

Optimal Level of Tourism Specialization and the Mediating Role of Productivity

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Abstract

Traditionally, tourism literature has systematically explored the relationship between tourism development and economic growth. The standard tool used for this purpose has been the Tourism-Led Growth Hypothesis (TLGH). However, more recent literature has shifted its focus from the effects of tourism on economic growth toward the true economic development of territories. Within this context, a recent article by Perles & Moreno (2024) develops the concept of Tourism as Optimal Choice Hypothesis (TOCH) that tests the optimal weight of tourism in the sectoral composition of destinations to maximize the well-being of their residents. Given the relative novelty of the concept, there are very few studies that empirically explore this hypothesis. Therefore, this study seeks to address this gap in the research. Specifically, it investigates the TOCH in Spain, evaluating the ideal share that tourism should have of regional economies and assessing the role of productivity in driving growth. Using static and dynamic panel data techniques for 17 Spanish regions (N=17) (all except the autonomous cities of Ceuta and Melilla) for the period 2009-2021 (T=13), the initial results show that economic development may fall to its lowest level when tourism specialization levels are at 23-25%, with only the Canary and Balearic Islands nearing this range. On the other hand, optimal specialization is found to be at 11-17%, with regions such as Cantabria, Catalonia, Madrid, Valencia, and Asturias aligning at around 11-12%. Notably, the expected mediating role of productivity remains unconfirmed. From a practical viewpoint, the article provides policymakers with a framework to gauge the impact of tourism as a primary growth engine or in combination with other sectors to optimize development outcomes.

Keywords: economic growth, productivity, tourism specialization, development

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1. Introduction

Tourism-driven economic growth, territorial development, and their underlying determinants have long been central topics in tourism economics research. The Tourism-Led Growth Hypothesis (TLGH) (Balaguer & Cantavella-Jordá, 2002), as an extension of the Export-Led Growth Hypothesis (ELGH), has become the primary theoretical framework for assessing the relationship between tourism specialization and regional wealth. Within this context, this methodology, with its continuously evolving analytical methods, often infers positive results supporting the hypothesis, in both a unidirectional and bidirectional sense (Alcalá-Ordoñez *et al.*, 2023). However, the results vary widely depending on the type of tourism, and also across different regions and time periods (Brida & Pulina, 2010; Brida *et al.*, 2016).

Despite the robustness of many of these findings, Song & Wu (2022) recently denounced the lack of a solid theoretical foundation in many TLGH studies, which could lead to unreliable conclusions. At the same time, studies such as Haller *et al.* (2021) and Koudoumakis *et al.* (2019) criticize the fact that, despite the economic growth enjoyed by tourist regions, many of them experience divergence from other regions specialized in different sectors. Other lines of research, such as those of Casado *et al.* (2022) and Torres-Penalva *et al.* (2025), observe that tourism specialization (at least in the case of Spain, which is the focus of our study) is associated with greater wage disparities compared to other industries.

This type of criticism has led not only to the strengthening of analytical methods (which will be explained later), but also to a renewal in terms of the theoretical perspective. This can be seen in studies such as Fahimi *et al.* (2018), Pulido-Fernández *et al.* (2021) and Alcalá-Ordoñez & Segarra (2023), which, beyond focusing on the relationship between wealth and tourism, use human development indicators. This aligns with the idea of not being limited to using GDP in economic analysis, as outlined in the research published by Stiglitz *et al.* (2018). Similarly, Brida *et al.* (2023) advocate for a transition from the traditional TLGH model to a green TLGH, emphasizing that the relationship between tourism and growth must also integrate sustainability principles. Meanwhile Song & Wu (2022) addresses how TLGH should also focus on how tourism enhances factor inputs or technological progress to drive economic growth. Finally, as a key reference for this research, Perles-Ribes & Moreno-Izquierdo (2024) proposes that, in addition to contemplating the impact of tourism on economic growth, it may be necessary to assess whether tourism truly represents the optimal choice for fostering economic development in destinations, introducing the Tourism as Optimal Choice Hypothesis (TOCH).

Continuing with this line of work, this research presents an extension of the TOCH model, which, in the same way as the original premise described in Perles-Ribes & Moreno-Izquierdo (2024), posits that the tourism sector can play a dual role as a driver of development in some destinations and as a constraint in others, depending on initial conditions and regional characteristics. As a novelty in this article, the hypothesis is tested on a set of regions using longitudinal data and on individual destinations, as in the cited study. As a second contribution, instead of focusing on traditional economic wealth indicators, this study considers the role of productivity as a key driver of growth and economic competitiveness in each of the regions analyzed. This approach follows previous frameworks and models proposed by Hidalgo Capitán (1998), Solow (1956), Swan (1956), and Porter (1990), which emphasize the pivotal role of productivity in shaping regional economic competitiveness and overall economic growth.

This analysis uses the seventeen regions of Spain as a case study. The justification for choosing Spain as the case study is threefold. First, it is internationally relevant as a tourist destination, attracting over 90 million international visitors in 2024 according to the Spanish National Statistics Institute (INE), with regions highly specialized in the tourism sector. Second, the relationship between mature sectors such as tourism and the country's low productivity levels (Mora Sanguinetti & Fuentes, 2012; Bauer *et al.*,

2020), justifies research that can offer solutions and recommendations to stakeholders. Finally, from a theoretical perspective, this study builds on the research line of TLGH and TOCH, whose hypotheses were originally developed based on the Spanish context, while introducing relevant methodological innovations.

The article is structured as follows. After this introduction, Section 2 provides a brief review of the literature on the subject. Section 3 explains the methodology, the data, and their sources. Section 4 presents the econometric results. Finally, Section 5 outlines the main conclusions and discusses the limitations and future lines of research on the topic.

2. Literature review

2.1. *Tourism specialization and economic development*

As briefly discussed in the introduction, the literature has established a positive relationship between tourism and economic activity in general. Although most studies support both unidirectional and bidirectional positive effects (Alcalá-Ordoñez *et al.*, 2023), the potential for tourism-driven growth varies considerably depending on regional characteristics, the degree of tourism specialization, and the time period analyzed (see Mitra, 2019; Pérez-Rodríguez *et al.*, 2021, 2022; Tang & Tan, 2018; and Tian *et al.*, 2022, among many others). In this regard, the literature has focused on the specific benefits observed in peripheral regions and remote areas, which have uniquely leveraged tourism-driven growth. In Europe, well-established tourist destinations in countries such as Greece, France, Spain, Italy, Portugal, and even Bulgaria illustrate how tourism specialization has facilitated economic transformation and modernization, contributing to regional convergence (Brida *et al.*, 2014; Clarke, 1981; Holleran, 2019; Moreno-Izquierdo *et al.*, 2024).

In this respect, it is worth questioning why many of the world's leading tourist economies have emerged in peripheral areas, such as Spain's Mediterranean coast before the 1950s, where tourism became a primary driver of economic progress. At least three key factors can help explain this phenomenon. First, the degree of tourism specialization and its significance within an economy are largely shaped by exogenous factors such as geography, history, climate, and other elements related to the fundamental factors of Porter's (1990) competitiveness model. Second, following Porter's model, destinations can leverage internal factors to create competitive advantages to enhance the competitiveness of their tourism products. Political planning, investment in infrastructure, marketing, and similar strategies can help overcome initial setbacks, transforming destinations that originally faced unfavorable comparative conditions into major tourism hubs. This also implies the ability of destinations to incorporate strategies for adapting to the new technological and climate change situation (Ramón-Rodríguez *et al.*, 2021).

Finally, external factors also play a crucial role in explaining the tourism specialization of certain regions, going beyond internal policies or territorial advantages. In this regard, both contextual circumstances, such as political or social conflicts that may limit or even permanently damage a destination's success (see Saint Akadiri *et al.*, 2020; Senbeto & Hon 2020), and broader national strategies seeking to redistribute wealth from "industrial centers" to less developed regions are relevant. This latter process has been particularly evident from the mid-twentieth century onward (see Christaller, 1964; Peters, 1969; and Lundgren, 1987).

However, the tourism-driven growth model has been highly criticized, particularly in regions where tourism has become a monoculture, as highlighted by Perles-Ribes *et al.* (2017), even though its impact on economic growth is well established in the literature. First, Bohlin (2016) observed that in many regions, tourism and its related sectors can dominate the economy, often at the expense of potentially more productive activities. This effect is illustrated in the Dutch disease or beach disease hypotheses

(Inchausti-Sintes, 2015; Balado-Naves, 2024), which suggest that excessive specialization in tourism can constrain long-term growth potential. Indeed, authors such as Haller *et al.* (2021), Koudoumakis *et al.* (2019), and Vojinovic *et al.* (2016) have highlighted that tourism specialization in peripheral areas of Europe is driving a process of economic divergence between the North and the South.

Additionally, the center-periphery development model adopted in many tourist regions (such as in the Spanish planning model) has given rise to economic and political dependence, fueled by an influx of travelers and external investment. This has significant negative effects, such as the erosion of cultural identity, extreme volatility during periods of crisis, and issues such as overcrowding and environmental degradation in tourist destinations (Balli *et al.*, 2015; Britton, 1981; Jacobsen, 2000; Weaver, 2017).

Therefore, understanding when productive specialization in tourism can be the most effective driver of regional growth (as was the case from the mid-twentieth century in some of Europe's most underdeveloped regions, where alternatives were scarce) and when it becomes necessary to shift toward economic diversification to avoid a process of divergence is essential for stakeholders involved in economic dependence in the sector. Addressing this question is precisely the objective of the TOCH from a theoretical perspective. The key advantage of this approach is that it considers both the initial structural conditions of the territories where tourism develops and the planning and intervention capacities of local and external stakeholders involved in its implementation (see Perles-Ribes & Moreno-Izquierdo, 2024).

2.2. *The Tourism as Optimal Choice Hypothesis as a viable alternative to the TLGH.*

From a theoretical point of view, the basic assumption of the TOCH is that destination managers have some degree of flexibility in determining the role of tourism within their territory. Although, as stated above, it is acknowledged that the initial structural factors of destinations significantly constrain the viable development alternatives available to them, it is also assumed that destination managers retain a certain capacity for action through territorial planning and economic management, either from the outset or once a certain level of development has been achieved.

When destinations establish their tourism strategies, there are numerous possibilities in terms of management and planning, as highlighted by Ivars-Baidal (2004) and Ivars-Baidal & Vera-Rebollo (2019), with the aim of fostering regional development. However, many objectives in the decision-making process prove to be incompatible with one another. While increasing tourism pressure in a destination may have positive effects on wealth generation, employment, and competitiveness indicators from a supply-demand perspective, it conflicts with residents' well-being and sustainability criteria. Moreover, authors such as Kozak & Martin (2012) and Blázquez-Salom *et al.* (2019) indicate that large-scale tourist attraction policies can lead to saturation. This ultimately proves to be detrimental not only to the well-being of residents (as evidenced by episodes of overtourism) but also to market competitiveness.

Following the product life cycle theory (Vernon, 1979; Butler, 1980), this issue suggests that tourism development reaches an optimal point, beyond which its contribution to a region (both economic and social) begins to decline. This idea is quantitatively developed in Perles-Ribes & Moreno-Izquierdo (2024) under the Tourism as Optimal Choice Hypothesis (TOCH), which questions whether transitioning from highly tourism-specialized models to more diversified ones is necessary. In this respect, their study shows that the maximum points aimed at achieving economic growth (measured through indicators such as wealth, productivity, or convergence) differ from those seeking to enhance the development of a destination—reflecting resident well-being and sustainability.

Thus, the original study by Perles-Ribes & Moreno-Izquierdo (2024), drawing on Porter's (1990) acquired or competitive advantages, helps clarify the rationale behind the reliance of peripheral economies on tourism, such as Spain's Mediterranean coast before the 1950s. At a time when the primary objective was convergence with more industrialized regions, coastal regions implemented large-scale investments and aggressive policies. While these strategies were logical from an economic growth perspective, it is now necessary to reconsider tourism policy and the degree or type of specialization in destinations according to the TOCH hypothesis. This aligns with the work of Chattopadhyay *et al.* (2022). Just as in the early development of mass tourism destinations, where strategic planning was often employed to overcome competitive disadvantages, destinations will once again need to resort to planning and the design of new incentives, as suggested by Acemoglu & Robinson (2012), to alleviate tourism pressure and promote more sustainable economic sectors, without compromising productive capacity.

From an empirical point of view, because TOCH is a recent idea, very few studies have tested it in practice. Perles-Ribes (2024) attempts to estimate the optimal weight of tourism in the Spanish regions but using a cross-sectional approach and a tourism weight variable estimated by McKinsey (2021), which includes direct, indirect, and induced effects. Its conclusions already indicated a U-shaped relationship between tourism and economic growth. As a second example of application, Perles-Ribes & Moreno-Izquierdo (2024) test the TOCH for the case of all of the coastal destinations (municipalities) located in the Region of Valencia, one of the regions considered in this paper, using panel data analysis techniques but estimating the weight of tourism in the economy using the services sector as a whole, which is far from the reality in many cases. Therefore, this paper is the first attempt to test the TOCH in general for the Spanish regions as a whole using panel data analysis techniques.

Another novel contribution of this article is that it incorporates productivity as a mediating factor into the TOCH hypothesis, as productivity is widely recognized as a key driver of growth. As highlighted by Gardiner *et al.* (2012), who analyze productivity and economic growth performance across European regions (EU-15), economic growth is more positively influenced by productivity increases than by employment rates. Similarly, Beugelsdijk *et al.* (2017) attribute persistent economic disparities across 257 EU regions primarily to differences in total factor productivity (TFP), reinforcing the central role of productivity in regional economic performance. Previous studies have also emphasized the crucial role of productivity in driving economic growth across various sectors, including agriculture (Johnston, 1951; Matsuyama, 1992; Moon & Lee, 2013), industry (Oeij *et al.*, 2011; Timmer *et al.*, 2011), and services (Illeris, 1989; Kyoji, 2010), including tourism (Keller & Bieger, 2007; Liu & Wu, 2019). In Echevarria (1997), Alonso-Carrera & Raurich (2010), and Galstyan & Wycherley (2012), microeconomic models are used to theoretically suggest that the sectoral composition of an economy indeed affects productivity and economic growth. In the specific case of tourism, Liu & Wu (2019) finds a direct relationship between tourism specialization, productivity, and economic performance.

Following this line of research and the growing awareness of the impact of tourism on economic development, we seek to address the following research questions for the specific case of Spain:

RQ1: *What is the optimal level of tourism specialization for a region to maximize the level of economic development?*

RQ2: *Does productivity currently mediate the relationship between tourism specialization and regional economic development?*

3. Methodology and data

3.1. Defining a methodology for the TOCH

In this article, we follow the analytical approach established by Perles-Ribes & Moreno-Izquierdo (2024), referred to as the “analysis of the optimal economic composition of destinations” (p. 5), to address the hypothesis of tourism optimal (TOCH). Unlike a causal analysis methodology, which is also discussed in the reference article, this approach follows a two-step process to assess whether a destination’s current economic structure aligns with the optimal industry mix for maximizing economic development and local welfare.

The first step determines the optimal sectoral composition using causal techniques such as Stochastic Frontier Models (SFM), Data Envelopment Analysis (DEA), etc. or traditional regression analysis, which is the approach used in this paper. Such approaches are effective in this context. The second step compares the real economic structure of destinations with this optimal industry mix estimated in the first step. Since this model is tailored to the tourism sector, we can state that an optimal level of tourism specialization $TSpec^*$ exists, maximizing economic growth and human development, expressed as follows:

$$\arg \max_T \{G(T)\} = f(TSpec^*) \quad (1)$$

$$\arg \max_T \{H(T)\} = f(TSpec^*) \quad (2)$$

Where $G(T)$ represents the economic growth of a destination, and $H(T)$ represents the development of a destination, as previously stated. Following this method, as established in Perles-Ribes & Moreno-Izquierdo (2024), we can address our research questions by testing two distinct null hypotheses:

HA: *The weight of alternative sectors to tourism in a destination (e.g., agriculture or industry) is equal to the optimum estimated by the model.*

HB: *The weight of the tourism sector is equal to the optimum estimated by the model.*

This article focuses on addressing the research questions by examining the specific weight of tourism ($TSpec$). In order to estimate an optimal level of tourism specialization, equations (1) and (2) define the variables $G(T)$ and $H(T)$ for each destination i , considering tourism specialization both in its linear and quadratic forms.

$$G_i(T) = f(TSpec_i, TSpec_i^2, X_{i,j}) \quad (3)$$

$$H_i(T) = f(TSpec_i, TSpec_i^2, X_{i,j}) \quad (4)$$

Therefore, we assume that both $G(T)$ and $H(T)$ follow either a U-shaped or an inverted U-shaped relationship, allowing us to identify a threshold beyond which our dependent variables decrease (if a maximum is reached) or increase (if a minimum is reached).

Additionally, the models may include a set of j control variables, denoted as X . In order to estimate the defined theoretical equations, we propose a combination of both static and dynamic models, as together they provide a comprehensive analysis by capturing short-term and long-term effects, improving robustness, and addressing endogeneity (Baltagi, 2021; Wooldridge, 2010).

The static panel data models are represented by the following general formula:

$$Y_{i,t} = \alpha + \beta_1 TSPEC_{i,t} + \beta_2 TSPEC_{i,t}^2 + \sum_{j=1}^J \gamma_j X_{i,t,j} + \mu_{i,t} \quad (5)$$

where $Y_{i,t}$ represents socioeconomic development of unit i in period t , either $G(T)$ or $H(T)$, depending on the analysis conducted. $TSPEC$ and $TSPEC^2$ represent the region's tourism specialization and its squared term, included in order to estimate an optimum for the tourism specialization. X_j represents a set of j control variables. α , β_1 , β_2 , and $\gamma_1 \dots J$ are the parameters to be estimated.

In the models with a one-way error component (i.e. one way fixed and random effects) $\mu_{it} = \mu_i + v_{it}$ represents the error term where μ_i denotes the unobservable individual specific effect and v_{it} denotes the remainder disturbance. Note that μ_i is time-invariant and it accounts for any region-specific effect that is not included in the regression (for example, territorial and climate conditions, governance structure, etc.). The remainder v_{it} disturbance varies with regions and time and can be considered as the usual disturbance in the regression.

According to Baltagi (2021), in the one-way fixed effect estimation, the μ_i are assumed to be fixed parameters to be estimated and the remainder disturbances stochastic with v_{it} independent and

identically distributed IID $(0, \sigma_v^2)$. The j set of X_{it} and $TSPEC$ and $TSPEC^2$ are assumed independent of the v_{it} for all i and t . The fixed effects model is an appropriate specification when focusing on a specific set of N regions as in this case.

Conversely, in the random-effects estimation, the μ_i can be assumed to be random. In this case, μ_i is

distributed as IID $(0, \sigma_\mu^2)$, with v_{it} independent and identically distributed IID $(0, \sigma_v^2)$ and the μ_i are independent of the v_{it} . In addition, the j set of X_{it} and $TSPEC$ and $TSPEC^2$ are assumed independent of the μ_i and v_{it} for all i and t . The random effects model is an appropriate specification if the research considers that N individuals are drawn randomly from a large population. This would not be the case here, as we shall explain shortly.

In the case of a two-way error component model, μ_{it} in (5) is conceived as $\mu_{it} = \mu_i + \lambda_t + v_{it}$ where μ_i denotes the unobservable individual effect, λ_t denotes the unobservable time effect, and v_{it} is the remainder stochastic disturbance term. λ_t is individual-invariant and it accounts for any time-specific effect that is not included in the regression. This two-way error component model can also be estimated as fixed or random in the ways detailed in Baltagi (2021).

Dynamic models employ the GMM estimator and system-GMM in various specifications, as inferred from the following equation:

$$Y_{i,t} = \alpha + \lambda Y_{i,t-k} + \beta_1 TSPEC_{i,t} + \beta_2 TSPEC_{i,t}^2 + \sum_{j=1}^J \gamma_j X_{i,t,j} + \mu_i + \epsilon_{i,t} \quad (6)$$

where $\lambda Y_{i,t-k}$ accounts for the persistence of the dependent variable over time, mitigating endogeneity concerns. The terms μ_i and $\epsilon_{i,t}$ represent the unobserved individual effects and the idiosyncratic error term, respectively. The dynamic panel data model is estimated using the Generalized Method of Moments (GMM), following Arellano & Bond (1991) and Blundell & Bond (1998). This approach controls for simultaneity bias and unobserved heterogeneity by incorporating lagged values of the explanatory variables as instruments.

As stated in the introduction and in the literature review, the TOCH framework highlights the dual role of tourism as a driver of development in some destinations and a constraint in others, depending on the initial conditions and regional characteristics. Given this variability in conditions, analyzing tourism's optimal weight must occur at a local level, as structural differences make broad generalizations difficult. This requires examining countries within supranational regions, regions within countries, and local destinations within regions. By studying the full population of relevant subjects in this manner, the issue of the statistical significance of the result diminishes or has no relevance at all (Ziliak & McCloskey, 2008).

This article adopts the view that the analysis is conducted for the entire population of Spanish regions. All regions are included in the study and there is no intention to generalize the findings beyond them. Moreover, although the period analyzed (2009–2021) does not capture long-term historical trends of the regions, it sufficiently reflects their current tourism and economic development conditions. Therefore, the authors treat the data as a full population rather than a sample and thus consider statistical significance to be a minor or even negligible concern in interpreting the results. Since this fact may not be shared by all readers, it is described in the final section referring to the article's limitations.

3.2. The mediating role of productivity

Statistical mediation analysis, in essence, quantifies the indirect effect of an independent variable (X) on a dependent variable (Y) through a third variable, known as the mediator (M) (Mehmetoglu, 2018). Given the central role of productivity as a driver of economic performance, as highlighted in the literature review, it is reasonable to assume that industry specialization affects economic growth and human development not merely by definition, but through its intrinsic characteristics.

In the case of tourism, as we have shown, the literature is highly critical of its productivity levels, wages, and technological innovation. Specifically, in the Spanish tourism industry, which is arguably the country's most emblematic sector, research has consistently highlighted its low productivity (Romão & Nijkamp, 2019), lack of innovation (Moreno-Izquierdo *et al.*, 2018), and the mismatch between worker training and available employment (Marrero-Rodríguez *et al.*, 2020). At the same time, in recent decades, the Spanish economy *"has been unable to combine employment creation and productivity growth, with the implication that sectors that expanded and created new jobs (...) did not succeed in attracting investment and technological innovation"* (Prados de la Escosura & Sánchez-Alonso, 2020, p. 19). Bearing these precedents in mind, we follow the Hayes (2018) model to analyze the relationship between our three elements described in Figure 1: tourism specialization (TSpec) as the independent variable, productivity (Prod) as the mediator, and economic performance (Y) as the dependent variable, which, in our analysis, is divided into economic growth and human development aspects.

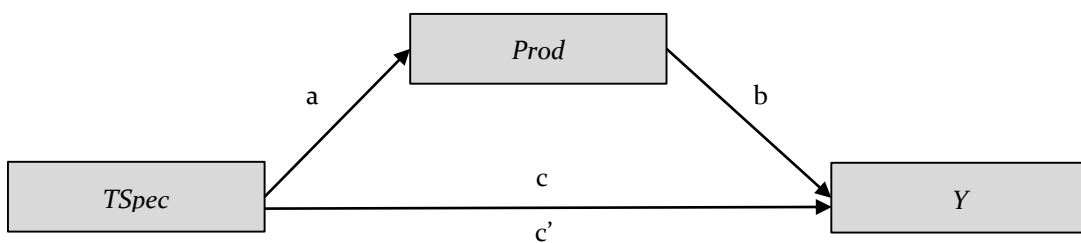


Figure 1. Mediation model - Tourism Specialization, Productivity and Economic Performance.

As defined by MacKinnon (2008), coefficient **a** represents the relationship between the independent variable (TSpec) and the mediator (Prod), coefficient **b** represents the relationship between the

mediator and the dependent variable, and coefficient c' represents the direct effect of TS_{spec} on the dependent variable, adjusted for the mediator. The indirect effect is calculated as the product ab . Finally, the total effect (c , excluding the prime symbol) is estimated as the sum of the indirect and direct effects.

Formally, three regression equations can be specified based on Figure 1 to capture all effects:

$$Y = i_1 + cTS_{spec} + e_1 \quad (6)$$

$$Y = i_2 + c'TS_{spec} + bProd + e_2 \quad (7)$$

$$Prod = i_3 + aTS_{spec} + e_3 \quad (8)$$

From this analysis, we can establish that a mediation relationship occurs when the indirect effect is statistically significant, and different types of mediation can be identified. According to Hair *et al.* (2021, p. 142), three types of mediation relationships exist: complementary mediation, which occurs when both the indirect and direct effects are significant and aligned in the same direction; competitive mediation, where both effects are significant but in opposite directions; and indirect-only mediation, which arises when only the indirect effect is significant. If the direct effect is significant and the indirect effect is not, the relationship is classified as direct-only non-mediation.

Beyond these definitions, understanding the interaction between these variables can yield valuable insights for stakeholders, enabling them to design more effective destination policies.

3.3. Variables selection and regression procedures

In order to test our research questions using the methodologies described in Sections 3.1 and 3.2, we use panel data from Spain's 17 Autonomous Communities (NUTS 2) for the period 2009-2021. As mentioned above, our dependent variable Y distinguishes between economic growth, measured by the Gross Domestic Product per capita (GDP_{pc}), and development, measured by the Human Development Index (HDI). GDP values have been obtained from the Spanish National Institute (2024), while HDI data have been provided by the Global Data Lab (<https://globaldatalab.org/shdi/table/shdi/>) (Table 1).

The main independent variable in our model, TS_{spec}, is measured as the percentage of tourism workers relative to the total number of workers in the region (W_{Tour}). Our model also considers it in its squared form (W_{Tour}²) in order to capture potential nonlinear effects between tourism specialization and economic performance.

As control variables, we include the registered population of the regions (Pop), which seeks to measure the size of the destination and its development potential; population density (Dens), which captures the degree of concentration and urbanization of the region; occupancy rate (Toc), capturing the dynamism of the region's labor market; and finally, the regional productivity (Prod), serving as a control variable in the regression estimations and as a mediator in the mediation models estimated in the second phase. Other factors that may affect the relationship, such as political organization or administrative structure, are assumed to be time-invariant over the period analyzed and are controlled for by using fixed effects, as detailed in the methods section.

Table 1. *Variables used*

Variable	Measure	Source
Dependent		
Region development	HDI: Human Development Index	Global Data Lab. Subnational HDI
	GDPpc: Gross Domestic Product per capita	Spanish National Statistical Institute. Regional Accounts of Spain.
Variable of interest		
Tourism specialization	WTour: Percentage of workers in tourism activity of total workers in the region.	Social Security
	WTour ² : Square of Tourism specialization	
Control variables		
Destination size	Pop: Registered Population in the region	Spanish National Statistical Institute. Foundation for the Study of Applied Economics (FEDEA)
Urbanization degree	Dens: Density of population	Spanish National Statistical Institute.
Employment dynamism	Toc: Occupancy rate	Foundation for the Study of Applied Economics (FEDEA)
Productivity (acting as a mediator in the last exercise)	Prod: Gross Value added / Workers Occupied in each region	Foundation for the Study of Applied Economics (FEDEA)

Using these data, we conduct the statistical exercises defined in previous sections. Specifically, static specifications defined in 3.1 are estimated using Gretl (Cottrell & Lucchetti, 2024) and validated with the plm package in R (Croissant & Millo, 2008), while dynamic specifications are estimated using the xtabond2 command in Stata (Roodman, 2003) and validated against the results from the plm package.

For the mediation analysis, the estimations are conducted both with and without time and region fixed effects. Within this framework, the total (c), direct (c'), and indirect (ab) effects of the relationships are estimated. The analysis is performed using the bruceR package (Bao, 2024) for R.

4. Results

4.1. Descriptive analysis: tourism specialization and regional development

In this first exercise, we conduct a descriptive analysis of tourism specialization within the selected sample. Based on the values reported in Table 2 for our two dependent variables (HDI and GDP per capita) and tourism specialization (WTour), the relationship appears to be non-linear. Specifically, regions with the lowest economic performance indicators—HDI values below 0.88 and GDPpc below €21,000—are found at the two extremes of the WTour distribution.

Extremadura, Castilla-La Mancha, and Murcia emerge as the three regions with the lowest levels of tourism specialization, coupled with particularly low HDI and GDPpc figures. In contrast, despite exhibiting comparable economic performance levels, the Canary Islands, Balearic Islands, and the Region of Valencia, display the highest WTour values. Within this context, the case of Murcia stands out. Despite being a Mediterranean region with coastal access, tourism plays a secondary role in its economy. Unlike other regions such as the Region of Valencia or Andalusia, where strong economic planning for tourism development began in the 1970s (as seen in Ivars-Baidal, 2004), Murcia focused on the agricultural sector to take advantage of its climate (Alcalá-Ordóñez *et al.*, 2025). This, however, has led to environmental problems that have hindered its tourism development, as pointed out by Moreno-

Izquierdo *et al.* (2024), including the degradation of the Mar Menor, one of the region's main tourist attractions (Guaita-García *et al.*, 2022). Moreover, the increasing aridification of the climate and extreme temperatures caused by climate change (Quereda Sala *et al.*, 2000) could put the region at a competitive disadvantage within Spain. This is something that policymakers should take very seriously.

Finally, at intermediate levels, a mix of regions presents diverse combinations of high and low values across these variables.

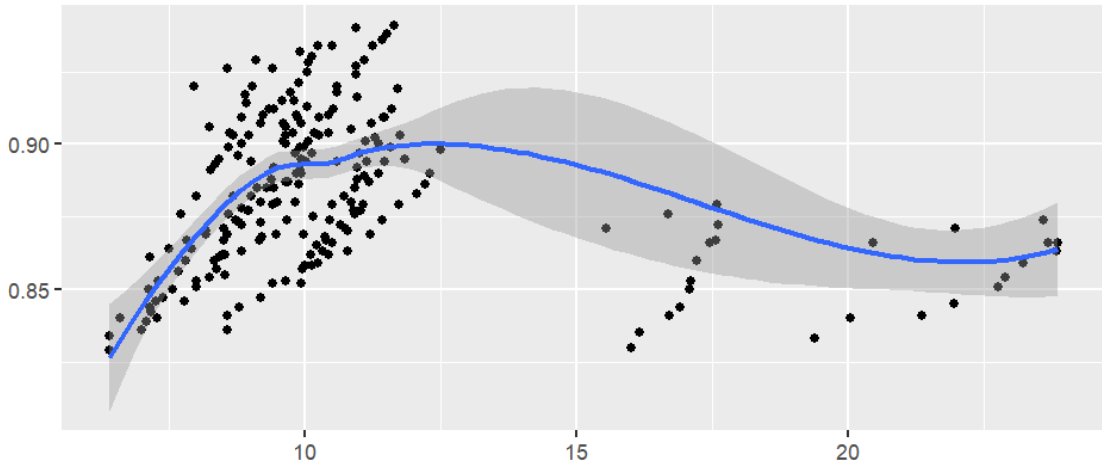
This non-linear relationship is best illustrated in Figures 2 and 3, which depict the locally estimated scatterplot smoothing (LOESS) curves for the different variables over the entire study period (2009–2021). This effect becomes even more pronounced when the Canary Islands and the Balearic Islands are isolated, as they appear as outliers in both graphs due to their exceptionally high tourism specialization, as noted also in Pérez-Dacal *et al.* (2014).

Furthermore, the Pearson correlation coefficients between tourism specialization and economic performance indicators are notably low. For GDPpc and WTour, the correlation coefficient is 0.01, with no statistical significance (p-value: 0.879), effectively ruling out any linear relationship between these variables over the study period. the correlation coefficient between HDI and WTour -0.15, which is statistically significant (p-value: 0.024); however, it still suggests a weak linear correlation. While seeming to contradict the academic literature that supports the idea of tourism being positively related to economic performance (TLGH), these results are to be expected given the heterogeneity of the sample. In fact, other previous studies such as Odeleye *et al.* (2022) or Zuo & Huang (2018) also detect non-linear patterns in their analyses when working with destinations with different levels of tourism specialization.

Table 2. *Average HDI, GDP per Capita, and Tourism Specialization by Region*

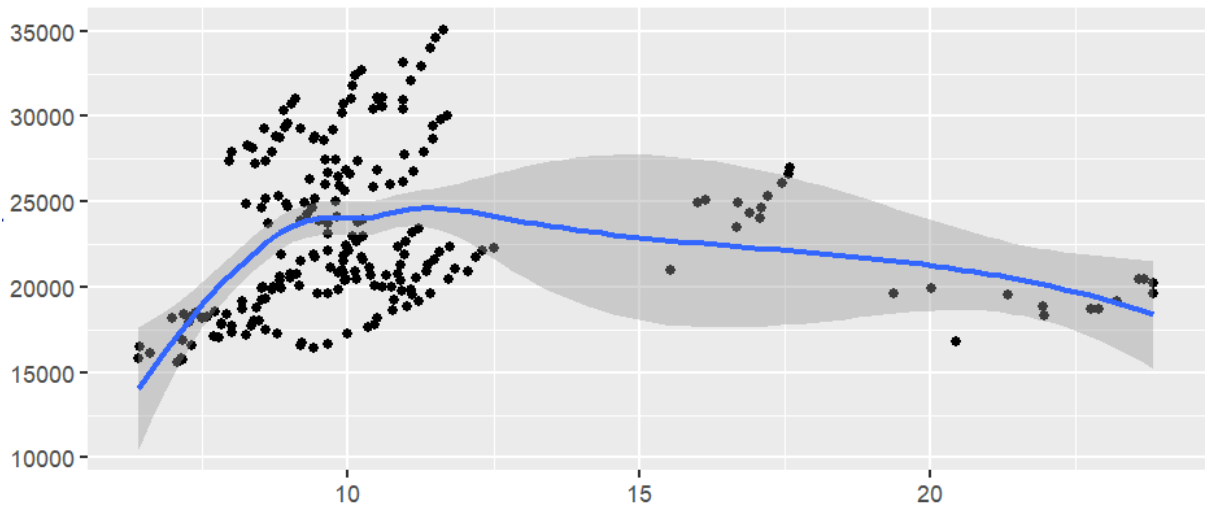
Region	HDI	GDPpc	WTour
Canary Islands	0.8560	19,265.45	22.22
Balearic Islands	0.8572	24,965.02	16.89
Region of Valencia	0.8767	20,537.58	11.36
Asturias	0.8830	20,800.51	10.96
Catalonia	0.8972	27,647.70	10.95
Madrid	0.9274	32,107.06	10.95
Cantabria	0.8851	21,675.75	10.71
Andalusia	0.8576	17,463.80	9.73
Castilla-Leon	0.8937	22,144.70	9.72
Basque Country	0.9190	30,139.10	9.64
Galicia	0.8824	20,966.87	9.57
La Rioja	0.8957	24,969.56	9.41
Aragon	0.8927	25,498.24	9.22
Navarra	0.9075	28,736.63	8.58
Murcia	0.8660	19,080.32	8.28
Castilla-la Mancha	0.8560	18,396.09	7.99
Extremadura	0.8512	16,844.14	7.28

This variation in results indicates that the link between tourism and human development differs from that of tourism and economic growth, as also noted by Croes *et al.* (2021), implying that these optimal levels may vary. These discrepancies arise because, while the HDI encompasses the economic dimension, it also incorporates other factors, thereby complicating its relationship with tourism development, as noted by Chattopadhyay *et al.* (2022). Based on this preliminary analysis, it is reasonable to hypothesize the potential existence of optimal values (either maxima or minima) in the relationship between the selected variables.



Note: X-axis: WTour. Y-axis: HDI. Grey area: 95 percent confidence interval for predictions.

Figure 2. LOESS curve for WTour and HDI.



Note: X-axis: WTour. Y-axis: GDPpc. Grey area: 95 percent confidence interval for predictions.

Figure 3. LOESS curve for WTour and GDPpc.

4.2. Measuring the optimal weight of tourism in the context of Spanish regions

4.2.1. Static analysis

In this section, we first perform a static analysis to examine the effects of WTour on economic and socioeconomic performance, distinguishing between GDP (Table 3) and HDI (Table 4). The findings are

the result of three different regression approaches: Pooled OLS (*Model 1*), panel data with unit fixed-effects estimation (*Model 2*: Within), and random-effects estimation using Generalized Least Squares (*Model 3*: GLS). Additionally, Tables 3 and 4 include fixed-effects and random-effects estimations incorporating unit and time dummy variables (i.e., two-way estimations) in Models 4 and 5.

The results reveal a notable discrepancy in the coefficients of the independent variables when using the Pooled model (*Model 1*). Specifically, for GDP per capita (*GDPpc*), Table 3 reports statistically significant coefficients for *WTour* (-86.17) and *WTour*² (2.681), whereas for HDI (*Table 4*), the coefficients for *WTour* (0.001912) and *WTour*² (-0.000134) are not significant. This discrepancy may be attributed to uncontrolled heterogeneity in the Pooled model, highlighting the importance of accounting for fixed or random effects in the estimations.

With respect to the panel data models (*Models 2 to 5*), the results in both tables indicate a positive effect of *WTour*. Specifically, for *GDP*, the coefficient estimates are 539.3 (statistically significant) in the one-way fixed-effects model (*Model 2*) and 25.71 (not significant) in the random-effects model (*Model 3*). For *HDI*, *WTour* also has a positive effect, with estimates of 0.03218 (statistically significant) in *Model 2* and 0.01562 (also significant) in *Model 3*. Conversely, *WTour*² exhibits a negative effect across all cases, suggesting a declining marginal impact of tourism specialization. In the case of *GDP*, the coefficients are -12.77 (statistically significant) in *Model 2* and -0.6940 (not significant) in *Model 3*, while for *HDI*, the values are -0.0006 (statistically significant) in *Model 2* and -0.0004 (also significant) in *Model 3*. These findings suggest the presence of an optimal threshold beyond which further specialization in tourism leads to diminishing returns. This pattern aligns with previous studies in the literature, such as Chang et al. (2010) and Chiu & Yeh (2017), which provide strong evidence of a nonlinear relationship between tourism growth and economic growth, or Biagi et al. (2017) and Chattopadhyay et al. (2022), which identify a similar relationship between tourism and human development.

Table 3. Static specifications. Dependent variable: *GDPpc*

	(1) Pooled OLS	(2) Within	(3) GLS	(4) Within	(5) GLS
constant	-23,730*** (437.8)	-31,870*** (1856)	-24,800*** (691.3)	-27,770*** (1628)	-23,620*** (308.6)
<i>WTour</i>	-86.17** (36.38)	539.3*** (102.0)	25.71 (57.31)	-176.1 (154.7)	-63.92 (75.95)
<i>WTour</i> ²	2.681** (1.240)	-12.77*** (2.044)	-0.6940 (1.812)	0.6793 (2.752)	1.407 (2.392)
Pop	0.02784 (0.01699)	-0.1275 (0.4919)	0.02920 (0.02278)	0.7353 (0.7326)	0.01909 (0.01574)
Dens	0.5318*** (0.1769)	19.55*** (6.149)	0.3024 (0.2313)	2.317 (5.391)	0.7441*** (0.1772)
Toc	544.7*** (7.261)	563.5*** (13.46)	546.1*** (7.788)	619.9*** (33.96)	557.2*** (10.10)
Prod	0.4874*** (0.01114)	0.4851*** (0.02608)	0.4927*** (0.01283)	0.4707*** (0.01455)	0.4616*** (0.01046)
n	221	221	221	221	221
Adj. R ²	0.9959	0.9718		0.9891	
lnL	-1567	-1474	-1574	-1369	-1440

Notes: Standard errors in parentheses. Levels of significance: * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Finally, it is important to note that the results of *WTour* and *WTour*² from the panel data models incorporating time dummy variables (i.e., two-way estimations in *Models 4* and *5*) exhibit opposite trends compared to *Models 2* and *3*, with substantially lower statistical significance. This discrepancy may stem from the inclusion of time-fixed effects, which capture macroeconomic shocks and long-term

trends that were previously influencing the estimated impact of *WTour*. As a result, the explanatory power of *WTour* and *WTour*² may have been reduced, leading to changes in both coefficient signs and significance levels. This aligns with the idea that the time periods considered in the analysis play a crucial role in the relationship between tourism specialization and economic performance, potentially altering the estimated effects, as discussed by Brida & Pulina (2010) and Brida *et al.* (2016).

Table 4. *Static specifications. Dependent variable: HDI*

	(1) Pooled OLS	(2) Within	(3) GLS	(4) Within	(5) GLS
constant	0.6696*** (0.04714)	0.5528*** (0.1095)	0.5625*** (0.03961)	0.9067*** (0.04343)	0.8397*** (0.04017)
WTour	0.001912 (0.007820)	0.03218*** (0.003424)	0.01562** (0.006630)	-0.002670 (0.002670)	-0.001713 (0.002430)
WTour ²	-0.0001134 (0.0002431)	-0.0006205*** (8.080e-05)	-0.0004188** (0.0002054)	5.633e-05 (5.479e-05)	1.863e-05 (4.628e-05)
Pop	-1.054e-07 (9.477e-07)	-2.477e-05 (5.253e-05)	9.524e-07 (1.752e-06)	1.954e-05 (1.251e-05)	-4.573e-07 (2.251e-06)
Dens	1.152e-05 (1.099e-05)	0.0008420 (0.0005577)	-2.398e-05 (2.631e-05)	-0.0003027** (0.0001137)	3.385e-05 (2.317e-05)
Toc	0.001585** (0.0005450)	0.001018* (0.0005372)	0.002094*** (0.0005158)	-0.0006116 (0.0008562)	0.0004673 (0.0008131)
Prod	2.743e-06*** (4.442e-07)	-9.889e-07 (9.162e-07)	2.372e-06*** (5.196e-07)	-1.183e-07 (3.310e-07)	1.849e-07 (3.552e-07)
n	221	221	221	221	221
Adj. R ²	0.6434	0.6065		0.9764	
lnL	607.4	737.1	526.9	1048	587.1

Notes: Standard errors in parentheses. Levels of significance: * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Likewise, it is important to note that although tourism specialization is not statistically significant in either its linear or quadratic terms in some of the estimated specifications, which might suggest that economic performance in Spanish regions is influenced by factors other than their degree of tourism specialization, this is not relevant in the context of the analysis carried out. On the one hand, the lack of significance of some variables generally appears in those specifications where time dummies have been included, that is, in columns (4) and (5) of Tables 3 and 4. This is a well-known fact in empirical studies, where time dummies, acting as temporal shocks, tend to capture the explanatory power of certain variables that reach significance in other specifications.

On the other hand, the lack of significance of the explanatory variables is more evident in the estimations where HDI is the dependent variable (Table 4) than in those where GDP per capita (GDPpc) is used (Table 3). This may be primarily due to the lower variability of HDI compared to GDPpc. The HDI variable is composed of variables that reflect structural aspects of the destinations, such as GDPpc itself, the level of education, and life expectancy in the regions. These structural aspects exhibit a high degree of stability in the Spanish regions during the period considered. Furthermore, the process of normalizing and aggregating these components into the HDI variable makes it an even more stable indicator. For this reason, when time-dummy variables are incorporated (column 4 and 5 of tables 3 and 4), they capture the explanatory power that other variables might otherwise exert. This does not happen when only the GDPpc variable is used, as it better reflects the short-term evolution of the destinations analyzed. Finally, given that our dataset encompasses the entire population of all Spanish regions, the lack of statistical significance does not necessarily imply that there is no practical or economically relevant relationship between the variables. In line with Ziliak & McCloskey (2008), when

analyzing a full population, significance tests are not required to generalize results to the entire dataset, as there is no uncertainty regarding data representativeness.

Building on the identified non-linearity, we estimate the optimal level of tourism specialization for Spanish regions, as presented in Table 5, identifying a threshold (maximum or minimum) beyond which further increases or decreases in WTour lead to diminishing or even negative returns in socioeconomic performance (measured by HDI and GDPpc). Our findings first highlight that the estimated optimal level of tourism specialization varies depending on the model specification and the dependent variable considered. This indicates that the shape of the relationship, whether U-shaped or inverted U-shaped, is not entirely robust, as evidenced by the variations in the results reported in the table. However, the result obtained allows us to determine an indicative optimum, maximum or minimum, depending on the shape revealed by each estimated model.

Specifically, for the HDI variable, the optimal tourism specialization values range from 8.43% in the Pooled OLS model (Model 1) to 45.97% in the two-way random effects model (Model 5). In contrast, for GDP, the optimal tourism specialization ranges from 16.07% in the Pooled OLS model (Model 1) to over 100% in the two-way fixed effects model (Model 4). This inconsistent result is likely due to an outlier in the estimation process.

However, our diagnostic tests suggest that the preferred specification for both of the socioeconomic dependent variables considered is the two-way fixed effects model (Model 4), which generates an optimal value of 23.70% (minimum) for HDI and over 100% (also minimum) for GDPpc, the latter being inconsistent, as previously mentioned. These findings, together with the above-mentioned descriptive analysis, suggest that greater tourism specialization is generally associated with lower economic performance, with the estimated optimal values corresponding to extreme cases of tourism dependency, such as those observed in the Canary and Balearic Islands. This result aligns with the criticism raised in Perles-Ribes & Moreno-Izquierdo (2024) regarding the study of the relationship between tourism specialization and economic growth. While tourism as an economic activity is inherently a component of a country's wealth, theoretically, the more tourism grows, the more the economy should grow. However, when considering other socioeconomic factors, such as HDI, the effect of tourism becomes diluted and can even turn negative if it affects other components, such as wealth distribution, population well-being, or sustainability.

Table 5: *Optimal tourism specialization value for the estimated models.*

Static specification	HDI		GDP		Econometric software for both HDI and GDP
	Optimal value	Max/Min	Optimal value	Max/Min	
Pooled OLS (Model 1)	8.43%	Max	16.07%	Min	Gretl/R
Pooled OLS with time dummies (Not in the tables)	<0%	Max	16.68%	Min	Gretl
One-way FE (Model 2)	25.93%	Max	21.10%	Max	Gretl/R
Two-way FE (Model 4)	23.70%	Min	>100%	Min	Gretl/R
One-way RE (Model 3)	18.65%	Max	18.51%	Max	Gretl/R
Two-way RE (Model 5)	45.97%	Max	22.71%	Min	Gretl/R
	24.41%	Max	26.88%	Min	R

With regard to productivity, we can observe that in the static specifications (Tables 3 and 4) it usually presents a positive and significant coefficient, both when GDP per capita is considered as the dependent variable and when HDI is used. In the case of the preferred model (column 4 in Tables 3 and 4), a significant coefficient of 0.47 is obtained when GDP per capita is used as the dependent variable. In

contrast, when HDI is considered, the coefficient turns negative, although it does not reach statistical significance. In general, these results would reflect the importance of productivity as a driver of economic development in the Spanish regions.

4.2.2. *Dynamic analysis*

Tables 6 and 7 present the results of the estimations using a dynamic specification of the model considered. In principle, the models are estimated using a two-step system GMM. When the two-step estimator does not converge, a one-step estimator is provided. The estimated dynamic models reflect that tourism specialization is only statistically significant for economic development measured through GDPpc. In the case of the HDI, Table 6 shows that the only statistically significant coefficient is that of the lagged value of the dependent variable itself. This result is very common in the estimation of dynamic models, where a highly persistent variable is explained almost perfectly by its own past values (Keele & Kelly, 2006; Wilkins, 2017). As discussed in the case of the static models, due to its composition of stable structural factors such as GDP *per capita*, education, and life expectancy, the limited variability of HDI makes it a more stable indicator than GDP *per capita*. This stability or high persistence, enhanced by normalization and aggregation processes, reduces the significance of other explanatory variables, especially when the lagged value of the HDI is included since it absorbs much of the explanatory power. In contrast, GDP *per capita* better captures short-term changes, allowing other variables to retain more explanatory relevance. Thus, recognizing this fact, together with the soundness of the theoretical model used and the consideration in the analysis of the whole population, renders statistical significance a less critical concern. Moreover, in the author's view, the comments made regarding the statistical significance of static models are also valid for the dynamic specification.

On the other hand, it is noteworthy that, similar to the static specifications, productivity also exhibits a positive and significant coefficient in the dynamic specification when GDP per capita is the dependent variable. This again underscores the importance of productivity as a key driver of development. The next section will explore whether this relevance stems from a mediating relationship or arises through other causal mechanisms.

As we can see, while the preferred static models yield the minimum values for tourism specialization, the dynamic models provide information on the maximum value of this variable. According to the estimated models, these maximum values would be located at around 12 percent for the case of the HDI (11.92 per cent) as a dependent variable, and 17 percent (16.85 per cent) when regional development is measured using GDP *per capita*. Regions with a value close to 11 or 12 percent would be Cantabria, Catalonia, Madrid, Valencia and Asturias. The only region with a value close to 17 percent is the Balearic Islands, which holds the seventh position in the GDPpc ranking. Therefore, this value that could suggest that there is still room to increase the weight of tourism in the economy seems somewhat excessive, because regions with a higher GDPpc also have a tourism specialization of around 12 percent. However, all of the results for the case of GDPpc should be interpreted with great caution, given the lack of values of reference in that region of the sample and the amplitude that the estimation errors in Figure 3 reflect for this range of values.

Apart from the models shown in Tables 6 and 7, additional models have been estimated (not included in the paper, but available upon request to the authors) with other lags and instrument specifications and collapsing options in order to test the robustness of the obtained results and to verify the potential problem of the many instruments, which is common in this type of models. The models yield coefficients similar to those presented in these tables, without substantially altering the conclusions drawn.

Table 6. *Dynamic model. Dependent model HDI*

HDI	Coef.	Corrected Std. Err.	z	P>z	[95% Conf. Interval]	
HDI(-1)	0.901255	0.0878989	10.25	0.000	0.7289764	1.073534
Pop	-5.00e-06	0.0000118	-0.42	0.672	-0.0000282	0.0000182
Prod	8.22e-07	1.08e-06	0.76	0.446	-1.29e-06	2.94e-06
Dens	0.0000295	0.0001243	0.24	0.812	-0.0002141	0.0002732
Toc	0.0004221	0.0007299	0.58	0.563	-0.0010084	0.0018527
WTour	0.0012064	0.005259	0.23	0.819	-0.009101	0.0115139
WTour ²	-0.0000506	0.0001379	-0.37	0.714	-0.0003208	0.0002197
constant	0.0366036	0.0550155	0.67	0.506	-0.0712248	0.1444321

Notes: Dynamic panel-data estimation, two-step system GMM. Number of groups=17. Number of instruments = 43. Wald $\chi^2(7) = 1,943.29$ (Prob > $\chi^2 = 0.000$). The Arellano-Bond test for AR(1) in first differences is $z = -2.00$ (Pr > $z = 0.045$) and the Arellano-Bond test for AR(2) in first differences is $z = 1.06$ (Pr > $z = 0.288$). The Sargan test of overidentification. The Restriction is $\chi^2(35) = 43.42$ (Prob > $\chi^2 = 0.155$) and the Hansen test of overidentification. The Restriction is $\chi^2(35) = 15.43$ (Prob > $\chi^2 = 0.998$). HDI(-1) first lag of HDI. Code: xtabond2 IDH L.IDH Pop Prod Dens Toc WTour WTour2, gmm(L.IDH Pop Prod Dens Toc WTour WTour2, lag(2 6) collapse) two step robust

Table 7: *Dynamic model. Dependent model GDPpc*

GDPpc	Coef.	Corrected Std. Err.	z	P>z	[95% Conf. Interval]	
GDPpc(-1)	-0.0171382	0.0223591	-0.77	0.443	-0.0609613	0.0266848
Pop	-0.0423435	0.8874531	-0.05	0.962	-1.781719	1.697033
Prod	0.4759743	0.0249011	19.11	0.000	.4271689	.5247796
Dens	-0.080803	12.99212	-0.01	0.995	-25.5449	25.38329
Toc	603.0711	19.52899	30.88	0.000	564.795	641.3472
WTour	314.7735	167.1737	1.88	0.060	-12.88096	642.428
WTour ²	-9.336126	5.967406	-1.56	0.118	-21.03203	2.359775
constant	-27,524.21	1,775.937	-15.50	0.000	-31,004.98	-24,043.44

Notes: Dynamic panel-data estimation, two-step system GMM. Number of groups=17. Number of instruments = 43. Wald $\chi^2(7) = 55,884.02$ (Prob > $\chi^2 = 0.000$). The Arellano-Bond test for AR(1) in first differences is $z = -1.73$ (Pr > $z = 0.083$). The Arellano-Bond test for AR(2) in first differences is $z = -1.39$ (Pr > $z = 0.166$). The Sargan test of overidentification. The Restriction is $\chi^2(21) = 496.83$ (Prob > $\chi^2 = 0.000$). The Hansen test of overidentification. The Restriction is $\chi^2(21) = 15.74$ (Prob > $\chi^2 = 0.998$). GDPpc(-1) first lag of GDPpc. Code xtabond2 GDPpc L.GDPpc Pop Prod Dens Toc WTour WTour2, gmm(L.GDPpc Pop Prod Dens Toc WTour WTour2, lag(2 6) collapse) two step robust

4.3. Mediation analysis

The second part of the exercise explores the relationship between the variables considered by performing a mediation analysis. The exercise is illustrated in Tables 8 and 9. Table 8 shows the relationship between tourism specialization and economic development measured as HDI as mediated by regional productivity with and without region and time fixed effects. Table 9 replicates the exercise for economic development measured using GDP per capita. To calculate the statistical significance of the relationships, a bootstrap analysis based on 5000 replications was performed.

The results in Tables 8 and 9 show that if the fixed effects of time and region in the upper part of the tables are not considered, a negative total effect between tourism specialization (statistically significant, highlighted in bold in Table 8) and economic development is observed when such development is

measured through the HDI. On the contrary, the result points to a positive effect (although not statistically significant) when this development is measured through GDPpc. When region and time fixed effects are introduced (bottom part of the tables), the relationship becomes clearer, as both results reveal total effects that are negative and statistically non-significant.

Table 8. *Estimated effects of tourism specialization, productivity, and HDI mediation model with and without fixed effects.*

Model	Effect	S.E.	z	p	[Boot 95% CI]
No FE	Indirect (ab)	0.0002 (0.0004)	0.6200	0.535	[-0.0004, 0.0011]
	Direct (c')	-0.0014 (0.0004)	-3.4325	<0.001	[-0.0022, -0.0006]
	Total (c)	-0.0011 (0.0004)	-2.5643	0.010	[-0.0019, -0.0002]
FE	Indirect (ab)	0.0000 (0.0001)	0.1680	0.867	[-0.0002, 0.0002]
	Direct (c')	-0.0004 (0.0005)	-0.8771	0.380	[-0.0013, 0.0006]
	Total (c)	-0.0004 (0.0005)	-0.8707	0.384	[-0.0013, 0.0006]

Notes: Package Use: 'mediation' (v4.5.0) Effect Type: Simple Mediation (Model 4) Sample Size: 221 Random Seed: set.seed(1) Simulations: 5000 (Bootstrap). Percentile Bootstrap Confidence Interval

The direct effect between tourism specialization and economic performance is mostly negative in all estimations carried out, except in the case of GDPpc when fixed effects are included. In almost all of the models this relationship is not statistically significant. However, the negative direct effect reaches statistical significance when economic development is measured through the HDI and the estimation is performed without fixed effects.

Table 9. *Estimated effects of tourism specialization, productivity, and GDPpc mediation model with and without fixed effects.*

Model	Effect	S.E.	z	p	[Boot 95% CI]	
No FE	Indirect (ab)	50.171	79.515	0.631	0.528	[-81.325, 235.031]
	Direct (c')	-36.921	31.705	-1.164	0.244	[-97.630, 28.412]
	Total (c)	13.250	79.456	0.166	0.166	[-113.931, 200.449]
FE	Indirect (ab)	-77.233	142.472	-0.542	0.588	[-297.679, 255.562]
	Direct (c')	31.974	100.488	0.318	0.750	[-148.752, 254.603]
	Total (c)	-45.259	-205.949	-0.220	0.826	[-388.253, 420.320]

Notes: Package Use: 'mediation' (v4.5.0) Effect Type: Simple Mediation (Model 4) Sample Size: 221 Random Seed: set.seed(1) Simulations: 5000 (Bootstrap). Percentile Bootstrap Confidence Interval

Finally, regarding the indirect effect, which is the truly relevant effect for the mediation analysis, it can be observed that none of the indirect effects reach statistical significance. In view of this result, it seems clear that, despite its theoretical importance, productivity would not play a mediating role in this context, at least for the specific case study analyzed. This seemingly counterintuitive result might suggest that tourism specialization influences economic growth primarily through other mechanisms or channels, such as sustained long-term investment, aligning with the determinants of tourism development identified by Assaf and Josiassen (2011).

According to Hair *et al* (2021:142) a *direct-only non-mediation relationship* would be observed when economic development is measured using the Human Development Index (HDI) and no fixed effects

are considered. As reflected in Table 8, in this case, the direct effect is statistically significant, but the indirect effect is not. Conversely, in the other model specifications, a no-effect non-mediation is detected, meaning that neither the direct nor the indirect effect reach statistical significance. These findings challenge the conventional assumption that productivity plays a pivotal role in linking tourism and economic development.

5. Discussion and conclusion

The results of this article suggest the existence of an optimal level of tourism specialization, maximum or minimum, beyond which a greater or lesser reliance on tourism, depending on the estimated case, is associated with lower economic development. The different maximum or minimum optimal values are obtained according to various model specifications. Therefore, in some cases, it may be advisable to increase the share of tourism specialization, while in others, it is better to reduce it. The results coincide with Brida *et al.* (2016), who argue that the nonlinearities in the relationship between tourism and economic growth should not be ignored. Moreover, the findings align with other previous research suggesting the non-linear effects of tourism on economic growth, such as Chang *et al.* (2010) and Chang *et al.* (2012).

Aside from the above, from an empirical point of view, our findings suggest that economic development reaches its lowest levels when tourism specialization is between 23% and 25%, a range in which only the Canary and Balearic Islands can be found. This observed relationship does not necessarily imply causation. In accordance with Porter (1990) and other tourism competitiveness models adapted to small islands such as Croes (2010) and Kumar & Patel (2024), structural factors and the unique constraints associated with island economies, depending on monoculture of agriculture or tourism, may explain why tourism is the main or the best viable development alternative for the territory and why regions with lower economic development become more dependent on tourism, rather than tourism itself driving economic decline. This perspective also aligns with Perles-Ribes & Moreno-Izquierdo (2024) which argues that in some cases, tourism becomes the dominant economic strategy due to a lack of viable alternatives. This finding is also consistent with previous studies, such as Chang *et al.* (2012), who state that “if the economy is too heavily dependent on the tourism sector, tourism development may not lead to impressive economic growth, as the overall contribution of tourism to the economy could be reduced by many factors.” (p. 38).

Conversely, our study identifies an optimal range of tourism specialization of between 11% and 17%, where economic development reaches its highest levels. Regions such as Cantabria, Catalonia, Madrid, Valencia, and Asturias exhibit values close to the lower bound of this range. Madrid, Catalonia, and Valencia, in particular, have diversified economies, with strong industrial sectors and advanced services, such as finance and technology, contributing significantly to their economic structure. Uncertainty increases above 12% due to the lack of observed data points, leading to higher estimation errors. Our results are not directly comparable to those obtained in Perles-Ribes & Moreno-Izquierdo (2024) focused on the Region of Valencia, because the variables used to reflect the weight of tourism in the destination differ between the two studies. They use the weight of the whole services sector as a variable for analysis and obtain maximum values for the municipalities in the range of between 55 and 77 per cent, while in this study the percentage of tourism workers of the total is used to reflect the weight of the tourism activity in the destinations. For the same reason, the result obtained is not comparable with that obtained in Perles-Ribes (2024) because its tourism weight estimation provided by the McKinsey report is different from the one used in this article. Therefore, this study refines and advances the empirical knowledge applied to tourism.

Regarding the role of productivity, the literature on economic growth and development has long recognized its central role as a key driver of economic success. Particularly, Porter (1990) emphasized

the important role of productivity in fostering regional competitiveness and long-term growth. Echevarria (1997), Alonso-Carrera & Raurich (2010), and Galstyan & Wycherley (2012), among others, point out that differences in sectoral composition influence productivity, which, in turn, influences the economic performance of the territories.

Based on this theoretical framework, this article also explores the mediating role of productivity in the relationship between tourism specialization and the development of Spanish regions. The results obtained contradict this expected role, suggesting that no mediation effect exists. Since the estimations indicate that productivity plays a significant role as a driver of regional economic development, the absence of mediation between tourism and development suggests that this relevance operates through a causal mechanism other than mediation.

On the one hand, the results of the panel data analysis reflected in Tables 3 to 5 are contradictory. While in Table 3 productivity plays a positive role in the economic development of the territories when measured through GDP per capita in both the static (Table 3) and dynamic (Table 5) specifications, the productivity coefficient has an unreliable sign and does not reach statistical significance when development is measured through the HDI (Tables 4 and 6).

On the other hand, the results obtained from the specific mediation exercise carried out also contradict this expected role of productivity, suggesting that no mediation effect exists. According to Hair *et al* (2021:142) a direct-only non-mediation relationship is observed when economic development is measured using the Human Development Index (HDI) and no fixed effects are considered. As reflected in Table 8, in this case, the direct effect is negative and statistically significant, but the indirect effect is not. Conversely, in the other model specifications, a no-effect non-mediation is detected, meaning that neither the direct nor the indirect effect reaches statistical significance. These findings challenge the conventional assumption that sectoral composition and productivity play a pivotal role in economic development, such as in Porter (1990), Echevarria (1997), Alonso-Carrera & Raurich (2010), and Galstyan & Wycherley (2012) and open new lines of research on the causal mechanisms linking tourism specialization and economic development.

From a theoretical viewpoint, our findings contribute to the debate by challenging the Tourism-Led Growth Hypothesis (TLGH), which assumes that tourism invariably fosters economic expansion. Previous studies have analyzed the existence of thresholds in the relationship between tourism specialization and economic growth. In this regard, Chang *et al.* (2010) identify two endogenous thresholds in a global sample, showing that tourism positively contributes to growth at moderate levels of specialization but loses significance beyond a certain point. Building on this, Chang *et al.* (2012) apply panel threshold models to examine how the impact of tourism varies depending on key macroeconomic factors such as trade openness, investment, and government expenditure. These studies highlight the importance of structural economic conditions in shaping the tourism-growth nexus, demonstrating that the benefits of tourism specialization are not uniform across different economic contexts. However, focusing on Spain, our study takes a different and deeper approach by identifying the optimal percentage of tourism specialization. In other words, rather than analyzing how external macroeconomic conditions influence the tourism-growth relationship, we quantify the ideal level of tourism that maximizes economic development in Spanish regions. To the best of our knowledge, this is the first article to apply this approach, which represents a significant innovation compared to the existing literature and provides concrete benchmarks for policymakers seeking to integrate tourism into a broader regional development strategy.

Furthermore, while structural conditions may sometimes make tourism the only viable development option in a region, our findings caution against allowing tourism to become overly dominant simply

because it is perceived as a straightforward or low-risk economic alternative. As Lacher & Oh (2012) note, excessive reliance on tourism can lead to sectoral crowding, limiting economic diversification and monopolizing governmental strategies and resources. This situation is comparable to the "Dutch disease" phenomenon observed in resource-dependent economies (Inchausti-Sintes, 2015), where an over-specialized tourism sector may hinder the emergence of alternative industries. By identifying an optimal threshold, this study provides an alternative theoretical lens to the assumption that more tourism always leads to greater development.

Finally, another theoretical contribution of the article is that despite its theoretical relevance, the mediating role of productivity in the relationship between tourism specialization and economic development is not confirmed, whether measured through the Human Development Index (HDI) or GDP per capita. This result opens up the possibility of exploring new specifications, suggesting different causal relationships between tourism specialization and productivity.

From a practical standpoint, the findings of this study provide valuable insights for tourism policymakers and destination managers. The Tourism as Optimal Choice Hypothesis (TOCH) highlights that the impact of tourism specialization on economic development is not uniform across all regions; rather, it depends on local structural conditions. Therefore, the methodological application of TOCH and the estimation of optimal specialization levels must be conducted at a local scale, as these values are inherently specific to each territory and cannot be easily generalized across different regions.

Once these optimal values are estimated for a given destination or group of destinations, they can serve as a practical guide for managers to design and implement targeted economic policies aimed at improving the quality of life of residents. In some cases, these policies may advocate for increasing the role of tourism within the regional economy to harness its growth potential. In other cases, the findings may indicate over-reliance on tourism, necessitating a strategic refinement of the existing tourism model or a diversification strategy to balance the regional economic structure.

In the case of the Spanish regions analyzed, it seems clear that both Extremadura and Castilla-La Mancha have room to increase their development through a greater emphasis on their tourism sector. An increase in the weight of tourism might also be advisable in Murcia, although to a lesser extent than in the two previous cases. The remaining mainland regions would be at values close to the optimum. Finally, in the Canary and Balearic Islands, it would seem advisable to reduce the weight of economic activity in order to increase their levels of development. However, given the structural conditions imposed by insularity, it appears difficult to build a more balanced productive fabric, making tourism possibly the most viable option for economic development in these territories.

While these findings do not negate the benefits of tourism, they also highlight the critical need for strategic economic planning in highly tourism-dependent regions. Over-dependence on tourism can lead to economic vulnerabilities, particularly if the sector dominates local resources and inhibits the development of other productive industries. To mitigate these risks, policymakers should consider implementing adaptive strategies in order to refine the tourism activity. One possible approach involves enhancing the quality and value of tourism activities by targeting higher-income visitor segments or attracting digital nomads, capitalizing on factors such as improved connectivity and quality infrastructure. Additionally, diversification policies that strengthen local industries, including agriculture, fishing, and tourism-linked manufacturing (even those related to the tourism sector, as suggested by Porter (1990)), could serve as viable economic policy avenues for destination managers to explore.

Despite its contributions, the study also has several limitations, which also open new lines for future research. The first limitation relates to the short-term nature of the relationships analyzed. As long-term economic patterns may differ from the short-term findings observed in this study, further research will be required to establish the robustness of the results over time. In this regard, other types of methods related to time-series models or long-panel data techniques would be advisable for this purpose.

A second limitation concerns the sample size. Since the study focuses on Spanish regions, it is able to control for cross-country heterogeneity, ensuring a more consistent analytical framework. However, this focus on a single country may limit the generalizability of the findings. A potential future line of research would be to apply this methodology to a broader set of regions and territories, allowing for greater variability in economic structures and tourism dependence.

A third limitation is that the study may not truly represent the entire population. Although data from all Spanish regions are included, the analysis covers only 13 years, which is a relatively short period. Additionally, since regions are aggregates of smaller units, this may dilute the actual effects, challenging the authors' view that statistical significance is a minor concern in this context.

Finally, a fourth limitation relates to the use of mediation analysis in time-series and longitudinal studies. While mediation analysis is well-established in cross-sectional research, its application in longitudinal settings remains a methodological field that is still under development. Further refinement of these techniques could provide deeper insights into the mechanisms linking tourism specialization and economic development.

Building on these limitations, future research should also further explore the TOCH framework by applying alternative causal analysis techniques, as proposed by Perles-Ribes & Moreno-Izquierdo (2024). Another line of research stemming from this study is expanding its analysis and international application to other European or global tourist destinations. Additionally, identifying new explanatory variables that mediate the relationship between tourism specialization and economic development represents a promising avenue for further inquiry. Broadening this line of research would contribute to a better understanding of the mechanisms through which tourism influences regional economic trajectories and provide more precise policy recommendations for sustainable tourism-driven development.

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