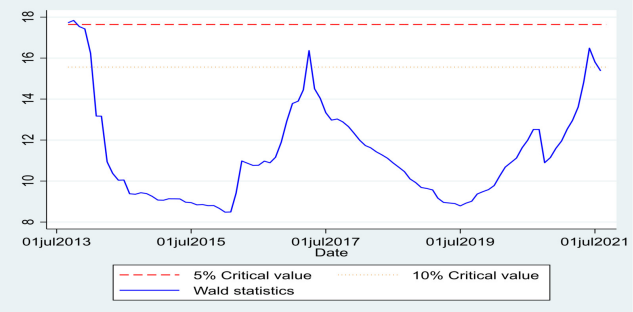

Figure 2. Time varying causality (GPR→GAS)

Note: GPR stands for geopolitical risk and GAS represents gas inflation.

Figure 3. Time varying causality (GPR→FLT)

Note: GPR stands for geopolitical risk and FLT refers to fuels and lubricants for personal transport equipment inflation.

geopolitical risks and energy inflation in Nigeria. For these reasons, this method is used in this study. The time-varying causality test is implemented following Rossi and Wang (2019), using a reduced-form VAR model with time-varying parameters, specified as follows:

$$A_t(L)y_t = u_t \quad (1)$$

$$A_t(L) = I - A_{1t}L - A_{2t}L^2 - \ldots - A_{pt}L^p \quad (2)$$

where $y_t = [y_{1t}, y_{2t}, \ldots, y_{nt}]'$ refers to a $(n\ x\ 1)$ vector of endogeneous variables. A_{jt} = $(n\ x\ n)$ coefficient matrices have time-varying characteristics. u_t represents error term.

III. Main Findings

The time-varying Granger causality tests are conducted to evaluate the predictive capability of geopolitical risks on gas inflation, as well as fuels and lubricants for personal transport equipment inflation in Nigeria. The selected method's proficiency in handling both time-variation and instabilities enables the identification of specific periods where causal effects are evident. The comprehensive results are detailed in Table 1, with the time-varying plots of causal effects illustrated in Figures 2 and 3.

As presented in Table 1, the null hypothesis indicating no causal impact from geopolitical risk to gas inflation is rejected by all four test statistics at a 10% significance level or better. Similarly, the results demonstrate that the null hypothesis of no causal impact from geopolitical risk to fuels and lubricants for personal transport equipment inflation is also rejected at a 10% significance level or better. These findings suggest that geopolitical risks exacerbate energy inflation in Nigeria, contributing to economic uncertainty with adverse consequences for the country. This observation not only corroborates earlier studies by Caldara et al. (2022, 2024) and Yang et al. (2023) regarding the inflationary effect of geopolitical risks but also highlights this phenomenon within Nigeria's energy sector. Furthermore, our results align with the assertion by Olasehinde-Williams et al. (2023) that geopolitical risks intensify energy inflation in the European Economic Area, extending this conclusion to the Nigerian context.

Figure 2 illustrates the time-varying plot of the causal effect from geopolitical risk to gas inflation in Nigeria, highlighting period-specific significance. Statistically significant periods are observed in the early months of 2014, around mid-2017, and in the initial months of 2021. These periods coincide with notable geopolitical events in Nigeria, such as the Chibok schoolgirls kidnapping by Boko Haram in 2013, the herdsmen attacks and the designation of "Indigenous People of Biafra" as a terrorist organization in 2017, and the aftermath of the EndSARS protests in early 2021.

Figure 3 presents the time-varying causal effects from geopolitical risk to fuels and lubricants for personal transport equipment inflation in Nigeria. This effect is statistically significant from late 2015 to early 2019, a period marked by various crises including the recurring clashes between farmers and herders in northern Nigeria, secession attempts in the Niger-Delta region, and the increased activities of the "Indigenous People of Biafra" leading to its classification as a terrorist organization.

IV. Conclusion

This study examines the relationship between geopolitical risk and energy inflation in Nigeria, specifically focusing on gas inflation and fuels and lubricants for personal transport equipment inflation from January 2012 to June 2023. Using the time-varying causality test, the analysis indicates that geopolitical risks significantly influence energy inflation in Nigeria, with periods of statistical significance corresponding to key geopolitical events, such as the Chibok kidnapping, farmer-herder conflicts, and the EndSARS protests. These findings highlight the influence of geopolitical tensions on Nigeria's energy markets, as geopolitical risk contributes to uncertainty, affecting both gas prices and transport-related energy costs.

Empirical results suggest the importance of considering geopolitical risk in formulating energy policies and strategies aimed at stabilizing prices and promoting economic growth (Saint Akadiri et al., 2020). The time-varying nature of the causality indicates that geopolitical risks have both immediate and long-term effects on energy inflation, suggesting a need for adaptable policy responses to mitigate the impact of such risks on the economy.

Nigeria may benefit from enhancing its domestic energy infrastructure to reduce the impact of geopolitical risks on energy inflation. By investing in local refineries and production facilities, the country could decrease its dependence on imported energy, making it less susceptible to external shocks. Additionally, implementing an early warning system to monitor geopolitical tensions domestically and internationally would allow for timely interventions, such as strategic fuel reserves or temporary subsidies, to manage rising energy costs during crises.

Diversifying energy sources, including renewables like solar and wind, could help reduce reliance on fossil fuels, which are more affected by geopolitical instability. This approach would improve long-term energy security and reduce inflationary pressures. The government could also offer targeted subsidies to sectors most impacted by energy inflation, such as transportation and logistics. Furthermore, addressing internal security threats, such as insurgency and ethnic conflicts, which contribute to geopolitical risks, is essential for stabilizing energy prices and maintaining economic stability.

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