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# The Tourism Growth Nexus in European and Asian Countries: A Panel Data Analysis

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**Abstract**

Tourism is considered as one of the strongest determinants of economic growth and it has its multifaceted impacts on the economy of the host country. This paper aims to identify the tourism led growth hypothesis for a panel of Asian and European countries. The results of the panel unit root tests indicate that both variables are stationary at their levels. The Pedroni cointegration approach has been utilized to check the relationship among tourism growth and economic growth. The results depict that long run relationship exists among the variables. In this study we found that we have bi-directional causality among tourism growth and economic growth in the case of overall analysis while, we found uni-directional causality in the case of Asian countries. Finally, in the case of European countries we found that there is a bi-directional causality between tourism and economic growth.

***Keywords:*** Economic growth; Tourism growth; Cointegration; Panel Causality.

## 1. Introduction

Tourism activities and travelling is the largest growing sector of the global economy. Many countries are benefited from rising demand by developing many vibrant hospitality sectors which they generate foreign currency for the local economies [1, 2, 3].

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The considerable volumes of foreign currency inflows, the high development rates and growth, the infrastructure development and the new added management experience are positively contribute to the social – economic development of the countries as a whole [4, 5]. Tourism sector requires only basic labor skills and relatively low levels of technology. The countries that have the suitable natural resource endowments can develop successfully the tourist sectors. The tourists usually demand main types of goods and services such as accommodation, food entertainment and transportation [6, 7, 8]. All these services are labor intensive so we have the creation of jobs that are primarily low – skilled. But with the development of tourism we can have a foster of the overall growth with the increase in production, employment and income. In this study we used annual panel data related to eight European and Asian countries covering the period from 1995-2011. These eight countries are Turkey, Greece, Italy, France, Pakistan, India, China, and Maldives. The objective of this paper is to analyze the relationship between tourism and economic growth between the above countries.

## 2. Literature Review

Tourism has flourished worldwide in the last three decades and upstaged many traditional industries. Nowadays, it becomes as one of the world's largest and fastest growing economic activities. Tourism as an activity is multidisciplinary and compromises many industries and its benefits are spreading over a wider section of society comparatively to the other sectors of the economy [9]. Two innovative studies [10, 11] have highlighted the potential effect of the tourism development in promoting growth through the creation of jobs and the generation of revenue for the government. That economic relationship is known as “Tourism Led-Growth hypothesis”. According to that hypothesis one of the most important factors for economic growth is international tourism [12]. The tourist expenditure, is an alternative form of exports, and can provide the foreign exchange earnings.

The authors of [13] investigated the relationship between tourism and economic growth for Latin American countries from 1985 until 1998. Their study was based on a panel data approach using the Arellano – Bond estimator. Their results have indicated that tourism sector can be conductive to economic growth in medium or low income countries. Having this in mind the differences in the degree of economic development in various regions is determining whether tourism development and the growth relationship differ for developed and developing economies. The author of [14] using data for the period 1980 to 2007 for 7 Mediterranean Countries found solid evidence of panel cointegration relations between tourism development and GDP. His study also indicated that tourist receipts have a higher impact on GDP in all Mediterranean countries. The empirical results of the research of [15] indicated a long-run equilibrium relationship and bidirectional causality between tourism expansion and economic development in Taiwan using Granger causality test and cointegration approach. The author in [16] examined the relationship between tourism and economic growth for African countries using the GMM approach for the period 1995-2004, and their findings confirmed the Tourism-led growth hypothesis.

In a recent work [17] the author empirically investigated the causal relationships among real GDP, tourism development and the real exchange rate using the unit root and the cointegration tests. The results indicated that there is a bi-directional causality between tourism and economic growth. Also the study found structural breakpoints which are corresponding to critical economic, political or tourist incidents. They also used heterogeneous panel cointegration techniques to examine the long-run relationship between tourism development and economic growth for OECD and non-OECD countries, including countries in Asia, Latin America and sub-Saharan Africa for the period from 1990 to 2002. Their results indicated that tourism has a greater impact on GDP in non-OECD countries than in OECD countries. In one other research [18] they authors have tried to investigate the long-run relationship between GDP and tourism exports using panel data for the Pacific Island countries. Their results suggest that if we will have an increase of 1% in tourism exports then we will have and an increase to GDP by 0.72% in the long run and by 0.24% in the short run.

Over the recent years in the literature there have been many studies models that are focusing on the relationship between tourism development and economic growth in various countries, such as Spanish and Italian regions [19], Nicaragua [20], Latin American [21], East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa. As a conclusion from all the above studies, it seems that we have clear consensus that tourism is promoting economic growth. It is also clear that the role of tourism in economic growth is larger for smaller developing countries than for the developed countries. Apart from the unidirectional hypotheses, several scholars found that the causal relationship between tourism and the economy runs in both directions. For instance, [22] in South Korea and [23] in Aruba support the bidirectional hypothesis, according to which there are mutual influences across the tourism-economy nexus. At the same time, there are occasions in which all the aforementioned propositions are rejected, as in the case of [24] in Turkey where no causal links between the two factors can be established. Furthermore, [25] find that the tourism-economic growth relationship is not stable over time but rather responsive to major economic events. According to [26, 27] they argue that tourism has not only direct positive contribution to the development of tourism-related industries but also indirect but significant impact on the development of other industries. The author of [28] provide empirical evidence that apart from contributing to the per capita GDP growth, tourism industry also contributes to the investment in infrastructural and human capital development of the Latin American countries. However, in a recent study [29], they authors after analyzing 117 countries have concluded that the tourism growth of a country does not automatically result in economic development, unless conditions are favorable for encouraging this process. And so, “not all types of interventions in the pursuit of tourism growth are equally effective in promoting a country’s economic development. These results support those obtained by [30], who concluded that high-performance countries have well-established tourism industries.

From the above literature review, it is evident that tourism can play an important role in stimulating larger growth and development, reducing regional asymmetries, creating employment and positive impacts that affect (directly or indirectly) other economic activities. This paper will focus on the impact of tourism on regional development.

## 3. Methodology and Data

In this study we used annual panel data of eight European and Asia countries. The countries are: Turkey, Greece, Italy, France, Pakistan, India, China, and Maldives, and the estimation period is from 1995 to 2011. All the data have been obtained from World Bank resources. The variable of GDP has been used as the proxy of economic growth while tourism receipts are used as a proxy of tourism growth. One of the key problems in assessing the scale, importance and hence impacts of tourism is the inconsistency and incomparability of the collected data.

The panel data studies, until very recently, have ignored the crucial stationarity (ADF and Phillips-Perron) and cointegration (Engle-Granger and Johansen) tests. However, with the growing involvement of macroeconomic applications in the panel data tradition, where a large sample of countries constitute the cross-sectional dimension providing data over lengthy time series, the issues of stationarity and cointegration have emerged in panel data as well. This was mainly due to the fact that the macro panels have both large N and T compared to micro panels which have large N but small T. Consider, for example, the Penn World Tables data where all the data are available for a large set of countries and at least some of the variables are expected to have unit roots. This has brought a new set of problems in panel data analyses that were previously ignored.

### *3.1 Panel Unit Root*

Although the relative literature on time-series studies successfully answer many stationarity issues, the adoption and adjustment of similar tests on panel data is yet in progress. This is mainly due to the complexity of considering relatively large T and N samples in the later studies. We can summarize the major differences between time-series and panel unit-root tests as follows:

1. Panel data allows us to test the various approaches with different degrees of heterogeneity between individuals.
2. In the panel data analysis, so far, one cannot be sure about the validity of rejecting a unit root.
3. The power of panel unit-root tests increases with an increase in N. This power increase is much more robust than in the size of the one observed in the standard low-power DF and ADF tests applied for small samples.
4. The additional cross-sectional components incorporated in panel data models provide better properties of panel unit-root tests, compared with the low-power standard ADF for time-series samples.

Both DF and ADF unit-root tests are extended to panel data estimations, to consider cases that possibly exhibit the presence of unit roots. Most of the panel unit-root tests are based on an extension of the ADF test by incorporating it as a component in regression equations. However, when dealing with panel data, the estimation procedure is more complex than that used in time series. The crucial factor in panel data estimation appears to be the degree of heterogeneity. In particular, it is important to realize that all the individuals in a panel may not have the same property, that is to say they may not all be stationary or non-stationary (or cointegrated or not cointegrated). So if we carry out a panel unit root test where some of the panel data have a unit root and some do not, the situation becomes quite complex.

A second issue has to do with the formulation of the null hypothesis; one may form the null as a generalization of the standard DF test (i.e. that all series in the panel are assumed to be non-stationary) and reject the null if some of the series in the panel appear to be stationary, while on the other hand one can formulate the null hypothesis in exactly the opposite way, presuming that all the series in the panel are stationary processes, and rejecting it when there is sufficient evidence of non-stationarity.

Another important theoretical consideration in the development of the panel unit- roots literature has to do with the asymptotic behavior of a panel's N and T dimensions. Various assumptions can be made regarding the rates at which these parameters tend to infinity. One may fix, for example, N and let T go to infinity and after that let N tend to infinity. Alternatively, one may allow the two indices to tend to infinity at a controlled rate, i.e. as T = T(N), while a third possibility is to allow both N and T to tend to infinity simultaneously .

### *3.1.1 The LL test*

One of the first panel unit-root tests was that developed by Levin and Lin [31]. (The test was originally presented in a working paper by Levin and Lin in 1992. Their work was finally published in 2002 with Chu as co-author [32] but the test is still abbreviated as LL by the initials of the first two authors.) Levin and Lin adopted a test that can actually be seen as an extension of the DF test. Their model takes the following form:

$$\Delta Y_{it} = a_i + \rho Y_{i,t-1} + \sum_{i=0}^{n} \emptyset_k \Delta Y_{i,t-k} + \delta_{it} + \theta_t + u_{it}$$

This model allows for two-way fixed effects, one coming from the $a_i$ and the second from the $\theta_t$. So we have both unit-specific fixed effects and unit-specific time trends. The unit-specific fixed effects are a very important component because they allow for heterogeneity since the coefficient of the lagged $Y_i$ is restricted to be homogeneous across all units of the panel. The null hypothesis of this test is that:

$$H_0: \rho = 0$$

$$H_0: \rho < 0$$

Like most of the unit root tests in the literature, the LL test also assumes that the individual processes are cross-sectionally independent. Under this assumption, the test derives conditions for which the pooled OLS estimator of ρ will follow a standard normal distribution under the null hypothesis. Thus, the LL test may be viewed as a pooled DF or ADF test, potentially with different lag lengths across the different sections in the panel.

### *3.1.2 The Im, Pesaran and Shin (IPS) test*

The major drawback of the LL test is that it restricts $\rho$ to be homogeneous across all i. The authors of [33] the LL test allowing heterogeneity on the coefficient of the $Y_{i,t-1}$ variable and proposing as a basic testing procedure one based on the average of the individual unit root test statistics.

The IPS test provides separate estimations for each i section, allowing different specifications of the parametric values, the residual variance and the lag lengths. Their model is given by:

$$\Delta Y_{it} = a_i + \rho Y_{i,t-1} + \sum_{i=0}^{n} \emptyset_k \Delta Y_{i,t-k} + \delta_{it} + u_{it}$$

The null and alternative hypotheses are:

$H_0$: $\rho_i = 0$ for all i

$H_0$: $\rho < 0$ for at least one i

Thus, the null of this test is that all series are non-stationary processes, under the alternative that a fraction of the series in the panel are assumed to be stationary. This is in sharp contrast with the LL test, which presumes that all series are stationary under the alternative hypothesis. The authors of [33] formulated their model under the restrictive assumption that T should be the same for all cross-sections, requiring a balanced panel to compute the t-test statistic. Their t-statistic is nothing else than the average of the individual ADF t-statistics for testing that $\rho_i = 0$ for all i (denoted by $t\rho_i$).

$$\bar{t} = \frac{1}{N} \sum_{i=1}^{N} t_{\rho i}$$

They also showed that under specific assumptions $t\rho_i$; converges to a statistic denoted as $t\rho_{iT}$ which they assume that is iid and that also has finite mean and variance. They then computed values for the mean $(E[t_{iT}|\rho_i = 1])$ and for the variance $(Var[t_{iT}|\rho_i = 1])$ of the $t_{iT}$ statistic for different values of N and lags included in the augmentation term of equation (20.1). Based on those values, they then constructed the IPS statistic for testing for unit roots in panels given by:

$$t_{IPS} = \frac{\sqrt{N}\left(\bar{t} - 1/N \sum_{i=1}^{N} E[t_{iT}|\rho_i = 0]\right)}{\sqrt{Var}[t_{iT}|\rho_i = 0]}$$

Which they have proved follows the standard normal distribution as T→∞ followed by N→∞ subsequently. The values of $E[t_{iT}|\rho_i = 0]$ and $Var[t_{iT}|\rho_i = 1]$ are given in their paper. Finally, they also suggested a group mean Lagrange multiplier test for testing for panel unit root.

## 4. Panel Cointegration Tests

The motivation towards testing for cointegration is primarily linked with the provision of investigating the problem of spurious regressions, which exists only in the presence of non-stationarity. The cointegration test among two variables is a formal way of investigating between:

1. A simple spurious regression where both Xit and Yit are integrated of the same order and the residuals of regressing Yit to Xit (i.e. the Uit sequence of this panel data model) contains a stochastic trend; or
2. The special case in which, again, both Xit and Yit are integrated of the same order, but this time the Uit

sequence is stationary.

Normally in the first case we apply first differences to re-estimate the regression equation, while in the second case we conclude that the variables Xit and Yit are cointegrated. Thus, in order to test for cointegration it is important to ensure that the regression variables are a priori integrated of the same order.

There are different possible tests for cointegration in panels, and the best-known cointegration tests are based on the Engle and Granger cointegration relationship. In the time series framework the remarkable outcome of the Engle-Granger procedure is that if a set of variables are cointegrated, then there always exists an error-correcting formulation of the dynamic model, and vice versa. Their analysis consists of a standard ADF test on the residuals Ut under the null H0: the variables are not cointegrated, versus the alternative Ha: the variables are cointegrated. If we observe that the ADF statistic is less than the appropriate critical value, we reject the null that there are no cointegrating relationships between the variables and we continue with the estimation of the ECM. The Engle-Granger procedure can also be used for the estimation of either heterogeneous or homogeneous panels, under the hypothesis of a single cointegrating vector, as we will show below.

### *4.1 The Pedroni Test*

The author of [34] proposed several tests for cointegration in panel data models that allow considerable heterogeneity. Pedroni's approach differs from that of McCoskey and Kao presented above in assuming trends for the cross-sections and in considering as the null hypothesis that no cointegration. The good features of Pedroni's test are the fact they allow for multiple regressors, for the cointegration vector to vary across different sections of the panel, and also for heterogeneity in the errors across cross-sectional units.

The panel regression model that Pedroni proposes has the following form:

$$Y_{it} = a_i + \delta_t + \sum_{m=1}^{M} \beta_{mi} X_{mi,t} + u_{i,t}$$

Seven different cointegration statistics are proposed to capture the within and between effects in his panel, and his tests can be classified into two categories. The first category includes four tests based on pooling along the 'within' dimension (pooling the AR coefficients across different sections of the panel for the unit-root test on the residuals). These tests are quite similar to those discussed above, and involve calculating the average test statistics for cointegration in the time series framework across the different sections. The test statistics of these tests are given below:

The panel v statistic:

$$T^2 N^{3/2} Z_{NT} = \frac{T^2 N^{3/2}}{\sum_{i=1}^{N} \sum_{t=1}^{T} L_{1t}^{-2}\, u_{it}^2}$$

The panel ρ statistic:

$$T\sqrt{N}Z_{\hat{\rho}NT} = \frac{T\sqrt{N}(\sum_{i=1}^{N}\sum_{t=1}^{T} L_{11t}^{-2}(\hat{u}_{it-1}^{2}\Delta\hat{u}_{it}^{2} - \hat{\lambda}_i))}{\sum_{i=1}^{N}\sum_{t=1}^{T} L_{1t}^{-2} u_{it}^{2}}$$

The panel t statistic (non-parametric):

$$Z_{tNT} = \sqrt{\overline{\sigma}_{NT}^{2}\sum_{i=1}^{N}\sum_{t=1}^{T} L_{1t}^{-2} u_{it}^{2}}\ (\sum_{i=1}^{N}\sum_{t=1}^{T} L_{11t}^{-2}(\hat{u}_{it-1}^{2}\Delta\hat{u}_{it}^{2} - \hat{\lambda}_i)$$

The panel t statistic (parametric):

$$Z_{tNT} = \sqrt{\overline{\sigma}_{NT}^{*2}\sum_{i=1}^{N}\sum_{t=1}^{T} L_{1t}^{-2} u_{it}^{*2}}\ (\sum_{i=1}^{N}\sum_{t=1}^{T} L_{11t}^{-2}(\hat{u}_{it-1}^{*2}\Delta\hat{u}_{it}^{*2} - \hat{\lambda}_i)$$

The second category includes three tests based on pooling the between dimension (averaging the AR coefficients for each member of the panel for the unit root test on the residual). So, for these tests the averaging is done in pieces and therefore the limiting distributions are based on piece wise numerator and denominator terms. These tests are given below:

The panel ρ statistic:

$$T\sqrt{N}Z_{\hat{\rho}NT} = T\sqrt{N}\frac{\sum_{t=1}^{T}\widehat{(u}_{it-1}^{2}\Delta\hat{u}_{it}^{2} - \hat{\lambda}_i)}{\sum_{i=1}^{N}(\sum_{t=1}^{T} u_{it}^{2})}$$

The panel t statistic (non-parametric):

$$\sqrt{N}\breve{Z}_{tNT-1} = \sqrt{N}\sum_{i=1}^{N}\left(\sqrt{\breve{\sigma}_i^{2}}\sum_{i=1}^{T}\hat{u}_{it-1}^{2}\right)\sum_{t=1}^{T}(\hat{u}_{it-1}^{2}\Delta\hat{u}_{it}^{2} - \hat{\lambda}_i)$$

The panel t statistic (parametric):

$$\sqrt{N}\breve{Z}_{tNT-1}^{*} = \sqrt{N}\sum_{i=1}^{N}\left(\sqrt{\breve{\sigma}_i^{*2}}\sum_{i=1}^{T}\hat{u}_{it-1}^{*2}\right)\sum_{t=1}^{T}(\hat{u}_{it-1}^{*2}\Delta\hat{u}_{it}^{*2})$$

The major drawback of above procedure is the restrictive a priori assumption of a unique cointegration vector.

## 5. Results Analysis

### *5.1 Unit Root Analysis*

The IPS and Levin, Lin and Chu, unit root tests for panel datasets are performed on the explanatory variables.

These tests are applied to the variables in their levels and in their first differences form. The t-statistics and their respective probability values are reported in Table 1. All the tests indicate that the panel level series of our variables are stationary in their levels I (0). Thus we use the level of the variables panel to study the cointegration tests.

**Table 1:** Unit Root Results

| Variables | IPS | | Levin, Lin, Chu | |
|---|---|---|---|---|
| | Level | 1st difference | Level | 1st difference |
| GDP | 28.946* | 18.530* | 4.467** | 0.674** |
| | [0.00] | [0.00] | [0.00] | [0.25] |
| Tourism receipts | 24.309* | 53.945* | 3.359** | 8.478** |
| | [0.00] | [0.00] | [0.001] | [0.00] |

** Probabilities are computed assuming asymptotic normality

* Probabilities for IPS tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

### *5.2 Cointegration Analysis*

Once the order of stationarity has been defined, our next step is to apply panel cointegration methodology. For further analysis of the long-run relationship between LGDP and LTR in these groups of countries Pedroni panel co-integration technique is used.

**Table 2:** Panel Cointegration Results

| | Constant and trend | Constant without trend |
|---|---|---|
| **Pedroni Residual Cointegration Tests** | | |
| Panel v-Statistic | -0.769 [ 0.779]* | 0.851[0.197]** |
| Panel rho – Statistic | 2.352 [0.990] | 0.389 [0.651]** |
| Panel pp – Statistic | 1.830 [0.966] | -0.191 [0.424]** |
| Panel ADF – Statistic | -2.590 [0.004]*** | -2.510 [0.006]*** |
| **Group Statistics** | | |
| Group rho – Statistic | 2.239 [0.987] | 0.921 [0.821]* |
| Group pp – Statistic | 0.815 [0.792]* | -0.964 [0.167]** |
| Group ADF – Statistic | -1.462 [0.071]** | -2.785 [0.002]*** |

***, ** and * denotes significance respective at the 1%, 5% and 10% level

Reference [34] proposed several tests for cointegration that allow for heterogeneous slope coefficients across cross-sections. This consists of seven component tests: the panel v-test, panel rho-test, panel PP-test, panel ADF-test, group rho-test, group PP-test, and group ADF-test. The Pedroni panel co-integration tests are based on the “within dimension” and the “between dimensions” approach. The results of panel cointegration tests are presented in Table 2. Table 2 also compares the cases with and without trend.

As is evident from table 2, the null hypothesis (in which there is no cointegration relationship) is rejected in all the tests (in the case without trend). These results are in line with several studies like [35, 36, 14].

### *5.3 Granger Causality Results*

Given that our variables are cointegrated the next step is to use granger causality test in order to check the direction of causality among tourism growth and economic growth. We have estimated three models; the first model refers to the overall panel, the second one to the panel of the Asian countries, and the last one on the panel of the European countries.

The results from the first model indicate that there is a bi-directional causality among tourism growth and economic growth. The results from the second model explore uni-directional causality running from tourism growth and economic growth. That means that only tourism growth is causing an increase in the economic growth in the context of Asian countries. Finally, when we deal with the panel of European countries we find that we have bi-directional causality among tourism growth and economic growth. That result is in line with [37].

**Table 3:** Results of Granger Causality Test

| | |
|---|---|
| **Panel of Overall Countries** | |
| Tourism growth does not cause economic growth | 4.65* |
| Economic growth does not cause tourism growth | 5.32* |
| **Panel of Asian Countries** | |
| Tourism growth does not cause economic growth | 7.86* |
| Economic growth does not cause tourism growth | 2.34 |
| **Panel of European Countries** | |
| Tourism growth does not cause economic growth | 4.11* |
| Economic growth does not cause tourism growth | 6.72* |

* shows the 1% significance level

## 6. Conclusions - Recommendations

The purpose of this study is to investigate the tourism led growth hypothesis for a panel of Asian and European countries which includes Turkey, Greece, Italy, France, Pakistan, India, China, and Maldives. We used annual data covering the period from 1995-2011. The data have been obtained from World Bank resources. The GDP variable has been used as the proxy of economic growth while tourism receipts are used as a proxy of tourism growth. To test our series for unit root we have used the LL and IPS tests of unit root. The results indicate that both variables are stationary at the panel level series. The Pedroni cointegration approach has been used to check the relationship among tourism growth and economic growth. The results depict that long run relationship exists among the variables. Using the Granger Causality test, we found that there is a bi-directional causality among tourism growth and economic growth in the case of overall panel analysis (including all the countries). In addition, we found uni-directional causality in the case of the Asian countries and finally in the case of European countries we found that there is bi-directional causality between tourism and economic growth.

In light of these results the major policy implication which may be drawn from this study is that all the above countries can improve their economic growth performance. That can be done not only by investing on the traditional sources of growth such as investment in physical and human capital, trade, and foreign direct investment, but also by strategically harnessing the contribution of the tourism industry. The significant impact of tourism expanding on the above countries economy justifies the necessity of governments intervention aimed, at promoting and increasing tourism demand by providing the tourism facilities. As well, the economic expansion (result we have found in the overall panel analysis) affects the tourism growth which is reflected by the development in infrastructure and tourism resorts.

This study can be extended in several directions. First, in this paper, we are unable to include a human capital variable in our regressions due to the unavailability of the data. Hence, a future research agenda involves more empirical investigation when data for human capital variable is available. Also, our study is restricted to Mediterranean and Asian countries, thus future research could focus on other tourism-specialized countries, so that regional comparison could be done in terms of to what extent tourism contribute to growth. Also future research should focus on testing for additional explanatory variables and their relations.

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