REEXAMINING THE TOURISM – GDP NEXUS IN TURKEY:
A BAYESIAN PERSPECTIVE[*]

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Abstract

Tourism sector is an important revenue, exchange and employment source for economies thanks to its forward and backward linkages. Due to these multifaceted impacts, countries are striving to develop the tourism sector and achieve a competitive advantage. Since the 1980s, Turkey has invested in the tourism sector by adopting a tourism-led growth strategy, and consequently that has become one of the world's leading destinations. 1.1 million tourist came to Turkey in 1980 and revenues of $ 0.327 billion was created. In 2018, the number of tourists increased to 45.8 million and tourism revenue to $ 34.5 billion.

The strengthening of global tourism flows in time and the fact that the tourism sector became important for the economies led to an expansion in the analysis of the economic effects of the tourism sector. Most of the empirical studies on the subject are constitute from the demand function estimation and the effect of tourism on economic growth. In the available studies, classical (frequency) inference is the standard method has been applied. There has been no study in which Bayesian inference approach has been applied, which has become increasingly popular in recent years. This study aims to contribute to the literature by considering the impact of tourism on GDP in a Bayesian framework. The findings show that this relation is sensitive to the form of the prior distribution used. While a non-informative (Jeffrey's type) prior distribution is used, it is seen that tourism has enhancing effect on the GDP, but no significant effect is observed when inverted-gamma and multivariate prior distribution is used.

Key Words: Tourism, growth, GDP, Bayesian analysis.

Jel Codes: C01, C11, L83.

TÜRKİYE'DE TURİZM – GSYH İLİŞKİSİNİN YENİDEN İNCELENMESİ: BAYESYEN BİR BAKIŞ

Öz

Turizm sektörü sahip olduğu ileri ve geri bağlantılar sayesinde ekonomiler için önemli bir gelir, döviz ve istihdam kaynağıdır. Bu çok yönlü etkileri nedeniyle ülkeler turizm sektörünü geliştirmek ve rekabet avantajı elde etmek için çabalamaktadırlar. Türkiye de özellikle 1980'lerden itibaren turizme dayalı büyüme stratejisini benimseyerek sektöre büyük yatırımlar yapmış bunun sonucunda da dünyanın önde gelen destinasyonlarından biri haline gelmiştir. 1980'de Türkiye'ye gelen 1,1 milyon turist 0,327 milyar $ gelir yaratırken 2018 yılında turist sayısı 45,8 milyona ve turizm geliri ise 34,5 milyar $'a yükselmiştir.

Küresel turizm akımlarının zaman içinde oldukça güçlenmesi ve turizm sektörünün ekonomiler için önemli hale gelmesi turizm sektörünün ekonomik etkilerine yönelik analizlerde de bir artışa neden olmuştur. Konuyla ilgili ampirik çalışmaların çoğunu talep fonksiyonu tahmini ve turizmin büyümeye etkisi oluşturmaktadır. Mevcut çalışmalarda yöntemsel olarak hep klasik (frekansçı) çıkarsama yaklaşımına başvurulmuştur. Son yıllarda giderek daha popüler hale gelen Bayesyen çıkarsama yaklaşımının kullanıldığı bir çalışma bulunmamaktadır. Bu çalışma, turizmin GSYH'ye etkisini Bayesyen bir çerçevede ele alarak literatüre katkıda bulunmayı amaçlamaktadır. Elde edilen bulgular sözkonusu ilişkinin kullanılan önsel dağılımın biçimine karşı duyarlı olduğunu ortaya koymaktadır. Bilgi vermeyen (Jeffrey tipi) önsel dağılım kullanıldığında turizmin GSYH'yi artırıcı etkide bulunduğu görülürken ters-gamma ve çok değişkenli önsel dağılım kullanıldığında anlamlı bir etki görülmemektedir.

Anahtar Kelime: Turizm, büyüme, GSYH, Bayesyen analiz.

Jel Kodları: C01, C11, L83.

INTRODUCTION

A complex tourism industry has developed to respond to consumer demands today. Primarily functioning as an intermediary, the tourism industry bridges the gap between the tourist, *i.e.* the "consumer" in economic terms, and the international target, that is the "producer" of the goods and services that consumers seek. The industry consists of a wide range of individual initiatives that support the mass movement of people across regions or international borders, including wholesale and retail travel agencies, airlines, hotels, tour operators, advertising agencies, and other related businesses that are widely and geographically dispersed.

The product offered by international tourism destinations is different from those sold by other economic sectors. It is an export item consisting of services. Unlike other export items, even if sold in the foreign market, international tourism is produced and consumed in the

destination region and can therefore be considered as invisible export item. As the product is consumed locally by foreign visitors, a small number of physical products leave the production area (Spinrad *et al*., 1982: 7).

Today, tourism has become the world's fourth largest export industry after oil, chemicals and food. As a result, tourism-related targets have also been included in the United Nations 2030 Sustainable Development Goals. In this context, it is aimed to create and implement policies to support sustainable tourism that creates employment and promotes local culture and products until 2030 in Target 8.9. In target 12.b., it has been adopted to develop and implement tools that allow for a sustainable tourism that creates employment and encourages local culture and products to control the effects of sustainable development. In the 14.7., the goals of increasing the economic benefits offered to the developing small island states and the least developed countries by obtaining from the sustainable use of marine resources through the sustainable management of fishing, aquaculture and tourism until 2030 are determined.
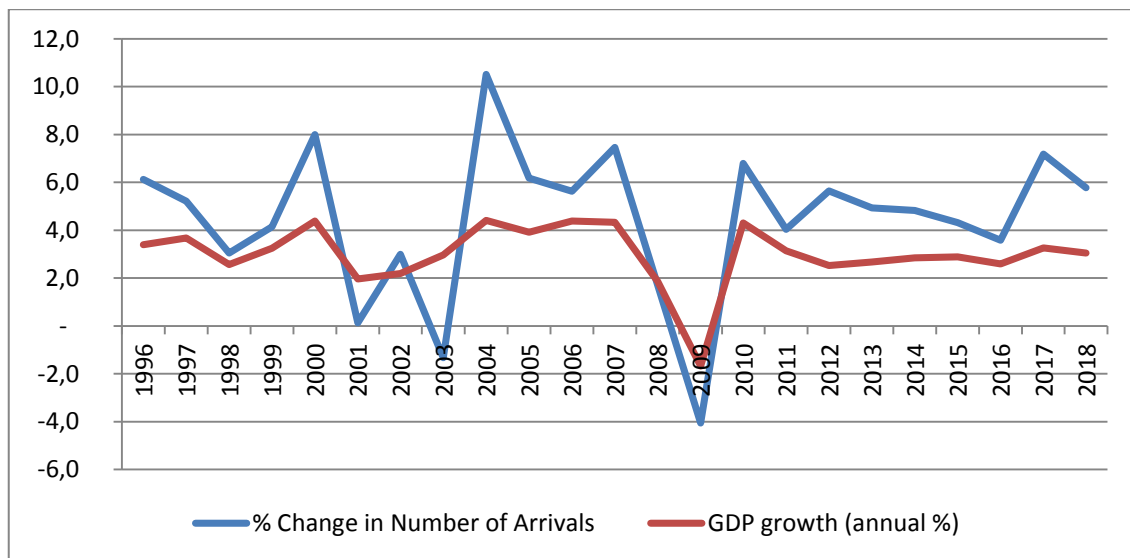

Source: Created from the World Bank data.

Figure 1. World Tourist Arrivals and Global GDP (% change)

Since tourist spending is an alternative form of export that contributes to the balance of payments through foreign exchange revenues in many countries, it is seen as a potential way for tourism expansion, development and growth. The basic abutments of the idea that tourism can be an important catalyst for economic and social development are as follows; First, tourism supports foreign exchange gains from commodity trade and at times finances the imports of capital goods necessary for the growth of manufacturing sectors in the economy.

Second, tourism encourages new infrastructure investments, increases human capital and competition. Third, it accelerates activities in the agricultural, industrial and commercial sectors of the economy that come into direct or indirect contact with the tourism industry and stimulate industrial development through spillover effects. Fourth, the major advantage of the tourism sector is that it tends to be labor-intensive, so an increase in production is normally achieved by an increase in employment. This is advantageous for economies that need to reduce unemployment, but it also creates a shock in the labor market that triggers wage increases and mobility between sectors in the service sector (Ohlan, 2017: 9; Eugenio-Martín *et al*. 2004: 2; Spinrad *et al*., 1982: 9).

Although tourism expansion can contribute to a country's economic well-being, the economic, social, and environmental benefits it produces do not spontaneously occur. For this reason, the policies and actions of the segments involved in tourism that allow the tourism growth to be channeled to the improvement of the socioeconomic conditions of the population must be managed correctly. Moreover, the relationship between the growth of tourism activities and economic development sometimes faces serious constraints; it has been recognized that tourism is not a key factor contributing to overcoming low levels of prosperity in many countries (Cárdenas-García, 2015: 207).
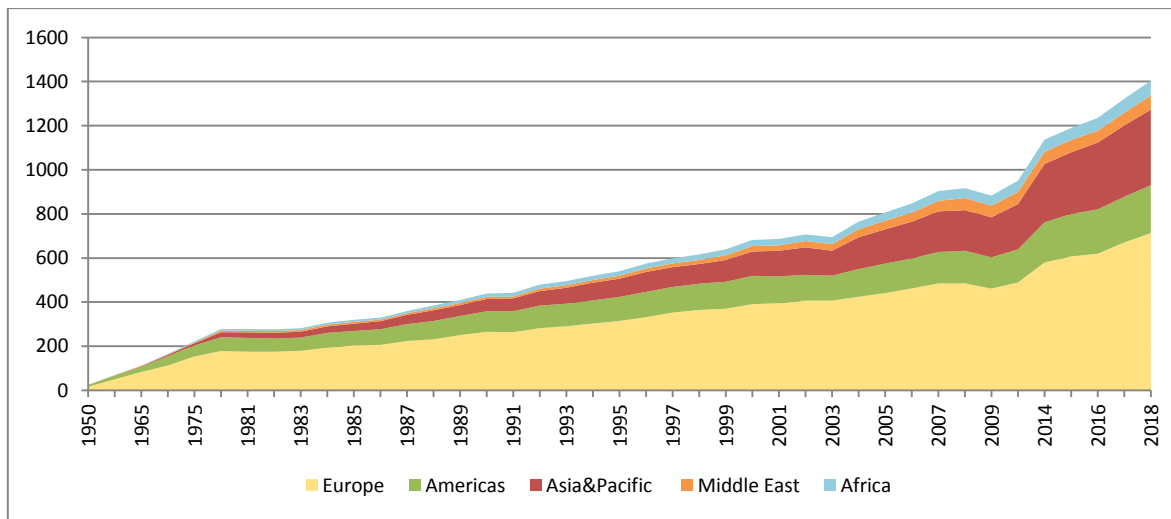

Source: www.ourworldindata.org

Figure 2: International Tourist Arrivals by World Region (million)

According to UNWTO, international tourist arrivals increased by seven percent globally in 2017 to 1326 million, and total international tourism revenues increased by five percent to $ 1340 billion (Figure 2). When we look at the distribution of international tourist arrivals by region in 2017, it is seen that Europe has 51 percent, Asia and Pacific region 24 percent and America 16 percent. Africa and the Middle East share 5 percent and 2 percent, respectively. In terms of market share, it is seen that developed countries had a share of 55 percent and developing countries 45 percent in the tourism market in 2017.
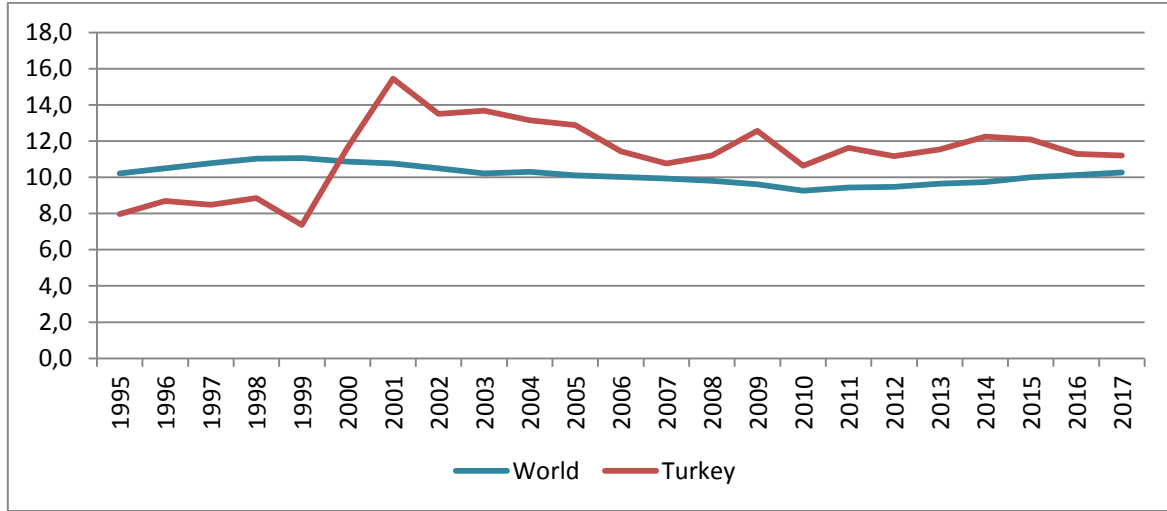
The importance of the tourism sector in Turkey's economy is more evident. Today, tourism is the second most important source of foreign exchange earnings in Turkey. Official statistics reveal a rapid increase in tourist arrivals and tourism revenues in recent years. 2018 According to data from the Ministry of Culture and Tourism of Turkey to 39 million 488 thousand foreigners, including 6 million 624 thousand citizens residing abroad except total of 46 million 112 million tourist arrivals were realized. In the same year, a total of 29.5 billion dollars tourism income was obtained, 81.41 percent of which were foreigners and 18.11 percent from tourists residing abroad (Figure 3). Also according to the fourteenth world tourism income in Turkey in 2017, it ranks eighth in the number of incoming tourists. Parallel to the increase in the number of tourist arrivals and tourism revenues, the share of tourism revenues in the gross domestic product increased rapidly. A concise account of the development of the tourism sector in Turkey over time can be found in Yolal (2016).
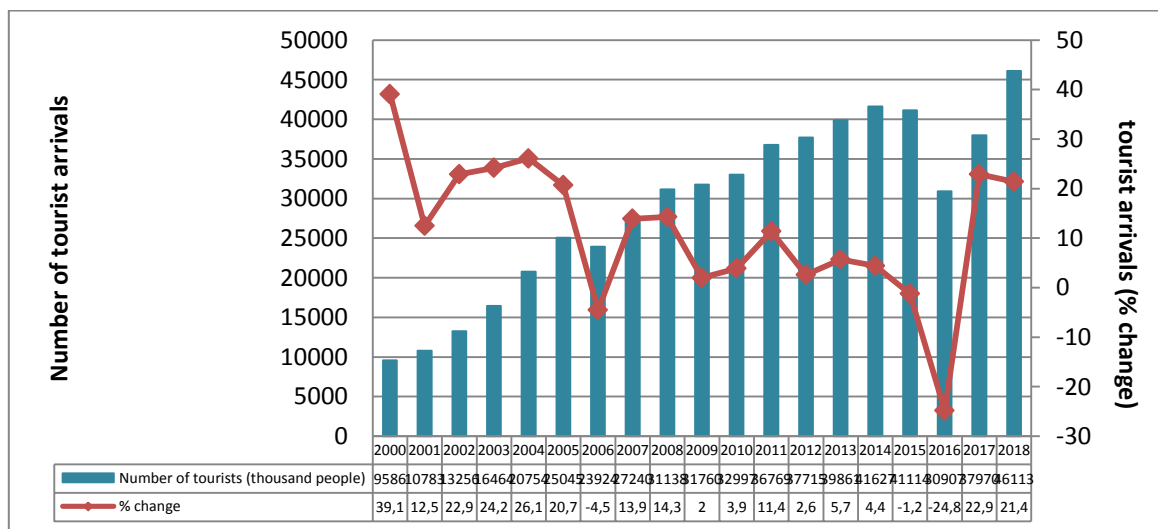
Source: Created from World Bank data.

Figure 3. International Tourist Arrivals to Turkey and % Change

The importance of international tourism as a major source of income for Turkey's economy is well known by policy makers in Turkey. In the early 1980s, the Turkish authorities launched a comprehensive program of financial liberalization and economic stability to improve and balance the internal and external balances of the economy. Perhaps the most striking feature of this stabilization and liberalization program is the open announcement of the new approach, the end of the import substitution policy, and the preference of an outward-oriented policy, namely an export-oriented policy. The authorities gave priority to the development of the tourism sector as part of their export-led economic growth strategy. The tourism sector is defined as "flueless industry" by the economists. The growth of the tourism industry has been accepted as an important source of balance and an additional source of income for GDP surpluses in the balance of payments (Savaş *et al*., 2010: 122-123).

Source: Created from WTTC Economic Impact Reports.

Figure 4. Total Contribution of Travel&Tourism to GDP in the World and Turkey

In order to empirically investigate the impact of the tourism sector on economic growth in Turkey, which has an important place in the global tourism market, dozens of studies have been carried out to date. But all of these studies are based on a conventional (frequentist) approach and show contradictory results about the validity of the tourism-led growth (TLG) hypothesis. In this study, the validity of the TLG hypothesis is investigated via the Bayesian approach, which is becoming increasingly common in the literature. In this way, it is aimed to give a different perspective on the subject.

The rest of the study was organized as follows. In the second section following the introduction, a review of the related empirical literature was given. In the third section, brief information about the estimation method, variables, and data set used in the analysis was explained, and the findings were presented. The study ends with the conclusion part.

2. REVIEW OF THE EMPIRICAL LITERATURE

The relationship between international tourism and economic growth has been the subject of many studies empirically in recent years. Detailed reviews of the empirical literature as to the relationship between tourism and economic growth can be found in Sinclair (1998), Brida and Pulina (2010), Brida *et al.* (2016), Gwenhure and Odhiambo (2017) and Comerio and Strozzi (2019). In these studies, the regression and causality relationships between tourism and economic growth rate in both specific country examples and various country groups are discussed. Information on the direction of the causal relationship between tourism expenditures and economic growth is also of particular importance for policy makers in determining policies to be implemented. Findings obtained in the studies can be summarized with four main hypotheses. These are: the tourism-led growth hypothesis, which states that there is causality from international tourism to economic growth, the growth-led tourism hypothesis that states that there is causality from economic growth to international tourism, the feedback hypothesis that states that there is a two-way causality between international tourism and economic growth, and finally it is the neutrality hypothesis that states that there is no causality between growth.

There are many studies investigating the impact of tourism on economic growth / size through panel data analysis for a group of countries. Among these are Eugenio-Martín *et al.* (2004) for Latin American countries, Fayissa *et al.* (2008), and Nene and Taivan (2017) for African countries, Sequeira and Nunes (2008) for 94 countries, Holzner (2010) for 134 countries, Narayan *et al.* (2010) for Fiji, Tonga, Solomon Islands and Papua New Guinea, Çağlayan *et al.* (2012) for 135 countries, Chou (2013) for ten transition countries, Cárdenas-García et al. (2015) for 144 countries, Kum *et al.* (2015) for the Next-11 countries, to name a few.

On the other hand, the relationship between tourism and growth has been the subject of dozens of time series studies. Some selected studies are: Belloumi (2010) for Tunisia, Cortes-Jimenez and Pulina (2010) for Spain and Italy, Balaguer and Cantavella-Jordá (2002) for Spain, Oh (2005) for Korea, Khalil *et al.* (2007) and Malik *et al.* (2010) for Pakistan, Eeckels *et al.* (2012) for Greece, Norsiah and Mohd (2012) for Malaysia, Bouzahzah and El Menyari

(2013) for Morocco and Tunisia, Jaforullah (2015) for the New Zealand, Phiri (2016) for South Africa, Ohlan (2017) for India.

Through the literature survey made, it was found that validity of the TLG hypothesis was investigated in about ninety empirical papers for the case of Turkey. In the vast majority of the analyses carried out, income from tourist flow for tourism and (real) GDP for economic growth were used as proxies as core variables together with other model-specific sets of explainatory variables. In 46 of these studies, the relationship between Tourism and economic growth was investigated via co-integration approach, and in 41 papers evidence for co-integration was obtained. The most commonly used cointegration method is the Johansen and ARDL bounds test. One of the main focuses of the researches is the causal relationship between tourism and economic growth. Using various testing methods, mostly the classic pairwise Granger causality test, Analyses usually resulted in favor of a one-way causality relationship running from tourism to economic growth (36 papers), while some other papers found evidence in the other direction (7 papers), two-way (9 papers) and no causality (6 papers). This variation in the results of cointegration and causality analyses may be stemmed from the proxy variables used, as well as on preferences in the modeling and prediction procedure, such as the proper determination of the lag structure and the model specification.

3. EMPIRICAL ANALYSIS

3.1. The Method, Model and Data

In this study, the relationship between tourism and growth is handled with a Bayesian approach. Bayesian and classical (frequentist) approaches to inference have opposite perspectives on sample and population parameter. In the frequentist approach, estimates are made for fixed but unknown parameter values based on hypothetically repeated random samples. In Bayesian inference, however, the observed sample data is assumed to be fixed and the parameters are random. In other words, Bayesian analysis answers questions based on the distribution of parameters conditional on the observed sample, whereas frequentist analysis answers questions based on the distribution of statistics obtained from repeated hypothetical samples, which would be generated by the same process that produced the observed sample given that parameters are unknown but fixed. Frequentist analysis consequently requires that

the process that generated the observed data is repeatable. This assumption may not always be feasible.

Frequentist analysis is entirely data-driven and strongly depends on whether or not the data assumptions required by the model are met. On the other hand, Bayesian analysis provides a more robust estimation approach by using not only the data at hand but also some existing information or knowledge about model parameters. In frequentist statistics, estimators are used to approximate the true values of the unknown parameters, whereas Bayesian statistics provides an entire distribution of the parameters.

Frequentist inference is based on the sampling distributions of estimators of parameters and provides parameter point estimates and their standard errors as well as confidence intervals. The exact sampling distributions are rarely known and are often approximated by a large-sample normal distribution. Bayesian inference is based on the posterior distribution of the parameters and provides summaries of this distribution including posterior means and their MCMC standard errors (MCSE) as well as credible intervals. Frequentist confidence intervals do not have straightforward probabilistic interpretations as do Bayesian credible intervals (Stata Manual, 2015: 4).

In the Bayesian analysis, elements of the parameter vector θ are considered as unknown random quantities, whereas in the traditional (frequentist) approach, the parameters are seen as unknown but fixed values. Bayesian inference is based on the following Bayes Theorem:

$$p(\theta|y) = \frac{p(y|\theta)p(\theta)}{p(y)}$$

According to the theorem, the probability of obtaining θ parameters with the available data is as much as the ratio of the probability of obtaining the parameter vector θ to the probability of observing the sample data, multiplying the probability of having the present sample data if the parameters are obtained. $p(y)$ in the denominator is a quantity calculated as follows,

$$p(y) = \int p(y|\theta)\, p(\theta)d\theta$$

and since it is constant with respect to different parameter vectors, $p(\theta|y)$ can be reduced to

$$p(\theta|y) \propto \int p(y|\theta)\, p(\theta)$$

Here $p(\theta|y)$ is the conditional probability distribution of the parameters to the data and is called the posterior distribution. $p(y|\theta)$ is the conditional sample distribution to the parameter vector and is represented by the likelihood function. $p(\theta)$ is the prior distribution that reflects the available information about the parameter vector and constitutes an important detail for Bayesian inference.

In Bayesian inference, unlike the classical approach, parameter estimates are not obtained as points. Instead, the mean and parameters of the final distribution are evaluated according to the weighted interval estimates calculated over the final distribution. In weighting, the inverse of variance, which is called precision parameter, is used. Since the posterior distribution calculation includes integration, the Markov Chain Monte Carlo (MCMC) algorithm is used for convergence and sampling simulations such as Metropolis-Hastings (MH) and Gibbs are used for the iterative sampling process.

In order to estimate the relationship between tourism and GDP, a regression equation in the form of a Cobb-Douglas production function based on the assumption that there is an exponential relationship between output (Q) and inputs (capital – K, and labor – L) is used.

$$Q_t = \beta_0 \cdot K_t^{\beta_1} \cdot L_t^{\beta_2}$$

In the model, gross domestic product (*GDP*) instead of output volume, gross fixed capital formation (*GFCF*) instead of capital input, number of employed persons (*EMP*) instead of labor input and number of tourist arrivals (*TOUR*) as additional input were used. The expression of the equation in the form of a production function is as follows:

$$GDP_t = \beta_0 \cdot GFCF_t^{\beta_1} \cdot EMP_t^{\beta_2} \cdot TOUR_t^{\beta_3} \cdot e^{\varepsilon_t}$$

The regression equation to be estimated can be expressed in linearized form as follows:

$$lnGDP_t = \beta_0 + \beta_1 lnGFCF_t + \beta_2 lnEMP_t + \beta_3 lnTOUR_t + \varepsilon_t$$

GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Gross fixed capital formation includes land improvements, plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools,

offices, hospitals, private residential dwellings, and commercial and industrial buildings. Employment to population ratio is the proportion of population that is employed and covers those over the age of 15. Tourist arrivals denote the number of international inbound tourists (overnight visitors) who travel to Turkey other than that in which they have their usual residence, but outside their usual environment, for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within Turkey. All monetary data are in constant 2010 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2010 official exchange rates. The data used in the analysis consists of annual observations for the period 1995 - 2019 and were compiled from the World Bank's online database (WDI-Databank). The relatively short sampling period does not a problem since the Bayesian approach also performs well in small samples.

3.2. Findings

Bayesian estimation results of the model are given in Table 1-3. A maximum of 12500 iterations are allowed for the MCMC algorithm, 2500 of which are reserved for the burn-in stage. In the estimation process, Jeffrey's noninformative flat prior was used first. Since the results obtained with a noninformative prior are mostly based on sampling information, it gives results close to classical inference. Looking at the results obtained, it is seen that all three variables have significant effect on GDP. The effect of the employment variable is negative, contrary to expectations. This situation can be attributed to the fact that increased employment brings together inefficiency and loss of production. In terms of mean values of the coefficient estimates the largest impact on GDP belongs to the capital formation. The impact of the tourism on GDP is approximately 36% of that. The effect of the employed labor force is relatively quite small. A 1% increase in the number of tourist arrivals increases the GDP by 0.24% on average.

Table 1. Estimation result (Jeffrey's prior)

Variable	Coefficient	Mean	St. error	MC error	95% HPD interval	
					% 2.5	% 97.5
Intercept	β_0	2.0594	0.0351	0.0102	1.9886	2.1193
GFCF	β_1	0.6642	0.0619	0.0138	0.5489	0.7788
EMP	β_2	− 0.1809	0.0349	0.0026	− 0.2501	− 0.1161
TOUR	β_3	0.2413	0.0691	0.0151	0.1057	0.3722
Number MCMC iteration		12 500		Number of burn-in		2 500
Number of MCMC sample		10 000		Log marginal likelihood		38.355

Normal and multivariate normal (Zellner-*g*) distributions were also tested for prior distribution. However, in both cases, the effect of tourism on GDP was found to be statistically insignificant. The effect of the labor force and capital formation seems positive and significant in the former case, and negative but insignificant in the latter case. Based on these results, it is understood that prior distribution preference causes a radical change in determining the relationship.

Table 2. Estimation result (Normal prior)

Variable	Coefficient	Mean	St. error	MC error	95% HPD interval % 2.5	% 97.5
Intercept	β_0	0.0950	0.2600	0.0215	$-$ 0.4066	0.5938
GFCF	β_1	0.4715	0.1885	0.0281	0.1088	0.8514
EMP	β_2	0.3960	0.1765	0.0496	0.0835	0.6715
TOUR	β_3	0.3363	0.2002	0.0221	$-$ 0.0435	0.5938
Number MCMC iteration	12 500			Number of burn-in		2 500
Number of MCMC sample	10 000			Log marginal likelihood		$-$ 4.1250

Table 3. Estimation result (Zellner-*g* prior)

Variable	Coefficient	Mean	St. error	MC error	95% HPD interval % 2.5	Variable
Intercept	β_0	1.9732	26.0901	1.5588	$-$ 42.1470	55.4404
GFCF	β_1	0.8510	2.5506	0.1147	$-$ 4.2707	6.0077
EMP	β_2	$-$ 0.2602	7.2759	0.4399	$-$ 14.8879	11.8377
TOUR	β_3	0.0549	3.1930	0.1789	$-$ 5.8255	6.5376
Number MCMC iteration	12 500			Number of burn-in		2 500
Number of MCMC sample	10 000			Log marginal likelihood		$-$ 48.0196

There is a couple of information criteria commonly used to choose the most suitable among the competing models. The most well-known are Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and Deviance Information Criterion (DIC). The model using the Jeffrey a priori distribution is the most suitable model since it has the smallest DIC and the largest logML value (see Table 4). However, these criteria are not very suitable when it comes to Bayesian inference, because they either ignore the prior distribution or assume that

the prior distribution is noninformative. Therefore, *Bayes factor* is used to compare models with same parameters but different prior. According to the Bayes factor values calculated by using log marginal likelihood ratios, the estimates using Jeffrey's prior yield more satisfactory results than the other two prior distributions.

Table 4. Information criteria for model comparison

Prior type	DIC	Log ML	Log BF
Zellner's *g*	66.1948	− 48.0196	−
Normal	− 20.5755	− 4.1222	43.8974
Jeffrey's	− 94.3414	38.3552	86.3748

Note: Marginal likelihood (ML) is computed using Laplace-Metropolis approximation.

ROBUSTNESS CHECK

As mentioned earlier, different proxy variables are used for economic volume and size of the tourism sector in the related empirical literature. Since the regression estimates are sensitive to the variables used in the model, the estimation process was repeated with different indicators in order to observe the effect of different proxy preferences on the estimates and the persistence of the results obtained♠. In this context, new estimates have been obtained by using per capita GDP for economic size, and tourism revenues as a monetary variable instead of the number of tourist arrivals. The results show no remarkable difference in terms of pattern and sign of the variables regardless of the prior distribution adopted. Therefore, it can be said that proxy preferences for variables do not radically affect estimation results in the tourism - GDP relationship.

CONCLUSION

The tourism industry is among the most important and fastest growing sectors in the world. Tourism has become the most important and dynamic sector for many economies, especially with its direct and indirect effects on the economy. Tourism is regarded as a favorable economic activity for promoting economic growth due to its complementarity with other economic activities, its positive impact on the current account deficit, its potential to create employment and earn foreign currency.

Turkey has become one of the leading actors in the world tourism market with its policies adopted and reforms performed in the last 35 years. In this respect, it is important to

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♠ The results can be submitted by the corresponding author upon request.

investigate whether Turkey has benefited adequately from the growing tourism sector on the way to economic growth and to determine the measures to be taken to increase the contribution of tourism to growth. So far, dozens of empirical studies have been conducted as to the impact of tourism on growth/economy in Turkey. In these studies, all of which based on the traditional (frequentist) inference approach, though findings were obtained that mostly supported the tourism-led growth hypothesis, conflicting results also exist. In this study, the subject was discussed in terms of Bayesian inference. Using three distinct prior distributions, the optimal estimate obtained in the analysis confirms the validity of the tourism-led growth hypothesis in Turkey. Accordingly, it has immense importance that decision makers in Turkey consider appropriate policies to increase and disseminate the economic and social benefits provided by tourism and thus to sustain tourism-led growth.

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