

THE IMPORTANCE OF THE TOURISM INDUSTRY IN THE GROSS DOMESTIC PRODUCT

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Abstract: Due to the complex nature of the relationship between the tourism industry and GDP, economists have not reached a unanimous consensus on how these variables influence each other. Therefore, this study was conducted to examine the impact of the tourism sector on GDP. The research focuses on Turkey, Greece, Italy, Spain, Egypt, and Cyprus over the period 2003–2022. To analyze these relationships, a regression analysis was carried out using the OLS method in STATA-14. The results indicate that all regressors are statistically significant, demonstrating that the development of the tourism sector contributes to GDP growth.

Keywords: OLS method, GDP, tourism, Breusch-Pagan test, Breusch-Godfrey test, correlation, regression

Introduction

Currently, the tourism sector has emerged as one of the fastest-growing industries worldwide. Following oil refining and extraction and automobile manufacturing, tourism ranks as the third-largest sector globally. As Aleksandrova (2002) states, tourism encompasses “the aggregate of relationships and phenomena arising when people travel and stay in places different from their permanent residence and work” [1]. Bystrov and Vorontsova (2007) define the tourism services market as “an economic phenomenon that integrates demand and supply of specific tourism goods and services in a given place and time” [2]. Today, people’s movements, attitudes, and ways of seeking enjoyment in life are transforming. Individuals increasingly aim to spend leisure time meaningfully, explore new cultures and traditions, and improve their well-being—services that the tourism sector readily provides. Over recent years, this drive for discovery has intensified, further accelerating the growth of tourism. In some countries, the tourism industry is growing steadily, with annual growth rates reaching 8–10%, underscoring its crucial role in national economies.

Methodology

In order to achieve the aforementioned research objectives, it is essential to construct an appropriate econometric model and to compile a suitable dataset. Building such a model necessitates the use of socio-economic and statistical indicators highlighted in previous

literature. The selection of model specifications and variables, as well as their sources and theoretical justifications, are presented below.

Several studies emphasize the importance of including variables such as tourism revenues, the number of international tourists, and macroeconomic indicators like GDP, exchange rates, and inflation in tourism-related econometric models (Balaguer & Cantavella-Jordá, 2002; Brida et al., 2016). Moreover, panel data analysis and regression techniques such as OLS, fixed-effects, or random-effects models are widely applied to examine these relationships across countries and time periods (Chen & Chiou-Wei, 2009; Gunduz & Hatemi-J, 2005).

For this study, annual data covering the period from 2003 to 2022 were collected from official sources such as the World Bank, UNWTO, national statistical institutes, and central banks of the countries analyzed. The model specification was developed considering theoretical insights and empirical findings from prior research to ensure robust and meaningful results.

$$=+ + \quad (1.1)$$

In this study, the main indicator representing Gross Domestic Product (GDP) is derived from the World Bank's data repository, reflecting each country's annual GDP figures over the selected period. Descriptive statistics for this variable are presented after introducing the model variables. In the STATA commands, the variable name is designated as "GDP" to ensure consistency and ease of interpretation when working with commands and reporting results. GDP serves as the primary dependent variable in the econometric model.

As the key explanatory variable potentially influencing GDP, the tourism indicator ("tourism") was selected. Data for this variable were also obtained from the World Bank database, representing the volume of tourism activity in each country. Within STATA, this variable is coded as "tourism" ("number"), facilitating straightforward usage in the statistical software.

Descriptive statistics for the variables are presented in Table 1. According to the table, the average number of tourists across the selected countries during the observed period amounts to approximately 37,482,519 annually.

Table 1. Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
number	100	41643916	37482519	2370000	1.262e+08
GDP	120	7.365e+11	6.581e+11	1.719e+10	1.992e+12

Greater emphasis is placed on examining the descriptive statistics of the key variables. It is crucial to assess the distribution of the datasets and to determine the extent to which they approximate a normal distribution. To achieve this, histograms of the variables are generated in STATA and compared against the theoretical normal distribution curve. This approach provides valuable insights into the data's underlying patterns and the suitability of the econometric methods applied.

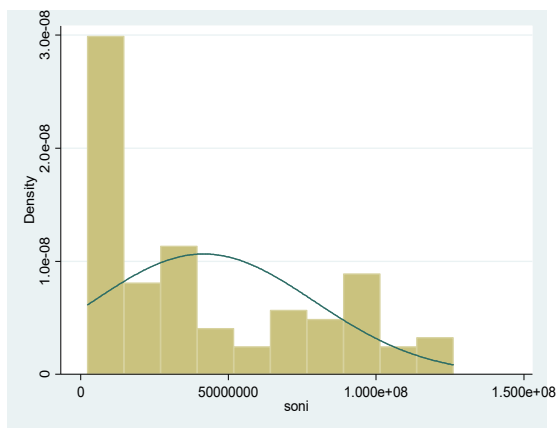
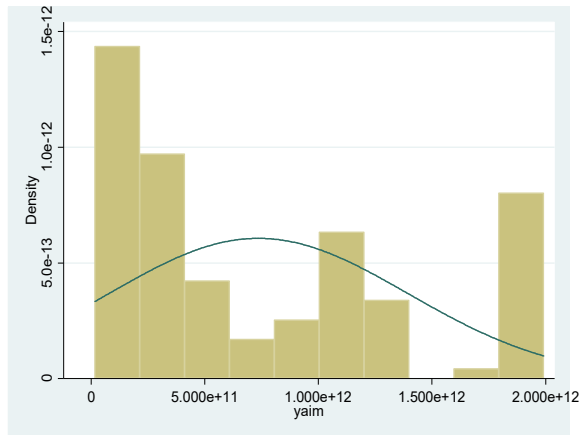


Diagram 1. Distribution of GDP indicator

Diagram 2 Distribution of tourism volume indicator

Figure 1 illustrates the distribution of the GDP variable, plotted alongside a normal distribution curve constructed based on the sample mean and standard deviation. From the figure, it is evident that the GDP data do not follow a normal distribution.

Figure 2 presents the frequency distribution for the number of tourists. Similarly, the diagram shows that the tourism variable does not conform to a normal distribution pattern.

To gain preliminary insights into the direction and strength of the relationship between the two key economic indicators, Figure 3 was generated. This figure takes the form of a scatterplot depicting the relationship between GDP and the number of tourists. The scatterplot indicates a positive association between GDP and tourism numbers, as evidenced by the upward trend in the distribution of data points.

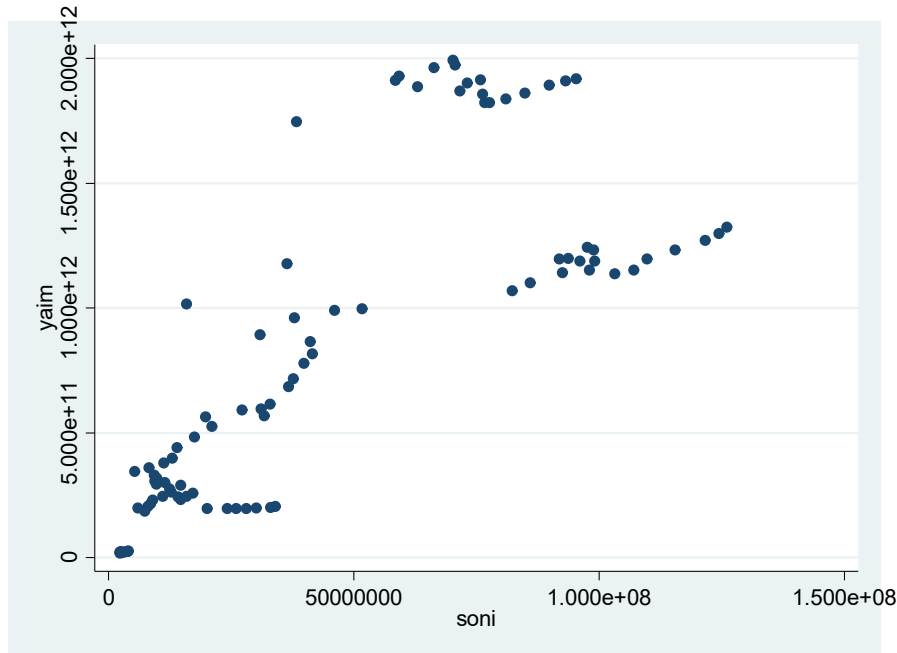


Diagram 3 Relationship between GDP and tourism volume

However, it is important to recognize that the observed relationship might also be influenced by other factors. Therefore, a deeper analysis of the connection between these two variables is warranted. To achieve this, calculating the correlation coefficients between the variables is considered appropriate. **Table 2** presents the correlation matrix.

An examination of the table reveals that there is indeed a positive economic relationship between the two indicators. The correlation coefficient, calculated at **0.812**, confirms the pattern observed in the scatterplot. Based on the correlation coefficients, we can conclude that there is a strong economic relationship between GDP and tourism figures.

Table 2. Matrix of correlation coefficients

Variables	(1)	(2)
(1) GDP	1.000	
(2) number	0.812	1.000

Taking these aspects into consideration, the primary objective of this study is to determine the interrelationship between the economic indicators under investigation through a regression model. To achieve this goal, calculations were performed using the Ordinary Least Squares (OLS) method within the STATA-14 software environment. The results and their subsequent discussion are presented in the following section.

Results Analysis

When discussing the outcomes of the conducted regression analysis, it is first essential to examine the initial regression results. These preliminary findings are presented in Table 3. The table indicates that both individual and overall statistical significance levels of the estimated coefficients are below 0.05, implying that the variables are statistically significant.

According to the regression results, the number of tourists exerts a positive influence on GDP. The analysis demonstrates that tourism has a substantial and statistically significant effect on GDP growth.

Table 3. Initial regression results

GDP	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
number	14412.26	1046.163	13.78	0	12336.19	16488.34	***
Constant	1.638e+1	5.848e+1	2.80	.006	4.774e+1	2.799e+1	***
	6					2	
	1	0			0	1	
Mean dependent var	763977662686.		SD dependent var		665217206952.		
	483				391		
R-squared	0.659		Number of obs		100		
F-test	189.787		Prob > F		0.000		
Akaike crit. (AIC)	5623.733		Bayesian crit. (BIC)		5628.944		
*** p<.01, ** p<.05, * p<.1							

The presence of heteroskedasticity issues is highly significant when assessing the quality of an econometric model. Therefore, the Breusch-Pagan tests for heteroskedasticity were conducted, with the results presented in Table 4.

Table 4. Brusch-Peagan heteroscedasticity test

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of yaim
chi2(1) = 28.05
Prob > chi2 = 0.0000

The Breusch-Pagan test indicates that the null hypothesis of homoskedastic error terms is rejected. Based on the outcomes of these tests, it can be concluded that the model suffers from heteroskedasticity problems. Consequently, to address this issue, it was deemed necessary to re-estimate the model in logarithmic form.

Table 5 Logarithmic regression results

lgGDP	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lgnumber	1.116	.046	24.38	0	1.026	1.207	***
Constant	7.734	.778	9.94	0	6.19	9.278	***
Mean dependent var	26.653		SD dependent var		1.520		
R-squared	0.858		Number of obs		100		
F-test	594.211		Prob > F		0.000		



Akaike crit. (AIC)	175.022	Bayesian crit. (BIC)	180.233
*** p<.01, ** p<.05, * p<.1			

After transforming the variables and re-running the regression using the log-linear specification, the Breusch-Pagan tests were conducted again to verify the presence of heteroskedasticity. The results of these tests are reported in Table 6.

Table 6. Brusch-Peagan heteroscedasticity test

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lgGDP
chi2(1) = 3.77
Prob > chi2 = 0.0522

According to the results of the Bruce-Pagan test, it can be seen that the heteroscedasticity problem in the model has been eliminated.

In the following table, we conduct the Bruce-Godfrey test to check for the autocorrelation problem in the model.

Table 7. Brusch-Godfrey autocorrelation test

Number of gaps in sample:	df	Prob>Chi2
6		
Breusch-Godfrey LM test for autocorrelation		
chi2		
38.048	1	0.000

H0: no serial correlation

As can be seen from the results, our model has an autocorrelation problem. Since p<0.05, it is concluded that the model has an autocorrelation problem. To overcome this problem, we conduct the Niu-West autocorrelation-resistant standard errors test.

Table 8. Standard errors stable to Niue-West autocorrelation

GDP	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
number	14	16			11	17	
	412.266	25.826	.86		185.868	638.665	**
Consta	1.	4.			6.	2.	
nt	638e+11	858e+10	.37	.001	739e+10	602e+11	**

Mean	763977	SD dependent	665217
dependent var	662686.483	var	206952.391
Number of obs	100	F-test	78.581

*** p<.01, ** p<.05, * p<.1

The results show that the autocorrelation problem in the model has been eliminated.

Conclusion

According to data from the World Travel & Tourism Council, in 2018, international tourism contributed approximately USD 8.8 trillion to the global economy, accounting for 10.4% of total economic activity. Furthermore, the tourism sector was responsible for around 319 million jobs worldwide (Kun.uz, 2019) [3].

This study investigates the impact of the tourism industry on Gross Domestic Product (GDP) in Turkey, Greece, Italy, Spain, Egypt, and Cyprus over the period from 2003 to 2022. To analyze these relationships, a regression analysis was performed using the Ordinary Least Squares (OLS) method in STATA-14. The results indicate that all regressors are statistically significant, demonstrating that the development of the tourism sector positively contributes to GDP growth.

Tourism plays a critical role in the economies of many countries and is essential for national economic success. It increases revenue generation, creates numerous employment opportunities, and fosters cultural exchange between foreign visitors and local citizens. In addition to tourism expenditures, businesses and individuals often reinvest the income earned from tourism-related activities, thereby significantly contributing to the development of local economies.

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