

"Does the accumulation of creative capital influence the competitiveness of the tourism sector in European regions?"

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Abstract: Recently, more countries have implemented policies aimed at enhancing the synergy between two strategic sectors: tourism and the creative industries. This article assesses this relationship for a sample of European regions (171 regions). Our main contribution lies in assessing how the accumulation of resources linked to the cultural and creative sectors helps to maximize tourism competitiveness –measured by means of an efficiency model. From a methodological point of view, we apply a two-stage model. First, we construct a tourism efficiency indicator and five synthetic indicators of creativity by means of data envelopment analysis. Secondly, we test the influence of the accumulation of creative industries on regions’ tourism competitiveness by means of a regression analysis. The results can be used to draw conclusions which are applicable in the field of management so that destinations can find competitive advantages for their tourism sector and thus enhance their cultural and creative capita.

Keywords: Tourism competitiveness, creative capital, DEA, synthetic indicators, European regions.

Introduction

In recent decades, tourism and the creative activities have emerged as key sectors for economic development due to their growing capacity to contribute to GDP and to generate employment (García-Suárez and Pulido-Fernández, 2015). For this reason, a significant number of countries have begun to work on policies aimed at boosting the

two sectors, and especially at promoting the link between them (Richards and Raymond, 2000; Richards, 2010).

In terms of its economic importance, the tourism sector is considered strategic for modern-day economies (Sainaghi, et al. 2017), whose productive structures involve an ever-greater service component, both in developed and developing countries (Joshi, et al. 2017). According to data from the World Tourism Organization, tourism is one of the most important economic sectors globally, accounting for almost 10% of GDP and total employment. Moreover, it is a sector in clear expansion, with the number of international tourist arrivals having grown by 4% in 2019. That was the tenth consecutive year of growth after the economic crisis of 2008, a trend that was only halted by the abrupt intrusion of the COVID-19 pandemic. However, according to the World Tourism Barometer published by the UNWTO, international tourist arrivals tripled in July 2022 compared to the same period in 2021, standing at approximately 60% of the pre-pandemic level, in a clear upward trend in the short term. ¹

For their part, over the last two decades the cultural and creative sectors have become clear drivers of economic performance at the regional level (Cerisola and Panzera, 2022). As Boix et al. (2021) argue, creativity contributes considerably to increasing a country's wealth, with a very high positive correlation existing between the percentage of companies dedicated to the cultural and creative sectors in an area and its GDP. This is so much so that –according to UNESCO data– there are approximately 30 million jobs related to the creative and cultural sector in the world, with the latter representing 3% of the world's GDP. For this reason, this sector is currently considered key to continuous

¹ <https://www.unwto.org/es/taxonomy/term/347>. (Accessed November 2022).

improvement in terms of territorial development and competitiveness (Boix and Lazzaretti, 2012).

Based on the above, many countries have begun to include the combination of the two industries in their economic policies (Long and Morpeth, 2016), as it has become a profitable option in the search for alternative development models. This idea forms a line of work focused on the diversification of cultural tourism, seeking to incorporate creative activity into the tourism offer (Richards, 2020). All of this is related to tourist destinations' growing interest in positioning themselves in ever-more competitive positions within a highly internationalized sector, which has led them to turn to the creative industries as a means of gaining competitive advantages. There are many instances in which this combination of industries has shown its dynamic capacity. Such is the case of tourism related to the creative design industry in Milan, technological tourism in Korea, creative tourism in New Zealand or more specific cases, such as ceramic workshops in Vietnam. In all these examples, the development of specific policies geared towards consolidating the link between the two industries has shown a clear impact on economic development and cultural sustainability. It has also been shown that integrating tourism experiences and creative content can generate new groups of demand -thereby contributing to the image and competitiveness of tourism destinations- and positively influence the growth of creative industries themselves (Richards, 2010).

The main objective of our work is to propose a model to analyze the relationship between the accumulation of cultural and creative capital and tourism competitiveness within the context of European regions, and to show how this symbiosis can generate competitive advantages for European tourism destinations. We start from a novel approach, since our model assesses how the territorial endowment of creative resources generates the

right context for destinations to maximize their tourism output –in terms of impact– by diversifying motivations and consumptions. To achieve this objective, we apply a two-stage conditional efficiency model, combining data envelopment analysis (DEA) and regression analysis. The cultural and creative territorial performance of European regions is measured from a multidimensional perspective, based on the conceptual dimensions underlying the creative economy, talent, diversity and tolerance, culture, technology and innovation, cultural and creative industries. Based on the information provided by a broad set of variables, composite indicators are constructed using the DEA method.

Literature Review

This work can be contextualized within two lines of research: the regional evaluation of tourism efficiency, on the one hand, and creative potential and its effect on economic development, on the other. The study of tourism competitiveness is a consolidated line of research from the point of view of its analytical foundations, established by Crouch and Ritchie (1999)². These authors were the first to enunciate the possibility of carrying out an analysis of efficiency adapted to territorial units –tourist destinations– assuming the idea of a virtual production process, in which these destinations have operativity over their tourist resources. This approach is currently yielding a fruitful line of empirical applications, especially among those developing efficiency models and two-stage conditional efficiency models. Various works focus on analyzing the efficiency of the general tourism industry (Cuccia et al., 2016; Benito et al., 2014) or, more specifically, study the optimization of particular tourist flows or motivations, such as cultural

² In the approach developed by Crouch and Ritchie (1999) –an argument subsequently assumed by the different authors involved in this line of research– efficiency is considered a proxy of competitiveness. Authors argue that managing tourist resources efficiently, and therefore achieving better performance, is a key element when a tourist destination gains a competitive advantage over its rivals.

tourism (Suzuki et al., 2011; Gómez-Vega and Herrero-Prieto, 2017; Herrero-Prieto and Gómez-Vega, 2017). Furthermore, contributions differ according to the scale of analysis, with the most common being those conducted at the regional level within a single country (Barros et al., 2011; Figueroa et al., 2018), with a smaller number of studies being carried out at the country level within a single continent (Soysal-Kurt, 2017; Gómez-Vega and Herrero Prieto, 2018), or with global samples (Hadad et al. 2012; Gómez-Vega et al., 2022)³. The notion of creativity is based on the interaction between human creativity, ideas, intellectual property, knowledge, and technology. However, even though there is no general consensus when defining and delimiting the activities that encompass the creative economy, the UNCTAD (2010) defines creative sectors as the cycles of creation, production and distribution of goods and services that make use of creativity and intellectual capital, including activities that produce tangible goods and intangible intellectual or artistic services with creative content and economic value. Although the concept is currently evolving, creativity is a complex phenomenon and one affected by multiple dimensions, which makes it difficult to measure using simple indicators (Montalto et al., 2019).

Numerous studies have highlighted the important implications of cultural and creative activities for economic development and territorial disparities (Backman and Nilson, 2018; Boix et al., 2021; Cerisola, 2018). It is therefore appropriate to consider these activities as a version of the capital stock of an economic system (Herrero-Prieto, 2007). Throsby (1999) defines cultural capital as the set of tangible and intangible elements that are an expression of the ingenuity, history or identification process of a people, which can be understood as a fixed resource, an asset that is accountable in the form of a flow of derived goods and services, and which can be accumulated. This cultural capital has

³ For a more complete review of the references that make up the line of study on tourism efficiency, see (Gómez-Vega, 2019 and Gómez-Vega and Herrero, 2018).

seen its initial notion broadened to take on a new, more dynamic and closely related component –creative capital– which comprises the sum of a society's material and immaterial values that enable and stimulate individuals and institutions to be innovative and dynamic (Caves, 2000; UNCTAD, 2010). The notion of creative capital corresponds rather to an attitude, combining doses of imagination, as an aptitude for discovery; of judgment, as the capacity to order and select ideas; and of opportunity, as the ability to take advantage of and explore new utilities and profits (Herrero-Prieto, 2007). Its most direct manifestation is found in the cultural and creative industries. However, the set of cultural amenities of a territory, a qualified environment, the capacity for openness and tolerance, as well as the available technology and the capacity to attract and retain talent are important aspects which are indicative of cultural and creative capital and which represent competitive advantages for territories (Boix et al., 2021). The accumulation of these advantages is conducive to the generation of creative processes and constitutes the determining factors of creative potential and regional competitiveness (Backman and Nilsson, 2018). From this characterization of the creative economy, it is clear that this is a multifaceted phenomenon, involving multiple components, measurement of which is complex, given its multidimensional nature. For these reasons, recent years have witnessed a proliferation of works aimed at monitoring and measuring cultural and creative potential, with the construction of composite indicators of creativity being a fundamental instrument in this field of study (Correia and Costa, 2014; Rodrigues and Franco, 2019; Boal and Herrero, 2020). In this paper, we address the measurement of cultural and creative capital from a multidimensional perspective, considering the territorial endowment of these elements –at a regional level– as a competitive advantage in the analysis of tourism efficiency.

As far as studies on the relationship between tourism and creativity are concerned, the number of works is limited, although in recent years they have become increasingly important. Many focus on analyzing how tourism development has helped attract professionals and creatives. As Romero-Padilla et al. (2020) indicate, the reasons for achieving this attraction pole effect are marked by a series of factors: the tourism sector's capacity to favor the provision of infrastructures; the acquisition of an international mentality by local society as a result of the influence of populations from different geographical areas; the capacity to attract private investment over a wide array of sectors (real estate, commerce, technology, etc.); and, finally, creating a brand image that enjoys international recognition linked to the destination. All of these factors are perceived as competitive advantages which, rooted in a specific space, can generate a restructuring of productive activity (Reverte et al. 2016).

The theoretical body exploring the link between tourism and creativity has mainly been driven through the contributions of authors such as Richards and Raymond (2000), Richards (2005; 2011) and, more recently, Virginija, (2016). However, the most prolific area within this line of work involves empirical cases. One contribution is that of Reverte et al. (2016) who analyze the ability of the tourism sector to reorganize production, by studying the agglomeration of the creative class in tourist cities. Adopting a similar approach, Romero-Padilla et al. (2020) work on the case of coastal tourist cities in the province of Malaga, in Spain. Several studies examine the capacity of creative tourism to offer competitive advantages to tourist destinations (Richards, 2020), either in the specific case of small cities and regions (Richards, 2019) or in particular destinations such as Turin (Adamo et al., 2019). In terms of quality analysis of tourism experiences, prominent are the works of Decano and Suhartanto (2019) on a sample of creative tourism destinations in Indonesia, and Richards (2021), who focuses on the handicraft

sub-sector. A search for references on works that explore the link between tourism competitiveness and creative agglomeration reveals only the recent work by Pulido et al. (2021). After constructing a synthetic indicator of creativity for a sample of Spanish cities, the authors perform a correlation analysis to observe the link between the result and the tourism competitiveness of these same cities. However, in a parallel line of research, we find several works that propose analyzing the conditioning effect of the accumulation of cultural resources on tourism competitiveness. However, as Gómez-Vega and Picazo-Tadeo (2019) point out, it is one of the main competitive advantages, although they do not incorporate variables related to the creative industry in their analyses. The state of the art allows us to affirm that our work helps to fill a gap in the literature by building a model to assess the relationship between cultural and creative capital accumulation and tourism efficiency.

Case study and methodology

The case study is the European regions (NUTS 2), with 171 regions of 20 European countries. It is important to note that the sample does not include relevant tourist destinations, such as the regions of Italy, Greece and the United Kingdom, as no information is available in the database used.

Although the availability of statistical information decreases as the level of territorial disaggregation increases, the regional level does provide us with more exhaustive results on the spatial distribution of cultural and creative capital and regional tourism competitiveness in Europe than the usual country analysis. The main source of data used is Eurostat for the reference year 2015.

As regards the methodological approach, our work uses the two-stage conditional efficiency model, a consolidated approach within the research line of analyzing the

conditioning factors of tourism efficiency (Sainaghi, et al. 2017). This methodology combines two phases: first, efficiency analysis by means of the non-parametric DEA model; and second, estimating the impact of a series of external factors on efficiency, through a regression analysis. This is followed by a presentation of this model, as well as the method used to construct the synthetic creativity indicators employed in the second phase.

Tourism Efficiency. Data Envelopment Analysis

The method used to assess the tourism efficiency of European regions is the non-parametric data envelopment analysis (DEA) model. Analysis of tourism efficiency by means of DEA starts from a hypothetical or virtual production function, based on the assumption that destinations have operability over their resources. We thus understand that these destinations are competent when it comes to maximizing their tourism output, whether measured as the length of stay or in strictly monetary terms. This approach is based on the concept of territorial competitiveness developed by Crouch and Ritchie (1999). It is important to point out that, even when starting from a hypothetical production process, it is possible to analyze the tourism destination by means of a classical efficiency model, assimilating it to a commercial business or a territorial industry (Soysal-Kurt, 2017).

In order to answer the main question on which this stage is structured –the efficiency of European regions in maximizing their tourism output of international origin– it is necessary to pose a production function as a basic element of the methodological development. In our case –and similar to authors such as Barros et al. (2011) and Gómez-Vega and Herrero (2018) among others– a distinction is made between two inputs and one output, with an entirely managerial approach, i.e. maximization of the industry. On the input side, a variable is thus considered that quantifies the accommodation capacity

available in each region, i.e. the total number of beds in tourist establishments (*beds*). In addition, the flow of foreign individuals arriving in the country for tourism activities (*Arrivals*) is taken into account as a resource. On the output side, the main variable available to measure the real impact of tourism in the region –the number of nights spent by foreign tourists at the destination region (*Overnight stays*)– is selected. As Barros et al. (2011) point out, although arrivals and overnight stays can a priori be considered similar concepts, it should be noted that overnight stays reflect the real impact generated by tourists, while arrivals only show the flow. The main descriptive statistics of the production function can be found in Table 1.

-TABLE 1-

Among the alternatives offered by the model, we propose a model oriented towards maximizing output, since it is better suited to the objective of maximizing overnight stays from given tourism resources. This approach is the most common in the literature based on the same assumptions (Assaf and Agbola, 2011; Figueroa et al. 2018, among others). As regards the technological hypothesis, we opt for the constant returns to scale (CRS) model, since it provides us with a measure of pure technical efficiency. The model on which this phase of the empirical application is based is as follows:

We consider n regions or units to be evaluated. The output-orientation of DEA calculates an outcome θ_i for each unit, giving a solution to the linear program $i=1, \dots, n$, under the assumption of constant returns to scale:

$$\begin{array}{ll}
 \text{Max } \lambda, \theta_i & \omega_i \\
 \text{Subject to } x_i & X\lambda \geq 0 \\
 Y\lambda & \omega_i y_i \geq 0 \\
 \lambda \geq 0 &
 \end{array} \quad [1]$$

where x_i and y_i are, respectively, the input and output of i regions; X is the input matrix, while Y is the output matrix, and λ is a vector of $n \times 1$ variables.

Determinants of tourism efficiency. Regression analysis

After obtaining the tourism efficiency results, the second methodological phase aims to analyze the role played by the accumulation of cultural and creative capital on the tourism efficiency of European regions. As previously mentioned, measuring regional cultural and creative potential is a particularly complicated task given that creativity is a conceptually complex and multidimensional phenomenon (Rodrigues and Franco, 2019). This makes it difficult to measure through a single indicator, making it necessary to construct synthetic indicators in order to summarize a set of variables that are representative of the different components and dimensions underlying the concept of creativity (Nardo et al., 2008). Measuring creative capital first requires considering the various components and dimensions related to the creative economy. Following Boal and Herrero (2020), and conditioned by the availability of statistical information for European regions, we built a database that includes numerous variables of the main dimensions of the creative economy as established in the literature (Table 2) (Correia and Costa, 2014; Rodrigues and Franco, 2019): Talent; Openness and Tolerance; Culture; Technology and Innovation; and Creative Industries. We use Eurostat data –specifically the “Regions” database– and Table 2 presents the 19 representative indicators selected for each of them as well as their main descriptive statistics and the specific data source.

-TABLE 2-

One of the most relevant aspects in the creation of synthetic indicators is the aggregation method used, as this will condition the results obtained. A wide variety of aggregation methodologies are available (Nardo et al., 2008; Greco et al., 2019). In our case, we apply

DEA, through its "Benefit of Doubt" (BoD) orientation, because of the advantages it offers over others –mainly the lack of any need to include prior weights. This type of approach favors process objectivity as it does not –a priori– establish the weights⁴. Although the application of DEA was initially limited to analyzing production processes, the technique has subsequently been used in other contexts, particularly to construct composite indicators (Herrero-Prieto et al. 2019).

Once the synthetic creativity indicators have been constructed, they are incorporated – together with a series of socio-economic control variables– into a regression analysis in order to observe the possible conditioning effect they have on tourism competitiveness. For this purpose, a regression analysis is applied, following the approaches proposed by Simar and Wilson (2007). In this regression analysis, the efficiency indicator generated in the first stage is included as the dependent variable, while the synthetic creativity indicators constructed previously –together with a series of control variables specific to the socio-economic characteristics of the regions analyzed– are included as explanatory variables. The model is estimated according to the following approach:

$$\theta_k = \beta x_k + \varepsilon_k \quad [2]$$

where $\varepsilon_k \sim N(0, \sigma^2)$, and β is a vector of parameters for the set of independent variables x_k . To solve equation [2], models such as OLS (ordinary least squares) or Tobit regressions prove to be inadequate, as they fail to avoid the correlation between the efficiency results and the error term. ε_k . This is why, in this case, the truncated regression model proposed by Simar and Wilson (2007: pp.41-42) is used. According to these authors, once the efficiency ratios have been extracted on the basis of the formula [1], maximum likelihood is applied to obtain a $\hat{\beta}$ for β and a $\hat{\sigma}_\varepsilon$ for σ_ε in the truncated

⁴ For more details on this methodology, see Gómez-Vega (2019) and Murias et al., 2012.

regression of $\hat{\theta}_k$ at x_k within [2] using the subsample of non-efficient DMUs, with scores below 100. The calculation of estimations L bootstrap for β and σ_ε is then carried out as follows:

1. For each inefficient country, we draw ε_k of a normal distribution with variance $\hat{\sigma}_3^2$ and left truncated at $1 - \hat{\beta}x_k$ and calculate $\theta^* = \hat{\beta}x_k + \varepsilon_k$.
2. Subsequently, the regression of θ_k^* at x_k is estimated by maximum likelihood, generating a bootstrap estimation of $(\hat{\beta}^*, \hat{\sigma}_\varepsilon^*)$.
3. Finally, the bootstrap replications are carried out –in this case 5,000– which allow confidence intervals to be constructed for β and σ_ε .

To implement the two-stage regression model, Simar and Wilson (2007) assume the separability condition which involves that environmental variables only affect the distribution of efficiency and do not affect production possibilities sets. However, recent advances investigating non-parametric robust estimators methods (Daraio and Simar, 2014; Nepomuceno et al., 2022) have included the perspective of exogenous factors not under the control of decision units, and Daraio et al., (2018) evidence that it is required to check that exogenous determinants do not affect the set of production possibilities, and develop tests for the separability condition.

We examine the separability condition proposed by these authors under the null hypothesis of separability versus the alternative of non-separability. This condition assumes that exogenous determinant $z \in Z$ not affect the production possibilities set:

$$\text{Separability Condition: } f_{XYZ(x, y, z)} = f_{x,y|z}(x, y|z)f_Z(z) \text{ and } \psi^z = \psi \text{ for all } z \in Z \quad [3]$$

$$\text{Non-Separability Condition: } \psi^z \neq \psi \text{ for some } z \in Z \quad [4]$$

Where $\psi = \{(X, Y) | X \text{ can produce } Y\}$

The test randomly splits the sample into two independent subsamples, comparing the mean of unconditional efficiency estimates from the first subsample, where separability is imposed against the mean of conditional (on z) efficiency estimates from the second subsample (Daraio et al., 2018; Simar and Wilson, 2020). When the test fails to reject the separability hypothesis, we can measure the exogenous associations on the inefficiency distribution.

Results of the Analysis

Tourism Efficiency of European Regions

The geographical distribution of tourism efficiency –obtained by applying the DEA model for the 171 European regions– is shown in Figure 1. In broad terms, a clear concentration of efficiency can be perceived in certain areas of the Mediterranean arc and island regions, most likely in response to sun and beach tourism. Sun and beach tourism represents a very significant flow in the continent under analysis. This is concentrated in the area indicated, within the regions of our sample, due to the physical and climatic endowments it possesses. In addition, a clear north-south duality can be identified, with a clearly higher level of competitiveness in the northern regions of the continent. Likewise, in this initial approach to the results, we find an evident concentration of tourism competitiveness in those regions where the capital of the country is located, which is to be expected. These regions accumulate a significantly higher amount in terms of infrastructure, tourist and airport facilities and tourist attractions.

The numerical results of the efficiency indicator can be seen in Table 3. In order to facilitate interpretations, only the results for the top 20 and bottom 20 positions have

been included in this table⁵. The applied model calculates an average efficiency of 46%, which shows a wide space for improvement in the capacity of European regions to maximize their tourism impact. However, this result may be conditioned by the absence of national tourism flow in the model, an aspect which lies outside the scope of our work.

Looking at the individualized results, we see that, in general, the 20 most efficient units are found within the European countries that the World Economic Forum (WEF) considers to be the most competitive in terms of tourism (WEF, 2019). Among the most efficient regions, no single pattern of tourism specialization emerges, as is the case in the efficiency analysis of other continents. A good example of this would be the study applied in Latin and Central America (Gómez-Vega and Herrero-Prieto, 2018), which shows that the main motivation contributing to destination efficiency is related to sun and beach. In the European case, however, a wide range of regions appear, which responds to the varied tourism potential of the continent we are analyzing. To a large extent, this result justifies this continent's ability to traditionally attract the highest percentage of international tourists. Within these regions located in competitive destinations, several island regions show the best results, within which tourism is a key driver of growth, given their geographical limitations (Mazzola et al. 2022). The Canary Islands region, the only unit on the efficient frontier, and the Balearic Islands stand out. Both island regions are located in Spain and their characteristics allow them to be placed within sun and beach tourism and consumption of natural resources. Moreover, their features as islands favor a significantly longer stay (Gomez-Vega et al. 2022). Following the same pattern, we find some of the most efficient destinations located in Portugal, Região Autónoma da Madeira, and the Algarve.

⁵ All other results are available on request from the authors of the paper.

-FIGURE 1-

Alongside these regions, there are others with high levels of efficiency, but which are either inland or have a coastline, but are located in the cold areas of the continent. This indicates that they must respond to other types of tourist motivations. Prominent are those linked to urban and cultural tourism or even nature-related tourism interests, as is the case in the regions where the capitals of these countries are located: Berlin (Germany), Île de France (France), the Region of Madrid (Spain), the Metropolitan Area of Lisbon (Portugal), where, in addition, business tourism or congress tourism may carry significant weight. Worth noting is the presence of other regions in countries that are less competitive in terms of tourism –according to the WEF. This is because these are countries where tourism is highly concentrated in a single region, such that the tourism competitiveness indicator suffers when the whole country is considered. Examples are Praha (Czech Republic) and Région de Bruxelles-Capitale (Belgium). Finally, most of the efficient destinations are located in the western part of the continent, except for Jadranska Hrvatsk (Croatia) and Yugoiztochen (Bulgaria), two regions open to the sea and with important tourist cities, such as Dubrovnik in the former case.

-TABLE 3-

At the other end of the spectrum –i.e. within the 20 least efficient destinations– are mainly peripheral, and, in general, not very touristic regions. This is the case of destinations located in Eastern European countries, Észak-Magyarország (Hungary), Sud-Muntenia (Romania), Severen Tsentralen and Severozapaden (Bulgaria). What is also particularly worthy of note is that five regions in Sweden are among the least efficient regions in Europe (Norra Mellansverige, Östra Mellansverige, Småland med öarna, Övre Norrland and Mellersta Norrland). At the national level, however, Sweden ranks quite high –according to the WEF Tourism Competitiveness Indicator (2019). This

is due to highly concentrated efficiency in a single region – Stockholm– which contributes significantly to the country's overall competitiveness. Finally, we find several regions located in very efficient countries, such as Castilla la Mancha, Castilla y León, and Aragón (Spain), and Auvergne, Franche-Comté and Limousin (France), all of which are sparsely populated inland regions that have a lower capacity to attract international tourists. The main common features of the least competitive destinations are as follows: less populated areas, with a smaller number of tourist infrastructures, especially in terms of mobility. In addition, they are regions where there are no major cultural and natural resources such as UNESCO-declared sites. Finally, they are generally destinations that are significantly depressed in economic terms.

Creativity Indicators in European Regions

The results of the creativity indicators calculated using the DEA-BoD technique are analyzed below. The values of these indicators have been spatially geo-referenced, and the maps in Figure 2 show the performance of each region in each of the five dimensions. The resulting values have been classified into quartiles, which are highlighted with a decreasing color gradient, such that stronger colors represent a higher value of the indicator, while weaker colors reflect a lower level of performance.

First, we look at the spatial distribution of Dimension 1 "Talent", which synthesizes variables related to the human capital of each region and the accumulation of workers engaged in creative work. A priori, talent can emerge equally anywhere. However, the local conditions of each area are what make its retention possible, and therefore determine its location. It can thus be seen that the spatial distribution of our talent indicator shows a high concentration, fundamentally in the main axes of economic development in Europe (regions of northern Spain as well as central and northern Europe).

Dimension 2 "Openness" -which includes variables linked to diversity, integration and foreign talent in European regions- shows a high concentration in Mediterranean coastal regions and Portuguese regions, which can be explained by the high tourist flows they receive. In addition, high values can be observed in regions of Ireland and Germany (migratory phenomena) together with certain regions of Eastern European countries. Dimension 3 "Cultural supply and participation" is made up of both cultural supply and infrastructure variables (cinemas, libraries and theatres) as well as cultural consumption. As can be observed, it shows a much more dispersed spatial distribution. Regions in which the capital of the country is located -and in which there are therefore higher population densities and more leisure alternatives- also stand out (Brussels, Prague, Paris, Berlin, Lisbon, Madrid, etc.).

As expected, the spatial distribution of Dimension 4 -"Technology and innovation"- shows a high concentration in regions with higher economic development and income levels, and highlights the substantial regional inequality and the existing technology and innovation gap. The highest values are mainly represented by the northern and central European regions, while the southern and eastern European regions are grouped in lower quartiles, showing high polarization. Finally, Dimension 5 "Cultural and creative industries", which encompasses variables on cultural and creative enterprises, as well as information on capital and the generation of added value in this sector, shows a high spatial concentration. The explanation for this can be found in the agglomeration economies of this sector (Boal and Herrero, 2018). The highest values within this dimension are found in Swedish and German regions as well as in Northern Spain, Ireland, and Northern Europe. Coastal and tourist regions (the Spanish and French Mediterranean Arc) also show a good level of performance, while the worst values are found in the Baltic and Eastern European regions.

-FIGURE 2-

In order to shed further light on the configuration and spatial distribution of the creative indicators in the European context, Figure 3 graphically presents the result of calculating kernel densities for each of the previously defined dimensions of creativity. This allows us to observe and compare how each of the creativity dimensions is distributed so as to draw conclusions about the general characteristics of the continent. The dimension values are presented on the x-axis, while the associated density is presented on the y-axis, which describes the relative probability of a value falling into a particular range.

First, the estimated densities do not seem to show a marked multimodal distribution, which could indicate homogeneity in the behavior of the creative dimensions across European regions, such that the regional distribution of most indicators is heterogeneous. Moreover, most of the dimensions show a slight positive skew on the right-hand side of the tail –at the high values of the indicators– reflecting a clear concentration of indicators in a small group of regions.

-FIGURE 3-

Looking at the different dimensions, we find some differences in their distribution. It can be observed that the mode of the dimension "Cultural offer and participation" (D3) is below average, the mode of the dimension "Cultural and creative industry" (D5) is similar to the average, while the modes of the other dimensions "Talent", "Openness" and "Technology and innovation" (D1, D2 and D4) are above average, these being the main creativity traits in which European regions specialize. A significant concentration can be identified to the right of the distributions of the "Openness" and "Technology and innovation" indicators, whose modes are close to 80 and 60, respectively.

In sum, the empirical results of the different proxy indicators of cultural and creative capital show a very heterogeneous regional distribution across European countries. There is high spatial polarization, with important differences among central and northern European regions on the one hand, and between eastern and southern regions, on the other. There are large imbalances in the accumulation of these resources within regions of the same country, suggesting a lack of territorial cohesion. These results must be taken carefully into consideration, as cultural and creative capital has important implications for economic development, thereby constituting a new source of territorial disparities.

Analysis of the relationship between tourism efficiency and agglomeration of creativity.

Finally, in an effort to achieve the ultimate goal of the study, we verify whether the territorial endowment and accumulation of creative capital is helping to maximize the tourism competitiveness of European regions. In order to do so -and as explained above- we apply a regression analysis.

Previous to the application of the regression model, we tested the separability condition (Daraio et al., 2018), performed with the FEAR program Wilson (2008) on continuous data, splitting the sample into two independent subsamples with 1.000 bootstrap replications and 1.000 repetitions. Table 4 collects the obtained results, both for each environmental variable individually, as well as the joint test with all the environmental variables.

The first p-value is the Daraio-Simar-Wilson, which tell us whether we should reject or fail to reject the null hypothesis of the separable exogenous effect, and the second is the

Kolmogorov-Smirnov p-value. The results fail to reject the null hypothesis of separability with 99% confidence, so separability conditions are satisfied, and the second stage regression can be interpreted in the usual way.

-TABLE 4-

Following Simar and Wilson (2007), we postulate a truncated bootstrap regression, in line with their first algorithm. In our case, we incorporate the tourism efficiency score as the dependent variable, and the synthetic indicators of creativity as the explanatory variables, together with a series of socio-economic control variables. The descriptive statistics of the variables and the results of the estimation model are presented in Table 5.

Based on the results of the regression analysis, and focusing on the dimensions of creativity, we first find that all of them –with the exception of the "Technology and innovation" dimension– contribute positively to tourism efficiency. These results allow us to affirm a significant relationship between creative and cultural capital accumulation and tourism efficiency. Our model shows that more creative environments, both in terms of talent, diversity, cultural and creative activity and cultural and creative industry, generate the right context in which to maximize the tourism result in terms of impact. More specifically, looking at the results by variables, we can see that the indicators with the greatest impact on tourism competitiveness are those linked to the endowments and wealth generated by the creative industry. These are resources –particularly the former– that can contribute to prolonging tourists' stay and, therefore, to maximizing economic impact. In similar terms, the variables related to talent levels –which are closely linked to the presence of the previous indicator– generate a particularly significant effect. These are measured by means of educational levels and agglomeration of artists. Particularly interesting is the result of the Openness indicator. In this type of studies, it is usual to

find a relationship between tourism performance and more diverse and heterogeneous contexts in terms of local population. This is considered an added value for destinations and is linked to more welcoming and diverse territories, which contributes to a more satisfactory visitor experience.

However, we found that one of the indicators considered generates a negative effect. This is the case of the indicator formed by variables exclusively linked to technology and research and development. Interpreting the result literally, this is evidence that the purely technological sector –encompassed within the creative industry– not only does not generate the right context in which to maximize tourism competitiveness but may in fact be triggering the opposite effect. In this case, we find that the regions where most of the technology industry is accumulated have few tourist resources and are generally inland areas, with an economy highly specialized towards industrial activity. There may be a substitution effect between the two sectors, which it would prove interesting to explore in the future.

-TABLE 5-

Within the socio-economic variables, we obtain results within the expected range. Only "Life expectancy" generates an opposite effect on tourism efficiency, while in the variables "Population", "Population density" and "Youth", a positive effect is identified. In other words, regions with a higher number of inhabitants –that are more densely populated and that have a higher accumulation of young people– present the right context in which to maximize tourism competitiveness. These results confirm the greater tourism efficiency of urban areas, those that are more densely populated, that have a younger population, a large accumulation of cultural and creative resources, greater economic dynamism and which are the main entry point for international tourists by air. A good example of this would be the regions in which the capitals of each country are

located.

Conclusions

In recent years, many studies have appeared addressing the important implications that cultural and creative capital can have for economic development and welfare levels, which is why the cultural and creative sectors are becoming key pillars when designing development policies. Similarly, the tourism sector is one of the most important sectors globally, contributing significantly to the creation of wealth. However, although both have become strategic sectors for development, few studies have explored the relationships and synergies between them. In this paper, we pursue this line of research, specifically focusing on analyzing the relationship between cultural and creative capital and tourism efficiency, considering a novel case study -European regions.

As regards the methodology used, a territorial database was first created for the European regions, from 20 European countries. Application of the DEA method has made it possible to obtain an indicator of tourism competitiveness at the regional level. Among the most efficient regions in the sample, we found no single pattern of tourism specialization, which responds to the varied tourism potential of the continent analyzed. Among the most efficient regions, some are island regions, with resources linked to sun and beach tourism, such as the Canary Islands and the Balearic Islands in Spain, and the Autonomous Region of Madeira in Portugal. In addition, there are other regions in the interior of the continent, especially linked to urban and cultural tourism, such as Berlin (Germany), Île de France (France), the Region of Madrid (Spain) and the Metropolitan Area of Lisbon (Portugal). Among the least efficient are destinations mainly in Eastern Europe, as well as inland regions of peripheral countries, such as Sweden, Hungary, Romania, and Bulgaria.

Based on the results of the spatial distribution of the cultural and creative capital synthetic indicators, we can conclude that they present a heterogeneous pattern. Indicators related to cultural supply and participation, as well as talent, show a higher concentration in Southern Europe, while those referring to creative industry and innovation show a clear agglomeration in the center and north of Europe. In short, territorial heterogeneity and spatial polarization are identified as predominant patterns in the regional creative economy in Europe, which leads to a significant gap.

Furthermore –and as the main contribution of this work– we have been able to confirm that the tourism competitiveness of European regions is significantly conditioned by the accumulation of cultural and creative industries as well as by the existence of cultural amenities. This offers European regions a competitive advantage, as a possible diversification of their tourism offer, with positive effects on the economic impact generated by international tourism. Regions with more creative and cultural environments, that have a greater accumulation of talent, more diverse populations, as well as a larger cultural and creative industry, generate the right context in which to maximize tourism competitiveness. These results are interesting for regional development policy planning, and tourist destinations may find a differentiating factor when seeking to enhance their cultural and creative resources in an effort to attract a greater number of tourists and –particularly– to boost the economic impact they generate. Therefore, the results achieved in our research allow us to affirm that the regions, understood as tourist destinations, can find in the development of their cultural and creative sector a key tool to improve their tourism competitiveness. According to the geographic distribution of competitiveness and the results of the second stage, strengthening the creative sector can be fundamental to improve tourism competitiveness in those destinations with scarce resources that are difficult to provide (cultural or natural heritage, for example) or even impossible (coastline). In these cases,

a strong creative sector can contribute to supplement the lack of other tourism resources in order to maximize tourism competitiveness.

As regards the benefits derived from this research, it is important to note that the discussion may lead to tools of great interest for tourism management in the context of the UNWTO, and more specifically in the European Union. This research also offers policy makers and managers of tourism enterprises key information on the strengths and weaknesses of a sector that is vital to today's economic growth. In this sense, the main practical contribution involves gaining a deeper understanding of the variables that determine tourist destinations' ability to attract international tourists, and on which they should focus their efforts in order to improve their position vis-à-vis rival destinations. Our analysis focuses on the importance of territorial endowment and accumulation of creative capital in terms of the competitiveness of international tourism in Europe. This result is of interest vis-à-vis focusing part of political efforts towards strengthening this sector as a vital resource for consolidating tourism growth.

This research can be performed in other tourist destinations with the same method to yield similar results. Since it is considered that more research should be carried out using quantitative methods to measure which of the determining factors has the greatest effect in influencing the competitiveness of the tourist destination.

Limitations

Our work also offers possible improvements as regards our contribution, in addition to opening up future lines of research. Firstly, the study period –which has been conditioned by data availability at the regional level– should be extended to include the COVID crisis, which hit the tourism sector in particular. This would also help future

testing of the degree of resilience of cultural and creative capital when seeking to explain tourism efficiency.

In addition, it would be useful to consider the flow of domestic tourism, since some of the inefficient results could be explained by the importance of this flow in certain regions, which would lead to an overcapacity of some tourist facilities. Their incorporation could be either in the first stage or in the analysis of explanatory factors. It would also be interesting to extend the production function, in particular by considering the output of tourism receipts as the main output of the tourism impact. On this occasion, this has not been possible given the absence of homogeneous data for all the regions considered. As regards the sample, it would be interesting to include key countries in terms of tourism, such as the United Kingdom or Italy. This might have a significant effect on the efficiency analysis benchmarks. However, the lack of data on creative resources prevents the number of countries from being extended with the sources used. Finally, in the second stage it is possible to explore the effect that other types of variables –especially those of a socio-economic nature– have on tourism efficiency, such as levels of security, international openness, tourism expenditure, per capita income, etc. However, this has not been possible in the present study, as it lies beyond the scope of this research.

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Table 1. Variables and Descriptive Statistics of the DEA model

Variable	Description	Mean	Standard Deviation	Min	Max
Arrivals	Number of tourists of international origin arriving at hotel accommodation	3657432.3	4392040.03	202198	35635441
Beds	Number of beds available in tourist accommodation	108107.24	138224.674	3485	898706
Overnight stays	Number of overnight stays by international tourists	10180823.9	14866628.8	404764	94016358

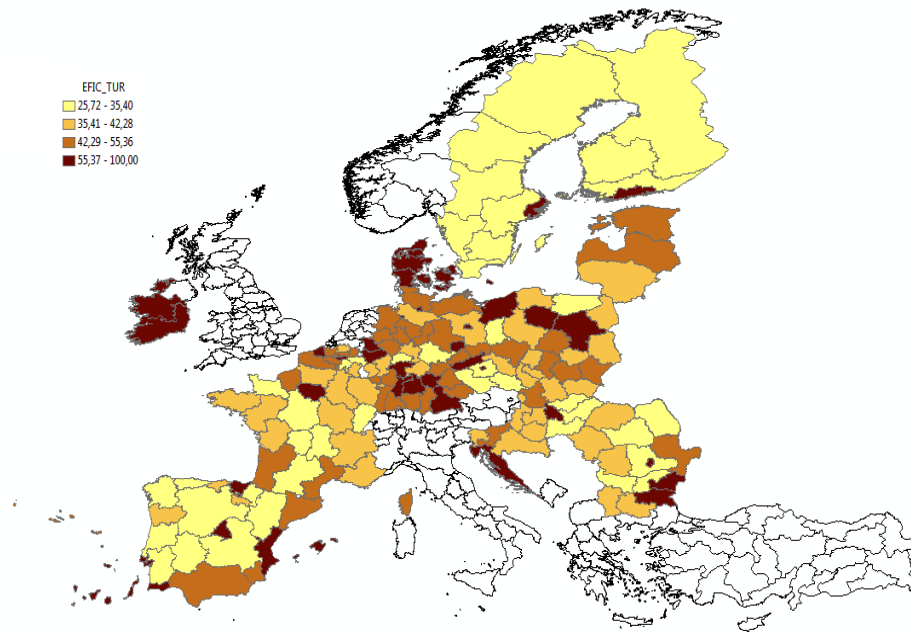
Source: Own elaboration.

Table 2. Dimensions and indicators of cultural and creative capital. Descriptive statistics

Dimension	Indicator	Description	Source	Mean	SD	Min	Max
D.1 - Talent	Human capital	Percentage of people with tertiary education	Regions	28.918	8.285	11.600	54.100
	Creative class	Number of people in creative occupations, per capita	Regions	0.037	0.016	0.008	0.105
		Number of persons in artistic occupations, per capita	Regions	0.021	0.007	0.006	0.047
D.2 - Opening	Diversity	Percentage of foreign population	Regions	0.051	0.048	0.001	0.309
	Foreign talent	Percentage of foreign population with tertiary education	Regions	0.603	0.593	0.107	4.810
	Integration	Employment rate of people from foreign countries	Regions	62.106	8.719	38.900	84.600
D.3 - Cultural offer and participation	Cinema capacity	Number of seats in cinemas, per capita	Cities	5489.519	3506.160	228.085	18500.359
	Theatres	Number of theatres, per capita	Cities	8.879	11.191	0.000	87.830
	Libraries	Number of libraries, per capita	Cities	32.141	28.762	1.486	156.515
	Cinema attendance	Cinema attendance as a percentage of the population	Cities	0.975	0.694	0.003	4.528
	Museum attendance	Museum attendance as a percentage of the population	Cities	0.596	0.649	0.013	4.670
D.4 - Technology and innovation	R&D expenditure	R&D expenditure, per capita	Regions	538.922	630.827	5.800	3737.300
	R&D personnel	Percentage of R&D personnel and researchers	Regions	1.117	0.814	0.099	4.304
	Patents	Number of patents, per capita	Regions	90.432	109.277	0.233	468.132
	Science and technology	Percentage of human resources in science and technology	Regions	31.468	7.720	11.800	53.700
	Brands	Trademark applications, per capita	Regions	140.430	118.461	3.969	610.396
D.5 - Cultural and creative industry	Creative industries	Number of creative enterprises, per capita	Regions	0.017	0.013	0.001	0.090
	Employment creative industries	Percentage of employment in creative industries	Regions	0.077	0.027	0.002	0.179
	Capital formation	Gross capital formation of the creative industries, per capita	Regions	859.489	899.914	19.866	5559.190
	Cultural GVA	Gross value added of the cultural sector	Regions	747.132	490.857	53.667	2249.637

Source: Own elaboration based on Eurostat

Figure 1. Distribution of tourism efficiency. DEA results.



Source: own elaboration.

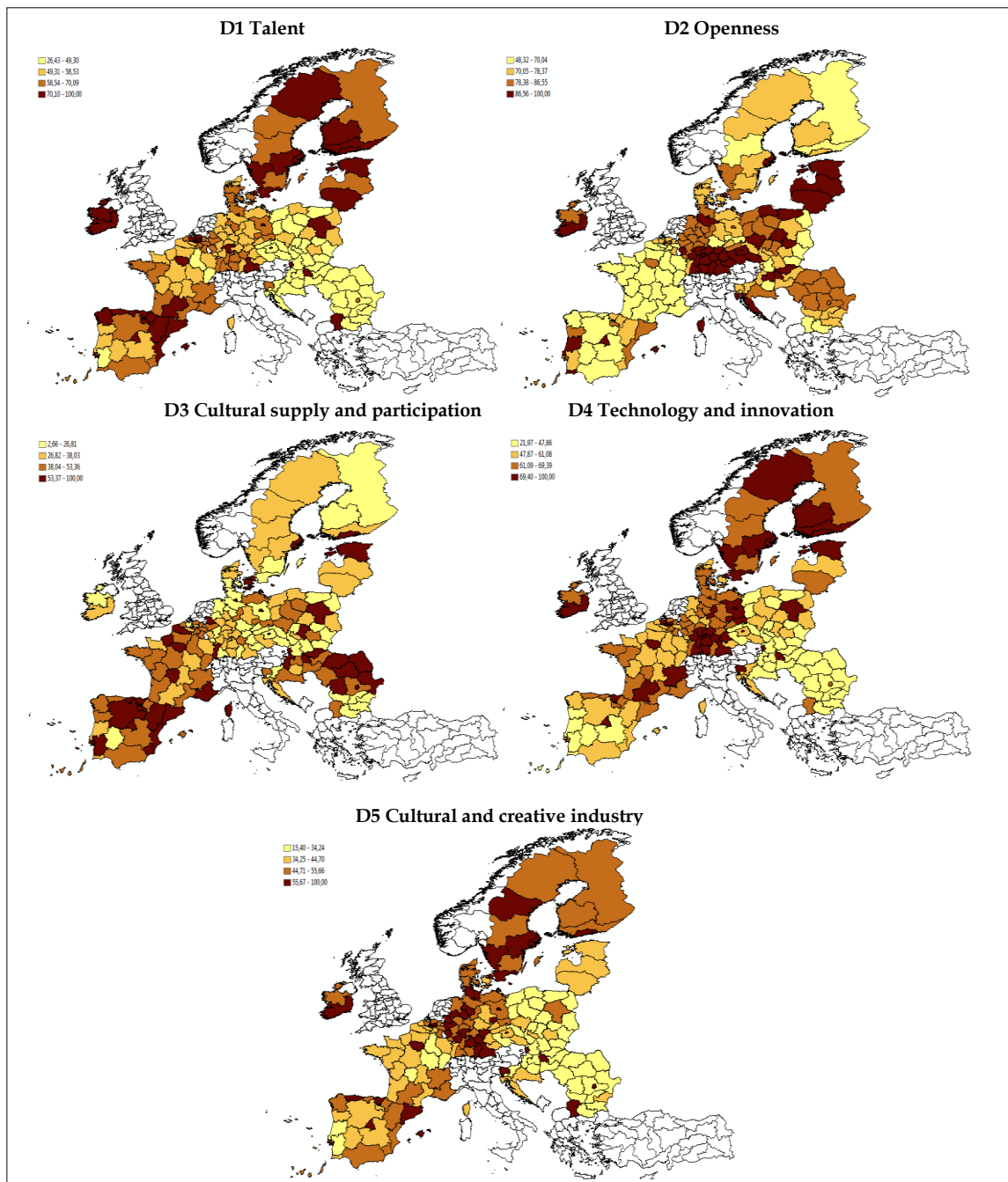
Note: For layout reasons, the Canary Islands region has been relocated to the southwest of the map

Table 3. Results of tourism efficiency analysis

Top 20 positions		Last 20 positions	
Region	Efficiency	Region	Efficiency
Canary Islands	100	Castilla-la Mancha	25.72
Berlin	98.08	Centro- Portugal	26
Hamburg	97.81	Severozapaden	26
Autonomous Region of Madeira	93.17	Åland	26.05
Île de France	89.89	Limousin	26.1
Illes Balears	81.67	Severen tsentralen	26.51
Région de Bruxelles-Capitale	77.18	Franche-Comté	27.06
Praha	76.5	Mellersta Norrland	27.24
Region of Madrid	75.1	Jihovýchod	27.67
Jadranska Hrvatska	71.55	Övre Norrland	28.14
Bremen	71.15	Castilla y León	28.23
Southern and Eastern Ireland	70.38	Småland med öarna	28.26
Stockholm	69.47	Auvergne	28.42
Yugoiztochen	68.88	Pohjois- ja Itä-Suomi	28.63
Lisbon Metropolitan Area	68.71	Alentejo	28.99
Nordjylland	68.41	Aragon	29.11
Zachodniopomorskie	67.48	South - Muntenia	29.33
Prov. West-Vlaanderen	66.79	Norra Mellansverige	29.49
Sjælland	66.41	Östra Mellansverige	29.91
Algarve	66.11	Észak-Magyarország	30.29

Source: Own elaboration

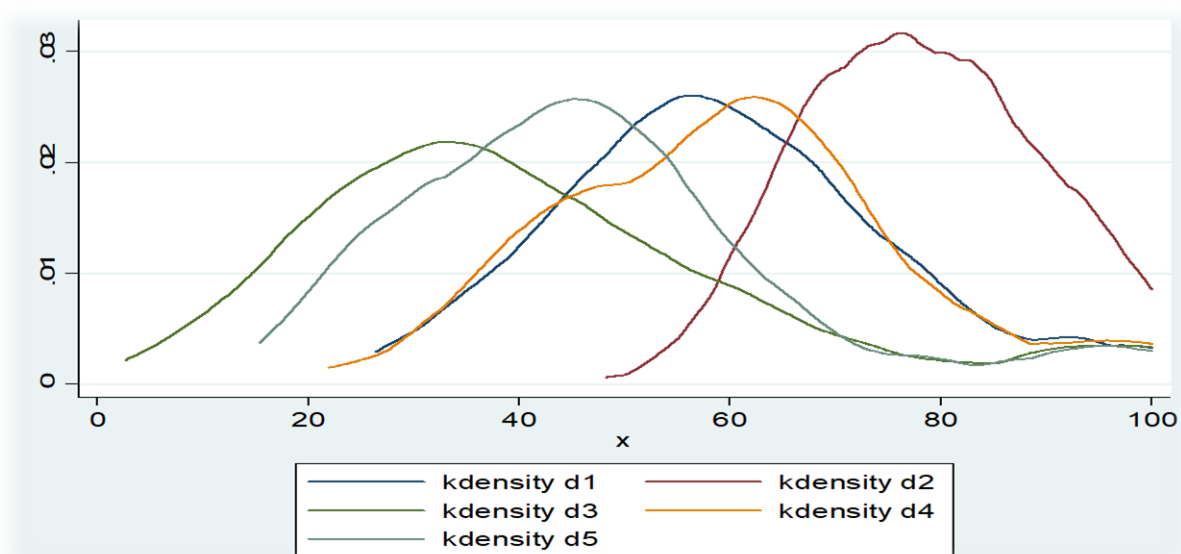
Figure 2. Maps of regional cultural and creative indicators



Source: own elaboration.

Note: For layout reasons, the Canary Islands region has been relocated to the southwest of the map.

Figure 3. Kernel densities for cultural and creative indicators



Note: D1-Talent; D2-Openness; D3-Cultural offer and participation; D4-Technology and innovation; D5-Cultural and creative industry.

Source: Own elaboration

Table 4. Results of the separability test

Environment variables	Tau statistic		<i>p</i> -value	
D1	-3.314312	0.4928840	0.932	0.154
D2	-2.9904787	0.4290199	0.916	0.289
D3	-5.2601868	0.4729533	0.969	0.234
D4	-3.8200942	0.4977064	0.959	0.172
D5	-1.1369657	0.4047399	0.769	0.325
Populat	-1.8061615	0.4087382	0.856	0.354
Dens	-4.8148254	0.4577168	0.982	0.239
Household	-4.5051727	0.3999314	0.958	0.338
Rent	-0.3092822	0.4993565	0.364	0.197
Youth	-12.033.003	0.4966701	0.787	0.153
Joint test	-0.3799331	0.2858919	0.766	0.265

Source: own elaboration. The first *p* value is based on averaging the Daraio et al. (2018) test statistic over multiple sample-splits. The second *p* value refers to the Kolmogorov- Smirnov statistic. See Simar and Wilson (2020) for details.

Table 5. Variables, Descriptive Statistics and Regression Analysis

Variable	Description	Mean	Standard Deviation	Min	Max	SW
D.1 - Talent	Talent	59.85	16.04	26.43	100.00	0.206* (0.125)
D.2 - Openness	Openness	78.29	11.12	48.32	100.00	0.224** (0.090)
D.3 - Cultural offer and participation	Cultural offer and participation	42.09	22.11	2.66	100.00	0.089* (0.049)
D.4 - Technology and research	Technology and innovation	60.25	16.67	21.97	100.00	-0.223* (0.116)
D.5 - Cultural and creative industry	Cultural and creative industry	47.13	18.31	15.40	100.00	0.304** (0.119)
Population	Millions of inhabitants by region	2.00	1.54	0.03	12.08	1.303** (0.626)
Population Density	Inhabitants in relation to the surface area of the region.	277.33	701.36	3.40	7408.00	0.003** (0.001)
Household income	Household disposable income balance. Normalized 0-1	0.48	0.25	0.06	1.00	7.936 (7.434)
Life expectancy	Life expectancy at birth. Normalized 0-1	0.95	0.03	0.87	1.00	-85.414* (51.362)
Youth	Percentage of population between 5-34. Normalized 0-1	0.83	0.07	0.63	1.00	21.739* (13.548)
						Constant
						67.029 (50.075)
						Sigma
						11.591*** (0.621)
						Wald Chi2
						135.4***

Source: own elaboration. ***Statistical significance at 1%; ** Statistical significance at 5%; * Statistical significance at 10%. Number of bootstrap replications=5000. SW, Simar y Wilson Regression model.