

A Spectral Method Approach For the Relationship Between Tourism and Economic Growth in Turkey

Türkiye’de Turizm ve Ekonomik Büyüme Arasındaki İlişki İçin Bir Spektral Metod Yaklaşımı

Asst. Prof. Dr. Mesut Balıbey - Asst. Prof. Dr. Serpil Türkyılmaz

Abstract

A popular topic in the econometrics and time series area is the cointegrating relationships among the components of a nonstationary time series. Engle and Granger's least squares method and Johansen's conditional maximum likelihood method are the most widely-used methods to determine the relationships among variables. Furthermore, the method proposed to test a unit root based on the periodogram ordinates has certain advantages over conventional tests. Periodograms can be calculated without any model specification and the exact distribution under the assumption of a unit root can be obtained. For higher order processes the distribution remains the same asymptotically. Furthermore, in recent years, many developing countries have given priority to the development of tourism industry as an important part of country's economic growth. In this context, the tourism-led growth hypothesis has attracted a great deal of attention among economists and policy makers. So, in this study, in order to indicate advantages over conventional test of Periodogram-based Method, a possible relationship between tourism and economic growth during the period 1999:01-2010:12 in Turkey is examined by using Periodogram-based Method, Johansen's Conditional Maximum Likelihood Method, Engle and Granger's Ordinary Least Square Method.

Keywords: Unit Root, Periodogram Method, Cointegration, Economic Growth, Tourism

Öz

Ekonometri ve zaman serileri alanında popüler bir konu durağan olmayan zaman serileri arasındaki eşbütünleşme ilişkileridir. Engle-Granger' in En Küçük Kareler Metodu ve Johansen' in Koşullu Maksimum Olabilirlik Metodu değişkenler arasındaki ilişkileri belirlemek için en yaygın kullanılan metodlardır. Ayrıca periodogram ordinatlarına dayanan bir birim kökü test etmek için önerilen metod, geleneksel testlere göre belli avantajlara sahiptir. Periodogramlar herhangi bir model tanımlaması olmaksızın tanımlanabilmektedir ve bir birim kök varlığı altında kesin dağılımı elde edilebilmektedir. Daha yüksek dereceli süreçler için dağılım asimptotik olarak aynı kalmaktadır. Ayrıca son yıllarda, bir çok gelişmekte olan ülke, ekonomik büyümenin önemli bir bölümü olarak turizm endüstrisinin gelişimine öncelik vermektedir. Bu bağlamda, turizme dayalı büyüme hipotezi ekonomistler ve politika yapıcılar arasında büyük ilgi çekmektedir. Bu nedenle çalışmada, periodograma dayalı testin geleneksel testlere göre avantajını göstermek için, Türkiye'de 1999:01-2010:12 dönemi için turizm ve ekonomik büyüme arasındaki olası ilişki, Periodogram Metodu, Johansen Maksimum Olabilirlik Metodu ve Engle-Granger Metodu ile incelenmektedir.

Anahtar Kelimeler: Birim Kök, Periodogram Metodu, Eşbütünleşme, Ekonomik Büyüme, Turizm

Introduction

In recent years, it is accepted that tourism sector is one of the major foreign exchange earners, a major source of income and main growth sector for many countries. In fact, in the global context, this sector is considered to be one of the sources of economic growth¹ all over the world. Moreover, many developing countries focus on economic policies to improve international tourism as a potential strategic factor for economic growth. Therefore, the impact of international tourism on a country's economic growth has attracted a great deal of attention among economists and policy makers.

In addition, the impact of international tourism on a country's economic growth, namely tourism-led growth hypothesis (TLGH) is that tourism not only increases foreign exchange income, but also creates employment opportunities, stimulates overall economic growth. Nowadays, tourism is the most important source of foreign exchange and growth after the manufacturing industry in Turkey. Although the tourism sector has grown rapidly in Turkey, researchers have paid little attention to the empirical analysis of the contribution of tourism to the country's economy (Hepaktan and Çınar, 2010, p.136, Cortes-Jimenez et al., 2009, pp.1-4, Tosun et al., 2003, pp.133-136, Öztürk and Acaravcı, 2009, pp.73-75, Çetintaş and Bektaş, 2008, pp.1-3, Aslan, 2008, pp.1-2, Kızılgöl and Erbaykal, 2008, pp.351-355, Kaplan and Çelik, 2008, pp.13-14, Çil-Yavuz, 2006, pp.162-163, Özdemir and Öksüzler, 2006, pp.108-115, Değer, 2006, pp.68-73, Gündüz and Hatemi, 2005, p.499).

Empirically, the analysis of tourism and economic growth relationship have been investigated for different countries, periods and methods. Furthermore, in the literature, there are several empirical papers investigating the tourism sector's contribution to a country's economic growth². In our study, we have included chronologically some of the most remarkable studies on this subject for Turkey and different countries.

Balaguer and Cantavella-Jorda (2002) examined the role of tourism in the Spanish long-run economic development. In this study, the tourism-led growth hypothesis was confirmed through cointegration and causality testing. Brau, Lanza and Pigliaru (2003) compared the relative growth performance of 14 tourism countries within a sample of 143 countries and founded that tourism countries grow faster than all the other countries. Dritsakis (2004) investigated empirically the tourism impact on the long-run economic growth of Greece by using the causality analysis among real GDP, real effective exchange rate and international tourism earnings. In his study, it was suggested that there was one cointegrating relationship among real GDP, real effective exchange rate and international tourism earnings and a strong Granger causal relation between international tourism earnings and economic growth. Oh (2005), could not find any long run relationship between tourism and economic growth for the Korean economy. Jimenez and Pulina (2006), for the Spanish and the Italian regions, found that tourism has a significant and positive role in regional economic growth. Brida et al. (2007), confirmed the tourism-led growth hypothesis through cointegration and causality testing for the case of Mexico. Lee (2008), could not find a cointegration relationship between tourism and economic growth. However, he supported growth-led tourism hypothesis. Lee and Chang (2008), found that tourism has a greater effect on GDP in non-OECD countries than in OECD countries. Cortes-Jimenez et al. (2009), revealed the significance of both exports and tourism towards long term growth with peculiarities for Italy and Spain. Mello-Sampayo et al. (2010), investigated the relationship between tourism and economic growth for a panel of European countries, and found that tourism enhanced economic growth for some countries in the sample. Chaiboonsri et al. (2010), using panel data approach for Thailand, found that growth in income (GDP) of Thai's Asia major tourist countries (Malaysia, Japan, Korea, China, Singapore and Taiwan) has a positive impact on international tourists arrival to Thailand. Ghartey (2010), supported tourism-led economic growth hypothesis for Jamaica. Seetanah et al. (2011), confirmed the tourism-led growth hypothesis for Africa. Ghosh (2011), revealed the absence of a long term equilibrium relationship between international tourist arrivals and economic activity in India and rejected the tourism-led growth hypothesis. Kreishan (2011),

1 There are many studies that investigate the relationships among economic growth and other factors affecting growth in Turkey. For example, See (Telatar, 1996, s.52-63) for the effects of inflation uncertainty on economic growth and (Yıldırım et al., 2007, s.1-38) for the relationship between financial development and economic growth.

2 Brida and Pulina (2010, s.1-27) present a literature review on the tourism-led growth hypothesis also.

examined the causality relationships between tourism earnings and economic growth for Jordan, and suggested that countries should focus on economic policies to promote international tourism in Jordan. Dritsakakis (2011) examined the relationship between economic growth and tourism development in seven Mediterranean Countries, and concluded that there is the evidence of panel cointegration relations between tourism development and GDP in the case of seven Mediterranean Countries. Furthermore, in the following part of this section we present briefly a literature survey for Turkey.

Tosun (1999) investigated the economic contribution of international inbound tourism in Turkey. However, he could not find empirical support for the tourism-led growth hypothesis and concluded that the contribution of international tourism to the Turkish economy is too unreliable. In addition, he suggested that international tourism should not be seen as an engine of export-led economic strategy. Kasman and Kırbaş-Kasman (2004) confirmed the existence of the tourism-led growth hypothesis for Turkey during the period covering 1963-2002, and indicated that growth of tourism has positive effects on economic growth. Gündüz and Hatemi (2005) found that the tourism-led growth hypothesis was supported empirically in the case of Turkey. Bahar (2006) proved that tourism has a positive effect on economic growth, and there is a bi-directional relationship between two variables in the long term. Kızılgöl (2006) investigated export and tourism-led growth hypothesis, and found that there was a long term relation between export-tourism revenues and economic growth, and showed that the tourism-led growth hypothesis is valid in the case of Turkey. Özdemir and Öksüzler (2006) concluded that there is one-way causality relation to economic growth from tourism for Turkey. However, Değer (2006) found that tourism earnings had no important effects on Turkish economic growth. Çil-Yavuz (2006) approved that there is not causality relationship between tourism receipts and economic growth by using Granger causality test and Toda Yamamoto approach. Gökdemir and Durdu (2007) supported that there is a long term relationship between tourism and growth in Turkey by using ARIMA models. Aslan (2008) investigated the role of tourism on economic growth in the long run in Turkey, and showed that tourism-led growth hypothesis was confirmed through Johansen Cointegration, Error Correction and Granger cau-

sality tests. Kızılgöl and Erbaykal (2008) investigated the causal relationship between tourism revenues and economic growth by Toda-Yamamoto approach, and indicated that to increase the tourism earnings Turkey should ensure sustainable growth. Akan and Işık (2009) showed that the tourism revenues have a positive impact on economic growth in long run for Turkey. Çetintaş and Bektaş (2008) researched short and long run relationships and causality between tourism and economic growth by using ARDL method in Turkey, and presented the long term relationship between two variables and unidirectional causality from economic growth to tourism. They proved the tourism-led growth hypothesis. Kaplan and Çelik (2008) examined the relationship between tourism expansion and economic performance in Turkey. They found the presence of one cointegrating vector between real output, real tourism receipts and real effective exchange rate, and tourism has a long run effect on growth. Zortuk (2009) researched the contribution of the rapidly developing tourism sector to the economic growth, and showed that there is a unidirectional causality from tourism development to economic development in Turkey. Öztürk and Acaravcı (2009) investigated the long-term relationship between the real GDP and tourism in Turkey by means of VEC model and ARDL model. They could not find any cointegration relationship between two variables, and proved that the tourism-led growth hypothesis is invalid for Turkey. Aykaç (2010) showed a positive impact on economic growth of tourism. Savaş et al. (2010) indicated that the Turkish case supports the tourism-led growth hypothesis. Hepaktan and Çınar (2010) rejected that the tourism-led growth hypothesis is valid for Turkey.

As shown in the literature, the direction of relationship between tourism and economic growth is not certain. In this context, in order to indicate advantages over conventional test of periodograms, we investigate a possible relationship between tourism and economic growth in Turkey by using Periodogram-based Method, Johansen's Conditional Maximum Likelihood Method, Engle and Granger's Ordinary Least Square Method.

Furthermore, we use a periodogram-based method developed by Akdi and Dickey (1998) to test unit root in this study differently. This method based on periodograms has some advantages. Periodograms can be calculated without any model specifications, the dist-

tribution of test statistic is free of sample size, there is an analytic form of the power function and there is no parameter estimation except the variance. In this sense, the study contribute to literature as a spectral approach for the relationship between two economic variables.

In following section, we explain the periodogram methods. Moreover, in section three, we discuss the empirical findings and summarize the results in the conclusion.

Methodology

Unit root tests comprise a standard diagnostic tool in applied time series analysis. There are several procedures to test for a unit root e.g. Dickey and Fuller (1979). Test procedures have also been developed to test for seasonal unit roots (Dickey, Hasza and Fuller, 1984, s. 355-367, Hylleberg, Engle, Granger and Yoo, 1990, s. 215-238). Dickey and Pantula (1987) proposed a procedure to test for multiple unit roots. Series with unit roots are described as integrated. Akdi and Dickey (1998) develop a procedure to test for a unit root using the periodogram ordinates of a univariate time series.

Engle and Granger (1987) have proposed an estimation procedure for the cointegrating vector. They used a regression approach to estimate the cointegrating vector β . Johansen (1988) gave an estimation procedure that has become very popular. Levy (2002) take

advantage of a squared coherence, phase and gain to study the cointegration relationship for a bivariate cointegrated system. He derives some restrictions by studying cross-spectral properties of a cointegrated bivariate system. Chen and Hurvich (2003) study the asymptotic distribution of a tapered narrow-band least squares estimator of the cointegrating vector β in the framework of fractional cointegration. Deo and Hurvich (2001) study the estimators based on the log periodogram regression and they obtain the asymptotic bias and variance. They suggest to use low frequencies in the context of in the long memory stochastic volatility model. Finite sample properties of spectral regression estimators have been studied by Chambers (2001) by simulation. Marunicci (2000) deals with a somewhat related problem. He considers spectral regression for cointegrated time series with long memory innovations. He provides a functional central limit theorem as a quadratic forms in nonstationary fractionally integrated processes. We investigate an estimation procedure for the cointegrating vector based on the periodogram. For simplicity, bivariate series are considered in detail. For this test, one may use the trigonometric transformation of the series. Given a realization of a time series $Y_1, Y_2, \dots, Y_n$, the periodogram ordinate can be calculated without any model specification as follow;

$$I_n(w_k) = \frac{n}{2}(a_k^2 + b_k^2), \quad (1)$$

where a_k, b_k are the Fourier coefficients and defined as

$$a_k = \frac{2}{n} \sum_{t=1}^n (Y_t - \bar{Y}) \cos(w_k t), \quad b_k = \frac{2}{n} \sum_{t=1}^n (Y_t - \bar{Y}) \sin(w_k t) \quad (2)$$

Note that when $w_k = 2\pi k/n$, the following equality appears,

$$\sum_{t=1}^n \cos(w_k t) = \sum_{t=1}^n \sin(w_k t) = 0 \quad (3)$$

and this causes the Fourier coefficients to be invariant to the mean and therefore the periodogram ordinate is invariant to the mean. Moreover, periodogram-based unit root/cointegration tests have the advantage of be-

ing seasonally robust, and model free from the selection of the lag lengths (Akdi and Dickey, 1999, s. 153-162).³

³ The periodogram-based method has certain advantages over conventional tests. Firstly, conventional tests require the estimation of too many AR parameters to account for the dynamics/seasonality of the series. Secondly, test results change with the sample size in conventional tests, while the periodogram-based method requires no parameter estimation except for variance. Thirdly, the critical values of the test statistics are free of sample size constraints. Thus, these might have considerable advantages, especially for small samples.

In order to reject the null hypothesis of a unit root, one needs to observe small values of the periodogram ordinates. Therefore, the values of the test statistics, $T(w_k)$ can be used to test for a unit root where;

$$T(w_k) = \frac{2(1 - \cos(w_k))}{s^2} I_n(w_k). \quad (4)$$

The test statistic is distributed as a mixture of chi-squares exactly for AR(1) series under the assumption of a unit root. Moreover the distribution remains the same asymptotically higher order processes. The normalized periodogram ordinate is distributed as chi-squares with two degrees of freedom asymptotically under the assumption of stationarity. The power can be calculated analytically for the periodogram method to test for a unit root (Akdi et al., 2006, s.487).

If a set of non-stationary multivariate time series has a stationary linear combination, then it is cointegrated. Briefly, if a series Y_t is non-stationary and there is a β vector (or matrix) such that $W_t = \beta Y_t$ becomes stationary, then Y_t is considered to be cointegrated and the vector β is the cointegrating vector.

We are going to examine a bivariate series with components tourism (X_t) and economic growth (Y_t) and we observe that both series are integrated of order one⁴. Thus, these non-stationary series can be written as a linear combination of stationary and non-stationary series as

$$\begin{aligned} X_t &= a_{11} U_t + a_{12} S_t, \\ Y_t &= a_{21} U_t + a_{22} S_t, \end{aligned} \quad (5)$$

where U_t and S_t represent the unit root and stationary component of these series, respectively. Since each component of the bivariate series includes the non-stationary component U_t , both components of Y_t are non-stationary. If the coefficients (a_{ij} , $i,j=1,2$) in Eq. (5) are known, then

$$Y_t - \frac{a_{21}}{a_{11}} X_t = (a_{22} - \frac{a_{21}a_{12}}{a_{11}}) S_t = c S_t \quad (6)$$

is stationary and the system is cointegrated with the cointegrating vector $\beta = ((-a_{21}/a_{11}), 1)'$. Since we do not know the coefficients, we need to estimate all the coefficients in Eq. (5). Instead, it is sufficient to estimate for our purpose. The differenced series in (6) looks like the residuals from the regression of Y on X and hence if the residual series is stationary, then the bivariate series is cointegrated. Moreover, the OLS estimator of the parameter X_t obtained from that regression is a consistent estimator for the ratio a_{21}/a_{11} (Akdi, 1998, s. 69-87).

Consider a regression of the real part of the cross periodogram ordinate of X_t and Y_t (say y_k) on the periodogram ordinate of X_t (say x_k) as

$$y_k = \alpha_0 + \alpha_1 x_k + \eta_k, \quad k=1,2,3,\dots, [n/2] \quad (7)$$

Akdi (1998) shows that the OLS estimator of the α_1 according to the model given in Eq. (7) is consistent for the ratio a_{21}/a_{11} . That is, if the differenced series

$Z_t = Y_t - \hat{\alpha}_1 X_t$ is stationary then the bivariate series is cointegrated. Moreover, Berument et al. (2005) propose a testing procedure for cointegration. They apply simple unit root testing procedure to the differenced series Z_t . However, the critical values are different and tabulated in the relevant study.

Empirical Results

In this section, we investigate the relationships between tourism receipts and economic growth. The monthly data is used and obtained from data base of the Central Bank of the Republic of Turkey, TUIK (Turkish Statistical Institution) and the Ministry of Tourism and Culture. The data consists of tourism receipts (TL-Million) and the GDP (Gross Domestic Product is measured in 1998 local currency units (TL-Thousand)) as a proxy for economic growth over the period of January 1999 and December 2010 for Turkey. Furthermore, all variables are transformed into natural logarithms and seasonally adjusted using Census-X12 method. The time series plots and their identification plots are given in Figure 1. In addition, first differenced series and their identification plots are given Figure 2.

4 See (Akdi et al., 2006, s.483-492) for information about the testing for unit roots when the macroeconomic series are integrated of order two.

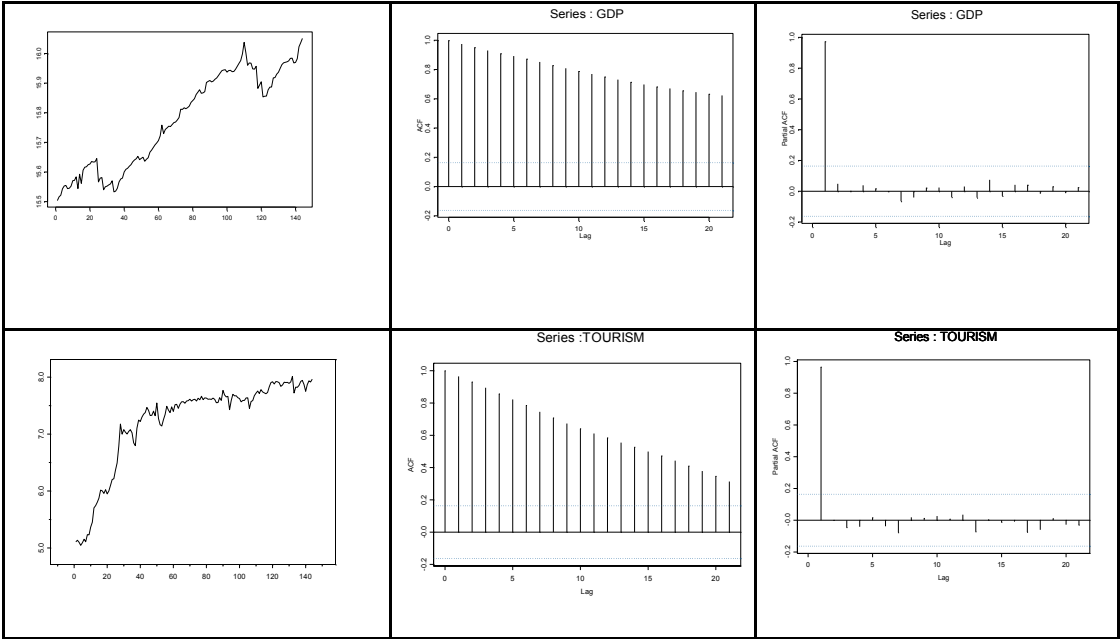


Figure 1. The Log-Transformed Seasonally Adjusted Series and Their Identification Plots

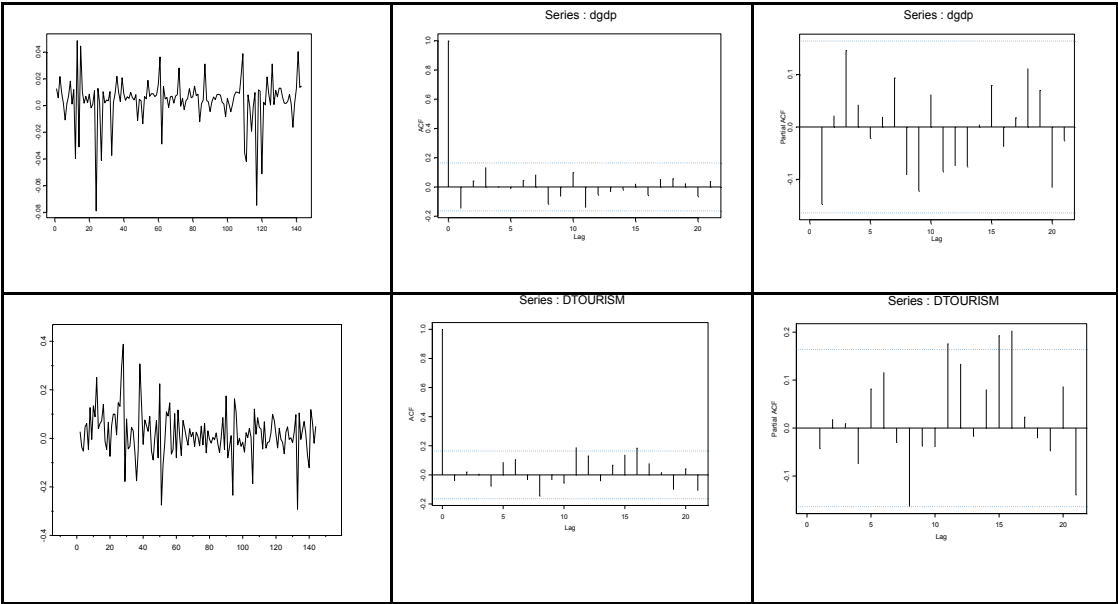


Figure 2. First Differences and Their Identification Plots

The identification plots and the values of AIC and SBC indicate that the tourism and economic growth series can be model as AR(1).

Models for X and Y are⁵,

$$X_t = \alpha_0 + \alpha_1 X_{t-1} + e_t, \quad t = 1, 2, \dots, 144.$$

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + e_t, \quad t = 1, 2, \dots, 144.$$

Table 1. The Results of Unit Root Tests⁶

	$\hat{\tau}_\mu$	Critical Value	Conclusions
X_t	-2.987076	-2,88	Stationary
Y_t	-0,581917	-2,88	Unit Root
∇X_t	-12.34266	-2,88	Stationary
∇Y_t	-13,72110	-2,88	Stationary

The stationarity of the series has been checked with standard ADF method and the periodogram based unit root test, and the results have been presented in Table 1 and 2 respectively.

As shown in Table 1, Tourism series is stationary while economic growth series is I(1). However, Table 2 indicates that both series are I(1). By using the advantages of the periodogram based unit root testing method we assumed that both series are of I(1). Therefore, it is possible to check whether these series are cointegrated or not. For the cointegration analysis, we apply three different methods as Johansen's method, periodogram method and the Engle Granger's method. Based on the Johansen's method, we find that bivariate time series are cointegrated at %5 level. Johansen's Trace Statistic and $\lambda_{\max}$ methods reject the null of no cointegration hypothesis. The results for the Johansen's method have been tabulated in Table 3.

Table 2. The Results of the Periodogram-based Unit Root Test

	$I_n(w)$	$\hat{\sigma}^2$	$T_n(w)$	Conclusions
X_t	38,0908	0,009494	7,637245	Unit Root
Y_t	2,92557	0,000326	17,08279	Unit Root

Table 3. The Johansen Cointegration Test Results

<i>Hypothesis</i>					
H_0	H_1	Eigenvalue	Trace Stat.	5% Critical	p value
$r=0$	$r>0^*$	0,136475	25,53352	20,26184	0,0085
$r=1$	$r>1$	0,032540	4,697582	9,164546	0,3182
<i>Hypothesis</i>					
H_0	H_1	Eigenvalue	Max.Eigen Value Stat.	5% Critical	p value
$r=0$	$r>0^*$	0,136475	20,83593	15,89210	0,0077
$r=1$	$r>1$	0,032540	4,697582	9,164546	0,3182

5 Y and X show seasonally adjusted and logarithmic transformed economic growth and tourism series respectively.

6 ∇X_t , ∇Y_t series refer first differenced log-transformed seasonally adjusted tourism and GDP series respectively.

Let y_k be the real part of the cross periodogram ordinate of tourism and economic growth and x_k be the periodogram ordinate of tourism and consider the model given in (7),

$$y_k = \alpha_0 + \alpha_1 x_k + \eta_k, \quad k=1,2,3,\dots, [n/2].$$

The OLS estimator of α_1 is a consistent estimator for the ratio a_{21}/a_{11} and is calculated as $\hat{\alpha}_1=0,17950$. Here, $[n/2]$ denotes the integer part of $n/2$. If the series $Z_t = Y_t - 0,17950X_t$ is stationary, then these two series are cointegrated. If Z_t is stationary, we will conclude that the tourism and economic growth series are cointegrated. In order to check whether these series are cointegrated, we regress ∇Z_t on Z_{t-1} and calculate the value of the usual t-statistics. The value of the periodogram-based test is -1,21 which is greater than 5% critical value -3,43564 (the critical values for the test statistic τ_a has been given in Berument et al. (2005). Therefore, we fail to reject the null hypothesis of no-cointegration. Accordingly, we can say that there is no cointegration relationship between tourism and economic growth.

Furthermore, in order to test whether the series tourism and economic growth are cointegrated or not implemented the Engle and Granger approach. That is we regressed economic growth on tourism and obtained the residual series, r_t . If the residual series r_t stationary, the time series of tourism and economic growth are cointegrated. Therefore, we calculated usual t statistic from the regression of ∇r_t on r_{t-1} . Statistic value is -0,898487 which is greater than 5% critical value -3.17 and which implies to accept the null of no cointegration.

As shown in Figure 1, we need to investigate the period of January 2003 and December 2010 because of possible structural break effects on two time series of the economic crises in November 2000 and February 2001 in Turkey. Results are presented in the following part of the study. The time series plots and their identification plots are given in Figure 3. In addition, first differenced series and their identification plots are given Figure 4.

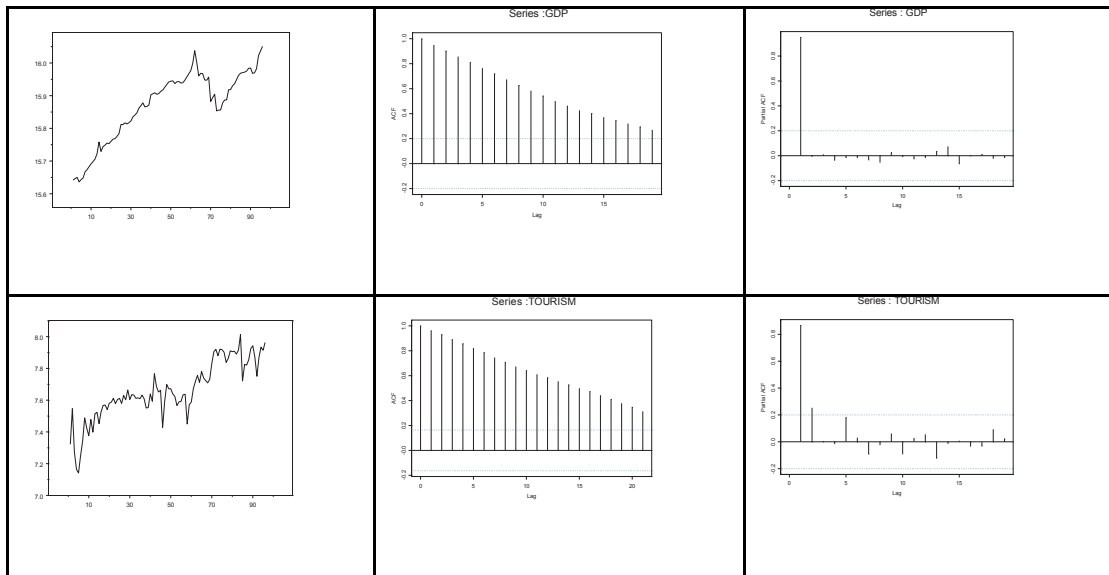


Figure 3. The Log-Transformed Seasonally Adjusted Series and Their Identification Plots

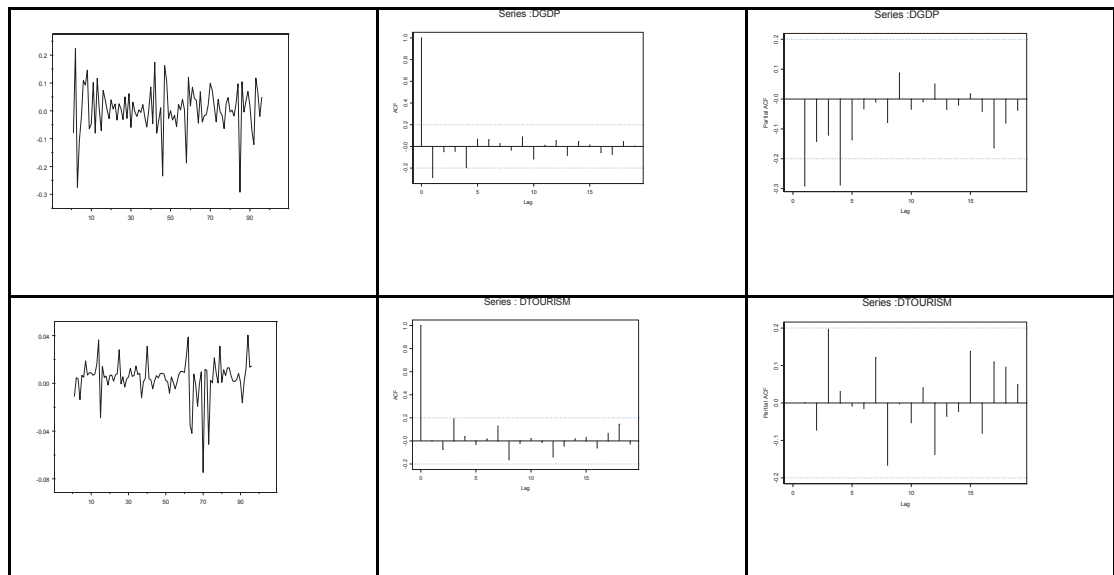


Figure 4. First Differences and Their Identification Plots

The identification plots and the values of AIC and SBC indicate that the tourism and economic growth series can be modelled as AR(1).

Models for X and Y are,

$$X_t = \alpha_0 + \alpha_1 X_{t-1} + e_t, \quad t = 1, 2, \dots, 96.$$

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + e_t, \quad t = 1, 2, \dots, 96.$$

Table 4. The Results of Unit Root Tests

	$\hat{\tau}_\mu$	Critical Value	Conclusions	$\hat{\tau}_\tau$	Critical Value	Conclusions
X_t	-1,385807	-2,89	Unit Root	-4,96961	-3,46	Stationary
Y_t	-1,306254	-2,89	Unit Root	-1,75389	-3,46	Unit Root
∇X_t	-9,661754	-2,89	Stationary	-9,63699	-3,46	Stationary
∇Y_t	-13,08373	-2,89	Stationary	-13,01345	-3,46	Stationary

Table 5. The Results of the Periodogram-based Unit Root Test

	$I_n(w)$	$\hat{\sigma}^2$	$T_n(w)$	Conclusions
X_t	1,12427	0,006893	0,310476	Stationary
Y_t	0,57568	0,000281	3,899785	Unit Root

The stationarity of the series have been checked with standard ADF test and the periodogram based unit root test, and the results have been presented in Table 4 and 5 respectively.

According to the results in Table 4 and 5, it is shown that series have different levels of integration. Therefore, there is no need to check whether these series are cointegrated or not.

Conclusions

In order to indicate advantages over conventional test of periodogram based method, this study examines whether there is any cointegration relationship between tourism and economic growth during the period 1999:01-2010:12 for Turkey by using three different cointegration methods as Periodogram based cointegration method, Johansen Method and Engle Granger Test. Firstly, we have checked whether tourism and economic growth series are stationary through Augmented Dickey Fuller(ADF) and periodogram-based unit root tests, and the results of ADF test have showed that tourism series are stationary while periodogram-based test indicates that both series are $I(1)$. Afterwards, we have applied different cointegration methods to check whether these series are cointegrated or not. According to periodogram-based cointegration test and Engle-Granger method, we obtained that tourism and economic growth are not cointegrated. In contrast, Johansen Test result has indicated a cointegration relationship. Consequently, periodograms can be calculated without any model specifications, critical values are free of the sample size and invariant to the mean. Therefore we prefer to use periodogram-based cointegration method. Furthermore, because of possible structural break effects on two time series of the economic crises in November 2000 and February 2001 in Turkey, we have investigated the period of January 2003 and December 2010 for Turkey also. We have checked whether tourism and economic growth series are stationary through ADF and periodogram based unit root tests for this period, and results have indicated that series have different levels of integration. Therefore, there is no need to check whether these series are cointegrated or not for this period. Moreover, it can be said that there is no long-run relationship between tourism and economic growth during the period 1999:01-2010:12 for Turkey. The findings of Engle-Granger Method and periodogram-based tests have supported Tosun (1999, s.217-250), Değer (2006,

pp.67-86), Çil-Yavuz (2006, pp.162-171), Öztürk and Acaravcı (2009, pp.73-81) and Hepaktan and Çınar (2010, pp.135-154) for Turkey, and Oh (2005, pp. 39-44), Lee (2008, pp.180-192) and Ghosh (2011, pp.347-355) for different countries.

Finally, periodogram-based method can be preferred because of advantages over conventional test. In addition, this method can be used to decide one of the conventional cointegration tests which indicate results of different co-integration relationships.

References

- Akan, Y., Işık C. (2009). Yabancı Ziyaretçi Harcamalarının Ekonomik Büyümeye Etkisi (1970-2007). *Anatolia: Turizm Araştırmaları Dergisi*, 20(2), 197-203.
- Akdi, Y., Dickey, D. A. (1998). Periodograms of Unit Root Time Series: Distributions and Tests. *Communications in Statistics: Theory and Methods*, 27, 69-87.
- Akdi, Y., Dickey, D. A. (1999). Periodograms for Seasonal Time Series with a Unit Root. *Journal of Turkish Statistical Association*, 2(3), 153-162.
- Akdi, Y., Berument, H., Cilasun, M. (2006). The Relationship Between Different Price Indices: Evidence from Turkey. *Physica A*, Vol. 360, 483-492.
- Akdi, Y., Metin Özcan K., Yalçın, Y. (2003). Robustness of Unit Root Tests When the Series are $I(2)$. *METU Studies in Development*, Vol. 30(1), 19-34.
- Aslan, A. (2008). Türkiye’ de Ekonomik Büyüme ve Turizm İlişkisi Üzerine Ekonometrik Analiz. *MPRA Paper No 106*, 11, 1-11.
- Aykaç, A. E. (2010). Türkiye’ de Turizm Gelirleri ile Büyüme Arasındaki İlişkinin Analizi. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, 28, 13-22.
- Bahar, O. (2006). Turizm Sektörünün Türkiye’nin Ekonomik Büyümesi Üzerindeki Etkisi: VAR Analizi Yaklaşımı. *Celal Bayar Üniversitesi İ.İ.B.F. Yönetim ve Ekonomi*, 13(2), 137-150.
- Balaguer J, Cantavella-Jorda, M. (2002). Tourism as a Long-Run Economic Growth Factor: the Spanish Case. *Applied Economics*, 34, 877-884.

- Berument, H., Akdi, Y., Atakan, C. (2005). An Empirical Analysis of Istanbul Stock Exchange Sub-Indexes. *Studies in Nonlinear Dynamics & Econometrics*, 9(3), 5, 1-12.
- Brau, R., Lanza, A., Pigliaru, F. (2003). How Fast are The Tourism Countries Growing? The Cross-Country Evidence. *CRENoS Centro Ricerche Economiche Nord Sud Working Paper*, 03-09, 1-21.
- Brida, J. G., Carrera, E. S., Risso, W. A. (2007). Tourism's Impact on Long-Run Mexican Economic Growth. *Economics Bulletin*, 3(21), 1-8.
- Brida, J. G., Pulina, M. (2010). A Literature Review on the Tourism-Led Growth Hypothesis. *CRENoS Working Papers*, 17, 1-27.
- Chaiboonsri, C., Sriboonjit, J., Sriwichailamphan, T., Chaitip, P., Sriboonchitta, S. (2010). A Panel Co-integration Analysis: An Application to International Tourism Demand of Thailand. *Annals of the University of Petroşani Economics*, 10, 3, 69-86.
- Chambers, M. J. (2001). Temporal Aggregation and the Finite Sample Performance of Spectral Regression Estimators in the Cointegrated System: A Simulation Study. *Econometric Theory*, 17-3, 591-607.
- Chen, W. W., Hurvich, C. M. (2003). Estimating Fractional Cointegration in the Presence of Polynomial Trends. *Journal of Econometrics*, 117, 95-121.
- Cortes-Jimenez, I., Pulina, M., Prunera, C.R., Artis, M. (2009). Tourism and Exports as a Means of Growth. *Research Institute of Applied Economics Working Paper*, 10, 1-28.
- Çetintaş, H., Bektaş, Ç. (2008). Türkiye'de Turizm ve Ekonomik Büyüme Arasındaki Kısa ve Uzun Dönemli İlişkiler. *Anatolia:Turizm Araştırmaları Dergisi*, 19(1), 1-6.
- Çil-Yavuz N. (2006). Türkiye' de Turizm Gelirlerinin Ekonomik Büyümeye Etkisinin Testi:Yapısal Kırılma ve Nedensellik Analizi. *Doğuş Üniversitesi Dergisi*, 7- 2, 162-171.
- Değer, M. K. (2006). Turizme ve İhracata Dayalı Büyüme:1980-2005 Türkiye Deneyimi. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 20- 2, 67-86.
- Deo, R. S., Hurvich, C. M. (2001). On the log Periodogram Regression Estimators of the memory Parameters in the Long Memory Volatility Models. *Econometric Theory*, 17-4, 686-710.
- Dickey, D. A., Hasza, D. P., Fuller, W. A. (1984). Testing For Unit Roots in Seasonal Time Series. *Journal of American Statistical Association*, 79, 355-367.
- Dickey, D. A., Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74, 427-431.
- Dickey, D. A., Pantula, S. G. (1987). Determining the order of Differencing in Autoregressive Processes. *Journal of Business and Economics Statistics*, 5, 455-461.
- Dritsakis, N. (2004). Tourism as a Long-run Economic Growth Factor: An Empirical Investigation for Greece Using Causality Analysis. *Tourism Economics*, 10-3, 305-316.
- Dritsakis, N. (2011). Tourism Development and Economic Growth in Seven Mediterranean Countries: A Panel Data Approach. *Tourism Economics*, 2-2, 1-29.
- Engle, R. F., Granger C. W. J. (1987). Cointegration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55, 251-276.
- Ghartey, E. E. (2010). Tourism, Economic Growth and Monetary Policy in Jamaica. *11 th Annual SALISES Conference in Port of Spain Trinidad-Tobago*, 24-26 March, 1-25.
- Ghosh, S. (2011). Examining Tourism-Led Growth Hypothesis for India. *International Journal of Indian Culture and Business Management*, 4- 3, 347-355.
- Gökdemir, L., Durdu, K. (2007). Economic Significance of Tourism in the Economic Growth of Turkey. *Revista Tinerilor Economisti (The Young Economists Journal)*, 1- 7, 169-176.
- Gündüz, L., Hatemi-J, A. (2005). Is the Tourism-Led Growth Hypothesis Valid for Turkey?. *Applied Economics Letters*, 12-8, 499-504.
- Hepaktan, E., Çınar, S. (2010). Turizm Sektörünün Türkiye Ekonomisi Üzerindeki Etkileri. *Sosyal Bilimler*, 8-2, 135-154.
- Hylleberg, S., Engle, R.F., Granger, C.W.J., Yoo, B.S. (1990). Seasonal Integration and Cointegration. *Journal of Econometrics*, 99, 215-238.

- Jimenez, I. C., Pulina, M. (2006). Tourism and Growth: Evidence for Spain and Italy. *46th Congress of the European Regional Science Association University of Thessaly (Volos, Greece) 30 August-3 September*, 1-24.
- Johansen, S. (1988). Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control*, 12, 231-254.
- Kaplan, M., Çelik, T. (2008). The Impact of Tourism on Economic Performance: The Case of Turkey. *The International Journal of Applied Economics and Finance*, 2-1, 13-18.
- Kasman, A., Kırbas-Kasman S. (2004). Turizm Gelirleri ve Ekonomik Büyüme Arasındaki Eşbütünleşme ve Nedensellik İlişkisi. *İktisat İşletme ve Finans Dergisi*, 220, 122-131.
- Kızılgöl, Ö., Erbaykal, E. (2008). Türkiye’ de Turizm Gelirleri ile Ekonomik Büyüme İlişkisi: Bir Nedensellik Analizi. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 13-2, 351-360.
- Kızılgöl, Ö. (2006). Türkiye’ de İhracata ve Turizme Dayalı Büyüme Hipotezinin Analizi: Eşbütünleşme ve Nedensellik İlişkisi. *İktisat ve Girişimcilik Üniversitesi Türk Dünyası Kırgız Türk Sosyal Bilimler Enstitüsü Akademik Bakış*, 10, 1-19.
- Kreishan, F. M. (2011). Time-series Evidence for Tourism-Led Growth Hypothesis: A Case Study of Jordan. *International Management Review*, 7-1, 89-93.
- Lee, C. G. (2008). Tourism and Economic Growth: The Case of Singapore. *Regional and Sectoral Economic Studies. Euro-American Association of Economic Development*, 8-1, 89-98.
- Lee, C., Chang, C.P. (2008). Tourism Development and Economic Growth: A Closer Look at Panels. *Tourism Management*, 29, 180-192.
- Levy, D. (2002). Cointegration in Frequency Domain. *Journal of Time Series Analysis*, 23-3, p. 333-339.
- Marunici, D. (2000). Spectral regression For Cointegrated Time Series With Long-Memory Innovations. *Journal of Time Series Analysis*, 21-6, 685-705.
- Mello-Sampayo, F., Sousa-Vale, S. (2010). Tourism and Growth in European Countries: An Application of Likelihood Based Panel Cointegration. *ISCTE Economics Research Center, Working Paper-05*, 1-20.
- Oh, C. (2005). The Contribution of Tourism Development to Economic Growth in the Korean Economy. *Tourism Management*, 26-1, 39-44.
- Özdemir, A. R., Öksüzler, O. (2006). Türkiye’ de Turizm Bir Ekonomik Büyüme Politikası Aracı Olabilir mi? Bir Granger Nedensellik Analizi». *Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 16, 107-126.
- Öztürk, İ., Acaravcı, A. (2009). On the Causality Between Tourism Growth: Empirical Evidence from Turkey. *Transylvanian Review of Administrative Sciences*, 25E, 73-81.
- Savaş, B., Beşkaya, A., Şamiloğlu, F. (2010). Analyzing the Impact of International Tourism on Economic Growth in Turkey. *ZKÜ Sosyal Bilimler Dergisi*, 6-12, 121-136.
- Seetanah, B., Padachi, K., Rojid, S. (2011). Tourism and Economic Growth: African Evidence from Panel Vector Autoregressive Framework. *UNU-WIDER World Institute for Development Economics Research*, 33, 1-22.
- Telatar, E. (1996). Enflasyon Belirsizliğinin Endüstriyel Üretim Üzerindeki Etkisi: Türkiye Örneği. *İktisat-İşletme ve Finans*, 11-125, 52-63.
- Tosun, C. (1999). An Analysis of Contributions International Inbound Tourism to the Turkish Economy. *Tourism Economics*, 5, 217-250.
- Tosun, C., Timothy, D.J., Öztürk, Y. (2003). Tourism Growth, National Development and Regional Inequality in Turkey. *Journal of Sustainable Tourism*, 11- 2&3, 133-161.
- Yıldırım, J., Öcal, N., Erdoğan, M. (2007). Financial Development and Economic Growth in Turkey: A Spatial Effect Analysis. *47th Congress of the European Regional Science Association in Paris*, 1-38.
- Zortuk, M. (2009). Economic Impact of Tourism on Turkey’s Economy: Evidence from Cointegration Tests. *International Research Journal of Finance and Economics*, 25, 231-239.