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The effects of geopolitical risks on tourism revenues of the Middle East and Asian countries

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Abstract. *In this study; the effects of Geopolitical Risks (GPR) on tourism revenue of the Middle East and Asia countries were examined by using panel data analysis under the cross-section dependency for the 1995-2021 period. According to the results, GPR has negative effects on tourism income in China, Hong Kong, India, Malaysia and Korea. Relative prices have a positive effect on tourism income in Indonesia, Malaysia, S. Arabia and Thailand. There are causality relations between GPR to tourism income in China, Hong Kong, Israel, Malaysia, Philippines, Russia, Korea and Thailand. Relative prices affect the tourism income in China, Hong Kong, Israel, Malaysia, Thailand and Turkey.*

Keywords: geopolitical risk index, tourism revenue, panel data analysis under the cross-sectional dependence.

JEL Classification: D81, L82, L85.

1. Introduction

Tourism is an important income source for developing countries. Tourism revenues reduce the current account deficits and economic crisis risks of countries by reducing their debt burden and their dependence on foreign currency. Tourism is the third-largest industry in terms of global export (WTO, 2018).

But geopolitical risks may significantly affect people's choices of tourism destinations. Because vacation is basically an activity for pleasure and entertainment, in cases where life safety and health conditions are not fully met, people can easily change or cancel their vacation plans (Marsiglio, 2016). Additionally, geopolitical risks have a crucial role in investments (Balcilar et al., 2018). Geopolitical risks also affect transportation costs (Webster and Ivanov, 2014). These may closely affect the tourism income, employment and economic growth of the host countries (Altay and Celebioglu, 2015, pp. 22-23; Gozgor and Ongan, 2017, p. 99). Despite all the importance, the research on the impact of geopolitical risks on tourism activities are very scant (Demir et al., 2019; Lee et al., 2020).

Geopolitical risks sharply increased with the 9/11 terror attacks in the US in 2001 and Second Gulf War in Iraq from 2003 to 2011 (Caldara and Iacoviello, 2019, p. 3). The protests of the Arab Spring, which started in Tunisia in December 2010 and spread to all Middle East and North African countries, and civil wars and mass migration events caused by them had significant effects on geopolitical risks (Gocer, 2015, p. 53). The withdrawal of the USA from Afghanistan and the Taliban's takeover of the administration in this country has been the last link that has increased the security concerns and geopolitical risks in this region (Mehra and Wentworth, 2021). At this point, it is of great benefit to frequently analyze the effects of increasing geopolitical risks on the economies of the countries in the region and to develop necessary policy recommendations.

In this study; the effects of the changes in the Geopolitical Risk Index (GPR[(1)]) developed by Federal Reserve Board experts Caldara and Iacoviello (2019) on tourism movements in 12 countries in the Middle East and Asia were examined by using panel data analysis methods operating under cross-section dependence. Our methods also produce individual results. Moreover, the effects of GPRs on tourism demand for these countries could be detailly analyzed. The relative prices and the number of tourists were also added to the study as control variables.

This paper is one of the first studies to explore the effects of GPRs on tourism demand in the developing Middle East and Asian countries. It is expected that the findings of the study may shed light on the tourism policies of countries and the future planning of tourism agencies.

2. Literature review

Since the GPR index has just been created, the literature in this field has only just begun to form. Among them, Balli et al. (2019) focused on the effects of GPRs on tourism demand in 8 emerging countries (Malaysia, Indonesia, Mexico, Philippines, South Korea, South Africa, Turkey and Thailand). They detected that impact of GPR is heterogenous for these countries. While Mexico was heavily affected by the GPR, Indonesia and other countries were found to be resistant to GPR shocks. According to these results, the impact of GPR is minimal in popular tourism destinations. Demir et al. (2019) analyzed the effects of GPR on inbound tourism in 18 countries from the 1995-2016 period and they found that GPR negatively affects the domestic number of tourists. Also, they determined that, while GDP, nominal exchange rate and population have positive effects on tourist numbers, inflation has a negative effect on it. Tiwari et al. (2019) investigated the effects of GPR and EPU (Economic Policy Uncertainties) on the number of tourists in India for the period of 2003M01-2017M06. They reached that GPR's effects are greater than EPU in the long run-on tourism in India. EPU has a negative impact on tourism in the short run.

Akadiri et al. (2020) examined the causal relations between GPR and economic growth to tourism in Turkey for the period of 1985Q1-2017Q4 by using Toda and Yamamoto's (1995) causality test. They detected a unidirectional causality from GPR to tourism and GPR to economic growth. Authors also found that one standard deviation shock of GPR has a remarkable negative effect on tourism income and economic growth, both in the short- and long-term. Demir et al. (2020) analyzed the impact of GPR on Turkey's tourist arrivals for the period of 1990M01-2018M12 by means of the NARDL method. They found that GPR has an asymmetric effect on tourist arrivals in the short run. Thus, while the GPR increases, the number of tourists decreases, yet, when GPR decreases, it doesn't have any effect on tourist numbers.

Polat et al. (2021) searched the impacts of GPR on the tourism index in the stock market (BIST) and tourist arrival in Turkey for 1998M01-2020M10 by using the Hatemi-J causality test. They detected an asymmetrical relationship between the GPR of Turkey and the BIST tourism index. An increase in Turkey's GPR level remarkably decreases the BIST tourism index returns. Also, a reduction of GPR in Turkey causes an increase in tourist numbers. Ghosh (2022) examined the effects of GPR on tourism demand in India for the period from January 2015 to December 2017, by using Bayer and Hanck's (2013) causality method. He determined that there are causal relationships between GPR and policy uncertainty to tourism demand and GPR affects the tourism demand of India in the long term. Hence, the author stated that the tourism agencies and politicians should develop new/creative marketing strategies and reduce the GPR level to boost the confidence of the tourists.

This study will make important contributions to the literature, as there is no panel data analysis on this topic that produced individual results for countries since existing studies are either in the form of a time series for a single country or they produce results for the whole panel.

3. Econometric analysis

3.1. Data set

In this analysis, the following data sets were used for detecting GPRs on tourism revenue in the 12 Middle East and Asian Countries (China, India, Hong Kong, Indonesia, Israel, Philippines, Malaysia, Russian Federation, South Korea, Saudi Arabia, Turkey and Thailand) and the study covers the 1995-2021 period.

GPR Index (GPR): GPR Index was developed by Caldara and Iacoviello (2019). They construct this index by counting the occurrence of words related to geopolitical tensions (“geopolitical risk”, “terrorist attack”, “piracy”, “risk of war”, “geopolitical tension”, “geopolitical concern”, “geopolitical uncertainty” and “threats based on terror”) in 11 main newspapers (The Daily Telegraph, The Boston Globe, Chicago Tribune, Financial Times, The Guardian, The Globe and Mail, Los Angeles Times, The Times, The New York Times, The Washington Post and The Wall Street Journal). This index was created by calculating the counting of a number of articles related to geopolitical risk. The GPR index spikes around the First (1990) and Second (2003) Gulf Wars, the 9/11 2001 terrorist attack, during the 2014 and 2022 Ukraine – Russian Federation crises. This data set was obtained from Policy Uncertainty (2022). In Appendix, figures created by GPR data of countries can be seen.

Tourist Number (TNUM): Number of tourist arrivals. This data was taken from the World Bank database (2022a).

Tourism Income (TINC): Tourism receipts (US Dollars). This data was retrieved from the World Bank database (2022b).

Relative Prices (RPRC): Real effective exchange rate data is used for this purpose. This data set was obtained from Bruegel (2021). This data was prepared by Darvas (2021) and it was used by following Irani et al. (2021).

Logarithmic transformation is applied to all series by following Dogan et al. (2016, p. 77). Summary statistics of the original data are presented in Table 1.

Table 1. *Summary statistics*

	GPR	TINCN	TNUM	RPRC
Mean	98.22	15	22	103
Median	92.81	10	12	104
Maximum	205.7	65	163	151
Minimum	44.69	1	1	50
Std. Dev.	25.68	14	31	18
Skewness	0.84	2	3	0.00
Kurtosis	4.19	6	10	3
Prob. of Jarque-Bera	0.00	0.00	0.00	0.00
Observations	312	312	312	312

Note: TINC as billion Dollars and TNUM as million people.

According to Table 1, the data are distributed around their mean. The differences between the maximum and minimum values are small. Therefore, the standard deviations of the data are low. This indicates that the problem of heteroscedasticity problem will not occur at the end of the analysis. The number of observations used in the study is 312, which is adequate. The GPR series achieved its highest value (205.7) in Hong Kong in 2020. The TINC series reached its highest value (65 billion Dollars) in Thailand in 2019. The TNUM series received its greatest value (163 million people) in China, and the RPRC series saw its greatest value (151) in 1998 in Hong Kong.

3.2. Model

By following Stryzhak et al. (2022, p. 92) and Wang et al. (2022, p. 4) the econometric models set in this study were given below:

$$TINC_{it} = \beta_0 + \beta_1 GPR_{it} + \beta_2 TNUM_{it} + \beta_3 RPRC_{it} + \varepsilon_{it} \tag{1}$$

$$TNUM_{it} = \alpha_0 + \alpha_1 GPR_{it} + \alpha_2 RPRC_{it} + \epsilon_{it} \quad (2)$$

Where i; countries ($i = 1, 2, \ldots, 12$), t; the time dimension of the panel ($t = 1, 2, \ldots, 26$). ε_{it}; shows error terms with random walk process. $TINC_{it}$ is tourism income, GPR_{it} is geopolitical risk level, $TNUM_{it}$ is tourist arrival numbers, $RPRC_{it}$ is relative prices in the country i, in the year t.

3.3. Analysis

In this study, panel data analysis methods operating under cross-section dependence were used. We also used methods which can produce individual results.

3.3.1. Cross-section dependence test

Cross-section dependence is an important subject for panel data analyses. When there is a cross-sectional dependence and it is ignored, results may be biased. In order to solve this problem first, the LM test was developed by Breusch and Pagan (1980). This test focuses on Eq. (3):

$$y_{it} = \alpha_i + \beta_i x_{it} + \varepsilon_{it}, \qquad i = 1, \ldots, N, t = 1, \ldots, T \quad (3)$$

Where x_{it} refers to deterministic components, N; cross-section and T is for the time dimension. This cross-sectional dependence test is based on covariance among ε_{it} error terms. The null hypothesis is "$Cov(\varepsilon_{it}, \varepsilon_{jt}) = 0,\ i \neq j$". It shows no cross-sectional dependence. In order to test these hypotheses, Breusch and Pagan (1980) obtained the LM test statistic as follows:

$$LM = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}^2 \quad (4)$$

Here $\hat{\rho}_{ij}^2$ shows covariance coefficients, which are obtained by estimating Eq. (3) via least-squares method (Destek, 2016, p. 41). Baltagi et al. (2012) also corrected the asymptotic deviations in the LM tests and obtained the LM_{BC} test statistic:

$$LM_{BC} = \left(\frac{1}{N(N-1)}\right)^{\frac{1}{2}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \left(\left(T_i \hat{\rho}_{ij}^2 - 1\right) - \frac{1}{2(T-1)}\right) \quad (5)$$

In this paper, LM and LM_{BC} cross-sectional dependence tests were used and the obtained results are presented in Table 2.

Table 2. *Cross-sectional dependence tests results*

	GPR	TNUM	TINC	RPRC
LM	271.39*** (0.00)	1160*** (0.00)	1325.57*** (0.00)	356.97*** (0.00)
LM_{BC}	17.64*** (0.00)	94.98*** (0.00)	109.39*** (0.00)	25.09*** (0.00)

Note: *** shows stationarity in 1% significance. Prob. values are given in the parentheses.

According to the results in Table 2, the null hypothesis is strongly rejected and it is determined that there is cross-section dependence among the countries. Therefore, analysis methods that take this situation into consideration should be used in the next stages of the study.

3.3.2. Panel unit root test

Stationarity levels of these series were investigated via Hadri and Kurozumi's (2012) panel unit root test (HK). This test takes the cross-sectional dependence among countries into consideration. Furthermore, it solves the autocorrelation problem in series by $AR(p+1)$ the process of Sul et al. (2005). HK is based on Eq. (6):

$$y_{it} = z_t'\delta_i + f_t\gamma_i + e_{it} \tag{6}$$

Where f_t is the common factors, e_{it} has an $AR(1)$ process and can be written as Eq. (7):

$$e_{it} = \phi_1 e_{it-1} + u_{it} \tag{7}$$

In Sul et al. (2005) method, y_{it} is assuming as it is $AR(p)$ and modified as it is in Eq. (8):

$$y_{it} = z_t'\delta_i + \hat{\phi}_{i1}y_{it-1} + \cdots + \hat{\phi}_{ip}y_{it-p} + \hat{\zeta}_{i0}\underline{y}_t + \cdots + \hat{\zeta}_{ip}\underline{y}_{t-p} + \hat{u}_{it} \tag{8}$$

Long term variation of the estimated equation is written as in Eq. (9):

$$\hat{\sigma}_{u_i}^2 = \frac{1}{T}\sum_{t=1}^{T}\hat{u}_{it}^2 \tag{9}$$

Variation of Sul et al. (2005) (*SPC)* is calculated by using Eq. (10):

$$\hat{\sigma}_{u_{iSPC}}^2 = \frac{\hat{\sigma}_{u_i}^2}{(1-\hat{\phi}_i)^2} \tag{10}$$

Operating this, Z_A^{SPC} test statistics is obtained with Eq. (11):

$$Z_A^{SPC} = \frac{1}{\hat{\sigma}_{u_{iSPC}}^2 T^2}\sum_{t=1}^{T}(S_{it}^w)^2 \tag{11}$$

Variance is computed in Choi's (1993) Lag Augmented (LA) method by using $\tilde{\sigma}_{u_i}^2$;

$$\hat{\sigma}_{u_{iLA}}^2 = \frac{\hat{\sigma}_{u_i}^2}{(1-\tilde{\phi}_{i1}-\cdots-\tilde{\phi}_{ip})^2} \tag{12}$$

Where $\tilde{\sigma}_{u_i}^2 = \frac{1}{T}\sum_{t=1}^{T}\tilde{u}_{it}^2$, it obtained estimation of Eq. (13):

$$y_{it} = z_t'\tilde{\delta}_i + \tilde{\phi}_{i1}y_{it-1} + \cdots + \tilde{\phi}_{ip+1}y_{it-p-1} + \tilde{\zeta}_{i0}\underline{y}_t + \cdots + \tilde{\zeta}_{ip+1}\underline{y}_{t-p-1} + \tilde{u}_{it} \tag{13}$$

Then, Z_A^{LA} test statistic is obtained via Eq. (14):

$$Z_A^{LA} = \frac{1}{\hat{\sigma}_{u_{iLA}}^2 T^2}\sum_{t=1}^{T}(S_{it}^w)^2 \tag{14}$$

Null hypothesis of this test is; "$\phi_i(1) \neq 0$ $for\ all\ i,\ no\ unit\ root$". and Alternative of this hypothesis is; "$\phi_i(1) = 0$ $for\ some\ i,\ has\ a\ unit\ root$". In this study, Hadri and Kurozumi's (2012) panel unit root test was used and outcomes are given in Table 3.

Table 3. *Panel unit root test results*

Variables	Level		First Difference	
	Z_A^{SPC}	Z_A^{LA}	Z_A^{SPC}	Z_A^{LA}
GPR	5.31 (0.00)	5.06 (0.00)	0.07*** (0.47)	0.50*** (0.50)
TNUM	2.40 (0.00)	2.77 (0.00)	0.57*** (0.28)	0.47*** (0.31)
TINC	2.97 (0.00)	2.30 (0.00)	0.008*** (0.49)	0.06*** (0.52)
RPRC	9.63 (0.00)	15.88 (0.00)	-0.35*** (0.63)	-0.40*** (0.65)

Note: *** indicates stationarity in 1% significance. Prob. values are given in the parentheses.

According to the results in Table 3, all series are non-stationary in the level and they are stationary in the first differences. Thus, all series are I(1). Therefore, applying a cointegration test is necessary according to Engle and Granger (1987).

3.3.3. Panel cointegration test

The existence of cointegration among the series was searched by means of the Durbin-Hausman panel cointegration test of Westerlund (2008). This method considers the cross-section dependency among countries. This test is based on Eq. (15):

$$y_{it} = \alpha_i + \beta_i x_{it} + z_{it} \tag{15}$$

Here $x_{it} = \delta_i x_{it-1} + w_{it}$ and $z_{it} = \lambda_i' F_t + e_{it}$. Then $e_{it} = \phi_i e_{it-1} + v_{it}$. F_t is the common factor and it can be written as Eq. (16):

$$F_{jt} = \rho_j F_{jt-1} + u_{jt} \tag{16}$$

Westerlund (2008) has developed two different test statistics in this method:

$$DH_g = \sum_{i=1}^{n} \hat{S}_i (\tilde{\phi}_i - \hat{\phi}_i)^2 \sum_{t=2}^{T} \hat{e}_{it-1}^2 \tag{17}$$

$$DH_p = \hat{S}_i (\tilde{\phi}_i - \hat{\phi}_i)^2 \sum_{i=1}^{n} \sum_{t=2}^{T} \hat{e}_{it-1}^2 \tag{18}$$

Where DH_g is Durbin-Hausman group statistics for heterogeneous panel and DH_p is panel statistics for the homogeneous panel.

Here $\hat{S}_i = \frac{\hat{\omega}_i^2}{\hat{\sigma}_i^4}$ and $\hat{\omega}_i^2 = \frac{1}{T-1} \sum_{j=-M_i}^{M_i} (1 - \frac{j}{M_i+1}) \sum_{t=j+1}^{T} \hat{v}_{it} \hat{v}_{it-j}$. $\hat{v}_{it}$ is the OLS residual, M_i is bandwidth and $\hat{\sigma}_i^2$ is variance.

The null hypothesis of Durbin-Hausman test is "$\phi_i = 1$ for all i, no cointegration" and the alternative hypothesis is "$\phi_i < 1$ for some i, cointegration". Results of the Westerlund (2008) Durbin-Hausman panel cointegration test are given in Table 4.

Table 4. *Panel cointegration test results*

	DH_g	DH_p
$Model: TINC = f(GPR, TNUM, RPRC)$	7.85*** (0.00)	4.95*** (0.00)
$Model: TNUM = f(GPR, RPRC)$	5.31*** (0.00)	6.66** (0.02)

Note: *** and ** indicates the existence of cointegration in the model at 1% and 5%, respectively. Prob. values are given in the parentheses.

These results demonstrate that there are cointegration relationships among series in both models. The results of DH_g and DH_p tests confirmed the existence of a long-run relationship (Malhotra and Kumari, 2016, p. 143) between the tourism sector and geopolitical risks in the selected Middle East and Asian countries. According to these cointegration relations, spurious regression problems will not be encountered in subsequent analyzes (Engle and Granger, 1987).

3.3.4. Panel regression analysis

Panel regression analysis was conducted by the Panel AMG estimator of Eberhardt and Bond (2009). This method takes into consideration cross-sectional dependence. The results obtained by the AMG method are represented in Table 5 and Table 6.

Table 5. *Panel regression analysis results (dependent variable: TINC)*

	GPR	TNUM	RPRC	Constant
China	-0.77*** (0.00)	0.57*** (0.00)	0.27 (0.56)	15.35*** (0.00)
Hong Kong	-0.32** (0.03)	0.58* (0.05)	0.23 (0.49)	13.66*** (0.00)
India	-0.38*** (0.00)	0.25* (0.09)	0.78 (0.13)	15.85*** (0.00)
Indonesia	-0.09 (0.15)	0.98*** (0.00)	0.24* (0.07)	6.51*** (0.00)
Israel	0.36** (0.01)	0.74 (0.57)	0.28 (0.18)	8.08*** (0.00)
Malaysia	-0.15** (0.03)	0.90*** (0.00)	0.85*** (0.00)	4.65*** (0.00)
Philippines	0.004 (0.98)	1.04*** (0.00)	-0.37 (0.32)	7.85* (0.05)
Russia	-0.09 (0.79)	0.46* (0.05)	0.12 (0.77)	14.13*** (0.00)
Saudi Arabia	-0.13 (0.46)	-0.09 (0.61)	0.90*** (0.00)	19.40*** (0.00)
South Korea	-0.16* (0.09)	0.70*** (0.00)	-0.68*** (0.00)	15.65*** (0.00)
Thailand	0.001 (0.97)	0.72*** (0.00)	1.14*** (0.00)	6.12*** (0.00)
Turkey	0.0004 (0.99)	0.58*** (0.00)	0.14 (0.22)	12.94*** (0.00)
Panel	-0.11* (0.06)	0.67*** (0.00)	0.34** (0.04)	11.71*** (0.00)
Number of obs.	312	Prob > chi2		0.00
Wald chi2(3)	67.38	RMSE		0.12

Note: ***, ** and * indicates significance in 1%, 5% and 10%. Prob. values are given in the parentheses.

According to the results in Table 5, geopolitical risks negatively affect the tourism income in China, Hong Kong, India, Malaysia, South Korea and the entire panel. If GPR increases by 1%, the tourism income of China decreases by 0.77%, by 0.32% in Hong Kong, by 0.38% in India, by 0.15% in Malaysia, by 0.16% in S. Korea and by 0.11% in the panel. Though it has a positive effect in Israel. It shows that the tourism demand of Israel is inelastic to GPR. The number of tourists increases the tourism income in China, India, Hong Kong, Indonesia, Philippines, Malaysia, Russian Federation, South Korea, Turkey, Thailand and the entire panel. When tourist arrivals increase by 1%, it improves tourism income by 0.57% in China, 0.58% in Hong Kong, 0.25% in Indonesia, 0.90% in Malaysia, 1.04% in Philippines, 0.46% in Russia, 0.70% in S. Korea, 0.72% in Thailand, 0.58% in Turkey and 0.67% in panel. Hence, these countries attracting more tourists will also increase their tourism revenues. If relative prices increase by 1%, tourism income expands by 0.24% in Indonesia, by 0.85% in Malaysia, by 0.90% in Saudi Arabia and by 1.14% in Thailand. These results indicate that the price elasticity of tourism demand is very low in the given countries. They can improve their tourism revenue by increasing the prices. Raising prices has reduced tourism revenues in South Korea. Thus, South Korea should avoid raising tourism prices.

Table 6. *Panel regression analysis results (dependent variable: TNUM)*

	GPR	RPRC	Constant
China	-0.19* (0.07)	-2.07*** (0.00)	28.46*** (0.00)
Hong Kong	-0.02 (0.75)	-0.45** (0.01)	18.39*** (0.00)
India	-0.25 (0.21)	1.77*** (0.00)	7.70*** (0.00)
Indonesia	-0.36*** (0.00)	-0.35 (0.10)	18.36*** (0.00)
Israel	-1.29*** (0.00)	0.18 (0.72)	19.10*** (0.00)
Malaysia	0.21 (0.28)	0.14 (0.80)	14.13*** (0.00)
Philippines	-0.23** (0.01)	0.55*** (0.00)	12.79*** (0.00)
Russia	-0.28 (0.39)	-0.32 (0.36)	19.16*** (0.00)
Saudi Arabia	0.46*** (0.00)	-0.39 (0.14)	15.53*** (0.00)
South Korea	0.09 (0.39)	-0.06 (0.74)	14.89*** (0.00)
Thailand	-0.23*** (0.00)	0.36* (0.07)	15.04*** (0.00)
Turkey	-0.29* (0.08)	0.45** (0.02)	15.28*** (0.00)
Panel	-0.19*** (0.00)	0.03 (0.84)	16.14*** (0.00)
Number of obs.	312	Prob > chi2	0.01
Wald chi2(2)	8.12	RMSE	0.14

Note: ***, ** and * indicate significance in 1%, 5% and 10%. Prob. values are given in the parentheses.

According to the results in Table 6, geopolitical risks negatively affect the tourist arrivals in China, Indonesia, Israel, Philippines Thailand, Turkey and the entire panel. If GPR increases by 1%, it decreases tourists' number by 0.19% in China, by 0.36% in Indonesia, by 1.29 in Israel, by 0.23% in the Philippines and Thailand, by 0.29% in Turkey and by 0.19% in the panel. However, GPR has a positive effect in Saudi Arabia at 0.46%. As shown, tourism demand in Saudi Arabia is inelastic due to the holly pilgrimage. An increase in the relative prices diminishes tourists in China and Hong Kong by 2.07% and 0.45%, respectively. It would be advantageous for these countries to not increase their prices of goods and services in order to increase the number of tourists. When relatively prices are increased by 1%, the number of tourists increases by 1.77% in India, 0.55% in the Philippines, 0.36% in Thailand and 0.45% in Turkey. These results indicate that the price elasticity of tourism demand is low in these countries.

3.3.5. Causality test

Existence of causality relations among series was examined by Konya's (2006) SUR test. The cross-section dependence among these countries is taken into consideration in this method. The Konya (2006) method uses this equation system for testing causality relations from X to Y:

$$Y_{1,t} = \varphi_{1,1} + \sum_{j=1}^{p_{y_1}} \alpha_{1,1,j} Y_{1,t-j} + \sum_{j=1}^{p_{x_1}} \gamma_{1,1,j} X_{1,t-j} + \epsilon_{1,1,t} \tag{19}$$

$$Y_{2,t} = \varphi_{1,2} + \sum_{j=1}^{p_{y_1}} \alpha_{1,2,j} Y_{2,t-j} + \sum_{j=1}^{p_{x_1}} \gamma_{1,2,j} X_{2,t-j} + \epsilon_{1,2,t} \tag{20}$$

$$\cdots\cdots$$

$$Y_{N,t} = \varphi_{1,N} + \sum_{j=1}^{p_{y_1}} \alpha_{1,N,j} Y_{N,t-j} + \sum_{j=1}^{p_{x_1}} \gamma_{1,N,j} X_{N,t-j} + \epsilon_{1,N,t} \tag{21}$$

Where p_{y_1} and p_{x_1} are optimal lag lengths. This method can be used when the series is stationary or cointegrated (Konya, 2006, p. 980)(2). The null hypothesis of this test is "$\gamma_{1,1,j} = 0$, for all j. No causality X to Y", and the alternative hypothesis is "$\gamma_{1,1,j} \neq 0$, for some j. Causality from X to Y in some cross-sections". Konya's (2006) test results were presented in Table 7.

Table 7. *Causality test results for each country*

	GPR → TINC	GPR → TNUM	TNUM → TINC	RPRC → TINC	RPRC → TNUM
China	5.96** (0.01)	2.80* (0.09)	0.14 (0.70)	20.30*** (0.00)	18.16*** (0.00)
Hong Kong	23.76*** (0.00)	20.47*** (0.00)	0.57 (0.99)	18.44*** (0.00)	16.63*** (0.00)
India	0.22 (0.63)	1.39 (0.23)	8.86*** (0.00)	0.87 (0.92)	0.41 (0.51)
Indonesia	0.95 (0.32)	0.83 (0.77)	4.54** (0.03)	1.31 (0.25)	1.55 (0.21)
Israel	5.05** (0.02)	1.21 (0.26)	1.90 (0.16)	4.89** (0.02)	10.10*** (0.00)
Malaysia	11.04*** (0.00)	6.25** (0.01)	28.53*** (0.00)	11.49*** (0.00)	32.32*** (0.00)
Philippines	3.50* (0.06)	5.70** (0.01)	25.91*** (0.00)	0.27 (0.86)	0.47 (0.82)
Russia	23.20*** (0.00)	0.54 (0.45)	0.12 (0.72)	12.83*** (0.00)	0.35 (0.85)
Saudi Arabia	0.24 (0.96)	8.16*** (0.00)	5.73** (0.01)	0.12 (0.71)	2.06 (0.15)
South Korea	6.02** (0.01)	0.70 (0.40)	0.24 (0.61)	0.16 (0.68)	1.30 (0.25)
Thailand	11.79*** (0.00)	3.20* (0.07)	1.14 (0.28)	2.78* (0.09)	4.16** (0.04)
Turkey	1.88 (0.16)	0.18 (0.67)	3.11* (0.07)	5.39** (0.02)	9.62*** (0.00)

Note: ***, ** and * indicates significance in 1%, 5% and 10%. Prob. values are given in the parentheses.

According to the causality test results in Table 7, there are causality relations from GPR to tourism income in China, Hong Kong, Israel, Malaysia, Philippines, Russia, South Korea, Thailand and the entire panel. Likewise, there are causality relations between GPR to tourist numbers in China, Hong Kong, Malaysia, Philippines, Saudi Arabia, Thailand and the entire panel. On the other hand, the number of tourists affects the tourism income in India, Indonesia, Malaysia, Philippines, Saudi Arabia and Turkey. These countries should focus on increasing their number of tourists. Relative prices affect the tourism income in China, Hong Kong, Israel, Malaysia, Russia, Thailand, Turkey and the entire panel. Moreover, prices affect the number of tourists in China, Hong Kong, Israel, Malaysia, Thailand, and Turkey. If these countries can accurately manage tourism prices, they can then increase their number of tourists and tourism income.

4. Conclusions

In this study; the effects of GPR on tourism movements towards Turkey, South Korea, Russian Federation, India, Saudi Arabia, China, Indonesia, Thailand, Philippines, Israel, Malaysia and Hong Kong were examined by using panel data analysis under the cross-section dependence for the period of 1995-2021. Our methods further produce individual results. Additionally, relative prices and tourist numbers were added as control variables to the analysis.

The cross-sectional dependence was tested via LM and LM_{BC} tests and it was decided that there is cross-section dependency among the Middle East and Asian countries. Stationarity levels of series were investigated by means of Hadri and Kurozumi's (2012) method and it was seen that all series are I(1). Cointegration relations of series are investigated via Westerlund's (2008) method and it was determined that series are cointegrated.

Panel regression analyses were conducted by using the AMG technique of Eberhardt and Bond (2009). According to panel results, GPR has a negative effect on tourism income in China, Hong Kong, India, South Korea, Malaysia and the entire panel. These countries should try to decrease the geopolitical risks on their territory in order to increase their tourism revenue. The most significant impact was found in China. GPR has a positive effect in Israel. The result shows that the tourism demand of Israel is inelastic to GPR. Likewise, GPR has a negative effect on tourist arrivals in China, Indonesia, Israel, Philippines, Thailand, Turkey and the overall panel. These countries should focus on decreasing their GPR level in order to increase their numbers of tourists. It is seen that Israel is the most vulnerable country in this domain. Quite the opposite, GPR has a positive effect in Saudi Arabia, which means that the tourism demand in Saudi Arabia is inelastic due to the holly pilgrimage. Price increases have a positive effect on tourism revenue in Indonesia, Malaysia, Saudi Arabia and Thailand. These results indicate that the tourism demands of these countries are inelastic. These countries can improve their tourism income by raising the prices. Thailand is the most advantageous country in this respect. While rising prices reduced tourist numbers in China and Hong Kong, the number has increased in India, the Philippines, Thailand and Turkey. These results imply the price elasticity of tourism demand is low in China and Hong Kong. Thus, China and Hong Kong should degrade their tourism prices.

According to the Konya (2006) test results, there are causality relations between GPR to tourism income in China, Hong Kong, Israel, Malaysia, Philippines, Russia, S. Korea and Thailand. Likewise, there are causality relations between GPR to tourist numbers in China, Hong Kong, Malaysia, the Philippines, Saudi Arabia and Thailand. On the other hand, tourist numbers affect the tourism revenue in India, Indonesia, Malaysia, Philippines, Saudi Arabia and Turkey. These countries should focus on increasing the number of tourists in order to make increase their revenue from the tourism sector. Relative prices affect the tourism income and the number of tourists in China, Hong Kong, Israel, Malaysia, Russia, Thailand and Turkey. If these countries can accurately control tourism prices, they can then increase their income.

According to the findings acquired from the analyses, the tourism industry should explain the sources of geopolitical risks, decrease tourism prices and the major stakeholders should establish platforms and develop international cooperation in their countries to reduce travellers' fears. This study emphasizes the mentioned countries to reduce GPRs. Otherwise, these risks may be damaging to the tourism sector.

Notes

(1) This index measures geopolitical risk levels, which are related to wars, terror attacks, and problems between countries that affect the peaceful course of life (Caldara and Iacoviello, 2019, p. 5).

(2) This situation is represented in the Konya (2006: 980) study as follows: It is assumed that Y_t and X_t are stationary or cointegrated therefore, depending on the time-series properties of the data, they might denote the level, the first difference or somewhat higher difference of X and Y.

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Appendix. GPR indexes of countries