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Why do creative industries cluster? An analysis of the determinants of clustering of creative industries*

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Abstract: Creative industries tend to concentrate mainly around large- and medium-sized cities, forming creative local production systems. The text analyses the forces behind clustering of creative industries to provide the first empirical explanation of the determinants of creative employment clustering following a multidisciplinary approach based on cultural and creative economics, evolutionary geography and urban economics. A comparative analysis has been performed for Italy and Spain. The results show different patterns of creative employment clustering in both countries. The small role of historical and cultural endowments, the size of the place, the average size of creative industries, the productive diversity and the concentration of human capital and creative class have been found as common factors of clustering in both countries.

Keywords: creative industries, creative local production systems, creative clusters, agglomeration economies
JEL: L22, R12, L82

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1. INTRODUCTION

An important debate on the role of creativity and culture as factors for local economic development is distinctly emerging (Power and Scott, 2004; Ginsburgh and Throsby, 2006). From the seminal contribution of Florida (2002), the flywheel role of creativity has been recognised in many fields from urban planning (Leslie, 2005; Laundry, 2000) to quarters regeneration (Cooke, 2005; Hutton, 2009), industrial policy and entrepreneurship (Trullén and Callejón, 2007; OECD, 2007) and international economic development strategies (UNDP/UNCTAD, 2008).

Creativity is frequently characterized by the agglomeration of firms so that creative industries are not homogeneously distributed across the territory but are concentrated (Cooke and Lazzeretti, 2008; Scott, 2005). In fact, creative industries tend to cluster in cities (Maskell and Lorenzen, 2004) and address a great variety of professions and economic sectors.

Despite the relevance of this issue (Wiesand Söndermann, 2005), the research on the reasons for the clustering of creative industries is scant (Hölzl, 2005; Marlett and Van Woerkens, 2007). The causes of this trend are still unclear, particularly the reasons for the industries' concentration in urban and metropolitan environments. A relevant question emerges: why do creative industries cluster? Five hypotheses are suggested by the theoretical literature as determinants of creative clustering: historical and cultural endowments and proximity to the political power, agglomeration economies, related variety, concentration of human capital, and Florida's creative class.

The specific aim of this contribution is to integrate the determinants of clustering of creative industries in an empirical model and to provide applied evidence of the causes of this process. To do this, the research analyses the geographical distribution of employment in creative industries in Italy and Spain by using localization patterns in the two countries, characterized by very similar socioeconomic and territorial structures but by different patterns of creative clustering (Lazzeretti et al., 2008). Thus, the research contributes to providing the first empirical evidence of the determinants of creative industries' clustering following a multidisciplinary approach, which integrates contributions from cultural and creative economics, evolutionary geography and economics. The analysis also allows identification of those patterns of creative clustering that are common to both countries, as well as those that are idiosyncratic to each country.

The paper is divided into six parts. After this introduction, the second section surveys the literature on the determinants of clustering of creative industries. Section three introduces the methodology to measure creative clustering in local production systems and the results of its application to Italy and Spain. Section four deals with the econometric modelling of the determinants of clustering of creative industries in Spain

and Italy. Section five present the results. The work ends with some conclusive remarks.

2. FORCES BEHIND CLUSTERING OF CREATIVE INDUSTRIES: A SURVEY OF THE DETERMINANTS OF CLUSTERING OF CREATIVE INDUSTRIES

Creative industries[1] tend to cluster in specific places. The reasons for this phenomenon are likely due to a multiplicity of elements linked mainly to culture, creativity, innovation and local development.

Five approaches have been considered: the reasons for creative clustering have been linked to the presence of historical and cultural heritage and the connections of this approach to cultural cluster and district, the effect of agglomeration economies and the organization of the industry, and the concept of "related variety" and its contribution to the clustering of creative activities. A fourth approach deals with the role of human capital in clustering and the fifth relies on the creative class theory.

2.1. The cultural approach: Artistic and cultural heritage and cultural cluster and district

The relationship between culture and creativity represents one of the most interesting frontiers that connect academics, who study the economy of culture, with city and regional economists, industrial and business economists and policy makers (Towse, 2003).

Studies on cultural economics and those on clusters and cultural districts have intensified, creating a rich and interesting mass of literature (Cinti, 2008). Among the many studies of cultural economy and arts management, in parallel with the interest in various cultural sectors (Evrard, Colbert, 2000; Benhamou, 2004), the debate has recently been extended to include the implications of creativity and culture as a fly wheel of local economic development (Zukin, 1995; Scott, 2000).

The territorial contexts are multifarious and the fundamental role of clustering forms (of networks of enterprises and institutions) is emphasised: from cultural districts (Frost-Kumpf, 1998; Santagata, 2002; Lazzeretti,

[1] Creative industries are defined as "industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property' (DCMS, 2001:05). In the DCMS report, creative industries included advertising, architecture, the art and antiques market, crafts, design, designer fashion, film and video, interactive leisure software, music, the performing arts, publishing, software and computer services, and television and radio.

2008) to cultural cluster (Van den Berg et al., 2000; Mommaas, 2004) to creative cities and, lastly, to cultural quarters (Landry and Bianchini, 1995; Hall, 2000; Wynne, 1992).

The strategic role of artistic and cultural resources and clusters as engines of sustainable economic development has been highlighted from many points of view (OECD, 2005). On one hand, they can be used to describe knowledge dynamics in local economic systems (Pilotti and Rinaldin, 2004), evidencing their ability to activate new productive chains (*filières*) and to revitalize European cities and regions through policies of urban regeneration (Mommas, 2004; Evans, 2009). From the other hand, it is possible to present a background in order to select the processes of value production in the relationship between artistic and cultural organizations and the territory. In particular, the presence of cultural and artistic heritage in the territory is a significant issue and one of the bases for the development of cultural districts and clusters (Camagni et al., 2004).

2.2. Agglomeration economies and the organization of the industry

Agglomeration economies can be generically defined as having advantages on costs or quality due to the spatial concentration of productive resources and actors (population, firms, institutions and other collective agents). Agglomeration's concept combines the "factors of agglomeration" - for example, transport advantages (Weber, 1929) - with the "concentration" advantages of production (Ohlin, 1933; Hoover, 1937). Agglomeration economies are divided in internal and external to the firm, whereas external economies are usually divided into localization and urbanization economies.

Localization economies arise from the concentration of many firms with similar characteristics in particular localities (Marshall, 1890) or more generically, from the concentration or growth of a particular industry in a certain location. At the same time, the existence of these advantages could explain the clustering of population and firms. Thus, creative industries could cluster to take advantage of the existence of a skilled labour market and local suppliers specialized in other parts of the creative *filière*, and to benefit from local knowledge spillovers. Hoover and Vernon (1959) remark that since places with a high population density often coincide with the most central parts of the metropolis, which are rich in positive externalities, (small) establishments find it advantageous to locate there. Higher levels of entrepreneurship boost greater employment growth.

Urbanization economies were originally related to the concentration of industry in general (Ohlin, 1933); to an increase in the total economic size of the city in terms of population, income, output or wealth; to a labour urban market that is efficient, flexible and skilled (Hoover, 1937); to social and productive diversity (Jacobs, 1961 and 1969); and to the density of agents (Hoover and Vernon, 1959; Ciccone and Hall, 1996). Thus, urbanization

economies can foster the clustering of creative industries if they benefit from a large size or capacity of the local consumption market, from the mixture among uses, and the variety of activities and people. These characteristics generate a dense and varied network of agents that fosters mutual economic and social support, facilitates knowledge transfer through cross-fertilization mechanisms and promotes innovation.

2.3. Related variety

A new, evolving paradigm among the studies in economic geography is the concept of 'related variety' (Frenken and Boschma, 2003; Frenken et al., 2007; Asheim et al., 2007). The concept is drawn from the studies of evolutionary economic geography. A 'related variety' industry is defined in terms of industrial sectors that are related because of shared or complementary competences in a cognitive-based definition (Boschma and Iammarino, 2007). In other words, a certain degree of cognitive proximity (Nooteboom, 2000) gives place to effective communication and interactive learning among different industries. This contributes to a higher capacity to absorb innovations from neighbouring sectors though cross-fertilisation. Thus, 'related variety' means that a relationship exists between industrial sectors and economic activities in terms of (effective and potential) competencies, innovations and transfers of knowledge.

The concept of 'related variety' has been recently applied to creative industries (Lazzeretti, 2009), particularly the active process of cross-fertilisation and cognitive relationships among different industries.

The growing importance of the 'related-variety' approach is underlined in some empirical works, such as Frenken and Boschma (2003). They analyse the Dutch metropolitan areas, and find that concentrated firms with a high related variety present a larger growth in terms of GDP for the years 1998-2006. Gulcan and Akgungor (2008) analyse three regions with three cluster initiatives in Turkey: a textile and fashion cluster in Istanbul; a towel, bathrobe and home textile cluster in Denizli; and a textile cluster in Gaziantep. They highlight different growth dynamics between related and unrelated industries from 1990 to 2005 using four digits employment data. Cantwell and Iammarino (2003) proved that the most competitive Italian regions have related-variety economies.

2.4. Human capital

Rauch (1993) and Ciccone and Hall (1996) study the existence of externalities related to human capital in cities. In Lucas (1988), the externalities generated by the exchange of ideas not only depend on the concentration of people in an area, but also on the level of human capital. Glaeser (2000) reports that access to human capital fosters firms to cluster.

Florida (2002 and 2005) associates human capital with talent and highlights that the economic geography of talent is highly concentrated. Thus, human capital externalities contribute to explain the concentration of activities in concrete points of space and can explain creative clustering.

2.5. Florida's 3Ts: Technology, talent and tolerance

Florida (2002) remarks that some places are poles of attraction for the creative class. Conversely, the driving force behind the development of a city turns out to be its ability to attract and retain creative individuals. Florida introduces the theory of the 3Ts (tolerance, talent and technology), which shifted the focus from the creative industries to the human factor and its creative habitat. The advantages deriving from diversity are emphasised together with the socio-demographic characteristics of the population (bourgeois-bohemian or "bobo" index) (Florida, 2002). Creativity is a multifarious factor and a resource for innovation, but also a competitive advantage associated with culture and territory. It is also a factor for developing and attracting creative industries.

3. MAPPING CREATIVE CLUSTERS IN ITALY AND SPAIN

The term 'creative industry' is used more and more in the context of political planning in many countries (OECD, 2007; UNCTAD, 2008). The first time the term was used was by the British government (DCMS, 1998), apparently as an extension of the definition of the culture sector. Thus, the term included the multi-media sector and followed the structural changes due to the growth and development of the new technologies. The original definition of creative industries was 'industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property' (DCMS, 2001:05). In the DCMS report, creative industries included advertising, architecture, the art and antiques market, crafts, design, designer fashion, film and video, interactive leisure software, music, the performing arts, publishing, software and computer services, and television and radio.

Lazzeretti et al. (2008) emphasised the use of local production systems (LPS) as units of analysis for creative clustering. A Creative LPS is defined as a local production system with a high concentration of firms or employees in creative industries. Following the most extended approach to the identification of manufacturing local production systems (De Propris, 2005; Boix and Galletto, 2006; Sforzi, 1997), we apply the *location quotient* (LQ) to the 2001 local labour systems (LLS) in Italy and Spain. In these researches, the boundaries of the LPS are assimilated to the boundaries of the LLS. Data are collected from the ISTAT and INE Census in 2001.

We apply the location quotient for the NACE rev. 1.1 definitions of creative economic activities, as proposed by the Department of Culture, Media and Sport (DCMS, 2001) and OECD (2005) as already tested in other contributions (Capone, 2008) (Table 1)[2]. The location quotient (LQ) compares the relative specialisation of a place in an industry regarding the national average and is defined as:

$$LQ_{ij} = \frac{E_{ij}}{E_i} \Big/ \frac{E_j}{E} > 1$$

,where E_{ij} is the number of employees in the creative industry i in a local production system j, E_i is the total number of employees in the creative industry i, E_j is the number of employees in a local labour system j, and E is the total employment in the country. An LQ above 1 indicates that the clustering of a creative industry i in a place j is larger than the national average, so that the LLS is specialised in creative industries.

Table 1: The creative industries

Publishing	**Research and development (Architecture, Graphic design, Fashion)**
22.1 Publishing	73.1 R&D experimentation in the field of natural sciences and engineering
22.2 Publishing and other activities related to publishing	73.2 R&D experimenting in the field of social and humanistic sciences
Music, Film and Video	74.2 Architecture and engineering studios
22.3 Reproductions from original sound registrations	
Software & Computer Services	**Film, Video, performing arts**
72.2 Production of software and information consulting	92.1 Production and distribution of videos and films; film projection;
72.6 Other activities related to computer services	92.2 Radio and television activities, excluding the management of the radio and television transmission networks
Advertising	92.3 Other entertainment activities
74.4 Advertising	

Source: our elaboration on DCMS (2001) and OECD (2005). NACE Rev. 1.1 codes.

[2] A discussion abount the suitability of the LQ for the analysis of creative clustering as well as other alternatives is found in Lazzeretti et al. (2008). In this text, the authors apply the LQ to the creative industry, which is divided into traditional creative industries and non-traditional creative industries. They obtain three LQs and conclude if the LLS is specialized in traditional creativity, in non-traditional creativity or diversified (when both partial LQs and the LQ of the total creative activities are more than one). This procedure identifies 62 creative local production systems (Creative LPS) in Italy and 25 in Spain.

In this application, we focus only on the aggregated LQ of creative industries. LLSs specialising in creative industries as a whole are named creative LPSs. Figure 1 presents creative LPSs (LQ above 1 and more than 250 employees in creative industries) in Italy and Spain in 2001.

In Italy, the LQ ranges from 0.1 up to 2.5 and the median LQ is 0.53. There are 35 creative LPSs from a total of 686 LPS in the country (5.1 of the LLS). The highest values are concentrated in big cities like Rome, Turin, Milan, Florence, Trento, and Padua. The total employment of these systems is over 489,123 units, representing more than 55% of the total employment in creative industries in Italy (879,151 jobs).

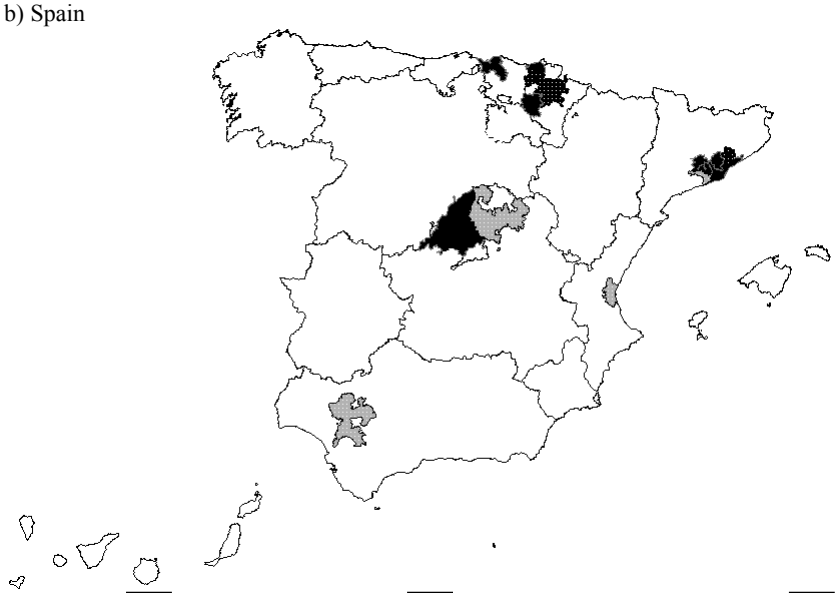
In Spain, the LQ ranges from 0.04 up to 2.1 and the median LQ is 0.33. There are only 18 creative LPSs (2.2% of the LLS) from a total of 806 in the country. Creative LPS have approximately 423,000 employees (63% of creative employment). Madrid's LPS accounts for 30% of the Spanish employment in creative industries and Barcelona another 15%. Both have 45% of the Spanish employment in creative industries and 72% of the employment of creative LPSs.

Creative industries are more important and less concentrated in Italy (mainly in the centre and north of the country), whereas in Spain they account for a smaller share of the total employment and are very concentrated in a few LPSs (Madrid, Barcelona, Basque Country-Navarre-Rioja, and Galicia as well as Valencia and Seville).

Figure 1. Creative local production systems in Italy and Spain, 2001. Location quotient above 1. Minimum 250 employees in creative industries.

a) Italy

b) Spain



LQ classes. Low creativity: 0 – 1; Low-medium creativity: 1 - 1.1; medium-high creativity: 1.1 - 1.25; High creativity: 1.25 - 2.5.

Source: Elaborated from ISTAT (2001) and INE Census (2001).

4. DETERMINANTS OF CLUSTERING OF CREATIVE INDUSTRIES: AN EMPIRICAL MODEL

The understanding of the process of creative industries' clustering has been mainly focused on a descriptive and conceptual point of view, rather than being modelled or mathematically formalised. The few empirical studies in this area and the multiplicity of possible explanations for the clustering of creative industries makes more attractive, at least in this part of the research, the estimation of an empirical model. This type of model departs from the factors of creative industries' clustering as identified in section 2. Moreover, it includes some considerations about the form of spatial processes.

Following the previous section, the LQ of employment in creative industries by LPS is proposed as a proxy for the creative clustering variable. The concentration of creative industries and creative employment in medium- and large-sized cities suggests that the relationship between the clustering of creative employment and its determinants could be highly non-linear. In fact, the concentration of advanced specialised functions in urban settlements follows non-linear patterns in the literature (Christaller, 1933). Furthermore, the distribution of centres and their growth usually follows potential forms as the Pareto distribution (Auerbach, 1913; Zipf, 1949) or lognormal distributions (Gibrat, 1931). In fact, the initial relationship between the LQ of creative employment and the most usual proxies for the proposed factors of clustering clearly follows an exponential form more than linear, gamma or polynomial distributions. Thus, an exponential model is proposed as the basic functional form:

$$y = \alpha X_1^{\beta_1} X_2^{\beta_2} X_3^{\beta_3} X_4^{\beta_4} X_5^{\beta_5} \qquad (1)$$

,where y is the LQ of employment in creative industries, X1 to X5 are sets of variables representing historical and cultural endowments, localization and urbanization economies, related variety, human capital and Florida's (2002) 3Ts (technology, talent and tolerance), and α, β1 to β5 are the sets of parameters to be estimated.

This functional form can be linearized using logarithms by producing a log-linear equation where the estimated parameters can be interpreted as elasticities:

$$\ln(y) = \ln(\alpha) + \beta_1 \ln(X_1) + \beta_2 \ln(X_2) + \beta_3 \ln(X_3) + \beta_4 \ln(X_4) + \beta_5 \ln(X_5) \qquad (2)$$

Additionally, we can generalize this equation to more flexible forms as the translog function (Berndt and Christensen, 1973), which relaxes the restrictions on the elasticities of substitution of factors and allows for second order and crossed effects:

$$\ln(y) = \ln(\alpha) + \sum_{i=1}^{N} \beta_i \ln(X_i) + \frac{1}{2} \sum_{i=1}^{N} \sum_{j=1}^{N} \varphi_{ij} \ln(X_i) \ln(X_j) \quad (3)$$

Following the theoretical framework, the explanatory variables are divided into five sets:

1. The proxy for *historical and cultural heritage* has been elaborated using data about the number of local goods designated as protected by the Ministry of Culture of Italy or Spain and divided by the total population in the LPS:

$$History\ and\ cultural\ heritage_j = \frac{A_j}{M_j} \quad (4)$$

, where *A* is the local goods, *M* is the size of the market (in this case the population), and *j* is the LPS. A dummy has been introduced to identify capitals of province as a proxy for proximity to political power and funds.

2. Localization economies in the LPS have been addressed by several indicators and basically follow Marshall (1890) concepts: structure and organization of the industry, qualification of the local labour market, specialised suppliers and knowledge and information spillovers[3]. Thus, the average firm size in the LPS takes into account preference for the organisation of the industry in small or large firms:

$$Firm\ size_j = \frac{L_j}{F_j} \quad (5)$$

, where *L* is the employment (jobs) and *F* is the number of firms.

A second indicator controls the effect of firm size in creative industries in the LPS:

$$Firm\ size_{ij} = \frac{L_{ij}}{F_{ij}} \quad (6)$$

, where *j* is the LPS and *i* is the creative industry.

[3] The range of information and indicators available for localisation economies is, however, limited. Notice that the indicator usually used as a proxy for localisation economies (the LQ) is in this case the dependent variable.

The qualification of the local labour market has been addressed using the number of qualified jobs in creative industries (ISCO categories 1 to 8):

$$Q_{ij} = \frac{QL_{ij}}{L_{ij}} \quad (7)$$

, where *QL* is the qualified employment.

The inverse of a Herfindahl index inside the productive chain is proposed as a proxy for specialized suppliers:

$$Filiere_{ij} = 1 \Big/ \left(\sum_i L_{ij} \Big/ L_{ij} \right)^2 \quad (8)$$

, and indicates the relative degree of homogeneity in the distribution of employment among sectors in creative industries using LPS. More equilibrated compositions mean more local suppliers[4]. Finally, no variable has been found to describe the local effects of knowledge and information spillovers.

3. *Urbanization economies* control the size of the urban market and the productivity, social diversity and density of employment. Due to pragmatic raisons (proximity to the concept of diversity), related variety has been estimated jointly with urbanization economies.

Ohlin-Hoover's potential size of the local market has been approached using the *total population* in the LPS. Chinitz (1961) and Jacobs (1969) have computed productive diversity by using the inverse of a Hirschman-Herfindahl index of employment diversity at two digits in the LPS. Higher values indicate higher specialisation (less diversity) of the economic structure:

$$DIV_j = 1 \Big/ \sum_j \left(L_{ij} / L_j \right)^2 \quad (10)$$

Finally, the potential density of urban land is:

$$D_{ij} = L_{ij} / U_j \quad (11)$$

[4] A second index has been calculated departing from Dumais et al. (2002) that uses a mixed local and input-output approach to detect if the presence of suppliers is above the local requirements, indicating the existence of a powerful chain of suppliers. However, this index has been removed from estimates as it proved to be very collinear with other localisation variables.

, which approaches the Ciccone-Hall density economies where *U* is the urbanized land.

Related variety has been computed using the three-digit level entropy index proposed by Boschma and Iammarino (2008) and Saviotti and Frenken (2008). The value of the entropy indicator increases the more diversified the creative profile of a LPS is:

$$\text{Re}\,lated\ \text{var}\,iety_j = \sum_{g=1}^{G} P_{g,j} H_{g,j} \quad (12)$$

, where $P_{g,j} = \sum_{i \in S_g} p_{i,j}$ is the aggregation of three digit and two digit sectors of each industry's share of the total employment

$p_{i,LPS} = L_{i,j} / \sum_{i=1} L_{i,j}$, and $H_{g,j} = \sum_{i \in S_g} \frac{p_{i,j}}{P_{g,j}} \log_2 \left(\frac{1}{p_{i,j} / P_{g,j}} \right)$.

4. *Human capital hypothesis* has been approached by more formally educated people (university graduates and postgraduates equivalent to ISCED 5 and 6) in the LPS:

$$Human\,capital_j = L_{ISCED(5,6)\ j} \Big/ \sum_{isced=1} L_{ISCED\ j} \ . \ (13)$$

5. *Florida's creativity* attempts to approach the 3Ts: technology, talent and tolerance. *Technology* includes the LQ of high and medium-high levels of technology manufacturing industries, as defined by OECD (2003), and the density of local patents:

$$TP_j = PAT_j / L_j \quad (14)$$

,where *PAT* stands for patents. *Talent* includes the same share variable of local tertiary graduates as a proxy for Lucas' human capital, and the rate of creative jobs in the knowledge professions (creative class):

$$CC_j = C_j / L_j \ (15)$$

,where *C* is creative occupations or the creative class (ISCO-88 scientists, engineers, artists, cultural creatives, managers, professionals and technicians), used to capture the effects of creativity[5].

Tolerance can be approached by the share of foreign workers who are part of local employment:

$$TO_j = FB_j / L_j \quad (16)$$

, where *FB* is foreign born workers.

Other control variables have been included. The linkages between creative industries and the knowledge economy have been tested by including the share of high and medium-high levels of technology manufacturing industries, the share of knowledge intensive services (except those classified as creative in our framework) as defined by OECD (2003), and the share of private per capita expenditures in R&D. Finally, a dummy has been included to control the relationship between creativity and Marshallian industrial districts, which is a widespread reality in Italy and Spain.

5. ECONOMETRIC ESTIMATION AND RESULTS

The empirical model (equations 2 and 3) has been estimated for each country separately, as suggested by the independent calculation of the LQ. An additional control on the possibility of pooling both samples has been performed, although pooling has been rejected. A two-step strategy was followed for estimations: first, we began by estimating separated regressions for culture and political power, localisation economies, urbanisation and related variety, and creativity (including human capital) in order to test separately the contribution of the different factors to creative employment clustering. Secondly, a full model, including all the economic and statistically significant variables in partial regressions, was estimated and reduced to a parsimonious specification.

5.1. Partial regressions

The results suggest that cultural endowments do not seem to be a clear determinant for the clustering of creative employment. In both countries, the coefficients are small, although in the case of Italy the coefficient is positive (0.08), whereas for Spain it is negative (-0.05) (Table 2). Regarding history and culture, we are not able to say that they do not influence the

[5] These data are not available for Italy at the level of local systems. We therefore calculate a median using provincial data.

concentration of creative industries and creative employment. Rather, historical and cultural assets are not enough to generate processes of concentration of creative industries. On the other hand, the capitals of province, used as a proxy for proximity to political power or access to funds, are highly correlated with creative employment clustering. The estimated coefficients are 0.63 for Italy and 0.92 for Spain.

Firm structure and localisation economies also show two common results for both countries. A larger firm size in creative industries positively affects creative clustering, as the coefficient is 0.72 for Italy and 0.20 for Spain (Table 2). The larger impact for Italy could be due to the smaller size of creative industries by LPS (the median is 1.5 in Italy, compared to 5.5 in Spain), which contrasts with a similar median size for the complete industry in both countries (around 3 employees by firm by LPS). Second, a more balanced distribution of the creative *filière* is also positively correlated with creative clustering (0.51 in Italy and 0.30 in Spain). In Spain, the average firm size in the LPS shows an inverse correlation with creative clustering. In other words, creative clustering is more related to small firm environments[6]. Finally, in the estimates for Spain, there is also enough information to include a variable of the percentage of qualified jobs in creative industries in the LPS, which is positively correlated with creative clustering (0.31)[7].

Regarding urbanisation economies, correlations are also reported between the size of the urban market (population) and the productive diversity. Population coefficients are small in both cases: 0.07 for Italy and 0.08 for Spain. On the contrary, diversity shows a positive and high correlation with creative clustering (0.32 for Italy and 0.62 for Spain). This indicates that diversity is much more important for urban clustering than the urban size, which does not seem to be a determinant for this type of clustering. This result suggests options for fostering creative clustering in small- and medium-sized cities that show a highly diverse productive structure. The rest of the variables associated with urbanisation economies are not significant for Italy, although in Spain the correlation of creative clustering with social capital (0.62) and related variety (0.46) is significant.

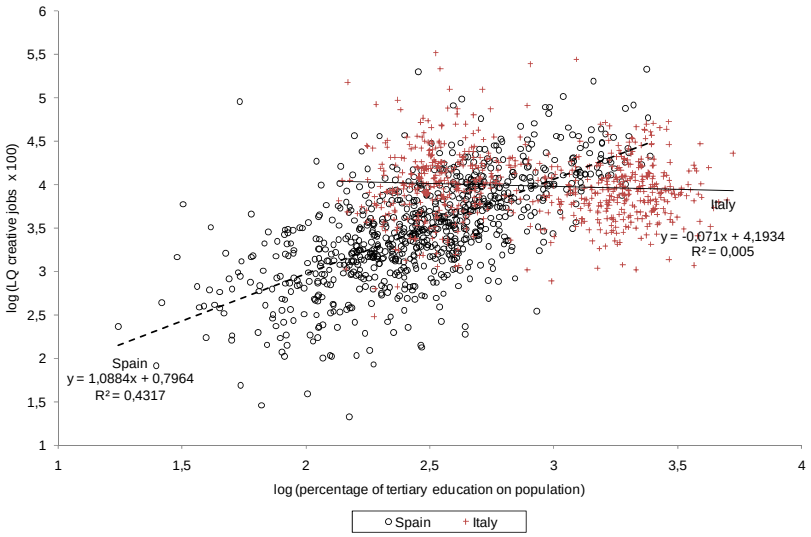
Florida's 3Ts approach shows similar results in both countries. The components of 'technology' and 'tolerance' are positively correlated with creative clustering, although their coefficients are not very high. In OLS regressions, the LQ of high-tech manufacturing is around 0.05 in Italy and 0.09 in Spain, the number of patents per employee is 0.01 in Italy and 0.04 in Spain, and the foreign born index is 0.04 in Italy and 0.12 in Spain. More

[6] In the estimations for Italy, the average firm size in the LPS and the average firm size in creative industries in the LPS are highly collinear, so that both have been estimated in separate regressions. Although the coefficient for the average firm size in the LPS in Italy is negative, as it is in Spain (although close to zero), the sign seems to be due to the collinearity of this variable with the variable '*filière*'.

[7] This variable cannot be estimated for Italy since the information is not available.

significant is the correlation between creative clustering and 'talent': the percentage of employees (jobs) with tertiary education is 0.14 in Italy and between 0.48 (OLS estimation) and 1.19 (IV estimations) in Spain. The creative class is 0.32 in Italy and 0.44 in Spain[8].

Figure 2. Correlation between creative clustering (LQ of creative employment) and human capital (percentage of tertiary graduates)



Source: Elaborated from ISTAT (2001) and INE Census (2001).

[8] The components of talent (human capital and creative class) are potentially endogenous. The results of a path analysis in partial regressions strongly suggest this possibility for Spain, although not for Italy. A Wu-Hausman test has been performed testing the possible effects on the consistency of the estimations in both countries. The test confirms the results of the path analysis and suggests that creative class can be treated as exogenous in both countries, whereas the percentage of tertiary graduates could be treated as endogenous in Spain in the partial regression (although not in the full regression). Two additional GMM regressions have been estimated for Spain. The first includes the percentage of secondary and tertiary graduates in 1991 as an instrument and the second considers agglomeration economies and the percentage of knowledge-intensive services other than the creatives as instruments. However, as the effects of potential endogeneity do not hold in the full regression and the coefficient for the percentage of tertiary graduates is unusually high in IV estimations, our opinion is that the results of the Wu-Hausman test and the subsequent IV estimations are affected by the misspecification of the partial model. Thus, the coefficient from the OLS estimations is more correct.

Regarding the fit (R2), partial regressions show an acceptable prediction for both countries, although the performance is much better for Spain. The R2 is low for historical patrimony and proximity to political power and funds (0.12 in Italy and 0.06 in Spain). For the structure of firms (average size) and localisation economies, it rises to 0.39 in Italy and 0.52 in Spain. Urbanisation economies show a lower explanatory capability than the localisation ones for Italy (0.25), whereas for Spain they show the best fit in partial models (0.64). Finally, for Florida 3Ts, the R2 is very low in Italy (0.07), whereas it has a good explanatory capability in Spain (0.55).

In summary, partial regressions suggest that for both countries, proximity to political power and funds, a larger average firm size in creative industries, a more balanced creative *filière*, and the diversity of the productive structure, education and the creative class are highly correlated with the clustering of creative employment. The size of the place and the concentration of high-tech industries also show a positive, although more reduced impact. In general, the main difference between both countries is the limited correlation between urbanisation economies and 3Ts with urban clustering in Italy, whereas these correlations are much higher for Spain. This could explain why in Italy, creative local production systems are much more abundant and distributed not only in large but also in medium-sized LPS. Conversely, their number is smaller in Spain and they tend to concentrate in the largest metropolitan areas of the country where diversity, variety, social capital, creative classes and tertiary-educated people are also concentrated.

5.2. Full model

The regressions combining the four sets of variables show the similarities and differences between both countries. In the estimates of the parsimonious model for Italy, only the average firm size in creative industries (0.63), the dummy for political power/budget (0.37), the productive diversity (0.22) and the tertirary graduates (0.24) are economically and statistically significant as the three main factors correlated with creative clustering (Table 3).

The similarities with Spain are the positive and significant coefficients for the productive diversity and the human capital (tertiary graduates), even if in both cases the coefficient is double for Spain than for Italy. The positive correlation between creative industry clustering and the average firm size of creative industries is also significant, although for Spain this latter coefficient is very small in the full estimates.

Additionally, the full model suggests again for Spain the negative coefficient for the average firm size in the LPS (-0.21). This coefficent indicates the correlation of creative clustering with environments of SMEs, more qualified jobs inside creative industries (0.18), other urbanization variables such as social capital (0.64), the density of jobs by m2 (0.07), and the percentage of university graduates (0.46). It is noted that in the full

model, the significance of the creative class was absorbed by other highly correlated variables (firm size, diversity, etc.).

5.3. Additional controls

As some LPS are very small and could affect the results, a third set of regressions has been performed by selecting the sample and including only those LPS with more than 10,000 inhabitants. However, the results have not changed in a significant way. Additional controls have been performed to take into account other effects, including the share of high and medium-high levels of technology manufacturing, the share of knowledge-intensive services, and a dummy to take into account whether the LPS is an industrial district. Although the concentration of knowledge-based activities other than the creative ones is positively correlated with employment clustering in creative industries, their economic and statistical significance disappears when the variables are introduced in the parsimonious regression. This indicates that the other variables are directly correlated with clustering. The dummy for industrial districts is not significant.

In the search for a more general specification, as suggested by the translog flexible form, quadratic and interactive terms have been tested. However, all cases were non-significant.

Spatial autocorrelation has been tested in the form of spatial lag and error effects based on a standardized contiguity matrix row. A process of spatial dependence arises from the tests and has been incorporated into the estimations (Table 3). In Spain, the coefficient for the spatial lag (0.15) is significant and suggests the existence of spatial spillovers, where the probability of employees clustering in creative industries is correlated with clustering in the neighbourhood LPS. On the other hand, the spatial lag is not significant in Italy, alhough it dominates a process of spatial error with a large coefficient (0.39). Although this spatial error could be interpreted as indicating the existence of spatial stochastic shocks between the LPS, our opinion is that the coefficient could be collecting the existence of omitted variables in the specification of the model.

Since it could be argued that differences between both countries could be due to a different composition of the creative industry in terms of greater relevance of some activities, this fact has also been tested by dividing creative industries into traditional and non-traditional groups. The results suggest that traditional and non-traditional creative industries tend to co-agglomerate and that their clustering determinants are not very different.

Regarding the sense of causality, as variables are measured for the same year, it is difficult to determine if the explanatory variables cause the clustering of employees in creative industries or if both are simultaneously determined. Reverse causality has been tested by including the dependent variable (LQ of employees in creative industries) as a regressor for the explanatory variables.

In some cases it has been significant. However, even if the results are interpreted as significant correlations but not causalities, they indicate the characteristics of the environments where creative industries tend to cluster. Thus, they can be used to evaluate the feasibility of policy strategies based on fostering creative industries in places with concrete characteristics.

Table 2. Partial regressions

a) Cultural approach

	Italy		Spain	
Constant	0.4576	***	0.7983	***
	(0.000)		(0.000)	
Cultural patrimony	0.0859	***	- 0.0555	***
	(0.000)		(0.004)	
Political power dummy	0.6390	***	0.9248	***
	(0.000)		(0.000)	
R2-adj	0.1299		0.0655	
Mean VIF	1.09		1.01	
Condition number	6.07		11.64	
Obs	686		806	

b) Organization of the industry and localization economies

	Italy		Italy		Spain	
Constant	-0.9640	***	-1.0693	***	-1.8037	***
	(0.000)		(0.000)		(0.000)	
Firm size in the LPS	-.01367	**			-0.5262	***
	(0.017)				(0.000)	
Firm size in creative industries			0.7203	***	0.2006	***
			(0.000)		(0.000)	
Filière	0.5158	***	0.1185	***	0.3014	***
	(0.000)		(0.005)		(0.000)	
Share of qualified jobs in creative industries					0.3113	***
					(0.000)	
R2-adj	0.2261		0.3914		0.5293	
Mean VIF	1.34		1.70		1.19	
Condition number	8.77		7.01		28.71	
Obs	686		686		806	

c) Urbanization economies and related variety

	Italy		Spain	
Constant	-2.2035	***	-2.6011	***
	(0.000)		(0.000)	
Size of the market	0.0743	***	0.0831	***
	(0.002)		(0.000)	
Productive diversity	0.3242	***	0.6248	***
	(0.000)		(0.000)	
Social capital	0.04420		0.7315	***
	(0. 269)		(0.000)	
Density of employment	0.0113		0.0706	***
	(0.571)		(0.000)	
Related variety	0.0221		0.4661	***
	(0.372)		(0.000)	
R2-adj	0.2532		0.6463	
Mean VIF	2.06		1.91	
Condition number	43.50		33.90	
Obs	686		806	

d) Human capital and creative class (Florida's 3Ts)

	Italy		Spain (OLS)		Spain (IV-I)		Spain (IV-II)	
Constant	0.3840		1.0604	***	1.9651	***	1.8383	***
	(0.283)		(0.000)		(0.000)		(0.000)	
LQ High-tech manuf.	0.0595	***	0.0978	***	0.0723	***	0.0698	***
	(0.000)		(0.000)		(0.000)		(0.000)	
Patents per employee	0.0153		0.0489	***	0.0354	***	0.0423	***
	(0.174)		(0.000)		(0.000)		(0.000)	
Creative class	0.3205	*	0.4464	***				
	(0.096)		(0.000)					
University graduates	0.1447	**	0.4859	***	1.1911	***	1.1367	***
	(0. 040)		(0.000)		(0.000)		(0.000)	
Foreign born	0.0483	*	0.1294	***	0.1511	***	0.1514	***
	(0.088)		(0.000)		(0.000)		(0.000)	
R2-adj	0.0709		0.5592		0.5263		0.5677	
Mean VIF	2.33		2.31					
Condition number	68.55		37.76					
Prob. Wu-Hausman	0.170		0.000	***	0.000	***	0.000	***
Obs	686		806		806		806	

Notes: (a) Dependent variable = Ln(LQ employees in creative industries); (b) All variables are natural logarithms; IV are instrumental variables estimations where IV-I includes as instrument the percentage of secondary and tertiay graduates in 1991, and IV-II includes the second considers as instruments agglomeration economies and the percentage of knowledge-intensive services other than the creatives; (d) P-values are in parentheses and asterisks represent statistical significance at 1% (***), 5% (**) and 10% (*);(d) Robust Huber-White estimators.

Table 3. Full model. Parsimonious estimation.

	Italy		Italy		Spain		Spain	
	OLS Robust		Spatial error model		OLS Robust		Spatial lag model	
Constant	-1.1494	***	-1.0645	***	-0.7272	***	-0.6307	**
	(0.000)		(0.000)		(0.001)		(0.013)	
Political power	0.2887	***	0.2682	***				
	(0.000)		(0.000)					
Firm size in the LPS					-0.2126	***	-0.1968	***
					(0.000)		(0.000)	
Firm size in creative ind.	0.8072	***	0.9096	***	0.0609	***	0.0621	***
	(0.000)		(0.000)		(0.000)		(0.000)	
Share of qualified jobs in creative ind.					0.1857	***	0.1796	***
					(0.000)		(0.000)	
Productive diversity	0.2328	***	0.2203	***	0.4232	***	0.3797	***
	(0.000)		(0.000)		(0.000)		(0.000)	
Social capital					0.6471	***	0.4979	***
					(0.000)		(0.000)	
Density of employment					0.0748	***	0.0721	***
					(0.000)		(0.000)	
University graduates	0.2489	***	0.3106	***	0.4615	***	0.4642	***
	(0.000)		(0.000)		(0.000)		(0.000)	
Spatial lag (ρ) or error (λ)			0.3969	***			0.1524	***
			(0.000)				(0.000)	
R2-adj	0.4912		0.5665		0.7324		0.7448	
Mean VIF	1.37				1.55			
Condition num.	23.17				55.26			
Prob.Wu-Haus.	0.3814				0.125			
Robust LM-lag	25.16	***			16.54	***		
Robust LM-error	87.36	***			7.55			
Obs	686		686		806		806	

Notes: (a) Dependent variable = Ln(LQ employees in creative industries); (b) All variables are natural logarithms; (c) P-values are in parentheses and asterisks represent statistical significance at 1% (***), 5% (**) and 10% (*);(d) Robust Huber-White estimators in non-spatial regressions; (e) Spatial error model GM iterated; (f) Spatial lag model IV-Robust.

6. CONCLUSIONS AND DISCUSSION

The aim of this research was to analyse the determinants of creative industries' clustering and to provide an explanation of the causes of this process. A first contribution has been to propose a preliminary empirical model to analyze the determinants of creative industries' clustering following a multidisciplinary approach based on cultural and creative economics, evolutionary economic geography and urban economics. A second contribution relies on the comparative analysis of the clustering patterns of creative employment in Italy and Spain through the application of an econometric model, which allows generalisation of the results.

The patterns of distribution of creative industries and creative clusters are different in both countries: they are distributed in Italy and concentrated in Spain. Some determinants for clustering are common to both countries, whereas others seem to dominate in one of the countries.

Historical and cultural heritage seems to be insufficient to generate concentration processes of creative industries in the two analysed cases, but the impact of artistic and cultural heritage is more relevant in Italy than in Spain.

The three agglomeration forces analysed - structure of the industry/scale, localization economies and urbanisation economies - explain the clustering patterns in both countries. However, the response to urbanisation economies surpasses the other two in Spain, which could explain the over-concentration of creative industries in Spain.

Regarding urbanisation economies, in both cases the size of the local system does not seem to be crucial. Conversely, the role of the city as capital of the region and the diversity of the location's productive structure are much more strongly correlated with the concentration of creative industries.

Results also confirm, in part, Florida's 3Ts approach. The results are quite similar in both countries (although the fit is much better for Spain). Moreover, in this context, creative industries seem to be a suitable proxy for analysing creativity. The last element is the role of qualified human capital, also included in Florida's paradigm of creative class, which is positively correlated with creative clustering in both countries although its impact is double in Spain. Talent, in the form of tertiary graduates, creative class or qualified workers, is related to the creative clustering.

In summary, the analysis highlights different characteristics of the creative industries in the two countries. In Italy, creativity is more related to cultural and artistic heritage and localisation economies and it is dispersed all over the territory. In Spain, creative activities are not only correlated with localisation economies, but also they are particularly related to urbanisation economies and talent and are concentrated in the main metropolitan areas.

To expand the research, we suggest including additional countries and analysing their patterns and causes of creative clustering. In any case, if these

results are confirmed, it means that the forces behind clustering and their intensity are not unique, and that there are several ways in which creative industries cluster. The most relevant implication of this research for policy is that policy makers face a multiplicity of clustering forms of creative industries that depend on the local resources and forces present in the territory, as well as on the characteristics of each country. Policies must be carefully planned and take these specificities into account.

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