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Revisiting the Tourism-Led Growth Hypothesis: Demand–Supply Dynamics, Heterogeneity and Causality in a Global Panel

Revisión de la Tourism-Led Growth Hypothesis*: dinámicas de demanda y oferta, heterogeneidad y causalidad en un panel global*

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Abstract

Whether tourism contributes to economic growth through demand-side or supply-side mechanisms remains an open question in the literature on the Tourism-Led Growth Hypothesis. Using a panel of 84 countries over the period 1995–2018, this study examines the tourism–growth relationship by applying panel cointegration techniques to two tourism demand indicators and one tourism supply indicator. By distinguishing between OECD and non-OECD economies, the analysis explicitly accounts for cross-country heterogeneity while capturing both short- and long-run dynamics. The results reveal robust evidence of cointegration, with important differences across time horizons and country groups. In particular, supply-side factors play a more prominent role in non-OECD economies, especially in the short run, whereas demand-side variables are more relevant in OECD countries. Panel Granger causality results further indicate bidirectional relationships between tourism and economic growth, consistent with the presence of mutually reinforcing dynamics between tourism development and economic performance.

Keywords: Tourism-led growth hypothesis; tourism demand; tourism supply; panel cointegration; Granger causality; heterogeneity.

Resumen

Dentro de la literatura sobre la *Tourism-Led Growth Hypothesis*, continúa siendo una cuestión abierta si el turismo contribuye al crecimiento económico a través de mecanismos de demanda o de oferta. Utilizando un panel de 84 países para el período 1995–2018, este estudio examina la relación entre turismo y crecimiento económico aplicando test de cointegración a dos indicadores de demanda turística y a un indicador de oferta turística. Al distinguir entre economías de la OCDE y no OCDE, el análisis tiene en cuenta de forma explícita la heterogeneidad entre países, capturando al mismo tiempo tanto las dinámicas de corto como de largo plazo. Los resultados muestran evidencia robusta de cointegración, con diferencias relevantes según el horizonte temporal y el grupo de países. En particular, la variable de oferta desempeña un papel más destacado en las economías no OCDE, especialmente en el corto plazo, mientras que las de demanda resultan más relevantes en los países de la OCDE. Asimismo, los resultados del test de causalidad de Granger indican la existencia de relaciones bidireccionales entre el turismo y el crecimiento económico, lo que es consistente con la presencia de dinámicas de refuerzo mutuo entre el desarrollo turístico y el desempeño económico.

Palabras clave: Hipótesis del crecimiento dirigido por el turismo; demanda turística; oferta turística; cointegración de panel; causalidad de Granger; heterogeneidad.

JEL Classification / Clasificación JEL: C33, C52, L83, O57.

1. Introduction

According to the United Nations (2022), tourism is the world's third-largest export sector, behind fuel and chemicals, and plays an important role as a driver of employment and economic growth. Prior to the pandemic, the World Travel and Tourism Council (2019) estimated that one out of every five new jobs created worldwide was generated in this sector, whose contribution to global GDP reached 10.4% in that year (7.6% in 2022). Empirical studies confirm the positive relationship between tourism and employment (Ladkin et al., 2023; Giotis, 2024), which is particularly important for developing economies (Condratov, 2017; Zhao, et al., 2023), where tourism can act as a driver of development and poverty alleviation (World Tourism Organization, 2004; Ashley & Mitchell, 2009).

The relationship between tourism and economic growth is commonly framed through the *tourism-led growth hypothesis* (TLGH), which states that the expansion of international tourism can act as a driver of long-term economic growth (Faber & Gaubert, 2019; Song & Wu, 2021) by increasing efficiency (Krueger, 1980), generating economies of scale (Helpman and Krugman, 1985), and allowing a faster rate of capital accumulation (Nowak et al., 2007). Numerous studies confirm this hypothesis (Brida et al., 2020; Nunkoo et al., 2020), which derives from the *export-led growth hypothesis* and the seminal contribution of Balaguer and Cantavella-Jordá (2002). In this context, the modern TLGH literature can be framed within a *demand-led growth* perspective, where tourism is interpreted as a form of service export whose expansion stimulates aggregate demand through multiplier effects (Palley, 2019; Pērez-Montiel et al., 2021).

However, tourism may also negatively affect local destination communities (Jeyacheya and Hampton, 2020; Martín et al., 2020) and contribute to episodes of short-term economic instability (Barros et al., 2014). There is broad consensus that local perceptions of the benefits and costs of tourism are increasingly important, as without social support the potential benefits of tourism may become a threat at the local level (Lee, 2013). In this context, several studies analyzing employment conditions in tourism destinations reveal that tourism may generate short-term tensions in labor markets (Walmsley et al., 2022), negative short-run effects on innovation (Chu et al., 2024), and that the benefits of inbound tourism and the quality of employment largely depend on the tourism development model adopted (Jolliffe & Farnsworth, 2003;

Zhang & Zhang, 2024). These findings point to the need to complement the demand-led perspective with a supply-side approach that explicitly accounts for production structures and destination-specific characteristics.

The *supply-led growth* framework is based on international trade theory (Heckscher, 1919; Ohlin, 1933) and neoclassical economic growth models (Solow, 1955; Swan, 1956), and has its roots in the interaction between productivity multipliers and innovation accelerators (Grossman and Helpman, 1991; Romer, 1989). Within this framework, destination supply conditions are key determinants of tourism performance (Vanhove, 2011; Pompili et al., 2019), including the management of an organized tourism supply (Bornhorst et al., 2010), accessibility and transport facilities (Williams and Baláž, 2008), and the endowment of natural, cultural and environmental resources (Li et al., 2006). From this perspective, tourism development can also be interpreted as a process driven by the expansion and upgrading of destination supply conditions.

Most of the modern TLGH literature treats supply factors as secondary determinants of tourism demand and economic growth (Muryani et al., 2020). However, several studies find that supply variables are significant in regions where tourism is associated with higher levels of economic growth and development (Croes et al., 2018; Borrego-Domínguez, 2022), and may be particularly relevant for developing countries (Ouerfelli, 2008; Gulaliyev et al., 2021). This suggests that neglecting supply-side dynamics may lead to an incomplete understanding of the tourism–growth nexus. These findings highlight the need for empirical approaches that explicitly incorporate tourism supply variables and analyze both short-run and long-run dynamics when evaluating the TLGH.

The main objective of this article is to examine whether the tourism–led growth process is better explained by demand-side or supply-side mechanisms for a panel of 84 countries over the period 1995–2018. The analysis distinguishes between OECD and non-OECD economies to explicitly account for cross-country heterogeneity and evaluates the hypothesis under specifications that capture both short-run and long-run dynamics.

This study contributes to the literature on the TLGH in three ways. First, it explicitly compares demand-side and supply-side tourism indicators within the same empirical framework. Second, it evaluates whether the tourism–growth relationship differs between OECD and non-OECD economies. Third, the application of panel cointegration techniques developed by Pedroni (1999, 2004) and Westerlund (2007) allows the identification of both short-run and long-run dynamics.

To the best of our knowledge, empirical analyses explicitly comparing demand and supply indicators for such a broad panel of countries remain scarce in the literature, as the TLGH is typically tested using only demand indicators (Ahmad et al., 2020).

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 presents the data and methodology. Section

4 reports the empirical results. Section 5 discusses the findings in relation to previous studies. Section 6 concludes. Section 7 outlines the main policy implications.

2. Literature review

There has been a recent increase in research using nonlinear and nonparametric approaches that support the TLGH (Liu and Wu, 2019; Zhang & Cheng, 2019; Singh and Alam, 2024) or suggest a bidirectional effect (Badulescu et al., 2020). Similarly, several papers employ panel data techniques to confirm the relationship between tourism development and economic growth across countries (Ehigiamusoe, 2021; Rasool et al., 2021). However, some studies question these findings, suggesting no causal relationship exists (Osinubi and Osinubi, 2020; Pérez-Rodríguez et al., 2021) or highlighting links between tourism development, economic growth, and environmental problems (Balsalobre-Lorente et al., 2020; Hamaguchi, 2021). Overall, the empirical evidence remains mixed and context-dependent (Aratuo & Etienne, 2019; Portella-Carbó et al., 2023), varying across time periods (Santamaría & Filis, 2019; Van der Schyff et al., 2019) and methodological approaches (Eyuboglu & Eyuboglu, 2019).

In summary, Chingarande and Saayman's (2018) evaluation of the relevance of the TLGH is based on evidence from 116 articles. They conclude that 72 support the hypothesis, 20 favour the economic-driven tourism growth hypothesis, 24 support bidirectional causality between the variables, and 6 find no evidence of a causal link. Similarly, Brida et al. (2016) reviewed around 100 peer-reviewed papers and concluded that, with few exceptions, empirical findings indicate that international tourism drives economic growth. These meta-analyses suggest that, despite broad support for the TLGH, there is no clear consensus regarding the direction and underlying mechanisms of the tourism–growth relationship.

However, recent contributions increasingly rely on multi-country panel data to account for cross-country heterogeneity. For instance, Mitra (2019) examined 158 countries between 2001 and 2017, classifying them into three groups according to the ratio of tourism receipts to GDP. The study concludes that the causal relationship between international tourism receipts and GDP is bidirectional for all groups. In addition, the relationship between tourism expenditure and GDP is positive for two groups and bidirectional for the group with the lowest tourism-to-GDP ratio.

De Vita and Kyaw (2017) investigated the relationship between tourism specialization and economic growth in 129 countries from 1995 to 2011, concluding that the positive effect of tourism specialization on growth depends on the level of economic development and the financial system's absorptive capacity. Similarly, Muslija et al. (2017), using panel data for 113 countries between 1995 and 2015, showed that the tourism–growth nexus differs across income levels. Tang and Tan (2018) tested the hypothesis with a panel

dataset of 167 countries and reached similar conclusions, emphasizing the importance of institutional quality in host countries. Risso (2018) analyzed the tourism–growth relationship using a global dataset of 179 countries for 1995–2016 and found bidirectional causality, supporting the feedback hypothesis worldwide. However, Chiu and Yeh (2017), using cross-sectional data from 84 countries, concluded that the hypothesis does not hold consistently.

Taken together, these studies highlight two key limitations in the literature: the lack of a unified framework to distinguish between demand-side and supply-side mechanisms, and the insufficient consideration of cross-country heterogeneity in shaping the tourism–growth nexus. This study addresses these gaps by jointly analyzing demand and supply indicators within a panel cointegration framework that explicitly accounts for both short-run and long-run dynamics.

3. Data

The data panel configuration ensures broad country coverage and indicator comparability. The Tourism Data Dashboard of the World Tourism Organization provides the tourism indicators used in this study[1]. Given data availability constraints, indicators are selected to maximize country coverage over the longest possible time span. The data for GDP per capita were extracted from the Penn World Table, version 10.0, and are denominated in US dollars at constant 2017 prices[2]. Data for Cuba are obtained from the Maddison Project Database (2020).

To homogenize the tourism indicators, all tourism variables are expressed in per capita terms. Consequently, the variables used in the analysis are the following:

- *var1*: Arrivals of nonresident overnight visitors (tourists) at national borders/Population. Defined as "*arrivals*."
- *var2*: Expenditure-travel/Population. Defined as "*expenditure*."
- *var3*: Accommodation for visitors in hotels and similar establishments. Non-monetary data: number of rooms/Population (1.000habs.). Defined as "*rooms*."
- *gdp*: gdp/Population

Table A.1 of the Annex presents the countries in the data panel. The panel represents around 40% of the 219 sovereign or associated countries with full international recognition. However, they represent 76.3% of OECD countries and, in terms of weight in tourism indicators, the panel remains highly representative in both OECD countries and non-OECD countries (Table A.2).

1 https://www.untourism.int/tourism-data/un-tourism-tourism-dashboard
2 https://www.rug.nl/ggdc/productivity/pwt/pwt-releases/pwt100?lang=en

Table A.3 shows summary statistics for all variables. Data are reported in levels prior to logarithmic transformation to facilitate comparison across country groups. As expected, non-OECD countries show lower minimum and average values, but present the highest maximum values and, on average, the highest expenditure per tourist. This highlights the relevance of cross-country heterogeneity in tourism dynamics.

4. Econometric analysis

This section reports the results of the panel unit root and cointegration tests. All variables are transformed into natural logarithms to reduce non-normality and improve comparability across series.

4.1. Methodology

4.1.1. Unit root tests

The first step in any cointegration analysis is to assess the stationarity properties of the variables. To this end, we employ the Levin, Lin and Chu (LLC, 2002) and Im, Pesaran and Shin (IPS, 2003) panel unit root tests, widely used in studies on the tourism–growth nexus. Both tests are implemented under specifications with and without a deterministic trend. A lag length of one is selected to ensure comparability across tests and given the relatively short time dimension.

The starting point for the LLC test is the following panel data model,

$$y_{it} = \rho_i y_{i,t-1} + z'_{it}\gamma_i + \varepsilon_{it} \tag{01}$$

where $i = 1,\ldots,N$ indexes panels; $t = 1,\ldots, T_i$ indexes time; y_{it} is the variable being tested; and ε_{it} is the error term. The z_{it} term can represent panel-specific means, or panel-specific means and a time trend. By default, $z_{it} = 1$, so that the term $z'_{it}\gamma_i$ represents panel-specific means (fixed effects). The null hypothesis is that all series contain a unit root ($H_0:\rho_i = 1$ for all i), against the alternative of stationarity. This equation is often written as,

$$\Delta y_{it} = \emptyset y_{i,t-1} + z'_{it}\gamma_i + \varepsilon_{it} \tag{02}$$

so that the null hypothesis is $H_0:\emptyset_i = 0$ for all i versus the alternative $H_a:\emptyset_i < 0$. In this model, ε_{it} is likely to present a serial correlation. To mitigate this problem, LLC augments the model with additional lags of the dependent variable, such as,

$$\Delta y_{it} = \emptyset y_{i,t-1} + z'_{it}\gamma_i + \sum_{j=1}^{p} \theta_{ij}\Delta y_{i,t-j} + u_{it} \tag{03}$$

where p is the number of lags specified. The test assumes that u_{it} is independently distributed across panels and follows a stationary invertible

autoregressive moving-average process for each panel. The test further assumes a common autoregressive coefficient across cross-sectional units, while allowing for individual effects, time effects and deterministic trends. This assumption may be restrictive in the presence of cross-sectional heterogeneity.

Im, Pesaran and Shin develop panel unit root tests that relax the assumption of a common autoregressive parameter, making them more suitable for heterogeneous panels by allowing for individual unit root processes across cross-sectional units. This feature makes the IPS test particularly appropriate in the presence of cross-sectional heterogeneity. In contrast to LLC, each panel is estimated separately, and the resulting t-statistics are averaged. The null hypothesis assumes a unit root for all panels (H_0:$\varnothing_i = 0$ for all i), while the alternative allows for stationarity in at least a fraction of them. Given the likely presence of cross-sectional heterogeneity in macro-panel data, the IPS test is expected to provide more reliable evidence on the order of integration and will therefore be given greater weight in the empirical analysis.

4.1.2. Cointegration test

All the cointegration tests applied are based on the following panel data,

$$y_{it} = x'_{it}\beta_i + z'_{it}\gamma_i + e_{it} \tag{04}$$

where y_{it} is the dependent variable, i = 1,...,N denotes the cross-sectional units, and t = 1,...,T_i denotes time. For each panel i, the covariates in x_{it} may include lagged terms. All tests require that the regressors are not cointegrated among themselves. β_i denotes the cointegrating vector, which may vary across panels. γ_i is a vector of coefficients associated with z_{it}, the deterministic components controlling for panel-specific effects and linear time trends. Finally, e_{it} represents the error term. The tests share a common null hypothesis, H_0, of no cointegration between y_{it} and x_{it}. Rejection of the null implies that e_{it} is stationary and, therefore, that y_{it} and x_{it} are cointegrated (alternative hypothesis, H_1).

Given the likely presence of cross-sectional dependence and heterogeneity, second-generation panel cointegration tests such as Westerlund are preferred, as they are more robust than traditional residual-based approaches, such as Pedroni. Although second-generation tests partially account for cross-sectional dependence, this issue should be considered when interpreting the results. This framework assumes panel-specific cointegrating vectors, as in equation (4), allowing slope coefficients to vary across panels. The test statistics are derived from an error-correction model in which the autoregressive parameter can be specified either as panel-specific or as homogeneous across panels. The panel-specific AR statistic tests the null hypothesis of no cointegration against the alternative that at least some panels are cointegrated (SPC), whereas the homogeneous AR

statistic tests the null against the alternative that all panels are cointegrated (APC). Both specifications are estimated, with greater emphasis placed on the homogeneous alternative (APC) for comparability with Pedroni results.

The Pedroni cointegration test constitutes a residual-based approach for panel data that allows for cross-sectional heterogeneity. In the presence of cross-sectional heterogeneity, it differs from alternative approaches that impose homogeneity across units, as it allows intercepts, deterministic trends, and cointegrating coefficients to vary across cross-sectional units.

Based on the cointegration relationship in equation (1), the test allows the autoregressive (AR) coefficient, ρ_i, to vary across panels. These panel-specific (PS) AR coefficients correspond to the "between-dimension" (or group) statistics in the Pedroni framework. Alternatively, the test can impose homogeneity by restricting the AR coefficients as $\rho_i = \rho$ to be the same over panels (SP), corresponding to the "*within-dimension*" statistics. Given that the between-dimension statistics have been shown to be more robust in the presence of cross-sectional heterogeneity, only this specification is estimated.

The Pedroni test reports several statistics, including the Phillips–Perron statistic (Phillips & Perron, 1988), the modified Phillips–Perron (PP) statistic, and the augmented Dickey–Fuller (ADF) statistic. Given the lower finite-sample efficiency of PP-type statistics (Davidson & MacKinnon, 2004), greater emphasis is placed on ADF-based results.

Finally, to assess cointegration, we distinguish between short-run dynamics and the long-run equilibrium relationship. Within the ARDL framework, once cointegration among the variables is established, the model allows the simultaneous estimation of both components. Short-run effects are captured through the inclusion of lagged first differences of the explanatory variables, which account for the immediate adjustments of the dependent variable to changes in the covariates. The long-run relationship is identified through variables in levels, reflecting equilibrium associations over time. This approach is standard in ARDL-based cointegration analysis (Pesaran et al., 2001; Xiao, 2015; Roy & Medhekar, 2025).

4.2. Results

Table A.4 shows mixed evidence across tests. While LLC rejects the unit root null for several variables in levels, IPS fails to do so but strongly rejects it in first differences, indicating that all variables are I(1) when cross-sectional heterogeneity is considered. All tests are implemented with a homogeneous lag structure (ADF with one lag) to ensure comparability. Table A.5 presents the results of the heterogeneity test developed by Pesaran and Yamagata (2008). The test statistics clearly reject the null hypothesis of slope homogeneity. These results confirm the presence of cross-sectional heterogeneity across panels.

4.2.1 Westerlund test.

The Westerlund test results (Table A.6) indicate that cointegration is supported exclusively for the supply variable. However, Group-level estimates reveal clear asymmetries: the relationship is statistically significant in the non-OECD countries, but not in the OECD panel. Among the demand variables, tourist expenditure shows only marginal evidence of cointegration, whereas tourist arrivals display no evidence of a long-run relationship. This pattern suggests that supply-side factors play a more decisive role in shaping tourism–growth dynamics in developing economies.

4.2.2 Pedroni test. Short-run

In the short-run analysis for the full panel, the supply-side variable exhibits the highest degree of statistical significance in testing the TLGH, whereas the demand-side variables provide only weak evidence of cointegration- (Table A.7). However, relevant differences emerge across country groups. For the set of non-OECD economies, the pattern is broadly similar, although tourism expenditure (*var2*) displays greater relative relevance than international tourist arrivals at the border (*var1*). This hierarchy between demand-side variables becomes more pronounced within the OECD group. In this group, the absence of significant evidence associated with the supply-side variable stands out, suggesting that short-run adjustment mechanisms may differ according to the level of development, with potential implications for the design of tourism policy. This may reflect more mature tourism markets in developed economies, where demand-side dynamics dominate in the short run.

4.2.3 Pedroni test. Long-run

In the long-run analysis, the results are more homogeneous (Table A.8). Evidence of cointegration is stronger and more consistent across variables than in the short-run specification, indicating a stable long-run cointegration relationship consistent with the TLGH for the full panel as well as for both OECD and non-OECD country groups. No clear hierarchy can be identified between the demand-side variables, nor do the findings reveal substantial differences between developed and developing economies. These findings suggest that the TLGH consolidates over time as a cumulative process, regardless of the level of economic development.

4.2.4 Granger causality

To further explore the dynamic relationship between tourism and economic growth, a panel Granger causality test following Dumitrescu and Hurlin (2012) has been conducted (Table A.9). The results provide strong evidence of bidirectional causality between tourism variables and economic growth, both for the full panel and across country groups. While these findings suggest

the existence of dynamic feedback effects between tourism development and economic performance, they should not be interpreted as evidence of structural causality, but rather as indicative of predictive relationships within the temporal framework considered. This pattern is consistent with the presence of mutually reinforcing dynamics, whereby tourism development contributes to economic growth while, at the same time, economic expansion supports further development of the tourism sector.

5. Discussion

Due to the lack of studies employing a fully comparable methodological framework, a direct comparison between our findings and those reported in the existing literature is not feasible. However, partial comparisons can be undertaken with studies that rely on demand-side indicators to test the TLGH.

Regarding the time dimension, evidence for large panels in the short run remains scarce. The clear differences observed in statistical significance across time horizons suggest that our findings are consistent with those of Chiu and Yeh (2017), who argue that the fulfillment of the hypothesis may not be continuous over time. A similar interpretation applies to Santamaría and Filis (2019) in the case of Spain, as our results for OECD countries also display variations in statistical significance across time horizons. In contrast, our findings diverge from those of Van der Schyff et al. (2019) for South Africa, since we find long-run cointegration for demand-side variables in the non-OECD group.

Turning to the longer-run results and focusing on the Westerlund test, our results partially diverge from the existing literature (Chingarande & Saayman, 2018; Brida et al., 2016), as evidence of cointegration is found only for the supply-side variable. However, when the results derived from the Pedroni test are considered, the evidence aligns with the broader literature supporting the TLGH (Risso, 2018).

Our findings are also in line with those reported by Muslija et al. (2017) and De Vita and Kyaw (2017), who document a positiv ıd highly significant long-run relationship between international tourism receipts and GDP per capita for the full panel of countries. The latter study is particularly relevant because it segments the panel by income level (low, middle, and high income) and incorporates tourism expenditure as a percentage of GDP as an additional indicator. If the high-income group is considered comparable to our OECD panel and the non-OECD group broadly analogous to the lower-income categories, the results remain convergent, although in our case all variables are expressed in per capita terms. In the specific context of OECD countries, our findings are also consistent with Balsalobre-Lorente et al. (2020), who report that international tourism expenditures are statistically significant at the 1%–5% level depending on the specification.

The comparison with Mitra (2019) is more complex, as countries are classified into three groups based on international tourism receipts as a proportion of GDP and no aggregate results for the full panel are reported.

Consequently, direct comparison with De Vita and Kyaw (2017) is therefore not feasible. Nevertheless, this study highlights heterogeneity across indicators and country groups, whereas our long-run results suggest more homogeneous patterns.

6. Conclusions

This study examines whether the tourism–led growth process is better explained by demand-side or supply-side mechanisms. The empirical results indicate that the tourism supply variable— measured as the number of rooms in hotels and similar establishments (*var3*, *rooms*)—provides robust evidence of cointegration, particularly when applying methodologies that account for heterogeneity across countries (Table 1). The findings also highlight that the tourism–growth relationship differs between OECD and non-OECD economies, suggesting that the underlying mechanisms are conditioned by the level of economic development. However, these results should be interpreted with caution due to potential limitations related to data comparability across countries, measurement differences in tourism indicators, and the presence of unobserved structural heterogeneity that may not be fully captured within the empirical framework.

Table 1. Evidence of TLGH compliance.

		Westerlund			Pedroni					
		Long-run			Short-run			Long-run		
		Full panel	OECD	Non-OECD	Full panel	OECD	Non-OECD	Full panel	OECD	Non-OECD
Demand	*arrivals* (var1)	NO	NO	NO	Low	Low	Low	High	High	High
	expen-diture (var2)	NO	NO	NO	Low	High	Me-dium	High	High	High
Supply	*rooms* (var3)	Me-dium	NO	Me-dium	High	NO	High	High	High	High

Source: authors.

However, empirical evidence is sensitive to the treatment of cross-sectional heterogeneity. When the analysis is extended by incorporating the results of the Pedroni cointegration test, a more nuanced pattern emerges. In the specification capturing longer-run relationships, the three variables considered show clear evidence of cointegration for the full panel of countries. This is consistent with the broader empirical literature supporting the TLGH.

The most policy-relevant differences arise when considering short-run dynamics and cross-country heterogeneity, particularly between developed and developing economies. The results indicate that the behavior of the variables differs significantly between OECD and non-OECD economies. For OECD

countries, characterized by higher income levels and more consolidated tourism markets, tourism demand variables show stronger evidence of cointegration, suggesting a dynamic closer to *tourism demand-led growth*. By contrast, for the group of non-OECD countries the tourism supply variable acquires significantly greater importance, pointing to *tourism supply-led growth*. These findings are further reinforced by the panel Granger causality results, which reveal strong evidence of bidirectional causal relationships between tourism variables and economic growth across all country groups. This result is especially relevant for developing economies, as it suggests that policies aimed at strengthening tourism supply capacity—such as infrastructure, accommodation and service provision—may play a decisive role in generating growth effects from tourism activity.

Taken together, these results indicate that the empirical validity of the TLGH is temporally contingent, varying between the short and the long run. Tourism does not operate as an immediate and homogeneous driver of economic growth, but rather as a cumulative process that consolidates over time. In line with this interpretation, the causality analysis suggests that the tourism–growth nexus is characterized by mutual interactions between variables, rather than a purely unidirectional mechanism. In this process, the role of supply-side factors appears to be particularly critical in the early stages of tourism development, which are more characteristic of developing economies. At the same time, this process is conditioned by countries' levels of economic development and by the role of tourism supply policies. These findings highlight the need to jointly consider demand and supply dimensions when evaluating the economic effects of tourism.

These results should be interpreted with caution given potential data limitations and measurement differences across countries. But, overall, they contribute to reconciling mixed evidence in the literature by highlighting the role of time horizons, cross-country heterogeneity, development levels, and bidirectional interactions in shaping the tourism–growth nexus.

7. Policy implications and future research directions

The results obtained in this study have relevant implications for the design of public policies in the field of tourism development. In particular, the findings suggest that tourism policy strategies should not focus exclusively on increasing the number of international visitors but should also prioritize strengthening the structure of tourism supply and attracting tourist profiles with higher spending capacity. At the same time, the evidence of bidirectional causality suggests that tourism development and economic growth reinforce each other, highlighting the need for integrated policy approaches that simultaneously support both demand and supply dynamics.

In this regard, the development of a diversified tourism supply with greater added value may contribute to generating stronger multiplier effects on the local economy (Adeoye-Olatunde & Olenik, 2021; Dogru, 2021). This is especially

relevant for developing economies, where the results indicate that supply-side factors play a more decisive role in shaping the tourism–growth relationship. Consequently, these results suggest that, for many economies, especially those with lower income levels, to initiate processes aimed at redefining their tourism development strategies in order to promote more sustainable forms of tourism with a greater capacity to generate added value. Such alternatives may include modalities such as ecotourism, rural tourism, agritourism, cultural tourism, or heritage tourism, which in many cases present a greater potential to generate economic benefits that are more evenly distributed across the territory. National and local administrations should take these issues into account when planning tourism projects within a region. Without adequate planning and supply-oriented development strategies, tourism expansion may fail to generate the expected growth effects, particularly in developing countries. In this context, policies should not be conceived as unidirectional interventions, but rather as part of a broader development strategy in which tourism and economic performance evolve jointly.

Finally, from an academic perspective, the results highlight the relevance of further research into the tourism–growth nexus by incorporating new variables related to the structure of tourism supply and by exploring differences across country groups and levels of economic development. In particular, future research could build on these findings by examining in greater detail the heterogeneous causal mechanisms identified in this study, especially in developing economies where supply-side factors appear to play a more decisive role. In addition, further work could deepen the analysis of the interactions between demand- and supply-side variables within a unified framework. Such approaches would allow a more precise identification of how development levels condition the mechanisms through which tourism and economic growth evolve jointly over time.

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Table A.1. Data Panel. Countries included.

Full panel *(84/219): 38.4%*						
OECD	Non-OECD *(55/181): 30.4%*					
	Sub-Saharian Africa	East Asia and Pacific	Europe and Central Asia	Latin American and Caribbean	Middle East and North Africa	South Asia
(29/38): 76.3%	*(13/48): 27.1%*	*(9/35): 25.7%*	*(4/28): 14.3%*	*(19/42): 45.2%*	*(7/20): 35.0%*	*(3/8): 37.5%*
Austria	Botswana	Cambodia	Croatia	Aruba	Egypt, Arab Rep.	India
Belgium	Cabo Verde	China	Cyprus	Bahamas, The	Jordan	Maldives
Chile	Congo, Rep.	Fiji	Moldova, Republic Of	Barbados	Kuwait	Sri Lanka
Costa Rica	Eswatini	Lao People's Democratic Republic	Ukraine	Belize	Morocco	
Czech Republic	Ethiopia	Malaysia		Bermuda	Oman	
Denmark	Madagascar	Myanmar		Bolivia, Plurinational State of	State Of Palestine	
Estonia	Mali	Philippines		Cuba	Tunisia	
Finland	Mauritius	Singapore		Dominica		
France	Niger	Thailand		Dominican Republic		
Germany	Senegal			El Salvador		
Greece	Seychelles			Grenada		
Hungary	South Africa			Jamaica		
Ireland	Togo			Nicaragua		
Israel				Panama		
Italy				Paraguay		
Latvia				Peru		
Lithuania				St. Lucia		
Luxembourg				Uruguay		
Mexico				Venezuela, Bolivarian Republic of		

(Continue)

Full panel *(84/219): 38.4%*

Norway						
Poland						
Portugal						
Slovak Republic						
Slovenia						
Spain						
Sweden						
Switzerland						
Turkey						
United States Of America						

Source: authors.

Table A.2. Data Panel. Tourism indicators. Percentage of representativeness/total.

	1995–2002	2003–2010	2011–2018
Full panel			
arrivals	82.99%	81.65%	80.96%
expenditure	78.30%	75.16%	70.45%
rooms	80.04%	80.03%	74.97%
OECD			
arrivals	86.97%	87.57%	88.30%
expenditure	82.22%	80.27%	77.48%
rooms	82.97%	86.14%	82.75%
Non-OECD			
arrivals	73.05%	64.55%	62.09%
expenditure	76.99%	70.23%	64.35%
rooms	77.35%	70.08%	64.56%

Source: authors.

Table A.3. Summary statistics.

	Obs	Mean	Std. Dev.	Min	Max
Full panel					
arrivals	2,016	0.802	1.241	0.002	11.740
expenditure	2,016	928.668	1,916.766	0.280	19,169.540
rooms	2,016	10.458	14.803	0.030	113.215
gdp	2,016	20,653.670	18,935.090	355.280	92,975.350
OECD					
arrivals	696	0.831	0.646	0.081	3.466
expenditure	696	890.301	1,373.142	7.973	10,113.450
rooms	696	11.070	7.966	1.253	40.483
gdp	696	35,841.230	17,881.840	8,969.208	92,975.350
Non-OECD					
arrivals	1,320	0.786	1.461	0.002	11.740
expenditure	1,320	948.299	2,149.183	0.280	19,169.540
rooms	1,320	10.116	17.334	0.030	113.215
gdp	1,320	12,643.580	13,910.090	355.280	83,629.140

Source: authors.

TABLE A.4. PANEL UNIT ROOT TEST RESULTS (LLC AND IPS) FOR VARIABLES IN LEVELS AND FIRST DIFFERENCES.

Full panel

	LLC			IPS		
	Intercept	Trend	1st Diff	Intercept	Trend	1st Diff
arrivals	-2.3228*	-3.9343***	-16.4553***	3.7857	1.1559	-17.7407***
expenditure	-2.8836**	-5.0528***	-16.4989***	4.2371	-0.6685	-18.6642***
Rooms	-3.3125***	-2.7305**	-11.1135***	3.0908	2.5883	-14.0253***
gdp	-3.1222***	-7.4216***	-14.1610***	4.3332	-1.8399*	-14.5745***

OECD

	LLC			IPS		
	LLC Level (Intercept)	LLC Level (Trend)	LLC 1st Diff	IPS Level (Intercept)	IPS Level (Trend)	IPS 1st Diff
arrivals	-0.6709	-2.5033**	-10.3132***	3.0233	0.2889	-10.5712***
expenditure	-1.1500	-2.4349**	-9.3646***	3.2758	0.0231	-11.1633***
Rooms	-1.3551[(a)]	-3.0193**	-8.1961***	2.7120	-0.1846	-9.2730***
gdp	-4.2052***	-5.5854***	-9.8514***	0.0308	-2.0993*	-8.9731***

Non-OECD

	LLC			IPS		
	LLC Level (Intercept)	LLC Level (Trend)	LLC 1st Diff	IPS Level (Intercept)	IPS Level (Trend)	IPS 1st Diff
arrivals	-2.3765**	-3.0473**	-12.8360***	2.4832	1.2188	-14.2484***
expenditure	-2.6842**	-4.4542***	-13.6016***	2.8576	-0.8430	-14.9597***
Rooms	-3.1705***	-1.2974[(a)]	-7.8033***	1.8504	3.3328	-10.5995***
gdp	-1.5302[(a)]	-5.2000***	-10.4279***	5.3328	-0.7494	-11.4959***

*, **, *** indicates significance at 5%, 1% and 0,1% level, respectively. [(a)] indicates significance at 10%. *Source:* authors.

TABLE A.5. SLOPE HOMOGENEITY TEST RESULTS.

	Full Panel	OECD	Non-OECD
	42.761***	24.993***	32.770***
adj.	45.713***	28.090***	36.830***

Ho: slope coefficients are homogenous. *, **, *** indicates significance at 5%, 1% and 0,1% level, respectively. *Source:* authors.

TABLE A.6. PANEL COINTEGRATION TEST RESULTS BASED ON WESTERLUND: GROUP AND PANEL STATISTICS.

	SPC			APC		
	All countries	OECD	Non-OECD	All countries	OECD	Non-OECD
arrivals	0.1089	0.5436	-0.2778	0.3932	1.2121	-0.2344
expenditure	-0.9908	-1.5559[a]	-0.1392	0.9166	-1.3275[a]	1.4212[a]
rooms	1.4042[a]	-1.2153	2.6158**	2.6689**	0.5293	2.4803**

*, **, *** indicates significance at 5%, 1% and 0,1% level, respectively. [a] indicates significance at 10%. SPC: some panels are cointegrated. APC: all panels are cointegrated. *Source:* authors.

TABLE A.7. SHORT-RUN COINTEGRATION RESULTS (ERROR-CORRECTION SPECIFICATION).

Full Panel

arrivals	lags (1)	lags (2)	*expenditure*	lags (1)	lags (2)	*rooms*	lags (1)	lags (2)
PP	3.9751***		PP	3.3914***		PP	4.1814***	
ADF	−0.3442	1.2877[a]	ADF	−1.2631	1.5863[a]	ADF	3.1483***	4.2660***

OECD

arrivals	lags (1)	lags (2)	*expenditure*	lags (1)	lags (2)	*rooms*	lags (1)	lags (2)
PP	2.1253*		PP	1.3477[a]		PP	1.3810[a]	
ADF	−1.3577[a]	0.0062	ADF	−4.3049***	−1.2168	ADF	−0.6788	0.4989

Non-OECD

arrivals	lags (1)	lags (2)	*expenditure*	lags (1)	lags (2)	*rooms*	lags (1)	lags (2)
PP	3.3406***		PP	3.2230***		PP	4.1647***	
ADF	0.5605	1.5869[a]	ADF	1.5650*	2.8440**	ADF	4.3837***	4.9098***

*, **, *** indicates significance at 5%, 1% and 0,1% level, respectively. [a] indicates significance at 10%. *Source:* authors.

TABLE A.8. LONG-RUN COINTEGRATION RESULTS (ARDL SPECIFICATION).

Full Panel

arrivals	lags (9)	lags (10)	*expenditure*	lags (9)	lags (10)	*rooms*	lags (9)	lags (10)
PP	3.9751***		PP	3.3914***		PP	4.1814***	
ADF	−2.1630*	-12.5132***	ADF	−0.8880	-14.3990***	ADF	3.3709***	-5.2445***

OECD

arrivals	lags (9)	lags (10)	*expenditure*	lags (9)	lags (10)	*rooms*	lags (9)	lags (10)
PP	2.1063*		PP	1.9822*		PP	1.3748	
ADF	−1.7510*	-10.6774***	ADF	−4.0646***	−15.3408***	ADF	−0.5659	-8.6188***

Non-OECD

arrivals			*expenditure*			*rooms*		
arrivals	lags (9)	lags (10)	*expenditure*	lags (9)	lags (10)	*rooms*	lags (9)	lags (10)
PP	3.3406***		PP	3.2230***		PP	4.1647***	
ADF	-1.5581	-9.3323***	ADF	1.4233	-6.6872***	ADF	4.5899***	-0.1680

*, **, *** indicates significance at 5%, 1% and 0,1% level, respectively.
Source: authors.

Table A.9. Panel Granger causality test (Dumitrescu–Hurlin).

Direction	Full Panel	OECD	Non OECD
var1 → gdp	10.1954***	3.8695***	9.7900***
var2 → gdp	10.6154***	1.1632	12.2741***
var3 → gdp	12.3617***	4.7748***	11.8098***
gdp → var1	8.7095***	4.7654***	7.3031***
gdp → var2	13.9056***	13.7599***	7.1934***
gdp → var3	17.2990***	6.6866***	16.5233***
var1 → var3	11.4663***	4.8835***	10.6243***
var2 → var3	15.6119***	2.7854**	17.2710***
var3 → var1	7.3678***	5.0508***	5.4378***
var3 → var2	8.5001***	9.4887***	3.6146***

*, **, *** indicates significance at 5%, 1% and 0,1% level, respectively.
Source: authors.