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ANALYZING ECONOMIES OF  
AGGLOMERATION IN SPAIN**

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# WHERE ARE THE ARTISTS? ANALYZING ECONOMIES OF AGGLOMERATION IN SPAIN

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## **Abstract:**

The creative economy has become the subject of increasing interest in recent years, both in the area of cultural economics as well as in economic development studies and the analysis of spatial disparities. In this regard, various studies have examined the spatial logics of cultural and creative industries, although analyses into the location and agglomeration of artists therein remain few and far between, in other words inquiry into the activities location linked to artistic creation in a purer sense. The present work thus seeks to delve into location and spatial structure of the cultural sector in a Spanish region, focusing specifically on activities more closely linked to artistic creativity, such as literary creation, performing arts, bullfighting, music, cinema, etc. The work examines the autonomous community of Castilla y León as an example, and posits an analysis of the spatial distribution of artists using micro-spatial disaggregation, in other words taking the network of towns as the territorial analysis unit. Spatial econometric techniques are used to identify location patterns, pinpoint territorial activity clusters and to measure agglomeration economies. A first look at the findings reveals that the cultural sector in Castilla y León evidences a strong trend towards concentration, with spatial distribution patterns which lead to the formation of statistically significant cultural clusters and strong spatial dependence between territories over the whole of the period analysed (2005-2013).

**Keywords:** Artists, spatial economic analysis, economies of agglomeration, cultural clusters, micro-territorial analysis.

**JEL classification:** Z11, R12

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## 1. Introduction

Analysis of agglomeration economies as a determining factor in the location of economic activities has been a recurring topic in economic analyses for centuries. In this regard, Marshall (1890) argued that the externalities generated by a high concentration of firms in a given area entail a number of benefits and advantages such as the creation of a specialised labour force, a reduction in transaction costs and the exchange of processes, knowledge and innovation. Since then, the study of spatial effects and geographical concentration has always played a leading role in regional economy as an analytical field in its own right in economic analysis. Authors such as Ohlin (1933) and Isard (1956) popularised the idea that external economies are accessible to all firms regardless of the sector to which they belong. In this regard, and given the major implications, interest in embracing this domain in economic theory has grown considerably, driven mainly by increased methodological developments and applied quantitative techniques together with the greater availability of georeferenced databases. Recent decades in particular have witnessed the re-emergence of a keen interest in the importance of agglomeration economies in the sectoral and territorial distribution of economic activities (Ogawa and Fujita, 1980; Romer, 1986), with analyses modelling the mechanisms involved in the concentration of resources and economic activity at both a national and international scale (Krugman, 1991 *a,b*). David and Rosembloom (1990) identify the source of Marshallian externalities, whilst Glaeser *et al.* (1992) and Henderson *et al.* (1995) focus their analysis on various types of these externalities. There are several empirical contributions to measuring the territorial concentration of firms through indexes (Ellison and Glaeser, 1997), and more recently, Cohen and Paul (2003) and Viladecans-Marsal (2004) have sought to ascertain the relevance of externalities and their scope of influence, respectively.

In the cultural domain, agglomeration economies have not, to date, been a major area of study, even though recent works have shown that cultural and creative activities employ their own distribution strategies, and inquiry into the analysis of location patterns in the field is gaining ground in cultural economics research, particularly as a result of the impact in terms of economic development and the emergence of new territorial disparities (Florida, 2002; Cooke and Lazzeretti, 2008). Indeed, there is no reason to believe why talent should not be equally distributed in spatial terms, and that it is factors such as training and technical skill, coupled with a favourable social and institutional environment, that have led to the concentration of creative talent in certain locations and areas, both today and indeed throughout history. Circumstances such as the impact of public or private patronage, the ability to attract major institutions or cultural facilities, an atmosphere conducive to creativity, demographic size or a minimum of cultural consumption, but also the mere fact of living near to other creators and other craftspeople and, in sum, other similar activities, are what have brought about the agglomeration of such creators and all manner of cultural activities. At this point in time, we should be asking ourselves whether the trivialisation of space brought on by the new means of technology and communication and transport is favouring concentration or dispersion and, therefore, whether proximity and agglomeration continue to prove necessary when deciding where to locate cultural and creative activities.

The present research seeks to shed light in this regard and to help explain agglomeration economies and the importance of setting when deciding where to locate in the cultural sector based on a case study and by applying statistical techniques and spatial econometrics. The basis of our rationale involves examining where and why cultural and creative activities tend to agglomerate, whether better results can be achieved thanks to concentration and what are the spatial frictions that account for clustering. The study pursues three specific objectives: to explore the spatial guidelines determining cultural and creative activities; examining the potential influence between adjacent territorial units in cultural sector location decisions so as to pinpoint spatial dependency effects; and, finally, to isolate significant spatial agglomerations (cultural clusters). As a case study, we take the autonomous region of Castilla y León in Spain and examine the period 2005-2013, with micro-spatial disaggregation, in other words, considering small territorial units (municipalities). This allows us to conduct a detailed analysis of location decisions and territorial disparities. For this purpose, we use municipal fiscal licence data from the Business Tax Register, a source of information closely related to creative activities and the labour market and which encompasses artists and craftspeople as well as cultural intermediaries. Our study of the distribution of cultural and creative activities has been carried out through an exploratory analysis of data and by calculating a concentration index (Gini index) for the whole time period. In order to include size and spatial interactions, spatial and global autocorrelation indicators, provided by spatial econometrics, are applied.

The content of the present work is divided into five sections: after this introduction, section 2 provides an overview of the theoretical analysis of agglomeration economies, and reviews the studies carried out in the area of culture; section 3 presents a proposal to operatively delimit the cultural sector, the data and sources used as well as the methodological design applied in the research; section 4 examines the results to emerge from the empirical application of the exploratory data analysis, the descriptive statistics and the results of the spatial econometrics indicators. Finally, section 5 presents the main conclusions of the research.

## **2. Theoretical framework**

One of the most frequently recurring questions in economic analysis is the study of the location of economic activities, with this having given rise to a consolidated and fertile body of analytical research in the shape of regional and urban economics. Marshall (1890) was who firstly explored in depth the issue of geographical concentration, defining externalities in the location process as those advantages which economic agents obtain by locating close to one another. These advantages are brought about by the presence of a skilled labour force, the agglomeration of subsidiaries and the flow of information between the various firms that have set up. It was later Weber (1929) who carried out an initial approach to the issue of industrial location, pointing to proximity to natural resources as a key element, with Hotelling (1929) establishing a model of linear competition which concluded with the premise that competition entailed concentration.

The concept of externality once again emerged in the academic debate. Towards the end of the last century, several studies into regional development appeared, modelling the mechanisms that impact on the

territorial distribution of resources (Krugman, 1991a; Kubo, 1995). In this new framework, attention focused on the direct interaction between agents and growing returns generated through economies of scale. O'Sullivan (2000) claims that economies of location emerged due to economies of scale in the production of inputs, the existence of a labour market and knowledge spillovers. These models reflect how individual interactions can give rise in an aggregated manner to collective behaviours in which common patterns emerge (Anselin, 1999). Progress has led to a highly fertile field of analysis which seeks to explain, not only the behaviour of economic agents in spatial terms but also how territory impacts on economic relations and on the potential for economic development, even bringing about a complementary notion of compensatory value judgement, such as the existence of territorial economic disparities.

Given the renewed interest in economies of location, a radical shift in these aspects emerged. The coming together of such disciplines as economics and geography is bearing fruit vis-à-vis considering spatial dimension as a common denominator in academic analysis. The works of Krugman (1991a, b) and Porter (1998) led to the emergence of a fresh theory of location, namely those who highlight the power of what is local and who point to the progress made in the field of economic geography, attaching greater importance to the ideas underlying the notion of territory and city when providing economic explanations. Authors such as Fujita and Krugman (2004) speak of a "New Economic Geography", which refers to the spatial interactions brought about by economic processes. This approach seeks to explain forms of economic concentration in spatial terms, turning attention to the actual organisation thereof, whilst advocating the forces which act on concentration, in other words, centripetal and centrifugal forces. In such a new theoretical context, attention focuses on models which reflect direct interaction between agents, mirrored through social norms, effects arising from proximity, spillovers, externalities, contagion effect, etc. In this way, the models provided by economic geography explain economic activities tendency to agglomerate endogenously in spatial terms, given the presence of growing returns to scale and various kinds of externalities. Fujita and Thisse (2007) conjecture that growth is the result of circular logic wherein both the backward and forward linkages in which firms engage lead to an agglomeration of activities which gradually strengthen one another.

Nevertheless, and in relation to aspects of territorial concentration, Marshall's legacy has been picked up by many present-day authors who focus on the various types of existing externalities as well as the importance and influence these have on location decisions (Henderson *et al.* 1995; Cohen and Paul, 2003; Viladecans-Marsal, 2004). In this context, the Marshallian concept of industrial district goes beyond geographical proximity and sectoral specialisation, in which local ecologies regain importance in industrial production (Becattini, 2002). In the Marshallian concept of district, a high level of trust is established between the main firms therein, as well as the close cooperation and administration brought about by innovation and greater competitiveness. At the heart of the district lies what Gertler (2003) terms the "being there": the idea that spatial proximity fosters tacit knowledge, a knowledge that can only be generated through co-presence and face-to-face interaction, and which affords added competitive advantage.

All of these particularities of the industrial district are by no means exclusive to industry, which is why many authors have broadened the notion of district to new sectors such as culture or tourism. When exploring the cultural sectors, we find the extension of the Marshallian notion of cultural district (Santagata, 2005; Lazzeretti, 2006; Capone and Boix, 2008). The production of goods and cultural services is characterised by the use of talent and creativity, which incorporate a certain degree of intellectual property and convey a symbolic meaning. These aspects often lead to the production of cultural goods and services being subject to competitive pressure, which forces agents individually to agglomerate into dense specialised clusters or industrial districts (Power and Scott, 2004). Cultural clustering thus generates benefits due to concentration and the density of exchange between cultural agents (Markusen, 1996).

Craft and cultural activities might also be felt to adapt their agglomeration and location trends over certain areas. The location patterns of these activities respond to various key factors which, in turn, account for the formation of cultural clusters. In this respect (Méndez *et al.*, 2012) highlight three relevant factors: hard, soft and relational location factors. The first group refers to the importance of certain tangible resources, in other words, the technical level of communication infrastructures, linked to levels of investment in R&D+i, widely available real estate and equipment. Of a more intangible nature, soft location factors refer to concepts such as the stock of human capital (Ateca, 2009) the call effect in a context of sociocultural diversity, an asset which is heterogeneous and tolerant, as well as elements linked to the quality of urban life. Yet, it is necessary to underscore the importance of social relations, even more so in the face of today's information societies. It is, therefore, the relational location factors which have a direct impact on the relations to emerge between firms and local actors, and which allow for various externalities to be created, resulting in the construction of cooperation networks in which transaction costs are reduced and contribute to the appearance of competitive advantages and the consolidation of localised clusters (vid. Cameron 2016, for the music sector). This is also what underlies the core idea of Florida (2002), who points out that competitiveness and wealth are increasingly determined by cities and regions ability to innovate and create as well as their capacity to foster and attract creativity. In his works, he explores the driving factors that attract creativity using indicators of Talent, Technology and Tolerance. Through this, the author measures a location's appropriate conditions for attracting or retaining the so-called creative classes, who would seek to settle in certain areas that provide specific conditions of quality.

In the academic domain of cultural economics, spatial analyses of the cultural sector remain still a minority. Nevertheless, many works have appeared addressing the topic. A review of the literature reveals in Brooks and Kushner (2001) and in Santagata (2005) an analysis of the concept and evolution of industrial districts in the cultural domain and their influence on economic development. In the European context, Cooke and Lazzeretti (2008) explore various cases of cultural clusters. Currid (2007) examines the value of proximity and face-to-face interaction in the art, fashion, and music in New York City. The study by Boix *et al.*, (2013) analyses the geography of creative industries in various European countries in a comparative study among France, the UK, Italy and Spain. Lazzeretti *et al.*, (2009) explain the reasons underlying cultural and creative concentration on the basis of the provision of heritage and cultural goods, economies of location and urbanisation, related variety and the concentration of the creative class. Power

and Nielsen (2010) compare the situation and dynamics of the distribution of the creative activities for all the EU regions, based on NUTS-2. In Spain, we find the study by Casares *et al.*, (2012) who address the territorial distribution of the creative class based on the notions of Florida and his indicators of technology, talent and tolerance at different levels of disaggregation. More recently, Boix and Lazzeretti (2012) conducted a study into creative industries in Spain using added value and employment data, and Méndez *et al.*, (2012) carried out an analysis of the creative economy in Spain considering the urban system as a whole and performing a comparative analysis in the metropolitan areas of Madrid and Barcelona.

This is, therefore, a field of inquiry which is arousing the growing interest of specialists at an international level. There are many works dealing with location and the interactions between economic activities and territory. Nevertheless, there are fewer studies which explore location and distribution trends of cultural and creative activities taking spatial effects into consideration, and even more so in the case of micro-spatial detail and focusing attention on the distribution of craftspeople and primary creation agents. Such are the objectives which we intend to address in the present paper, using a source of information which is closely aligned to creativity and which will enable us to conduct the analysis with the highest level of spatial disaggregation, namely at a municipal level.

### **3. How to measure artists' concentration in territory: methodology and case study**

Studying the cultural sector involves delimiting the area it covers in order to measure its scope, a task that does not always prove easy, and which is compounded by the fact that there is no general consensus, but a number of ad hoc definitions. It should be remembered that the cultural sector comprises activities that are knowledge use intensive, and characterised by a single guiding thread, since all of them, from creations in the purest sense down to the most standardised, imply a creative effort, the expression of beauty or content of a symbolic value, in addition to which their output, at least potentially, embodies some form of intellectual property (Throsby, 2001).

Activities involving artistic creation are thus encompassed in more precise concentric sectors, corresponding to the core of primary cultural production or provision of artistic resources, whereas activities involving the production and distribution of cultural goods and services display a greater dispersion and a wider scope. However, one factor that needs highlighting is the lack of consensus with regard to which activities should form part of the cultural and creative economy. Given this conceptual ambiguity, a number of different approaches have emerged in studies addressing the analysis of such activities and which depend on the statistical information available, time contexts, and the various perspectives explored, and in which the concept of creative industry continues to lend itself to a large number of unclear definitions (Oakley, 2009). Given such a context, Throsby (2001) establishes a classification of cultural activities through a system based on concentric circles, at the heart of which lie purely artistic and creative activities, and which in turn are surrounded by cultural and creative industries

in outer circles. Prominent amongst the proposed classifications is the UNCTAD (2010) *Creative Industries Reports* classification which distinguishes five conceptual models to define creative activities, considering those based on the production of symbolic goods and linked to intellectual property, and drawing a distinction between heritage, arts, media and functional creations.

The analytical proposal put forward in the present work involves identifying the guidelines regarding the location and distribution of cultural economics activities in their purest sense, in other words, those belonging to the most central cores of artistic and cultural creativity of those established in the literature – corefields-. To achieve this, a thus far much under-exploited database in this field of analysis is used, namely the information derived from the tax on business activities (*Impuesto de Actividades Económicas - I.A.E.-*), a tax levied locally in the Spanish tax system, managed by local councils and applied directly on any business activity whether undertaken by either physical or legal entities, and the amount of which remains constant regardless of the balance sheet. What proves useful about this source of information is that it contains a specific section devoted to licences for artistic activities, and therefore reflects the activities declared by all the physical or legal entities involved in the area of creation and production related to the fields of performing arts, music, cinema, circus, dance, sport and bullfighting. It thus constitutes the earliest seed of artistic creation and activity, which also adapts to the kind of labour market in the sector, in which self-employed and freelance workers most prominently, and which are later joined by the business and professional activities linked to exploiting and distributing the goods and services to emerge from the cultural sector. Table 1 shows the clusters of the business licences for the artistic and cultural activities considered in the present research based on the *I.A.E.* classification in large sections, in other words two digits. A more detailed list of the sectors broken down into three digits can be found in the annex.

The fact that this tax is managed at a local level allows us to study the location patterns of cultural and creative activities with a sufficient degree of territorial disaggregation. In addition, although exemptions to the tax were established in 2002 for certain kinds of business activities whose turnover falls below a set threshold, it should be pointed out that anybody, whether at an individual or company level, who engages in such business activities is obliged to register in the company and professional census, such that registration remains compulsory and thus ensures the reliability of the source of information.

For our particular case study, analysis of the distribution of cultural and creative activities in the region of Castilla y León, Spain, we thus draw on the information provided by the regional treasury ministry through the Statistical Information System<sup>1</sup> concerning the number of licences for the tax on business activities, based on a compendium of 11 areas of activity related to the cultural sector (all the artistic licences issued plus a selection of professional and business activities, related with the cultural and creative sector), with a municipal disaggregation for the 2,248 municipalities in the region, and for a time period spanning 2005 to 2013. However, it is important to point out one inherent limitation when dealing with such data at a local level in spatial statistical analysis. Given the enormous administrative division in the

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<sup>1</sup>*Sistema de Información Estadística –S.I.E.-* [www.jcyl.es/sie/](http://www.jcyl.es/sie/)



region used in the analysis, we are faced with a very large number of zeros in the database of licences for the various years studied, and which correspond to the lack of any entries of cultural activities in many rural towns and villages. Liviano and Arauzo (2013) show that a high proportion of zeros in the data matrix poses an interpretative challenge, although it is true that the zeros highlight one clear fact, namely the need for a certain urban and demographic grouping when registering activities of a cultural nature, together with the assumption that these tend to be concentrated in urban and metropolitan areas.

**Table 1.** Identification of tax licences for artistic and cultural activities depending on *I.A.E.* clusters

TYPE OF ACTIVITY	GROUP
Artistic Activities	01. Cinema, theatre, circus 02. Dance 03. Music 04. Sport 05. Bullfighting
Professional Activities	85. Entertainment 86. Liberal, artistic and literary professions 87. Betting, gambling and games of chance 88. Various
Business Activities	96. Recreational and cultural services 98. Amusement parks, fairs and entertainment services

Source: Authors' own, Tax on Business Activities -*I.A.E.*-.

As regards the methodology, when studying the geographical concentration or dispersion of a variable, one key question is to ascertain which indicator proves most appropriate. Many of the studies analysing the spatial distribution of economic activities in spatial entities are based on geographic location indices and disparity indices such as the Florence index, the Gini index, or the Hirschman-Herfindahl index. These indexes provide *a priori* relative information concerning the distribution of territorialised data. Yet, its main limitation is that it fails to take account of the influence of space, in other words, that each spatial entity is treated as an isolated and independent unit, whose location in the sample space of entities is considered random. As a result, we conduct a two-stage analysis. Firstly, we perform a study of the concentration of activities without spatial interaction, and which will constitute the initial approach to analysing of agglomeration economies in the cultural sector of the region studied. Secondly, territorial interactions are considered by means of spatial econometric analysis in order to explain the patterns of clustering and to determine possible niches of cultural creativity and activity in spatial terms.

By way of an initial approach to exploring the territorial distribution of cultural and creative activities, without considering spatial interactions, we propose calculating the Gini concentration index (Gini, 1912) for the whole time series analysed in the work. Said index varies from 0 to 1 (maximum equality-maximum inequality), pointing in this instance to a greater concentration of economic activity the higher the value of the index. The level of concentration of cultural activities has been calculated for the 2,248 municipalities in Castilla y León. The value obtained using this indicator is summed up in the first section of the results.

However, as already pointed out, using the concentration index provides information that fails to take account of the spatial treatment of the analysis units: each spatial entity is treated as an isolated unit and its location is deemed random in the sample area. As a result, differing spatial distributions of an activity may display similar values of the non-spatial index if the degree of concentration or dispersion is similar at an overall scale. Such treatment prevents determining whether the location of an economic activity is distributed randomly over an area or whether, by contrast, the location of an economic activity is spatially concentrated in closely adjacent geographical units.

In the field of spatial econometrics, spatial autocorrelation stems from the existence of a functional relation between what happens at one point in space and another (Paelink and Klaassen, 1979; Anselin, 1988). Thus, the presence of spatial autocorrelation means that the participation of a cultural economy activity in a given area is not only explained by endogenous variables, but also by the existence of such activities in neighbouring areas. Overall spatial analysis provides a spatial association indicator, known as Moran's Global  $I$  statistic, which serves to confirm the spatial autocorrelation of the data. Spatial association may be defined as follows:

$$AE = \frac{\sum_{ij}^N w_{ij} c_{ij}}{\sum_{ij}^N w_{ij}} \quad (1)$$

where  $c_{ij}$  measures the similitude of attributes of regions  $i$  and  $j$ ,  $w_{ij}$  measures the distance between regions  $i$  and  $j$ , with the distance  $ii$  being equal to zero, and  $N$  the number of regions analysed.

Moran's Global  $I$  spatial indicator is expressed as follows:

$$I = \frac{N \sum_{ij} w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{S_0 \sum_{i=1}^N (x_i - \bar{x})^2} \quad i \neq j \quad (2)$$

where  $x_i$  is the value of the variable  $x$  in region  $i$ ,  $\bar{x}$  is the sample mean of variable  $x$ ,  $w_{ij}$  are the components of the matrix of spatial weight,  $N$  the sample size and  $S_0 = \sum_{i=1}^n \sum_{j=1}^n w_{ij}$ .

With regard to the distribution of Moran's  $I$  statistic, according to Cliff and Ord (1981) the standardised expression of the test is distributed as a normal typified one. Statistical inference is performed by comparing the theoretically expected outcomes with those actually observed. In this context, the null hypothesis is defined as the likelihood of a region receiving a particular value of a variable is the same for all locations  $i$ , and is independent of what happens in the rest, in other words, licences are distributed homogenously in spatial terms; in contrast to the alternative hypothesis, the likelihood is not the same in all regions and/or the observed level of the variable in  $i$  is not independent of what happens in the rest, in other words, spatial autocorrelation is seen to exist.

Having constructed the contrast in the usual manner, and having typified Moran's  $I$  statistic ( $Z_I$ ),  $Z_I$  is then evaluated. The inferential process is performed by means of a permutation approach so as to calculate the likelihood that the spatial arrangement observed is the result of chance, with a random permutation of all the values observed based on 999 replicas.

Interpreting the statistically significant coefficients allows the following conclusions to be drawn:

- Non-significant values of the standardised I test,  $Z_I$ , lead to the null hypothesis being accepted, reflecting the inexistence of spatial autocorrelation.
- Significant values of  $Z_I > 0$  are indicative of positive spatial autocorrelation –finding similar values (high or low) of the variable, spatially grouped, to a greater extent as to what would happen by chance-.
- Significant values of  $Z_I < 0$  are indicative of negative spatial autocorrelation – a non-clustering of similar values occurs (high or low) of the variable higher than normal in a random spatial pattern.

The global autocorrelation statistic indicates the presence of significant spatial autocorrelation, but does not distinguish whether geographical concentration refers to low or high values of the variable, nor where the local clusters which are significant in statistical terms are located. Put differently, the global indicator is not sensitive to situations of instability in the distribution of the variable, in which the spatial process is not stationary. In order to overcome these limitations, the following step involves determining where the highest and lowest values in the area are located. This stage is carried out by means of local spatial analysis using Moran's Local  $I$  statistic. This indicator allows us to identify *spatial clusters* (Anselin, 1995), defined as those locations or set of adjacent locations for which the indicator proves significant.

The local indicator is defined as:

$$I_i = \frac{z_i}{\sum_i z_i^2 / N} \sum_{j \in J_i} w_{ij} z_j \quad (3)$$

where  $z_i$  is the value which the normalised variable takes in region  $i$ , and  $J_i$  the set of areas considered to be neighbouring  $i$ .

In this way, in order to determine spatial dependency at a local level, a calculation of the significance for each spatial unit is performed. This calculation allows a  $p$  value to be obtained for each spatial unit, thereby pinpointing the most significant areas. A cluster appears when the value of the participation of a region's cultural economy activities more closely resembles its neighbouring regions than it would otherwise do were spatial randomness to exist. For this purpose, the spatial weighted average of participations in neighbouring regions is taken as an indicator. Subsequently, using the values obtained maps are drawn up distinguishing: a) positive spatial autocorrelation, in other words, municipalities in which there is a direct link between similar values of the variable, such that municipalities displaying high values of the variable are surrounded by other municipalities in which the variable also gives high values, and vice-versa, and b) negative spatial autocorrelation, in other words, when there are municipalities displaying values that differ significantly from those of their closest neighbours, with high values surrounded by low values, or the opposite.

In order to obtain spatial indicators at a global and local level, a specific criterion needs to be considered which can establish the adjacency of the spatial units, generally the distance or proximity

between them. In the present study, a matrix of spatial weights has been drawn up to reflect spatial interdependencies by identifying *queen* type regions using first order physical spatial matrices<sup>2</sup>. The first order spatial matrix considers that a municipality's only neighbours are those with which it shares a municipal boundary. Based on this criterion, the *W* matrix of spatial weights allocates ones and zeros to the elements in the matrix depending on the existence or otherwise of adjacency. This allows the spatial lag operator to be constructed, which is the correcting element in spatial regression models, to which it is then incorporated in the form of a dependent variable or error term, so as to determine spatial autocorrelation.

Finally, it should be pointed out that in order to obtain the results of this article, the administrative divisions applied in Castilla y León are taken as a reference, using the maps available at the spatial data infrastructure service of Castilla y León<sup>3</sup>.

## 4. Results.

### 4.1 Descriptive analysis of the artistic and cultural activities location

By way of an initial approach, this section offers the results obtained from the descriptive analysis of the territorial distribution of artistic creation and cultural activities in the region of Castilla y León, Spain, for the period 2005-2013. This autonomous community is the largest political-administrative region in Spain. It has a large number of urban towns and villages, specifically 2,248 municipalities, although most are located over wide rural areas, and are small towns and villages with scant population and whose economic activities are primarily agriculture based. In contrast, we find the provincial capitals and larger areas which account for most of the population and for the region's economic activity.

For the variable studied, the number of professional licences for artistic and cultural activities, data are available from 2,248 municipalities for the whole 2005-2013 period. Table 2 shows the most relevant descriptive statistics for the total variable of the number of licences in each year analysed. Since 2005, the number of cultural and artistic licences have grown at an annual rate of 18.67%, rising from 1,036 licences in 2005 to 4,074 in 2013, a 293.24% increase over the period. With regard to other productive areas, the continued growth of the cultural sector is apparent, with there being little evidence that the economic crisis has had a negative impact on the creation of this kind of economic activity, unlike other sectors.

**Table 2.** Descriptive statistics of the number of licences for cultural economy activities located in municipalities 2005-2013

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<sup>2</sup> The physical spatial matrix in the analysis uses the criterion based on which the territories studied are physically adjacent, sharing one side or vertex. Thus,  $w_{ij}$  will take the value 1 if the territories share some point vertex on their boundaries and 0 otherwise. Moreno and Vayá (2000) offers various alternatives for defining a spatial weight matrix which serves as an instrument to reflect interdependencies.

<sup>3</sup> <http://www.cartografia.jcyl.es/>

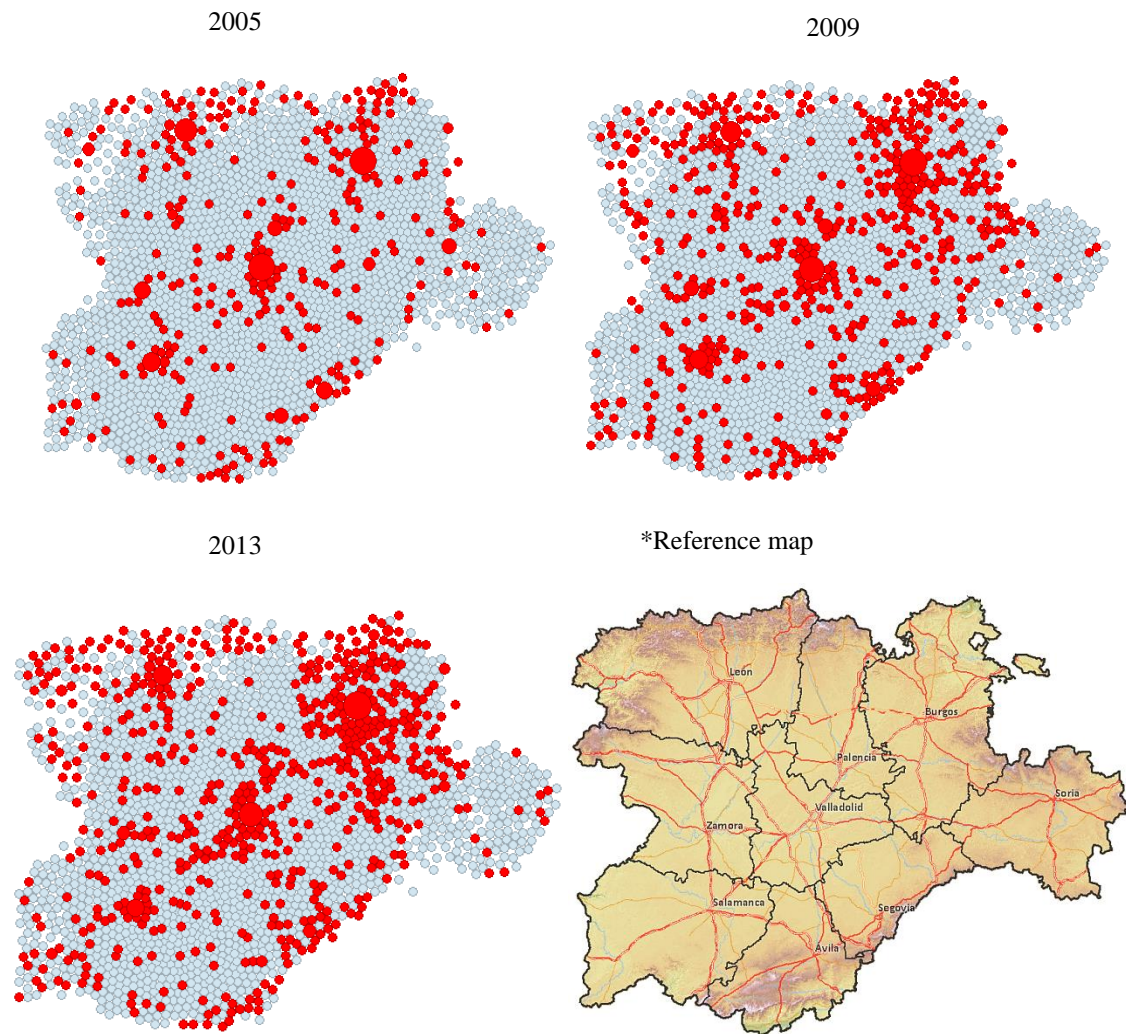
Years	Total licences	Mean	Sd	Min	Max
2005	1036	0.450	4.269	0	119
2006	1663	0.722	6.875	0	203
2007	2072	0.900	8.705	0	254
2008	2499	1.085	10.778	0	318
2009	2838	1.232	12.378	0	379
2010	3159	1.372	14.360	0	459
2011	3573	1.551	16.831	0	591
2012	3871	1.681	18.405	0	653
2013	4074	1.769	19.356	0	695

Source: authors' own based on *S.I.E* data

Figure 1 shows the cartogram of the variable professional licences for artistic and cultural activities for 2005, 2009 and 2013, as well as a reference map of the region. The red-coloured circles represent the towns which have some kind of register of cultural and artistic activities available, while those in light blue refer to towns in which there are no cultural licences registered. A priori, it seems reasonable to assume there has been a process of expansion and dissemination of cultural and creative activities in the region over the period analysed, even though there seems to have been a more intense agglomeration around the capitals of the region's diagonal axis. These would therefore seem to suggest that the spatial distribution in the cultural sector is not random but concentrated, indeed what first draws attention when looking at the map is the marked location of the distribution of these activities in certain nuclei, said distribution being characterized by a manifest spatial polarization. Furthermore, it can also be seen that, due to the large number of municipalities in which there are no cultural licences registered, leads us to the idea that the variable studied displays a distribution far removed from the normal distribution, and is highly asymmetrical.

As an initial approach to analysing the spatial distribution of artistic and cultural creation activities in Castilla y León (Figure 1), it may be deduced that the latter are concentrated primarily in provincial capitals and in the major provincial headers. One area which is clearly prominent is the centre of the regional capital, Valladolid, and its hinterland, together with certain areas of agglomeration around key tourist locations such as Burgos and Salamanca, in the regional diagonal axis; León, in the northwest, as well as other areas where the effects of decentralising activities from nearby metropolitan agglomerations, such as the mountain ranges of Segovia and Avila, in the case of Madrid, and the area of the *Merindades* in the northeast, in the case of Bilbao and the Basque Country as a whole.

**Figure 1.** Cartograms of professional licences for artistic and cultural activities



Source: authors' own based on *S.I.E* data

In order to determine how much concentration or dispersion emerges from this distribution of the cultural and creative activities in the urban interior of the region, we calculated the Gini concentration index for each year considered. The value of the nine indices for artistic and cultural professional licences is shown in Table 3. The indices obtained are high for all of the period considered and display an upward trend. In other words, cultural and creative activity is concentrated in the space and on an ever-increasing scale. There thus seems to be a certain pattern in the location of cultural economy activities in Castilla y León, namely there is a clear trend towards a growing agglomeration in specific areas.

In addition to the Gini index, Lorenz curves have also been constructed for the three main time points which, if possible, express more clearly the previously referred to process of spatial concentration. Indeed, as is shown in Figure 2, there is by no means an even distribution of the cultural and creative activities but rather one which is extremely polarized, since almost a tenth of the municipalities account for some seventy per cent of the existing licences in the region in this sector. This process of concentration proves even more noticeable over time as is reflected by the expansive displacement of the Lorenz curves between 2005 and 2013.

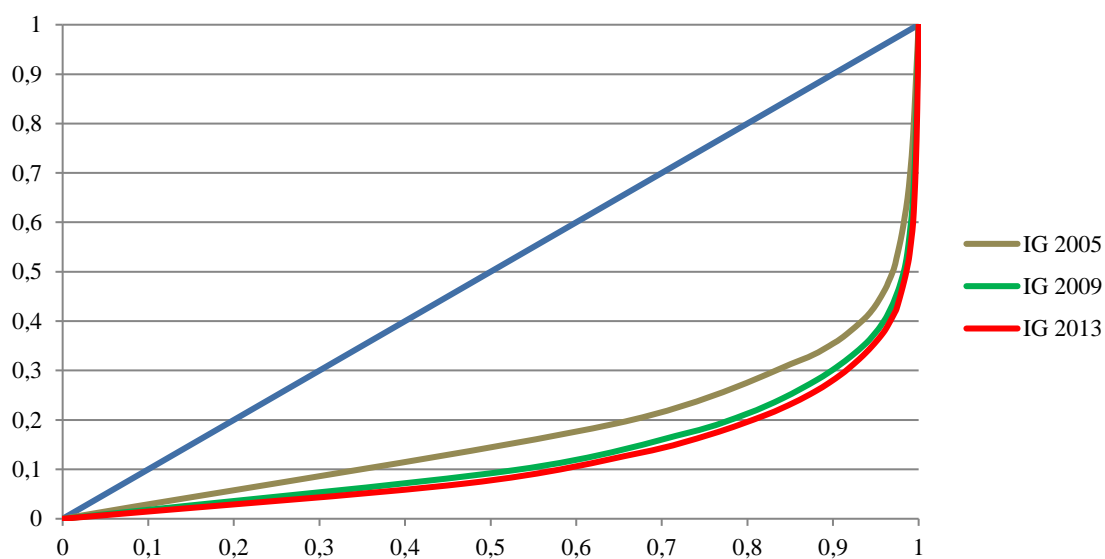
These findings highlight that although the volume of cultural and creative activity in the region has apparently increased and that there seems to be a certain dissemination in spatial terms of the number of licences, the bulk of the activity appears to be ever more concentrated in certain areas in the region.

**Table 3.** Index of concentration of licences for cultural economy activities

YEAR	GINI INDEX
2005	0.46059
2006	0.48297
2007	0.50941
2008	0.52389
2009	0.53226
2010	0.54332
2011	0.55895
2012	0.56109
2013	0.56141

*Source:* authors' own based on data

**Figure 2.** Lorenz curves of licences for artistic and cultural activities



*Source:* authors' own based on data

Nevertheless, although this descriptive resulted shows the existence of certain clusters, the map reflects the situation at the time it was drawn up. As a result, the analysis needs to be carried out using further inferential statistical instruments that would the existence of spatial behaviour to be determined, results which are presented in the following section.

## 4.2 Spatial econometrics applied to analysing the cultural sector

An initial cartographic-descriptive approach to studying location, conducted in the previous section, has evidenced that the distribution of cultural economy activities follows a spatial agglomeration pattern in certain areas, considering the number of licences registered in each municipality. However, when obtaining these results, the area in which the economic artistic activity is carried out has not been considered. An econometric study of the concentration provides answers to some interesting questions: do the maps reflect a concentrated or a disperse location? Are the locations of these activities pure chance or do they reflect statistically significant spatial patterns? Are there significant clusters that spawn high birth rates of cultural activities, attributable to the cross-effect of neighbouring spatial units? In short, are there agglomeration economies?

In order to measure the possible existence of patterns of spatial association in the municipal distribution of cultural economy activities in Castilla y León, Table 4 shows the results to emerge when analysing the evolution of Moran's Global  $I$  statistic between 2005 and 2013. By using permutations, and by recalculating  $I$  in each successive sample, the statistic reflects the likelihood of whether or not the spatial arrangement observed is the result of chance.

**Table 4.** Moran's Global  $I$  Statistic 2005-2013

<b>Year</b>	<b>Moran's <math>I</math></b>	<b><math>Z_I</math></b>	<b>P-value</b>
2005	0.034	3.136	0.017
2006	0.041	3.466	0.017
2007	0.033	3.308	0.019
2008	0.035	3.646	0.016
2009	0.032	3.111	0.015
2010	0.028	2.384	0.022
2011	0.026	2.502	0.017
2012	0.025	3.125	0.021
2013	0.025	2.817	0.014

*Source:* authors' own based on data

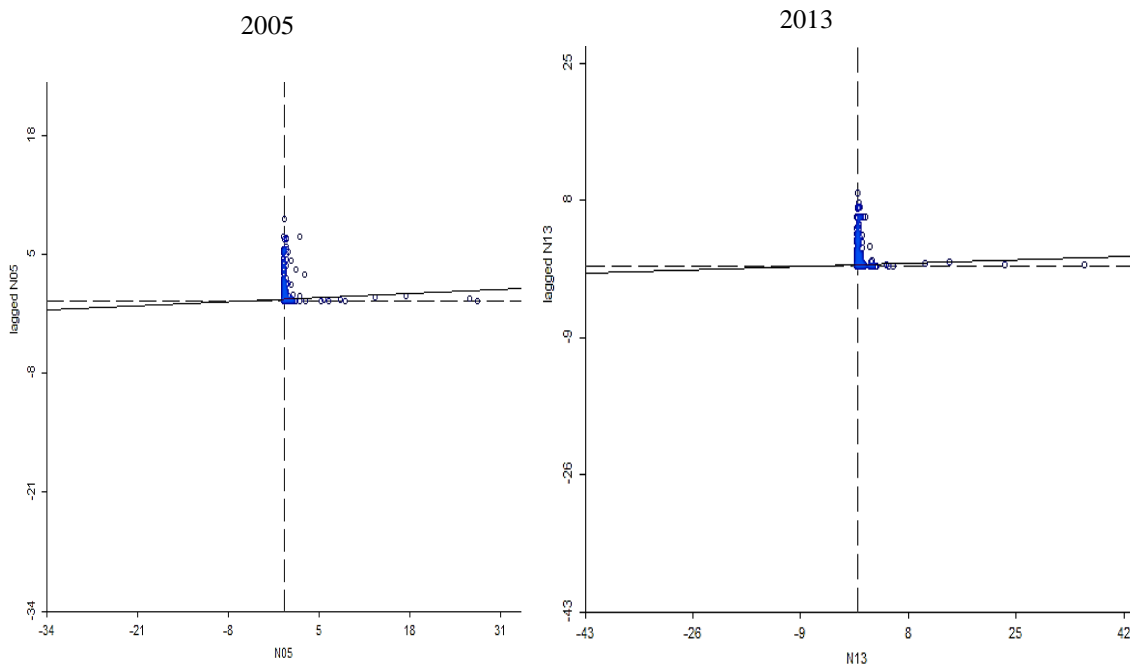
Moran's  $I$  test, obtained through a physical proximity matrix, allows us to reject the null hypothesis of spatial randomness for the whole period studied. That is, the number of professional licences for artistic and cultural activities in the spatial units considered is not independent of the level of the cultural economy activity in the neighbouring municipalities. Moreover, if we focus on the values of the standardized  $I$  coefficient,  $Z$ , the sign is positive for all the years analysed, thus confirming the existence of a positive spatial autocorrelation pattern. In statistical terms, it can be said that the likelihood of a municipality having a high or low value of the variable is not independent of what happens in the adjacent areas. In this sense, and as occurred with the descriptive maps, the results obtained evidence that the spatial distribution of cultural licences reflects major imbalances in Castilla y León, and leads to large areas that are devoid of



any relevant cultural activity, with said activity tending to concentrate in certain areas and neighbouring municipalities.

Adopting a more disaggregated approach, a closer look reveals the nature of the spatial dependency through Moran's dispersion diagram. The x-axis of Figure 3 shows the number of cultural professional licences ( $N$ ) as explaining the corresponding spatial lag, the y-axis. A municipality's spatial lag is the weighted value of  $N$  of its neighbouring municipalities, where the applied weight coefficient comes from the distance matrix. In this way, each of the four quadrants in the graph refers to a certain type of spatial association between each area and its neighbouring regions. The order of the quadrants is from right to left, and from top to bottom: quadrant I contains municipalities with a high number of registered licences surrounded by municipalities with a high number of licences (HH); II refers to municipalities with a low number of licences surrounded by municipalities with a high number of licences (LH); III reflects municipalities with low values surrounded by municipalities with low values (LL); and IV reflects municipalities which enjoy a rich cultural economy activity contained within poorer municipalities (HL). Categories displaying a positive spatial dependency are shown in quadrants I (HH) and III (LL), whereas negative spatial dependency appears in quadrants II (LH) and IV (HL). Where the point cloud is seen to be disperse around the four quadrants, there is no spatial association.

**Figure 3.** Moran dispersion diagrams

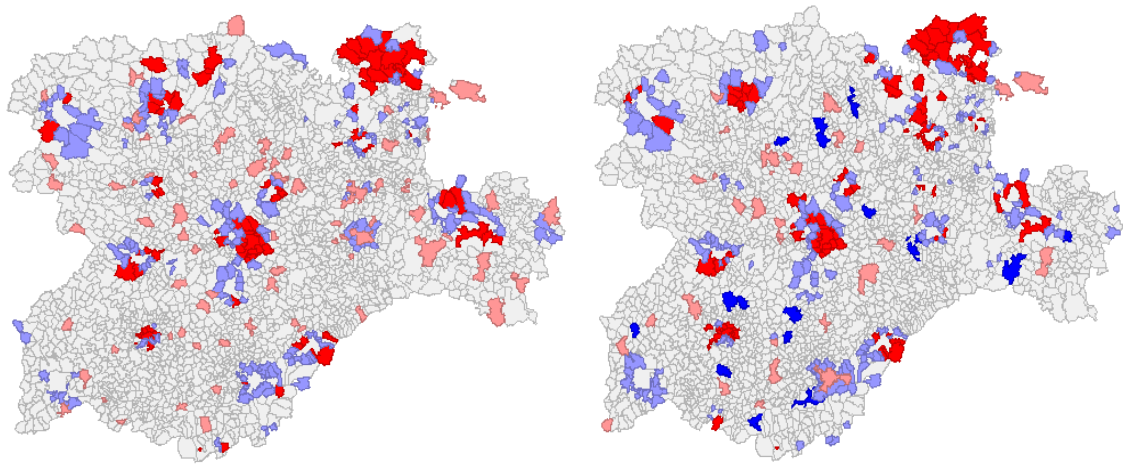


Source: author's own with GeoDa

As can be seen from the dispersion diagrams for the first and final years of the sample (2005 and 2013), the point cloud is mainly concentrated in quadrant I, thus confirming that municipalities with licences for artistic and cultural activities tend to be geographically close to other municipalities which boast an important artistic and cultural activity.

The results thus far obtained point to the presence of significant spatial autocorrelation. However, Moran's global statistic does not distinguish whether geographical concentration refers to high or low values of the variable. Nor does it allow for significant local clusters to be pinpointed on the map. To achieve this, we used Moran's local indicator. Figure 4 shows the maps of significant clusters, after 999 replicas in the simulation, of municipalities in Castilla y León for the first and final year of the sample analysed. The type of spatial relation is represented by different colours: red for the HH association, blue for the LL association, light blue for LH, and finally pink for HL.

**Figure 4.** Maps of local clusters of the number of professional licences for cultural activities



*Source:* authors' own with GeoDa

What first emerges is that cultural economic activity in Castilla y León is concentrated in a series of areas in the region, where there appears to be an effect of agglomeration economies as a result of the spatial interaction of the municipalities. The map shows an extremely strong concentration of values around the provincial capitals, with these municipalities reflecting clusters with high values of cultural professional licences surrounded in turn by other areas which also display high values in the variable. Given its size, one particular cluster worth highlighting is that around the regional capital, Valladolid, as well as others around Leon, Burgos and Salamanca. There are also other important areas of concentration in smaller provincial capitals such as Zamora, Palencia, as well as around the main provincial headers in certain areas such as Ponferrada in Bierzo, Ciudad Rodrigo in Salamanca and Aranda de Duero in Burgos. There are also other more disperse areas of agglomeration and which are linked nearby metropolitan centres such as the north-west of the province of Burgos, bordering Bilbao and other centres of activity in the Basque Country; and the areas around the provincial capitals of Segovia and Avila near the mountain ranges, and which are clearly connected to the agglomeration of Madrid.

One initial conclusion to emerge from these results is that, both from a global as well as a local approach, there is a significant and positive spatial autocorrelation relation, such that the spatial distribution of cultural professional licences evidences major imbalances, there being a tendency towards agglomeration in certain areas whilst others, principally those around the less populated and more remote areas away from the major towns and provincial capitals, are mainly bereft. The clusters formed are small and highly

localised, and coincide with the metropolitan areas in the regions of Castilla y León. The areas in Castilla y León which evidence the most significant cultural clusters, and which display the highest levels of cultural economy activities, are shown in Table 5.

**Table 5.** Areas of significant HH clusters by provinces

<b>Province where the cluster is mainly located</b>	<b>Significant local clusters with high values of professional cultural licences (HH)</b>
<i>Avila</i>	<i>Area of Avila-Gredos</i>
<i>Burgos</i>	<i>Agglomeration of Burgos</i> <i>Agglomeration of Aranda de Duero</i> <i>Area of Merindades (Northeast)</i>
<i>León</i>	<i>Agglomeration of León</i> <i>Agglomeration of El Bierzo (Northwest)</i>
<i>Palencia</i>	<i>Agglomeration of Palencia</i>
<i>Salamanca</i>	<i>Agglomeration of Salamanca</i> <i>Agglomeration of Ciudad Rodrigo</i>
<i>Segovia</i>	<i>Area of Segovia-La Granja</i>
<i>Soria</i>	<i>Area of Sierra-Pinares</i>
<i>Valladolid</i>	<i>Metropolitan area of Valladolid</i>
<i>Zamora</i>	<i>Agglomeration of Zamora</i>

*Source:* authors' own with GeoDa

## 5. Conclusions

To date, the number of studies carried out in the framework of economies of location of the cultural sector remains scarce. The existing literature in this respect has focused mainly on the location of cultural and creative industries and their link to the level of economic development. From a spatial approach, the present work explores the location and/or agglomeration of economic activities related to artistic creation and cultural activity linked to the more concentric urban areas found in the existing classifications in the literature, applying micro-spatial disaggregation. Cultural economy activities are localised in an area and interact with other economic activities, and have their greatest effect on a particularly spatial demarcation. Such a premise entails focusing particular attention on the role played by the surrounding area on the cultural sector. In the introduction, the hypothesis was conjectured that agglomeration economies play a key role in the location decisions of cultural economy activities and spark the formation of cultural clusters. In light of this, the current study seeks to explore the spatial distribution which is characteristic of artistic creation and activities in the cultural sector.

The present research offers a specific application to a region taken as a model, the autonomous community of Castilla y León, Spain, with a micro-territorial level of disaggregation, considering smaller units -municipalities-, which thus involves analysing in detail spatial location patterns and the emergence of territorial disparities. We use data related to the number of licences for artistic and cultural activities for the period 2005-2013. At an initial descriptive stage, despite the substantial increase in the volume of activity and although there is a certain growth in the region in the number of licences, we identify through the high values of the Gini index a clear trend on the part of cultural economy activities towards a concentration in the territory, a result which has been confirmed for all the years in the period studied.

In order to complement conventional concentration methods, and in an effort to go beyond merely describing territorialised data, at a second stage in the analysis we employ methodological instruments from spatial econometrics to gauge the impact of a municipality's artistic and cultural concentration on the decision to locate such activities in neighbouring municipalities, and we pinpoint the existence of spatial cultural clusters. The global spatial autocorrelation indicator allows us to rule out randomness in the spatial distribution of artistic and cultural activities in Castilla y León during the period 2005-2013, and to show that the structure of the cultural sector is also influenced by the spatial factor and by the effect of interrelation between municipalities. We also evidence a strong tendency towards the emergence of clusters, as opposed to the possibility of such activities being located dispersedly. Geographical proximity may thus be said to be a determining factor in the density of goods and cultural services. Further, the structure of the cultural sector is influenced by the spatial factor in terms of groupings and by the interrelation effects between the areas. This emerges as a global effect resulting both from similar features of the closest places as well as the creation of links between nodes, leading to the creation of major economies of agglomeration. This finding indicates that the cultural economic activity of an area depends to a large extent on what happens in neighbouring locations.

When comparing the data, applying Moran's local indicator allows us to break down the global value of the concentration in each municipality's individual contribution. Thus, and by fine-tuning the prior analysis, statistically significant forms of positive spatial autocorrelation with high values (territorial clusters) emerge, these being located mainly near to provincial capitals in the region and to the larger towns in the region. The significant clusters detected are not spread out over the region, but are located close to one another and tend to concentrate in the kinds of area referred to. Nevertheless, albeit to a lesser extent, the map shows a spatial competition pattern of high and low values (negative spatial autocorrelation), which might be linked to the appearance of specific focal points of high cultural creativity surrounded by weaker areas, corresponding to more isolated municipalities in urban areas.

In soon, the results show that the spatial distribution of the cultural sector in Castilla y León evidences major imbalances, tending to concentrate in certain areas and to leave large areas empty around the less populated and more remote areas, away from the main towns in the provinces and the provincial capitals analysed in the study. The findings to emerge from the present research reflect the cultural dynamics vis-à-vis spatial diffusion processes, and evidence a strong concentration in the location patterns for the

activities in question. Additional studies might shed further light on these findings by the considering the determining factors behind location economies in the cultural sector through the use of spatial regression models, without neglecting the important role played by spatial relations in the decision to locate.

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## Annex. Business licence for artistic and cultural activities

1. Artistic activities	
01. Activities related with the cinema, theatre and circus	011. Cinema and theatre directors
	012. Director's assistant
	013. Cinema and theatre actors
	014. Stuntmen and women, doubles, extras and meritorious artists
	015. Cinema television and video camera operators
	016. Comics, caricatos, eccentric artists, speakers, reciters, illusionists, etc.
	017. Prompter and stage manager
	018. Circus artists
	019. Other activities related to the cinema, theatre, circus.
02. Activities related with dance	022. Dancers
	029. Other activities related to dance
03. Activities related with music	031. Music teachers and conductors
	032. Musicians
	033. Singers
	039. Other activities related to music
04. Activities related with sport	041. Football players and trainers
	043. Motor racing drivers, trainers and mechanics
	044. Boxers, boxing trainers and coaches
	045. Basketball players, trainers and coaches
	046. Runner, cycling trainers and coaches
	047. Players, trainers, coaches of handball, volleyball, jai alai, and other sportsmen and sportswomen involved in horse-riding, wrestling, etc.
	048. Sports referees
	049. Other activities related to sport
05. Activities related with bullfighting	051. Bullfighters
	052. Mounted bullfighters
	053. Subordinate bullfighting
	054. Head of comic groups and similar
	055. Other staff related to comic groups and similar
	059. Other activities related to bullfighting
2. Freelance activities	
85. Workers in show-business and events	851. Technical show representatives
	852. Bullfighter managers
	853. Actors and performers' agents
	854. Experts in organising congresses, assemblies and similar
	855. Agents and bookmakers in events
86. Freelance, artistic and literary activities	861. Painters,sculptors, ceramists, craftspeople, engraves and similar artists
	862. Artwork restorers
87. Professions related with lotteries, gambling, games of chance	871. Official sellers of lotteries, sports bets and other gambling activities, ONLAE
	872. Official sellers of lotteries, sports bets and other gambling activities, other bodies
	873. non-official sellers of lotteries, sports bets and other gambling activities,
88. Various freelance professions	881. Astrologers and similar
	882. Tour guide
	883. Tour guide interpreters
	884. Insurance experts and appraisers for jewellery, goods and personal effects
	885. Settlement agents and maritime surveyor
	886. Timekeepers
	887. Make-up artists and beauticians
	888. Graphologist
3. Business Activities	
96. Recreational and cultural services	961. Production and services related to the film industry
	962. Cinema and film distribution
	963. Screening of cinema and video films
	965. Events and shows (exceptcinema and sport)
	966. Libraries, archives, museums, botanical gardenand zoos
	967. Sports facilities and schools and sports trainers
	968. Sports events
	969. Other recreational services, not classified in other parts
98. Amusement parks, fairs and other services related with shows and events. Conference organisers. Fairgrounds.	981. Gardens, amusement parks or attractions and aquatic parks and skating rinks
	982. Tombola, shows and games, such retail trade hospitality services, related to fairs and festivities, organisation and staging of sports best, lotteries and other games.
	983. Artist placement agent
	989. Other activities related to shows and tourism. Organising congresses, amusement parks and fairgrounds

Source: Authors' own, business licence section based on I.A.E.