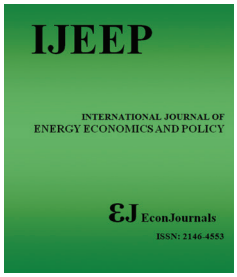

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Responses of Economic Policy Uncertainty, Financial Stress and Energy-Related Uncertainty to the Shocks in US-China Tension in US

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ABSTRACT

The current study examines the US-China tension shocks on economic policy uncertainty, financial stress and energy-related uncertainty for the first time in the case of the United States. To this end, monthly data is utilized spanning the period from January, 2000 to September, 2022. For the empirical estimations, time-varying parameter vector autoregression (TVP-VAR) model is applied. The findings reveal that the positive responses of economic policy uncertainty, financial stress and energy-related uncertainty to the shocks in US-China tensions are observed, validating the theoretical and economic intuition in general. However, the negative effects of US-China tension on economic policy uncertainty, financial stress and energy-related uncertainty is also obtained which is specific to US, aligned with economic intuition.

Keywords: US-China Tensions, Economic Policy Uncertainty, Financial Stress, Energy-Related Uncertainty, Time-Varying Parameter Vector Autoregression
JEL Classifications: G01, Q43, C32

1. INTRODUCTION

Since 2017, Sino-US political relations have notably worsened due to various disagreements, including human rights concerns, trade disputes, competition in high-tech industries, the COVID-19 investigation, and other matters (Cai, 2025). The ongoing U.S.-China geopolitical tensions have significant effects on multiple facets of the global economy and geopolitical landscape. It is essential to comprehend their impact on global resources, like crude oil. (Guo et al., 2025). The escalating commerce friction in the middle of the United States (US) and China, driven by China's fast economic development since its 2001 accession to the World Trade Organization (WTO), emphasizes competitive pressures arising from China's leading position in global manufacturing (Liu et al., 2025). US taxes on China are economically damage between US and Chine. The taxes have resulted in a powerful decrease in US imports from China. US losings are mostly depend on more expensive prices for clients (UN, 2019). The China-U.S. trade agreement has sparked mixed reactions. On the one hand, there is relief, as it temporarily prevents a harmful trade war. On the other hand, there is concern, since the deal gives the United States selective and preferential access to the Chinese market, violating multilateral rules that, in principle, forbid discrimination among trading partners (World Bank, 2020).

Since the tensions are increasing both countries, the academic interest to explore its effect on the global economy, energy and financial markets is also rising. China and the United States, as the two biggest oil usages globally also the US the great manufacturer, between US and China are looked forward to play a key role in the oil trade (Cai et al., 2022). In 2018 and 2019, both countries locked in a trade war, progressively raising taxes on each other's goods, eventually affecting around $450 billion worth of trade (World Bank, 2022). Any conflicts arisen between United States and China definitely influence on energy markets. More precisely, US-China tension leads to the fluctuations of energy stocks, thus amplifying uncertainties in the energy markets. Therefore, an interest to study the effects of between United States and Chine tension on energy-related uncertainty is increasing in the academia. More precisely, US-China trade tension and energy-related uncertainty are risk transmitters and receivers to each other (Akadiri and Ozkan, 2025). Therefore, increased tensions serve to the uncertainties in fossil fuels (Li et al., 2025), and oil supply (Guo et al., 2025). This could be because US-China tension first of all effects on trade, creating economic consequences. As a result, stock markets are affected by the heightened US-China tension, and energy stocks as well. More precisely, According to Ullah and Riaz (2025), energy-related uncertainty is linked to China`s overall and sectoral stock returns. Guo et al. (2021) in addition notice that political risk in US and China impacts on oil price. Pan et al. (2024) claim that US-China relation does effect on Global Financial Networks. It can be seen that US-China tension is interconnected to energy-related uncertainty, and in this nexus financial and economic activities also play a pivotal role. More precisely, Reboredo and Uddin (2016) search the effect of financial stress on energy price dynamics, however they claim financial stress is no important in determining energy price. Dong and Huang (2024) and Mariev and Islam (2025) also examine the interrelationship between financial stress and energy prices and stocks. Furthermore, energy markets and economic policy are also interconnected factors to each other. More specifically, Akusta (2024) finds that economic globalization increases energy security risk. Tillaguango et al. (2024) identify that energy policy is crucial to prevent global stagnation and inflation. Zheng et al. (2024) also study the connection between economic increase and green energy usage.

Even though the literature provides sufficient material to justify the effect of US-China tension on energy-related uncertainty, this association is not explored. Therefore, to fill this gap in literature, the current study investigates the association among US-China tension, energy-related uncertainty, financial stress and economic policy uncertainty in the United States, employing time-varying parameter vector autoregression (TVP-VAR) model. The remaining of the paper is organized as follows: Section 2 contains literature review; Section 3 provides data; Section 4 gives background about methodology; Section 5 includes empirical results; and Section 6 summarizes the findings.

2. LITERATURE REVIEW

2.1. Impact of US-China Tension on Economic Policy Uncertainty

In literature review, the interest is growing to examine the effect of US-China tension on economic policy uncertainty. More precisely, Cai (2025) analyzes the impact of US-China political tensions and worldwide supply chains pressure influence on the global economy. Rogers et al. (2024). They help shed light on this impact by developing an index that measures public concern over United States and China tensions. Their findings indicate that even without actual tension-inducing actions, the mere possibility of such actions can trigger negative economic reactions. Zhang et al. (2025) investigate impact of US-China geopolitical tensions influence the surroundings of semiconductor firms, emphasizing the crucial link in the middle of international relations and corporate sustainability. Their analysis shows that companies more exposed to these tensions tend to invest less in environmental initiatives, show lower energy efficiency, and exhibit weaker dedication to emissions reduction goals. Yu et al. (2023) examine how US TPU on China's agricultural imports and exports. The analysis show that an increase in US TPU will live in agriculture of China imports from the US in addition lead to decrease in China's overall exports of agriculture. Shi and Wang (2023) The study compares how economic policy uncertainty (EPU) from China and the U.S.—measured using the EPU index—affects the volatility of 11 major stock markets. The findings indicate that during the Global Financial Crisis (GFC), U.S. EPU had a stronger impact on volatility at both daily and monthly levels, particularly influencing European stock markets. In the post-GFC period, however, Chinese EPU began to play a more significant role, especially at a monthly frequency, affecting several markets in Asia and beyond Pan et al. (2024) examine the role of the state in the emergence, increase, and decrease of Chinese corporations' US listings and the reconfiguration of Global Financial Networks (GFNs) in response to the delisting risks arising from Sino-U.S. tensions. Their findings indicate that the US listings of Chinese corporations have been co-evolving with the exchanging interests, strategies, and bilateral relationship of the United States and Chinese executives.

2.2. Impact of US-China Tension on Financial Stress

Recent times, the investigation of US-China tension and financial variables are also increasing in academia. More precisely, Cai et al. (2025) examine the relation between variations in US and China geopolitical relationship and changes in United States fiscal circumstances. The analysis show that policymakers should closely observe financial markets during times of increased geopolitical tension, as US financial conditions can have an impact on US-China geopolitical relationships. Ouyang et al. (2024) examine the tail risk spillovers of both countries' stock exchange. Their findings indicate that understanding of tail risk contagion dynamics between stock markets of US and China, also Provides valuable insights into managing international risk regulations and enhancing global financial stability. Chen et al. (2022) examine impact of the U.S.- China commerce dispute effected the Chinese and U.S. stock exchanges at industry degree. The results emphasize that public utilities, industrial equipment manufacturing, and financials are key sectors in China's stock market, while financials, mining and quarrying, retail trade, and manufacturing play a central role in the U.S. Cai et al. (2023) The investigation into the Granger causality between US-China political relations and Chinese stock market returns, using the bootstrapping method and a rolling-window technique, reveals that changes in US-China political

relations have a lasting Granger causal effect on stock market fluctuations, while the reverse effects are short-lived. He et al. (2021) examine the impact of world commerce policy uncertainty on equity markets. Their findings indicate that between United States and China commerce disagreements have a useful effect on U.S stock trade while it negatively influences Chinese stock trade. Their analysis show that International investors and policymakers should consider the impact of both international and domestic TPU on the stock market. Wu (2025) examines how Sino-American tensions, as reflected by the U.S.–China Tension (UCT) index, on the volatility of global gold costs. These results emphasize that the significant impact of Sino-American tensions in forecasting gold market volatility offers important insights for investors to manage risk amid geopolitical instability.

2.3. Impact of US-China Tension on Energy-Related Uncertainty

US-China is major markets which play a pivotal role in the global economy, energy demand by them is also huge. Therefore, economic activities or conflicts influence on energy markets, thus affecting on energy-related uncertainty. Tensions in the US-China relations and strategies such as commerce sanctions and scarce earth controls implemented in the latest years influence the import and export shares of fossil oil in US and China. A growth in tension between US and China increases the energy costs volatility (Li et al. 2025). Moreover, the literature contains enough studies that explore tension of both countries and energy variables. More specifically, Cai et al. (2022) assess the effects of US-China geopolitical tensions on the oil commerce. Their analysis indicate that conflicting relations between US and China in the oil commerce may have important effects, like the growth of new strategic partners. Guo et al. (2025) examine the impact of U.S.-China tensions influence the worldwide crude oil stock in industrialized countries. This investigation provides fresh perspectives on the effects of U.S.-China tensions on the global economy and energy security, enhancing our understanding of the complex relationship between geopolitics and the energy market in developed countries. Akadiri et al. (2025) examines the mechanisms of risk transmission between US-China trade tensions, global oil price volatility, geopolitical risk, and energy-related uncertainty using an advanced quantile-on-quantile connectivity approach. The analysis show that different roles as net transmitters or net recipients of systemic risk, providing crucial insights into how these factors interact across different degrees of trade stress. Mignon and Saadaoui (2024) provide fresh evidence on how US-China political relations and geopolitical risks affect the oil market. Their analysis indicate that an improvement in the US-China geopolitical relation positively influence the oil trade: beneficial shocks on PRI are associated with optimistic expectations regarding future economic activity, driving up oil prices. Guo et al. (2021) set up three scenarios according to the development trend of the Sino-US trade conflict to measure the changes in global shipping carbon emissions under different trade conflict scenarios. The analysis indicate that, In contrast to a no-trade conflict scenario, an increase in tariffs will lead to a 0.329-0.345% reduction in international trade, while global international shipping carbon emissions are expected to rise by 0.25-0.33%.

3. DATA

This research employs the data in monthly frequency spanning from January 2000 to September 2022. The vector of endogenous variables Y_t is defined as:

$$Y_t^{'} = \left[UCT_t\ FSI_t\ EUI_t\ EPU_t\right], \quad (1)$$

The core variable of the model is the US-China tension index, denoted by UCT_t. This index is calculated by Rogers et al. (2024) compared to previous uncertainty indices, is able to quantify economic as well as political incidents between the US and China. The index of US-China tensions is downloaded from (https://www.policyuncertainty.com/US_China_Tension.html). The index of financial stress (FSI), developed by Office of Financial Research, is another important variable in the model. This index is obtained from (https://www.financialresearch.gov/financial-stress-index/) in a daily frequency and converted into monthly. Moreover, energy-related uncertainty is employed as a next variable. The index of energy-related uncertainty is constructed by Dang et al. (2023), and available in the website of economic policy uncertainty (https://www.policyuncertainty.com/media/Energy-Related%20Uncertainty%20Indexes.xlsx.). Lastly, economic policy uncertainty index is applied in the variable system, obtained from economic policy uncertainty web portal (https://www.policyuncertainty.com/us_monthly.html).

Natural log transformation is applied to US-China tension and energy-related uncertainty, and economic policy uncertainty. Financial stress is not transformed into log since it contains negative values.

Descriptive statistics of the variables in their levels are presented in Table 1.

Before the estimation of the VAR, the Augmented Dickey-Fuller (ADF) is implemented to determine integration levels of the variables. The results, presented in Table 2, indicate that the FSI and EPU are stationary, as evidenced by the significant test statistics. However, the remaining variables, i.e. UCT and EUI, are found to have a unit root at their levels but become stationary after the first difference is applied.

Based on the results of unit root test the variables, UCT and EUI are employed in the first differences whereas FSI and EPU are used at their levels in the VAR model.

Based on the paper's main objective, the US-China tension index (UCT) is ranked first because it is regarded as an exogenous shock affecting economic policy uncertainty (EPU), which is ordered second. Financial stress (FSI) is ordered third to measure their sensitivity to geopolitical and economic changes. To account for the dynamics of the energy-related uncertainty (EUI) and ensure that the model reflects the residual effects of the previous variables, the energy-related uncertainty is ordered as the last variable.

Table 1: Descriptive statistics (in levels)

Statistics	UCT	FSI	EUI	EPU
Mean	108.390	0.247	24.131	123.939
Median	97.942	−0.390	20.964	114.654
Maximum	349.945	11.064	83.018	350.459
Minimum	46.519	−1.915	0.416	57.202
Standard deviation	41.948	1.979	13.647	45.275
T	273	273	273	273

Table 2: Unit root test

	ADF			
	UCT	FSI	EUI	EPU
Level	−2.598*	−3.5425**	−2.3322	−3.825***
First Difference	−17.387***	-	−18.6197***	-

(*) Significant at the 10%, (**) Significant at the 5%, (***) Significant at the 1%. UCT, EUI and EPU are used in natural logarithm

4. METHODOLOGY

This paper employs the TVP-VAR methodology devised by Primiceri (2005) to analyze the impact of US-Sino tension on financial, energy and economic markets. In contrast with the linear VAR, the TVP-VAR model is designed to track the evolution of the dynamics among the variables in accordance with the varying economic conditions. Hence the model might be represented as follows (Casas and Fernandez-Casal, 2019):

$$Y_t = A_{0,t} + A_{1,t}Y_{t-1} + ... + A_{p,t}Y_{t-p} + U_t, t = 1,2,..., T \quad (2)$$

where Y_t is the previously defined endogenous variables` vector, $A_{i,t}$ (i = 0, 1., p) represents time-varying coefficient matrices, and U_t is the innovation vector with a time-varying covariance matrix Σ_t. Contrary to the TVP-VAR model based on the Bayesian methodology, the time-varying coefficients in $A_{i,t}$ are modelled as a smooth function of time ($\tau = t/T$) (Robinson, 1989). The estimation of coefficients is based on nonparametric kernel regression, where the parameters are estimated locally at each time point. This is undertaken with the estimation of weighted regressions, where the weights are determined by a kernel Epanechnikov function and a bandwidth parameter. The bandwidth parameter used to adjust the degree of smoothness of the time-varying parameters, is determined with cross-validation to balance bias and variance (Li and Racine, 2007).

The use of nonparametric polynomial kernel regression in the estimation offers significant advantages. First, this estimator is able to produce entirely data-driven estimates, in contrast with the Bayesian methodologies such as those proposed by Primiceri (2005) and Cogley and Sargent (2005), as there is no need to specify the prior distribution of the coefficients. Furthermore, in contrast with the Bayesian approach, which typically assume that the time-varying parameters follow a random walk process, this technique does not make priori assumptions about the coefficients' law of motion, enabling it to adapt flexibly to complex or unknown data-generating processes (Fan, 2018; Robinson, 1989).

To obtain time-varying impulse responses the TVP-VAR model described in Equation (2) can be transformed into Wold representation as follows (Casas and Fernandez-Casal, 2019):

$$\bar{Y}_t = \sum_{j=0}^{\infty} \Phi_{j,t} U_{t-j} \quad (3)$$

Such that $\left|Y_t - \bar{Y}_t\right| \to 0$. Matrix $\Phi_{0,t} = I_N$ and matrix $\Phi_{h,t} = \sum_{j=0}^{h} \Phi_{h-j} A_{j,t}$ for horizons h = 1, 2,…h. as for the constant model $\Phi_{h,t}$ represent the time-varying coefficient matrices of the impulse response functions. It can be interpreted as the expected response of $Y_{i,t+s}$ to and exogenous shock of $Y_{j,t}$ ceteris paribus lags of Y_t when the innovations are orthogonal.

The orthogonal time-varying responses can be obtained from the Cholesky decomposition of the time-varying variance covariance matrix Σ_t. This decomposition a lower triangular matrix P_t such that $\Sigma_t = P_t P_t^{\top}$. Finally using the orthogonalized innovations, the time-varying impulse response functions at horizon *h* are computed as follows:

$$\Psi_{h,t} = \Phi_{h,t} P_t \quad (4)$$

The time-varying responses quantifies the response of the endogenous variables to a one-unit shock in the orthogonalized innovations hence it allows for the identification of the interactions among the variables in a time-varying framework.

5. EMPIRICAL RESULTS

The stability test of the linear VAR[1] given in Figure 1 shows that there is a structural break. This leads us to estimate TVP-VAR model.

The TVP-VAR model is estimated to assess the effects of US-China tension, as previously evidenced by break point test.[2] Recent studies indicate that linear models inadequately capture the relationship between uncertainties and stock and commodity markets, especially during periods of increased uncertainty (Helmi et al., 2023; Bouteska et al., 2023).

After estimating the model with the nonparametric kernel function described above, time-varying impulse responses are computed using Eq. (4). The responses of energy-related uncertainty to the shocks in US-China tension are reported in Figures 2-4. The figures include time series plot of the accumulated time-varying impulse-responses at the horizons *h* = 1, 3, 6, 12 months. The responses are illustrated along with their 90% confidence bands to evaluate their significance throughout the analysis period.

The results indicate that the response of energy-related uncertainty to UCT shocks is not time-invariant. More specifically, UCT shocks positively impact on energy-related uncertainty during 2004 in US (Figure 2). This could be because, their index has

1 The results of linear VAR will be made available upon request.
2 tvReg package of R developed by Casas and Fernandez-Casal (2019) is used in the TVP-VAR estimation.

unlike directions compared to other indices of uncertainties. For example, the 2004 oil shock was driven by strong demand, supply constraints, and growing concerns over the security of oil supply (Dang et al., 2023). Moreover, the positive effect is observed in 2017. Turning to oil stock, the identified both countries of political relation shocks positively contributed to oil production for few months in 2017 (Cai et al., 2022). Furthermore, during 2019 and the beginning of COVID-19 period, the UCT shocks have positive impact on energy-related uncertainty. Dang et al. (2023) examine that the degree of economic policy uncertainties between the Covid-19 outbreak and in 2020 were much higher, causing the index to raise rapidly. And also, the negative influence is also observed during 2018. The analysis also indicate that how the shock on the covariance between crude oil and each agricultural commodity. The most important effact is observed for the covariance between crude oil and soybeans, it was initially recorded at approximately 0.30%, gradually rising to a positive value in November 2018, and reaching its peak of 0.72% in October 2018 (Cheng et al., 2023).

Figure 1: The structural break point test of linear VAR model

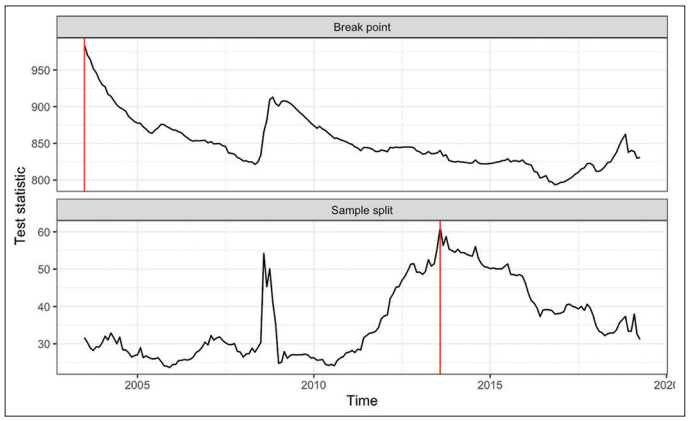


Figure 2: Time-varying impacts of US-China tension on energy-related uncertainty in US at different time horizons

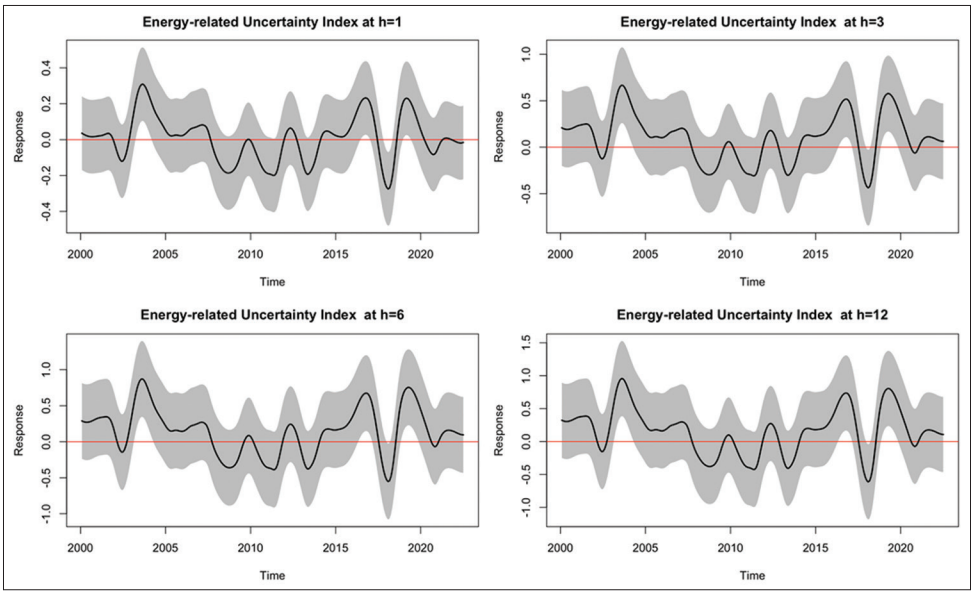


Figure 3: Time-varying impacts of US-China tension on economic policy uncertainty in US at different time horizons

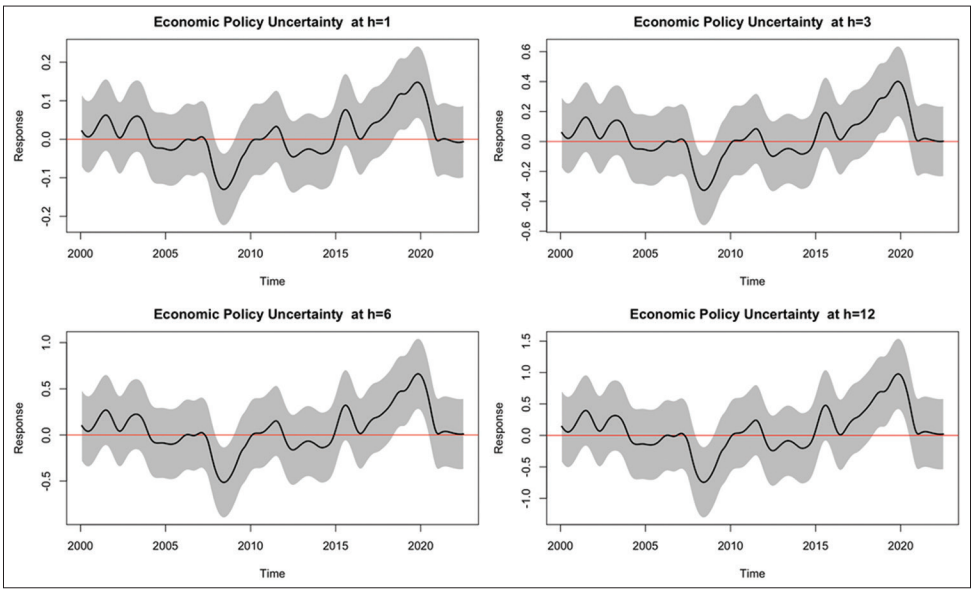
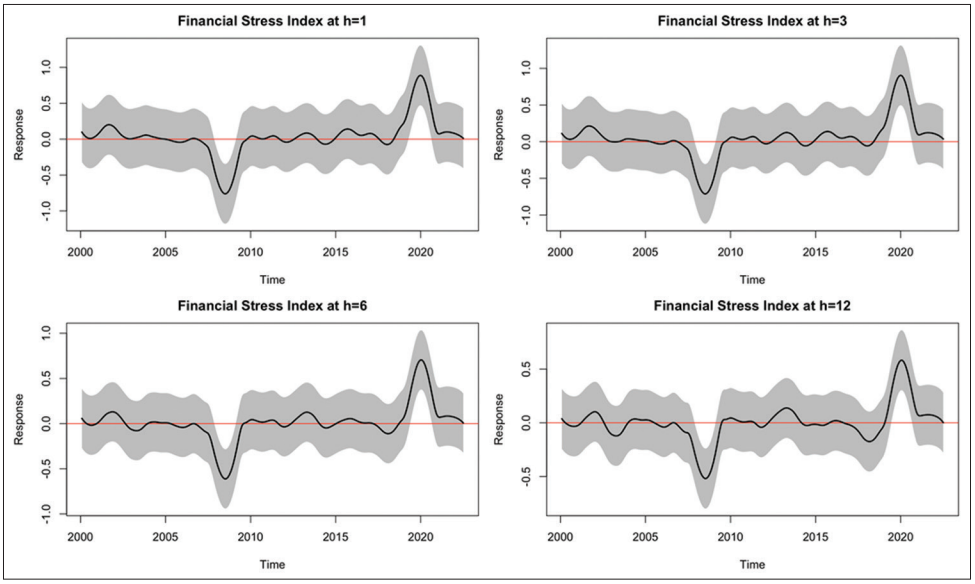


Figure 4: Time-varying impacts of US-China tension on financial stress in US at different time horizons



The time-varying responses of economic policy uncertainty to US-China tensions are presented in Figure 3. The time-varying responses demonstrate significant fluctuations, particularly during times of increased tension. The worldwide economic crisis of 2008 and the following economic downturn are characterized by significant negative responses, illustrating the adverse impacts of heightened US-China tensions on economic policy uncertainty. The relationship between China, the US, and global stock markets highlights that the US exerts a greater influence than China. While US Economic Policy Uncertainty (EPU) can affect global stock markets by 10-16%, China's impact remains relatively small (usually under 4%). Since the 2008 global financial crisis, US influence on stock markets, in general, has been on the decline (Zhang et al., 2019). In a similar manner, the trade war that commenced under the Trump administration in 2018, along with the COVID-19 pandemic in 2020, is linked to considerable positive reactions, highlighting the vulnerability of economic policy uncertainty to geopolitical and economic disruptions. The COVID-19 pandemic causes in the United States, also exhibits a positive and statistically crucial effect on the energy market costs (lnBRENT). This analysis indicate that the COVID-19 has a favorable influence on current energy market costs (Sharif et al., 2024).

The time-varying responses of financial stress to US-China tensions are displayed in Figure 4. Significant variations in the responses have been observed, with notable negative impacts occurring during the important events. More precisely, the responses are significant and negative during the financial crisis period which is 2008. An exaptional time is in 2007-2008, when China is shown to have relatively more effect than the United States, which is simply due to a sharp decline in the effect of US EPU. During this time, Brent oil costs and worldwide oil costs in general show an exponentially raising trend (Zhang et al., 2019). Moreover, the effect of US-China tension on financial stress is positive during the COVID-19 outbreak and corroborate the vulnerability of the financial sector to geopolitical risks and economic uncertainties. The US-China trade war and Brexit negotiations in 2018, along with Middle East tensions and oil price shocks in 2019, played a significant role in increasing financial market volatility and spillover effects. The COVID-19 pandemic and the 2020 recession further amplified these spillovers. These analysis show that the vulnerability of the worldwide economic system to crucial economic, political, and systemic shocks and their connection across categorical global FSIs and US economic sector (Hoque et al., 2024).

6. CONCLUSION

This paper investigates the effects of US-China tension shocks on economic policy uncertainty, financial stress, and energy-related uncertainty in the United States, using monthly data from January 2000 to September 2022. Employing the time-varying parameter vector autoregression (TVP-VAR) model, the research provides new insights into how geopolitical tensions influence key economic indicators. The results show that generally confirm that increased tensions between the US and China lead to heightened economic policy uncertainty, rising financial stress, and greater energy-related uncertainty, consistent with theoretical expectations. Interestingly, the analysis also reveals that instances where US-China tensions lead to reduced uncertainty and financial stress, a pattern specific to the US context. This suggests that certain market adjustments or policy responses may mitigate the negative impacts of such geopolitical shocks. Overall, the study highlights the complex and dynamic nature of the relationship between geopolitical risks and economic uncertainty in the United States.

The geopolitical tensions between the United States and China have become a significant source of economic uncertainty, with far-reaching implications across global markets and supply chains. This uncertainty is no longer limited to actual policy changes or trade restrictions, rather, the mere anticipation of conflict or disruption can generate notable economic consequences. Markets appear to react swiftly to perceived risks, highlighting the significant of investor sentiment and public perception in shaping financial outcomes.

The research shows that U.S.-China geopolitical tensions significantly influence financial markets. Geopolitical shifts can influence U.S. fiscal conditions and have lasting impacts on Chinese stock markets, while the reverse effects tend to be short-lived. Tail risk spillovers between the two countries' stock markets reveal important dynamics for managing international financial risk. Trade disputes have sector-specific effects, with industries like public utilities, financials, and manufacturing being particularly sensitive. Trade policy uncertainty tends to benefit U.S. equity markets but negatively affects Chinese markets.

Tensions between the U.S. and China have a crucial impact on global energy markets, particularly through increased volatility in energy prices and uncertainty. Economic conflicts, trade sanctions, and strategic resource controls effect fossil fuel import and export patterns in US and China. Increasing geopolitical tensions tend to heighten oil price fluctuations. These dynamics also affect crude oil markets in industrialized nations, reflecting broader implications for energy security. The interaction between geopolitical risk, trade tensions, and oil market volatility reveals that depending on the level of economic stress.

A key recommendation is the stabilization of U.S.-China trade relations, given their substantial influence on worldwide economic uncertainty. Policymakers from both countries should collaborate on creating bilateral de-escalation frameworks that include clearly defined targets for tariff reductions, measures to safeguard investments, and mechanisms for resolving disputes. The establishment of binding negotiation platforms—such as joint economic councils—would offer structured avenues to address trade disagreements before they affect energy markets. Implementing these strategies would strengthen the resilience of the global economic system, enabling it to better absorb both gradual shifts and major disruptions.

These findings provide essential insights for policymakers and business leaders—particularly in China and the United States—as they navigate periods of financial instability and geopolitical tension. Recognizing how shifts in U.S. financial conditions can influence the trajectory of Sino-American political relations offers valuable direction for companies engaged in global supply chains and international investment frameworks. The observed spillover from domestic financial dynamics in the U.S. to its diplomatic stance toward China illustrates the deep interconnection between economic and political spheres. Strengthening cooperation and maintaining open lines of communication between the two countries could help reduce the negative impact of financial disruptions on diplomatic engagement, contributing to a more stable and predictable economic environment. However, the influence of political changes on financial risk levels varies depending on the financial indicators analyzed. While some metrics reveal a strong correlation between geopolitical tensions and financial vulnerabilities, others point to weaker or unclear associations. These outcomes highlight that the importance of continued research to fully understand the causality and complexity of the economic-political relationship between US and China.

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