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Abstract

This article provides a meta-analysis of a selected sample of 87 estimates from studies based on panel data techniques published through until 2012. The purpose is to obtain a summary measure of the effects of tourism on economic growth by applying models for both fixed and random effects. The results show a positive elasticity between GDP and tourism, although the magnitude of the effect varies according to the methodological procedure employed in the original studies for empirical estimates. In this sense, when estimates exclude other explanatory variables of economic growth, elasticities are overvalued.

Keywords

meta-analysis, panel data, economic growth, elasticity

Introduction

Tourism has attracted relatively little attention in the literature on economic development until the last decade. The main thrust of research on the economic impact of tourism has been to measure direct and secondary impacts on local and regional economies (Pearce and Butler 2010). As pointed out in Sinclair (1998), most studies on tourism published during the second half of the 20th century were not expressly directed toward the topic of tourism's role in economic development. In these studies, it was considered that foreign exchange earnings from tourism could be used to import capital goods to produce goods and services (McKinnon 1964), that tourism can favor employment or additional tax revenues (Davis, Allen, and Consenza 1988; Durbarry 2002; Khan, Seng, and Cheong 1990; Uysal and Gitelson 1994), and that tourism can generate economic growth by enhancing efficiency through competition (Bhagwati and Srinivasan 1979; Krueger 1980). Tourism can also facilitate the exploitation of economies of scale at a local level (Helpman and Krugman 1985).

Theoretical models that consider a causal relationship between tourism and economic growth are a relatively recent phenomenon (Kim, Chen, and Jang 2006). Lanza and Pigliaru (2007) were the first to investigate this relation from an empirical point of view, while Balaguer and Cantavella-Jordà (2002) were the first to analyze the *tourism-led growth hypothesis* (TLG)—that is, the hypothesis according to which tourism generates economic growth—from an econometric perspective. From the outset, an increasing number of articles with the same objective—although for different

countries, using different methodologies and obtaining different results—have been published.

Most of the studies, such as those by Dritsakis (2004), Durbarry (2004), Gunduz and Hatemi (2005), Katircioglu (2009, 2010), Kim, Chen, and Jang (2006), and Lee and Chien (2008), are based on time series and refer to single national economies. Other time series studies, such as those by Arslanturk, Balcilar, and Ozdemir (2011), Brida, Lanzilotta, Lionetti, and Risso (2010), Chen and Chiou-Wei (2009), Jin (2011), and Lean and Tang (2010), for example, provide support for the TLG hypothesis.

The TLG hypothesis has also been investigated using cross-sectional analyses. Among the published reports, those by Figini and Vici (2010), Lanza and Pigliaru (2007), Po and Huang (2008), and Singh (2008) are particularly relevant. Finally, a third group of studies on the TLG hypothesis is based on panel data, this being a method of studying a particular subject at multiple sites, periodically observed over a defined time frame (Hsiao 2003). The number of studies based on panel data is smaller than that for the time-series approach, although a larger sample of countries is included, thus making these analyses more global (Lee and Chang 2008).

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The TLG hypothesis has thus been analyzed by different quantitative approaches and multiple outcomes have been obtained, although no scientifically rigorous systematic review has yet been made to determine the reason for these differences. In this sense, the meta-analysis proposed in this article can fill that knowledge gap, because it aims to bring together empirical findings to explain the variation in results and thereby yield some generalizations and directions for future research.

Our objective is to apply quantitative research synthesis—meta-analysis—as a technique for comparative research, by reviewing published empirical studies that analyze the TLG hypothesis using panel data. These studies tend to be more recent and provide global estimates on the basis of large samples of countries as outlined in Lee and Chang (2008). Therefore, this analysis may extract generic conclusions that are valid at an international level. Further to this, the panel data method examines the relation between GDP and tourism by considering other variables that are also essential for economic growth.

The use of meta-analysis emerged in 1976 (Glass 1976). In contrast to the traditional narrative review, the basic purpose of meta-analysis is to provide the same methodological rigor to a literature review that is required for experimental research (Rosenthal 1995). Despite being a relatively recent technique, its use has spread to different scientific disciplines such as social and behavioral sciences (Castillo-Manzano and Castro-Nuño 2012; Cooper and Hedges 1994; Lipsey and Wilson 2001; Petticrew and Roberts 2006) and particularly health sciences (Eddy, Hasselblad, and Shachter 1995; Egger, Smith, and Altman 2001; Sutton, Abrams, Jones, Sheldon, and Song 2000).

In the case of economic growth and development studies, the meta-analysis technique has been used to integrate findings on the effects of fiscal policies (Nijkamp and Poot 2004; Phillips and Goss 1995), the influence of income inequality conditions or political structures (De Dominicis, Florax, and De Groot 2008; Doucouliagos and Ulubaşoğlu 2008), the contribution of social capital to economic growth (Westlund and Adam 2010) and population growth (Headey and Hodge 2009), and the effectiveness of development aid (Doucouliagos and Paldam 2008).

In the field of tourism, general applications of this technique can be found in tourism research (Dann, Nash, and Pearce 1988), tourism forecasting (Calantone, Di Benedetto, and Bojanic 1987), and more specifically on tourist and economic impact studies (Wagner 2002). Meta-analyses of particular importance in this field concern those performed on tourism income multipliers (Baaijens, Nijkamp, and Van Montfort 1998), regional tourism multipliers (Baaijens and Nijkamp 2000), and tourism demand (Crouch 1995; Lim 1999). More recently, reports have been published concerning specific branches of tourism, such as that by Carlsen and Boksberger (2011) on wine tourism, Weed (2009) on sports tourism, and Sariisik, Turkey, and Akova (2011) on sailing tourism.

This article is divided into six sections: after this introduction, the next section explains the meta-analysis technique. The third section analyzes and classifies the studies based on panel data to corroborate the TLG hypothesis, explaining how the estimates sample has been selected and organized. The fourth section describes the outputs obtained by meta-analysis. A discussion of the results is presented in the fifth section, and conclusions are provided in the final section.

Methodology

Following Glass, McGaw, and Smith (1981) and Lipsey and Wilson (2001), the meta-analysis method consists of deducing a *summary effect* based on the combination of different estimates (*effect sizes*) from a selected sample of studies by means of different statistical techniques (Chalmers, Hedges, and Cooper 2002); the most usual are the *fixed-effects model* (FEM) and the *random-effects model* (REM).

Under an FEM, the selected studies are combined on the premise that there is homogeneity among them and that, according to Borenstein, Hedges, Higgins, and Rothstein, (2009), there is one *true effect size* (θ) that underlies all the studies. The inference made is only conditioned by the considered studies, without taking into account the variability among them. The only determinant of the weight of each study in the meta-analysis would be its own variance (*within-study variance*).

The technique to combine studies according to an FEM, known as the *inverse variance weighted method*, was described by Birge (1932) and Cochran (1937). Each effect size is involved in the summary effect in a manner that is inversely weighted by its precision (*statistical weight*). Assuming a sample of “ m ” estimates or effect sizes ($i = 1, 2, \dots, m$), representing a measure of the analyzed effect called T_i , a summary effect \bar{T} may be formulated as in (1) (Borenstein et al. 2009):

$$\bar{T} = \frac{\sum w_i T_i}{\sum w_i} \quad (1)$$

where w_i is the statistical weight of the i th estimate: $w_i = 1/v_i$ [2], and v_i the variance of the i th estimate, so that $\sum w_i = 1$.

The variance of the summary effect is formulated as:

$$\text{Var}(\bar{T}) = \frac{1}{\sum w_i} \quad (3)$$

It is possible that the variability among studies is higher than that expected simply due to pure randomness, which would be detected in the first instance by testing the hypothesis of homogeneity. The most widely used test was originally developed by Cochran (1954); it calculates the parameter Q , where:

$$Q = \sum w_i (T_i - \bar{T})^2 \quad (4)$$

Because of the low power of this test, highlighted by Takkouche, Cadarso-Suárez, and Spiegelman (1999), it is

recommended that a *subgroup analysis* of studies with similarities to each other be performed, or that additional procedures are used to quantify the possible heterogeneity. Among these alternatives, I^2 is a parameter proposed by Higgins, Thompson, Deeks, and Altman (2003), which indicates the proportion of the variation between studies (*between-studies variance*) in the total variation; that is, the proportion of total variation due to heterogeneity:

$$I^2 = \frac{\tau^2}{\tau^2 + \sigma^2} \tag{5}$$

where τ^2 (tau-squared) is the *between-studies variance* and σ^2 the *within-study variance*.

If heterogeneity is detected, an REM should be used, which considers that the estimated effects of the included studies are only a random sample of all those possible.

Following Borenstein et al. (2009), the true effect (θ) under an REM could vary from study to study. If it was possible to perform an infinite number of studies, the true effect sizes for them would be distributed about a *mean effect* that would explain two possible sources of variation: within the studies (random error) and between studies (true dispersion), so that:

$$T_i = \theta_i + e_i \tag{6}$$

where e_i is the error when T_i estimates the true effect θ_i .

The variance is given by expression [7]:

$$\text{Var}(T_i) = \tau_0^2 + v_i \tag{7}$$

where v_i is the variance due to sampling error in the i th estimate, and τ_0^2 is the *between-studies variance*.

Applying the *variance-weighted method*, expression (2) under the REM is transformed and we have, for each i th estimate, adjusted weights (w_i^*) according to equation (8):

$$w_i^* = \frac{1}{\frac{1}{w_i} + \tau^2} \tag{8}$$

where τ^2 is the between-studies variance and w_i the statistical weight for an i th estimate under an FEM.

With regards to the summary effect \bar{T} (i.e., a *mean effect* obtained from “a distribution of effect sizes”) and its variance, from equation (8) we can calculate, respectively:

$$\bar{T} = \frac{\sum w_i^* T_i}{\sum w_i^*}; \text{Var}(\bar{T}) = \frac{1}{\sum w_i^*} \tag{9}$$

The possibility of obtaining a biased summary effect must be assessed, which is derived from the presence of *publication biases* as a result of the fact that many completed studies are not actually published because they do not achieve significant effects, because they are unfavorable, or because they have negative outcomes (Sterne, Gavaghan, and Egger 2000; Thornton and Lee 2000).

Analytically, the publication biases can be detected by the statistical methods of Begg and Egger, which enable testing for the null hypothesis of no bias. *The method of Begg (Begg and Mazumdar Rank Correlation Test*: Begg and Mazumdar 1994) suggests an inverse correlation between study size and effect size; the rank-order correlation (*Kendall’s tau b*) between the treatment effect and the standard error can be determined. *Egger’s Test of the Intercept* (Egger, Smith, Schneider, and Zinder (1997) suggests that we assess this same bias by using precision (the inverse of the standard error) to predict the standardized effect (effect size divided by the standard error). The size of the treatment effect is captured by the slope of a regression line (B_1), while bias is captured by the intercept (B_0).

These methods are often supplemented by so-called *funnel plot diagrams*, which are plots of a measure of study size on the vertical axis as a function of effect size on the horizontal axis. Ideally, the cloud of data points resembles an upside-down funnel, indicating no publication bias. A funnel plot that is asymmetric, meaning that one of the tails is missing or is markedly shorter or more thinly populated by data points, indicates the possible presence of publication bias (Borenstein et al. 2009). The main limitation of this graphical method is that the symmetry is defined subjectively by the researcher, as evidenced in the literature (Thornton and Lee 2000; Macaskill, Walter, and Irving 2001). This limitation requires the application of *Duval & Tweedie’s Trim and Fill algorithm* (Duval and Tweedie 2000), which estimates the number of missing studies and yields an effect size estimate that is adjusted for the funnel plot asymmetry.

Finally, to assess the robustness or stability of the calculated summary effect, a sensitivity analysis is performed based on an iterative repetition of the meta-analysis, omitting in turn each of the studies and including others.

Panel Data Studies and Estimates

We have identified 13 studies published through until 2011 that use panel data to analyze the relationship between tourism and GDP (details are given in Table 1). The studies were identified by search techniques using Scopus, ScienceDirect, and Google Scholar and the main journals in tourism research (see Ryan 2005). The main search terms were *tourism*, *economic growth*, and *tourism led growth hypothesis*. References from other studies were also used, which include not only articles in scientific journals listed in Journal Citation Reports (JCR) or other databases but also working papers (Wpaper) that have achieved a certain scientific recognition on account of their quality or number of citations.

All the studies included are shown with an identification code in Table 1. The last column shows the estimates in each study that may differ depending on the estimation model: whether or not additional variables were used to explain economic growth, the type of variable used to measure tourism, whether the sample was classified into subsamples, and the inclusion or not of instrumental or dummy variables for econometric estimates.

Table 1. Panel Data Studies Showing the Relationship between Tourism and Gross Domestic Product.

Author	Year of Study	Code	Classification of Study	Sample	Period	No. of Estimates
Eugenio-Martín, Morales, and Scarpa	2004	Eug	Wpaper	Latin American countries	1985-1998	4
Sequeira and Campos	2005	Seca	Wpaper	72 countries	1980-1999	6
Sequeira and Nunes	2008	Sequ	JCR. Q3	Small, poor, and normally developed countries	1980-2002	16
Fayissa, Nsiah, and Tadasse	2008	Fayi	JCR. Q3	Sub-Saharan countries	1995-2004	4
Lee and Chang	2008	Lee	JCR. Q1	OECD, Asia, Latin American, and sub-Saharan countries	1990-2002	20
Cortés-Jiménez	2008	Cort	JCR. Q3	Coastal regions of Italy and Spain	1990-2000	12
Proenca and Soukiazis	2008	Sou	JCR. Q4	Portugal regions NUTS 2 and NUTS 3	1993-2001	6
Fayissa, Nsiah, and Tadasse	2009	Fay	Wpaper	Latin American countries	1995-2004	4
Adamou and Clerides	2010	Adam	Open journal	162 countries	1980-2005	10
Narayan, Narayan, Prasad, and Prasad	2010	Nara	JCR. Q3	4 islands	1988-2004	2
Holzner	2011	Holz	JCR. Q1	99 countries	1970-2007	4
Seetenah	2011	Seet	JCR. Q1	Pacific Islands and developed countries	1995-2007	6
Dritsakis	2012	Drit	JCR. Q3	Mediterranean countries	1980-2007	2

Source: Own elaboration.

Note: Wpaper = working paper; JCR = Journal Citation Reports; Q = quarter; OECD = Organization for Economic Cooperation and Development; NUTS = Nomenclature of Territorial Units for Statistics.

It was found that essentially all the analyses in these studies were carried out to determine the responsiveness of income growth rate to tourism, albeit with two different empirical models of estimation: *dynamic* and *non-dynamic*.

The dynamic model is defined as follows (10), in general terms:

$$y_{it} = \alpha_i + \phi y_{it-1} + \beta T_{it} + \lambda X_{it} + u_i + \varepsilon_{it} \quad (10)$$

where y is the logarithm of real per capita GDP, T is a measure of tourism development expressed in logarithmic terms, X represents a vector of other explanatory variables, α is a period-specific intercept term to capture changes common to all countries, u is an unobserved country-specific and time-invariant effect, ε is the error term, and the subscripts i and t represent country and time period, respectively.

Non-dynamic models are specified similarly, but without the term ϕy_{it-1} . They can be defined in general as follows:

$$y_{it} = \alpha_i + \beta T_{it} + \lambda X_{it} + u_i + \varepsilon_{it} \quad (11)$$

The value of the parameter β , which reflects the impact of tourism on the GDP, reaches a different interpretation in dynamic and *Non-dynamic* models. In *Non-dynamic* models, β reflects the elasticity of productivity with respect to tourism (expressed in natural logarithm terms), while in dynamic models, it reflects only part of the effect of tourism on productivity (in the same period). The effects of tourism expand in time, that is, tourism has an effect on productivity for various periods thereafter depending on the value of ϕ .

Irrespective of whether the models are dynamic or not, the studies also differ in terms of those that use additional variables such as education, physical capital, etc. to explain the GDP, compared with those that relate only to the tourism growth variable. In other words, do they include (or not) a vector X to account for other explanatory variables? In this sense, as pointed out in Cortés-Jiménez and Pulina (2010), these variables represent a decisive contribution to economic growth and should not be excluded from the analysis if one's aim is to show adequately the manner in which tourism also contributes to such growth.

Other important differences in estimates can be summarized: first, whether the temporal effect is included by virtue of the coefficient α ; second, the proxy of tourism expansion used to define T (tourism arrivals vs. tourism receipts); and Third, whether instrumental variables are used to estimate causal relationships between tourism and GDP. Finally, if the estimates are referred to countries or regions with similar characteristics (i.e., small countries with a traditional specialization in tourism, poor countries, or island groups).

Bearing in mind these specifications, Table 2 shows the estimated value of the coefficient β that measures the effect of tourism on GDP, together with the level of significance (Student's t -test) and its p value. A further number has been added to each code, to identify the estimates within each study.

For each record, specifications are provided that show under what basis the estimate was made, indicating whether a dynamic or *non-dynamic* model was used, if additional explanatory variables of economic growth have been included

Table 2. Tourism-Led Growth: Characteristics of the Panel Data Estimates.

Code ^a	Coefficient	Student's t-Test or Standard Error ^b	p-Value	A B		Dynamic Model		Time Dummies		Instrumental Variables		Proxy of Tourism Expansion		Sample of Countries		
				Yes	No	Yes	No	Yes	No	Tourism receipts	Arrivals	Overall	Specific			
Adam 1	0.002	0.00056 ^x	5%	x	x	x		x		x				x		
Adam 2	0.011	0.0007 ^x	No	x	x	x		x		x				x		
Adam 3	0.00018	0.000045 ^x	5%	x	x	x		x		x			x	x		
Adam 4	0.00012	0.00006 ^x	10%	x	x	x		x		x			x	x		
Adam 5	0.00117	0.00071 ^x	No	x	x	x		x		x				x		
Adam 6	0.0041	0.00096 ^x	5%	x	x	x		x		x				x		
Adam 7	0.0039	0.0012 ^x	5%	x	x	x		x		x				x		
Adam 8	0.00048	0.00012 ^x	5%	x	x	x		x		x				x		
Adam 9	0.00021	0.00015 ^x	No	x	x	x		x		x				x		
Adam 10	0.0027	0.0012 ^x	10%	x	x	x				x					x	
Cort 1	0.001		5%	x	x			x	x					x	24 Italian and Spanish coastal regions	
Cort 2	0.006		1%	x	x			x	x					x		
Cort 3	0.001		5%	x	x			x	x					x		
Cort 4	0.006		1%	x	x			x	x					x		
Cort 5	-0.001		No	x	x			x	x					x	13 Italian and Spanish interior regions	
Cort 6	-0.015		10%	x	x			x	x					x		
Cort 7	-0.001		No	x	x			x	x					x		
Cort 8	-0.017		5%	x	x			x	x					x		
Cort 9	0.001		10%	x	x			x	x					x	14 Italian and Spanish Mediterranean coastal regions	
Cort 10	0.007		1%	x	x			x	x					x		
Cort 11	0.001		5%	x	x			x	x					x		
Cort 12	0.006		1%	x	x			x	x					x		
Drit 1	1.235		1%		x			x						x	7 Mediterranean countries	
Drit 2	0.077		10%	x				x						x		
Eug 1	0.00036	1.68	10%	x	x			x						x	21 Latin American countries	
Eug 2	-0.00019	2.54	10%	x	x			x						x		
Eug 3	0.00063	1.92	10%	x	x			x						x		
Eug 4	0.00062	2.63	10%	x	x			x						x		
Fayi 1	0.042	0.0082 ^x	1%	x	x									x	17 Latin American countries	
Fayi 2	0.021	0.0103 ^x	5%	x	x									x		
Fayi 3	0.0243	0.0071 ^x	1%	x	x									x		
Fayi 4	0.0266	0.0082 ^x	1%	x	x									x		
Fayi 1	0.0378	0.0085 ^x	1%	x				x	x					x	42 sub-Saharan countries	
Fayi 2	0.0388	0.01 ^x	1%	x				x	x					x		
Fayi 3	0.0249	0.0081 ^x	1%	x	x			x	x					x	30 sub-Saharan countries	
Fayi 4	0.0256	0.0081 ^x	1%	x	x			x	x					x		
Holz 1	0.011	2	5%	x	x			x	x					x		
Holz 2	0.018	2.84	1%	x	x			x						x		
Holz 3	0.008	2.08	5%	x	x			x						x		

(continued)

Table 2. (continued)

Code ^a	Coefficient	Student's t-Test or Standard Error ^b	p-Value	Dynamic Model		Time Dummies		Instrumental Variables		Proxy of Tourism Expansion		Sample of Countries	
				A	B	Yes	No	Yes	No	Yes	No	Tourism receipts	Arrivals
Holz 4	-0.041	-0.97	No	x	x			x	x		x		x
Lee 1	0.36	11.84	5%	x		x		x		x			23 OECD countries
Lee 2	0.17	14.36	5%	x		x	x		x				
Lee 3	0.24	26.41	5%	x		x		x			x		
Lee 4	0.13	13.47	5%	x		x	x		x		x		
Lee 5	0.5	52.69	5%	x		x		x		x			32 OECD countries
Lee 6	0.5	35.21	5%	x		x	x		x				
Lee 7	0.61	5.38	5%	x		x		x			x		
Lee 8	0.17	-0.3	No	x		x	x		x			x	
Lee 9	0.13	-0.62	No	x		x		x		x			5 Asian countries
Lee 10	0.17	8.98	5%	x		x	x		x				
Lee 11	0.32	4.06	5%	x		x		x			x		
Lee 12	0.24	6.89	5%	x		x	x		x			x	
Lee 13	0.15	1.1	No	x		x		x		x			11 Latin American countries
Lee 14	0.09	8.9	5%	x		x	x		x				
Lee 15	0.36	16.36	5%	x		x		x			x		
Lee 16	0.23	12.08	5%	x		x	x		x			x	
Lee 17	0.3	8.23	5%	x		x		x		x			16 sub-Saharan countries
Lee 18	0.18	6.75	5%	x		x	x		x				
Lee 19	0.03	2.44	5%	x		x		x			x		
Lee 20	0.08	0.83	No	x		x	x		x			x	
Nara 1	0.24	3.84	1%	x		x		x		x			4 islands
Nara 2	0.72	15.29	1%	x		x		x		x			
Seet 1	0.12	1.95	10%	x	x		x		x			x	19 Pacific islands
Seet 2	0.06	1.95	10%	x	x		x		x			x	20 developing countries
Seet 3	0.064	1.96	10%	x	x		x		x			x	10 developing countries
Seet 4	0.14	2.04	10%	x	x		x		x				19 Pacific islands
Seet 5	0.033	1.87	10%	x	x		x		x				20 developing countries
Seet 6	0.08	1.89	10%	x	x		x		x				10 developing countries
Sequ 1	-14.21	-1.37	No	x	x				x				x
Sequ 2	-0.62	-1.78	10%	x	x				x				x
Sequ 3	-1.89	-1.29	No	x	x				x				x
Sequ 4	1.44	0.39	No	x	x				x				x
Sequ 5	0.329	2.22	5%	x	x				x				x
Sequ 6	1.104	2.26	5%	x	x				x				x
Sequ 1	0.013	1.05	No	x	x		x		x			x	x
Sequ 2	0.041	2.42	5%	x	x		x		x		x		x
Sequ 3	0.026	1.92	10%	x	x		x		x				x
Sequ 4	0.025	1.85	10%	x	x		x		x			x	x
Sequ 5	0.048	3.77	5%	x	x		x		x				x
Sequ 6	0.041	2.69	5%	x	x		x		x				x
Sequ 7	0.095	4.44	1%	x	x		x		x			x	x
Sequ 8	0.049	3.89	1%	x	x		x		x				x
Sequ 9	0.042	2.48	1%	x	x		x		x				x
Sequ 10	0.106	4.14	1%	x	x		x		x			x	x
Sequ 11	0.047	3.32	1%	x	x		x		x				x
Sequ 12	0.041	2.98	1%	x	x		x		x				x

(continued)

Table 2. (continued)

Code ^a	Coefficient	Student's t-Test or Standard Error ^b	p-Value	Dynamic Model		Time Dummies		Instrumental Variables		Proxy of Tourism Expansion		Sample of Countries	
				A	B	Yes	No	Yes	No	Yes	No	Tourism receipts	Arrivals
Sequ 13	0.077	2.5	1%	x	x							x	47 small countries
Sequ 14	0.06	1.79	10%	x	x					x			45 small countries
Sequ 15	0.055	1.87	10%	x	x					x			58 poor countries
Sequ 16	0.092	3.45	1%	x	x							x	58 poor countries
Sequ 17	0.063	3.28	1%	x	x					x			58 poor countries
Sequ 18	0.055	2.73	1%	x	x					x			58 poor countries
Sou 1	0.1006	1.55	No	x	x			x		x			7 NUTS 2 Portuguese regions
Sou 2	0.1082	1.7	5%	x	x			x		x			7 NUTS 2 Portuguese regions
Sou 3	0.1522	2.05	10%	x	x			x	x				30 NUTS 2 Portuguese regions
Sou 4	0.0401	1.54	No	x	x			x		x			30 NUTS 2 Portuguese regions
Sou 5	0.0056	2.31	10%	x	x			x		x			30 NUTS 2 Portuguese regions
Sou 6	0.009	2.55	10%	x	x			x	x				30 NUTS 2 Portuguese regions

Source: Own elaboration.

Note: A and B are referred to estimates that include or not adding explanatory variables of gross domestic product (GDP).

^aCodes are explained in Table 1.

^bAll data for this column are Student's t-test results except for those marked with a superscript x, which signifies standard error according to the original format from each study.

or not (A or B respectively), if time dummies have been used, depending on the tourism expansion proxy used, if instrumental variables have been used, and if they are estimates for a group of specific countries.

The study by Proenca and Soukiazis (2008) uses the accommodation capacity of the tourism sector as a proxy for the tourism. This proxy is not based on tourism arrivals or tourism receipts, and is therefore not classified in Table 2.

Table 2 shows how the coefficients obtained for estimates differ notably with each other, which is logical given the diverse array of specifications for each estimate. Given these differences, the meta-analysis considers different groups of similar estimates, justified on the basis of their high sensitivity to the specific characteristics that are considered. There are two sets of estimates (type 1 scenarios): dynamic and non-dynamic. Within each type 1 scenario, three clusters can in turn be made (type 2 scenarios): those that contemplate the whole sample for each scenario (overall), estimates that include only type A estimates, and type B estimates. Furthermore, within each type 2 scenario, other clusters can be formed (type 3 scenarios): those that contemplate the whole sample of estimates (overall) and that provide only specific, established, and differentiated estimates as described in Table 2. For dynamic estimates, unless the time dimension is large, dynamic panels are to be estimated using lagged levels and/or lagged differences as instruments, to be consistent estimates. Therefore, dynamic estimates that do not use instrumental variables and whose temporal dimension is not long have been eliminated. All the eliminated estimates are type B. These combinations give rise to a total of 46 scenarios.

Meta-analysis Results

Thirteen studies were identified in our search, but the estimates for two of them—Fayissa, Nsiah, and Tadasse (2009) and Sequeira and Campos (2005)—were excluded from the meta-analysis because the statistical information about the precision of the estimates was insufficient. The final study thus encompassed the empirical results from 11 suitable studies (Table 2) that gave rise to a total of 87 estimates (the sample for our meta-analysis framework) reported in the form of elasticity, which expresses the impact of tourism on GDP.

This sample can be considered large enough to perform the meta-analysis. As O'Mara and Marsh (2008) state, the number of studies considered for identifying a small or large sample of studies depends on the discipline, and we would expect that it would be smaller in the Social Sciences.

Table 3 summarizes the main results of the meta-analysis performed for the 46 scenarios formed by the criteria outlined in Section 3. The sensitivity analysis completed for the sample of 87 estimates (by an iterative repetition of the meta-analysis, omitting in turn each of the studies and including others), provided much more stable results when the 18 estimates from Sequeira and Nunes (2008) were omitted. The meta-analysis without these estimates shows both lower heterogeneity and publication bias for all the scenarios (all sensitivity analyses are available from the authors on request). Table 3 shows the results of the meta-analysis performed on the remaining sample of 69 estimates.

Independently of the estimation model used for our meta-analyses (FEM or REM), in all the scenarios a weighted

Table 3. Meta-Analysis Results.

Type I Scenarios	Type 2 Scenarios	Type 3 Scenarios	No. of Point Estimates	Fixed Point Estimate/(z value)	Random Point Estimate/(z value)	Heterogeneity Measures		Publication Bias					
						Q test (ρ)	I^2	Begg (Kendall's tau b)	Egger (B_e)	Duval and Tweedie's Trim and Fill			
										No. of missed studies	Readjusted Random Point Estimate		
Dynamic	Overall	Overall	44	0.000 (4.902)***	0.00089 (2.818)***	0.000***	47.016	(-0.241)	0.833	16	0.00063		
		t	22	0.000 (4.706)***	0.0059 (2.055)**	0.000***	57.897	0.112	1.041	10	0.00044		
		No t	22	0.00742 (4.738)***	0.00742 (4.738)***	0.968	0.000	(-0.141)	0.279	0	-		
		Inst	34	0.000 (4.813)***	0.00077 (2.449)**	0.000***	52.562	(-0.327)	0.888	11	0.00073		
		No inst	10	0.00576 (2.816)***	0.00576 (2.816)***	0.874	0.000	0.667	0.3505	0	-		
		Travel income	15	0.01238 (5.139)***	0.01238 (5.139)***	0.639	0.000	0.190	0.301	1	0.01238		
		Arrivals	23	0.000 (4.591)***	0.00031 (4.591)***	0.710	0.000	(-0.145)	0.387	5	0.00039		
		Specific countries	30	0.000 (4.775)***	0.0065 (2.339)**	0.002***	48.261	(-0.311)	0.971	12	0.00071		
		A	Overall	38	0.000 (4.732)***	0.00055 (2.379)**	0.031**	32.272	(-0.263)	0.641	13	0.00044	
			t	22	0.000 (4.706)***	0.00059 (2.055)**	0.000***	57.897	0.112	1.048	10	0.00044	
			No t	16	0.01047 (2.036)**	0.01047 (2.036)**	1.000	0.000	(-0.284)	(-0.136)	0	-	
			Inst	32	0.000 (4.731)***	0.0059 (2.242)**	0.006***	43.240	(-0.356)	0.765	10	0.00052	
			No inst	6	0.001 (0.099)	0.00128 (0.099)	1.000	0.000	0.667	0.1448	2	0.00076	
			Travel income	15	0.01238 (5.139)***	0.01238 (5.139)***	0.639	0.000	0.190	0.301	1	0.01238	
	B (inst)	Overall	2	0.009 (3.406)***	0.063 (0.911)	0.042**	75.819	-	-	-	-		
		No t	2	0.009 (3.406)***	0.063 (0.911)	0.042**	75.819	-	-	-	-		
		Specific countries	2	0.009 (3.406)***	0.063 (0.911)	0.042**	75.819	-	-	-	-		
		Non-dynamic	Overall	Overall	25	0.266 (126.649)***	0.258 (6.754)***	0.000***	99.618	0.187	(-0.775)	0	-
				t	10	0.198 (68.873)***	0.208 (4.036)***	0.000***	99.592	0.356	2.662	0	-
				No t	15	0.344 (111.753)***	0.290 (5.375)***	0.000***	99.515	0.000	(-2.606)	0	-
	No inst			25	0.266 (126.649)***	0.258 (6.754)***	0.000***	99.618	0.186	(-0.775)	0	-	
	Travel income			14	0.321 (116.239)***	0.2783 (4.563)***	0.000***	99.718	0.121	(-3.446)	0	-	
	Arrivals			11	0.191 (58.894)***	0.309 (6.773)***	0.000***	98.631	(-0.073)	1.918	1	0.202	
	Specific countries			25	0.266 (126.649)***	0.258 (6.754)***	0.000***	99.618	0.186	(-0.775)	0	-	
A	Overall		2	0.038 (1.362)	0.038 (1.362)	0.9860	0.000	-	-	-	-		
	No t		2	0.038 (1.362)	0.038 (1.362)	0.9860	0.000	-	-	-	-		
	No inst		2	0.038 (1.362)	0.038 (1.362)	0.9860	0.000	-	-	-	-		
B	Overall	23	0.267 (126.902)***	0.279 (6.993)***	0.000***	99.646	0.221	0.082	0	-			
	t	10	0.198 (68.873)***	0.208 (4.036)***	0.000***	99.592	0.355	2.662	0	-			
	No t	13	0.344 (112.277)***	0.290 (5.762)***	0.000***	99.150	(-0.012)	(-1.251)	0	-			
	No inst	23	0.267 (126.902)***	0.279 (6.993)***	0.000***	99.646	0.221	0.082	0	-			
	Travel income	12	0.324 (116.669)***	0.313 (4.872)***	0.000***	99.756	0.167	(-1.848)	0	-			
	Arrivals	11	0.191 (58.894)***	0.240 (6.773)***	0.000***	98.631	(-0.072)	1.917	1	0.202			
	Specific countries	23	0.267 (126.902)***	0.279 (6.993)***	0.000***	99.646	0.221	0.082	0	-			

Source: Own elaboration.

Note: Overall is related to all the estimates; each scenario A or B is respectively related to estimates with or without added exogenous variables of the economic growth; t and no t mean estimates with or without time dummies; Inst and no inst are respectively related to estimates with or without instrumental variables; Travel income and arrivals refer to estimates based on proxy variables of tourism obtained from data series of travel income or tourist arrivals; Specific countries are related to estimates obtained for a concrete sample of countries.

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

mean (summary effect) is obtained with a positive sign, which means that tourism, in a major or minor measure, contributes favorably to GDP in all cases.

With the aim of determining which of the two summary effects (FEM or REM) is more appropriate, the existence of heterogeneity should be analyzed. In the seventh column of Table 3, the statistical significance of the Q test is included. In 23 of the 46 scenarios, the null hypothesis of homogeneity is rejected (at the 99% level in most of the cases). In addition to this test, in the seventh column, the ratio I^2 is added to measure the heterogeneity, because the Q test has a limited power (Borenstein et al. 2009; Fleiss 1993; Takkouche, Cadarso-Suárez, and Spiegelman 1999).

According to the classification by Higgins et al. (2003) for the I^2 ratio, 13 of the 46 scenarios (formed by type A estimates from dynamic and *non-dynamic* studies) show full homogeneity ($I^2 = 0\%$). Nine scenarios show a low heterogeneity ($I^2 < 50\%$), and only 3 of the 24 remaining scenarios have a moderate heterogeneity ($50\% < I^2 < 75\%$).

The high heterogeneity detected in the 21 remaining scenarios ($I^2 > 75\%$) seems to be logical, since the estimates from the original studies have been obtained by different methods, variables, data, and samples, thus revealing the dispersion between them. As a consequence of this heterogeneity, as stated by Takkouche, Cadarso-Suárez, and Spiegelman (1999), the estimates obtained by REM (sixth column of Table 3) are more appropriate for further analysis. For this reason, we have chosen to focus on the above-mentioned column.

To evaluate the possible existence of publication bias, we show in the last column of Table 3 the results of Begg's test (Begg and Mazumdar 1994) and Egger's test (Egger et al. 1997), which enable testing for the null hypothesis of no bias. The p value is significant in 24 of the 46 scenarios, so the null hypothesis of absence of bias could be rejected (these methods are only viable with more than two combined estimates).

The detection power of both tests has been questioned (Macaskill, Walter, and Irving 2001; Sterne, Egger, and Smith 2001), and following Palma-Pérez and Delgado-Rodríguez (2006) we also consider, in the last column of Table 3, the quantitative interpretation of the funnel plot diagrams (available from the authors on request). This interpretation is based on the method of Trill and Fill (Duval and Tweedie, 2000) to include the number of missed studies in the scenarios in which the publication bias is detected.

In 31 of the 46 scenarios no study is missed that could potentially modify the summary effect. These scenarios are, in general, related to the *non-dynamic* models. In the 15 remaining scenarios, the existence of publication bias is detected and the Trim and Fill technique calculates the readjusted point estimates. According to the meaning of the publication bias (see the second section), if other future estimates were added, the summary effect would be modified, so we can conclude that the summary effect obtained for these 15

scenarios with publication bias is overestimating the contribution of tourism to the GDP.

Random Point Estimate Valuation

The distinction of studies according to their dynamic or *non-dynamic* character is crucial, not only from a methodological point of view but also in terms of the meta-analysis. Considering the results shown in Table 3, the dynamic scenarios show less heterogeneity in general, although they reach lower random point estimates. Even though the *non-dynamic* scenarios involved lower estimates, they showed a remarkable dispersion or heterogeneity and higher summary random point estimates. Most of the dynamic scenarios in Table 3 exhibited a publication bias, while *non-dynamic* scenarios did not in general.

The readjusted random point estimate in the dynamic models has a value of 0.00063 for the overall sample when all estimates are considered. In the other scenarios of the overall sample, the readjusted random point estimate is between 0.01238 (when travel income is taken as a proxy for tourism) and 0.00039 (when tourism arrivals are taken as the proxy).

As shown in Table 3, the random point estimate for *non-dynamic* models has a value of 0.25800 for the overall sample when all estimates are considered. In the other scenarios of the overall sample, the estimate fluctuates around the same value, with a minimum value of 0.191 and a maximum value of 0.344. With the exception of the estimates that use arrivals as a tourism indicator, none of the estimated values are biased. In this case, the readjusted random point estimate is 0.20182.

The random point estimates for *non-dynamic* models are therefore much higher than those obtained for dynamic models. Nevertheless, one must keep in mind that the small value obtained for dynamic models only reflects the effect of tourism on economic growth for the current period. However, the dynamic nature of the model really means that this effect may persist in time. In order to know what is the full impact of tourism on GDP in these dynamic models, or to determine a representative value of the total tourism-productivity elasticity over time, the value of the long-term cumulative dynamic multiplier (CDM) of tourism must be calculated.

For this, it is necessary to determine the estimated value of the parameter ϕ that relates the current period productivity to the productivity of previous periods. However, to calculate this cumulative effect, the estimated function should be stable. This occurs when ϕ in equation (10) is less than unity. Otherwise, the trajectory is divergent and the effect tends to multiply with time.

In the case where the dynamic functions are stable, with a single time delay, the long-term CDM is equal to:

$$\text{CDM} = \frac{\beta}{1-\phi} \quad (12)$$

The value of this cumulative multiplier is similar to the concept of the tourism-productivity elasticity of *non-dynamic* studies, which can help to interpret the effect of tourism on economic growth. In Table 4, estimated values of β and ϕ are given along with the value of the CDM calculated when the functions are stable. Parameters whose estimates proved to be not significant in the original studies have been omitted from Table 4, meaning that all estimates included in Table 4 are of type A.

In the last column, it can be seen that the CDM value is substantially higher than the estimated value of β . The last row of Table 4 shows that the average value of the CDM, which summarizes this effect, is 0.0488.

An interval of values for the long-term CDM has been calculated, which depends on the diverse specifications of estimates. Extreme values of the readjusted random point estimate obtained for dynamic models have been used. The minimum value of the CDM is calculated from the coefficient ϕ of the estimates using tourism arrivals and β equal to 0.00039. The maximum value is calculated from the coefficient ϕ of the estimates using travel income and β equal to 0.01238. This gives a range between 0.002 and 0.11.

It can be seen that the maximum value of long-term CDM (0.11) is significantly lower than the readjusted random point estimate in *non-dynamic* models (0.25), even at the latter's minimum value (0.191). It should be noted here that the choice of the type of panel model used may directly impact the validity of the results. If the data-generating process is best described as a dynamic panel, then the result from a *non-dynamic* panel would suffer from biases that come with misspecifications. Therefore, the results of the *non-dynamic* models should be considered with care.

This difference in values may also be explained when the dynamic and *non-dynamic* scenarios are divided into two subgroups (A and B). In the dynamic model scenarios, 38 estimates are of type A and only 2 are of type B, while in the *non-dynamic* model scenarios, 23 estimates are of type B and only 2 are of type A.

In both cases, it is noted that the random point estimates, or the readjusted values of the type A estimates, are lower than those obtained in each overall scenario (dynamic overall scenario or *non-dynamic* overall scenario). On the other hand, the random point estimates of the type B estimates are higher than those obtained in each overall scenario. That is, when additional variables that explain economic growth in the production function are included, in addition to the tourism variable, the impact of tourism on GDP decreases. In this sense, it can be argued that when estimates exclude other explanatory variables of economic growth, elasticities are overvalued. As pointed out in Cortés-Jiménez and Pulina (2010), the variables that represent a decisive contribution to growth should not be excluded from the analysis if we aim to adequately show the way in which tourism also contributes to it. Nevertheless, this conclusion must be considered with

Table 4. Long-Term Cumulative Dynamic Multipliers of Tourism on Economic Growth.

CODE ^a	Model type	β	ϕ	Cumulative Dynamic Multiplier (CDM)
Adam 1	A	0.002** (0.00056)	-0.1** (0.0077)	0.02 ^b
Adam 3	A	0.00018** (0.00045)	-0.01** (0.0073)	0.018 ^b
Adam 4	A	0.00012* (0.00006)	-0.09** (0.017)	0.001 ^b
Adam 6	A	0.0041** (0.00096)	-0.101** (0.0076)	0.041 ^b
Adam 7	A	0.0039** (0.0012)	-0.101** (0.018)	0.038 ^b
Adam 8	A	0.00048** (0.00012)	-0.1** (0.0074)	0.004 ^b
Holz 1	A	0.011** (2.00)	0.941*** (35.98)	0.186
Holz 2	A	0.018*** (2.84)	0.95*** (35.49)	0.360
Holz 3	A	0.008** (2.08)	0.97*** (52.93)	0.267
Cort 1	A	0.001** (NA)	0.895*** (NA)	0.010
Cort 2	A	0.006* (NA)	0.884*** (NA)	0.052
Cort 3	A	0.001** (NA)	0.919*** (NA)	0.012
Cort 4	A	0.006*** (NA)	0.907*** (NA)	0.065
Cort 6	A	-0.015 (NA)	0.891*** (NA)	-0.138
Cort 8	A	-0.017** (NA)	0.942*** (NA)	-0.293
Cort 9	A	0.001* (NA)	0.831*** (NA)	0.006
Cort 10	A	0.007*** (NA)	0.830*** (NA)	0.041
Cort 11	A	0.001** (NA)	0.869*** (NA)	0.008
Cort 12	A	0.006*** (NA)	0.857*** (NA)	0.042
Eug 1	A	0.00036* (1.68)	0.777* (19.30)	0.007
Eug 2	A	-0.0002* (2.54)	0.765* (12.64)	-0.001
Eug 3	A	0.00063* (1.92)	0.738* (10.16)	0.002
Eug 4	A	0.00062* (2.63)	0.597* (4.14)	0.002
Fayi 3	A	0.0249*** (0.0081)	0.568*** (0.073)	0.058
Seet 1	A	0.12* (1,95)	0.24** (215)	0.158
Seet 2	A	0.06* (1.95)	0.23*** (2.52)	0.078
Seet 3	A	0.064* (1.96)	0.34*** (2.43)	0.097

(continued)

Table 4. (continued)

CODE ^a	Model type	β	ϕ	Cumulative Dynamic Multiplier (CDM)
Seet 4	A	0.14* (2.04)	0.17* (2.17)	0.169
Seet 5	A	0.033* (1.87)	0.25** (2.15)	0.044
Seet 6	A	0.08* (1.89)	0.37** (2.19)	0.127
Average value of DM	—	—	—	0.0488 0.0527

Source: Own elaboration.

Note: NA = not available.

^{aa}Codes are explained in Table 1.

^bThe estimated function is $\Delta y_t = \theta y_{t-1} + \beta t_t$. So $y_t = (1 + \theta)y_{t-1} + \beta t_t$ and $MD = \beta / \theta$.

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

care because there are only two type B estimates for dynamic models and two type A estimates for *non-dynamic* models.

This subdisaggregation of estimates into A and B does not seem to be sufficient to eliminate the heterogeneity among them, except for type A *non-dynamic* scenarios. This suggests that other circumstances exist that also affect the value of the random point estimates. Therefore, other classification criteria based on methodological aspects (discussed in the third section) have been considered and applied to the overall sample for dynamic and *non-dynamic* scenarios, as well as to their respective A and B subgroups.

It was found that the inclusion of temporal variables and the use of instrumental variables tended to decrease the random point estimates value in all of the type 2 scenarios, and that the random point estimate values obtained for these scenarios were higher when travel income was used to measure tourism than when the number of arrivals was used.

Furthermore, the random point estimate tended to be slightly greater when the estimates that consider only specific samples of countries were used in dynamic models. This sample includes groups of countries considered to be poor, small, specialized in tourism, or from a specific geographic zone. The literature considers that tourism in such groups of countries has a considerably higher impact on economic growth. However, this small difference does not seem to reaffirm that the major effect is true in all groups. In this regard, some studies consider that country size does not affect the relationship between tourism and economic growth (Lanza, Temple, and Urga 2003; Sequeira and Nunes 2008), but the degree of specialization in tourism is indeed quite relevant (Adamou and Clerides 2010; Holzner 2011; Narayan et al. 2010; Sequeira and Campos 2005; Sequeira and Nunes 2008). It also seems that there is evidence in favor of tourism fostering growth to a greater degree in countries with a lower income level (Eugenio-Martín, Morales, and Scarpa 2004; Lee and Chang 2008; Seetenah 2011).

Conclusions

Theoretical models that consider a causal relationship between economic growth and tourism (namely the TLG hypothesis) are a recent phenomenon. This article performs a quantitative systematic review (meta-analysis) that synthesizes the findings from the previous panel data empirical evidence.

According to the meta-analysis presented, we can conclude that tourism contributes to economic growth, thereby corroborating the initial hypothesis and suggesting that economic efforts to promote tourism will have a positive effect on the country’s overall economic activity. Nevertheless, the magnitude of the effect was found to vary according to the methodological procedure employed in the original studies using empirical estimates. In general, we find that the value of these elasticities is affected by a range of features used in the estimates carried out. We deduce that as a model becomes more specific, the value of elasticity (productivity with respect to tourism) tends to decrease. Thus, the inclusion of explanatory variables for economic growth, in addition to that of tourism, tends to reduce the value of the elasticity. Also, when temporal variables and instrumental variables are considered, the value of the elasticity tends to diminish. The estimates also depend on the proxy used to measure tourism. When the proxy is travel income, the elasticity is higher than when the number of arrivals is used.

We consider essential that future research include economic growth explanatory variables in estimates carried out and that functions to be estimated, including temporal and instrumental variables, be adequately specified. Also, it may be appropriate that estimations use both proxies of tourism—arrivals and travel income—to enable a range of values to be specified concerning tourism’s effect on GDP. If available data are insufficient to calculate these proxies, other variables of a similar magnitude may be used. For example, the subitems of balance of payments related to tourism as an alternative to the magnitude of travel income.

The sample estimates can be clearly divided into two subsamples. Those based on dynamic models and those based on *non-dynamic* models. The meta-analysis applied to estimates based on dynamic functions shows that elasticity in the short term is small, yielding a readjusted random point estimate ranging between 0.0004 and 0.0123. The initial effect is extended in time, so that in the long term the average value of the elasticity is in a range between 0.002 and 0.110. The value of this long-term CDM is obtained from estimates that include variables for economic growth in addition to that of tourism (type A). Hence, although the initial effect of the tourism on GDP is small, it is increased over time. Therefore, policy makers and the tourism industry should plan long-term actions, whether public, private, or mixed, in order to optimize the resources invested.

The meta-analysis applied to estimates based on *non-dynamic* functions shows that the elasticities had an average value of 0.266 for the overall sample. The results of the

non-dynamic models should be considered with care because the data-generating process is best described as a dynamic panel. Also, this value may be overestimated because the majority of estimates were type B for *non-dynamic* scenarios, which do not include other explanatory variables of economic growth. The random point estimate for type A *non-dynamic* scenarios was only 0.038, which is within the range of values for the long-term CDM.

Finally, the meta-analysis results show that the tourism effect tends to be slightly greater for specific samples of countries. However, there were insufficient panel data studies relating to groups of similar countries for this result to be more precisely stated. Thus, future research focused on specific groups of countries (specialized in tourism, from specific geographic regions, with a similar income level) would likely extend our findings.

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References

- Adamou, A., and S. Clerides. (2010). "Prospects and Limits of Tourism-Led Growth: The International Evidence." *Review of Economic Analysis*, 3: 287-303.
- Arslanturk, Y., M. Balcilar, and Z. A. Ozdemir. (2011). "Time-Varying Linkages between Tourism Receipts and Economic Growth in a Small Open Economy." *Economic Modelling*, 28: 664-71.
- Baaijens, S. R., and P. Nijkamp. (2000). "Meta-analytic Methods for Comparative and Exploratory Policy Research: An Application to the Assessment of Regional Tourist Multipliers." *Journal of Policy Modeling*, 22: 821-58.
- Baaijens, S. R., P. Nijkamp, and K. Van Montfort. (1998). "Explanatory Meta-analysis for the Comparison and Transfer of Regional Tourist Income Multipliers." *Regional Studies*, 32: 839-49.
- Balaguer, J., and M. Cantavella-Jordà. (2002). "Tourism as a Long-Run Economic Growth Factor: The Spanish Case." *Applied Economics*, 34: 877-84.
- Begg, C. B., and M. Mazumdar. (1994). "Operating Characteristics of a Rank Correlation Test for Publication Bias." *Biometrics*, 50: 1088-101.
- Bhagwati, J., and T. Srinivasan. (1979). "Trade Policy and Development." In *International Economic Policy: Theory and Evidence*, edited by R. Dornbunsh and J. Frenkel. Baltimore, MD: Johns Hopkins University Press, pp. 1-35.
- Birge, R. T. (1932). "The Calculation of Errors by the Method of Least Squares." *Physical Review*, 40: 207-27.
- Borenstein, M., L. Hedges, J. P. T. Higgins, and H. R. Rothstein. (2009). *Introduction to Meta-analysis*. Chichester, UK: Wiley.
- Brida, J. G., B. Lanzilotta, S. Lionetti, and W. A. Risso. (2010). "The Tourism-Led Growth Hypothesis for Uruguay." *Tourism Economics*, 16 (3): 765-71.
- Calantone, R. J., C. A. Di Benedetto, and D. Bojanic. (1987). "A Comprehensive Review of the Tourism Forecasting Literature." *Journal of Travel Research*, 26: 28-39.
- Carlsen, J., and P. Boksberger. (2011). "The Blending of Wine and Tourism Experiences: A Meta-analysis." In *CAUTHE 2011 National Conference Tourism: Creating a Brilliant Blend*, edited by M. J. Gross. Adelaide: University of South Australia, School of Management, pp. 983-89.
- Castillo-Manzano, J. I., and M. Castro-Nuño. (2012). "Driving Licenses Based on Points System: An Efficient Road Safety Strategy or a Global Fashion Transport Policy? A Worldwide Meta-analysis." *Transport Policy*, 21: 191-201.
- Chalmers, T. C., L. V. Hedges, and H. Cooper. (2002). "A Brief History of Research Synthesis." *Evaluation & the Health Professions*, 25: 12-37.
- Chen, C.-F., and S. Z. Chiou-Wei. (2009). "Tourism Expansion, Tourism Uncertainty and Economic Growth: New Evidence from Taiwan and Korea." *Tourism Management*, 30: 812-18.
- Cochran, W. G. (1937). "Problems Arising in the Analysis of a Series of Similar Experiments." *Journal of the Royal Statistical Society* 4 (Suppl.): 102-18.
- Cochran, W. G. (1954). "The Combination of Estimates from Different Experiments." *Biometrics*, 10: 101-29.
- Cooper, H., and L. V. Hedges. (1994). *The Handbook of Research Synthesis*. New York: Russell Sage Foundation.
- Cortés-Jiménez, I. (2008). "Which Type of Tourism Matters to the Regional Economic Growth? The Cases of Spain and Italy." *International Journal of Tourism Research*, 10: 127-39.
- Cortés-Jiménez, I., and M. Pulina. (2010). "Inbound Tourism and Long-Run Economic Growth." *Current Issues in Tourism*, 13: 61-74.
- Crouch, G. I. (1995). "A Meta-analysis of Tourism Demand." *Annals of Tourism Research*, 22: 103-18.
- Dann, G., D. Nash, and P. Pearce. (1988). "Methodology in Tourism Research." *Annals of Tourism Research*, 15: 1-28.
- Davis, D., J. Allen, and R. M. Consenza. (1988). "Segmenting Local Residents by Their Attitudes, Interests, and Opinions toward Tourism." *Journal of Travel Research*, 27: 2-8.
- De Dominicis, L., R. J. Florax, and H. L. De Groot. (2008). "A Meta-analysis on the Relationship between Income Inequality and Economic Growth." *Scottish Journal of Political Economy*, 55: 654-82.
- Doucouliafos, H., and M. Paldam. (2008). "Aid Effectiveness on Growth: A Meta Study." *European Journal of Political Economy*, 24: 1-24.
- Doucouliafos, H., and M. A. Ulubaşoğlu. (2008). "Democracy and Economic Growth: A Meta-analysis." *American Journal of Political Science*, 52: 61-83.

- Dritsakis, N. (2004). "Tourism as a Long-Run Economic Growth Factor: An Empirical Investigation for Greece Using Causality Analysis." *Tourism Economics*, 10: 305-16.
- Dritsakis, N. (2012). "Tourism Development and Economic Growth in Seven Mediterranean Countries: A Panel Data Approach." *Tourism Economics*, 18: 801-16.
- Durbarry, R. (2002). "The Economic Contribution of Tourism in Mauritius." *Annals of Tourism Research*, 29: 862-65.
- Durbarry, R. (2004). "Tourism and Economic Growth: The Case of Mauritius." *Tourism Economics*, 10: 389-401.
- Duval, S., and R. Tweedie. (2000). "Trim and Fill: A Simple Funnel Plot Based Method of Testing and Adjusting for Publication Bias in Meta-analysis." *Biometrics*, 56: 455-63.
- Eddy, D. M., V. Hasselblad, and R. Shachter. (1995). *Meta-analysis by the Confidence Profile Methods: The Statistical Synthesis of Evidence*. Boston, MA: Academic Press.
- Egger, M., G. D. Smith, and D. G. Altman. (2001). *Systematic Reviews in Health Care: Meta-analysis in Context*. 2nd edition. London: BMJ Books.
- Egger, M., G. D. Smith, M. Schneider, and Ch. Zinder. (1997). "Bias in Meta-analysis Detected by a Simple, Graphical Test." *British Medical Journal*, 31: 629-34.
- Eugenio-Martín, J. L., N. M. Morales, and R. Scarpa. (2004). *Tourism and Economic Growth in Latin American Countries: A Panel Data Approach*. Fondazione Eni Enrico Mattei Working Paper Series, Nota di Lavoro 26.
- Fayissa, B., C. Nsiah, and B. Tadasse. (2008). "Impact of Tourism on Economic Growth and Development in Africa." *Tourism Economics*, 14: 807-18.
- Fayissa, B., C. Nsiah, and B. Tadasse. (2009). *Tourism and Economic Growth in Latin American Countries (LAC): Further Empirical Evidence*. Working Papers 200902, Middle Tennessee State University, Department of Economics and Finance.
- Figini, P., and L. Vici. (2010). "Tourism and Growth in a Cross-section of Countries." *Tourism Economics*, 16: 789-805.
- Fleiss, J. L. (1993). "The Statistical Basis of Meta-analysis." *Statistical Methods in Medical Research*, 2: 121-49.
- Glass, G. V. (1976). "Primary, Secondary, and Meta-analysis of Research." *Educational Researcher*, 5: 3-8.
- Glass, G. V., B. McGaw, and M. L. Smith. (1981). *Meta-analysis in Social Research*. Beverly Hills, CA: Sage.
- Gunduz, L., and J. A. Hatemi. (2005). "Is the Tourism-Led Growth Hypothesis Valid for Turkey?" *Applied Economics Letters*, 12: 499-504.
- Headey, D., and A. Hodge. (2009). "The Effect of Population Growth on Economic Growth: A Meta-regression Analysis of the Macroeconomic Literature." *Population and Development Review*, 35: 221-48.
- Helpman, E., and P. Krugman. (1985). *Market Structure and Foreign Trade*. Cambridge: MIT Press.
- Higgins, J. P. T., S. G. Thompson, J. J. Deeks, and D. G. Altman. (2003). "Measuring Inconsistency in Meta-analyses." *British Medical Journal*, 327: 557-60.
- Holzner, M. (2011). "Tourism and Economic Development: The Beach Disease?" *Tourism Management*, 32: 922-33.
- Hsiao, Ch. (2003). *Analysis of Panel Data*. Cambridge: Cambridge University Press.
- Jin, J. C. (2011). "The Effects of Tourism on Economic Growth in Hong Kong." *Cornell Hospitality Quarterly*, 52: 333-40.
- Katircioglu, S. (2010). "Testing the Tourism-Led Growth Hypothesis for Singapore—An Empirical Investigation from Bounds Test to Co-integration and Granger Causality Tests." *Tourism Economics*, 16: 1095-101.
- Katircioglu, S. T. (2009). "Revising the Tourism-Led-Growth Hypothesis for Turkey Using the Bounds Test and Johansen Approach for Co-integration." *Tourism Management*, 30: 17-20.
- Khan, H., C. Seng, and W. Cheong. (1990). "Tourism Multipliers Effects on Singapore." *Annals of Tourism Research*, 17: 408-18.
- Kim, H. J., M. H. Chen, and S. Jang. (2006). "Tourism Expansion and Economic Development: The Case of Taiwan." *Tourism Management*, 27: 925-33.
- Krueger, A. (1980). "Trade Policy as an Input to Development." *American Economic Review*, 70: 188-292.
- Lanza, A., and F. Pigliaru. (2007). "How Fast Are Small Tourism Countries Growing? Evidence from the Data for 1980-2003." *Tourism Economics*, 13: 603-13.
- Lanza, A., P. Temple, and G. Urga. (2003). "The Implications of Tourism Specialisation in the Long Run: An Econometric Analysis for 13 OCDE Economies." *Tourism Management*, 24: 315-21.
- Lean, H. H., and C. F. Tang. (2010). "Is the Tourism-Led Growth Hypothesis Stable for Malaysia? A Note." *International Journal of Tourism Research*, 12: 375-78.
- Lee, C.-C., and C.-P. Chang. (2008). "Tourism Development and Economic Growth: A Closer Look to Panels." *Tourism Management*, 29: 80-192.
- Lee, C.-C., and M.-S. Chien. (2008). "Structural Breaks, Tourism Development, and Growth: Evidence from Taiwan." *Mathematics and Computers in Simulation*, 77: 358-68.
- Lim, C. (1999). "A Meta-Analytic Review of International Tourism." *Journal of Travel Research*, 37: 273-84.
- Lipsey, M. W., and D. B. Wilson. (2001). *Practical Meta-analysis*. Thousand Oaks, CA: Sage.
- Macaskill, P., S. D. Walter, and L. Irving. (2001). "A Comparison of Methods to Detect Publication Bias in Meta-analysis." *Statistics in Medicine*, 20: 641-54.
- McKinnon, R. (1964). "Foreign Exchange Constraint in Economic Development and Efficient Aid Allocation." *Economic Journal*, 74: 388-409.
- Narayan, P. K., S. Narayan, A. Prasad, and B. C. Prasad. (2010). "Tourism and Economic Growth: A Panel Data Analysis for Pacific Island Countries." *Tourism Economics*, 16: 169-83.
- Nijkamp, P., and J. Poot. (2004). "Meta-analysis of the Effect of Fiscal Policies on Long-Run Growth." *European Journal of Political Economy*, 20: 91-124.
- O'Mara, A. J., and H. W. Marsh. (2008). *Incorporating Within-Study Correlations in Multivariate Meta-analysis: Multilevel Versus Traditional Models*. SELF Research Centre, University of Oxford.

- Palma-Pérez, S., and M. Delgado-Rodríguez. (2006). "Practical Considerations on Detection of Publication Bias." *Gaceta Sanitaria*, 20: 10-16.
- Pearce, D. G., and R. W. Butler. (2010). *Tourism Research: A 20-20 Vision*. Oxford: Goodfellow.
- Petticrew, M., and H. Roberts. (2006). *Systematic Reviews in the Social Sciences: A Practical Guide*. Malden, MA: Blackwell.
- Phillips, J. M., and E. P. Goss. (1995). "The Effect of State and Local Taxes on Economic Development: A Meta-analysis." *Southern Economic Journal*, 62: 320-33.
- Po, W.-C., and B.-N. Huang. (2008). "Tourism Development and Economic Growth, a Nonlinear Approach." *Physica A*, 387: 5535-42.
- Proenca, S., and E. Soukiazis. (2008). "Tourism as an Alternative Source of Regional Growth in Portugal." *Center of Studies for European Union*, 34.
- Rosenthal, R. (1995). "Writing Meta-analytic Reviews." *Psychological Bulletin*, 118: 183-92.
- Ryan, C. (2005). "The Ranking and Rating of Academics and Journals in Tourism Research." *Tourism Management*, 26: 657-62.
- Sariisik, M., O. Turkay, and O. Akova. (2011). "How to Manage Yacht Tourism in Turkey: A Swot Analysis and Related Strategies." *Procedia Social and Behavioral Sciences*, 24: 1014-25.
- Sequeira, T. N., and C. Campos. (2005). *International Tourism and Economic Growth: A Panel Data Approach*. Working Papers 141, Fondazione Eni Enrico Mattei.
- Sequeira, T. N., and P. M. Nunes. (2008). "Does Tourism Influence Economic Growth? A Dynamic Panel Data Approach." *Applied Economics*, 40: 2431-41.
- Seetenah, B. (2011). "Assessing the Dynamic Economic Impact of Tourism for Island Economies." *Annals of Tourism Research*, 38: 291-308.
- Sinclair, M. T. (1998). "Tourism and Economic Development: A Survey." *Journal of Development Studies*, 34: 1-51.
- Singh, D. R. (2008). "Small Island Developing States (SIDS). Tourism and Economic Development." *Tourism Analysis*, 13: 629-36.
- Sterne, J. A. C., M. Egger, and G. D. Smith. (2001). "Investigating and Dealing with Publication and Other Biases in Meta-analysis." *British Medical Journal*, 323: 101-5.
- Sterne, J. A. C., D. Gavaghan, and M. Egger. (2000). "Publication and Related Bias in Meta-analysis: Power of Statistical Tests and Prevalence in the Literature." *Journal of Clinical Epidemiology*, 53: 1119-29.
- Sutton, A. J., K. R. Abrams, D. R. Jones, T. A. Sheldon, and F. Song. (2000). *Methods for Meta-analysis in Medical Research*. Chichester, UK: Wiley.
- Takkouche, B., C. Cadarso-Suárez, and D. Spiegelman. (1999). "Evaluation of Old and New Tests of Heterogeneity in Epidemiologic Meta-analysis." *American Journal of Epidemiology*, 150: 206-15.
- Thornton, A., and P. Lee. (2000). "Publication Bias in Meta-analysis: Its Causes and Consequences." *Journal of Clinical Epidemiology*, 53: 207-16.
- Uysal, M., and R. Gitelson. (1994). "Assessment of Economic Impacts: Festivals and Special Events." *Festival Management and Event Tourism*, 2: 3-10.
- Wagner, D. M. (2002). "Comparing European Cities Tourism Guest Surveys: An Intelligent Meta-analytical Approach." In *City Tourism*, edited by K. W. Wober. Wien: Springer-Verlag, pp. 150-62.
- Weed, M. (2009). "Progress in Sports Tourism Research? A Meta-review and Exploration of Futures." *Tourism Management*, 30: 615-28.
- Westlund, H., and F. Adam. (2010). "Social Capital and Economic Performance: A Meta-analysis of 65 Studies." *European Planning Studies*, 18: 893-919.

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