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Tourism and economic growth: an application to coastal regions in the Mediterranean area

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Abstract
This paper describes regional touristic supply under the framework of territorial capital to understand which territorial assets are the most important for stimulating economic growth. We used spatial regression models to consider spatial dependencies among regions, and Bayesian Model Averaging to specify our models using only the most relevant territorial assets. We have focused on the Mediterranean coast. The results show that many of the variables considered in our models play an important role in predicting GDP, recognizing them as strategic in economic growth, as well as a variety of strictly tourist assets, such as cultural heritage and landscape.

Keywords
Tourism growth, territorial capital, tourism competitiveness, spillover effects, spatial regression models, Mediterranean area

JEL Codes
C11, L83, Z32, R11, R58

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1 Introduction

Tourism has the potential to promote regional growth, especially for regions located in developing countries (Yang and Fik 2014). In fact, if tourism is properly managed and the tourist carrying capacity is respected (see, for example, van der Borg, in Coccosis and Mexa, 2017), the tourism sector can positively affect other sectors of local economies through spillover effects and become a relevant driver of economic growth (Cernat and Gourdon, 2012; Brida et al., 2016; Kadiyali and Kosová, 2013).

Investing in tourism represents an opportunity for developing countries to promote the growth of rural and peripheral areas (Hohl and Tisdell 1995). There is a substantial body of literature on this; a number of papers study the relationship between tourism and economic growth (see, for instance, Shahzad et al., 2017; Perles-Ribes et al., 2017; Croes, Ridderstaat, and van Niekerk, 2018; Dogru and Bulut, 2018). These works conclude that there is a positive correlation between tourism and economic growth, and some even analyse the effect in causal terms (Dogru and Bulut, 2018).

Other studies show how tourism can be an important factor in mitigating the negative effects of an economic crisis (Perles-Ribes et al., 2017), especially in peripheral regions and on islands (Katircioglu, 2009; Croes, Ridderstaat, and van Niekerk, 2018). Several scholars also focus on how tourism can maintain regional development by enhancing the expenditure of external consumers or by supporting the formation of new services capable of attracting inhabitants with positive effects on local spending. (Ruault, 2018). Recently, the phenomenon of overtourism has begun to feature in the debate on tourism as a driver of regional economic and social development, and in numerous studies (see, for example, Biagi and Detotto 2014; Peeters et al., 2018; UNWTO, 2018; van der Borg, 2017) it has been demonstrated that, if the tourist carrying capacity of destinations is not violated, tourism remains a very important source of regional development.

The tourism-led growth hypothesis has attracted much attention from scholars, especially in recent years, and testing empirically its predictions has become one of the most important research lines in tourism economics (Song et al., 2012). Pablo-Romero and Molina (2013) provide a comprehensive review of the literature and reveal that the relationship between tourism and growth is almost always confirmed. In their review, only four of 87 studies pointed to evidence of a null effect of tourism on growth. In addition, another review performed by Brida, Cortes-Jimenez and Pulina (2016) found similar results.

However, only a limited number of studies analysed which specific regional characteristic of touristic supply contributes the most to stimulating regional competitiveness and economic growth in parallel.

According to Camagni and Capello (2013), regions can be characterized by the concept of territorial capital—which is defined as a set of specific endowments (or assets) owned and exploited in order to increase competitiveness. The same concept can be applied to define regional territorial characteristics that describe a territory's touristic supply and represent assets capable of stimulating economic growth. In this paper, in order to identify territorial capital dimensions related to the regional touristic supply, we refer to ATTREG (2011), a study funded by the ESPON programme to understand the determinants of regional attractiveness in terms of various types of audiences (i.e. citizens and visitors). The ATTREG project developed a theoretical model based on the concept of attractiveness, intended to capture how a place is perceived by visitors and residents in relation to the types of territorial capitals that the place itself has to offer. In other words, attractiveness is seen as the interaction among a complex set of characteristics based on the presence (or absence) of certain forms of territorial capitals (assets or endowments). The level of attractiveness of a place is determined by the combination of different assets and from the way(s) in which such assets are mobilized, both by non-governmental organizations and institutional actors.

The contribution of the present paper is twofold. First, we relate the concept of territorial capital, as defined by Camagni and Capello (2013), with that developed under the ATTREG project. We assume that specific territorial characteristics typical of touristic regions and associated with higher levels of attractiveness of visitors represent a competitive advantage for economic growth and can be exploited to increase regional competitiveness. Second, we use rigorous econometric methods to test which of the assets defined under the ATTREG project are associated with GDP growth. We first test for the presence of spatial dependence among units/regions using the Moran's I statistics. Since we find that the level of spatial correlation among units is statistically different from zero, we use spatial regression methods that are appropriate to obtain unbiased estimates of parameters when the usual assumption of independence does not hold. Moreover, we adopt a dynamic panel specification, as in Sequeira and Nunes (2008) and Poprawe (2015), with time and country fixed-effects to account for adjustment mechanisms that are likely to affect GDP growth. Last, we use a Bayesian Model Averaging (BMA) approach to estimate the most influential determinants of GDP.

The paper is organized as follows: Section 2 presents a review of the literature on the relationship between territorial capital, regional growth and attractiveness. Section 3 discusses data availability and describes the geographical area over which the empirical analysis will be conducted. Section 4 presents the econometric model and other empirical methods employed in the paper. Section 5 concludes.

2 Literature review

2.1 The economic literature

The central role played by territorial capitals in determining regional economic growth was established by Camagni and Capello (2013). Territorial capitals represent the specific endowments (or assets) that a region possesses and can exploit in order to promote economic growth. The approach adopted by the authors is strongly supply-oriented, which has already been proven by many prominent papers in the regional growth literature, and it is the approach that proved to be most effective in predicting the determinants of economic growth. However, results from this literature are mixed, and there is not yet agreement about which territorial assets are the most relevant in predicting economic growth. On one side, there are the canonical determinants of economic growth (e.g. capital and labour); on the other, there are a wide range of non-traditional factors, including infrastructure endowments, natural and cultural resources and social capital. The influence of these determinants has already been tested separately, to some extent, by previous empirical papers, but they have never been considered together to provide a comprehensive frame for the interpretation of regional development and innovation factors; indeed, this approach is completely new in the literature that explains economic growth with tourism.

Among non-traditional factors, the influence of social capital has been largely studied by regional economists, who assume that intangible assets, synergies and institutional factors have been very important to promoting economic growth (Putnam, 1993; Camagni, 1999; Faray, 2006; Capello, 2006; Storper, 2003; Camagni, 2003; West-Lund, 2006; Fritsch & Storey, 2014; Panzer-Krause, 2019). However, other types of territorial capitals have been identified by the Organisation for Economic Co-operation and Development (OECD, 2001) and were recently considered by the Commission of the European Union. According to these studies, each region possesses a specific territorial capital, different from that of other regions, in which it would be more desirable to invest in order to produce positive externalities for the territory itself and for surrounding areas. However, there is still no consensus about which elements should constitute territorial capitals. Some indications are given by the Commission of the European Union, stating that such factors should include the area's geographical location, size, factor of production endowment, climate, traditions, natural resources, quality of life or the agglomeration economies provided by its cities and business networks. Other factors may be understandings, customs and informal rules that enable economic actors to work together under conditions of uncertainty and a combination of institutions, rules and practices that make creativity and innovation possible.

2.2 The tourism literature

In the tourism economic literature, a model for the attractiveness of European regions and cities for residents and visitors (ATTREG) was studied in order to describe how to exploit the set of endowments, or territorial assets, owned by each region to attract different types of audiences to a given destination and what actions can be taken by policymakers to mobilize these assets. The model is based on the concept of attractiveness, which is understood as how a place is perceived by visitors and residents in relation to the types of assets that it has to offer. In the ATTREG model, attractiveness is built through the interaction of a complex set of characteristics based on the presence (or absence) of certain forms of territorial capitals (assets or endowments).

The premise on which the ATTREG model is based is the concept of territorial capital, which is represented by a complex system of natural and socio-economic elements that define the uniqueness of local assets and the capacity to attract tourists and visitors. Territorial capital is composed of four elements: economic, institutional, physical/environmental and social environment capitals (see Deas and Giordano, 2001), to which the ATTREG model adds “social and cultural” and “anthropic” capitals. The level of attractiveness of a place is determined by the combination of different assets and by the way(s) in which such assets are mobilized, both by non-governmental organizations and institutional actors (Fernandez, Pena-Boquete, and Pereira, 2009; Perez-Dacal, Pena-Boquete, and Fernandez, 2014).

Evidently, this level of attractiveness cannot be stimulated without limits; destination management strategies must be implemented according to sustainability principles (Butler, 1996; Ritchie and Crouch, 2000; Navarro, 2012) and with the awareness that there is a limit to the tourism carrying capacity of a destination (O’Reilly, 1986). Exceeding this limit threatens to irreparably damage tourism attractiveness and competitiveness (Buhalis, 2000; McIntyre, 2011; Ritchie and Crouch, 2004) due to the onset of a multitude of negative effects that tend to outweigh the initial benefits (Archer et al., 2005; Coccosis, 2017), leading the destination to its decline or death (Butler, 1980; Giannoni and Maupertuis, 2007).

The phenomenon of overtourism, which affects an increasing number of global destinations each year (Peeters et al., 2018; WTTC and McKinsey, 2017), refers not to tourism itself, but to when its consequences become ‘too much’ (Namberger et al., 2019), compromising the quality of visitors’ tourist experience (Hovinen, 1982; Canestrelli and Costa, 1991; Hovinen, 2002) and the quality of life of the residents (Mathieson and Wall, 1982). However, if these limits are respected through suitable destination management and marketing policies, tourism can still be an important resource for the growth of a region (Coccosis and Mexa, 2017; Navarro, 2012).

A second study to which we refer frequently is the Tourism and Travel (T&T) sector Competitiveness Index (TTCI) developed by the World Economic Forum and intended to create a ranking of touristic destinations according to their level of competitiveness. The ranking and indicators provided have the advantage of representing the entire world, but they lack territorial variability within each country. The final index is obtained as the sum of three sub-indexes that represent different pillars of national touristic sector competitiveness. The first sub-index represents the T&T regulatory framework, the second captures the T&T business environment and infrastructure and the third measures T&T human, cultural and natural resources. Each index is then subdivided into several pillars (or dimensions) that are meant to serve as proxies for the sub-index to which they refer. The three sub-indexes, however, capture territorial endowments that are very similar to those that the ATTREG project measured. In fact, the regulatory framework measured by the TTCI is represented well by the institutional capital dimension of the ATTREG model, whereas the business environment and infrastructure measure is captured through economic and social capital; finally, human, cultural and natural resources are captured by the social, environmental and anthropic capitals of the ATTREG model. Even though the number and types of indicators can vary, at least from a conceptual point of view, the two projects are very similar in spirit, and they share the idea of expressing the touristic sector level of competitiveness and performance with a multidimensional index capable of considering different sources of attractiveness of a territory.

3 Data

3.1 The Mediterranean area

In this paper, we analyse the Mediterranean area, which is composed of the regions adjacent to the Mediterranean Sea that are affected by the regional development strategies promoted by the European Territorial Cooperation MED 2014–2020 Programme.

Following the Commission decision of 31 October 2006 that involved drawing up a list of eligible regions and areas for the transnational strands of the European territorial cooperation objective, the MED programme covers the following areas: Cyprus (the entire country), France (4 regions: Corse, Languedoc-Roussillon, Provence Alpes Cte d'Azur, RhoneAlpes), Italy (18 regions: Abruzzo, Apulia, Basilicata, Calabria, Campania, Emilia-Romagna, Friuli-Venezia Giulia, Lazio, Liguria, Lombardy, Marche, Molise, Umbria, Piedmonte, Sardinia, Sicily, Tuscany, Veneto), Malta (the entire country), Portugal (2 regions: Algarve, Alentejo), Slovenia (the entire country), Spain (6 autonomous regions: Andalusia, Aragon, Catalonia, Balearic islands, Murcia, Valencia, and the two autonomous cities—Ceuta and Melill), the United Kingdom (1 region of economic programming: Gibraltar) and Croatia (the entire country). Moreover, other countries that participate with the European funds of the IPA (Instrument for Pre-Accession Assistance) are: Albania, Croatia, Bosnia and Herzegovina and Montenegro. The overall objective of the MED 2014–2020 Programme is to promote sustainable growth in the Mediterranean area fostering innovative concepts and practices, reasonable use of resources and supporting social integration through integrated and territorially based cooperation. The Programme highlights how tourism offers substantial opportunities in terms of economic growth and employment, and how exploiting this potential will require development strategies for infrastructure, sites and attractions, accommodation, marketing and service innovations.

3.2 Data

The present paper uses information from various sources to describe territorial assets for regions located in the MED space. Data are collected under the Nomenclature of Territorial Units for Statistics (NUTS) 2 classification, which presents the same level of disaggregation of territories in the MED program and has available information about territorial assets and outputs for most of the MED regions. Data are available for each country/region listed above, with the exception of Albania, Bosnia and Herzegovina, Montenegro and the region of Gibraltar. The final database is composed of 52 regions identified through the NUTS 2 classification. The main sources of data used are represented by Eurostat and ESPON. The ESPON database, exploiting data collected in the ATTREG project, already provides most of the relevant information to measure territorial capital. However, we decided to extend and improve this database by adding to indicators, when possible, temporal variability. In fact, one of the premises of the ATTREG model was to measure regional attractiveness through the use of dynamic models; however, indicators and assets collected were not available for more than one period, or, at most, they were provided as averages over only two periods.

Our data were collected over a 10-year time span, 2000–2010. We chose these years for our analysis because, after 2010, a new NUTS classification was adopted, making it very difficult to conduct a comparison of time series and of information with the original ATTREG database, which was collected under the NUTS 2006 classification. Some variables do not vary over time because we could not find appropriate proxies; thus, these will be treated as fixed regional endowments.

A second aspect that we improved upon with respect to the ATTREG project is related to measuring spatial interactions, or spillover effects. Even though this was one of the premises cited in the ATTREG project, there are no variables that can be used to account for the effect of spatial interactions or spillover effects among regions. In this paper, we adopt a spatial regression analysis approach to specifically account for territorial spillover effects. A full list of the variables used in the analysis, with time reference and source, is available in Table 1.

Table 1: Output measures and territorial capitals

Variable	Description	Time availability
	Output measures	
Variable	Description	Time availability
GDP_head_pps	Real GDP per capita in PPS	2000–2010
	Antropic capital	
AN2_05	Monuments and other tourist sights, indexed*	2009
AN2_11	Gross population density (average population/km^2)	2000–2010
AN2_15	Tourist accommodation capacity (bed places/population)	2000–2010
AN2_21	Metropolitan regions**	2009
AN2_23	Accessibility***	2001
MM2_64	Airport rank****	2001/2003
	Economic capital	
EH2_14	Share of employment in agriculture	2000–2010
EH2_18	Share of employment in industry	2000–2010
EH2_44	Share of employment in wholesale, retail, hotel and restaurants	2000–2010
EH2_42	Share of employment in creative workforce	2000–2008
EH_51	Share of employment in knowledge intensive sectors	2000–2010
EH_53	Share of employment in high technology sectors or with ISCED level 5–6	2000–2010
EH_54	Share of self-employment	2000–2010
EH_57	Patents per worker	2000–2010
	Environmental capital	
EN2_23	Climate variability	1985
EN2_34	Quality of natural landscape	2009
ESP2_NUT	NUTS3 regions	2009
	Institutional capital	
IN2_48	Satisfaction with health services	
	Social capital	
SC2_44	Share of university students (isced_56/population with age > 18)	2000–2010
SC2_45	Life expectancy	2000–2010
SC2_20	Dependency rate	2001/2003
SC2_02	Satisfied residents	2002/2004

*Notes: * Weighted average of 'stars' in Touring Club Italy guidebook series (Green Guides of Europe series) in each NUTS 2 area (assigning weight 3 to 'conjuncts' and 1 to individual monuments and objects, 2001–2008). ** Nuts 2 containing metropolitan region. *** Population per hour travel time between NUTS2 centroids for road and ferry network (2005) and working age population (2001). **** Rank of regional air passenger flows based on passenger movements through regional airports (averaged 2001–2003; 1 = busiest).*

3.3 Descriptive analysis

In this section, we present some descriptive evidence about the territorial variability of our main variables of interest, namely, real GDP per capita in PPS and various measures of territorial capital. Figure 1 shows real GDP growth per capita in PPS as the percentage variation between average real GDP per capita in PPS in 2000–2005 and in 2006–2010. Black circles represent the average real GDP per capita in PPS in 2006–2010. As we can see, many regions faced a decrease in real GDP per capita in PPS that is mainly attributable to the 2008 global economic and financial crisis. Italy, Greece and Spain experienced moderate and more severe reductions, whereas other regions experienced small or moderate positive variations (e.g. France, Spain, Portugal and Croatia).

Figure 2 shows the spatial distribution of anthropic capital indicators in the MED area and the temporal variation for indicators recorded in different time periods. Green and red circles represent positive or negative variations for the variables of interest between the average level in 2000–2005 and in 2006–2010. The dimension of circles indicates the magnitude of variations. Italy, with respect to other countries, shows a higher presence of monuments and other touristic sights, as well as a higher level of accessibility, especially in northern regions. Tourism accommodation capacity is lower for regions farther from the coast and in southern Italy. Last, we also see the distribution of airports in the MED area, with major airports located in Spain, Italy and France.

Figure 3 shows the spatial distribution of environmental and institutional capital indicators in the MED area. The share of Natura 2000 sites seems to be evenly distributed between regions. Southern Italy, Greece and southern Spain and Portugal have slightly higher values for this indicator. Climate variability is higher in Italy and Greece. Institutional capital is measured through the share of residents that are satisfied with health services and presents higher values in France and Spain.

Figure 4 shows the spatial distribution of economic capital indicators; we can see that Greece is the country with the highest share of employment in agriculture, whereas Italy has the highest share of workers in industry. The share of workers in wholesale, retail, hotels and restaurants is higher in Croatia, Greece and in some areas of Spain and Portugal. The share of knowledge-intensive workers and workers in high-technology sectors is higher in France and northern Italy. Finally, the higher shares of self-employed workers are found in Italy and Greece. We can see that the share of workers in agriculture and industry has decreased in almost all regions considered, whereas there has been an increase in the share of workers in wholesale, retail, hotels and restaurants, especially in southern Italy, Greece, Spain and Portugal. It is also interesting to notice how the share of those employed in the knowledge-intensive and high-technology sectors has increased in almost all the regions considered. Finally, Figure 5 shows the spatial distribution of social capital. The share of university students is higher in France, Spain and Portugal. Life expectancy is lower in Croatia, Greece and Portugal, even though it increased in almost all regions considered.

4 Empirical strategy

4.1 The econometric model

In order to estimate the effect of territorial capital on economic growth, we can adopt a standard OLS specification that can be expressed as follows:

$$ly_t = \alpha + \tau ly_{t-1} + X_t \beta + v_t \,, \qquad (1)$$

where ly_t represents the logarithm of real GDP per capita in PPS, ly_{t-1} is the logarithm of real GDP per capita in PPS in $t-1$ and is included to capture dynamic effects that are likely to arise when using time-series data. In panel data, time dependence is often assumed because of the presence of costs of adjustments or other behavioural frictions that lead almost naturally to the use of a dynamic model including time lags of the dependent variable among regressors. X_t represents the vector of covariates (i.e. territorial assets) and a set of time and country dummies to capture other unobservable factors related to time- and country-specific effects. All variables are considered at their past value to avoid simultaneity bias problems.

It is worth noting that equation (1) is equivalent to estimating the parameters of interest directly on the yearly growth rate of real GDP per capita in PPS if we consider that it can be expressed as:

$$g_t = \alpha + \tau' ly_{t-1} + X_t \beta + v_t \,, \qquad (2)$$

where $g_t = ly_t - ly_{t-1}$ is the yearly growth rate of real GDP per capita and $\tau' = \tau + 1$. The only assumption behind this model is that τ is lower than one; otherwise, the AR(1) model assumed for ly_t is not stationary.

However, OLS estimates from equations 1 and 2 are biased because the usual assumption of independence between units, or regions in our case, does not hold. This assumption is generally very difficult to justify, and the economic and econometric literature have already widely proved that it is unlikely to hold when data are represented by observations located in space. As pointed out by Ertur and Koch (2007), there are externalities that can be generated by physical and human capital as well as for technological interdependences between regions. Ertur and Koch (2007) justify the use of spatial lags with motivations similar to those adopted in the time-series and panel literature to justify the use of time lags. Another reason to assume spatial interdependencies among units is provided by the assumption of the existence of latent unobservable factors related to culture, infrastructure and recreational amenities for which we have no available information, affecting regional performance in terms of GDP growth or touristic attractiveness. Also, in this case, we may find it necessary, from a theoretical point of view, to include spatial lagged variables in order to obtain unbiased estimates. The literature refers to this phenomenon as spatial dependence between observations and provides a series of econometric models (i.e. spatial regression models) capable of relaxing the restrictive assumption of independence among units imposed by standard OLS models. A very general specification for spatial regression models can be represented by the following equations:

$$\begin{aligned} g_t &= \alpha + \tau' y_{t-1} + \rho W l y_t + X_t \beta + W X_t \theta + v_t \\ v_t &= \lambda m v_t + \varepsilon_t \end{aligned} \qquad (3)$$

The term Wly_t represents the spatial lag variable of ly_t and is included in the econometric model to account for interdependencies between units. X_t represents the usual vector of covariates, whereas WX_t is the spatial lag vector of covariates X_t. v_t is the error term, and m is the spatial weight matrix associated with the error term.

From this very general specification, it is possible to derive the most widely used spatial regression models. In fact, if we set $\theta_k = 0$, we have the specification for the well-known Spatial Autoregressive Model with Auto Regressive disturbances (SAC), whereas if $\lambda = 0$, we would estimate the Spatial Durbin Model (SDM). When $\lambda = 0$ and $\theta = 0$, we obtain the Spatial Autoregressive Model (SAR), and if $\rho = 0$ and $\theta_k = 0$, we estimate the Spatial Error Model (SEM). According to the specification we decide to use, and consequently the parameters we decide to set to zero, we get different spatial regression models, accounting for different types of interdependencies among regions.

In the present paper, we consider the SAR and SDM specifications to account for spatial spillover and spatial heterogeneity effects. However, using spatial regression models, we cannot, as previously, consider the parameters as elasticities directly; rather, we need to take a step further. In fact, the derivative of the outcome variable with respect to each covariate takes a much more complicated form than that usually assumed in OLS models. The econometric literature on spatial regression provides some summary measures that can be derived from the estimated parameters and that are interpretable as OLS coefficients. They are: (i) the average direct effect: provides a summary measure of the impact on outcome arising from changes in the i^{th} region of variable *k*; (ii) the average indirect effect: provides a summary measure of the impact on the outcome of interest for region *i* arising from changes in all the other *j* regions of variable *k*; (iii) the average total effect = average direct effect + average indirect effect, which is interpretable in two ways: the average total impact of variations in variable *k* on the outcome of the typical region, or as the total cumulative impact arising from one region *j* raising its territorial asset *k* on the outcome *Y* of all other regions (on average).

To decide at the outset whether a spatial regression model is preferred to a standard OLS specification, it is necessary to test for the presence of spatial dependence for the outcome variables. In order to perform this task, we use the Moran's I statistic, which is one of the most common measures of spatial autocorrelation. It varies on a scale between -1 and 1. When Moran's I is equal to +/- 1 there is a very strong positive/negative degree of spatial autocorrelation; in other words, the $k-th$ nearest neighbour of region i, presents values that are very similar or very dissimilar from those of region i. If Moran's I is close to zero, then we can conclude that there is no recognizable pattern between the values of region *i* and those of its *k* nearest neighbours. Moran's I is assumed to have a normal distribution function, which means that, after computing its standard error, we can conduct a standard t-test to verify whether or not it is significantly different from zero.

4.2 Bayesian model averaging

In previous sections, we described the variables that will be employed in the empirical analysis (see Table 1). Now, we aim at understanding which of these are more likely to be correlated with the outcome variables adopted to measure MED regions' touristic performances. We use BMA to accomplish this task.

When we choose a given specification for our empirical model, there is no assurance that it is the one that best fits the data; in fact, in the presence of model uncertainty, there could be another model that also provides a good fit but leads to different parameters, standard errors or predictions (see Regal and Hook, 1991; Draper, 1995; Madigan and York, 1995; Kass and Raftery, 1995; Raftery et al., 1997). BMA provides a statistical tool to overcome this problem, allowing a researcher to compare a very large number of specifications and choose the one that best fits the data. Formally, we can define BMA as follows:

$$pr(Y \mid D) = \sum_{k=1}^{K} pr(Y \mid M_k, D)\, pr(M_k \mid D)\,, \quad (4)$$

where $pr(Y \mid D)$ represents an average of the posterior distributions under each model considered, M_k, with $k = 1,\ldots,K$ weighted by the posterior model probability. The posterior probability for model M_k is given by:

$$pr(M_k \mid D) = \frac{pr(D \mid M_k)\, pr(M_k)}{\sum_{l=1}^{K} pr(D \mid M_l)\, pr(M_l)}\,, \quad (5)$$

where

$$pr(D \mid M_k) = \int pr(D \mid \theta_k, M_k)\, pr(\theta_k \mid M_k)\, d\theta_k \quad (6)$$

is the integrated likelihood of model M_k, and θ_k is the vector of parameters of model M_k.

5 Results

5.1 Testing for spatial dependences

In this section, we test the presence of spatial dependence among the outcomes of interest in our paper. As anticipated, we estimated the Moran's I statistic with various weight matrices W. In particular, we used weight matrices to consider interconnections between region *i* and its 1, 2, 3, 4 or 5 nearest neighbours. We specified different weight matrices with the aim to test whether our results are robust to the number of neighbours used in the analysis. Table 2 shows the results of the spatial dependence analysis and, in particular, lists the Moran's I statistic and the associated *p*-values for the test of equality to zero. We find evidence of a positive and strong spatial dependence among regions ranging from 0.4196 (*W* considering the first nearest neighbour) to 0.6492 (*W* considering the first two nearest neighbours). However, Moran's I is always positive and significantly different from zero, confirming the presence of strong spatial dependence among regions.

Table 2: Test for spatial dependence on real GDP per capita in PPS (average value 2000–2010)

Number of neighbours	Statistics	Normal Approximation	Randomization
1	Moran's I	0.4196	0.4196
	P-value	0.0014	0.0015
2	Moran's I	0.6492	0.6492
	P-value	0	0
3	Moran's I	0.5971	0.5971
	P-value	0	0
4	Moran's I	0.5423	0.5423
	P-value	0	0
5	Moran's I	0.4883	0.4883
	P-value	0	0

Notes: Number of neighbours, NN = 1,2,3,4,5.

5.2 Bayesian model averaging

Table 3 shows the results of BMA performed on GDP per capita in PPS with the aim of identifying the most influential territorial capital dimensions, showing their posterior inclusion probability (PIP). Each estimated model includes time and country dummies. Generally, to interpret the results, it is necessary to consider that the higher the PIP, the higher the probability of inclusion for each variable in the model. Following other empirical papers, we defined a threshold of 0.9 for the PIP in order to decide whether a certain variable should be included in our final specification. Here, however, we do not include spatial or time lags for dependent and independent variables because their inclusion is not supported by standard BMA routines. Looking at Table 3, we can see how the most relevant territorial assets for explaining real GDP per capita in PPS are related to anthropic capital. In this case, in fact, all the assets proposed are included with PIP = 1. When we look at economic capital, the share of employment in wholesale, retail and trade is excluded from the final list of relevant assets. Considering environmental capital, we find that both the quality of natural landscape and climate variability are found to be relevant in explaining GDP per capita in PPS. Also, institutional capital is found to be important, with a PIP of 1, whereas according to social capital, the percentage of satisfied residents must be excluded from our final specification.

Table 3: Bayesian model averaging for real GDP per capita in PPS

Territorial capital	Territorial assets	Posterior inclusion probability
Antropic capital	Log(Monuments and tourist sights quality)	1
	Log(Population density)	0.99
	Log(Number of hotel beds/10,000 population)	1
	Log(Accessibility)	1
	Log(Airport rank)	1
Economic capital	Share of employment in agriculture	1
	Share of employment in industry	1
	Share of employment in wholesale retail and trade	0.28
	Share of employment in knowledge intensive sectors	1
	Share of employment in Technology sectors	1
	Share of self-employment	1
Environmental capital	Log(climate varibility)	1
	Quality of natural landscape	0.74
Institutional capital	Satisfaction with health services	0.94
Social capital	Share of students with tertiary education	1
	Dependency rate	1
	Satisfied residents	0.15
	Life expectancy	0.98

5.3 Main estimates

Table 4 shows the estimated coefficients from equations 1 and 3. Each table lists the estimated coefficients obtained from OLS, SAR and SDM. We show results choosing three structures for the weight matrix, considering interconnections among region *i* and its 1, 2 or 3 nearest neighbours, respectively. We justify this choice after considering that our estimated parameters from the model with the three nearest neighbours were not statistically different from those obtained from models with a higher number of neighbours. SDM specifications account for both direct (X_t) and indirect (WX_t) effects of territorial assets. Moreover, all spatial specifications list the estimated spatial correlation coefficient (ρ), which measures the degree of spatial correlation and provides further motivation for the use of spatial regression models. We also show the log pseudo-likelihood for each model that was used to select the model specification that best fits the data. Last, we list the coefficient associated to the first lag of real GDP per capita in PPS. As we can see, rho is always significantly different from zero, except in the SAR model, where only the first nearest neighbour is considered. The spatial correlation is highest when we consider the SDM model, and the log pseudo-likelihood is highest when we use the three nearest neighbours for the weight matrix. Given this preliminary evidence, we chose the SDM model with a spatial weight matrix considering three neighbours as our preferred model for the GDP growth equation. Looking at the estimated coefficients, we can notice how $log(gdp_{t-1})$ is always significantly different from zero and less than one—as is generally required by stationary autoregressive models. We can also see how almost all anthropic capital assets are significant in explaining variations in GDP per capita in PPS, except for the indicator related to number of hotel beds per inhabitant (lAN2 15) and to gross population density (lAN2 11). Interestingly, we notice a significant effect of the quality of monuments and tourist sights (lAN2 05) in almost every specification. A strong and positive influence in also found for the accessibility index (lAN2 23), which presents both a direct and an indirect effect, meaning that if more accessible regions have higher real per capita GDP in PPS growth rates, those that are close to them decrease it (the WX_t coefficient of lAN_23 is negative and significant).

Moreover, we can also see that airport ranking (lMM2 64) is significant in explaining growth of real GDP per capita in PPS (the negative sign is justified by the fact that this variable is recorded as a ranking, where 1 corresponds to the busiest airport). Here, we find only a direct effect. We also find that economic capital is relevant, even though it presents a lower number of assets that are significantly different from zero. In fact, only the shares of people employed in industry (EH2 18) and in high-technology sectors or with ISCED level 5–6 (EH53) are found to significantly explain GDP growth rates. We also estimate a significant effect of environmental capital, specifically related to climate variability (lEN2 23) and quality of natural landscape (EN2 34); however, in the latter case, the effect is both direct and indirect, meaning that regions surrounded by neighbours with a higher quality of landscape are also those with higher GDP growth. Finally, we find a significant effect of institutional capital, whereas no effect was found when looking at assets related to social capital, except for the dependency rate indicator (SC2 20), which negatively affects GDP growth, meaning that higher shares of elderly people are associated with regions with lower GDP growth rates.

In Table 5 we show the decomposition of spatial effects of independent variables as direct, indirect and total effects. As already mentioned, this table allows us to compare the elasticities estimated by OLS in equation 1 with the SAR model estimated in equation 3. In particular, this table shows OLS estimates and the direct (column 1), indirect (column 2) and total (column 3) effects of independent variables on GDP growth from the SAR model, after accounting for spatial dependencies between units. At first glance, we can note how the coefficients are generally different in both sign and magnitude for many variables. This means that accounting for spatial effects is relevant in order to obtain unbiased estimates. The main differences are found for the quality of monuments and other touristic sights (AN2 05); in the SDM model, this has a positive and direct effect (column 2) on per capita real GDP in PPS growth, which is much smaller than that estimated through OLS (column 1). Gross population density (AN2 11) has a positive indirect effect (column 4) on per capita real GDP in PPS growth. This positive effect could be interpreted as a positive spillover of being geographically nested in a cluster of regions with high population density that are generally more economically active, and could prompt other regions' growth through the creation of trade and business opportunities. The same indicator is not significant in the OLS model (column 1). Accessibility (AN2 23) has a positive direct and a negative indirect effect (columns 3 and 4) on economic growth, again significantly smaller than that estimated through OLS (column 1). The shares of employment in agriculture (EH2 14), in industry (EH2 18) and in high technology sectors (EH 53) have positive indirect effects on economic growth, according to the SDM model. The quality of natural landscape (EN2 34) has a strong positive direct and indirect effect on per capita real GDP in PPS growth when we consider the SDM model, whereas the estimated effect is negative in the OLS specification. Unsurprisingly, the quality of institutions has a direct and positive effect on per capita GDP in PPS growth, according to both OLS and SDM. Last, we estimate a negative direct correlation with the dependency rate (SC2 20) when using the SDM specification. This could be explained by higher costs associated with the presence of retired individuals.

Table 4: Estimates of the influence of territorial assets on GDP per capita PPS

Variables	OLS	SAR	SDM		SAR	SDM		SAR	SDM	
		NN = 1	NN = 1		NN = 2	NN = 2		NN = 3	NN = 3	
	X	X	X	WX	X	X	WX	X	X	WX
Log-pseudoL		1081.344	1095.961		1088.03	1107.486		1088.525	1113.441	
ρ		0.0002	0.0551**		0.0533**	0.170***		0.0600**	0.2221***	
		-0.0003	-0.0249		-0.0225	-0.0456		-0.0233	-0.0415	
lyt-1		0.942***	0.8980***		0.933***	0.921***		0.932***	0.9082***	
		-0.0228	-0.033		-0.0221	-0.0302		-0.022	-0.0305	
lAN2_05	0.0560***	0.005***	0.0108***	0.017***	0.0022	0.0036	0.0001	0.0023	0.0086**	0.0222
	(0.009)	(0.002)	(0.004)	(0.007)	(0.002)	(0.003)	(0.022)	(0.002)	(0.004)	(0.023)
lAN2_11	-0.0091	-0.0014	0.0034	0.0077	-0.0023	0.0031	0.0127	-0.0021	0.0055	0.0306**
	(0.011)	(0.003)	(0.003)	(0.008)	(0.003)	(0.005)	(0.011)	(0.003)	(0.004)	(0.015)
lAN2_12	-0.100***	-0.008**	-0.017***	-0.0014	-0.0055	-0.0091**	0.0223*	-0.0061*	-0.0128**	0.0086
	(0.009)	(0.004)	(0.007)	(0.007)	(0.003)	(0.004)	(0.013)	(0.003)	(0.005)	(0.019)
lAN2_15	0.0358***	0.0003	0.0005	0.0019	-0.0001	0.0052	0.0025	-0.0007	-0.0017	-0.0242
	(0.009)	(0.003)	(0.003)	(0.006)	(0.003)	(0.006)	(0.014)	(0.003)	(0.005)	(0.016)
lAN2_23	0.3211***	0.0097	0.0472**	-0.029**	0.0078	0.0438**	-0.14***	0.0044	0.0508**	-0.0895**
	(0.028)	(0.014)	(0.019)	(0.015)	(0.014)	(0.018)	(0.04)	(0.014)	(0.02)	(0.039)
lMM2_64	-0.0987***	-0.0061	-0.0133*	0.0136	-0.0036	-0.0062	0.0231	-0.0046	-0.0129**	-0.0002
	(0.009)	(0.005)	(0.007)	(0.011)	(0.004)	(0.004)	(0.018)	(0.004)	(0.006)	(0.022)
EH2_14	-0.0103***	-0.0009**	-0.0004	0.0009	-0.001**	0.0006	0.004**	-0.001**	-0.0001	0.0070***
	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)	(0.002)
EH2_18	0.0048***	0.0002	0.0006	0.0002	-0.0004	0.0005	0.0001	-0.0004	0.0002*	0.0009
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
EH_51	-0.0049***	-0.0004	-0.0006	0.0014	-0.0005	-0.0004	-0.0009	-0.0005	-0.0006	-0.0002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
EH53	0.0083***	0.0011	0.0015*	-0.0013	0.0013*	0.0011	-0.0011	0.0014*	0.0013*	-0.0009
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
lEN2_23	0.0077	0.0022	0.0084**	0.0097	0.0032*	0.0063	0.0076	0.0036**	0.0033	0.0107
	(0.009)	(0.002)	(0.003)	(0.008)	(0.002)	(0.004)	(0.016)	(0.002)	(0.004)	(0.016)
EN2_34	-0.0018***	-0.0002	-0.0001	0.0006**	-0.0003**	0.0001	0.0025**	-0.0003**	0.0004**	0.0056***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
IN2_48	0.0021***	0.0003*	0.0002	0.0001	0.0002	0.0007*	0.0018*	0.0002	0.0004*	0.0009
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
lSC2_45	0.0087	-0.0027	-0.0045	-0.0064**	-0.0004	-0.0011	-0.0081	-0.0005	-0.0007	-0.0125
	(0.009)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.008)	(0.003)	(0.003)	(0.01)
SC2_20	0.0042***	-0.0001	-0.0009	-0.001	-0.0009**	-0.0003	-0.0008	-0.0008**	-0.0016***	-0.0076***
	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)	(0.002)
Constant	8.1925***	0.8036**	1.2329***		0.1919	-0.1176		0.16	-0.1579	
	(0.739)	(0.334)	(0.455)		(0.346)	(0.986)		(0.343)	(1.079)	
Observations	572	520	520	520	520	520	520	520	520	520
R-squared	0.87	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. R-squared	0.86	.	.	.	.	.	.	.	.	.
Number of NUTS2	52	52	52	52	52	52	52	52	52	52

*Notes: Robust standard errors in round brackets. Significance levels: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$. Each specification* *includes country and year dummies.*

Table 5: Decomposition of spatial effects of independent variables

	OLS	SAR		
		NN = 4		
VARIABLES		Direct	Indirect	Total
lAN2_05	0.0560***	0.0098*	0.0323	0.0422
	(0.009)	(0.006)	(0.031)	(0.036)
lAN2_11	-0.0091	0.0069	0.0404*	0.0473*
	(0.011)	(0.005)	(0.021)	(0.025)
lAN2_12	-0.1007***	-0.0121*	0.0065	-0.0056
	(0.009)	(0.006)	(0.028)	(0.034)
lAN2_15	0.0358***	-0.0027	-0.0317	-0.0344
	(0.009)	(0.006)	(0.023)	(0.029)
lAN2_23	0.3211***	0.0445**	-0.0993**	-0.0549
	(0.028)	(0.021)	(0.046)	(0.059)
lMM2_64	-0.0987***	-0.0129*	-0.0034	-0.0163
	(0.009)	(0.007)	(0.031)	(0.037)
EH2_14	-0.0103***	0.0004	0.0089***	0.0093**
	(0.002)	(0.001)	(0.003)	(0.004)
EH2_18	0.0048***	0.0003	0.0036**	0.0017
	(0.001)	(0.000)	(0.002)	(0.002)
EH_51	-0.0049***	-0.0006	-0.0005	-0.0011
	(0.001)	(0.001)	(0.002)	(0.002)
EH53	0.0083***	0.0013	0.0123**	0.0005
	(0.002)	(0.001)	(0.003)	(0.003)
lEN2_23	0.0077	0.0043	0.0160	0.0203
	(0.009)	(0.005)	(0.022)	(0.027)
EN2_34	-0.0018***	0.0007***	0.0072***	0.0078***
	(0.000)	(0.000)	(0.002)	(0.002)
IN2_48	0.0021***	0.0005*	0.0014	0.0018
	(0.001)	(0.000)	(0.001)	(0.001)
lSC2_45	0.0087	-0.0019	-0.0159	-0.0178
	(0.009)	(0.003)	(0.011)	(0.013)
SC2_20	0.0042***	-0.0021***	-0.0102***	-0.0122***
	(0.002)	(0.001)	(0.003)	(0.004)
Constant	8.1925***			
	(0.739)			
Number of NUTS2_en	52	52	52	52

Notes:

*Robust standard errors in round brackets. Significance levels: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$. Each specification includes country and year dummies.*

6 Conclusions

Today, tourism is undoubtedly at the centre of various countries' agendas, and many regional policies aim at exploiting this sector in order to stimulate local development. As shown in this research, such exploitation would be reductive if focused only on creating new economic opportunities that are strictly connected to the tourism industry without considering the additional benefits that could be brought to the entire economy of a region while strengthening its competitiveness as a whole. With reference to the macro area that we have analysed, it would seem that the institutions responsible for its development are actually moving in this direction. The MED 2014–2020 Territorial Cooperation Programme, in order to pursue the goal of a more sustainable and inclusive development of the programme area, places tourism among most of its Investment Priorities, recognizing this sector as strategic for smarter and more inclusive development.

This programme calls for the strengthening of sustainable development policies for more efficient valorisation of natural resources and cultural heritage in coastal and adjacent maritime areas, to be achieved through 'integrated' or 'ecosystemic' approaches. The purpose of this is to prevent giving rise to isolated results and to instead allow a global coordination effort to make tourism contribute to the sustainable development of territories. Likewise, the European Union intervened on this issue (COM, 2010, 5; EU, 2014) by pressing for member states to initiate actions to support the key role played by tourism in the development of many European regions, in particular the less developed regions, due to its considerable spillover. To the best of our knowledge, however, no further guidelines seem to have emerged on how to operationally decline these objectives and identify the specific tourist assets to leverage.

The methodology and results set out in this research can, therefore, lay the foundation for an exploitation of tourism specifically tailored to the peculiarities and attributes of the regional tourist offering, initiating a tourism policy with the widest repercussions. A rigorous identification of the specific territorial capitals that contribute most to the economic growth of a region can support policymakers in identifying the possible levers to be used to stimulate the local economy, also revealing the importance of some determinants that may have formerly been underestimated. An appropriate stimulation of such assets, implemented in accordance with the principles of sustainable tourism development, can help boost the competitiveness of a region and promote economic growth by stimulating other sectors of local economies through spillover effects.

In this paper, we have estimated the effects of various types of territorial capitals owned by regions, considered by the tourism economics literature as proxies of regional touristic supply characteristics, altogether with canonical GDP determinants on real per capita GDP growth in PPS. We found that many of the characteristics analysed play a role in predicting GDP growth. Our estimates, with respect to the OLS model, are unbiased because they specifically account for spatial interdependencies among regions and for the existence of latent unobservable factors related to culture, infrastructure and recreational amenities affecting regional performance in terms of GDP growth or touristic attractiveness. We address these issues by using spatial regression models that apply a series of econometric models capable of relaxing the restrictive assumption of independence among units imposed by standard OLS models.

Thus, our estimates can be used to test whether the creation of agglomeration economies is determinant for stimulating GDP growth through tourism. In fact, from our results, we found that many variables considered in our model have not only direct effects, but also indirect influences. For instance, gross population density (AN2 11) has a positive indirect effect (column 4 of Table 5) on real GDP per capita in PPS growth. We interpret this effect as a positive spillover of being geographically nested in a cluster of regions with high population density that are generally more economically active and could prompt other regions' growth through the creation of trade and business opportunities. Similar conclusions can be drawn looking at the share of employment in agriculture (EH2 14), in industry (EH2 18) and in high technology sectors (EH 53) that have positive indirect effects on economic growth. These indirect effects may be related to the presence of agglomeration economies exploited by regions through tourism. Our results also reveal the importance of unconventional determinants of GDP growth, such as the quality of monuments and other touristic sights (AN2 05) and the quality of natural landscapes (EN2 34).

Figure 1: Spatial distribution of real GDP per capita growth in PPS in the MED area

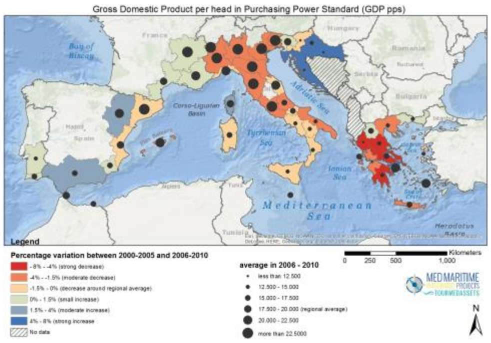


Figure 2: Spatial distribution of Anthropic capital in the MED area.

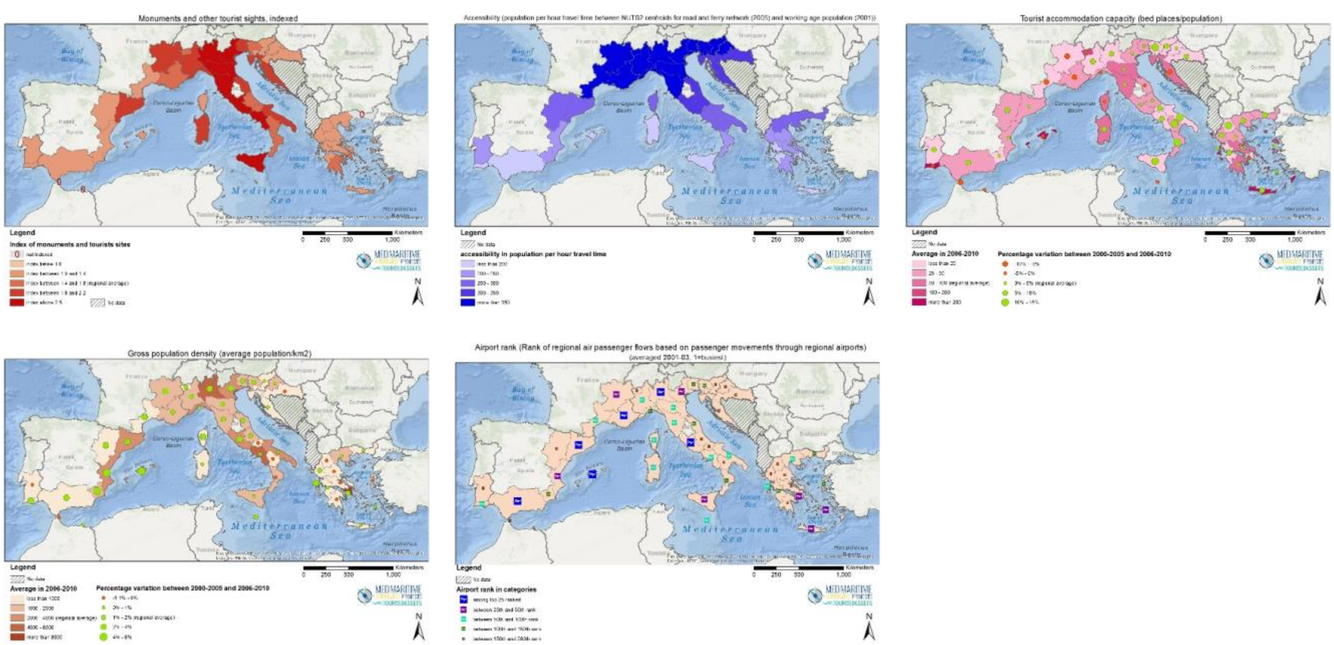


Figure 3: Spatial distribution of Environmental and Institutional capital in the MED area

Figure 4: Spatial distribution of Economic capital in the MED area

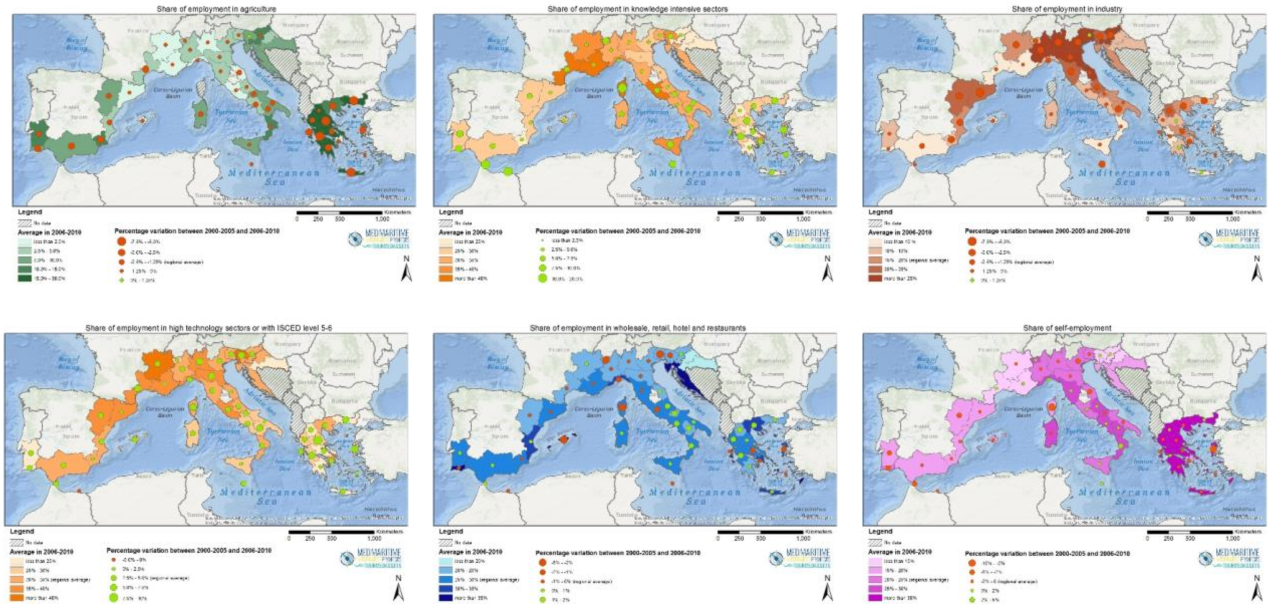
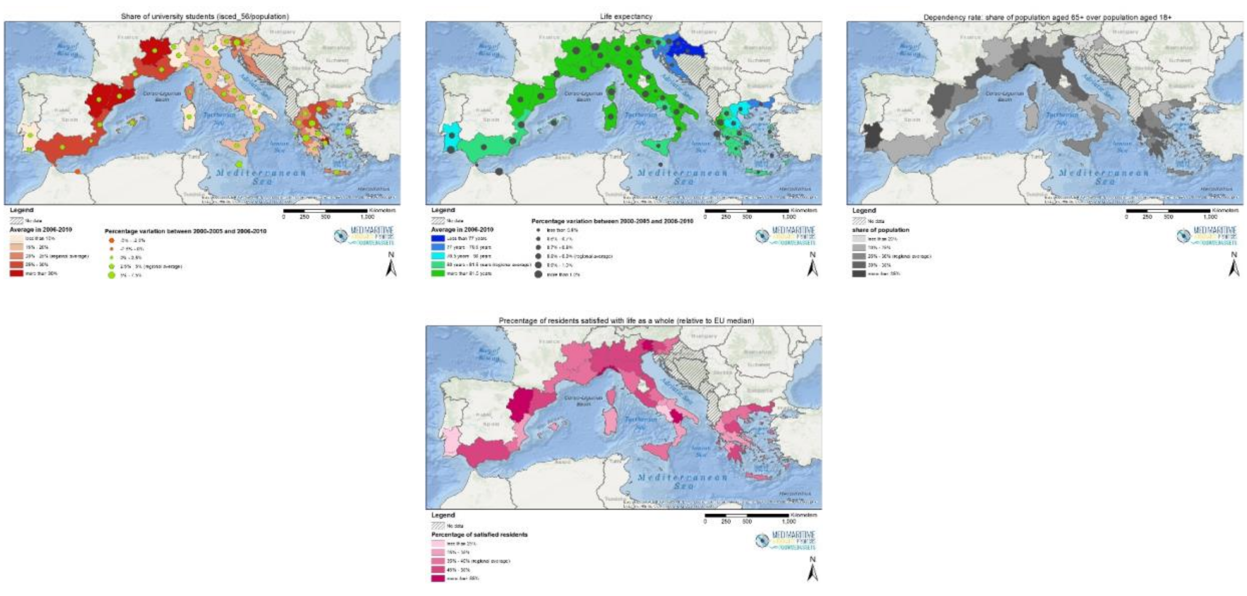


Figure 5: Spatial distribution of Social capital in the MED area



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