Geopolitical Risk and Economic Policy Uncertainty: A Regime-Dependent VAR Analysis

Iulia Lupu
Adina Criste
"Victor Slăvescu" Centre for Financial and Monetary Research, Romania
iulia_lupu@icfm.ro
criste.adina@gmail.com

Abstract

This paper investigates the dynamic relationship between global economic policy uncertainty (GPU) and geopolitical risk (GPR) over the period 1997–2025. Utilizing monthly data from the Global Economic Policy Uncertainty Index and the Geopolitical Risk Index, we estimate both a linear vector autoregression (VAR) and a nonlinear threshold VAR (TVAR) model to capture potential regime-dependent dynamics. The empirical findings reveal strong asymmetries in the transmission of uncertainty shocks. In tranquil periods, shocks to the GPU exert limited influence on GPR, and vice versa. However, during high-risk geopolitical regimes, policy uncertainty shocks significantly amplify geopolitical tensions, while geopolitical shocks lead to persistent increases in economic policy uncertainty. These results underscore the importance of accounting for nonlinearities and regime shifts when modelling uncertainty interdependence. Our findings contribute to a better understanding of how uncertainty propagates through the global system and offer important implications for policy design and risk management under conditions of elevated geopolitical stress.

Key words: geopolitical risk, economic policy uncertainty, threshold VAR (TVAR) model, regime-dependent dynamics
J.E.L. classification: C32, E66, F50, D80

1. Introduction

Periods of heightened uncertainty, whether stemming from economic policy decisions or geopolitical events, have increasingly defined the global macroeconomic landscape. From the aftermath of the 2008 global financial crisis to the disruptions triggered by the COVID-19 pandemic and ongoing geopolitical tensions, uncertainty has emerged as a powerful driver of financial market volatility, investment behaviour, and macroeconomic outcomes. Two categories stand out among the multiple sources of uncertainty: economic policy uncertainty (EPU) and geopolitical risk (GPR). While both have been studied extensively in isolation, their interaction remains relatively underexplored, particularly the potential bidirectional and regime-dependent dynamics between them.

The literature has established that economic policy uncertainty broadly affects firm-level investment (Baker, Bloom and Davis, 2016), stock returns (Bossman, Gubareva and Teplova, 2023), and macroeconomic activity. Simultaneously, geopolitical risk has been shown to trigger capital outflows, depress consumption, and elevate financial volatility (Caldara and Iacoviello, 2022). The relationship between geopolitical risk and economic policy uncertainty is characterised by intricate interdependencies. Escalations in geopolitical tensions can doubt the credibility and direction of future policy measures, while volatile or opaque economic policymaking may aggravate geopolitical instability, especially in vulnerable regions. Gaining insight into the mutual reinforcement of these two forms of uncertainty is strategically important for policymakers, financial actors, and risk management practitioners.

This paper contributes to the growing literature on uncertainty by empirically examining the dynamic relationship between global economic policy uncertainty (GPU) and GPR over the period 1997–2025. We use the GPR index developed by (Caldara and Iacoviello, 2022) and the GPU index by (Baker, Bloom and Davis, 2016) to capture fluctuations in global uncertainty. Our empirical strategy relies on a combination of a linear vector autoregression (VAR) and a nonlinear threshold VAR (TVAR) framework, allowing us to assess how the transmission mechanisms differ across low-risk and high-risk regimes.

The results reveal pronounced asymmetries: during geopolitical calm periods, GPU shocks have limited effects on GPR. However, in high-risk regimes, GPU shocks generate significant feedback into GPR, and vice versa. These findings underscore the importance of accounting for nonlinear and regime-dependent interactions in uncertainty modelling. They also carry important policy implications: in environments already characterised by geopolitical stress, unclear or unstable economic policies may exacerbate volatility, undermining investor confidence and global stability.

The remainder of this paper is structured as follows. Section 2 describes the theoretical background, Section 3 presents data and methodology, including the sources, transformations, and econometric framework. Section 4 presents the empirical results, including baseline and regime-specific impulse response functions. Section 5 concludes with key insights, policy implications, and avenues for future research.

2. Theoretical background

The relationship between EPU and GPR has garnered significant attention in recent years, particularly in their combined impact on macroeconomic stability and financial markets. The foundational work by Baker, Bloom and Davis (2016) introduced the EPU index, which provides a quantitative measure of policy-related economic uncertainty. Concurrently, Caldara and Iacoviello (2022) developed the GPR index, which captures the frequency of news articles related to geopolitical tensions and conflicts.

Several studies have explored the individual and joint effects of EPU and GPR on various economic indicators. For instance, Arif, Rawat and Shahbaz (2020) examined the impact of U.S. EPU on GPR in BRIC economies, revealing heterogeneous effects across countries. Their findings suggest that while U.S. policy uncertainty negatively influences GPR in China and Russia, it has a positive relationship with GPR in India and Brazil, indicating the complexity of cross-country spillovers. Studies have shown, for example, that the transmission mechanisms between GPU and GPR can differ significantly between low-risk and high-risk periods, emphasizing the need for models that account for such nonlinearities.

In the financial domain, Bossman, Gubareva and Teplova (2023) investigated the asymmetric effects of EPU, GPR, and market sentiment on European Union sectoral stocks. Utilising quantile-based techniques, they found that EPU from the European Union has the highest predictive ability on European Union sectoral stock returns, while U.S. EPU shows no significant predictive power. Their study underscores the importance of regional factors in determining the influence of policy uncertainty and geopolitical risks on financial markets. Environmental considerations have also been linked to EPU and GPR. Anser et al. (2021) analyzed the effects of these uncertainties on environmental degradation in emerging economies. Their research indicates that both EPU and GPR contribute to increased CO_2 emissions, highlighting the broader implications of policy and geopolitical uncertainties beyond economic and financial spheres.

Methodologically, various approaches have been employed to capture the dynamic interactions between GPU and GPR. Using vector autoregression (VAR) and threshold VAR (TVAR) models, firstly proposed by Antonakakis and Gabauer (2017), allows for examining regime-dependent relationships (Chirilă and Chirilă, 2022). Different types of VAR methodologies were used to analyse uncertainty in respect with different other economic indicators (Balcilar et al., 2021; Yang et al., 2022; Lopes and and Rotatori Corrêa, 2023; Hurduzeu et al., 2024).

3. Research methodology

This study employs two primary macro-financial indices to investigate the interaction between economic policy uncertainty and geopolitical risk (data source Economic Policy Uncertainty, 2025). The GPR Index, developed by Caldara and Iacoviello (2022), measures global geopolitical tensions, capturing the frequency of news-based references to geopolitical events. The GPR index is available at a daily frequency and was retrieved in May 2025. The GPU Index, constructed by Baker, Bloom and Davis (2016), reflects global economic policy uncertainty and is published at a monthly frequency. The sample period spans from May 1997 to April 2025, yielding 373 monthly observations.

To ensure temporal consistency, the daily GPR index is aggregated to a monthly frequency via a simple arithmetic mean, preserving the richness of high-frequency information while maintaining compatibility with the monthly GPU series. The aggregation is formalized as:

$$\mathrm{GPR}_t = \frac{1}{D_t}\sum_{d=1}^{D_t} \mathrm{GPRD}_{t,d},$$

where D_t denotes the number of trading days in the month t. Additionally, GPU values, initially reported at the beginning of each month, are temporally realigned to end-of-month timestamps to synchronise with the monthly GPR aggregates.

GPR and GPU indices are standardised to facilitate meaningful comparison between the two series (z-scores). While unit root tests using the Augmented Dickey–Fuller (ADF) procedure suggest that both series are non-stationary in levels but stationary in first differences, the empirical analysis proceeds using level data. This decision is grounded in two considerations: (i) the potential existence of a cointegrating relationship between the indices, and (ii) the robustness of impulse-response analysis to near-unit-root behaviour. A preliminary graphical inspection reveals asynchronous spikes in the two series, hinting at potential regime-dependent dynamics.

The analysis adopts a regime-switching approach to capture potential nonlinearities in the relationship between economic policy uncertainty and geopolitical risk. High-risk and low-risk regimes are defined using a threshold rule based on the empirical distribution of the GPR index. Specifically, months where GPR exceeds its 75th percentile are classified as high-risk:

$$\mathrm{HighRisk}_t = \begin{cases} 1, & \text{if } \mathrm{GPR}_t > Q_{0.75}(\mathrm{GPR}) \\ 0, & \text{otherwise} \end{cases}$$

This classification yields 93 high-risk months (approximately 25%) and 280 low-risk months (approximately 75%). Sensitivity analyses employing alternative thresholds at the 70th and 80th percentiles confirm the robustness of this regime definition.

To model the dynamic relationship between economic policy uncertainty and geopolitical risk, the analysis begins with a standard vector autoregression (VAR) framework. Let:

$$\mathbf{y}_t = \begin{bmatrix} \mathrm{GPU}_t \\ \mathrm{GPR}_t \end{bmatrix}.$$

The baseline VAR(p) model is specified as:

$$\mathbf{y}_t = \mathbf{c} + A_1\mathbf{y}_{t-1} + \cdots + A_p\mathbf{y}_{t-p} + \boldsymbol{\varepsilon}_t, \quad \boldsymbol{\varepsilon}_t \sim \mathcal{N}(0, \Sigma).$$

Lag order selection using the Akaike Information Criterion (AIC) suggests an optimal lag length of $p = 2$.

To accommodate regime-specific dynamics, the baseline VAR is extended into a Threshold VAR (TVAR), where model parameters vary by regime according to the high-risk indicator:

$$\mathbf{y}_t = \left[\mathbf{c}^{(L)} + A^{(L)}(L)\mathbf{y}_{t-1}\right](1 - \mathrm{HighRisk}_t) + \left[\mathbf{c}^{(H)} + A^{(H)}(L)\mathbf{y}_{t-1}\right]\mathrm{HighRisk}_t + \boldsymbol{\varepsilon}_t.$$

Each regime-specific system is estimated using ordinary least squares (OLS), maintaining the two-lag structure for comparability. Coefficient differences between regimes are evaluated using Wald tests with heteroskedasticity-robust standard errors. Inference is based on 1,000 wild bootstrap replications.

Impulse response functions (IRFs) are computed separately for each regime over a 12-month horizon, with the regime indicator held constant throughout the simulation. Confidence intervals are constructed using 1,000 bootstrap samples.

As an additional robustness check, a Markov-Switching VAR (MS-VAR) model is estimated. Unlike the TVAR, this model allows regimes to emerge endogenously from the data. The smoothed regime probabilities obtained from the MS-VAR are compared against the externally defined high-risk regime indicator to assess model consistency and classification accuracy.

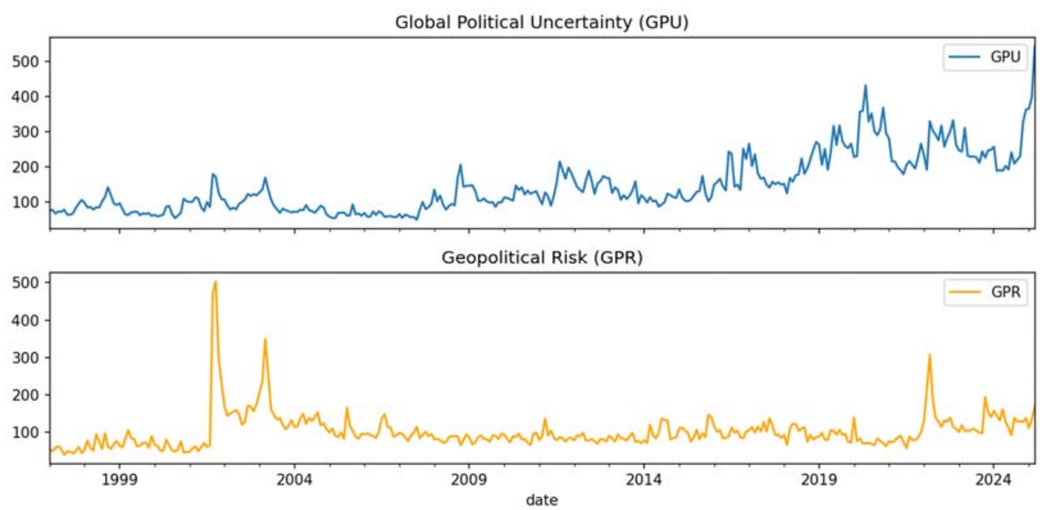
Four key considerations shape the methodological design of this study. First, aggregating daily GPR data to a monthly frequency ensures that the model incorporates high-resolution geopolitical information while remaining compatible with the lower-frequency GPU series. This mixed-frequency handling enables the capture of both short-term volatility and long-term trends in uncertainty dynamics. Second, by employing a Threshold VAR (TVAR) framework, the model can account for potential nonlinearities and asymmetries in the transmission of economic policy uncertainty across different levels of geopolitical risk. This is particularly important given the empirical observation that policy shocks may have varying effects depending on the prevailing risk environment. Third, based on a quantile threshold of the GPR index, the regime classification strategy provides a transparent and economically interpretable criterion for distinguishing between high- and low-risk periods. This threshold rule aligns with intuitive notions of geopolitical stress and enhances the clarity of the empirical setup. Finally, the chosen approach offers practical value for policy analysis: by identifying how the impact of economic policy uncertainty varies across geopolitical regimes, the model generates insights that are directly relevant for policymakers, investors, and risk managers seeking to navigate periods of elevated uncertainty.

4. Findings

Preliminary Dynamics

Figure no. 1 displays the GPU and GPR indexes' time series over the sample period from 1997 to 2025.

Figure no. 1. Evolving Patterns of Global Uncertainty: GPU and GPR from 1997 to 2025



Source: Authors' adaptation based on Economic Policy Uncertainty (2025)

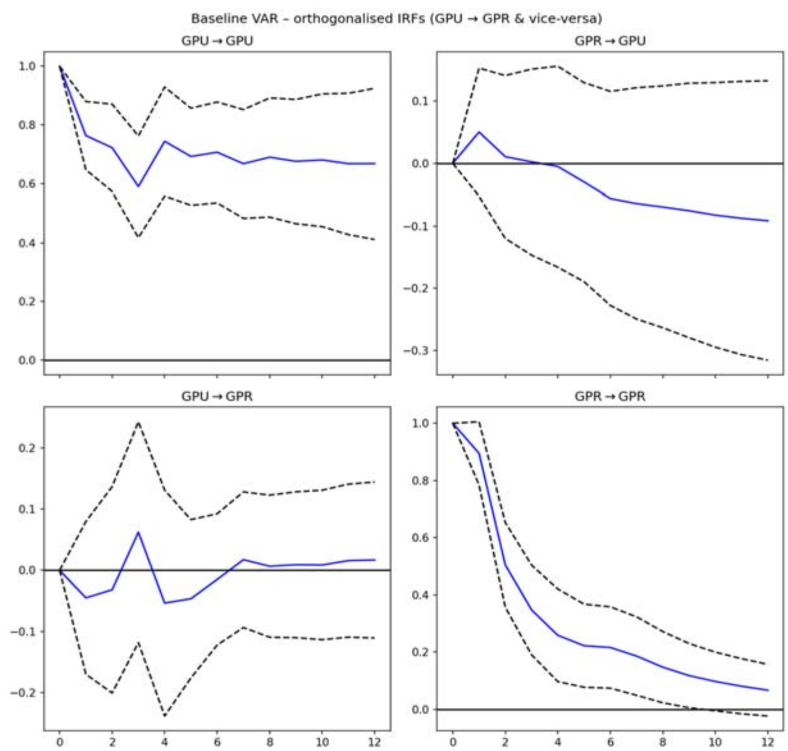
While both indices capture distinct but interrelated dimensions of global uncertainty, their dynamics reveal important contrasts and interactions. The upper panel shows that GPU has experienced an upward trend, particularly since 2016, with a sharp escalation in the most recent period (2023–2025). This trend suggests a structural intensification of political and economic uncertainty at the global level, likely driven by events such as global financial crisis, Brexit, the COVID-19 pandemic, and the increasing fragmentation of global governance. The most recent surge likely reflects compounded crises, including geopolitical tensions, fiscal instability, and shifting policy frameworks in major economies. In contrast, the lower panel displays the GPR index, which is characterized by episodic spikes corresponding to major geopolitical events. Notable peaks include the September 11 attacks in 2001, the Iraq War in 2003, and the Russian invasion of Ukraine in 2022. While GPR does not exhibit a persistent trend over time, it reacts sharply to shocks, highlighting its sensitivity to international conflict, terrorism, and military escalation. A comparative reading of the two indices suggests that GPU reflects a broader, cumulative rise in systemic uncertainty, while GPR responds to acute geopolitical events. However, a stronger co-movement emerges in recent years, indicating a growing interdependence between political and geopolitical sources of uncertainty. This is particularly evident after 2022, when both indices increased in parallel, suggesting that global policy uncertainty and geopolitical tensions are becoming mutually reinforcing.

Baseline VAR Impulse Response Functions

Figure no. 2 presents orthogonalised impulse response functions (IRFs) from the baseline VAR(2) model. The top-left panel shows that a one-standard-deviation shock to GPU has a persistent, though declining, impact on itself, suggesting moderate inertia in policy uncertainty. The bottom-left panel shows the transmission from GPU to GPR, where the response is small and statistically insignificant, indicating weak direct transmission from policy to geopolitical uncertainty.

On the other hand, the top-right panel reveals that shocks to GPR exert a small but persistent adverse effect on GPU, suggesting that geopolitical tensions may dampen economic policy certainty over time. The bottom-right panel shows the autocorrelation of GPR itself, with a significant and long-lasting decline consistent with mean-reverting behaviour in geopolitical news flows.

Figure no. 2. Baseline VAR - Orthogonalised IRFs between GPU and GPR



Source: Authors' representation

Threshold VAR: Regime-Dependent Responses

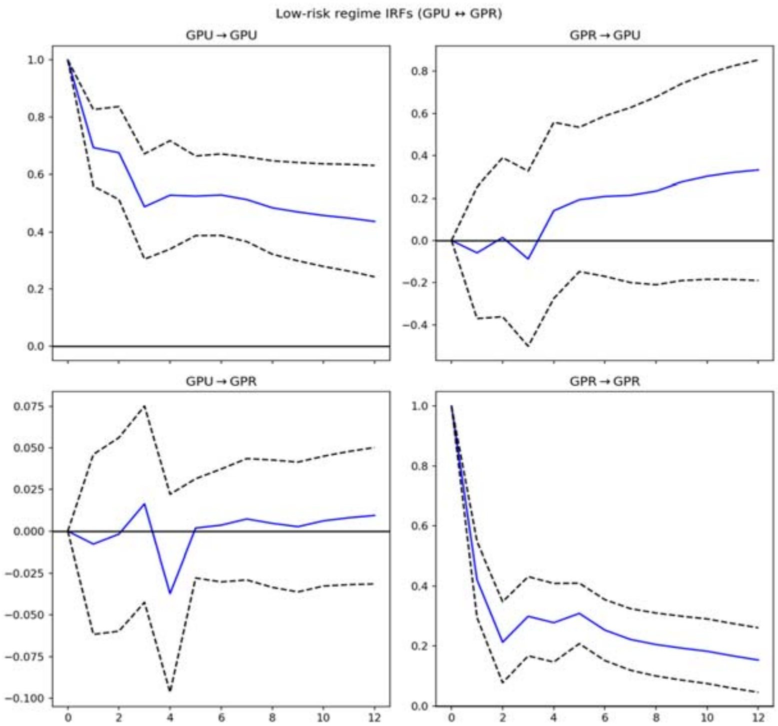
To explore whether the transmission mechanisms differ across risk environments, we estimate a TVAR model and compute regime-specific IRFs.

Figures no. 3 and 4 present the responses for the low-risk and high-risk regimes, respectively.

In the low-risk regime (Figure no. 3), shocks to GPU (top-left panel) have a relatively muted and decaying effect on themselves, while the bottom-left panel indicates that GPU shocks do not significantly affect GPR.

Notably, GPR shocks have a positive and gradually increasing effect on GPU (top-right), suggesting a weak transmission from geopolitical news to economic uncertainty in tranquil times.

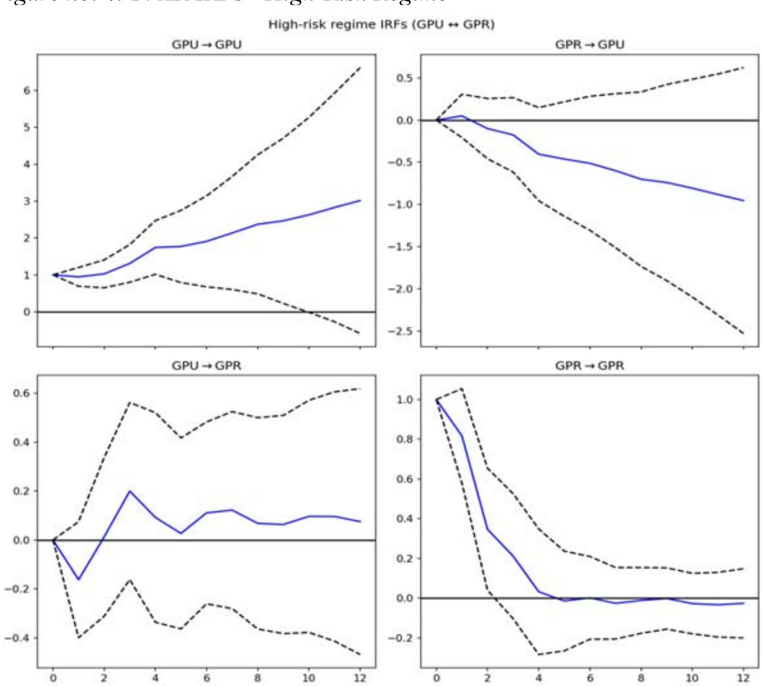
Figure no. 3. TVAR IRFs - Low-Risk Regime



Source: Authors' representation

Conversely, in the high-risk regime (Figure no. 4), the system behaves markedly differently.

Figure no. 4. TVAR IRFs - High-Risk Regime



Source: Authors' representation

A one-standard-deviation GPU shock produces a significant and growing effect on itself (top-left), indicating strong self-reinforcement of policy uncertainty in times of geopolitical stress. The bottom-left panel reveals that GPU shocks now have a sizable and positive effect on GPR, implying that economic policy uncertainty can exacerbate geopolitical instability in volatile environments. GPR shocks continue to exert an intense and persistent negative impact on GPU (top-right), consistent with expectations that heightened geopolitical tensions worsen economic policy clarity in crisis conditions. The bottom-right panel confirms the persistence of GPR in this regime as well.

These findings underscore the asymmetric interaction between economic policy uncertainty and geopolitical risk. While GPU shocks are largely inert or weakly transmitted under normal conditions, their effects are significantly amplified in periods of geopolitical tension. Similarly, GPR shocks have qualitatively different effects across regimes, with stronger feedback loops in the high-risk scenario. These results align with previous empirical findings that suggest nonlinear and regime-dependent propagation of uncertainty shocks. The TVAR structure thus proves critical in uncovering these dynamics, which would be obscured in a linear VAR. The contrast between the baseline model and the regime-specific responses illustrates the importance of accounting for nonlinearities in uncertainty interactions, particularly in contexts of heightened systemic risk.

5. Conclusions

This paper investigates the dynamic relationship between GPU and GPR using a combination of linear and nonlinear time series models from 1997 to 2025. By leveraging a baseline VAR and a TVAR framework, we uncover evidence of regime-dependent interactions obscured in linear models.

Our findings suggest that the transmission of uncertainty is highly sensitive to the geopolitical environment. In particular, GPU shocks exert minimal influence on GPR during tranquil periods, while their impact becomes statistically significant and economically large in high-risk regimes. Similarly, GPR shocks have asymmetric effects on GPU. During low-risk periods, geopolitical shocks contribute modestly to economic policy uncertainty, whereas they produce intense and persistent responses in high-risk periods. Impulse response analyses further support these nonlinear patterns, which reveal markedly different dynamics across regimes.

The results have important implications for both policymakers and financial market participants. From a policy perspective, the amplification of uncertainty in high-risk environments underscores the importance of coordinated responses during geopolitical crises. The finding that GPU feeds into GPR under such conditions suggests a potential feedback loop, whereby poorly communicated or unpredictable economic policy may exacerbate geopolitical instability. For investors, understanding the conditional impact of uncertainty shocks can improve risk management strategies, particularly in environments marked by elevated geopolitical tension.

Future research could extend this framework in several directions. First, incorporating additional variables, such as financial volatility indices or macroeconomic fundamentals, could help disentangle the channels through which uncertainty propagates. Second, examining cross-country heterogeneity using panel VAR or global VAR frameworks may reveal whether the observed dynamics are specific to the global level or driven by regional asymmetries. Finally, integrating structural identification schemes, such as sign restrictions or proxy SVAR methods, would enable a more precise interpretation of the shocks driving these interactions.

By revealing the conditional dynamics between geopolitical risk and economic policy uncertainty, this study advances the understanding of how uncertainty propagates under different regimes, underscoring the relevance of regime-sensitive modelling approaches in an increasingly volatile global environment.

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