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TOURISM LED GROWTH: EVIDENCE FROM PANEL COINTEGRATION TESTS

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Tourism Led Growth:
Evidence from Panel Cointegration Tests

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Abstract

The Tourism-Led-Growth hypothesis is investigated in this study. We employ a panel of 187 countries for a period that spans from 1995 to 2009. Panel unit root tests confirm that both GDP and tourism receipts are non-stationary. Alternative panel cointegration tests are employed and the results suggest that there is a long-run relationship between tourism receipts and GDP. Different specifications that take into account the accounting effect, confirm the latter. Finally, the long-run elasticities of tourism receipts on GDP are found to take values close to 0.2.

Keywords: panel unit roots; panel cointegration; tourism-led-growth.
JEL codes: L83; C33; O11.

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1. Introduction

Tourism has gained considerable importance in the global economy, both for developed and developing countries. Its positive benefits for economic growth are well-documented in the economics literature (e.g., Sinclair 1998; Balaguer and Cantavella-Jordà 2002; Durbarry 2004; Nowak *et al* 2007). As WEF (2011) reports, Travel & Tourism is one of the world's largest industries, contributing US$ 5,834.5 billion to global GDP, 9.3% of the total in 2010. It also supports over 235 million jobs, and these are forecasted to increase to just over 303 million by 2020. Furthermore, from direct and indirect combined activities the Travel & Tourism sector now accounts for a remarkable 4.8% of world exports, and 9.2% of world investment. According to UNWTO (2010), even in the context of the current global economic downturn tourism remains one of the most promising sectors for reducing unemployment, considering that job creation in tourism tends to outgrow that of other sectors.

In particular, international tourism is recognized as having a positive effect on economic growth through many different channels, like increasing personal income, taxes, revenues and employment opportunities (Lee and Chang 2008), increasing foreign exchange earnings, which yield capital goods accumulation (McKinnon, 1964) contributing in this way to the balance of payment (Nationmaster, 2010), stimulation of investments in new infrastructures (Eugenio-Martìn and Morales 2004; Sakai 2009), human capital (Blake *et al* 2006) and technology (Feng and Morrison 2007; Lemmetyinen and Go2009). Furthermore, tourism stimulates other related industries by direct, indirect and induced effects (Syriopoulos 1995; Spurr 2009) and causes positive economies to scale and scope (Andriotis 2002; Weng and Wang 2004). Finally, Sinclair (1998) points out that developing countries often are more endowed with natural resources (e.g., wildlife, coral reefs, canyons, caves, falls and deserts).

There are also disadvantages, together with advantages, deriving from tourism development, like costs incurred from the provision and maintenance of infrastructures and the need for specialized education (Sinclair 1998), increased pollution, congestion or despoliation of the environment (Pearce 1985; Jenner and Smith 1992; Gursoy and Rutherford 2004), and potential increase of crime and violence (Dunn and Dunn 2002). Overall, taking into account the potential economic, social, cultural, environmental and political benefits and costs of tourism development, there is a general consensus to the point that tourism sector may significantly contribute to economic growth.

The aim of this paper is to investigate the existence of a long-run relationship between tourism receipts and GDP, in this way providing evidence of the so-called Tourism-Led-Growth Hypothesis (TLGH) for a wide range of countries (187 countries) and for a period that spans from 1995 to 2009, by utilizing a battery of panel cointegration tests. The TLGH was directly derived from the Export-Led Growth Hypothesis (ELGH) that postulates that economic growth can be generated not only by increasing the amount of labour and capital within the economy, but also by expanding exports (Balassa

1978). Analogously to the ELGH, the TLGH analyzes the possible temporal relationship between tourism development (in our paper measured by tourism receipts) and economic growth (measured by GDP), both in the short and long-run (Brida and Pulina 2010). From an empirical perspective, the TLGH has mainly been tested via the so-called Granger no-causality test (Granger 1988).

Since the empirical evidence on the TLGH is still mixed, this paper aims at further investigating the following research questions: does tourism affect economic growth? Is there along-run relationship between tourism and economic growth? And, finally, how much (in terms of elasticity) does tourism development contribute to economic growth?

Our results confirm that both GDP and tourism receipts are non-stationary. This suggests that when employing first differences vital information is left out. Moreover, more than one panel cointegration tests suggest that there is a long-run relationship between tourism receipts and GDP. Alternative specifications confirm the latter. Finally, we reveal that the long-run elasticities of tourism receipts on GDP take values close to 0.2.

The paper is organized as follows. Section 2 briefly reviews the literature, from both a theoretical and an empirical perspective, on the relationship between tourism development and economic growth, and more specifically on the TLGH. Section 3 describes the data set and the variables used, the empirical methodologies applied (panel unit root tests and panel cointegration tests) and the interpretative framework. Section 4 presents and discusses our empirical findings, while Section 5 provides concluding remarks and future research directions.

2. Tourism Development and Economic Growth: The Evidence

Several studies investigated whether tourism development contributes to economic growth, from both a theoretical and an empirical point of view, but the empirical evidence on the impact of the tourism sector on economic growth, and the TLGH in particular, is mixed. This inconclusiveness stems from a lack of homogeneity and comparability in terms of sample data, time periods, geographical locations and methodologies (Lee and Chang 2008).

From a theoretical perspective, the relationship between the tourism sector and economic growth has been developed in three dimensions: i) the short-run analysis based on the Keynesian income multiplier, so-called tourism multiplier (for a review, see Cooper *et al* 2008); ii) the Input-Output model or the Computable General Equilibrium (CGE) model, studying the interrelationship between the tourism sector and other sectors (Copeland 1991; Dwyer *et al* 2004 and 2006; Blake *et al* 2006; Sinclair *et al* 2010); and iii) the long-run perspective rooted in either exogenous or endogenous growth models (Hazari and Sgrò 1995; Lanza and Pigliaru 1995 and 2000; Candela and Cellini 1997; Lozano *et al* 2008).

The TLGH is linked to endogenous growth modelling and can be empirically tested through the analysis of reduced-form time-series models or within panel data structures.

The research question we address in this paper is twofold. First we wish to test whether there is a long-term relationship between tourism and GDP growth. Second we wish to measure the long-run elasticity between tourism sector and GDP (i.e., "how much" can tourism increase GDP in the long-run).

One of the first theoretical contributions in this context is Lanza and Pigliaru (1995). They apply the Lucas two-sector endogenous growth model (Lucas 1988) to the tourism sector. They focus on an economy specialized in manufacturing goods and another specialized in tourism goods in order to examine whether a tourism economy is inevitably associated with a lower growth rate than a manufacturing one, under the assumption that the technological progress is higher in the manufacturing sector than in the tourism sector. They conclude that the tourism sector would grow at a higher rate than the manufacturing sector if and only if an increase in the terms of trade more than compensates the technological gap between the two sectors and the two goods are not close substitutes to each other (i.e., the elasticity of substitution between them is lower than one).

Within the same framework Candela and Cellini (1997) show that the smaller the economy, the easier would be for the terms of trade to offset the technological gap (i.e., the smaller the opportunity cost of specializing in tourism) and therefore the countries specializing in tourism tend to be small in size. Lanza and Pigliaru (2000) demonstrate that a country with a large endowment of natural resources would specialize in tourism and grow faster even when the increase in the terms of trade does not balance the technological gap. This is because the rate of utilization of tourism resources would increase sufficiently to offset the technological gap. However this is a temporary condition, because if the rate of exploitation of natural resources keeps increasing over time so to become greater than their natural rate of reproduction, tourism may cease to affect GDP long-run growth. As a consequence, there could be potential problems of sustainability of the growth process (on the sustainability issue, see Giannoni and Maupertuis 2007; Cerina 2007; Lozano *et al* 2008).

Various methodological approaches have been used to empirically assess the TLGH: VAR, VECM, ARDL, ARCH, E-GARCH-M, panel data models and causality tests. Initially, this literature mainly made use of vector autoregressive (VAR) models. Subsequently, most studies implemented the VAR specification into a vector error correction mechanism (VECM) model (Engle and Granger 1987) so as to take explicitly into consideration the short and the long-run dynamics (Oh 2005; Tang *et al* 2007; Jackman and Lorde 2010) while Granger causality tests were implemented to check exogeneity[1].

[1] Additional time-series approaches have been employed in the literature: the autoregressive distributed lags (ARDL) model, (Narayan 2004; Katircioglu 2009a,b,c); the exponential generalised autoregressive conditional heteroskedastic model in mean, E-GARCH-M (Chen and Song 2009); and a multivariate ARCH with a bootstrap Granger causality (Gunduz and Hatemi-J 2005).

Panel data modelling has been implemented several distinct methodologies (for a survey see Brida and Pulina 2010), such as least squares dummy variables (LSDV), generalised methods of moments (GMM) and heterogeneous panel, Sims causality test (Sims 1972), linear feedback measures (Geweke *et al* 1983; Geweke 1984), Toda and Yamamoto (1995) approach that generalises the Granger procedure (Lean and Tang 2009), Zapata and Rambaldi (1997) approach that proposes to test causality with an alternative procedure for moderate to large sample situations (Tang *et al* 2007), the graph theoretical approach (Demiralp *et al* 2003), Pedroni approach (Pedroni 2004), Quantile Regression (Mussoni *et al* 2012), and most of all Granger causality test.

From an empirical perspective, the studies trying to detect the impact of tourism on economic growth can be mainly classified as: (i) case studies, or (ii) cross-country comparisons. The case study approach was dominant for a long time because of the scarce availability of cross-country data. A first case study about the temporal relationship between tourism and international trade was proposed by Shan and Wilson (2001) for China, but the TLGH was first tested by Balaguer and Cantavella-Jordà (2002) for Spain. Some other studies analyzing the relationship between tourism and economic growth for specific countries include, for example, Dritsakis (2004) for Greece, Durbarry (2004) for Mauritius, and Novak *et al* (2007) for Spain. Novak *et al* test the so-called TKIG (tourism, (k) capital, import, growth) hypothesis, and they find that international tourism brings in foreign exchange earnings, which can be used to import capital goods, thus leading in turn to economic growth. Cortés-Jiménez (2008) applies the Arellano-Bond estimator for dynamic panel data to two countries, Spain and Italy, and finds that domestic tourism is important for economic growth in the case of Spain, while international tourism seems to be more significant for Italy. These studies mainly rely on econometric techniques such as cointegration and error correction models and mainly find evidence of a positive relationship between economic growth and tourism (Adamou and Clerides 2010).

Regarding the cross-country studies, one of the main contributions is due to Brau *et al* (2004 and 2007), who want to empirically investigate the conclusions of Lanza and Pigliaru (1995 and 2000). Their results show that tourism-specializing countries grow at a significantly higher rate than all the other countries they analyzed (OECD countries, small countries, less-developed countries, oil producers), thereby confirming the conclusions of Lanza and Pigliaru models about the importance of tourism specialization for economic growth. Moreover, they show that small tourism-specializing countries grow much faster than other small countries, thereby also supporting the findings of Candela and Cellini (1997). From Brau *et al* (2004 and 2007) we can therefore conclude that even if smallness per se can be bad for growth (Easterly and Kraay, 2000), this is not true when small size goes together with tourism specialization. On the other hand the critics of these papers claim that only some of the control variables that are typical of the endogenous growth literature are taken into consideration (openness to trade and initial income levels are included, but not investment and human capital).

Further studies follow more closely the endogenous growth literature and use panel data techniques, like Eugenio-Martìn *et al* (2004), who find that tourism and higher economic growth are associated only in low and medium income countries, but not in high-income countries. Subsequently, Sequeira and Campos (2007) do not find evidence that tourism specialization and economic growth are linked, but afterwards, Sequeira and Nunes (2008) on the contrary find that tourism specialization does affect economic growth, both in all countries and specifically in poor countries (in contrast to the conclusions of Brau *et al* 2007 that tourism is more important in small countries).

More recently, Figini and Vici (2010) find some evidence linking tourism specialization with economic growth only for the 1980-1990 period (while not for the 1990-2005 period), but they conclude that since the data from that period are not fully reliable, there is no robust evidence on the link between tourism specialization and higher growth rates. Therefore, unlike most of the previous empirical literature, they conclude that there is not any significant independent relationship between tourism specialization and economic growth. They claim that this is consistent with Lanza and Pigliaru model (1995 and 2000), insofar as Lanza and Pigliaru just show the conditions under which a tourism-based economic growth can thrive, despite a low rate of technological progress. Instead Figini and Vici (2010) show that on average a tourism-specializing country does not grow differently from any other country. Furthermore, they argue that the higher growth rates they find for tourism-specializing countries in the 1980s with respect to the 1990s might stem from the increasing rate of exploitation of natural resources, thus leading to a worsening of the long-run sustainability (similarly to the scenario presented in Brau *et al* 2004 and 2007). On the contrary, Adamou and Clerides (2010) find that tourism specialization is associated with higher rates of economic growth at relatively low levels of specialization, but then diminishing returns begin and tourism's contribution becomes minimal (the turning point is estimated to be at a 20% level of specialization). Therefore, they conclude that there is a promise for tourism-led growth, in particular for countries at relatively early stages of development (i.e. developing countries), but the contribution of tourism to economic growth cannot continue indefinitely, so that once the potential benefits of tourism are finished other economic sectors must be developed in order to make the economy grow.

In conclusion, we can summarize the main empirical findings of the literature on the TLGH in four main categories: (i) unidirectional causality running from tourism development to economic growth (the tourism-led growth hypotheses-TLGH); (ii); unidirectional causality running from economic growth to tourism development (economic-driven tourism growth hypotheses); (iii) bi-directional causality between tourism and economic growth (reciprocal causal relationship between each other); (iv) no causal relationship between tourism development and economic growth (no feedback effect between each other). These four cases can be further classified in two scenarios: short-run Granger causality and long-run Granger causality (for a review, see Brida and Pulina 2010).

In the short-run the TLGH is confirmed for the following countries: Spain (Nowak *et al* 2007; Cortés-Jiménez and Pulina 2010), the European and Latin American countries (Po and Huang 2008), Taiwan (Chen and Song 2009), and South Africa (Akinboade and Braimoh 2010). On the contrary, a unidirectional temporal relationship running from economic growth to tourism development is detected for South Korea (Oh 2005), African countries (Lee and Chang 2008), USA (Tang and Jang 2009), and for Fiji, Tonga, Solomon Islands and Papua New Guinea (Naryan *et al* 2010). For Cyprus, Louca (2006) finds a unidirectional Granger causality running from transport expenditure and hotel expenditure to tourism industry income and tourism arrivals, respectively. A bi-directional Granger causality is found for Greece (Dritsakis 2004), Turkey (Demiroz and Ongan 2005), Latin American countries (Lee and Chang 2008), and South Korea (Chen and Song 2009). Finally, in the case of Barbados, Jackman and Lorde (2010) do not find any temporal relationship between tourism and household's expenditure growth.

On the other hand, in the long-run a cointegrating relationship between the economic variables under investigation is found in nearly all studies, except the case of Barbados (Jackman and Lorde 2010) and Turkey (Katircioglu 2009c). The TLGH is validated for the following countries: Spain (Balaguer and Cantavella-Jordà 2002), 13 OECD countries (Lanza *et al* 2003), Greece (Dritsakis 2004), Latin American countries (in low and medium-income countries, but not in high-income countries, see Eugenio-Martìn and Morales 2004), Turkey (Gunduz and Hatemi-J 2005), OECD, Asia and Africa (Lee and Chang 2008), Uruguay (Brida *et al* 2008a), Mexico (Brida *et al* 2008b), Nicaragua (Croes and Vanegas 2008), Chile (Brida and Risso 2009), Colombia (Brida *et al* 2009), Tunisia (Belloumi 2010), South Africa (Akinboade 2010), Antigua and Bermuda (Schubert *et al* 2011), Fiji, Tonga, Salomon Islands and Papua Guinea (Narayan *et al* 2010), Trentino Alto Adige and South Tyrol, Italy (Brida *et al* 2010; Brida and Risso 2010), and Italy (Cortés and Pulina 2010). The opposite result of a unidirectional temporal relationship running from economic growth to tourism development is found for Fiji (Narayan 2004), South Korea (Oh 2005), and Cyprus (Katircioglu 2009a). Instead, a bi-directional Granger causality is found for Mauritius (Durbarry 2004), Turkey (Demiroz and Ongan 2005), Taiwan (Kim *et al* 2006), Spain (Nowak *et al* 2007; Cortés and Pulina 2010), Latin American countries (Lee and Chang 2008), Malta (Katircioglu 2009b), and Malaysia (Lean and Tang 2009).

The final picture emerging from this literature review is rather mixed and not clear-cut, because if many studies find evidence of a positive effect of tourism specialization on economic growth (in particular in small and developing countries), there are also studies concluding about the opposite casual relationship (from economic growth to tourism development) and some others showing the existence of a bi-directional Granger causality. One possible explanation for these mixed results is that the different studies use different methodologies and specifications. Moreover, many case studies are specific to some countries and therefore they are not immediately applicable to other countries.

Additionally, there are several possible explanations for the differences existing in the level of tourism and economic development, like different natural resources, tourism infrastructures, education, safety and socio-cultural features, etc. In conclusion, these findings suggest the need to employ different econometric tools and data set and in general to further investigate in order to better assess the TLGH. This is the contribution our paper intends to give.

3. Data and Methodology

3.1 Data

Tourism time-series data are limited on a global scale. Most tourism time-series data begin in 1980, but they are viewed as unreliable due to measurement errors. In this essay we use World Development Indicators (WDI_GDF, 2011), the World Bank database which provides tourism-related variables starting from 1995. The WDI_GDF database utilizes tourism data from the World Tourism Organization (WTO). From this database, the variables Gross Domestic Product (GDP) and International Tourism receipts, measured in current US dollars, are used to test the long-run relationship between tourism development (tourism receipts) and economic growth (GDP).

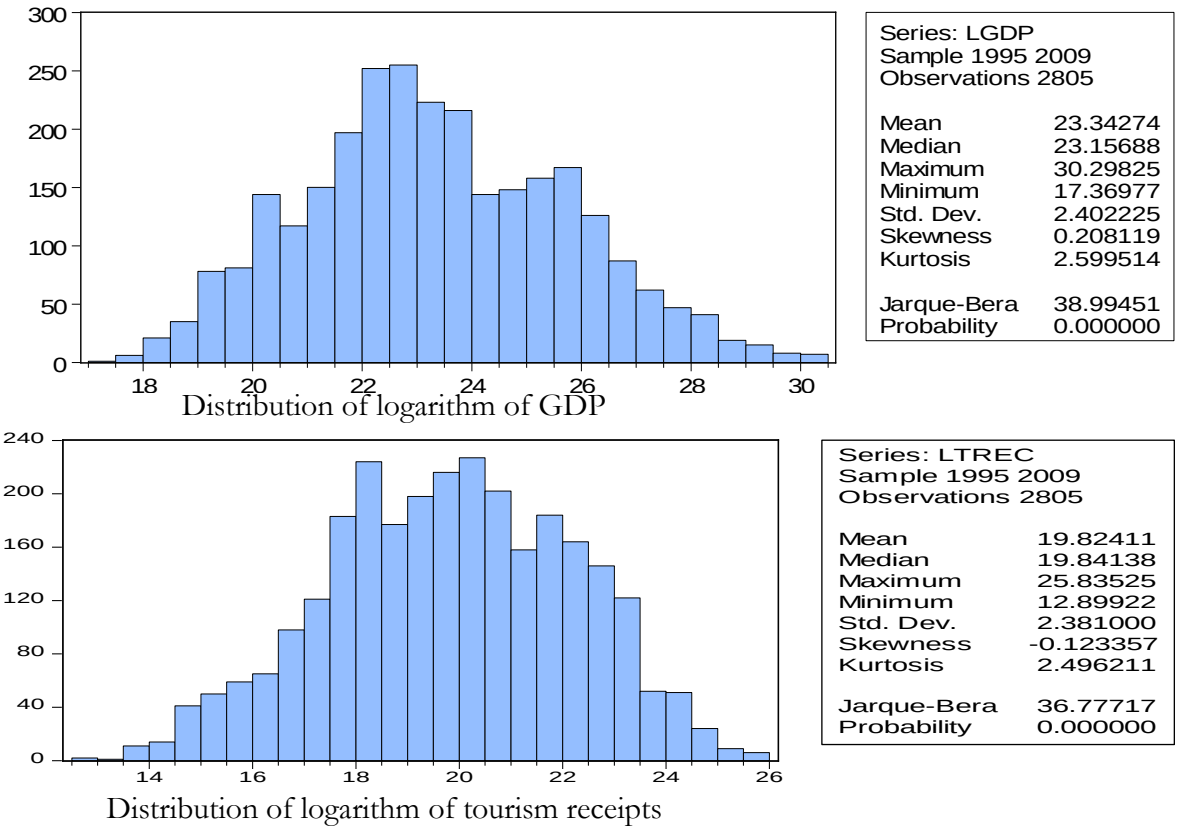
Initially, an unbalanced panel set is created including 187 countries (the list of countries is listed in the Appendix), in annual frequency for the time period 1995-2009. The main criterion was the availability of at least two observations for both variables, in matching dates. Gross domestic product in its construction includes tourism receipts, so it's endogenous to tourism receipts by definition. In order to avoid the accounting effect on the relation between tourism and GDP, the variable GDP without tourism (referred as "GDP no tourism" from now on) is created by the difference between GDP and tourism receipts (see also Sharma and Panagiotidis 2005). All variables are taken in natural logarithms. The panel set is unbalanced, due to lack of observations, and this could introduce limitations in the analysis. For this reason, a balanced set is created, by employing interpolation techniques.

The descriptive statistics and the distribution of the variables in the unbalanced and balanced panel sets are shown in Table 1 and Figure 1. Both unbalanced and balanced panel samples exhibit similar properties.

Table 1: Summary Statistics

	Descriptive statistics					
	Unbalanced Panel			Balanced Panel		
	log of GDP	log of "GDP no tourism"	log of tourism receipts	log of GDP	log of "GDP no tourism"	log of tourism receipts
Mean	23.36	23.38	19.95	23.33	23.25	19.8
Median	23.18	23.22	19.99	23.15	23.09	19.81
Maximum	30.29	30.28	25.83	30.29	30.28	25.83
Minimum	17.86	17.41	12.89	17.36	17.14	12.89
St.Dev.	2.39	2.43	2.33	2.39	2.44	2.37
Skewness	0.21	0.17	-0.13	0.21	0.18	-0.11
Kurtosis	2.57	2.55	2.53	2.6	2.6	2.49
Jarque-Bera	42.05***	34.69***	32.14***	39.54***	34.15***	36.81***
Prob	0.00	0.00	0.00	0.00	0.00	0.00

Figure 1: Distribution of logarithm of GDP (LGDP) and tourism receipts (LTREC)



3.2 Methodology

The empirical analysis is divided in three parts and is applied to both types of panel sets (unbalanced and balanced). In the first part, through panel unit roots tests we examine for the existence of panel unit roots in the variables. In the second part, panel cointegration tests investigate the existence of a

long-run relationship between tourism and GDP (in its two specifications). In the third part, estimation of the long-run relationship is carried out with panel least squares (PLS).

3.2.a. Panel Unit root and stationarity tests

First of all, the three variables are tested for the existence of unit roots in levels and in first differences. There are two types of Panel Unit root tests, one category that is aimed at checking the existence of a common unit root for all the cross sections (Common Unit root tests) and the other category that is aimed at investigating the existence of an individual unit root for each cross-section of the panel (Individual Unit root tests). The Common Unit root tests are the LLC test (Levin, Lin, Chu, 2002) and the Breitung test (2001). The Individual Unit root tests are the IPS test (Im, Pesaran, Shin, 2003), the Fisher-Augmented Dickey Fuller (Fisher ADF) test and the Fisher-Phillips Peron (Fisher PP) test. Alternatively, through the Hadri test it is possible to verify the null hypothesis of stationarity on a common root context. In all tests, unit roots are tested with intercept and linear trend (for more details on all the tests see the technical appendix).

3.2.b. Panel Cointegration tests

The Panel Cointegration tests, which examine the existence of a long-run relationship, are classified into two types: tests based on the Engle-Granger (1987) methodology and tests based on the Johansen-Fisher methodology. The Engle-Granger based tests used in this paper are the Pedroni (1999, 2004) test and Kao (2004) test. The Johansen-Fisher based test is the one proposed by Maddala and Wu (1999) (more details are available at the technical appendix).

3.2.c Long-Run Models

If the two alternative specifications of GDP and tourism receipts are cointegrated, then the long-run models are estimated. The estimation is carried out with Panel Least Squares (PLS).

Panel Least Squares (PLS)

The long-run equations between tourism receipts and GDP (in its two specifications) are in the following general forms:

$$y_{it} = \sim_i + \quad rt_{it} + £_{it} \quad , \qquad \text{where } y_{it} : \text{log of GDP t} \ , rt_{it} : \text{log of tourism receipts}$$

$$y_{it}^{NT} = \sim_i + \quad rt_{it} + u_{it} \qquad\qquad y_{it}^{NT} : \text{log of GDP without tourism receipts}$$

The parameter is the long-run elasticity of tourism receipts on GDP and ~ is an intercept parameter.

The first equation is more likely to exhibit endogeneity bias in the parameters, while in the second equation the variables are considered as exogenous by construction. The equations will be estimated

with Least Squares, assuming fixed effects, random effects and pooled estimation. The estimation will be carried out in both types of panel sets, balanced and unbalanced. In the balanced set, random effects can be additionally inferred by assuming two-way random effects (random cross-section and random-period) and combinations of fixed and random effects. In the unbalanced set random effects will be estimated by assuming only random cross-sections.

4. Empirical Findings

In the next section we present and discuss the empirical findings. For this reason, we follow the same three parts described in previous Section, which refer to the methodology used in the paper, that is (i) panel unit root tests, (ii) panel cointegration tests, and (iii) long-run models based on panel least squares (PLS).

4.2.a. Panel unit root tests

The three variables (log of GDP, log of GDP without tourism receipts, log of tourism receipts) have been tested for the existence of unit roots in levels and in first differences.

Tables 2 and 3 present the panel unit root and stationarity tests for the unbalanced set (for the levels and for the first differences of the variables respectively), while Tables 4 and 5 show the same tests for the balanced set.

Table 2: Panel Unit Root tests for the levels of the variables (Unbalanced Set)

Panel Unit root tests (Unbalanced set)-levels													
Variable	**Test**	**LLC**		**Breitung-t**		**IPS-W**		**ADF**		**PP**		**Hadri**	
		stat	***Prob***	***stat***	***Prob***	***stat***	**Prob**	***stat***	***Prob***	***stat***	***Prob***	***stat***	***Prob***
log of GDP	Individual effects	3.52	0.99	N/A	N/A	12.95	1	130.72 (chi-square) 14.40 (Choi Z-stat)	1 1	82.94 (chi-square) 19.52 (Z-stat)	1 1	165.56*** (Hadri Z-stat) 11575.3*** (Het Cons Z-stat)	0.00 0.00
	Individual effects and individual linear trends	-8.75***	0.00	8.19	1	-0.47	0.31	356.59 (chi-square) -0.65 (Choi Z-stat)	0.68 0.25	200.21 (chi-square) 7.21 (Choi Z-stat)	1 1	49.86*** (Hadri Z-stat) 137.9*** (Het Cons Z-stat)	0.00 0.00
log of GDP (no tourism receipts)	Individual effects	4.02	1			12.71	1	145.35 (chi-square) 14.47 (Choi Z-stat)	1 1	95.25 (chi-square) 19.47 (Choi Z-stat)	1 1	178.74*** (Hadri Z-stat) 14856.7*** (Het Cons Z-stat)	0.00 0.00
	Individual effects and individual linear trends	-7.87***	0.00	8.06	1	0.16	0.56	345.98 (chi-square) 0.73 (Choi Z-stat)	0.71 0.76	210.41 (chi-square) 7.58 (Choi Z-stat)	1 1	51.72*** (Hadri Z-stat) 135.32*** (Het Cons Z-stat)	0.00 0.00
log of tourism receipts	Individual effects	-2.40***	0.00			5.06	1	245.70 (chi-square) 5.86 (Choi Z-stat)	1 1	274.73 (chi-square) 5.66 (Choi Z-stat)	1 1	43.02*** (Hadri Z-stat) 1211.58*** (Het Cons Z-stat)	0.00 0.00
	Individual effects and individual linear trends	1.39	0.91	6.31	1	-0.48	0.31	391.84 (chi-square) 1.13 (Choi Z-stat)	0.18 0.12	365.30 (chi-square) 0.14 (Choi Z-stat)	0.58 0.558	23.92*** (Hadri Z-stat) 31.11*** (Het Cons Z-stat)	0.00 0.00

Notes

a. One lag assumed for all tests

b. Quadratic spectral kernel, Andrews's bandwidth is used for all tests.

c .The panel set includes 187 countries.

d. The null hypothesis of these tests is that the panel series has a unit root (non-stationary series) apart from the Hadri test which assumes stationarity

e. * 10% level of significance, ** 5% level of significance, ***1% level of significance.

Table 3: Panel Unit Root Tests for the first differences of the variables (Unbalanced Set)

Panel Unit root tests (Unbalanced set)-first differences													
Variable	**Test**	**LLC**		**Breitung-t**		**IPS-W**		**ADF**		**PP**		**Hadri**	
		stat	***Prob***	**stat**	**Prob**	**stat**	***Prob***	**stat**	***Prob***	**stat**	***Prob***	**Stat**	***Prob***
log of GDP	Individual effects	-2.48***	0.00	N/A	N/A	-8.65***	0.00	589.99*** (chi-square) -9.13 *** (Choi Z-stat)	0.00 0.00	756.6*** (chi-square) -13.25*** (Z-stat)	0.00 0.00	3.916*** (Hadri Z-stat) 42.87*** (Het Consi Z-stat)	0.00 0.00
	Individual effects and individual linear trends	13.12	1	9.02	1	-0.92	0.177	397.46 (chi-square) -1.14 (Choi Z-stat)	0.139 0.126	526.11*** (chi-square) -5.81*** (Z-stat)	0.00 0.00	10.93*** (Hadri Z-stat) 11.58*** (Het Consi Z-stat)	0.00 0.00
log of GDP (no tourism receipts)	Individual effects	0.31	0.62			-8.41***	0.00	572.71*** (chi-square) -8.75*** (Choi Z-stat)	0.00 0.00	730.50*** (chi-square) -12.71*** (Z-stat)	0.00 0.00	4.14*** (Hadri Z-stat) 5.95*** (Het Cons Z-stat)	0.00 0.00
	Individual effects and individual linear trends	7.63	1	6.91	1	-1.45*	0.073	396.94** (chi-square) -1.90** (Choi Z-stat)	0.030 0.028	547.415*** (chi-square) -6.05719*** (Choi Z-stat)	0.00 0.00	11.63*** (Hadri Z-stat) 11.96**** (Het Consi Z-stat)	0.00 0.00
log of tourism receipts	Individual effects	2.205	0.986			-12.8***	0.00	793.76*** (chi-square) -13.6*** (Choi Z-stat)	0.00 0.00	1223.28*** (chi-square) -21.6567 *** (Choi Z-stat)	0.00 0.00	0.81 (Hadri Z-stat) 1.12 (Het Cons Z-stat)	0.208 0.130
	Individual effects and individual linear trends	-49.8***	0.00	2.53	0.994	-8.79***	0.00	583.92*** (chi-square) -6.416*** (Choi Z-stat)	0.00 0.00	918.42*** (chi-square) -14.6007*** (Choi Z-stat)	0.00 0.00	9.44*** (Hadri Z-stat) 9.67*** (Het Cons Z-stat)	0.00 0.00

Notes

a. One lag assumed for all tests

b. The Quadratic spectral kernel, Andrews bandwidth is used for all tests.

c. The panel set includes 187 countries.

d. The null hypothesis of these tests is that the panel series has a unit root (non-stationary series) apart from the Hadri test which assumes stationarity

e. * 10% level of significance, ** 5% level of significance, ***1% level of significance.

Table 4: Panel Unit Root Tests for the levels of the variables (Balanced Set)

Panel Unit root tests (Balanced set)-levels													
Variable	**Test**	**LLC**		**Breitung-t**		**IPS-W**		**ADF**		**PP**		**Hadri**	
		stat	***Prob***	***stat***	***Prob***	***Stat***	***Prob***	***stat***	***Prob***	***stat***	***Prob***	***stat***	**Prob**
log of GDP	Individual effects	3.35	0.99			12.52	1	141.11 (chi-square) 13.86 (Choi Z-stat)	1 1	94.56 (chi-square) 18.86 (Choi Z-stat)	1 1	156.83*** (Hadri Z-stat) 2617230*** (Het Cons Z-stat)	0.00 0.00
	Individual effects and individual linear trends	-6.0***	0.00	9.14	1	-0.16	0.43	366.07 (chi-square) -0.69 (Choi Z-stat)	0.60 0.24	202.85 (chi-square) 7.08 (Choi Z-stat)	1 1	47.20*** (Hadri Z-stat) 134.88*** (Het Cons Z-stat)	0.00 0.00
log of GDP (no tourism receipts)	Individual effects	3.67	0.99			12.61	1	151.10 (chi-square) 13.68 (Choi Z-stat)	1 1	102.36 (chi-square) 18.54 (Choi Z-stat)	1 1	144.35*** (Hadri Z-stat) 3141531*** (Het Cons Z-stat)	0.00 0.00
	Individual effects and individual linear trends	-5.84***	0.00	7.86	1	0.27	0.60	353.56 (chi-square) -0.07 (Choi Z-stat)	0.76 0.46	216.04 (chi-square) 6.72 (Choi Z-stat)	1 1	45.63*** (Hadri Z-stat) 133.29*** (Het Cons Z-stat)	0.00 0.00
log of tourism receipts	Individual effects	-3.75***	0.00			4.45	1	258.06 (chi-square) 5.06 (Choi Z-stat)	1 1	304.97 (chi-square) 4.35 (Choi Z-stat)	0.99 0.99	45.20*** (Hadri Z-stat) 1017.93*** (Het Cons Z-stat)	0.00 0.00
	Individual effects and individual linear trends	-1.45*	0.07	4.69	1	-3.26***	0.00	453.70*** (chi-square) -3.05*** (Choi Z-stat)	0.00 0.00	454.69*** (chi-square) 2.00** (Choi Z-stat)	0.00 0.0225	22.94*** (Hadri Z-stat) 31.29*** (Het Cons Z-stat)	0.00 0.00

Notes

a. One lag assumed for all tests

b. The Quadratic spectral kernel, Andrews bandwidth is used for all tests.

c. The panel set includes 187 countries.

d. The null hypothesis of these tests is that the panel series has a unit root (non-stationary series) apart from the Hadri test which assumes stationarity

e. * 10% level of significance, ** 5% level of significance, ***1% level of significance.

Table 5: Panel Unit root Tests of the first differences of variables (Balanced Set)

Panel Unit root tests (Balanced set)-first differences													
Variable	**Test**	**LLC**		**Breitung-t**		**IPS-W**		**ADF**		**PP**		**Hadri**	
		stat	**Prob**	**stat**	**Prob**	**stat**	**Prob**	**stat**	**Prob**	**stat**	**Prob**	**stat**	**Prob**
log of GDP	Individual effects	1.52	0.93	N/A	N/A	-8.70***	0.00	615.10*** (chi-square) -9.42*** (Choi Z-stat)	0.00 0.00	776.92*** (chi-square) 13.59*** (Choi Z-stat)	0.00 0.00	3.30*** (Hadri Z-stat) 4.00*** (Het Cons Z-stat)	0.0005 0.00
	Individual effects and individual linear trends	16.75	1	9.15	1	-1.52*	0.06	430.00*** (chi-square) -145684*** (Choi Z-stat)	0.02 0.07	549.98*** (chi-square) -6.03*** (Choi Z-stat)	0.00 0.00	11.39*** (Hadri Z-stat) 11.26*** (Het Cons Z-stat)	0.00 0.00
log of GDP (no tourism receipts)	Individual effects	1.24	0.89			-9.10***	0.00	629.43*** (chi-square) -9.97*** (Choi Z-stat)	0.00 0.00	817.80*** (chi-square) -14.55*** (Choi Z-stat)	0.00 0.00	3.35*** (Hadri Z-stat) 4.98*** (Het Cons Z-stat)	0.0004 0.00
	Individual effects and individual linear trends	16.84	1	7.77	1	-2.22**	0.013	447.353*** (chi-square) -2.52267*** (Choi Z-stat)	0.005 0.005	593.91*** (chi-square) -7.38*** (Choi Z-stat)	0.00 0.00	11.23*** (Hadri Z-stat) 10.82*** (Het Cons Z-stat)	0.00 0.00
log of tourism receipts	Individual effects	-2.18**	0.01			-16.2***	0.00	933.66*** (chi-square) -15.94*** (Choi Z-stat)	0.00 0.00	1391.97*** (chi-square) -24.04*** (Choi Z-stat)	0.00 0.00	-0.30 (Hadri Z-stat) 3002.07*** (Het Cons Z-stat)	0.6208 0.00
	Individual effects and individual linear trends	5.83	1	2.89	0.99	-8.67***	0.00	677.80*** (chi-square) -7.82*** (Choi Z-stat)	0.00 0.00	1014.87*** (chi-square) -16.04*** (Choi Z-stat)	0.00 0.00	7.47*** (Hadri Z-stat) 8.73*** (Het Cons Z-stat)	0.00 0.00

Notes

a. One lag assumed for all tests

b. The Quadratic spectral kernel, Andrews bandwidth is used for all tests.

c. The panel set includes 187 countries.

d. The null hypothesis of these tests is that the panel series has a unit root (non-stationary series) apart from the Hadri test which assumes stationarity

e. * 10% level of significance, ** 5% level of significance, ***1% level of significance.

The case with and without trend under all different specifications were considered and are presented in Tables 2, 3, 4 and 5. The general conclusion that can be revealed from the panel unit root tests is that the level of the variables are I(1), so that that both GDP and tourism receipts are non-stationary. This suggests that when employing first differences vital information is left out. Nevertheless, the first difference of the variables are I(0), such that we can carry out the second part of the empirical analysis (Panel Cointegration tests) by taking the first difference of the variables, in order to check for the existence of a long-run relationship between them.

4.2. b. Panel cointegration tests

The next step is to consider panel cointegration tests in order to investigate the existence of a long-run relationship between tourism receipts and GDP (in its two specifications: with and without tourism receipts).

Table 6 presents the panel cointegration tests for the unbalanced set, while Table 7 does the same tests for the balanced set. The cases we considered were two: the long-run relationship between tourism receipts and GDP and the long-term relationship between tourism receipts and GDP (net of tourism receipts). Each case was estimated with i) no trend and no intercept, ii) intercept but no trend and iii) intercept with trend.

Table 6: Panel Cointegration Tests (Unbalanced Set)

Panel cointegration tests (Unbalanced set)						
log of tourism receipts	**log of GDP**			**log of GDP (no tourism receipts)**		
	Intercept without trend	No trend- no intercept	Intercept with trend	Intercept without trend	No trend- no intercept	Intercept with trend
Pedroni residual cointegration tests						
Panel statistics						
Panel-v	1.59**	7.210***	2.904***	1.436*	7.332***	4.043***
p-value	0.05	0.00	0.001	0.07	0.00	0.00
Panel-rho	-1.51*	-5.216***	4.08	-1.17	-5.06***	3.73
p-value	0.06	0.00	1	0.12	0.00	0.99
Panel-PP	-9.020***	-8.165***	-10.87***	-8.37***	-7.996***	-11.26***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Panel-ADF	-2.90***	-2.562***	-2.31**	-2.61***	-2.621***	-2.73***
p-value	0.001	0.005	0.01	0.004	0.004	0.0031
Panel statistics	**Weighted**					
Panel-v	-5.2	-3.66	-13.79	-3.070	-2.82	-10.13
p-value	1	0.99	1	0.9989	0.99	1
Panel-rho	-1.077	-3.32***	7.19	-1.94**	-2.91***	5.447
p-value	0.140	0.0004	1	0.0256	0.001	1
Panel-PP	-12.47***	-5.67***	-16.64***	-10.91***	-5.24***	-14.93***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Panel-ADF	-10.25***	-3.41***	-10.70***	-7.04***	-2.05**	-7.18***
p-value	0.00	0.00	0.00	0.00	0.02	0.00
Group statistics						
Group-rho	3.57	3.171785	9.90	3.69	3.14	10.17
p-value	0.99	0.99	1	0.99	0.99	1
Group-PP	-14.38***	-10.40***	-26.46***	-13.89***	-10.39***	-25.05***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Group-ADF	-7.05***	-4.73***	-9.71***	-6.44***	-4.76***	-10.60***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Kao residual cointegration tests						
ADF	-4.83***			-4.21***		
p-value	0.00			0.00		
Johansen-Fisher panel cointegration tests						
Trace test (Fisher stat)						
None	887.1***	896****	1503***	887.6***	901.1***	1234***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
At most 1	509.8***	552.5***	438.6***	506.2***	553.3***	432.9***
p-value	0.00	0.00	0.0001	0.00	0.00	0.02
Maximum eigenvalue test (Fisher stat)						
None	816.2***	752.3***	897.1***	818.1***	756.7***	875.1***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
At most 1	509.8***	552.5***	438.6***	506.2***	553.3***	432.9**
p-value	0.00	0.00	0.0001	0.00	0.00	0.02

Notes
a. One lag specified in all tests
b. Quadratic kernel, Newey automatic selected bandwidth
c. Sample 0f 187 countries
d. d.f corrected for ADF variances
e. * 10% level of significance, ** 5% level of significance, ***1% level of significance.

Table 7: Panel Cointegration Tests (Balanced Set)

Panel cointegration tests (Balanced set)						
log of tourism receipts	**log of GDP**			**log of GDP (no tourism receipts)**		
	Intercept without trend	No trend- no intercept	Intercept with trend	Intercept without trend	No trend- no intercept	Intercept with trend
Pedroni residual cointegration tests						
Panel statistics						
Panel-v	1.35*	5.13***	2.18***	1.17	5.27***	3.46***
p-value	0.08	0.00	0.01	0.11	0.00	0.00
Panel-rho	-3.72***	-6.14***	2.37	-3.39***	-6.09***	2.58
p-value	0.00	0.00	0.99	0.00	0.00	0.99
Panel-PP	-11.94***	-10.14****	-16.42***	-11.08***	-10.12***	-15.19***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Panel-ADF	-6.55***	-4.86***	-7.50***	-6.04***	-4.87***	-7.32***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Panel statistics	**Weighted**					
Panel-v	-5.25	-4.02	-13.66	-4.98	-3.91	-12.74
p-value	1	1	1	1	1	1
Panel-rho	-3.08***	-3.90***	5.10	-7.45***	-5.42***	-0.33
p-value	0.001	0.00	1	0.00	0.00	0.36
Panel-PP	-14.26***	-6.89***	-21.61***	-18.80***	-8.24***	-36.24***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Panel-ADF	-13.90***	-5.14***	-16.64***	-13.94***	-5.43***	-16.72***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Group statistics						
Group-rho	2.70	2.54	9.03	2.81	2.55	9.28
p-value	0.99	0.99	1	0.99	0.99	1
Group-PP	-15.34***	-10.41***	-28.03***	-14.69***	-10.31***	-25.35***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Group-ADF	-8.48***	-6.42***	-8.18***	-7.66***	-6.40***	-7.57***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Kao residual cointegration tests						
ADF	-5.62***			-5.13***		
p-value	0.00			0.00		
Johansen-Fisher panel cointegration tests						
Trace test (Fisher stat)						
None	975.2***	1009***	1346***	973.1***	1008***	1335***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
At most 1	573.5***	616.3***	456.8***	570.7***	615.6***	458.3***
p-value	0.00	0.00	0.002	0.00	0.00	0.001
Maximum eigenvalue test(Fisher stat)						
None	895.5***	848.6***	983***	894.1***	847.2***	969.2****
p-value	0.00	0.00	0.00	0.00	0.00	0.00
At most 1	573.5***	616.3***	456.8***	570.7***	615.6***	458.3***
p-value	0.00	0.00	0.002	0.00	0.00	0.001

Notes

a. One lag specified in all tests

b. Quadratic kernel, Newey automatic selected bandwidth

c. Sample 0f 187 countries

d. d.f corrected for ADF variances

e. * 10% level of significance, ** 5% level of significance, ***1% level of significance.

The alternative panel cointegration tests under the different assumptions that are presented in Tables 6 and 7 for the balanced and the unbalanced dataset reveal a similar message. They provide evidence in favour of cointegration, suggesting that there is a long-run relationship between tourism receipts and GDP (not a spurious regression). Alternative specifications (when tourism is deducted from GDP) confirm the latter making the statement even stronger. The accounting effect does not drive the result and the results are not sensitive to the measure of GDP (with and without tourism receipts). The cointegration relation between the two variables should also make us more sceptical when considering regression with first differences without taking into account the non-stationarity properties of the variables.

4.2.c Long-Run Models

Finally, given that the panel cointegration tests reveal the existence of a long-run relationship between tourism receipts and GPD (in both alternative specifications), we performed panel least squares (PLS) in order to estimate the magnitude of this long-run relationship between tourism receipts and GDP.

Table 8 shows the cointegration equations for the unbalanced set, while Figures 2 and 3 show the corresponding scatter plots between the variables (in the different specifications). Table 9 and Figures 4 and 5 present the corresponding results for the balanced set.

Table 8: Cointegrating equations (Unbalanced Set)

Unbalanced Sample results							
Depended variable		**log of GDP**			**log of GDP (no Tourism receipts)**		
Methodology		**Fixed**	**Random (cross-section/period none)**	**Pooled**	**Fixed**	**Random (cross-section/period none)**	**Pooled**
Constant	**Coefficient**	20.24***	13.34***	6.27***	20.75***	13.66	6.25
	t-stat	121.67	64.41	28.61	118.51	62.90	26.51
	p-value	0.00	0.00	0.00	0.00	0.00	0.00
log of Tourism receipts	**Coefficient**	0.161***	0.50***	0.86***	0.131****	0.48***	0.85***
	t-stat	19.34	53.80	78.90	15.026	49.61	73.11
	p-value	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R-squared		0.994		0.70	0.993		0.67
log likelihood		848.088		-4328.6	716.07		-4516.8
Adjusted R-squared (weighted)			0.52			0.47	
Adjusted R-squared (unweighted)			0.58			0.54	
Prob(F-stat)		0.00	0.00	0.00	0.00	0.00	
AIC		-0.5010		3.3583	-0.3986		3.50
SIC		-0.0424		3.3629	0.0599		3.50
Cross sections		187	187	187	187	187	187
Period		1995-2009	1995-2009	1995-2009	1995-2009	1995-2009	1995-2009
Obs		2579	2579	2579	2579	2579	2579
Rho(random)	**Cross section**		0.9513			0.9546	
	Idiosyncratic		0.0487			0.0454	

* 10% level of significance, ** 5% level of significance, ***1% level of significance.

Figure 2: Scatter plot between logs of GDP and Tourism Receipts (Unbalanced Set)

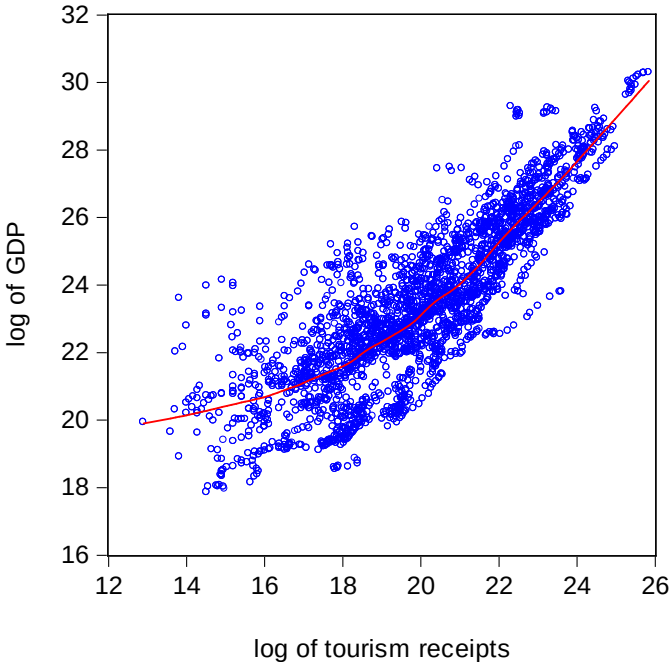


Figure 3: Scatter plot between logs of GDP (not including Tourism Receipts) and Tourism Receipts (Unbalanced Set)

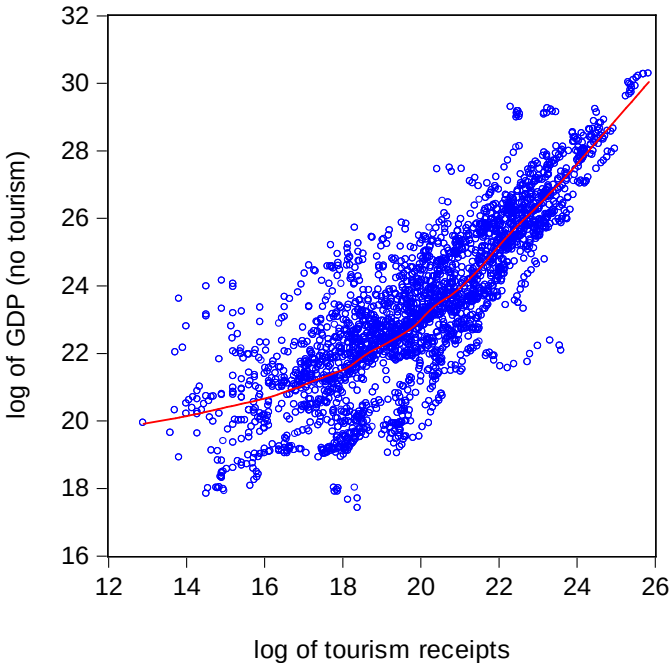


Table 9: Cointegrating equations (Balanced Set)

Balanced Sample results											
Depended variable		log of GDP					log of GDP (no tourism receipts)				
Methodology		Fixed	Random (two way)	Random (period)	Random (cross-section)	Pooled	Fixed	Random (two way)	Random (period)	Random (cross-section)	Pooled
Constant	Coefficient	19.95***	18.65***	19.20***	19.33***	6.66***	20.39***	19.01***	19.56***	19.78***	6.65***
	t-stat	115.39	89.29	114.17	114.40	31.73	111.40	85.90	110.11	110.44	29.48
	p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
log of tourism receipts	Coefficient	0.17***	0.23***	0.20***	0.20***	0.84***	0.14***	0.214156***	0.18***	0.17***	0.83***
	t-stat	19.62	25.84	24.60	23.69	80.02	15.65	22.19211	20.84	19.42	74.57
	p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R-squared		0.99				0.69	0.99				0.66
log likelihood		363.55				4770.05	202.67				4973.87
Adjusted R-squared (weighted)			0.19	0.99	0.72			0.14	0.98	0.68	
Adjusted R-squared (unweighted)			0.33	0.97	0.30			0.29	0.97	0.26	
Prob(F-stat)		0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00
AIC		-0.1151				3.40	-0.0004				3.5478
SIC		0.3125				3.40	0.4272				3.5520
Cross sections		187	187	187	187	187	187	187	187	187	187
Period		1995-2009	1995-2009	1995-2009	1995-2009	995-2009	1995-2009	1995-2009	1995-2009	1995-2009	995-2009
Obs		2805	2805	2805	2805	2805	2805	2805	2805	2805	2805
Rho (random)	Cross section		0.96		0.9707			0.9702		0.9718	
	Idiosyncratic		0.02	0.9409	0.0293			0.0282	0.94	0.0282	
	Period		0.001	0.0591				0.0016	0.05		

* 10% level of significance, ** 5% level of significance, ***1% level of significance.

Figure 4: Scatter plot between logs of GDP and Tourism Receipts (Balanced Set)

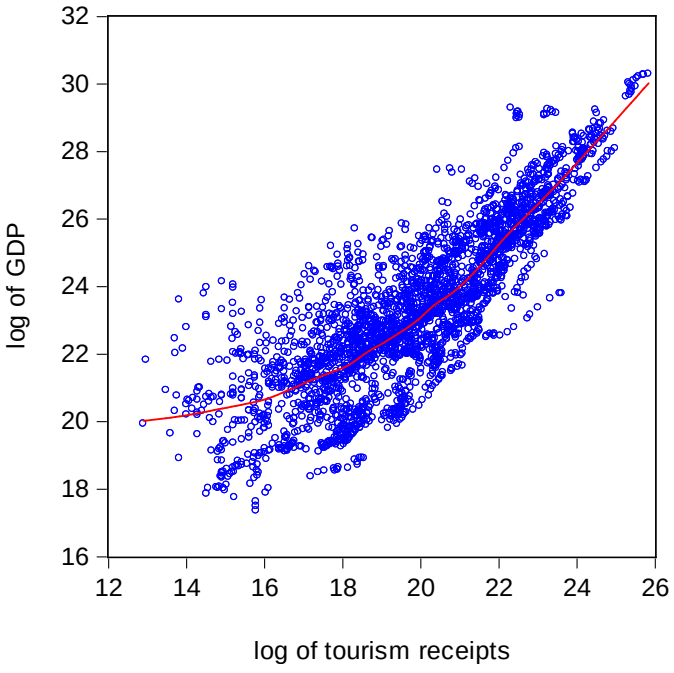
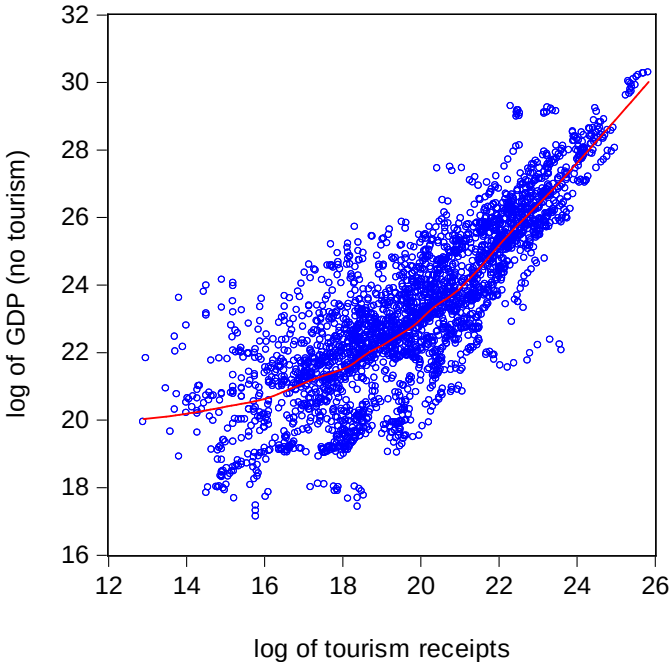


Figure 5: Scatter plot between logs of GDP (with no Tourism Receipts) and Tourism Receipts (Balanced Set)



In summary, the estimation of the long-run models reveals that the average long-run elasticity between tourism receipts and GDP is around 0.2. More specifically, the fixed effects elasticities for the unbalanced set are equal to 0.16 for the log of GDP, and to 0.13 for the log of "GDP no tourism", while the fixed effects elasticities for the balanced set are equal to 0.17 for the log of GDP, and to 0.14 for the log of "GDP no tourism". The scatter plots confirm our econometric conclusion of a positive long-run relationship between the two variables under consideration.

5. Conclusions

This study employed a wide panel of 187 countries. This heterogeneous sample includes economies at very different stages of their economic development, coming from different geographical regions and facing different characteristics and limitations. The period considered spans from 1995 to 2009. We considered the relationship between GDP (with and without tourism receipts) and tourism receipts.

Alternative panel unit root and stationarity tests confirmed that all three variables (GDP, GDP net of tourism and tourism receipts) are all I(1) and their first differences I(0). The next step was to employ a group of panel cointegration tests that supported the existence of long-run relationship between tourism and GDP (with and without tourism receipts). Different estimation techniques were employed to approximate the long-run elasticity. Its values ranged from 0.84 to 0.13. The average long-run elasticity between tourism receipts and GDP was found to be close to 0.2 (the fixed effects elasticities for the unbalanced panel was 0.16 for the log GDP and 0.13 for the log GDP net of tourism, while for

the balanced it was 0.17 and 0.14 respectively). The long-run elasticity for the log GDP without tourism is lower than the elasticity for the log GDP but their values are not qualitatively different.

Overall we have provided evidence in favour of the long-run tourism-led-growth hypothesis: tourism development seems to affect the economic growth of an economy. Future extensions of this research work could consist in applying further econometric methodologies to the same dataset, like Panel Error Correction Modelling and Models of asymmetry.

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Appendix

List of Countries							
Number	**Country**	**Number**	**Country**	**Number**	**Country**	**Number**	**Country**
1	Albania	51	Egypt	101	Luxembourg	151	Slovenia
2	Algeria	52	El Salvador	102	Macao	152	Solomon Islands
3	Angola	53	Equatorial Guinea	103	Madagascar	153	South Africa
4	Antigua and Barbuda	54	Eritrea	104	Malawi	154	Spain
5	Argentina	55	Estonia	105	Malaysia	155	Sri Lanka
6	Armenia	56	Ethiopia	106	Maldives	156	St. Kitts & Nevis
7	Aruba	57	Fiji	107	Mali	157	St. Lucia
8	Australia	58	Finland	108	Malta	158	St. Vincent & Grenadines
9	Austria	59	France	109	Marshall Islands	159	Sudan
10	Azerbaijan	60	French Polynesia	110	Mauritania	160	Suriname
11	Bahamas, The	61	FYROM	111	Mauritius	161	Swaziland
12	Bahrain	62	Gabon	112	Mexico	162	Sweden
13	Bangladesh	63	Gambia, The	113	Micronesia, Fed. Sts.	163	Switzerland
14	Barbados	64	Georgia	114	Moldova	164	Syria
15	Belarus	65	Germany	115	Mongolia	165	Tajikistan
16	Belgium	66	Ghana	116	Morocco	166	Tanzania
17	Belize	67	Greece	117	Mozambique	167	Thailand
18	Benin	68	Grenada	118	Namibia	168	Togo
19	Bermuda	69	Guatemala	119	Nepal	169	Tonga
20	Bhutan	70	Guinea	120	Netherlands	170	Trinidad &Tobago
21	Bolivia	71	Guinea-Bissau	121	New Caledonia	171	Tunisia
22	Bosnia and Herzegovina	72	Guyana	122	New Zealand	172	Turkey
23	Botswana	73	Haiti	123	Nicaragua	173	Turkmenistan
24	Brazil	74	Honduras	124	Niger	174	Uganda
25	Brunei	75	Hong Kong	125	Nigeria	175	Ukraine
26	Bulgaria	76	Hungary	126	Norway	176	United Arab Emirates
27	Burkina Faso	77	Iceland	127	Oman	177	United Kingdom
28	Burundi	78	India	128	Pakistan	178	United States
29	Cambodia	79	Indonesia	129	Palau	179	Uruguay
30	Cameroon	80	Iran	130	Panama	180	Uzbekistan
31	Canada	81	Iraq	131	Papua New Guinea	181	Vanuatu
32	Cape Verde	82	Ireland	132	Paraguay	182	Venezuela
33	Central African Republic	83	Israel	133	Peru	183	Vietnam
34	Chad	84	Italy	134	Philippines	184	West Bank and Gaza
35	Chile	85	Jamaica	135	Poland	185	Yemen
36	China	86	Japan	136	Portugal	186	Zambia
37	Colombia	87	Jordan	137	Puerto Rico	187	Zimbabwe
38	Comoros	88	Kazakhstan	138	Qatar		
39	Congo, Republic of	89	Kenya	139	Romania		
40	Costa Rica	90	Kiribati	140	Russia		
41	Cote d'Ivoire	91	Korea, Republic of	141	Rwanda		
42	Croatia	92	Kuwait	142	Samoa		
43	Cuba	93	Kyrgyzstan	143	Sao Tome and Principe		
44	Cyprus	94	Laos	144	Saudi Arabia		
45	Czech Republic	95	Latvia	145	Senegal		
46	Denmark	96	Lebanon	146	Serbia		
47	Djibouti	97	Lesotho	147	Seychelles		
48	Dominica	98	Liberia	148	Sierra Leone		
49	Dominican Republic	99	Libya	149	Singapore		
50	Ecuador	100	Lithuania	150	Slovak Republic		