Agglomeration, innovation, productivity and tourism competitiveness: a spatial econometric analysis on European regions

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Abstract

Tourism is a place-based activity, while in many advanced economies it is increasingly becoming a knowledge-based activity. Recent developments and innovations in Information and Communication Technologies (ICT) have radically transformed the tourism business. The broad interpretation of the tourism sector adopted in our work follows this comprehensive approach, including ICT services. This analysis for 237 European NUTS 2 regions aims to contribute to the understanding of whether and how the development of regional systems of innovation has influenced the competitiveness of tourism destinations.

Against the background of existing relevant and comparable data - appropriate for an international analysis of the tourist sector - this study examines the impacts of both traditional production factors (physical and human capital) and contextual variables related to the territorial capital of each region (such as level of specialisation in tourism, intensity of innovation, labour qualification or productivity) on regional tourism competitiveness (expressed by the evolution of the growth of gross value added generated by tourism in each region) over a period of 8 years (including a period of unprecedented expansion of tourism activities, negative economic effects caused by the international crisis and the gradual effects of the processes of recovery).

The results reveal lower levels of productivity in those regions where tourism services are more labour-intensive, suggesting that the supply of tourism services in those regions is based on traditional products and services with a low value added. On the other hand, regions where education, innovation and productivity demonstrate higher levels are also those where gross value added in tourism is less important for the regional economy. Different patterns of spatial development and agglomeration, with important policy and managerial implications for the tourist sector, were identified, thus confirming the great potential of spatial econometric analysis – and, in particular, spatial autocorrelation methods – for advanced tourism studies.

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Tourism is clearly a place-based activity, while in many advanced economies it is increasingly becoming a knowledge-based activity. Co-terminality, spatiality and temporality distinguish tourism from other economic activities, enhancing its potential for the development of practice and place-based innovation strategies based on information and knowledge, while the spatial agglomeration of tourism activities can generate externalities for the regional economy. Recent developments and innovations in Information and Communication Technologies have radically transformed the tourism business, increasing its potential for interactivity and cooperation, making information a key element to match supply and demand of tourism services. New practices oriented towards personalized needs and based on new internet services enhance the potential for the development of processes of co-creation of services or may even to become "tools of mass collaboration", with significant impacts on innovation processes, collaborative governance models or education and training. The broad interpretation of the tourism sector adopted in our work follows this comprehensive approach.

As most of the tourism services are provided by small and medium-sized companies - often with limited structured formal learning processes -, the information obtained through their interaction with tourists tends to be tacit and localised, enhancing the importance of regional innovation networks for innovation. The regional analysis developed in this work aims to capture this regional innovation dynamics and its implications for tourism competitiveness. Against the background of existing relevant and comparable data, this study examines whether and how the development of regional systems of innovation influence the competitiveness of tourism destinations. The impacts of both traditional production factors and contextual variables related to the territorial capital of each region on regional tourism competitiveness over a period of 8 years will be analysed.

The research includes a general inventory and overview of the data for the different variables included in the model. Next, an exploratory spatial analysis based on local Moran-I indicators of spatial autocorrelation between tourism competitiveness and the explanatory variables

taken into consideration is offered. Finally, an advanced econometric approach based on a spatial panel data model is presented and developed. A discussion of the main results of our analysis and its policy and managerial implications will be offered. This study covers almost all NUTS-2 regions (237) in the European Union. NUTS-2 regions are relevant for the purposes of this analysis, as they generally have a specific institutional framework for regional and tourism policies and exhibit also some territorial coherence, although, in a strict sense, they can not exactly to be considered a tourism destination.

The dependent variable considered in the spatial panel model is tourism competitiveness, measured on the basis of the regional gross value added (at current prices) by tourism activities in each region. Tourism is clearly more important in South and West European regions but a shift to the Eastern side of Europe can be noticed in the last 8 years. The determinants of the regional tourism competitiveness considered are related to the importance of tourism in the regional economy (share of tourism in regional employment and gross value added; tourism demand, measured by the nights spent at regional tourism accommodation establishments), human capital (education of the work force), physical capital (gross fixed capital formation in tourism) and immaterial regional resources (productivity and regional investment in research and development). These indicators reflect the territorial capital of each region and its ability to transform resources into competitive products and services.

Tourism regions are normally not islands in isolation and tourism flows are often crossing regional borders. The existence of such spatial effects can be tested using Global and Local Indicators of Spatial Autocorrelation by introducing spatially lagged variables. For the purposes of this analysis, a geographic neighbourhood is defined according to the second level rook contiguity criteria. This information is used to build a spatial weight matrix that defines the impacts of each region on its neighbours. Two additional conditions are defined: the spatial weight matrix is row normalized and the impact on the direct first-level neighbour is twice as large as the impact on the second level.

Clusters of high values of regional competitiveness in tourism and high tourism demand were identified in the Southern European regions from Spain, France and Italy. It is also noticeable that there exists a large number of Southern regions (in the same countries) where low value added in tourism has a clear spatial autocorrelation with high tourism demand, suggesting the existence of a tourism supply based on low value-added products and services, with relatively

low productivity. On the other hand, clusters of low values for both variables can generally be found in Eastern European regions, despite the existence of a few exceptions within this area (and also in the United Kingdom), where a reverse pattern occurs.

It is also possible to observe a high dispersion of clusters of regions with a positive spatial autocorrelation. Some regions from Portugal, Spain and Italy, but also in the United Kingdom or North Eastern Europe, show high values for both variables, linking high competitiveness to high specialisation in tourism. Clusters of regions with low competitiveness and low specialisation are located in Central or Eastern European regions. Central Europe is the area where clusters of regions with high competitiveness and low specialisation can be identified (mostly in the North of France and Germany), suggesting high productivity in tourism services, although this sector is not predominant in the regional economy. The other type of negative spatial autocorrelation occurs in important parts of the territories from Portugal, Spain, Greece or North Eastern regions, revealing a high importance of tourism for the regional economy, but low achievements in terms of value added (low productivity).

A large number of clusters of regions with low levels of competitiveness in tourism and low levels for productivity, education and R&D (mostly in Eastern European regions) is also found. On the contrary, very few clusters of regions exist where high levels of tourism competitiveness are related to high scores achieved in any of those three factors. We may also observe the existence of a large number of clusters of regions with low values for gross value added in tourism, despite the high scores registered for productivity, education and R&D in the area where they are located. Again, this confirms the abundance of regions where these factors are more developed and tourism is less important within the regional economy. On the contrary, there is a low number of regions registering the reverse situation (high value added in tourism with low scores for productivity, innovation and education).

A spatial panel data model is an adequate tool to provide a model explanatory analysis, as it allows the estimation of a model including a time series and cross-sectional dataset, with information related to a large number of units over 8 years, taking into consideration the potential spatial effects. For computational purposes, natural logarithms were applied to the data related to the dependent variable, measuring tourism competitiveness (gross value added in the tourism sector - "logGVAT") and to the independent variables related to tourism demand (nights spent in tourism accommodation establishments - "logNIT") and investments

in tourism (gross fixed capital formation in the tourism sector - "logINV"); the importance of tourism in the regional gross value added (GVATS) and employment (EMPTS) are expressed in percentage, which is also the case for the immaterial factors of competitiveness (work force with tertiary education – "EDUC" – and investment in research and development as a share of the regional GDP – "ID"). Productivity ("PROD") is expressed in thousands of euros per worker.

(1) $\log GVAT_{it} = \beta_0 + \beta_1 \log NIT_{it} + \beta_2 \log INV_{it} + \beta_3 EMPTS_{it} + \beta_4 GVATS_{it} + \beta_5 EDUC_{it} + \beta_6 ID_{it} + \beta_7 PROD_{it} + _{it} u_{it}$

where i is an index for the regions, t is an index for the time period and u is the error term. All the scores obtained for a Variance Inflation Test were clearly below the threshold of 5 (O'Brien, 2007), revealing the absence of problems caused by multicollinearity. The computation of a spatial panel model regression implies the inclusion of a spatially lagged endogenous variable, measuring the impact of the growth of tourism competitiveness in one region on its neighbours. A spatial multiplier is also included in order to capture un-modelled spatial effects potentially existing in the distribution of the error term (spatial error).

(2) $Y_{it} = \rho W Y_{it} + X_{it}\beta + u_{it},$
(3) $u_{it} = \lambda W u_{it} + \varepsilon_{it}$

In this case, Y represents the dependent variable, X is a vector that represents the independent variables, W is a nonnegative N×N matrix of known contiguity parameters describing the spatial impacts among the regions considered in this study, WY represents the endogenous interaction effects among the dependent variable, Wu shows the interaction effects among the disturbance terms of the different units, ρ is called the spatial autoregressive coefficient (identifying the spatial lag), λ the spatial autocorrelation coefficient (identifying the spatial error), i is an index for the regions and t is an index for the time period concerned. Considering the existence of both types of spatial effects (identified after the performance of relevant tests), a general spatial Cliff-Ord type model (Cliff and Ord, 1981) is computed and the option between a random or fixed effects model has been supported by the result of a Spatial Hausmann test (p-value < 2.2e-16), leading to the choice for a fixed effects model.

The results of the model confirmed the expected positive correlation between tourism competitiveness, tourism demand, investment in the tourism sector and the level of specialisation in tourism, when measured by the share of the gross value added by this sector within the overall regional gross value added. Nevertheless, when specialisation is measured taking into consideration the share of the work force employed in tourism, a negative correlation with tourism competitiveness can be found. This suggests that regions where the tourism sector is more labour-intensive achieve lower levels of productivity and also relatively lower levels of gross value added in the tourism sector. It was also possible to observe that productivity in tourism, qualifications of the regional work force and regional investment in research and development have the expected positive impacts on the competitiveness on tourism. Time effects clear identify a negative impact on the gross value added in the tourism sector after 2008, reflecting the impact of the international financial crisis on the tourism sector. The existence of spatial effects among regions is also clear. These include positive spillover effects, expressed in the value of the spatial autoregressive coefficient (suggesting that tourism dynamics in one region has positive impacts on the contiguous regions) and also positive unmodelled effects, expressed in the value of the spatial autocorrelation coefficient).

The exploratory spatial analysis presented had revealed the existence of a large number of Southern European regions (where the major mass tourism sun-and-sea destinations are located) with high levels of specialisation in tourism and relatively low achievements in terms of value added. This has important implications for those destinations, as it reveals the existence of a high pressure on local resources (normally ecologically sensitive), with relatively low impact on the regional economy. Adequate policies oriented to increase the value added of these services may lead to the achievement of a higher economic performance, reducing the negative impacts on the environment and landscapes.