

Empirical Evidence on Tourism, Geopolitical Risk and Economic Policy Uncertainty Relationships in Malaysia

Siti Nurhidayah Mohd Roslen^{1*}, Chua Mei Shan¹, Azlul Kalilah Zaghlol¹, Shafinaz binti Ahmad Nazar²,
Pang Mary³

¹Faculty of Business and Management, UiTM Cawangan Selangor (Puncak Alam), Malaysia

² Faculty of Accountancy and Management, Universiti Tunku Abdul Rahman (Sg Long), Selangor, Malaysia

³Faculty of Business, Hospitality and Humanities, Nilai University, Malaysia

sitihidayah@uitm.edu.my*, meishan@uitm.edu.my, azlulkalilah@uitm.edu.my, shafinaz@utar.edu.my,
marypang@nilai.edu.my

Abstract: Malaysia, celebrated for its rich cultural diversity, vibrant cities, and pristine natural landscapes, stands prominently on the global tourism map. However, the tourism industry is susceptible to the impact of geopolitical risk and economic policy uncertainty. These external factors, shaped by global events and policy changes, can significantly influence the tourism landscape in Malaysia. Given this significance, the study aims to empirically investigate the cointegrating relationship between international inbound tourism levels (tourist arrivals), geopolitical risk (GPR index), and economic policy uncertainty (EU index) in Malaysia. The analysis uses quarterly observations from the first quarter of 2000 to the fourth quarter of 2022. The study employs the Granger Causality test, supported by structural VAR impulse functions and variance decomposition analysis to illustrate how economic policy uncertainty responds to shocks in tourist arrivals. The significant causal relationship observed moves from tourist arrivals to economic policy uncertainty. In other words, the study implies that variations in tourist arrivals have a lasting impact on economic policy uncertainty but not necessarily on geopolitical risk. This study provides valuable implications for policy planning and decision-making. Policymakers should consider the implications of shifts in tourism patterns for economic policy uncertainty. The absence of a long-term relationship between tourist arrivals and geopolitical risk may suggest conducting separate risk assessments to manage geopolitical risks that may affect the tourism industry in Malaysia.

Keywords: *tourism, economic policy uncertainties, geopolitical risk, VAR impulse function, Malaysia*

1. Introduction and Background

Research in the tourism area is of paramount importance in today's globalized and interrelated world. It comprises a multidisciplinary field that investigates various aspects of tourists' attraction factors, travel services, accommodations, hospitality, and policies and their impacts on tourists, communities, economies, and the environment. According to the World Travel and Tourism Council (2021), travel and tourism are two of the world's largest and most important sectors, comprising approximately 80% of small and medium-sized enterprises (SMEs). The sector holds significant importance in promoting socio-economic development, job creation, and empowering women, youth, and other societal groups in many countries. In light of the high interdependence of the global landscape, it has become imperative for all countries to become crisis-ready, especially in times of high uncertainty. It is worth noting that the primary concern is not about the type of crisis that happens but rather about the preparation, management, and responses by the affected economies.

Malaysia's economy is highly dependent on international trade. The level of the country's exports contributes significantly to a portion of its GDP. Based on statistics provided by the World Bank, as of 2022, the country's international trade accounted for 141% of the total GDP. Despite the relatively low level of geopolitical risk and economic policy uncertainty index in the country, these factors remain significant for Malaysia's economic condition. This is because any disturbance in global trade, regardless of regional conflicts, trade disputes, or international tensions, can directly affect Malaysia's economic well-being. In addition, Malaysia also depends on tourism and foreign direct investment (FDI) to increase its economic growth. Geopolitical risk and economic policy uncertainties may affect tourists' and foreign investors' willingness to spend money and invest in the country.

This study aims to analyze the significance of geopolitical risk and economic policy uncertainties concerning the Malaysian economy. Specifically, this study examines the tourism sector to fill the gap in existing research

regarding the impacts of geopolitical risk and economic policy uncertainties on the tourism market. Following Caldara and Iacoviello (2022), this study defines the geopolitical risk index as a measure of adverse geopolitical events and associated risks based on a tally of newspaper articles that cover geopolitical tensions and their evolution and economic effects since 1900. The economic policy uncertainty index, as defined by Ahir et al. (2022), is determined by the frequency of the word 'uncertainty' in quarterly Economist Intelligence Unit country reports. Specifically, these two indices highlight words related to threats and uncertainty as reported in various global reports and newspapers. Past literature in the same study area lacked a standardized approach for quantifying uncertainty (Zhang et al., 2022). In addition, the importance of geopolitical factors in shaping macroeconomic outcomes has not been the subject of systematic empirical analysis (Caldara and Iacoviello, 2022). The creation of the geopolitical risk (GPR) and economic policy uncertainty (EPU) indices provides additional evidence linking economic policy uncertainty and geopolitical issues.

The contribution of this paper to the literature is twofold. First, we contribute to the limited body of literature on the nexus between GPR and tourism using unified and recently developed measures of uncertainty lacking in earlier literature. The advantage of using unified measures of uncertainty in the study of tourism demand is that our model can provide stronger affirmation of the tourism-led growth hypothesis which can contribute to the more contextual discussion of the empirical evidence about the link between uncertainty in geopolitical conditions, economic policy and tourism track the effect of GPR on the economy more closely in real-time. Second, we employ the structural VAR impulse response function to demonstrate how economic policy uncertainty reacts to a shock in the number of tourist arrivals. To the best of our knowledge, no other study has been conducted to validate the impact of geopolitical tensions and economic policy uncertainty on international inbound tourist arrivals in the context of Malaysia. In addition, the use of robust econometric techniques such as the structural VAR model and impulse response function may result in a model with greater explanatory power about the variations in tourist arrivals in response to changes in geopolitical risk level and economic policy uncertainty. The remaining sections of the paper are organized in the following manner: Section 2 examines the relationships between GPR, EPU, and tourism as discussed in past literature. Section 3 explores data sets and research methodology. The findings and analysis are located in Section 4, followed by Section 5, which provides a conclusion to the article along with observations on the policy implications of the findings.

2. Literature Review

International Inbound Tourism in Malaysia: Malaysia has been a popular tourist destination, attracting millions of international tourists annually. As of 2022, Malaysia has recorded 10,070,964 tourist arrivals, which is over a 100% increase from 2020 (Malaysia Tourism Promotion Board, 2022). Considering the post-pandemic period, Malaysia has shown commendable growth in tourist arrivals after the two-year hiatus due to the global COVID-19 pandemic. Key sources of international visitors for Malaysia in 2022 were Singapore, Indonesia, Thailand, India, and Brunei. Malaysia possesses a diverse range of attractions, including its cultural diversity, pristine beaches, lush rainforests, and vibrant cities. Among the popular destinations are Pahang, Perak, Selangor, Johor, and Kedah. Besides attractive destinations to visit, Malaysia is also known for its cultural diversity, which includes a blend of Malaysian, Chinese, Indian, and indigenous influences. The multicultural setting has also allowed the country and visitors to celebrate its diversity through various cultural festivals, religious practices, and culinary delights, which have a significant influence on tourists' perceptions and as a tourism product (Samsudin and Fuza, 2021; Muzaini, 2018). The tourism industry in Malaysia, like many others, also faces challenges such as global economic changes, natural disasters, and most recently, the COVID-19 pandemic. In addition, factors involving geopolitical risk and economic uncertainty also affect the Malaysian tourism industry.

Geopolitical Risk and Tourism: Geopolitical risk (GPR) can be defined as the shifts in the relationships between countries or regions (Mokdadi and Saadaoui, 2023) and is a global phenomenon, continuously flowing and interconnected from one country to another (Hasan et al., 2020). Geopolitical risk rises with shifts in the geographic and political factors influencing country relations. Things that happen may be caused by political, economic, or security factors in a specific country which may adversely affect the tourism industry. Geopolitical risks can significantly discourage tourists from visiting a country. Tourists are more inclined to choose safer travel destinations. The presence of a higher level of safety at the travel destination has been found to have a

positive correlation with the destination image. It was found by Gavurova et al. (2023) that a higher level of destination safety may be associated with a more positive destination image. In addition, this sense of safety among tourists is constructed at different travel stages not only before a trip but also during and after a trip (Zou and Yu, 2022). Tourists' perceptions during and after a trip may develop a nostalgia effect. Unfavorable travel experiences perceived by tourists may dissuade revisit intention as a result of the high level of disappointment risk which may contribute to negative nostalgia for the visitors (Hu and Xu, 2021). Hence, it can be said that tourists' decisions to revisit may decrease in a heightened-risk environment. Proper risk identification and management to encourage tourists' revisit activities are critical to attract foreign investment and capital flow in the tourism sector.

Past studies on geopolitical risks and the tourism industry have been concentrated in several areas, including examining the effect of geopolitical risks on stock returns and studying the relationship between geopolitical risks and various economic measures. Regarding stock return performance, geopolitical risks have shown significant predictive power for the returns and volatility of tourism stocks (Raheem and Le Roux, 2023), particularly for emerging economies under normal market conditions (Hasan et al., 2020). These findings suggest that geopolitical risks play a substantial role in influencing the tourism sector. Zhang et al. (2022) proposed that the impact of geopolitical risks on tourism was greater than the effect of economic policy uncertainty, based on their study during the global financial crisis. Additionally, empirical results from Demir et al. (2019) indicated that geopolitical risks negatively affect inbound tourism. A standard deviation shock in geopolitical risk may contribute to more than a 10% variation in tourism income (Hailemariam and Ivanovski, 2021), with this negative effect persisting in both the short and long run (Saint Akadiri et al., 2020). Regardless of the positive connections between nations, increased geopolitical danger could make them less effective in attracting foreign visitors (Wujie, 2023). In summary, these findings collectively underscore the substantial impact of geopolitical risks on the tourism sector, economic measures, and visitor arrivals, with implications for both short- and long-term outcomes.

Economic Policy Uncertainty and Tourism: Economic policy uncertainty can be defined as unanticipated changes that affect the economic system that could lead to changes in governmental fiscal, political, regulatory, and monetary policies (Al-Thaqeb et al., 2022). Economic policy uncertainty significantly affects the demand for international tourism, particularly during major events such as the subprime crisis, Euro-crisis, and pandemics (Doğan et al., 2023). Payne et al. (2023) found a negative impact of economic policy uncertainty on international tourist arrivals in coastal countries. Uncertain economic policies tend to decrease the number of international tourist arrivals, potentially impacting the region's economic growth and residents' income (Uzuner et al., 2020). Some studies suggest a long-term effect of economic policy uncertainty on tourist arrivals (Ongan and Gozgor, 2018), while others highlight a short-term impact (Tiwari et al., 2019). Ongan and Gozgor's (2018) investigation into Japanese tourist arrivals in the United States from 1996 to 2015 revealed that a one-standard-deviation increase in the Economic Policy Uncertainty Index led to a notable and persistent 4.7% decrease in Japanese tourists visiting the US. This effect weakens over time, especially with an increased lag period (Álvares et al., 2007). In contrast, Tiwari et al. (2019), examining tourist arrivals in India, suggested that economic policy uncertainty primarily affects tourist arrivals in the short term. The variation in the timing of the impact could be attributed to differences in the economic class of the sample countries (developed vs. developing) used by these researchers.

Previous literature predominantly suggests a unidirectional impact of economic policy uncertainty on international tourist arrivals. Nevertheless, a bidirectional relationship may exist between economic policy uncertainty and international tourist arrivals. Simply put, tourist arrivals can contribute to reduced economic policy uncertainty. Both inbound and outbound tourism have the potential to foster economic growth (Tsung-Li et al., 2022), instilling confidence in businesses, investors, and the general population and thus lowering uncertainty about future economic conditions. It is crucial to note that the positive impact of the tourism industry on economic growth is primarily driven by factors such as tourist attractions (Zhang and Zhang, 2023), tourism revenues (Soylu, 2020), and higher tourist expenditure (Usmani et al., 2021) in the visited country, rather than solely by the number of tourist arrivals. Exploring potential bidirectional interactions between economic policy uncertainty and tourist arrivals in developing countries, as suggested by some literature, could provide a more comprehensive understanding of the dynamics involved. Therefore, this study aims to contribute additional evidence in the context of developing countries, using Malaysia as the study sample.

3. Research Methodology

Dependent Variable: The dependent variable is represented by the term "tourist arrivals" or TA. The unit of measurement is the number of tourists. This study considers the quarterly observations from the first quarter of the year 2000 to the fourth quarter of the year 2022. The data source for TA is the official Tourism Malaysia website, which can be accessed at the following URL: <https://www.tourism.gov.my/statistics>.

Explanatory Variables: Geopolitical risk, proxied by GPR, is one of the main explanatory variables used in this study. In addition to GPR, the Economic Uncertainty Index, represented by the EU variable, is also employed as an explanatory variable. The quarterly observations for GPR are obtained from datasets downloaded from <http://www.policyuncertainty.com/gpr.html>. This index was developed by Caldara and Iacoviello (2022) and represents the measure of adverse geopolitical events based on several newspaper articles covering geopolitical pressures. The second main explanatory variable, EU quarterly data, was obtained from the Datastream database, referring to the relative frequency of own-country newspaper articles containing a trio of terms related to the economy, policy, and uncertainty.

This study contributes to the existing literature by investigating the interconnections between Geopolitical Risk (GPR) and Economic Uncertainty (EU) and their impact on the tourism sector. The aim is to estimate the significance of GPR and EU in the growth of the tourism sector by examining their roles as crucial determinants of international inbound tourist arrivals to Malaysia. For both GPR and EU, values are normalized by the total number of words and rescaled by multiplying by 1,000, using the average of the base year's data until the most recent data equals 100. A value greater than 100 indicates higher levels of risk, while a lower index value suggests a lower level of risk.

Control variables, following Ghosh (2002), include economic growth proxied by the industrial production index (IP), exchange rate (EX), inflation (CPI), and trade openness (EM), computed by dividing exports by imports. The data source for IP is the Department of Statistics Malaysia (DOSM), retrieved from <https://open.dosm.gov.my/>. Imports and export data for computing the EM variable were collected from the DOSM database. The data source for EX is the Bank for International Settlements (BIS), available at <https://data.bis.org/topics/EER/data>. According to BIS, real effective exchange rates measure the international competitiveness of components of financial condition indices and are calculated as geometric trade-weighted averages of bilateral exchange rates adjusted by relative consumer prices. Similar to EM, CPI data were also collected from the DOSM database. According to DOSM, CPI measures the cost of purchasing a constant 'basket' of goods and services by households in a specified period relative to a base period (year 2010 = 100). For all variables, the period of observations is quarterly, from 2000 until 2022.

Table 1 displays the descriptive statistics of the data, whereas Table 2 illustrates the correlation between variables. According to the data in Table 1, we observe that most of the variables (except TA and EX) have a positive skewness. The variable with the lowest standard deviation is GPR, while CPI has the highest standard deviation. The correlation matrix in Table 2 reveals that there is a positive relationship between TA and GPR, whereas a negative relationship is observed between TA and EU variables. Furthermore, there is also a negative relationship between industrial production and tourist arrivals.

After selecting the variables, we checked for multicollinearity, which occurs when independent variables in the regression model are highly correlated with each other. Ignoring multicollinearity may result in a vague, imprecise, and unreliable model. Correlation coefficients exceeding 0.8 indicate severe multicollinearity. Based on Table 2, the correlation value between IP and CPI variables is the highest, with a value of 0.98. To further test for multicollinearity with these variables in the model, we used variance inflation factors (VIF) in this study. Table 3 shows that the average VIF value is greater than 10 when CPI and IP variables are included in the same model. By removing the CPI variable (with the highest VIF value) from the existing model, the average VIF score is then reduced to 2.16, indicating that there is no severe multicollinearity in the model. Given these findings, CPI will be excluded in the subsequent analyses to address the multicollinearity issue.

Table 1: Descriptive Statistics

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis
TA	4,715,383	5,388,534	2,037,286	-0.94	2.97
GPR	0.04	0.03	0.05	6.14	49.47
EU	0.14	0.09	0.16	1.77	5.99
EM	1.19	1.19	0.06	0.13	2.49
EX	110.50	112.15	7.31	-0.32	1.94
IP	102.00	100.20	13.52	0.11	1.94
CPI	102.95	103.28	14.99	0.00	1.64

Table 2: Correlation Matrix

Variables	TA	GPR	EU	EM	EX	IP	CPI
TA	1.00						
GPR	0.01	1.00					
EU	-0.33***	0.00	1.00				
EM	-0.46***	-0.22**	0.27***	1.00			
EX	0.21**	0.14	-0.10	0.01	1.00		
IP	-0.48***	0.04	0.25*	-0.03	-0.82***	1.00	
CPI	0.15	-0.07	0.03	-0.31***	-0.73***	0.98***	1.00

Table 3: Variance Inflation Factors

Variables	CPI and IP in the same model		Excluding CPI from the model	
	VIF	1/VIF	VIF	1/VIF
GPR	1.31	0.89	1.31	0.76
EU	1.11	0.76	1.11	0.89
EM	2.02	0.49	1.42	0.70
EX	5.87	0.17	3.50	0.28
IP	32.72	0.03	3.47	0.28
CPI	46.77	0.02	NA	NA
Mean VIF	14.97		2.16	

Model Estimation: This study explores how tourism in Malaysia is impacted by the geopolitical risk index and economic policy uncertainty. To avoid the problem of omitted variable bias, this study includes selected control variables, which encompass industrial production, inflation, effective exchange rate, and trade openness. The general functional forms for exploring the impact of geopolitical risk and economic policy uncertainty on tourism are expressed in equations (1) and (2).

$$TA_t = f(GPR_t, EM_t, EX_t, IP_t, \epsilon_t) \dots \dots \quad (1)$$

$$TA_t = f(EU_t, EM_t, EX_t, IP_t, \theta_t) \dots \dots \quad (2)$$

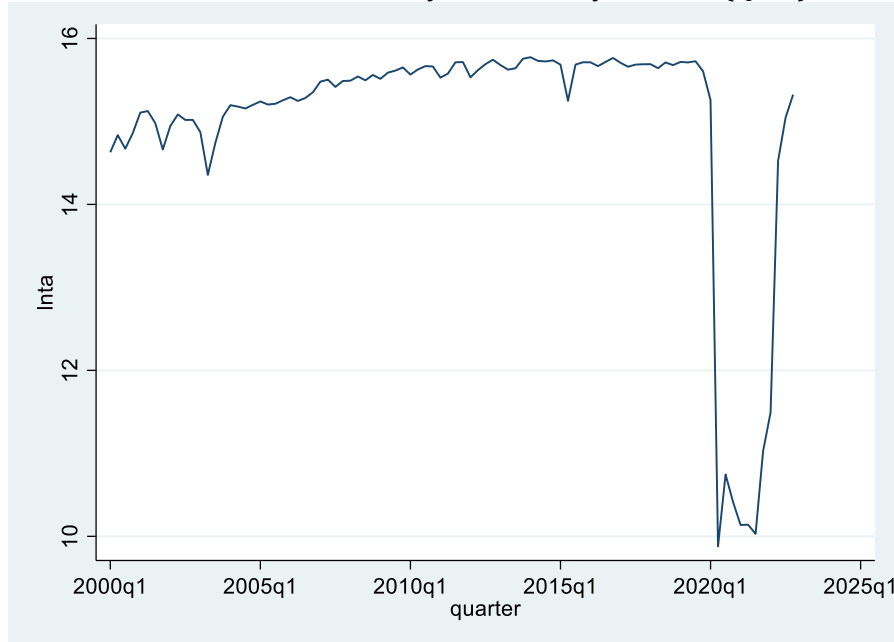
Here, TA denotes tourist arrivals, GPR is the geopolitical risk index, EU is the economic policy uncertainty index, EM is the ratio of exports to imports, EX is the effective exchange rate, IP is industrial production, while ϵ_t and θ represents the usual error term for equations (1) and (2), respectively. An increase in geopolitical risk and economic policy uncertainty is expected to result in negative reactions to tourist arrivals. An increase in geopolitical risk and economic uncertainty, coupled with a rise in the exchange rate and inflation, will consequently lead to a slowdown in the tourism business due to the increase in the cost of buying the currencies of visited countries. Additionally, the rising cost of living contributes to this slowdown. On the other hand, a rise in industrial production will have a positive impact on tourism because it will lead to the growth of

businesses that support the sector. In addition, growing import and export activities will also have a positive effect on the tourism sector. It is inferred that when consumers have a higher propensity to spend, there will be increased travel and tourism activities.

Unit Root Testing: Before employing any time series method, it is imperative to confirm the stationarity of the series. Failure to consider the stationarity of time series data in the analysis may lead to spurious regression, subsequently resulting in the model's failure to predict the data across different time intervals (Granger and Newbold, 1974). In this study, the Augmented Dickey-Fuller unit root test (ADF test) (Dickey and Fuller, 1979) and the Phillips-Perron unit root test (Phillips and Perron, 1988) are used to assess the stationarity of the collected series.

Zivot And Andrews Unit Root Test with One Structural Break: In identifying the structural break in the series, we apply the Zivot and Andrews (ZA) unit root test with one structural break. The results in Figure 1 show that tourist data in Malaysia has one breakpoint in the model, which is in the year 2020, quarter 1 (2020q1 in the graph). The ZA model can be stated as in equation (4).

Figure 1: Total number of tourist arrivals in Malaysia from the year 2000 (Qtr 1) until 2022 (Qtr 4)



$$H_0: y_t = \mu + y_{t-1} + e_t \quad (3)$$

$$H_1: y_t = \hat{\mu} + \hat{\theta} DU_t(\hat{T}_b) + \hat{\beta} t + \hat{\gamma} DT_t(\hat{T}_b) + \hat{\alpha} y_{t-1} + \sum_{j=1}^k \hat{c}_j \Delta y_{t-j} + \hat{e}_t \quad (4)$$

As shown in equation (3), the null hypothesis for the Zivot-Andrews unit root test is that the series has a unit root with a drift that excludes exogenous structural change. The model allows for a change in the intercept and a break in the trend. Similar to conventional Dickey-Fuller unit root test equations, the test equations include the k-lagged differences of y to eliminate the effect of the error correlation structure on the asymptotic distribution of the statistics. DU_t is a dummy variable indicating changes in the intercept, and DT_t is another dummy variable explaining the change in the trend occurring at time T_b . T_b is the break date. The null hypothesis is rejected when α is statistically significant.

Cointegration analysis: In practice, many economic and financial variables contain one unit root and are thus $I(1)$. Cointegration between variables exists when a linear combination of them is stationary, even if the individual variables have unit roots and are non-stationary. A cointegrating relationship may also be seen as a long-term or equilibrium phenomenon. Although cointegrating variables can deviate from their relationship in

the short run, their association tends to return in the long run (Brooks, 2019).

To test the cointegrating relationship between TA, GPR, EU, EM, EX, and IP, this study employed the Engle-Granger 2-step method (Engle and Granger, 1987). This method recommends a two-step procedure for cointegration analysis. In the first step, we ensure that all individual variables are stationary after first differencing. Next, the cointegrating regression is estimated using Ordinary Least Squares (OLS). The residuals of the cointegrating regression are denoted as $\hat{u}_t$ are saved before conducting a unit root test on these residuals to confirm that they are $I(0)$. Once it is confirmed that the residuals of the cointegrating regression are $I(0)$, step 2 can be conducted. However, if the residuals are $I(1)$, the models will be estimated using only the first differences. In this study, it was found that the residuals of the cointegrating relations were all $I(0)$.

In the second step, the residuals obtained in step 1 are used as one variable in the error correction model, as stated in equation (5).

$$\Delta y_t = \beta_1 \Delta X_t + \beta_2 (\hat{\mu}_{t-1}) + v_t \quad (5)$$

Where $\hat{\mu}_{t-1} = y_{t-1} - \hat{\tau}X_{t-1}$. The stationarity, a linear combination of non-stationary variables is also known as a cointegrating vector. $(1-\hat{\tau})$ is called the cointegrating vector. The null hypothesis of no cointegration can be precluded when the $Z(t)$ test value is less than the critical value by at least a 5% confidence level.

In this study, additional control variables used in the system, excluding any constant term, may increase the number of variables to k . Consequently, there could be up to r linearly independent cointegrating relationships, where $r \leq k-1$. To address this, the study complements the Engle-Granger cointegration test with the Johansen cointegration test.

Granger Causality Test: After establishing the long-run relationship between tourist arrivals and geopolitical and economic uncertainties, this study further investigates dynamic causality among TA, GPR, and EU. The causality analysis is based on the Vector Error Correction Model (VECM), and the Granger Causality Test is applied. Equation (6) represents the VECM model.

$$\Delta \begin{bmatrix} TA_t \\ X_t \\ EM_t \\ EX_t \\ IP_t \\ CPI_t \end{bmatrix} = \begin{bmatrix} \gamma_1 \\ \gamma_2 \\ \gamma_3 \\ \gamma_4 \\ \gamma_5 \\ \gamma_6 \end{bmatrix} + \sum_{i=1}^m \Delta \begin{bmatrix} \theta_{11i} & \theta_{12i} & \theta_{13i} & \theta_{14i} & \theta_{15i} & \theta_{16i} \\ \theta_{21i} & \theta_{22i} & \theta_{23i} & \theta_{24i} & \theta_{25i} & \theta_{26i} \\ \theta_{31i} & \theta_{32i} & \theta_{33i} & \theta_{34i} & \theta_{35i} & \theta_{36i} \\ \theta_{41i} & \theta_{41i} & \theta_{41i} & \theta_{41i} & \theta_{41i} & \theta_{41i} \\ \theta_{51i} & \theta_{51i} & \theta_{51i} & \theta_{51i} & \theta_{51i} & \theta_{51i} \\ \theta_{61i} & \theta_{61i} & \theta_{61i} & \theta_{61i} & \theta_{61i} & \theta_{61i} \end{bmatrix} \times \begin{bmatrix} TA_{t-1} \\ GPR_{t-1} \\ EM_{t-1} \\ EX_{t-1} \\ IP_{t-1} \\ CPI_{t-1} \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \end{bmatrix} (ECT_{t-1}) + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \end{bmatrix} \quad (6)$$

Where Δ is the differences operator, ECT_{t-1} is the one-period lagged error correction term, derived from the cointegrating vector. X_t is the main regressor in this study which are GPR and EU, $\mu_{1t}, \mu_{2t}, \dots$ and $represent$ the residual terms. The above VAR contains six variables in the first differenced form of the left-hand side, and $t-1$ lags of the dependent variables in the right-hand side, each with the coefficient matrix attached to it. The statistical significance of ECT_{t-1} explains the long-run Granger causality behavior, while Wald's test statistics demonstrate the short-run dynamics. As a robustness check, variance decompositions and impulse response functions (IRFs) results are also presented in this study.

4. Results and Discussion

Unit Root Test and Cointegration: In this section, this study analyzed and presented the empirical findings. The analysis began with stationarity tests on the identified series. The Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Zivot-Andrews (ZA) unit root tests were employed for this purpose. The ZA unit root test was also used to account for the presence of a structural break in the TA series. The findings, as indicated in Tables 4 and Table 5, confirm that the variables display integration of order $I(1)$. Since the variables are integrated at order $I(1)$, the cointegration test was performed.

Table 4: Unit root test ADF and Phillips Perron (PP) tests

At level	ADF test	Results	PP test	Results
TA	-2.30	Non-stationary	-2.59	Non-stationary
GPR	-5.70***	Stationary	-5.72***	Stationary
EU	-5.73***	Stationary	-5.65***	Stationary
EM	-3.99***	Stationary	-3.76***	Stationary
EX	-0.75	Non-stationary	-0.89	Non-stationary
IP	-1.35	Non-stationary	-1.13	Non-stationary
CPI	-0.34	Non-stationary	-0.35	Non-stationary
First difference	ADF test	Results	PP test	Results
ΔTA	-9.29***	Stationary	-9.33***	Stationary
ΔGPR	-12.97***	Stationary	-15.59***	Stationary
ΔEU	-11.76***	Stationary	-13.03***	Stationary
ΔEM	-11.75***	Stationary	-13.35***	Stationary
ΔEX	-8.47***	Stationary	-8.44***	Stationary
ΔIP	-12.49***	Stationary	-13.87***	Stationary
ΔCPI	-8.79***	Stationary	-8.77***	Stationary

Note: *** and ** indicate that the finding is significant at 1% and 5% level, respectively.

Table 5: Zivot-Andrews Test Results

At level	Break date (TB)	k	t	Inference
TA	2016q4	2	-3.66	Non-stationary
GPR	2008q1	2	-3.80	Non-stationary
EU	2019q2	0	-5.99	Stationary
EM	2016q4	2	-3.10	Non-stationary
EX	2012q2	0	-2.83	Non-stationary
IP	2017q4	0	-5.73	Non-stationary
CPI	2017q1	0	-3.27	Non-stationary
First difference	Break date (TB)	k	t	Inference
ΔTA	2019q2	0	-9.63	Stationary
ΔGPR	2004q3	3	-8.21	Stationary
ΔEU	2004q3	2	-8.40	Stationary
ΔEM	2012q3	2	-8.273	Stationary
ΔEX	2003q4	0	-8.559	Stationary
ΔIP	2020q3	0	12.529	Stationary
ΔCPI	2006q2	3	-6.562	Stationary

Notes:

- Critical values: 1%: -4.93; 5%: -4.42; 10%: -4.11
- The null hypothesis for Zivot-Andrews's test is the series has a unit root with a structural break.

The results of the Engle-Granger cointegration test are displayed in Table 6. The null hypothesis of no cointegration is rejected based on the lower test statistic values compared to the critical value at the 5% level. Tourist arrivals are found to be cointegrated with GPR and EU. In the case where there are only two variables in the equation, y_t and x_t , there can be at most only one linear combination of the independent and dependent

variables (given the direction of the relationship is from x_t to y_t). However, in this study, we have other control variables in the system (ignoring any constant term) that may increase the number of variables to k . In this case, there may be up to r linearly independent cointegrating relationships (where $r \leq k-1$). To address this, we supplement the Engle-Granger cointegration test findings with Johansen cointegration test results.

Table 6: Engle-Granger Cointegration Test

Dependent	Independent variable	Test statistic	Critical value at 5% level	Inference
TA	GPR	-2.327	-3.404	No cointegration
TA	EU	-2.944	-3.404	No cointegration
TA	EM	-2.911	-3.404	No cointegration
TA	EX	-2.460	-3.404	No cointegration
TA	IP	-2.290	-3.404	No cointegration
GPR	TA	-5.745*	-3.404	Cointegration
EU	TA	-6.243 *	-3.404	Cointegration

Note: (*) shows rejection of the null hypothesis of no cointegration at a 5% level of significance.

The results of the Johansen cointegration test are presented in Table 7. For Model 1 and Model 2 results, it can be seen that the test statistic is smaller than the critical value for maximum rank 1. This indicates that we can reject the null hypothesis of no cointegration. In other words, we accept the null hypothesis that there is one cointegrating equation in both Model 1 and Model 2. Thus, we confirm the long-run cointegrating relationship across tourist arrivals, geopolitical risk, economic uncertainty, trade openness, exchange rate and economic growth.

Table 7: Johansen Cointegration Test Results

Model 1

$$TA_t = f(GPR_t, EM_t, EX_t, IP_t)$$

Maximum Rank	Eigenvalue	Trace statistic	Critical value
0	.	95.3105	68.52
1	0.59898	45.0550*	47.21
2	0.36654	19.9444	29.68
3	0.23693	5.0718	15.41
4	0.07246	0.9346	3.76

Model 2

$$TA_t = f(EU, EM_t, EX_t, IP_t)$$

Maximum Rank	Eigenvalue	Trace statistic	Critical value
0	.	95.3105	68.52
1	0.59898	45.0550*	47.21
2	0.36654	19.9444	29.68
3	0.23693	5.0718	15.41
4	0.07246	0.9346	3.76

The causality analysis of the relationship between Tourist Arrivals (TA), Geopolitical Risk (GPR), Economic Uncertainty (EU), Exchange Rate (EX), Equity Market (EM), and Industrial Production (IP) based on the Vector Error Correction Model (VECM) is presented in Table 8. The coefficient of the error correction term in the EU_t equation is negative and statistically significant. The significance of this coefficient indicates a unidirectional Granger causality from TA to EU. Therefore, this study concludes that changes in tourism are a cause of economic policy uncertainty in Malaysia.

Table 8: Granger-causality Wald test results

Panel A: Relationship between GPR and TA						
Dependent variable	ΔTA_{t-1}	ΔGPR_{t-1}	ΔEM_{t-1}	ΔEX_{t-1}	ΔIP_{t-1}	ECM_{t-1}
ΔTA_t	-	0.0104	-1.9836	-0.4901	-1.1565	-0.1941
ΔGPR_t	0.0495	-	-1.5527	-2.7147	-0.4564	0.0870
Panel B: Relationship between EU and TA						
Dependent variable	ΔTA_{t-1}	ΔEU_{t-1}	ΔEM_{t-1}	ΔEX_{t-1}	ΔIP_{t-1}	
ΔTA_t	-	0.6885	-1.7552	-0.6717	-1.2118	-0.0592
ΔEU_t	-0.0127***	-	-0.3369***	0.1388	0.0036	-0.0572**

Note: (***), (**) and (*) denote significance at the 1%, 5%, and 10% levels, respectively.

After establishing the unidirectional causality relationship from Tourist Arrivals (TA) to Economic Uncertainty (EU), the study employs the structural VAR impulse response function to illustrate how economic policy uncertainty responds to a shock in the number of tourist arrivals. The results, depicted in Figure 2, demonstrate that during the initial stages, there is a rapid decrease of less than 0.1% in economic policy uncertainty when tourist arrivals increase by 1%. The reaction of the EU to a shock in TA becomes consistently stable after the first 10 periods. Figure 3 also presents, through the variance decomposition method, that the response of EU to a shock in TA stabilizes in the long run. By the second period, 5% of the variability in the EU is attributed to the shock in TA. These findings indicate that an increase in the tourist arrivals rate correlates with a decrease in economic policy uncertainty. The study suggests that elevated tourism levels contribute significantly to a country's revenue through taxes, fees, and tourist spending, fostering greater fiscal stability for the government and diminishing the likelihood of abrupt changes in the country's economic policy.

Figure 2: Impulse response of the economic policy uncertainty index

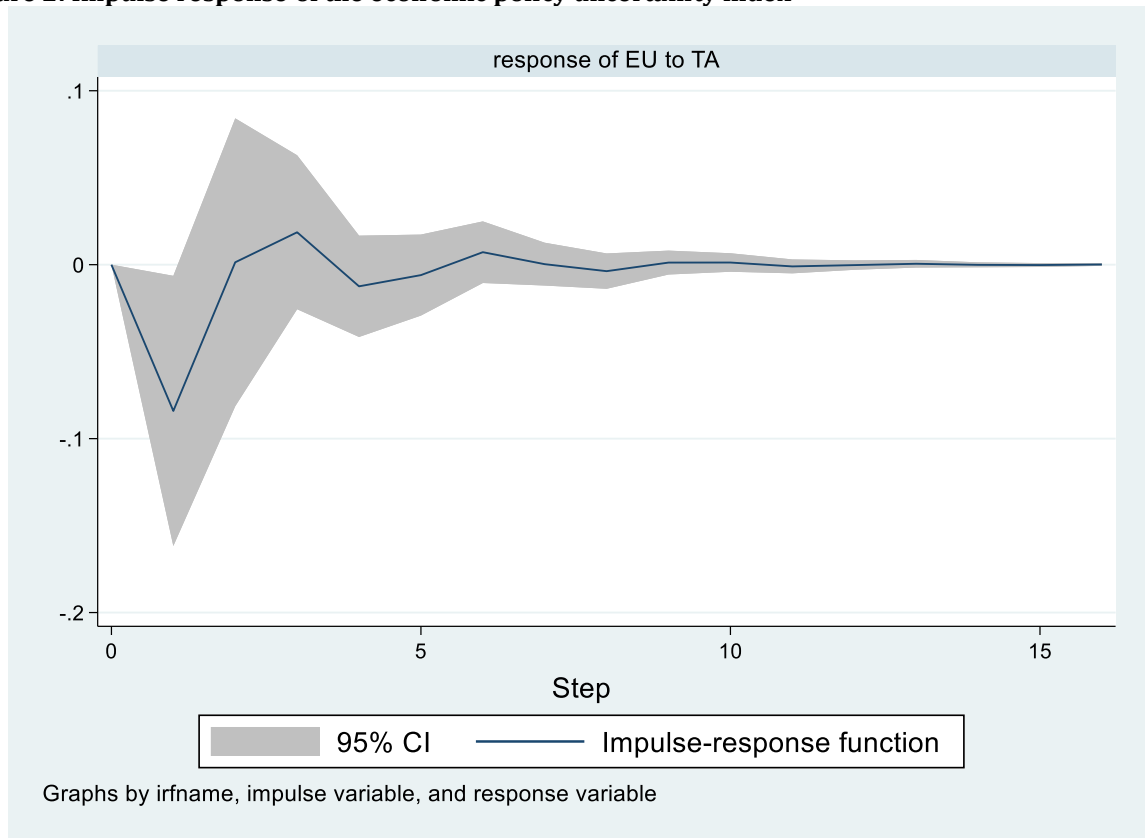
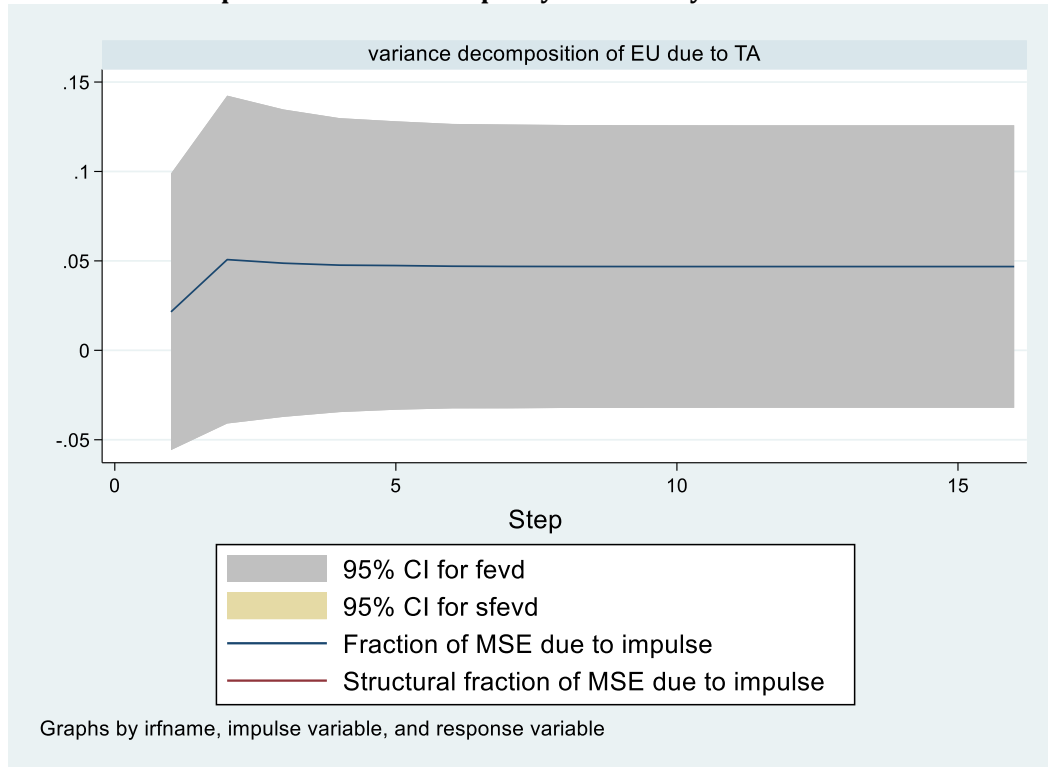


Figure 3: Variance decomposition of economic policy uncertainty index



Discussion: The results for the geopolitical risk variable show no significant long-term relationship between tourist arrivals and geopolitical risk. In the short run, there is a weak negative impact of geopolitical risk on Malaysian tourism, confirming previous findings by Syed et al. (2022) that the influence of geopolitical risk varies across countries, affecting some more significantly than others. These findings are also in line with Balli et al. (2019) study, suggesting that international tourists may not consider geopolitical risk seriously when deciding to travel, particularly for countries with appealing tourism destinations like Malaysia. The limited impact of geopolitical risks on tourist arrivals in Malaysia over the long run may be attributed to the significant appeal of the country's numerous destinations.

Findings from the analysis of causality reveal a cointegrating relationship between economic uncertainty and tourist arrivals. A decrease in tourist arrivals may lead to increased economic policy uncertainty in Malaysia, while a thriving tourism industry could contribute to economic stability and reduced uncertainty. These results align with the study by Akadiri et al. (2020), supporting a one-way causality relationship from international tourist arrivals to economic policy uncertainty, consistent with the tourism-economic policy uncertainty hypothesis.

This study also presents the results from the structural VAR impulse response function in Figure 2. The findings demonstrate that a rise in tourist arrivals quantitatively results in a rapid initial decrease (less than 0.1%) in economic policy uncertainty. This decrease remains relatively stable in the long run, with approximately 5% of the variability in economic policy uncertainty attributed to the impact of tourist arrivals (Figure 3). Overall, these results suggest that increased tourism in Malaysia corresponds to lower economic policy uncertainty. This is because the tourism industry significantly contributes to the country's revenue through taxes (Tovmasyan, 2021; Pole and Grizane, 2021), fees (Wu et al., 2017; Walpole et al., 2001), and tourist spending (Gavurova et al., 2020). This income remains relevant in boosting Malaysia's economy and reducing the likelihood of sudden changes in economic policy, as reported by Fuad and Puasa (2011).

5. Managerial Implications and Recommendations

This study provides valuable insights for policymakers and managers. The limited long-term impact of geopolitical risk on tourist arrivals suggests that policymakers can mitigate short-term effects by leveraging attractive destinations and implementing effective security measures to prepare for potential future risks. Furthermore, the study emphasizes that increased tourist arrivals contribute to fostering a stable economic policy environment. Businesses can benefit by aligning their strategies with a thriving tourism industry. Therefore, continuous efforts to support and promote tourism are vital for maintaining economic stability.

Conclusion

In this study, the researchers investigated the relationship among geopolitical risk, economic policy uncertainty, and tourist arrivals in Malaysia using quarterly data spanning from 2000 to 2022. The tourism industry's substantial contribution to Malaysia's GDP, with a 26.7% increase observed from 2021 to 2022, underscores the importance of understanding the interplay between various risk factors and tourist arrivals for potential insights into economic fluctuations.

Existing literature has consistently shown that escalating geopolitical tensions and economic policy uncertainty have adverse effects on tourist arrivals (Payne et al., 2023; Tiwari et al., 2019; Ongan and Gozgor, 2018). While previous studies have predominantly focused on the impact of geopolitical risk and economic policy uncertainty on tourist arrivals, there has been limited attention dedicated to comprehending how tourist arrivals might reciprocally influence these uncertainties. This study aims to address this gap in the existing literature.

The analysis, conducted using the GPR index developed by Caldara and Iacoviello (2022) and EU data sourced from the Datastream database, reveals a cointegrating relationship between economic uncertainty and tourist arrivals, contrasting with the absence of a similar relationship for geopolitical risk. Moreover, the findings indicate a unidirectional Granger causality relationship between tourist arrivals to changes in economic policy uncertainty. Specifically, a 1% increase in tourist arrivals results in a slight decrease (less than 0.1%) in economic policy uncertainty. This observation is attributed to the positive influence of heightened tourism on income generation from tourism activities, leading to a minor reduction in economic policy uncertainty. These consistent results are obtained across various robust econometric techniques, including the Johansen cointegration test, structural VAR model, impulse response function, and variance decomposition analysis. The study underscores the significance of recognizing the role of tourism industry growth in mitigating economic policy uncertainty, offering valuable insights for practitioners, policymakers, and investors.

Acknowledgment: We would like to express our sincere gratitude to the Faculty of Business and Management, Universiti Teknologi Mara for the research grant funding. This research was supported by the Faculty of Business and Management, Universiti Teknologi Mara. Grant Number: 600-TNCPI 5/3/DDF (FPP) (011/2022).

References

- Ahir, H., Bloom, N., & Furceri, D. (2022). The world uncertainty index (No. w29763). National Bureau of Economic Research.
- Akadiri, S. S., Alola, A. A., & Uzuner, G. (2020). Economic policy uncertainty and tourism: evidence from the heterogeneous panel. *Current Issues in Tourism*, 23(20), 2507-2514.
- Al-Thaqeb, S. A., Algharabali, B. G., & Alabdulghafour, K. T. (2022). The pandemic and economic policy uncertainty. *International Journal of Finance & Economics*, 27(3), 2784-2794.
- Álvares, G., Hoti, S., & McAleer, M. (2007). Modeling international tourist arrivals to the five major Spanish destinations. *Modeling and Simulation Society of Australia and New Zealand*.
- Balli, F., Uddin, G. S., & Shahzad, S. J. H. (2019). Geopolitical risk and tourism demand in emerging economies. *Tourism Economics*, 25(6), 997-1005.
- Brooks, C. (2019). *Introductory econometrics for finance*. Cambridge University Press.
- Caldara, Dario and Matteo Iacoviello (2022). Measuring Geopolitical Risk. *International Finance Discussion Papers 1222r1*. Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/IFDP.2022.1222r1>.

- Demir, E., Gozgor, G., & Paramati, S. R. (2019). Do geopolitical risks matter for inbound tourism? *Eurasian Business Review*, 9, 183-191.
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366a), 427-431.
- Doğan, B., Ghosh, S., Tiwari, A. K., & Abakah, E. J. A. (2023). The effect of global volatility, uncertainty and geopolitical risk factors on international tourist arrivals in Asia. *International Journal of Tourism Research*, 25(1), 1-62.
- Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.
- Fuad, S. N. A., & Puasa, A. F. (2011). National key economic area multiplier impact on Malaysian economy: An input-output analysis. *International Journal of Management Studies*, 18, 34-58.
- Gavurova, B., Skare, M., Belas, J., Rigelsky, M., & Ivankova, V. (2023). The relationship between destination image and destination safety during technological and social changes COVID-19 pandemic. *Technological Forecasting and Social Change*, 191, 122488.
- Gavurova, B., Suhanyi, L., & Rigelský, M. (2020). Tourist spending and productivity of the economy in OECD countries—research on perspectives of sustainable tourism. *Entrepreneurship and Sustainability Issues*. [https://doi.org/10.9770/jesi.2020.8.1\(66\)](https://doi.org/10.9770/jesi.2020.8.1(66))
- Ghosh, S. (2021). Geopolitical risk, economic growth, economic uncertainty and international inbound tourism: an Indian illustration. *Review of Economics and Political Science*, 7(1), 2-21.
- Granger, C. W., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics*, 2(2), 111-120.
- Hailemariam, A., & Ivanovski, K. (2021). The impact of geopolitical risk on tourism. *Current Issues in Tourism*, 24(22), 3134-3140.
- Hasan, M., Naeem, M. A., Arif, M., Shahzad, S. J. H., & Nor, S. M. (2020). Geopolitical risk and tourism stocks of emerging economies. *Sustainability*, 12(21), 9261.
- Hu, Y., & Xu, S. (2021). Memorability of a previous travel experience and revisit intention: The three-way interaction of nostalgia perceived disappointment risk and extent of change. *Journal of Destination Marketing & Management*, 20, 100604.
- Malaysia Tourism Promotion Board (2022). *Malaysia Tourism Key Performance Indicator 2022*, <https://mytourismdata.tourism.gov.my/wp-content/uploads/2023/11/KPI2022-Final-lores.pdf>
- Mokdadi, S., & Saadaoui, Z. (2023). Geopolitical uncertainty and the cost of debt financing: the moderating role of information asymmetry. *The Journal of Risk Finance*, 24(5), 684-720.
- Muzaini, H. (2018). Informal heritage-making at the Sarawak cultural village, East Malaysia. In *Theming Asia* (pp. 102-122). Routledge.
- Ongan, S., & Gozgor, G. (2018). Tourism demand analysis: The impact of the economic policy uncertainty on the arrival of Japanese tourists to the USA. *International Journal of Tourism Research*, 20(3), 308-316.
- Payne, J. E., Nazlioglu, S., & Mervar, A. (2023). Economic policy uncertainty and international tourist arrivals: A disaggregated analysis of the Croatian Adriatic coast. *Tourism Economics*, 29(4), 986-1004.
- Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75(2), 335-346.
- Pole, L., & Grizane, T. (2021). Tourism tax model for the development of regions. *Research for Rural Development*, 36.
- Raheem, I. D., & le Roux, S. (2023). Geopolitical risks and tourism stocks: New evidence from the causality-in-quantile approach. *The Quarterly Review of Economics and Finance*, 88, 1-7.
- Saint Akadiri, S., Eluwole, K. K., Akadiri, A. C., & Avci, T. (2020). Does causality between geopolitical risk, tourism and economic growth matter? Evidence from Turkey. *Journal of Hospitality and Tourism Management*, 43, 273-277.
- Samsudin, N. A., & Fuza, Z. I. M. (2021, November). Attribution of Family Business-Based in Cultural Heritage Management in Malaysia. In *International Conference on Business and Technology* (pp. 683-697). Cham: Springer International Publishing.
- Soylu, Ö. B. (2020). Panel Granger causality analysis of relationships between tourism and economic growth in the top eight tourist destinations. *Ekonomski Pregled*, 71(4), 407-430.
- Syed, Q. R., Bouri, E., Zafar, R. F., & Adekoya, O. B. (2022). Does geopolitical risk mitigate inbound tourism? Evidence from panel quantile regression. *Journal of Public Affairs*, 22, e2784.
- Tang, C. F., & Tan, E. C. (2015). Does tourism effectively stimulate Malaysia's economic growth? *Tourism Management*, 46, 158-163.

- Tiwari, A. K., Das, D., & Dutta, A. (2019). Geopolitical risk, economic policy uncertainty and tourist arrivals: Evidence from a developing country. *Tourism Management*, 75, 323-327.
- Tovmasyan, G. (2021). Capital investments, tourist tax and tourism development: the case study of Armenia. *Economics and Sociology*, 14(1), 199-213.
- Tsung-Li, W., Hung-Pin, L., & Yu-Chi, S. (2022). The Dynamic Analysis Among Energy Consumption, Tourist Expansion and Economic Growth on Carbon Dioxide Emissions. *Economic Computation & Economic Cybernetics Studies & Research*, 56(4).
- Usmani, G., Akram, V., & Praveen, B. (2021). Tourist arrivals, international tourist expenditure, and economic growth in BRIC countries. *Journal of Public Affairs*, 21(2), e2202.
- Uzuner, G., Akadiri, S. S., & Alola, A. A. (2020). Tourist arrivals in four major economies: another side of economic policy uncertainty and fear. *Environmental Science and Pollution Research*, 27, 29659-29665.
- Walpole, M. J., Goodwin, H. J., & Ward, K. G. (2001). Pricing policy for tourism in protected areas: lessons from Komodo National Park, Indonesia. *Conservation Biology*, 15(1), 218-227.
- World Travel and Tourism Council. (7 June 2021). *The new WTTC campaign shows the importance of international travel to people and businesses around the world*. London. <https://wttc.org/news-article/new-wttc-campaign-shows-the-importance-of-international-travel-to-people-and-businesses-around-the-world>
- Wu, W., Zhang, L., & Qiu, F. (2017). Determinants of tourism ticket pricing for ancient villages and towns: Case studies from Jiangsu, Zhejiang, Shanghai and Anhui provinces. *Tourism management*, 58, 270-275.
- Wujie, X. (2023). The impact of geopolitical risks and international relations on inbound tourism—evidence from China and key source countries. *Cogent Social Sciences*, 9(2), 2285244.
- Zhang, H., Jiang, Z., Gao, W., & Yang, C. (2022). Time-varying impact of economic policy uncertainty and geopolitical risk on tourist arrivals: Evidence from a developing country. *Tourism Management Perspectives*, 41, 100928.
- Zhang, Y., & Zhang, J. (2023). Tourist Attractions and Economic Growth in China: A Difference-in-Differences Analysis. *Sustainability*, 15(7), 5649.
- Zou, Y., & Yu, Q. (2022). Sense of safety toward tourism destinations: A social constructivist perspective. *Journal of Destination Marketing & Management*, 24, 100708.