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Geopolitical Risk and Türkiye's Tourism Growth: Testing a Shifting Relationship

Abstract. *This study analyses the relationship between tourism and economic growth in Türkiye, taking a novel approach by considering the impact of geopolitical risk. Using monthly data from 1996 to 2022, we disaggregate tourism markets based on countries' geopolitical risk levels. By employing a fuzzy clustering technique, we reveal how the tourism-growth nexus varies across different geopolitical risk clusters. Furthermore, we utilise Fourier-Toda-Yamamoto Causality test to analyse the causal relationship across short, medium, and long-term horizons. Our findings reveal a consistent tourism-led growth pattern in all countries regardless of geopolitical risk, highlighting the significant role of tourism in the Turkish economy. However, the study uncovers crucial nuances within the tourism-growth relationship, demonstrating a feedback effect in the short run and varying causal relationships across different time horizons. This study contributes to the literature by explicitly incorporating geopolitical risk into the analysis of tourism-led growth, providing valuable insights for policy makers in Türkiye.*

Keywords: *tourism-led growth hypothesis; geopolitical risk; fuzzy clustering; Fourier causality; Türkiye.*

JEL Classification: C32, Z32, Z38.

1. Introduction

The tourism industry, like many others, is highly vulnerable to various risks. Investors tend to favour environments with low uncertainty and risk, as this fosters greater confidence in investment decisions. Consequently, events such as political turmoil or acts of terrorism can significantly influence international tourist arrivals. The broader political environment, both domestically and internationally, has a profound impact on the economy, tourism, and other sectors (Antonakakis et al., 2017). Geopolitical risks, in particular, can negatively affect tourist arrivals, overnight stays, and other indicators of tourism development (Lanouar and Goaied,

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2019). While the extant literature has examined the influence of geopolitical risk and uncertainty on tourism (Hailemariam and Ivanovski, 2021; Lee et al., 2021), the intricate relationship between tourism, economic growth, and geopolitical risk remains under-explored.

This study examines the tourism-led growth hypothesis for Türkiye using a novel approach. We first cluster tourist-origin countries based on their Geopolitical Risk Index (GPRI), allowing us to investigate whether the validity of the tourism-led growth hypothesis varies across different geopolitical risk levels. Furthermore, we analyse the hypothesis across distinct time horizons, encompassing the short, medium, and long-run. For this purpose, we utilise a comprehensive dataset of monthly data that spans from January 1996 to December 2022.

The tourism-led growth hypothesis posits a causal relationship between tourism development and economic growth. Extensive research has investigated this hypothesis using both single-country and panel data approaches. The findings of these studies exhibit considerable variability. While some studies support the validity of the tourism-led growth hypothesis (e.g., Brida and Risso, 2009), others have identified a bidirectional causal relationship between tourism development and economic growth (e.g., Durbarry, 2004; Nowak and Sahli, 2007). Conversely, certain studies have even documented a negative impact of tourism on economic growth (e.g., Sequeira and Campos, 2007).

The tourism-led growth hypothesis serves as a prominent framework for understanding the relationship between tourism and economic growth. However, this theory may be incomplete due to the significant variation in geopolitical risk across countries, which can exert a substantial influence on tourism activity. This study incorporates the dimension of geopolitical risk by considering the ranking of countries based on their GPRI. Geopolitical risk is defined as "the risk associated with wars, terrorist acts, and tensions between states that affect the normal and peaceful course of international relations" (Caldara and Iacoviello, 2022). The GPRI encompasses both the direct risks posed by such events and the emergent risks associated with escalating geopolitical tensions. The existing literature provides substantial evidence that geopolitical risk negatively impacts tourism (Balli et al., 2019; Demiralay and Kilincarslan, 2019; Tiwari et al., 2019; Saint Akadiri et al., 2020). This study aims to cluster countries based on their GPRI and investigate whether the tourism-growth relationship varies across these geopolitical risk clusters for Türkiye.

Türkiye exhibits a high level of tourism activity driven by several factors. First, its strategic geographical location positions it as a bridge between eastern and western cultures, attracting tourists from both regions. Second, Türkiye's extensive coastline serves as a major draw for tourists seeking coastal destinations. The implementation of the Tourism Encouragement Law (No. 2634) in 1982 significantly stimulated the industry's growth. Subsequently, the enactment of Law No. 4848 further propelled the sector, prioritising tourism through policies focused on sustainable tourism planning, enhancing competitiveness, and prioritising customer satisfaction. In recent decades, Türkiye has achieved substantial progress in tourism. International tourist arrivals increased from 5.3 million in the 1990s to 40 million in 2018. Türkiye ranks 14th globally in terms of tourism revenue and 8th in inbound international tourist flows as of 2017. The country generated $29.5 billion in tourism in 2018 and aims to reach $50 billion in earnings by 2023 (Asgary and Ozdemir, 2020). These factors make Türkiye an ideal case study to explore the nexus between tourism, economic growth, and geopolitical risk.

This paper contributes to the existing literature in several key ways; Firstly, it examines the tourism-led growth hypothesis using high-frequency monthly data. The use of monthly data in tourism studies improves the statistical power of the model by increasing the number of observations and providing more detailed information (Hailemariam and Ivanovski, 2021). In contrast, most previous studies in this field relied on annual data (Song and Li, 2008). Secondly, this study departs from prior research by first clustering tourist-origin countries based on their GPRI using fuzzy clustering analysis. This approach allows for observations to belong to multiple clusters simultaneously, with varying degrees of membership determined by their similarity to each cluster. This enables us to assess whether the validity of the tourism-led growth hypothesis differs across distinct geopolitical risk clusters, providing insights into the role of geopolitical risk in influencing tourism. Thirdly, the paper investigates the causal relationship between tourism and economic growth by incorporating a Fourier function into the standard Vector Autoregression (VAR) model. The use of the Fourier function within the VAR model offers a distinct advantage, as it allows multiple structural changes without compromising the power of the test (Nazlioglu et al., 2016). Finally, in contrast to existing studies that typically test the tourism-led growth hypothesis over the entire period under consideration, this paper examines the hypothesis across different time horizons, namely the short, medium, and long-run. This multi-temporal analysis provides a more comprehensive understanding of the dynamic relationship between tourism and economic growth.

The remainder of this paper is structured as follows: Section 2 provides a comprehensive review of the relevant literature. Section 3 details the methodologies and datasets employed in this study. Section 4 presents the empirical results obtained from the analysis. A discussion of the findings is presented in Section 5. Finally, Section 6 concludes the paper, summarising the key contributions and outlining potential avenues for future research.

2. Literature Review

2.1 Geopolitical Risk and Tourism

In recent years, a growing body of research has examined the relationship between geopolitical risk and a range of economic and social variables, utilising the GPRI developed by Caldara and Iacoviello (2022). An area where this relationship has been particularly pronounced is in the tourism sector. Tourist arrivals are highly sensitive to geopolitical risks, making this area a focal point for researchers. Several studies have investigated the impact of geopolitical risk on tourism, employing diverse econometric methods and analysing various samples. The majority of these studies have relied on the GPRI developed by Caldara and Iacoviello (2022).

For instance, Saint Akadiri et al. (2020) analysed the relationship between tourism, geopolitical risk, and economic growth in Türkiye using quarterly data from 1985Q1 to 2017Q4. Their findings indicated a unidirectional causality running from geopolitical risk to both economic growth and tourism. Demir et al. (2020) investigated the asymmetric relationship between geopolitical risk and tourist arrivals in Türkiye utilising monthly data from January 1990 to December 2018. The results of their nonlinear autoregressive distributed lag (ARDL) model demonstrated that an increase in geopolitical risk leads to a decrease in tourist arrivals in Türkiye. Bayraktaroglu et al. (2021) examined the causal relationship between international tourist arrivals and geopolitical risk in Türkiye using annual data from 1998 to 2019. Their findings revealed a unidirectional causality from geopolitical risks to foreign visitor arrivals in Türkiye. Furthermore, their asymmetric causality analysis indicated that positive shocks to geopolitical risk led to negative shocks in tourist arrivals. Hailemariam and Ivanovski (2021) investigated the relationship between geopolitical risk and demand for tourism service exports in the United States using monthly data from January 1999 to August 2020. Their structural VAR model confirmed that geopolitical risk has a negative impact on tourism service exports. Finally, Polat et al. (2021) analysed the impact of geopolitical risk on tourist arrivals in Türkiye using monthly data from January 1998 to October 2020. Their results indicated that a decrease in geopolitical risk leads to an increase in tourist arrivals in Türkiye.

2.2 Tourism-Led Growth Hypothesis

The association between tourism expansion and economic growth has been the subject of extensive research over the past few decades. Ghali (1976) pioneered the empirical exploration of this relationship, setting the stage for subsequent research. The seminal work of Balaguer and Cantavella-Jorda (2002) provided empirical validation for the tourism-led growth hypothesis. Since then, a substantial body of literature has emerged examining the tourism-led growth hypothesis (Nowak and Sahli, 2007).

However, several studies have presented evidence for the opposite effect, suggesting that economic growth drives tourism development (e.g., Tang and Jang, 2009; Lee, 2012). This counter-hypothesis is known as the growth-led tourism hypothesis. According to this perspective, sustained economic growth within a country facilitates the development of its tourism sector. As resources become available for investing in tourism infrastructure, the growth momentum stimulates the expansion of tourism. Tourists are drawn to countries with demonstrable economic prosperity and a well-developed tourism infrastructure. Furthermore, several of studies have identified a mutually reinforcing relationship between tourism and economic growth, suggesting a feedback loop where each factor contributes to the other's expansion (e.g., Shahbaz et al., 2017). Conversely, a limited number of studies have found an insignificant relationship between tourism and economic growth across different countries (e.g., Tang, 2011).

The preceding literature review highlights the growing interest in investigating the relationship between geopolitical risk and tourism. Furthermore, extensive research has been conducted on the tourism-led growth hypothesis. However, there is a notable gap in the literature regarding the integration of geopolitical risk into the analysis of the tourism-led growth hypothesis. Specifically, studies that cluster countries based on geopolitical risk and explore the tourism-led growth hypothesis in these clusters are scarce. Moreover, research exploring this nexus in the context of Türkiye remains limited. Additionally, none of the existing studies have employed a VAR function augmented with a Fourier function to allow for multiple structural changes within the Granger causality framework. This study addresses this gap in the literature by incorporating these novel methodological elements.

3. Data and Model

To examine the validity of the tourism-led growth hypothesis for Türkiye, we utilise a comprehensive dataset of monthly data spanning from January 1996 to December 2022. Following the approach of Tang (2011) and Tang and Tan (2013), we employ the industrial production index (2010=100) as a proxy for economic growth and disaggregate international visitor arrivals from various tourism markets to represent tourism activity. The study considers international visitor arrivals from the following countries: Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Denmark, Egypt, Finland, France, Hungary, India, Indonesia, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, Norway, Philippines, Poland, Portugal, Russia, Saudi Arabia, South Africa, Spain, Sweden, Thailand, Tunisia, the United Kingdom, the United States, and Venezuela. The selection of these countries is based on data availability. Additionally, we include real exchange rates as a control variable to account for potential currency fluctuations. Data for the industrial production index and real exchange rates are obtained from the International Monetary Fund's International Financial Statistics database. The international visitor arrival data are sourced from the Turkish Statistical Institute. Furthermore, we utilise the GPRI developed by Caldara and Iacoviello (2022) to account for the influence of geopolitical risk on tourism.

3.1 The Causality Test with a Fourier Function

Since Granger's seminal work, which earned him the Nobel Prize, the development of causality tests has lagged behind that of other econometric techniques, such as unit root and cointegration tests. The Granger causality test is rooted in the vector autoregressive (VAR) model, requiring variables to be stationary for implementation. Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996) proposed augmenting the VAR model with additional lags to circumvent the need for differencing variables that exhibit unit roots, as differencing can lead to the loss of long-run information. In recent years, some studies have incorporated structural changes into causality analysis. Enders and Jones (2016) suggested augmenting the standard VAR model with a Fourier function to accommodate multiple structural changes within the Granger causality framework. This approach offers the advantage of not compromising the power of the test, as the number, form, and location of structural changes do not affect the Fourier function's effectiveness. Nazlioglu et al. (2016) further refined this methodology by incorporating a Fourier function into the lag-augmented VAR model to address long-run information loss and allow for multiple structural changes. We employ the following VAR model to implement the Fourier causality test proposed by Nazlioglu et al. (2016):

$$\ln TN_t = \beta_1 + \theta_1 \sin\left(2\pi kt/T\right) + \theta_2 \cos\left(2\pi kt/T\right) + \sum_{i=1}^{p} \beta_{1i} LnIPI_{t-i} +$$

$$\ldots\ldots\ldots\ldots + \sum_{i=1}^{p} \beta_{2i} LnTN_{t-i} + \sum_{i=1}^{p} \beta_{3i} LnR_{t-i} + u_t$$

$$\ln IPI_t = \alpha_1 + \phi_1 \sin\left(2\pi kt/T\right) + \phi_2 \cos\left(2\pi kt/T\right) + \sum_{i=1}^{p} \alpha_{1i} LnTN_{t-i} +$$

$$\ldots\ldots\ldots\ldots + \sum_{i=1}^{p} \alpha_{2i} LnIPI_{t-i} + \sum_{i=1}^{p} \alpha_{3i} LnR_{t-i} + e_t$$

where TN represents the number of international tourists arriving in Türkiye, IPI denotes the industrial production index, and R indicates the real exchange rate, which serves as a control variable. The trigonometric terms are incorporated into the VAR model to capture the effects of structural changes. k represents a specific frequency, t is the trend term, and T represents the sample size. The optimal value of k is determined by minimising the sum of squared residuals.

The null hypothesis of $\beta_{1i} = 0, \forall_i$ indicates that there is no causal relationship running from the industrial production index (IPI) to the number of tourists (TN). Conversely, the null hypothesis of $\alpha_{1i} = 0, \forall_i$ indicates that there is no causal relationship from TN to IPI. These null hypotheses can be tested using Wald test statistics, with corresponding critical values obtained through bootstrap simulations.

3.2 Fuzzy Cluster Analysis

Numerous studies have examined the effects of geopolitical risk on tourism over the past few years (e.g., Saint Akadiri et al., 2020; Hailemariam and Ivanovski, 2021; Lee et al., 2021). However, these studies typically treat geopolitical risk as a control variable within the tourism-growth relationship equation. This study adopts a different approach. Instead of merely controlling for geopolitical risk, we employ cluster analysis to group countries based on their GPRI values. This clustering allows us to determine whether the tourism-growth relationship varies significantly across different levels of geopolitical risk.

Cluster analysis is a statistical method commonly employed to identify groups of similar objects (Romesburg, 2004). Traditional clustering methods, such as hierarchical or non-hierarchical approaches, assign observations to a single cluster. Fuzzy clustering, however, allows data points to belong to multiple clusters simultaneously, with varying degrees of membership determined by their similarity to each cluster. Membership values for each data point in each cluster are represented as continuous numbers between 0 and 1, where 0 signifies no membership and 1 represents full membership. This study utilises the FANNY algorithm, which minimises the following target function (Kaufman and Rousseeuw, 1990, 182):

$$C = \sum_{v=1}^{K} \left(\sum_{i,j=1}^{n} u_{iv}^2 u_{jv}^2 d(i,j) \Big/ 2\sum_{j=1}^{n} u_{jv}^2 \right)$$

where $d(i,j)$ and u_{iv} represent the dissimilarity between objects i and j and the unknown membership of object i to cluster v, respectively. K represents the number of clusters. The membership functions are subject to constraints $u_{iv} \geq 0$ (for $i = 1,...,n$ and $v = 1,...,k$) and $\sum_{v=1}^{k} u_{iv} = 100\%$ constraints (for $i = 1,...,n$), ensuring that the membership values cannot be negative. To calculate the dissimilarity between objects, we employ the Euclidean distance, defined as follows:

$$d(i,j) = \sqrt{\sum_{k=1}^{p} \left(X_{ik} - X_{jk} \right)^2}$$

where X represents the values, and p indicates the number of objects. To determine the optimal number of clusters, we employ two widely used metrics: the normalised Dunn coefficient (F_k^*) and the normalised Kaufman coefficient (D_k^*). The normalised Dunn coefficient is calculated as follows (Kaufman and Rousseeuw, 1990, 171):

$$F_k^* = \frac{F_k - (1/k)}{1 - (1/k)} = \frac{kF_k - 1}{k - 1}$$

where F_k represents Dunn's partition coefficient, calculated as $F_k = \sum_{i=1}^{n} \sum_{v=1}^{k} u_{iv}^2 \Big/ n$. The Dunn coefficient ranges from 0 to 1, irrespective of the number of clusters. The normalised Kaufman coefficient is calculated as follows (Kaufman and Rousseeuw, 1990, 192):

$$D_k^* = D_k \big/ 1 - \left(1/K\right)$$

where $D_k = \frac{1}{n}\sum_{k=1}^{K}\sum_{i=1}^{N}\left(h_{ik} - u_{ik}\right)^2$ denotes the Kaufman partition coefficient. The optimal number of clusters is determined by identifying the value where F_k^* is maximised and D_k^* is minimised.

4. Empirical Results

We first applied fuzzy cluster analysis to group countries based on their geopolitical risk indexes. To facilitate this, we calculated the arithmetic mean of the geopolitical risk index for each country during the entire analysis period. Then these mean values were subjected to cluster analysis. Table 1 presents a summary of the test statistics used to determine the optimal number of clusters.

Table 1. Determining the number of clusters

Number of Clusters	F_k	F_k^*	D_k	D_k^*
2	0.738	0.476	0.088	0.175
3	0.627	0.440	0.120	0.179
4	0.586	0.449	0.167	0.222
5	0.591	0.488	0.158	0.198

Source: Author's computation.

Table 1 indicates that the normalised Dunn coefficient (F_k^*) attains its highest value and the normalised Kaufman coefficient (D_k^*) its lowest value when the number of clusters is set to two. Based on these results, we classified the countries into two clusters according to their geopolitical risk indexes. The fuzzy clustering analysis grouped the countries into two clusters based on their geopolitical risk indexes. Cluster 1 comprised 14 countries with high geopolitical risk, including Belgium, Canada, China, Egypt, France, Germany, India, Italy, Japan, Korea, Russia, Saudi Arabia, the United Kingdom, and the United States. Cluster 2 included 22 countries with low geopolitical risk, encompassing Argentina, Australia, Brazil, Chile, Denmark, Finland, Hungary, Indonesia, Malaysia, Mexico, Netherlands, Norway, Philippines, Poland, Portugal, South Africa, Spain, Sweden, Switzerland, Thailand, Tunisia, and Venezuela[1].

We proceed to evaluate the tourism-led growth, growth-led tourism, feedback, and neutrality hypotheses for Türkiye by analysing visitor arrivals from disaggregated tourism markets for these two clusters. Following the

[1] Probability values of memberships to the clusters ara available from the authors upon request.

recommendation of Dolado and Lütkepohl (1996), we augment the VAR model with an additional lag. Table 2 presents the results for tourist inflows from Cluster 1 countries over the entire analysis period.

Table 2. Causality test results for Cluster 1 countries (entire period)

Countries	H_0: Growth ↛ Tourism	H_0: Tourism ↛ Growth	Lag	Freq
	Test Stat	Test Stat		
Belgium	7.531 (0.076)***	63.853 (0.000)*	3	1
Canada	5.144 (0.171)	60.995 (0.000)*	3	1
China	0.162 (0.916)	31.322 (0.000)*	2	1
Egypt	6.656 (0.045)**	66.922 (0.000)*	2	1
France	8.925 (0.046)**	77.08 (0.000)*	3	1
Germany	5.851 (0.073)***	21.84 (0.005)*	2	1
India	8.688 (0.019)**	31.147 (0.000)*	2	1
Italy	7.664 (0.062)***	85.118 (0.000)*	3	1
Japan	19.321 (0.003)*	16.159 (0.009)*	2	1
Korea	8.197 (0.024)**	14.482 (0.004)*	2	1
Russia	8.851 (0.021)**	7.697 (0.033)**	2	1
Saudi Arabia	9.625 (0.035)**	108.242 (0.000)*	3	1
United Kingdom	5.941 (0.125)	49.813 (0.000)*	3	1
United States	6.068 (0.066)***	19.261 (0.007)*	2	1

Note: *, **, and *** indicate significance at the 1%, 5%, and 10% levels, respectively. The numbers in parentheses show the bootstrap p-values obtained using 10000 simulations.

Source: Author's computation.

The results presented in Table 2 indicate that we cannot reject the feedback hypothesis for Türkiye in relation to visitor arrivals from all countries except Canada, China, and the United Kingdom. Therefore, for visitors originating from these three countries, the tourism-led growth hypothesis is supported for Türkiye. Table 3 presents the results for international visitors originating from countries with low geopolitical risk indexes.

Table 3. Causality test results for Cluster 2 countries (entire period)

Countries	H_0: Growth ↛ Tourism	H_0: Tourism ↛ Growth	Lag	Freq
	Test Stat	Test Stat		
Argentina	6.722 (0.044)**	27.616 (0.002)*	2	1
Australia	4.87 (0.097)***	30.676 (0.002)*	2	1
Brazil	2.317 (0.309)	33.621 (0.001)*	2	1
Chile	4.213 (0.135)	19.925 (0.006)*	2	1
Denmark	5.094 (0.168)	58.525 (0.000)*	3	1

Finland	4.705 (0.200)	57.753 (0.000)*	3	1
Hungary	1.053 (0.530)	40.909 (0.003)*	2	1
Indonesia	5.156 (0.163)	79.517 (0.000)*	3	1
Malaysia	13.076 (0.005)*	9.313 (0.022)**	2	1
Mexico	9.283 (0.022)**	36.567 (0.002)*	2	1
Netherlands	10.066 (0.032)**	66.846 (0.000)*	3	1
Norway	8.353 (0.025)**	22.488 (0.004)*	2	1
Philippines	3.18 (0.202)	27.134 (0.000)*	2	1
Poland	4.042 (0.137)	46.539 (0.000)*	2	1
Portugal	6.211 (0.052)***	30.423 (0.000)*	2	1
South Africa	4.56 (0.111)	32.758 (0.001)*	2	1
Spain	7.03 (0.041)**	30.493 (0.001)*	2	1
Sweden	14.072 (0.007)*	59.43 (0.000)*	3	1
Switzerland	7.568 (0.069)***	47.742 (0.000)*	3	1
Thailand	0.96 (0.785)	33.169 (0.000)*	3	1
Tunisia	0.293 (0.940)	56.871 (0.000)*	3	1
Venezuela	13.935 (0.003)*	30.692 (0.001)*	2	1

Note: *, **, and *** indicate significance at the 1%, 5%, and 10% levels, respectively. The numbers in parentheses show the bootstrap p-values obtained using 10000 simulations.

Source: Author's computation.

The findings presented in Table 3 indicate that the feedback hypothesis holds for Türkiye in relation to visitor arrivals from 11 out of the 22 countries with low geopolitical risk indexes. The tourism-led growth hypothesis, on the other hand, is supported for the remaining countries in this cluster. To investigate whether causality exists across different frequencies, we transform the time series data using wavelet decomposition. We begin by assessing the causal relationship in the short- (spanning two to eight years), medium- (spanning 8 to 32 years), and long-run (spanning over 32 years) for countries belonging to Cluster 1 and present the results in Table 4.

Table 4. Causality test results for countries in Cluster 1 in the different Frequencies

Countries	**H0: Growth ↛ Tourism**	**H0: Tourism ↛ Growth**	**H0: Growth ↛ Tourism**	**H0: Tourism ↛ Growth**	**H_0: Growth ↛ Tourism**	**H0: Tourism ↛ Growth**
	Test Stat.	**Test Stat.**	**Test Stat.**	**Test Stat.**	**Test Stat.**	**Test Stat.**
Belgium	15.552 (0.006)*	57.617 (0.000)*	3.468 (0.483)	30.075 (0.000)*	1.551 (0.815)	12.606 (0.017)**
Canada	10.714 (0.034)**	61.739 (0.000)*	5.332 (0.263)	20.089 (0.001)*	1.399 (0.839)	8.297 (0.086)***
China	0.639 (0.958)	64.426 (0.000)*	3.89 (0.427)	38.136 (0.000)*	15.18 (0.005)*	6.651 (0.162)

Countries	H0: Growth ↛ Tourism	H0: Tourism ↛ Growth	H0: Growth ↛ Tourism	H0: Tourism ↛ Growth	H_0: Growth ↛ Tourism	H0: Tourism ↛ Growth
	Test Stat.	Test Stat.	Test Stat.	Test Stat.	Test Stat.	Test Stat.
Egypt	17.525 (0.002)*	57.287 (0.000)*	22.089 (0.000)*	28.356 (0.000)*	2.885 (0.566)	9.698 (0.053)***
France	17.936 (0.003)*	59.801 (0.000)*	5.838 (0.216)	31.398 (0.000)*	7.531 (0.111)	12.945 (0.012)**
Germany	8.636 (0.087)***	14.907 (0.019)**	1.218 (0.875)	12.784 (0.015)**	6.561 (0.169)	14.874 (0.007)*
India	13.258 (0.014)**	37.605 (0.000)*	10.202 (0.039)**	23.68 (0.001)*	7.192 (0.135)	6.646 (0.160)
Italy	8.809 (0.068)***	97.426 (0.000)*	3.054 (0.557)	35.814 (0.000)*	1.418 (0.843)	6.881 (0.144)
Japan	28.193 (0.000)*	8.817 (0.083)***	18.622 (0.001)*	11.243 (0.025)**	13.829 (0.011)**	14.801 (0.005)*
Korea	19.372 (0.002)*	27.805 (0.000)*	54.987 (0.000)*	14.089 (0.008)*	0.616 (0.960)	4.009 (0.402)
Russia	13.371 (0.018)**	7.213 (0.135)	5.086 (0.277)	22.6 (0.000)*	39.646 (0.000)*	19.759 (0.001)*
Saudi Arabia	28.324 (0.000)*	108.323 (0.000)*	7.501 (0.119)	13.734 (0.010)	0.997 (0.905)	5.654 (0.229)
United Kingdom	13.412 (0.013)**	33.98 (0.000)*	4.834 (0.304)	30.132 (0.000)*	13.872 (0.011)**	15.122 (0.006)*
United States	17.476 (0.006)*	9.534 (0.072)***	9.141 (0.060)***	34.073 (0.000)*	7.708 (0.108)	24.769 (0.000)*

Note: *, **, and *** indicate significance at the 1%, 5%, and 10% levels, respectively. The numbers in parentheses show the bootstrap p-values obtained using 10000 simulations. The optimal lag lengths and frequencies are not reported due to conserve space but available upon request.

Source: Author's computation.

The results presented in Table 4 indicate that, in the short-run, we cannot reject the feedback hypothesis for Türkiye in relation to visitor arrivals from all countries within Cluster 1, with the exception of China and Russia. While the Chinese international tourism market supports the tourism-led growth hypothesis, the Russian international tourism market supports the growth-led tourism hypothesis for Türkiye in the short run. For the medium run, the findings support the feedback hypothesis for Türkiye in relation to visitor arrivals from Egypt, India, Japan, Korea, and the United States. For visitors from the remaining countries in Cluster 1, the tourism-led growth hypothesis cannot be rejected, with the exception of visitors from Saudi Arabia. The neutrality hypothesis is supported for the Saudi Arabian international tourism market. In the long-run, the results support the feedback hypothesis for Türkiye in relation to visitor arrivals from Japan, Russia, and the United Kingdom. The growth-led tourism hypothesis is supported for international arrivals from China. For visitors from India, Italy, Korea, and Saudi Arabia, the neutrality hypothesis is supported. For visitors from the remaining countries within Cluster 1, the tourism-led growth hypothesis cannot be rejected.

Table 5 presents the findings for visitor arrivals from Cluster 2 countries:

Table 5. Causality test results for countries in Cluster 2 in the different Frequencies

Countries	H0: Growth ↛ Tourism	H0: Tourism ↛ Growth	H0: Growth ↛ Tourism	H0: Tourism ↛ Growth	H0: Growth ↛ Tourism	H0: Tourism ↛ Growth
	Test Stat.	Test Stat.	Test Stat.	Test Stat.	Test Stat.	Test Stat.
Argentina	16.084 (0.005)*	26.67 (0.000)*	10.881 (0.029)**	19.396 (0.001)*	0.168 (0.996)	9.106 (0.059)***
Australia	17.336 (0.003)*	37.452 (0.000)*	10.86 (0.033)**	14.837 (0.005)*	0.83 (0.932)	5.256 (0.264)
Brazil	13.185 (0.012)**	37.872 (0.000)*	6.219 (0.194)	36.016 (0.000)*	0.347 (0.987)	5.522 (0.242)
Chile	12.426 (0.019)**	20.268 (0.003)*	12.46 (0.017)**	21.971 (0.000)*	1.646 (0.795)	7.858 (0.106)
Denmark	15.542 (0.006)*	52.123 (0.000)*	7.414 (0.118)	25.525 (0.000)*	0.861 (0.928)	9.648 (0.051)***
Finland	12.197 (0.024)**	44.819 (0.000)*	1.571 (0.816)	39.253 (0.000)*	1.261 (0.864)	9.403 (0.051)***
Hungary	9.570 (0.056)***	55.122 (0.000)*	2.018 (0.730)	57.214 (0.000)*	1.498 (0.819)	6.846 (0.149)
Indonesia	10.811 (0.034)**	64.892 (0.000)*	9.561 (0.050)***	79.545 (0.000)*	5.537 (0.241)	5.809 (0.217)
Malaysia	20.627 (0.003)*	4.499 (0.306)	11.856 (0.022)**	14.223 (0.009)*	13.406 (0.011)**	5.418 (0.249)
Mexico	22.221 (0.001)*	32.9 (0.000)*	2.144 (0.712)	39.181 (0.000)*	10.408 (0.037)**	15.429 (0.006)*
Netherlands	18.231 (0.002)*	60.939 (0.000)*	2.603 (0.629)	42.641 (0.000)*	2.224 (0.691)	10.356 (0.038)**
Norway	14.885 (0.009)*	16.45 (0.014)**	3.597 (0.461)	17.408 (0.003)*	7.878 (0.099)	4.591 (0.330)
Philippines	8.315 (0.089)***	39.155 (0.000)*	5.463 (0.250)	39.255 (0.000)*	0.551 (0.969)	7.518 (0.116)
Poland	9.422 (0.055)***	51.531 (0.000)*	10.603 (0.032)**	39.823 (0.000)*	0.786 (0.937)	7.737 (0.100)
Portugal	20.11 (0.001)*	26.082 (0.000)*	9.493 (0.053)***	14.854 (0.007)*	4.468 (0.339)	7.997 (0.096)***
South Africa	13.241 (0.013)**	34.968 (0.000)*	3.897 (0.417)	39.654 (0.000)*	2.989 (0.547)	10.9 (0.025)**
Spain	18.959 (0.001)*	31.86 (0.000)*	9.427 (0.056)***	24.221 (0.000)*	2.112 (0.719)	9.85 (0.044)**
Sweden	22.991 (0.000)*	51.495 (0.000)*	6.04 (0.194)	30.499 (0.000)*	8.897 (0.067)***	12.532 (0.016)**
Switzerland	12.214 (0.023)**	40.128 (0.000)*	4.253 (0.374)	24.253 (0.000)*	4.304 (0.367)	8.814 (0.068)***
Thailand	4.088 (0.386)	36.037 (0.000)*	3.854 (0.432)	35.505 (0.000)*	3.634 (0.459)	10.147 (0.042)**
Tunisia	7.416 (0.123)	49.675 (0.000)*	7.865 (0.100)	15.991 (0.004)*	1.15 (0.886)	9.825 (0.045)**
Venezuela	20.598 (0.001)*	25.146 (0.000)*	7.382 (0.119)	17.902 (0.001)*	1.312 (0.861)	10.105 (0.040)**

Note: *, **, and *** indicate significance at the 1%, 5%, and 10% levels, respectively. The numbers in parentheses show the bootstrap p-values obtained using 10000 simulations. The optimal lag lengths and frequencies are not reported due to conserve space but available upon request.

Source: Author's computation.

Over the short-run, the feedback hypothesis is supported for Türkiye in relation to visitor arrivals from all countries within Cluster 2, with the exception of Malaysia, Thailand, and Tunisia. The tourism-led growth hypothesis is supported for the international tourism markets of Thailand and Tunisia. Conversely, the growth-led tourism hypothesis cannot be rejected for international arrivals from Malaysia. In the medium run, the feedback hypothesis is supported for Türkiye in relation to visitor arrivals from Argentina, Australia, Brazil, Chile, Indonesia, Malaysia, Poland, Portugal, and Spain. For all international arrivals from the remaining countries within Cluster 2, the tourism-led growth hypothesis cannot be rejected. The results of the Fourier causality test in the long-run indicate that the feedback hypothesis is supported for Türkiye only in relation to visitor arrivals from Mexico and Sweden. The growth-led tourism hypothesis is supported for Malaysian visitors. International arrivals from Argentina, Denmark, Finland, the Netherlands, Portugal, South Africa, Spain, Switzerland, Thailand, Tunisia, and Venezuela validate the tourism-led growth hypothesis for Türkiye. For arrivals from other countries within Cluster 2, the neutrality hypothesis cannot be rejected.

5. Discussion

Our findings initially confirm the validity of the tourism-led growth hypothesis for Türkiye when considering all countries in the full sample. This suggests a causal relationship running from international visitors to economic growth in Türkiye. Importantly, this hypothesis holds true for all countries, regardless of whether they exhibit high or low levels of geopolitical risk. To the best of our knowledge, this study represents the first attempt to test the tourism-led growth hypothesis for Türkiye using disaggregated data. Therefore, we can compare our results with previous studies that have utilised aggregated data. Our results for the full sample are consistent with the findings of Gunduz and Hatemi (2005).

However, a significant disparity emerges when examining the validity of the feedback hypothesis across geopolitical risk clusters. While our results confirm the feedback hypothesis for 11 out of 14 countries with low geopolitical risk, the hypothesis is supported for only 11 out of 22 countries with high geopolitical risk.

Furthermore, our analysis reveals significant variations in the findings across different time periods. For instance, in the short run, the feedback hypothesis is supported for the majority of countries, irrespective of their geopolitical risk levels. However, in the medium and long-run, the number of international tourism markets for which the feedback hypothesis holds true is considerably lower. This pattern suggests that the causal relationship between international tourist arrivals and economic growth aligns with the traditional view that tourism primarily stimulates short-term domestic consumption. However, achieving long-term effects requires significant investments in technological advancements and long-term infrastructure development (Jin, 2011).

Based on the empirical findings, it can be inferred that tourism plays a crucial role in creating employment opportunities and generating foreign exchange, contributing to short-term economic growth in Türkiye. Notably, for long-term economic growth and sustained competitiveness, policymakers should prioritise allocating additional resources towards developing Türkiye's tourism sector.

The Turkish government should prioritise developing appropriate policies to safeguard the economy from unexpected economic shocks. Such measures will ensure that the positive benefits derived from tourism can have a lasting and significant impact in the long-run. Robust economic policies will bolster the confidence of international investors, leading to greater resilience in the Turkish economy and ultimately enhancing the prosperity generated by the tourism sector. In addition, other countries facing similar circumstances can take valuable lessons from these policy initiatives to effectively stimulate their tourism sectors.

6. Conclusions

This study investigates the tourism-led growth hypothesis for Türkiye, utilising data on international tourist arrivals from Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Denmark, Egypt, Finland, France, Hungary, India, Indonesia, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, Norway, Philippines, Poland, Portugal, Russia, Saudi Arabia, South Africa, Spain, Sweden, Thailand, Tunisia, the United Kingdom, the United States, and Venezuela. Monthly data spanning from January 1996 to December 2022 are employed for this analysis. To the best of our knowledge, this study is the first to cluster countries based on their geopolitical risk index and explore the potential variations in the tourism-growth relationship across different geopolitical risk levels. Employing the fuzzy clustering method, we identified two distinct clusters: Cluster 1 comprises 14 countries with high geopolitical risk, while Cluster 2 includes 22 countries with low geopolitical risk.

A VAR model incorporating the Fourier causality test was employed to examine the tourism-led growth hypothesis. The results confirm the validity of the tourism-led growth hypothesis for all countries over the entire analysis period. This finding suggests that tourism plays a causal role in driving economic growth in Türkiye. However, the results demonstrate considerable variation across different time periods. In the short run, the feedback hypothesis holds true for most countries, regardless of their geopolitical risk levels. However, the validity of the feedback hypothesis in the medium and long-run is significantly reduced, applying to fewer countries. Over the long-run, the Fourier causality test indicates that the feedback hypothesis is valid only for Mexico and Sweden. Furthermore, international tourist arrivals from Argentina, Denmark, Finland, the Netherlands, Portugal, South Africa, Spain, Switzerland, Thailand, Tunisia, and Venezuela support the tourism-led growth hypothesis for Türkiye in the long-run. Based on these findings, it is recommended that the public policies in Türkiye prioritise tourism expansion and implement measures to stimulate tourism demand.

This study aimed to confirm the tourism-led growth hypothesis for Türkiye. The analysis categorised the sample into two clusters based on the geopolitical risk index. This study could be expanded by incorporating other characteristics, such as geographic proximity or levels of economic uncertainty. Another limitation of this study is that it focuses solely on the role of international tourist arrivals in economic growth. It does not consider other essential aspects of tourism, such as investment in the sector or tourism revenue. Future research should incorporate these additional variables when testing the tourism-led growth hypothesis. Furthermore, investigating the validity of the hypothesis across various time dimensions would offer a more nuanced understanding of the dynamic relationship between tourism and economic growth.

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