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Abstract

This paper applies likelihood-based panel cointegration techniques to examine the existence of a long run relationship between GDP, tourism earnings per tourist and total trade volume for a panel of European countries over the period 1988–2010. Removing the cross dependency, our panel tourism-led growth model indicates that tourism development has a higher impact on GDP in the North than in South European countries. The policy implication of this result is that for this group of countries, the best strategy is to raise tourism receipts. Furthermore, the volume of trade shows a significant and much more stronger effect on the long run economic growth in our sample economies than tourism does.

JEL Classification: F43; C33; L83

Keywords: Tourism; Economic growth; Rank tests; Panel unit root tests; Panel cointegration

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1 Introduction

As globalization reaches the remotest economies in the world, international tourism has been steadily increasing, as well as the importance of the tourism industry for the economy of many countries. According to the World Travel & Tourism Council (WTTC)[1], Tourism was a major source of economic growth to European countries, especially in small countries such as Malta, where it averaged 11% of Gross Domestic Product (GDP) in 2008 but also in larger countries such as Spain where the tourism sector amounted to 6.1% in the same period. Tourism-generated proceeds have come to represent an increasing employment, external revenue source, household income and government income. Thus, tourism plays, nowadays, a key role in boosting the countries' economies.

In the literature on growth, the export-led growth hypothesis (see McKinnon, 1964) postulates that international tourism contributes to growth in two ways. In the first place, enhancing efficiency through competition between the local sectors and foreign destinations (Bhagwati and Srinivasan, 1979, Krueger, 1980). Secondly, by facilitating the exploitation of economies of scale in local firms (Helpman and Krugman, 1985). On the other hand, there are economic, social and environmental costs associated with tourism activity (Palmer and Riera, 2003). If the negative externalities from tourism activity outweigh its benefits, the development of tourism activity may turn out to deter economic growth.

The growing importance of tourism on the national economies led to the emergence of the Tourism Satellite Account[2] (TSA) worldwide that provides a means of separating and examining both tourism supply and tourism demand within the general framework of the System of National Accounts and, simultaneously, important contributions have been made to estimate empirically different forms and degrees of tourism on long-run economic growth (see Balaguer and Cantavella-Jordá, 2002, Eugenio-Martin, 2004, Oh, 2005, Gunduz and Hatemi-J., 2005, Lee and Chang, 2008, Katircioglu, 2009, Cortés-Jimenéz and Pulina, 2010).

The branch of empirical research on the effects of tourism on economic growth that focuses on a single country and cointegrates gross domestic product (GDP) with the number of tourist arrivals (or alternatively with the volume of tourism receipts) and real exchange rate[3] has found that tourism has generally a positive impact on economic growth. Balaguer and Cantavella-Jordá (2002) tested the tourism-led growth hypothesis for Spain through cointegration and causality tests relating real GDP, international tourism earnings and the real effective exchange rate, confirming the existence of a stable relationship between economic growth and tourism. They also found causality from tourism activity to economic growth. Gunduz and Hatemi-J. (2005) tested the tourism-led growth hypothesis for Turkey applying a causality test based on leverage bootstrap simulations between the number of tourist arrivals, real gross domestic product and real exchange rates. They support empirically the tourism-led growth hypothesis. Katircioglu (2009) used cointegration and Granger causality tests to analyze the existence of a long-run equilibrium relationship between tourism, trade and real income growth and conclude that real income growth stimulates growth in international trade but also stimulates the international tourist arrivals into Cyprus. Further, it was found that the international trade's growth stimulates tourist arrivals into the island. Cortés-Jimenéz and Pulina (2010) estimate a production function for Italy and for Spain that includes the inputs physical and human capital, and exports. Their Granger causality tests reveal that the tourism-led growth hypothesis is validated both for Spain with the Granger causality running in both directions and for Italy unidirectional Granger causality running from tourism expansion to economic growth.

[1] See http://www.wttc.org/

[2] For a detailed Tourism Satellite Account see http://www.unwto.org/statistics/index.htm

[3] Real exchange rate is used to proxy for the economy's competitiveness.

The empirical research focussing on a panel of countries also provides evidence of a long-run relationship between tourism development and GDP growth. Eugenio-Martin (2004) studied Latin American countries to confirm that increasing the per capita number of tourists caused more economic growth in low and medium-income countries. Lee and Chang (2008) estimated the impacts of tourism activity in economic growth, applied panel cointegration techniques to an enlarged sample of countries and distinguished between developed and underdeveloped countries to estimate regional effects. Again, these authors concluded that there exists a long-run relationship between tourism development and real GDP per capita, and this can be found both for OECD and for non-OECD countries. However tourism development has a higher impact on GDP in non-OECD countries, especially in Sub-Saharan Africa.

In the above mentioned empirical research, a measure of international competitiveness and its impact on long-run economic growth has been introduced in the model to be estimated. Inbound tourism captures foreign exchange depending on its competitiveness as tourists always have the chance to choose a different, less expensive destination, what can depend solely on the exchange rate path. Tourism can also be regarded as a trade complement, matching the imbalances caused by external trade, especially present in economies specialized in non-tradable goods such as services activities being tourism a good example. Again, competitiveness is an important determinant of the external overall performance. While studying recent developments for the EURO area a special care is needed concerning the suggestion of a measure of competitiveness. Due to the adoption of the common currency, the exchange rate is no longer an economic policy or a way to promote competitiveness. Regarding the countries that have adopted a common currency, competitiveness is reflected mainly in the country productivity and this is translated into that country ability to trade, measured by its trade flows. As the European countries adopted a single currency, the effect of European countries tourism activity on its economic development and long-run growth should be determined considering simultaneously their trade relationships.

This paper, like Katircioglu (2009), empirically researches the relationship between economic growth, international trade and tourism activity, but goes one step further extending the analysis to a panel of 31 European countries, the 27 European Union Countries plus Iceland, Norway, Switzerland and Turkey, estimating a multivariate model, using panel data cointegration procedures. We want to determine the importance of tourism flows measured by tourism receipts per tourist and also international trade flows on the economic development of these countries for the period between 1988 and 2010, differentiating among three European geographic regions, the North, central and South Europe.

As in the export-led growth hypothesis, a tourism-led growth hypothesis would postulate the existence of various arguments for which tourism would become a main determinant of overall long-run economic growth. In a more traditional sense it should be argued that tourism brings in foreign exchange which can be used to import capital goods in order to produce goods and services, leading in turn to economic growth. In other words, it is possible that tourists provide a remarkable part of the necessary financing for the country to import more than to export. If those imports are capital goods or basic inputs for producing goods in any area of the economy, then, it can be said that earnings from tourism are playing a fundamental role in economic development. In a more endogenous economic growth line of thought, tourism can play a valuable role in stimulating higher growth, creating employment and bringing about positive externalities that affect (directly or indirectly) other economic activities.

This paper contributes to the literature since we consider a different measure of tourism activity, not previously used. There are enormous differences among European countries tourism offer. The differences among European countries income per capita are inevitably translated into their market prices, and so we expect to find some differences when considering touristic regions inside Europe (see Nowak and Cortés-Jimenéz, 2007). Lee and Chang (2008) reinforced the idea that tourism impact on economic growth differs according to developed regions versus developing regions, but treated OECD countries as a single region, not taking into account the differences that may exist among for instances, European countries. Additionally, tourism has been measured either by tourism receipts or by the number of tourist arrivals. The level and quality of tourism has never been taken into account when analyzing the impact of tourism on economic growth. We propose a simple measure of tourism quality given by tourism receipts per tourist. Our empirical study takes into account European regional differences while proxying country competitiveness by their trade volume and country tourism activity by their earnings per tourist.

The remainder of this paper is organized as follows. In Section 2, a empirical model specification is presented and the time series properties of the data analyzed through several panel data unit root tests. Section 3 provides the empirical results for panel cointegration tests and ranks. Section 4 discusses the long-run relationship equilibrium and Section 5 concludes.

2 Model Specification and Time Series Analysis

The empirical model that motivates our research of the relationship between tourism flows and economic growth is given by the following equation:

$$GDP_{it} \quad = \quad \alpha_i + \beta_1 TOUR_{it} + \beta_2 INT_{it} + u_{it} \tag{1}$$

where $\begin{cases} i = 1, 2, \ldots, 31, \text{ denotes countries;} \\ t = 1, \ldots, 23, \text{ denotes periods (years).} \end{cases}$

The dependent variable, GDP_{it}, is the log of the Gross Domestic Product of country i at time t, $TOUR_{it}$ is the log of the Tourism Earnings per Tourist Arrival in country i at time t and INT_{it} is the log of Exports plus Imports of country i at time t.

The two-way error component term of Equation (1) is given by:

$$u_{it} = \lambda_t + \eta_i + \varepsilon_{it} \tag{2}$$

where η_i accounts for unobservable country-specific effects and λ_t accounts for time-specific effects. The term ε_{it} is the random disturbance in the regression, varying across time and country cells.

In Equation (1), each country gross domestic product is estimated against tourism expenses by tourist and total international trade. The proxy used for measuring the tourism economic activity was the tourism expenditures by tourist in order to evaluate tourism quality[4], differentiating countries by the type and quality of tourism specialization. Also, this option eliminates multicolinearity problems that could emerge when relating total trade volume and total tourism earnings. To proxy for international competitiveness, we had to take into account that we were analyzing European countries that belong to the EURO area. Since 2001, the real exchange rate was no longer a suitable measure of these countries' competitiveness, so the total trade volume stands as a good proxy for the country international economic position since total exports and

[4]The volume of expenditures per tourist arrivals proxies the quality of the region's tourism activity, since it gauges how much, on average, a country induces its tourists to spend. Therefore, it represents an indirect estimate of the quality of tourism activity. Each tourist tends to spend more in high quality tourism than in low quality tourism, and consequently a higher expenditure per tourist will represent a higher quality tourism destination. A sustainable tourism activity will be a direct function of its quality.

total imports depend on a country international competitiveness[5]. While determining the long-run equilibrium of the real exchange rate (Inkle and Montiel, 1999) suggest using total trade volume values that lead to the the equilibrium of the Current Account after the disequilibrium period as the explanatory variables.

Choosing tourism expenditures by tourist arrivals to proxy tourism comes from the suggestion that this is a more accurate measure of tourism impact in terms of its quality. By selecting the variable tourism receipts as a proxy for tourism activity we will be introducing idiosyncratic features in our analysis such as the duration of the stay, a character that can reflect a bias since its volume could be the consequence of the type of destination – for instance, if it is a cultural and more urban destination, usually of shorter duration, versus a beach resort or a stay in the countryside, that normally last for longer. Additionally, higher expenditures may be the result of a longer stay that, in itself, may be the consequence of a longer distance and therefore a status such as center versus periphery could influence the estimated results. The variable number of tourist arrivals also suffers from some drawbacks which can be identified to being determined by the cost of the destination but also by the particular features (like visiting Coliseum can only happen in Rome but Italy has also beaches that directly concur with the ones from the Mediterranean, so Italy has more arrivals due to a particular feature which we could classify as culture, not due to its tourism quality) and of some destinations that cannot be replicated by traveling to another destinations.

Following the trade-led growth hypothesis, (McKinnon, 1964), we expect the trade elasticity β_2 in Equation (1) to have positive sign. Given the the tourism-led growth hypothesis, we also expect the tourism elasticity β_1 in Equation (1) to have positive sign. The positive signs of both coefficients also reflect tourism and trade's externalities and spillovers effects to the economic activity.

The host countries receiving the tourism's flows were selected to highlight the duality between developed and developing countries. Our sample incorporates countries with different cultures, income, organization and infrastructures. The list of countries is the 27 European Union Countries plus Iceland, Norway, Switzerland and Turkey. We pooled the data and conduct panel data analysis. We considered all European countries in the panel and also three groups of European countries based on the type of tourism based on their geographical location. A first group pertains to Central European countries and includes Austria, Belgium, Bulgaria, Czech Republic, Germany, Hungary, Luxembourg, the Netherlands, Poland, Romania, Slovakia, Slovenia, and Switzerland. A second group of North European countries integrates Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, and United Kingdom. A third group concerns South European countries and includes Cyprus, France, Greece, Italy, Malta, Portugal, Spain and Turkey. A description of all data and data sources is provided in appendix A.

2.1 Time Series Properties of the Data

Since the appropriateness of the methodology to be applied to the econometric estimation depends on the time series properties of the data, such properties must be ascertained before any estimation is carried out. There are several statistics that may be used to test for a unit root in

[5] The use of total volume of trade comes from the international economics literature that states that the sum of the total exports with the total imports is a good indicator of the degree of an economy's openness. This openness indicator is also an indirect measure of a region's competitiveness. An open economy will tend to be globally integrated what acts as publicity of local habits and places which, in turn helps promoting tourism activity. Countries and its tourist activities have to be attractive and open. Openness implies low barriers of entry and is directly connected to a country's ability to promote its tourism activity. This variable can be therefore an alternative control variable in a group of economies that share a common currency.

panel data, but since we have a not so long panel data set, We implement two different types of panel unit root tests: the Levin, Lin and Chu (2002) test (LL) and the Im, Pesaran and Shin (2003) test (IPS). In contrast to the LL test, the IPS's t-bar statistic is based on the mean augmented Dickey-Fuller (ADF) test statistics calculated independently for each cross-section of the panel. Based on Monte Carlo experiment results, IPS demonstrate that their test has more favorable finite sample properties than the LL test.

(Insert table 1 here)

Table 1[6] reports the test results based on the inclusion of an intercept and trend. In every case the null that every variable contains a unit root for the series in logs is not rejected[7].

The panel unit root tests applied previously do not account for cross-sectional dependence of the contemporaneous error terms. It has been shown in the literature that failing to consider cross-sectional dependence may cause substantial size distortions, see, for example, Banerjee (1999) and Pesaran (2007). To avoid this mis-performance of the unit root tests we proceed our panel unit root analysis relaxing the assumption of cross sectional independence, employing the test proposed by Moon and Perron (2004) and the test proposed by Pesaran (2007). The Cross-sectionally Augmented IPS Panel Unit Root Test (CIPS) proposed by Pesaran (2007) is a panel fixed effects test allowing for parameter heterogeneity and serial correlation between the cross-sections, correcting their dependency. Within the same line of thought, Moon and Perron (2004) considered a linear dynamic factor model in which the panel is generated by both idiosyncratic shocks and unobserved dynamic factors that are common to all the units, thus explicitly permitting correlation among the cross-sectional units. To avoid specification errors both tests are employed in regressions with an intercept and a trend.

(Insert table 2 here)

In Table 2[8] we report the results for the Pesaran cross-sectionally augmented IPS test. The model used to test the unit root hypothesis is the one with intercept and trend. Because our data is annual we test until 3 lag lengths. The unit root test hypothesis is not rejected at the conventional level of significance for the three variables considering a lag length of 2 or 3. These results indicate that variables under investigation are integrated of order 1. Note that, although not shown here, similar results were obtained when we divided the samples according to geographical regions.

(Insert table 3 here)

Moon and Perron panel unit root test results are given in Table 3[9]. Except for the trade variable, all results confirm that for the European countries panel the variables are non stationary at the five percent level. To sum up, it is clear that GDP, real earnings per tourist and total trade volume are I(1) series. Having ascertained the non stationary time series properties of the data, allows us to test for the existence of a cointegration relationship among the variables.

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[6]This estimation was performed using the Rats code that is available upon request to Peter Pedroni.

[7]To test for the possibility that the variables which were found to be non-stationary are integrated of second order, $I(2)$, unit root tests on the first differences of the variables were run. Although not shown here, these tests suggest that all variables are stationary in first differences.

[8]CISP-estimation was performed using the GAUSS code available on line at http: www.econ.cam.ac.uk/faculty/pesaran/

[9]This estimation was performed using the GAUSS code available upon request to the authors.

3 Cointegration Analysis

In this section we report our cointegration analysis results based on three different tests: Pedroni (1999, 2001, 2004), Larsson and Lyhagen (1999) and Larsson, Lyhagen and Lothgren (2001) likelihood tests. Pedroni panel cointegration test is employed over the entire group of European countries and also considering the smaller geographic groups of North, Central and South Europe. Larsson and Lyhagen tests for cointegration rank are employed over the three geographic groups of European countries. Finally, Larsson et al. (2001) panel cointegration test is employed over the entire group of European countries.

The panel cointegration test proposed by Pedroni (2004) is reported in Table 4[10]. This residual-based test for the null of no cointegration in heterogeneous panels rejects the null for large negative values. Clearly, from Table 4, the panel statistics indicate fairly support for the hypothesis that real GDP are cointegrated with tourism earnings per tourist arrival and total international trade for the entire group, and also for the sub-sample of Central and South European countries considered in our cointegration analysis.

(Insert table 4 here)

We then implemented the Larsson and Lyhagen (1999) test for Cointegrating Rank for each regional group of European countries. This test has better small sample properties, therefore, it was chosen to analyse each sub-regional group. The Larsson and Lyhagen (1999) Cointegrating Rank tests are given in Table 5[11] where the Bartlett corrected critical values are obtained by using the estimated model as data generating process when calculating the sample mean. Using the Bartlett corrected critical values[12], the test rejects the null of 0 cointegrating rank but does not reject the null of 1 cointegrating vector at a 5% significance level. Hence, the panel cointegration tests reveal that the common cointegrating rank is one and that the deterministic component contains an unrestricted constant and restricted trend. We also employed the likelihood-based cointegration test proposed by Larsson et al. (2001). This test has better large sample properties, so it was used for the whole sample, the 31 European countries' estimates. These authors propose a likelihood-based test of the cointegrating rank in heterogeneous panels to allow for the possibility of multiple cointegrating vectors. Under the null hypothesis, each group in the panel has at most r cointegrating relationships. Once we calculated the average of the individual Johansen trace statistics (namely the LR-bar statistic), we derived a standardized LR-bar statistic to use as the panel cointegration rank test. The setup for the panel vector autoregressive model was modeled as following: we considered as deterministic components an unrestricted intercept and a deterministic trend in the cointegration relationships.

(Insert table 5 here)

The LR-statistic is reported in Table 6[13] for the entire sample of countries in our panel. Our results suggest that there is a common cointegration rank in the panel. Compared with the Pedroni tests, Larsson and Lyhagen (1999) and Larsson et al. (2001) tests provide stronger evidence of cointegration among the variables.

(Insert table 6 here)

[10]This estimation was performed using the Rats code that available upon request to the author.

[11]This estimation was performed using the GAUSS code available upon request to the authors.

[12]Given the good size properties of the Bartlett Critical Values (BVC) [see Larsson and Lyhagen (1999)], we focus our analysis on the BVC test.

[13]This estimation was performed using the GAUSS code available upon request to the authors.

4 Estimation of the Long-Run Equilibrium

Our final step is the estimation of the long-run relationships between GDP, tourism earnings per tourist and the total trade volume. In this Section, we begin estimating the long-run equilibrium using the fully-modified OLS (FMOLS) estimator proposed by Pedroni (2000), then we performe the general diagnostic tests for cross section dependence in panels suggested by Pesaran (2004). The hypothesis that there are not cross-sectional dependence is rejected for all regions except for the South European countries. Therefore, we proceed to estimate our panel data model subject to error cross section dependence as suggested by Pesaran (2006).

We estimate the cointegration panel coefficients using the panel fully-modified OLS (FMOLS) estimator proposed by Pedroni (2000).

(Insert table 7 here)

In Table 7[14] we report Pedroni FMOLS results for cointegration between real GDP, real tourism earnings per tourist arrivals and real total trade volume. β_1 is the estimator for tourism earnings-real GDP elasticity and β_2 is the estimator for total trade volume-real GDP elasticity. In regard to the three European regions, most of the coefficients' estimates are statistically significant, the exception being the slope for the tourism's coefficient for the South European countries group. Analyzing each coefficient, with reference to all European countries, it is clear from the panel estimates that tourism earnings per tourist arrival play a significant role, such that a 1% increase in this variable leads to a 5% of increase in real GDP. This result is consistent with the results presented in the estimations for individual countries, finding positive effects of tourism development on economic growth. This effect is also found for two of the regional groups studied, namely, Central European countries (with a 3% elasticity) and North European countries (with a 6% elasticity), but is not found for the South European countries (with a 0% not significant elasticity). Simultaneously, we found a positive and significant effect from trade to real GDP for the entire panel and for each regional group. South European countries present a smaller trade elasticity (0.49) than the 0.62% found for the group of all European countries. When analyzing each individual country we note that the most consistent region corresponds to the Central European countries group.[15], the estimators concerning tourism activities and total trade volume seem to be consistent with results obtained for the panel. Some South European countries show individually a negative, even though not significant relationship between tourism and economic growth and, further more, total trade volume is not that relevant for GDP (this may be due to their dependency on imports).

(Insert table 8 here)

In the above analysis, we have to take into consideration that the previous estimation of the cointegration relation does not account for cross-sectional dependence of the contemporaneous error terms and it has been shown in the literature that failing to consider cross-sectional dependence may cause substantial size distortions, see, for example, O'Connell (1998) and Pesaran (2007). We performed the general diagnostic tests for cross section dependence in panels suggested by Pesaran (2004) as shown in Tables 8-11[16]. The hypothesis that there are not cross-sectional dependence is rejected for all regions except for the South European countries.

[14] This estimation was performed using the Rats code available upon request to the authors.

[15] Despite the presence of some outliers, such as Czech Republic, Hungary or even Bulgaria, Slovakia and Slovenia. Observing the data we noticed that prior to 1989, these countries' data suffered from 'missing data problems'.

[16] These estimations were performed using the GAUSS code available upon request to the authors.

Therefore, we proceed to estimate our panel data model subject to error cross section dependence as suggested by Pesaran (2006). The Pesaran (2006)'s Monte Carlo simulations show that common correlated effects-Pesaran (2006) pooled estimator (CCE-PPE) has satisfactory small sample[17] properties.

(Insert table 9 here)

(Insert table 10 here)

In Table 8 we present the estimation results for the pooled specification for the complete sample as well as for each individual country. Removing the cross dependency, the estimator for the tourism earnings by tourist arrival-GDP elasticity is around 0.5% although not significant. Total trade volume-GDP elasticity moves in opposite direction, augmenting its value towards 92.2% for the set of all European countries. Maybe this result is due to the variable we are using to measure external competitiveness: total trade volume. This variable also measures tourism flows because it contains the item travel and tourism from the current account. Then we are correlating GDP with tourism flows (inbound and outbound) whereas we are correlating GDP with total trade volume. Regarding individual countries estimators, we find a similar performance. The majority has no statistic significance and the values of the tourism earnings by tourist arrival-real GDP elasticities decreases as compared to the estimators obtained by the FMOLS methodology. Once more, total trade volume is the statistically significant variable and showing generalized high magnitude estimators for its elasticities.

(Insert table 11 here)

The same estimation technique: common correlated effects-Pesaran (2006) pooled estimator (CCE-PPE) applied to the three regional groups (see Tables 9, 10 and 11) provide similar results to the ones described to the all panel . We find larger coefficients for tourism-GDP elasticity for Central European countries and North European countries when compared to South European countries.

5 Conclusion

This paper applies likelihood-based panel cointegration techniques to examine the existence of a long-run relationship between GDP, tourism earnings per tourist and total trade volume.

Regarding previous work on the effects of tourism on economic growth, we extend the analysis to different regional group of countries, we choose a different proxy for international competitiveness and for measuring tourism activity. The countries in the panel are European countries pooled by three geographic regions, Central European countries, South European countries and North European countries. We use total value of trade as a measure of international competitiveness in order to be able to differentiate the EURO countries. Since we could not use the real exchange rate, we choose variables that are considered while estimating the long-run value of the real exchange rate. Tourism earnings per tourist is used to proxy tourism activity but since it is in per capita terms it reflects the quality of tourism services provided by each country.

Our results show that there is solid evidence of a panel cointegration relation between tourism and GDP in the European countries. We then performed estimations of the long-run relationship between the variables using the FMOLS estimator. As for the FMOLS estimates, the parameters had to be analyzed carefully because we found the presence of common correlated effects.

[17] Pesaran (2006)'s Monte Carlo simulations also showed that the mean group estimators (CCE-PMG) have satisfactory properties when N and T are relatively large.

Removing the cross dependency, our panel tourism-led growth model indicates that tourism development has a higher impact on GDP in the North than in South. The policy implication of this result is that for this group of countries, the best strategy is to raise tourism receipts. Furthermore, and worth noting too, is that in general, the volume of trade shows a significant and much more stronger effect on the long-run economic growth in our sample economies than tourism does. Thus, tourism shows a long-run relationship with economic growth but its impact on the long-run economic growth is much smaller than its share on GDP leads us to assume.

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Appendix

A DATA

Data used in this article are annual figures covering the period 1988-2010 and variables of this study are real GDP, tourism expenditures by tourist arrival, and real trade volume (total exports plus total imports). Data for GDP and total trade volume are taken from AMECO Database (Eurostat) and for tourism earnings and tourist arrivals from World Travel and Tourism Council (WTTC). Variables, except tourist arrivals, were converted to 2000 US$ constant prices using real exchange rates also taken from AMECO Database.

Data Sources

From the AMECO Database *Eurostat*, it was obtained:

GDP: GDP at current prices for the period 1988-2010.

INT: Total Trade Volume is total exports plus total imports for the period 1988-2010.

The *World Travel and Tourism Council (WTTC)* is the source of the following series:

$TOUR$: Tourism Economic Activity is total tourism earnings divided by total international tourist arrival, for the period 1988-2010.

Tables

Table 1: Panel Unit Root Tests

Tests Series in Log-Levels	**GDP**	**TOUR**	**INT**
All European Countries in the Panel			
Levin et al. (2002) Test	-0.601	-0.916	-0.239
Im et al. (2003) Test	-0.677	-0.223	-0.063
Central European Countries			
Levin et al. (2002) Test	-0.694	-1.076	-0.534
Im et al. (2003) Test	-0.482	-0.646	-0.849
North European Countries			
Levin et al. (2002) Test	-0.479	-1.076	-0.540
Im et al. (2003) Test	-0.403	-0.646	-0.893
South European Countries			
Levin et al. (2002) Test	0.211	-0.537	0.176
Im et al. (2003) Test	-0.267	-0.222	0.748

The null hypothesis is that the series is a unit root process. An intercept and trend are included in the test equation. The lag length was selected by using the Akaike Information Criteria. The critical values are taken from from Im et al. (2003).

* Rejects the null at the 10% level.

** Rejects the null at the 5% level.

*** Rejects the null at the 1% level.

Table 2: Pesaran (2007) Cross-sectionally Augmented IPS (CIPS) Test

Lag	$p=1$	$p=2$	$p=3$
All European Countries in the Panel			
GDP	-2.088*	-1.797	-1.591
TOUR	-2.173*	-1.843	-1.929
INT	-2.771**	-2.208	-1.985

The null hypothesis is that the series is a unit root process. Critical values for the CIPS test are -3.35 (10%), -2.41 (5%), and -1.89 (1%), see Pesaran (2007).
* Rejects the null at the 10% level.
** Rejects the null at the 5% level.
*** Rejects the null at the 1% level.

Table 3: Moon and Perron (2004) Panel Unit Root Test

	t_a^*	t_b^*
All European Countries in the Panel		
GDP	-0.020	-0.416
TOUR	-0.012	-0.062
INT	0.076	1.631*

The tests statistics are distributed as $N(0,1)$ under the null of non stationarity. Critical values are 1.28 (10%), 1.64 (5%) and 2.33 (1%).
* Rejects the null at the 10% level.
** Rejects the null at the 5% level.
*** Rejects the null at the 1% level.

Table 4: Pedroni (2004) Panel Cointegration Tests

	Test Statistic
All European Countries in the Panel	-1.277*
Central European Countries	-1.829*
North European Countries	-0.241
South European Countries	-1.980*

The tests statistics are distributed as $N(0,1)$ under the null of no cointegration. The statistics are constructed using small sample adjustment factors from Pedroni (1999, 2004).
* Rejects the null at the 10% level.
** Rejects the null at the 5% level.
*** Rejects the null at the 1% level.

Table 5: Larsson and Lyhagen (1999) Tests for Cointegrating Rank

H_0	$ACV^{a)}$	$BCV^{b)}$	$-2logQ_T$
Central European Countries			
$R = 0$	176.407	265.105	311.999
$R \leq 1$	96.513	184.345	162.395
$R \leq 2$	39.969	105.135	77.977
North European Countries			
$R = 0$	176.407	265.105	286.727
$R \leq 1$	96.513	184.165	149.387
$R \leq 2$	39.969	97.852	75.812
South European Countries			
$R = 0$	176.407	265.105	352.628
$R \leq 1$	96.513	184.476	165.992
$R \leq 2$	39.969	99.669	77.945

a) The asymptotic critical values at 5% significance level.

b) Bartlett corrected critical values at 5% significance level.

Table 6: Larsson et al. (2001) Panel Cointegration Test

	Standardized LR-bar$^{a)}$	$R = 0$	$R \leq 1$
All European Countries in the Panel	$\gamma_{\overline{LR}}(H(r)\vert H(3)) = \frac{\sqrt{N}(\overline{LR}-E(Z_K))}{\sqrt{VAR(Z_K)}}$	8.627	1.382

The null hypothesis is that there are no more than r cointegrating relationships. Critical values are 1.29 at 10% significance level, 1.64 at the 5% level and 2.32 at the 1% level.

a) The moments $E(Z_K)$ and $VAR(Z_K)$ are obtained from the procedure described in Johansen (1995) for the model with a constant and deterministic trend. We used the gauss code sent by the authors upon request. The values obtained for $r = 0$ were $E(Z_K) = 20.032; VAR(Z_K) = 5.721$ and for $r = 1$ were $E(Z_K) = 13.681; VAR(Z_K) = 5.006$.

Table 7: Panel Estimates of the Cointegration Relationship: FMOLS

Panel Group FMOLS Results:

	β_1	t-stat	β_2	t-stat
All European Countries	0.05	3.92***	0.62	65.99***
Central European Countries	0.03	2.30***	0.64	55.95***
North European Countries	0.06	3.39***	0.69	30.37***
South European Countries	0.00	0.93	0.49	24.99***

Countries Results:

	β_1	t-stat	β_2	t-stat
Central European Countries				
Austria	0.13	2.20***	0.31	2.90***
Belgium	0.06	2.20***	0.32	7.27***
Bulgaria	-0.01	-0.36	1.06	57.90***
Czech Republic	0.33	3.87***	0.72	5.33***
Germany	0.12	2.47***	0.22	2.20***
Hungary	-0.32	-6.37***	0.83	11.08***
Luxembourg	0.06	1.20	0.58	5.47***
Netherlands	0.08	3.52***	0.52	12.99***
Poland	0.23	2.77***	0.94	15.04***
Romania	0.24	2.07 ***	0.99	46.83***
Slovakia	0.00	0.04	0.67	3.67***
Slovenia	-0.03	-1.24	0.84	26.85***
Switzerland	0.04	1.35	0.33	3.32***
North European Countries				
Denmark	0.04	2.81***	0.50	4.33***
Estonia	0.03	2.75***	0.51	6.24***
Finland	0.08	0.67	0.80	5.32***
Iceland	-0.03	-1.07	0.86	30.77***
Ireland	-0.02	-0.20	0.51	5.19***
Latvia	0.10	4.09***	0.63	3.26***
Lithuania	0.47	3.39***	1.04	5.72***
Norway	-0.07	-2.19***	0.59	11.96***
Sweden	0.07	0.69	0.70	5.24***
UK	-0.02	-0.23	0.74	18.03***
South European Countries				
Cyprus	-0.05	-2.32 ***	0.30	10.43***
France	-0.03	-1.46	0.22	9.43
Greece	0.51	2.75***	0.93	4.80***
Italy	-0.04	-0.54	0.24	1.91
Malta	0.09	1.02	0.63	3.10
Portugal	-0.04	-0.54	0.24	1.91
Spain	-0.42	-1.50	0.02	0.07
Turkey	-0.06	-0.39	1.12	38.66***

The tests statistics are distributed as $N(0,1)$ under the null of no-cointegration. The test statistics are constructed using small sample adjustment factors from Pedroni (2000, 2004).

*** Rejects the null at the 1% level.

Table 8: Panel Estimates of the Cointegration Relationship: CCE-PPE

OLS Mean Group Estimates a)

	β_1	t-stat	β_2	t-stat
All European Countries	0.058	1.995***	0.621	12.480***

Pesaran's (2004) CD test statistic (residuals): 9.735.

Pesaran's (2006) CCE Pooled Estimates b)

	β_1	t-stat	β_2	t-stat
All European Countries	0.005	0.673	0.922	29.750***

CCE Estimator for each country c)

	β_1	t-stat	β_2	t-stat
Austria	0.030	1.154	0.258	6.000***
Belgium	0.025	2.778***	0.279	18.600***
Bulgaria	0.013	0.929	1.085	26.463***
Czech Republic	0.148	3.217	0.394	4.062***
Germany	0.027	1.227	0.267	4.768***
Hungary	-0.266	-3.644***	0.832	4.379***
Luxembourg	-0.008	-0.242	0.513	12.512***
Netherlands	0.042	2.800***	0.440	19.130***
Poland	0.047	0.618	0.951	38.040***
Romania	0.029	0.296	1.209	21.589***
Slovakia	-0.014	-2.800***	1.089	4.755***
Slovenia	-0.030	-3.750***	0.822	28.345***
Switzerland	0.016	0.516	0.384	4.267***
Cyprus	0.071	2.219***	0.290	8.286***
France	0.003	0.143	0.254	8.759***
Greece	0.053	0.609	0.147	1.105
Italy	0.056	0.789	0.452	3.348***
Malta	0.012	0.353	0.584	4.326***
Portugal	0.068	3.238***	0.368	4.658***
Spain	0.026	0.292	0.322	3.009***
Turkey	0.072	0.889	1.104	28.308***
Denmark	0.004	0.667	0.471	13.457***
Estonia	-0.016	-2.286***	0.490	14.000***
Finland	0.052	0.929	0.570	4.957***
Iceland	-0.001	-0.027	0.857	34.280***
Ireland	0.007	0.132	0.567	7.088***
Latvia	0.012	0.706	0.627	6.029***
Lithuania	0.096	1.032	0.926	6.173***
Norway	0.049	2.333***	0.682	15.500***
Sweden	0.022	0.314	0.574	7.553***
UK	0.021	0.362	0.737	23.031***

[a] OLS Mean Group Estimator is simple cross section average of OLS estimator for each cross section unit.
[b] CCE Pooled Estimator is defined by eq(65) and t-stat is the associated t-ratio of the standard error based on Newey-West type variance estimator of eq(74) in Pesaran (2006).
[c] CCE Estimator for a Country is defined by eq(26) and the corresponding t-stat associated to the standard error based on Newey-West type variance estimator of eq(50) in Pesaran (2006).
*** Rejects the null at the 1% level.

Table 9: Panel Estimates of the Cointegration Relationship: CCE-PPE

Central European Countries

OLS Mean Group Estimates a)

	β_1	t-stat	β_2	t-stat
All Countries	0.065	1.585	0.649	8.269***

Pesaran's (2004) CD test statistic (residuals): 12.617.

Pesaran's (2006) CCE Pooled Estimates b)

	β_1	t-stat	β_2	t-stat
All Countries	0.006	1.120	0.974	50.576***

CCE Estimator for each country c)

Central European Countries	β_1	t-stat	β_2	t-stat
Austria	0.023	1.211	0.430	3.071***
Belgium	0.002	0.167	0.550	8.333***
Bulgaria	0.011	1.222	0.959	31.967***
Czech Republic	0.042	0.700	0.473	4.637***
Germany	0.041	1.281	0.306	1.117
Hungary	-0.205	-8.542***	1.113	23.188***
Luxembourg	-0.020	-0.952	0.862	14.131***
Netherlands	0.010	0.714	0.701	18.946***
Poland	0.060	1.538	0.995	71.071***
Romania	0.073	1.217	1.130	35.313***
Slovakia	-0.010	-2.500***	0.900	4.390***
Slovenia	-0.012	-3.000***	0.899	64.214***
Switzerland	0.002	0.077	0.922	8.951***

a) OLS Mean Group Estimator is simple cross section average of OLS estimator for each cross section unit.
b) CCE Pooled Estimator is defined by eq(65) and t-stat is the associated t-ratio of the standard error based on Newey-West type variance estimator of eq(74) in Pesaran (2006).
c) CCE Estimator for a Country is defined by eq(26) and the corresponding t-stat associated to the standard error based on Newey-West type variance estimator of eq(50) in Pesaran (2006).
*** Rejects the null at the 1% level.

Table 10: Panel Estimates of the Cointegration Relationship: CCE-PPE

South European Countries

OLS Mean Group Estimates a)				
	β_1	t-stat	β_2	t-stat
All Countries	0.038	0.491	0.520	4.094***
Pesaran's (2004) CD test statistic (residuals): 1.761.				
Pesaran's (2006) CCE Pooled Estimates b)				
	β_1	t-stat	β_2	t-stat
All Countries	0.049	1.252	0.797	16.941***
CCE Estimator for each Country c)				
South European Countries	β_1	t-stat	β_2	t-stat
Cyprus	0.012	0.200	0.14	2.439***
France	0.046	0.767	0.20	3.736***
Greece	0.426	7.745***	0.78	9.725***
Italy	0.030	0.909	0.95	11.321***
Malta	0.003	0.043	0.75	3.906***
Portugal	0.014	0.203	0.76	5.418***
Spain	0.009	0.214	0.85	8.455***
Turkey	0.046	0.407	0.88	16.509***

[a)] OLS Mean Group Estimator is simple cross section average of OLS estimator for each cross section unit.
[b)] CCE Pooled Estimator is defined by eq(65) and t-stat is the associated t-ratio of the standard error based on Newey-West type variance estimator of eq(74) in Pesaran (2006).
[c)] CCE Estimator for a Country is defined by eq(26) and the corresponding t-stat associated to the standard error based on Newey-West type variance estimator of eq(50) in Pesaran (2006).
[***] Rejects the null at the 1% level.

Table 11: Panel Estimates of the Cointegration Relationship: CCE-PPE

North European Countries

OLS Mean Group Estimates a)

	β_1	t-stat	β_2	t-stat
All Countries	0.067	1.399	0.664	11.057***

Pesaran's (2004) CD test statistic (residuals): 5.112.

Pesaran's (2006) CCE Pooled Estimates b)

	β_1	t-stat	β_2	t-stat
All Countries	0.061	2.979***	0.587	7.168***

CCE Estimator for each country c)

North European Countries	β_1	t-stat	β_2	t-stat
Denmark	0.009	0.600	0.738	16.043***
Estonia	0.020	2.222	0.428	4.756***
Finland	0.152	2.027	0.426	2.731***
Iceland	-0.019	-0.528	0.842	18.711***
Ireland	0.002	0.053	0.377	7.854***
Latvia	-0.023	-2.556***	-0.201	-4.467***
Lithuania	0.565	4.669***	0.529	3.574***
Norway	0.017	0.895	0.514	9.885***
Sweden	0.095	2.436***	0.170	2.297
UK	0.030	0.577	0.629	22.464***

[a] OLS Mean Group Estimator is simple cross section average of OLS estimator for each cross section unit.
[b] CCE Pooled Estimator is defined by eq(65) and t-stat is the associated t-ratio of the standard error based on Newey-West type variance estimator of eq(74) in Pesaran (2006).
[c] CCE Estimator for a Country is defined by eq(26) and the corresponding t-stat associated to the standard error based on Newey-West type variance estimator of eq(50) in Pesaran (2006).
*** Rejects the null at the 1% level.