



# Energy-related Uncertainty and Tourism Stock Markets: New Insights from Time-varying Relationship with TVP-VAR Approach

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## ABSTRACT

In this study, a time-varying parameter vector autoregressive (TVP-VAR) model is estimated to examine the effects of energy-related uncertainty, geopolitical risk and global economic activity on tourism stock prices in the United States (US) over the period February 1996-September 2022. The time-varying responses reveal that tourism stocks are negatively affected by energy-related uncertainty, particularly during financial crisis and COVID-19. Moreover, geopolitical risk shocks also negatively influence tourism stocks. Global economic activity exhibits both positive and negative shocks in tourism stocks. The results highlight the importance of considering sector-specific dynamics of energy-related uncertainty on tourism stocks in US.

**Keywords:** Energy-related Uncertainty, Tourism Stocks, TVP-VAR

**JEL Classifications:** Q43, Z3, C32

## 1. INTRODUCTION

Tourism is a vital economic driver contributing to GDP growth, employment, and foreign exchange earnings. Its influence extends beyond direct economic benefits to financial markets, particularly through publicly traded companies in hospitality, airlines, and entertainment sectors (Pirnazarov, 2025). Moreover, the tourism industry has unique industrial attributes essential to explaining the sentiment affect, like the crucial influence the Coronavirus 2019 (COVID-19) pandemic on the tourism sector (Peng et al., 2023). In 2024, tourism accounted for 10% of the global economy, contributing US\$10.9 trillion to global GDP. The sector supported 357 million jobs worldwide, approximately one in every ten jobs,

highlighting its central role in the labor market. International visitor spending also surged, reaching US\$1.9 trillion. Furthermore, tourism has a long value chain and when effectively managed, jobs, value and positive impacts can be created at each linkage. Tourism can expand markets for existing and new products and services that directly influence the bad and isolated communities. If developed in a sustainable way, the sector can play a powerful role in conserving biodiversity, protecting cultural heritage, and supporting climate-friendly livelihoods, becoming a key pillar of the blue and green economy (World Bank, 2025).

Energy-related uncertainty refers to the unpredictability and variability in factors that influence the production, distribution,

pricing, and consumption of energy. This uncertainty arises from a combination of geopolitical tensions, market volatility, technological change, regulatory developments, and environmental concerns (International Energy Agency, 2023). Energy market uncertainty is driven by inherent risks and shocks within domestic and global energy systems across three main steps: production, distribution, and consumption. Moreover, the continued presence of these shocks significantly contributes to market instability, with notable economic and environmental impacts. This uncertainty influences economic growth by increasing energy price volatility and shaping investment decisions in the energy sector (Peng et al., 2025). The energy market faces significant uncertainty, which can rapidly impact global commodity markets, putting pressure on macroeconomic activity through households and businesses, and influencing all forms of consumption (Su et al., 2025). Energy plays a central role in driving development. It enables the investments, innovations, and emerging industries that generate employment, foster inclusive economic growth, and promote shared prosperity on a sustainable planet. Expanding the use of renewable energy and energy efficiency, investing in large-scale electrification, enhancing the performance of power utilities, and avoiding the construction of new coal plants while phasing out old ones are essential steps to ensure clean energy access for homes, schools, hospitals, and businesses (World Bank, 2024).

Tourism is heavily reliant on energy due to its essential transportation component. As energy resources become depleted and alternatives—especially for air and road transport—remain limited, travel costs are expected to rise, which could lead to a decline in tourism demand (Logar et al., 2013). When energy prices rise, households are compelled to allocate a larger portion of their budget to meet basic energy needs. This reduces their disposable income, leading them to cut back on non-essential spending, particularly on goods and services with high income elasticity, such as tourism. Additionally, since tourism services often rely on transportation, the increased cost of transport further raises the overall price of the combined travel and tourism package (Weitzel et al., 2025). Moreover, there is a negative relation in the middle of tourism and energy prices. This might be due to a rise in oil prices, which ultimately increased air fares, thus negatively affecting the tourism sector (Faisal et al., 2021).

Although there is a strong link between energy-related uncertainty and tourism stocks, no study in academia has addressed this issue. Admittedly, Kocourková et al. (2024) examine the effect of energy-related uncertainty on international tourism receipts in Europe. However, the literature lacks on two issues. Firstly, the impact of energy-related uncertainty on tourism stocks is not studied in the case of the US, secondly, there is no application of high frequency financial data in the energy-related uncertainty-tourism stocks nexus. To fill this gap of the literature, the current work shows that the effect on energy-related uncertainty on tourism stocks in the US, employing Time-varying Parameter Vector Autoregression (TVP-VAR) Model with monthly data. The results validate the theoretical linkage and economic intuition.

The rest of the paper is formed in the following way: Section 2 provides literature review; Section 3 includes background for

data and methodology; Section 4 shows the findings obtained by empirical estimations; and Section 5 concludes.

## 2. LITERATURE REVIEW

### 2.1. The Effect of Energy-related Uncertainty on Tourism Stocks

Energy-related uncertainty captures the unexpected fluctuations in energy prices and supply risks, which in turn affect macroeconomic outcomes such as inflation, investment, and economic growth. Measuring this uncertainty is crucial for understanding the economic impact of energy market volatility (Caldara et al., 2023). In literature, energy-tourism nexus is one of the hot topics being studied. More precisely, Weitzel et al. (2025) Energy price shocks have a notable impact on the tourism industry in the European Union, primarily through indirect channels that heighten the sector's sensitivity to energy price fluctuations. When energy costs rise, households are required to allocate a greater portion of their budget to essential energy needs, reducing their capacity to spend on non-essential activities like tourism. As a result of these indirect effects, the tourism sector may experience relatively greater declines in output compared to other, more energy-intensive industries. Faisal et al. (2021) explored the relation among GDP, FDI, oil prices, and tourism using annual data from 1995 to 2017. Their results indicate that an increase in inward FDI supports the growth of tourism, with oil prices and GDP acting as intermediary channels. Tverijonaite et al. (2022) This study examines how the tourism industry in Iceland perceives the effect on existing and planned energy projects on tourism, and explores the factors that influence the scale and nature of these impacts. Findings indicate that perceptions of the spatial extent of the impacts are shaped by three main factors: the visibility of renewable energy infrastructure and its environmental effects; the movement patterns of tourists; and changes in tourism activity resulting from energy developments. Additionally, proposed energy projects are generally viewed more negatively than existing ones. Logar et al. (2013) This study explores the potential impacts of peak oil on Spain's tourism sector and its indirect effects on the broader economy. The findings indicate that a decline in demand for tourism services leads to the largest output reductions in transport sectors linked to tourism, including air, water, land, and rail transport. These are followed by declines in the activities of travel agencies, non-market recreational, cultural and sports services, as well as restaurants and hotels. Depending on the oil price scenario considered, GDP is projected to decline by between  $-0.08\%$  and  $-0.38\%$ , with job losses—both direct and indirect—estimated to range from around 20,000 to 100,000. Kocourková et al. (2024) explore the impact of energy-related uncertainty on international tourism receipts in Europe, and they find negative association. The literature review clearly shows that the effect of energy-related uncertainty on tourism stocks in the case of US is neglected in previous studies. Based on the studies, the theory shows that the effect of energy-related uncertainty on tourism stocks is negative.

### 2.2. The Effect of Geopolitical Risk on Tourism Stocks

Regarding geopolitical risk, the previous works assess its impact on tourism in literature. More specifically, Demiralaya and Kilincarslan (2019) analyzed the impact of global political risks between Stock

returns of Travel and Leisure firms at the regional scale. The findings show that the negative impact of political risks between Travel and Leisure activities are mostly driven by the threat of adverse political events only in bearish market periods. Raheem and Roux (2023) studied the relation in the middle of terrorism and the tourism sector. Their findings emphasize that geopolitical risks have a greater influence on the volatility of Travel and Leisure stocks than on their returns, particularly in the lower quantiles below the median. Demiralay (2020) aimed to build upon prior research, this study investigates how the U.S. Tourism and Travel Stock Index responds to political disagreements among U.S. politicians, represented by the Partisan Conflict Index. The results indicate that heightened partisan conflict can adversely influence tourism stock prices through multiple mechanisms. Raxeem and Roux (2023) examine the relation in the middle of political risks and Travel and Leisure markets. They studied that geopolitical risks is weakly related to the Travel and Leisure stock for between Indonesia and South Korea. But, significant relationships are observed for India, China, Malaysia, and Israel. Furthermore, GPR is found to predict the volatility of T&L stocks more effectively than stock returns. These results remain robust across alternative measures of GPR. Zhang et al. (2022) examine how global and domestic uncertainty shocks—specifically economic policy uncertainty and geopolitical risks—affect Chinese inbound tourism using a time-varying parameter vector autoregression (TVP-VAR) model. The results show that the impact of these shocks on tourist arrivals changes over time in both magnitude and direction. Consistent with previous research, the theoretical link between geopolitical risk and tourism stocks is negative.

### 2.3. The Effect of Global Economic Activity on Tourism Stocks

Increased economic activity also might lead to a surge in tourism stocks. More precisely, Zhang et al. (2022) investigated the time-varying influence between domestic and global economic policy uncertainty on Chinese inbound tourism using TVPVAR technology. Their findings show that the effect on economic policy uncertainty on China's inbound tourism industry is time-varying and that the impact of diminishes over time. Ma et al. (2024) explored how Chinese and global economic policy uncertainty impact the growth of inbound tourism in China—measured by both tourism revenue and arrivals—using ARDL and NARDL models. The findings reveal that the negative components of economic policy uncertainty consistently exert a stronger influence on the growth of inbound tourism arrivals. Wang et al. (2022) investigated the relationship between strategies for reducing economic vulnerability and international tourism development. Their findings reveal that when GDP per capita is little, global tourism has got a negative impact. However, once a certain threshold of GDP per capita is surpassed, the effects of international tourism become positive. Jannat et al. (2025) investigates the evolving relation in the middle of climate change, economic growth, green technology, globalization, government effectiveness, and tourism growth in G-7 countries from 1996 to 2019, offering fresh insights into sustainable tourism dynamics. The research highlights the crucial role of economic development and green technology in promoting sustainable tourism within these nations. Elgin and Elveren (2024) explore the connection between two key tourism indicators—tourist arrivals as a share of the total population and tourism revenue as a percentage

of total exports—and various aspects of sustainable development, including health, the economy, education, social progress, and the environment. The findings highlight a significant interaction between tourism and sustainable development, with this relationship varying notably between developed and developing countries, especially in relation to GDP per capita. The studies show that the effect is positive from global economic activity to tourism stocks.

## 3. DATA AND METHODOLOGY

### 3.1. Data

This research employs the US data in monthly frequency spanning from February 1996 to September 2022. The vector of endogenous variables  $Y_t$  is defined as:

$$Y_t' = [EUI_t, GPR_t, GEA_t, TTPI_t], \quad (1)$$

The core variable of the model is the tourism stocks, denoted by  $TTPI_t$ . This is the travel and tourism price index, downloaded from Refinitive. The index of The Global Economic Activity (GEA), developed by Kilian (2009), is another important variable in the model. This index is obtained from the Dallas Federal Reserve's research database. Next, geopolitical risk index developed by Caldara and Iacoviello (2021) is applied in the variable system. Geopolitical risk is denoted with GPR, and obtained from economic policy uncertainty web portal (<https://www.policyuncertainty.com/gpr.html>). Lastly, the energy-related uncertainty index is employed, constructed by Dang et al. (2023) and downloaded from the website of economic policy uncertainty ([https://www.policyuncertainty.com/energy\\_uncertainty.html](https://www.policyuncertainty.com/energy_uncertainty.html)). Descriptive statistics of the variables in their levels are presented in Table 1.

Natural log transformation is applied to all variables except for GEA as this variable contains negative values over the estimation period.

Before the estimation of the VAR, including the Augmented Dickey-Fuller (ADF) unit root test is implemented to determine integration levels of the variables. The results, presented in Table 2. EUI, GPR and GEA stationary at their levels, whereas TTPI has a unit root at the level. However, TTPI also becomes stationary once the first difference is taken.

**Table 1: Descriptive statistics (in levels)**

Statistics	EUI	GPR	GEA	TTPI
Mean	23.289	2.735	4.635	6281.432
Median	20.277	2.539	-7.216	3161.305
Maximum	83.018	10.853	189.316	16017.39
Minimum	0.416	0.952	-161.463	856.11
Standard deviation	13.576	1.148	66.853	4926.603
T	320	320	320	320

**Table 2: Unit root tests**

	ADF			
	EUI	GPR	GEA	TTPI
Level	-8.709***	-3.901***	-3.482***	-
First Difference	-	-	-	-16.4107***

(\*) Significant at the 10%; (\*\*) Significant at the 5%; (\*\*\*) Significant at the 1%.



Based on the paper's main objective, tourism stocks (TTPI) is ranked as the last because it receives shocks from all other variables and give responses to them. The energy-related uncertainty (EUI) is the first in the variable system affecting all others including GPR, GEA and TTPI. Geopolitical risk is the second since it impacts on global economic activity (GEA) and tourism stocks (TTPI). Global economic activity (GEA) is the third receiving shocks from EUI and GPR and transmitting shock into TTPI.

### 3.2. Methodology

This paper employs the TVP-VAR methodology devised by Primiceri (2005) to analyze the impact of energy-related uncertainty, geopolitical risk and global economic activity on tourism stocks. In contrast with the linear VAR, the TVP-VAR model is designed to track the evolution of dynamics among the variables in accordance with the varying economic conditions. Hence the model might be represented as follows (Casas and Fernandez-Casal, 2019):

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

where  $Y_t$  is the previously defined endogenous variables' vector,  $A_{i,t}$  ( $i = 0, 1, \dots, p$ ) represents time-varying coefficient matrices, and  $U_t$  is the innovation vector with a time-varying covariance matrix  $\Sigma_t$ . 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 assumes 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  $|Y_t - \bar{Y}_t| \rightarrow 0$ . Matrix  $\Phi_{0,t} = I_N$  and matrix  $\Phi_{h,t} = \sum_{j=0}^h \Phi_{h-j} A_{j,t}$

for horizons  $h=1, 2, \dots, h$ . 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  $Y_{t+h}$  to an 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  $\Sigma_t$ . This decomposition a lower triangular matrix  $P_t$  such that  $\Sigma_t = P_t P_t^T$ . 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 quantify 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.

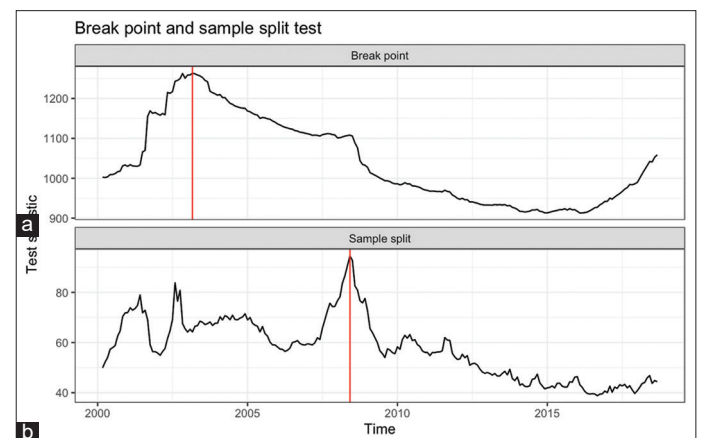
## 4. EMPIRICAL RESULTS

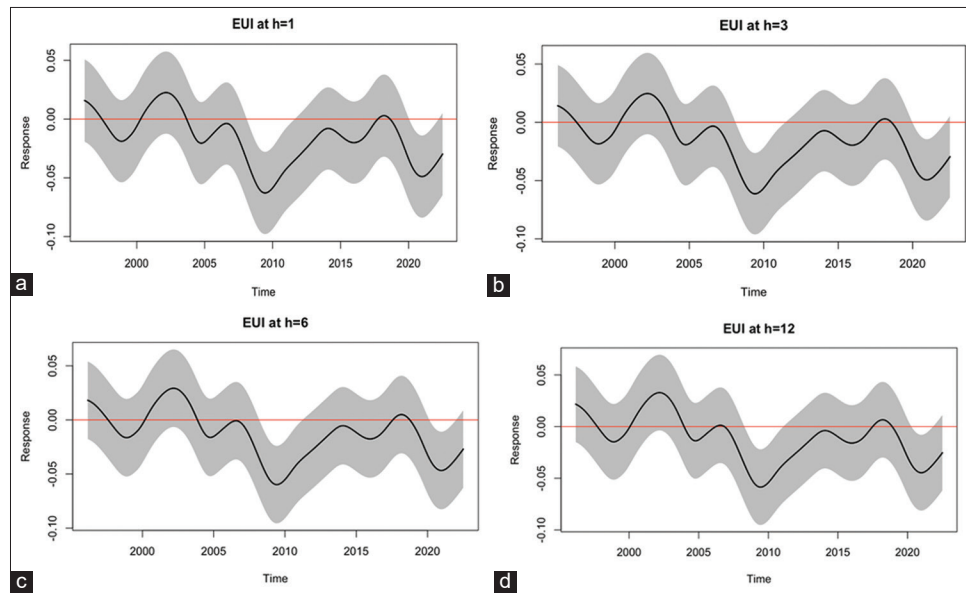
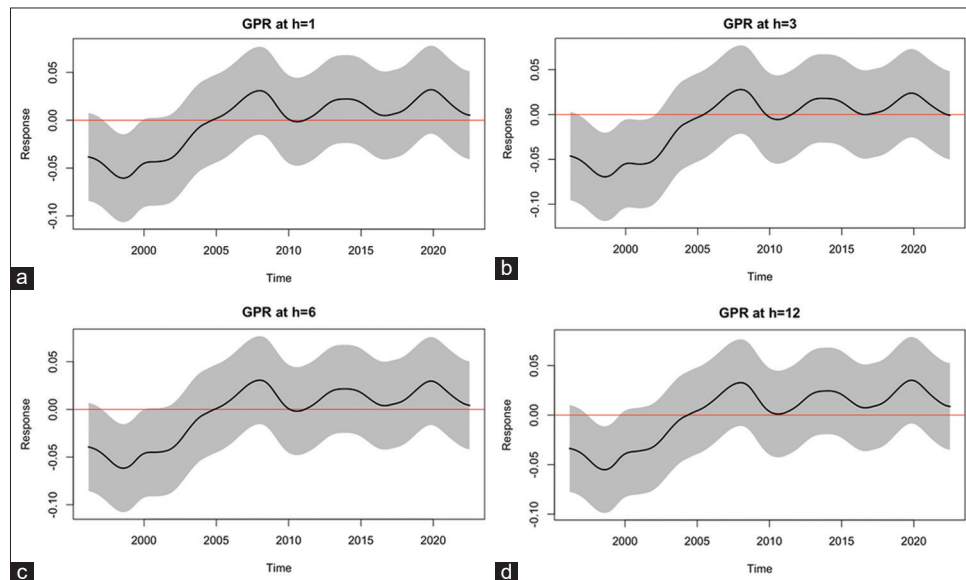
This section presents the results of the TVP-VAR analysis to analyze the responses of tourism stocks to the shocks in energy-related uncertainty, geopolitical risk and global economic activity. Before proceeding to TVP-VAR, the linear VAR model is estimated<sup>1</sup>. However, the stability test of the linear VAR model shows that there is a break point (Figure 1). Therefore, linear VAR is not applicable, and thus time-varying parameter VAR model is constructed. The TVP-VAR model is estimated to assess the effects of US-China tension, as previously evidenced by break unit root test.<sup>2</sup> 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

- 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.

**Figure 1:** (a and b) The break point stability test of linear VAR model



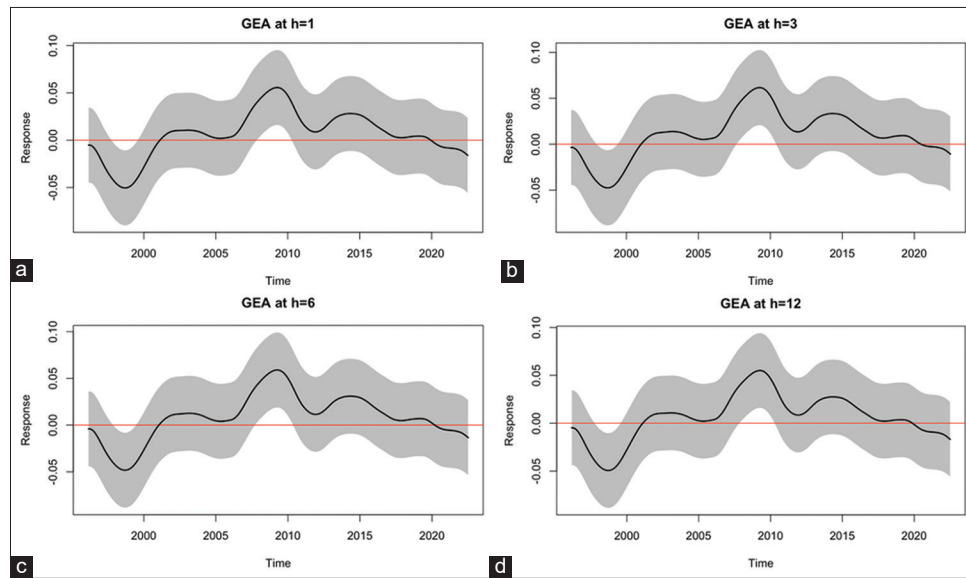
**Figure 2:** (a-d) Time-varying responses of tourism stocks to the energy-related uncertainty shocks**Figure 3:** (a-d) Time-varying responses of tourism stocks to the geopolitical risk

described above, time-varying impulse responses are computed using Eq. (4). The responses of global economic activity, oil-gas and clean energy stock returns are reported from 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 tourism stocks to other variables' shocks is not time-invariant and is significantly influenced by global events. The cumulative responses of all variables across various horizons exhibit a consistent pattern, as the total impact of the UCT shocks is fully completed within a 2-month horizon.

The time-varying responses of tourism stocks to energy-related uncertainty shocks are presented in Figure 2. The time-varying responses demonstrate significant fluctuations, particularly during

times of increased tension. The international bankruptcy of 2008 and the following economic downturn are characterized by significant negative responses, illustrating the adverse impacts of heightened energy-related uncertainty on tourism stocks. Admittedly, the effects of China's GPR shock on inbound tourism peaked in terms of negative impact during either the first or the second stage. Moreover, the COVID-19 pandemic in 2020-2021 is linked to considerable adverse reactions, highlighting the vulnerability of tourism stocks to energy-related uncertainty. More specifically, from early 2020 to mid-2021, a powerful correlation in the middle of the Clean Energy Index and the U.S. tourism part is observed. This may review the relation instability of the clean energy sector in the pandemic, while the tourism sector suffered crucial setbacks (Wang et al., 2025).

The time-varying responses of tourism stocks to geopolitical risk are displayed in Figure 3. Significant variations in the responses have been observed, with notable negative impacts occurring

**Figure 4:** (a-d) Time-varying responses of tourism stocks to the global economic activity

during 1998-1999. More precisely, actual geopolitical events lead to a reduction in tourism stock returns (Demeralay and Klincarslan, 2019). Moreover, during 1998-1999, the tourism industry was particularly vulnerable due to reduce travel demand in affected regions and rose perceptions of risk between travelers and investors alike. Studies show that the initial phases of geopolitical crises typically induce sharp declines in tourism stock values as markets react to uncertainty and anticipated disruptions in tourism flows (Nguyen and Ennew, 2011). However, these negative impacts tend to fluctuate over time, often moderated by conflict resolutions, policy interventions, or shifts in market sentiment, illustrating the time-varying nature of the relationship between geopolitical risk and tourism stocks. Furthermore, research utilizing a time-varying parameter vector autoregression (TVP-VAR) model examines the dynamic relationship between geopolitical risks and Chinese inbound tourism. The study reveals that the impact of geopolitical risks on tourism is not static but fluctuates over time, with significant variations in the responses observed during periods of heightened uncertainty (Demir et al., 2019). Furthermore, studies suggest that geopolitical risks induce volatility and reduce the attractiveness of tourism stocks as investment assets, as investors seek safer alternatives during turbulent times (Bouri et al., 2021). This dynamic is evident in the negative response of tourism stocks during 1998-1999, a period marked by notable geopolitical tensions.

The time-varying responses of tourism stocks to global economic activity are illustrated in Figure 4. Similarly to geopolitical risk, global economic activity shocks negatively impact on tourism stocks during the period of 1998-1999. This could be because, the contribution of tourism to economic growth is positive and crucial among 1995–2003. After rising steadily from 1997 onward, it peaks around 2001 and then reduces until 2008. Moreover, during the global financial crisis that occurred in 2008-2009, the response of tourism stocks to global economic activity shocks is positive. This is attributed to the fact that a crucial rise in average connectivity is identified, from 15% before the Global Financial Crisis to 50% after 2008. Furthermore, the effect of global financial

crisis of 2008 on tourism might be positive which is in line with the findings by (Kubickova et al., 2019). During 1998-1999 corresponds to the aftermath of the 1997 Asian financial crisis and other global economic disturbances, which severely constrained global demand and investor confidence (Song et al., 2019). Moreover, these shocks often lead to heightened market volatility and risk aversion among investors, resulting in the withdrawal of capital from more cyclical sectors such as tourism. Evidence presented by Lee and Song (2021) supports this, showing that tourism stocks tend to underperform during periods of global economic contraction due to diminished earnings prospects and increased uncertainty.

## 5. CONCLUSION

This study investigates how energy-related uncertainty, geopolitical risk, and global economic activity effect tourism stock prices in the United States by employing a time-varying parameter vector autoregressive (TVP-VAR) model. This method allows for the analysis of dynamic relationships over time, capturing how the impact of shocks changes across different economic periods. The empirical results emphasize that energy-related uncertainty has a crucial negative impact of tourism stocks, especially during major global events like the financial crisis and the COVID-19 pandemic. Geopolitical risk also consistently exerts a negative influence on the tourism sector, highlighting its vulnerability to external shocks. Meanwhile, global economic activity shows a mixed impact, with both positive and negative affects observed depending on the period. These results show that the importance of accounting for sector-specific and time-varying dynamics when analyzing stock market behavior. For policymakers and investors, the study provides valuable insights into how external uncertainties affect tourism-related financial markets in the U.S.

This study ephasizes that energy-related uncertainty has crucial impact for the tourism sector through various direct and indirect channels. Increasing energy prices can decrease households'

disposable income, limiting their ability to spend between tourism and travel. This leads to a decline in tourism demand and lower revenues for tourism-related businesses. The tourism sector is especially sensitive to energy shocks due to its dependence on transportation and accommodation, which are energy-intensive. Studies have also indicated that the indirect effect on energy uncertainty on tourism can be greater than on some more energy-intensive industries. Additionally, perceptions of environmental changes caused by energy projects can negatively impact of tourism attractiveness, especially in areas where natural landscapes are a key part of the tourism experience. Furthermore, macroeconomic factors such as GDP, foreign direct investment, and oil prices play an intermediary role in this relationship. Overall, the existing research shows that a mostly negative relation among energy-related uncertainty and tourism, while research specifically focused on U.S. tourism stocks remains limited.

This study shows that a negative theoretical relation in the middle of geopolitical risk and the tourism sector, especially tourism-related stock performance. Geopolitical risks, like political tensions, conflicts, and terrorism, tend to create uncertainty in financial markets, leading to decrease investor confidence and lower stock returns in the tourism and leisure industry. The impact of these risks is often more pronounced during periods of market downturns, reflecting the heightened sensitivity of the tourism sector to external shocks. Moreover, geopolitical uncertainty effects not only stock returns but also rises volatility, with stronger effects observed in lower quantiles of stock distribution. Political disagreements and domestic instability can also reduce tourism demand and disrupt investor sentiment, further weakening stock performance. The effects vary by region, with some countries showing stronger correlations than others. Overall, these findings suggest that geopolitical risk negatively impact of tourism stocks through various channels and highlights the need for incorporating such risks into investment and policy decisions related to the tourism industry.

The literature highlights that a generally positive relation in the middle of global economic activity and tourism sectors. Economic growth tends to stimulate higher tourism demand, as increased income and improved living standards encourage greater spending on travel and leisure. However, this relation is not uniform and can vary based on economic context and development degree. For example, in lower-income economies, tourism may initially have limited influence, but as GDP per capita rises beyond a certain threshold, the influence becomes crucial positive. Additionally, the impact of economic policy uncertainty on tourism sector is shown to be time-varying, with stronger negative influences during periods of heightened uncertainty. Yet, as uncertainty diminishes, the tourism sector tends to recover. Studies also emphasize that sustainable economic development, including advancements in green technology and effective governance, further enhances tourism growth, particularly in developed economies. Overall, global economic activity helps the expansion of tourism and positively impact of tourism-related stocks, even though the magnitude and direction of the affect can depend on specific economic conditions and time periods.

Based on the findings of this article, several integrated suggestions can be made to increase the resilience and sustainability of the tourism sector in the face of energy-related uncertainty, geopolitical risks, and global economic fluctuations. Firstly, due to the strong negative effect energy-related uncertainty on tourism, especially through growing energy prices and environmental concerns, policymakers and tourism businesses should prioritize investments in renewable energy and energy-efficient infrastructure. Promoting sustainable transport and accommodation can help decrease the sector's vulnerability to energy shocks. Secondly, since geopolitical risks like conflicts, political tensions, and terrorism reduce investor confidence and rise market volatility, it is fairly crucial to increase robust risk management strategies. This includes diversifying tourism markets, enhancing diplomatic stability, and preparing contingency plans. Thirdly, the positive role of global economic activity in boosting tourism shows that the need to support stable economic growth through effective governance, foreign direct investment, and green technology. Additionally, economic policy uncertainty should be closely monitored, as it can weaken tourism performance during volatile periods. Overall, integrating sustainability, risk preparedness, and economic resilience into tourism policies can help ensure long-term stability and growing in the sector.

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