Role of Spatial Dispersion of Creative Capital for Understanding Regional Differences in Spain

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Abstract

It has been argued that 'creative class' as a source of growth has gained increasing attention in recent years. However, creative people are not spread equally; instead tend to concentrate within particular locations across nations or places. According to Florida, a main factor in explaining creativity driven growth is the location choice of creative people (Florida, 2002; Fritsch and Stuetzer, 2009). This research investigates the spatial distribution of creative capital and its effects on regional disparities by considering geographic differences of employment. We analyze the spatial distribution of creative capital associated with the dispersion of employment, human capital and regional inequalities. This dispersion is tried to be used as a possible factor behind the differences in Spain. Our findings indicate that provinces with low income per capita clusters vanish from 1996 to 2004, while creative capital and human capital concentrations are mostly the same.

Keywords: Creative Capital, Spain, Regional Development

JEL codes: R 11, R 12, O 10, E 24

1. INTRODUCTION

A debate has recently emerged about the role of creative people on economic growth (Lang and Danielsen, 2005; Boschma and Fritsch, 2007). According to Florida (2004), creative people are a key driver of urban and regional development (Florida, 2004; Boschma and Fritsch, 2007). He mentioned that cities and regions whose populations show high levels of creativity grow faster and his creative capital theory is significantly different from the human capital theory, the key to understanding regional economic growth is not a high level of education, but creativity (Florida, 2002; 2002a). In more recent publications, Florida has argued that the creative class theory outperforms the human capital theory in predicting urban economic development (Florida, 2005).

On the other hand, Glaeser found that human capital variables when pitted against the creative class theory in a test of economic growth outperformed the creative class model (Glaeser, 2005; Hoyman and Faricy, 2008). According to Glaeser and his co-authors who have found an evidence for the relation between human capital and economic growth, cities and regions with more educated residents grow faster than cities with smaller stocks of highly educated labor (Glaeser and Saiz, 2003; Marlet and Woerkens, 2007).

To shed light on these discussions, this research presents empirical findings from Southern European case study, namely the country of Spain. It investigates the spatial distribution of creative capital and its effects on regional disparities by considering geographic differences of human capital and employment. Based on the major objective of the study, two-step analysis is implemented. First we analyze the dispersion of creative capital associated with the dispersion of employment, human capital and regional inequalities. Second, this dispersion is tried to be used as a possible factor behind the differences in Spain.

Within the scope, the following section provides summary of the literature on focusing the creative class theory along with its relation to regional development and previous critics of the creative class. In section 3, the geography of employment and creative capital in Spain is described. In section 4, data and research methodology are outlined while the dispersion of creative class and its impact on regional differences in Spain are investigated. The last section concludes.

2. THE REVIEW OF THE CREATIVE CLASS THEORY

Volumes of studies demonstrated that the quality of a region's workforce is a key determinant of that region's economic success (Glaeser, 2000; Florida, 2002; Simon and Nardinelli, 2002). Nowadays, the role of high skilled workers as represents an emerging paradigm, being at the center of a scientific debate in economic development and has been the subject of growing interest among not only economists, economic geographers, regional scientists (Mallender and Florida, 2007), but also sociologists, and urban planners (Power and Scott, 2004; Hartley, 2005; Cooke and Lazzeretti, 2008, Lazzeretti et. al., 2008). Regional development studies now commonly stress the need for regions, both urban and rural, to be open and attractive to human capital (Bollman, 1999; Petrov, 2008). Florida (2002a) asserts high skilled workers' idea and creativity are the most important element in the economic success of regions. In this new approach, today knowledge based economic growth and local development is found associated with "clustering of creative people and human capital" as pointed out also by Lucas (1998). Also other authors highlighted how local development is highly related with highly skilled human capital (Glaeser, et al., 1992; Henderson, et al., 1995; Capone, 2006).

The creative class theory stresses the importance of place in attracting talented workers—specifically, that areas blessed with technology, talent, and tolerance (referred to by creative class scholars as the three Ts) will experience population and economic growth (Hoyman and Faricy, 2008). The creative class theory as presented by Richard Florida in 'The Rise of the Creative Class' (2002a) is a multifaceted concept that represents a new class, an emerging sector of the economy, and an urban plan for economic growth and development. The presence of technology clusters, talented populations, and tolerance attracts a significant number of creative workers, and the presence of this 'creative class' drives innovation and economic growth in cities is asserted in this theory (Florida, 2002a; Hoyman and Faricy, 2008).

The creative class is often identified as the group of individuals who are either highly educated or engaged in creative (scientific, artistic, or technological) types of activities (Florida, 2002a; 2005; Petrov, 2008). According to Florida (2004), the core of the creative class includes "people in science and engineering, architecture and design, education, arts, music and entertainment, whose economic function is to create new ideas, new technology and/or new creative content" (Florida, 2004). Surrounding this creative core is "a broader group of creative professionals in business and finance, law, health care and related fields" (Florida, 2002a). An important sub-group of the creative core is the bohemians, which includes the artistically creative people such as 'authors, designers, musicians, composers, actors, directors, painters, sculptors, artists, printmakers, photographers, dancers, artists, and performers' (Florida, 2002a; Fritsch and Stuetzer, 2009). Florida mentioned that creative class is creative and innovative, and as a result of this, remarkable for its high productivity (Florida, 2002a; Marlet and Woerkens, 2007).

The main factor participating in creativity is human capital. Creativity is, therefore, considered to be a form of capital (Florida, 2005), the so called 'creative capital'. From this perspective, the major driving force of economic development is creative people, or the creative class (Florida, 2005; Petrov, 2008). The notion of the creative class goes beyond traditional representations of a highly skilled workers, knowledge workers, and so forth (Petrov, 2008). The human capital and the creative class approach both differ from regular economic geographical literature because they assume that it is people, not firms, who lead the way (see Marlet and Woerkens, 2007). Creative, well educated, people do choose desirable places to live while companies are attracted towards such places by the creative, educated working force (Boarnet, 1994; Marlet and Woerkens, 2007). Human capital theory is essentially about the creation and use of knowledge by the skilled and highly educated in those cities and regions (Marlet and Woerkens, 2007). According to modern theories, economic growth is mostly the result of stocks of human capital the economies possess, and not as much of their physical and investment capital. Even though the most conventional measure of human capital was the educational level, it would be necessary, but difficult, to take into account everyone's intrinsic creative potential to generate new ideas, technologies, business models, cultural forms and whole new industries. It is how the "creative class" came to being as a concept in the studies of Richard Florida (Dinescu and Grigorovici, 2008). It is argued that not only the level of skills, but also the creative ability of the labor force (or of the creative class) is a key ingredient of endogenous development in urban areas (Anderson, 1985; Florida, 2002; 2002a). The creative class argument, although debated by many (Glaeser, 2005; Markusen, 2006), has found support in a number of empirical studies that measured creativity and its effect on regional economic competitiveness (Florida and Gates, 2001; Florida, 2002; 2002a; Mc Granahan and Wojan, 2007). These studies also demonstrated that quality of place (interpreted as a function of diversity and openness) represents one of the most important factors in attracting creative capital (Florida, 2002a;

2005), and hence acts as a powerful force of urban and regional economic growth and development (Petrow, 2008).

A main criticism about Florida's approach is that he confuses creativity and human capital (Glaeser, 2005; Fritsch and Stuetzer, 2009). This criticism is mainly directed towards the definition of creative people for the empirical analysis on the basis of occupations. Many of the occupations that Florida regards as creative require a relatively high level of qualification. Thus, his critics state that he measures the impact of qualification and human capital on economic development (Fritsch and Stuetzer, 2009). Marlet and Woerkens (2007) agree with Glaeser (2005) that creativity is largely the same as human capital. Nevertheless, designing categories for people who are not necessarily highly educated yet highly important for economic production is useful to achieve a better understanding of regional economic growth (Marlet and Woerkens, 2007). According to them, Florida does not support this creative class theory with much empirical analysis, some of the people in Florida's creative class are indeed not highly educated; but most of them are (Marlet and Woerkens, 2007). The lack of evidence of causality between the creative class and economic growth in thriving urban areas, where it is unclear whether the creative class fosters growth or the growth attracts the creative labor force are pointed out (Glaeser, 2005; Shearmur, 2007; Petrov, 2008). Glaeser's critique (Glaeser, 2005) is correct to the extent that there tends to be a highly positive correlation between the share of people in creative occupations and the share of people with a higher level of education. However, according to Fritsch and Stuetzer (2009), for the contribution to economic development, it may be important how qualification is applied. A further point of criticism is directed towards the impact of people in artistic occupations, the bohemians, on economic development (Lang and Danielsen, 2005; Markusen, 2006). These critics doubt that there is a causal relationship between a high share of bohemians in a region and economic development Fritsch and Stuetzer, 2009). Hoyman and Faricy (2008), found the wide adoption of creative class–based policies to be surprising given that in the academic literature, there is little evidence supporting the relationship between creative clusters and actual economic indicators. Goonewardena (2004) has indicated that cities have always been creative and diverse, so this cannot be responsible for the new economy and growth in the 1990s (cited in Hoyman and Faricy, 2008).

Since we know that creative people are associated with economic development, and we also know that they are spread unevenly, it is important to understand the factors that account for this varied geography (Mallender and Florida, 2007). The concentration of creative people in a few locations can be regarded as a reason for the clustering of economic activity. This is particularly true for activities with a high demand for high qualified labor such as research and development, design and marketing and high-tech industries (Arora et al., 2000; Florida, 2004; Fritsch and Stuetzer, 2009). Florida's argument is congruent to Jacobs' (1970, 1985) ideas about the important role of cities as well as the basic hypotheses of the new economic growth theory (Romer, 1986, 1993; Lucas, 1988, cited in Fritsch and Stuetzer, 2009. Lucas (1988) recognized the role of great cities, which localize human capital and information, create knowledge spillovers, and become engines of economic growth (Lucas, 1988; Mallender and Florida, 2009). According to the role of highly skilled workers in explaining the relation between inequality and economic growth, various studies investigated that growth is heterogeneous (Paci and Usai, 2001; Castella and Domanech, 2002; Ahmed, 2009). Karlsson, et al. (2009) observe that the critical input in the knowledge economy – the human capital – is strongly concentrated in geographical space, much more so than most other types of economic resources and activities. With other words, they conclude that human capital exhibits strong tendencies to agglomerate in certain locations (Karlsson, et al. 2009; Berry and Glaeser 2005) argued that human capital levels are

diverging and its concentration is likely to continue to occur in certain regions only (Florida, 2002; Berry and Glaeser, 2005).

Economists for a long time have stressed that there exists a link between the agglomeration of highly skilled workers and development. Besides, there are strong tentative empirical evidences that the agglomeration of human capital contributes to regional development (Jacobs 1961, 1969; Lucas 1988; Glaeser 1994; Qian, 2008; Fujita, 1988; Krugman, 1991; Romer, 1990). On the other hand, there are theoretical and empirical discussions on the differences between human and creative capital, their effects on growth and contribution to economic development (Glaeser, 2005; Mallender and Florida, 2007; Marlet and Woerkens, 2007; Hoyman and Faricy, 2008). From such a perspective, this research attempts to identify regional differentiation associated with the spatial distribution of creative capital, by considering human capital dispersion in Spain.

3. THE CREATIVE CAPITAL IN SPAIN

Spanish comprises 52 provinces and 19 Autonomous Communities. Overall discussing the regional differences in Spain shows us that despite improvements, regional differentiation is an ongoing phenomenon (Tortosa-Ausina et.al., 2005; Pastor, et al. 2010; Cuadrado, et al. 1998; Villaverde, 2001; de la Fuente, 2002; Goerlich, et al. 2002; Raymond, 2002; Lladós, 2002). For the 1961-1981 period, Leonida and Montolio (2001) highlighted the fact that the rich provinces had lost positions in the distribution of income, but that they still created a separate mode (showing persistence), indicating that there were few rich regions in Spain in that period. In the period 1991 to 1997 there began a process of polarization of income level. The provinces were grouped in two income levels: below and above average, indicative of this process of income divergence and polarization. The latter provinces were found to be located, primarily, in the north of Spain, as north-south divide became apparent during the nineties (Leonida and Montolio, 2001). In Maza and Villaverde's study (2009), provinces are reported as tending to form clusters with similar levels of income per inhabitant with the north eastern part of Spain being the most developed area and the south and north-west of the country being least developed. These authors highlighted the fact that there is a territorial imbalances in relative per capita income in Spain's provinces and that provinces with per capita income levels above (below) the national average tend to cluster (Maza and Villaverde, 2009). The empirical literature examining inequality has mainly focused primarily on the convergence of economic factors, principally per capita income. The studies reviewed, as well as the authors' previous study (Kerimoglu, Karahasan, 2011), point to convergence in per capita income among Spanish regions (Pastor et al., 2010). Similar findings are reported by Cuadrado et al. (1998); Villaverde (2001); de la Fuente (2002); Goerlich et al. (2002); Raymond (2002); Lladós (2002), although signs of stagnation in this convergence, and even divergence, have been detected since the mid-1990s, as well as the existence of 'clubs' of regions.

According to Prados de la Escosura and Roses (2009), human capital provided a positive, albeit small, contribution to labor productivity growth thereby facilitating technological innovation, while broad capital accumulation and efficiency gains are complementary in Spain's long-term growth. In the period 1850-2000, Spain experienced a major transformation in the general level of qualifications of its labor force, with the proportion of Spanish workers having completed at least their secondary education more than doubling (from 36.4% in 1985 to 78% in 2002) (Prados de la Escosura and Roses, 2009). The

number of jobs for the professionally trained levels has also grown very rapidly in the years between 1850 and 2000 (Prados de la Escosura and Roses, 2009).

If we consider the creative employment, we find that 50% and more is increased in all provinces of the country. The figures regarding the creative capital, both for 1996 and 2004, indicate that the highest share of creative employment in the total employment by provinces is observed in Barcelona, Zaragoza, Madrid and Vizcaya (see Table 1). Girona, Alicante, Castellon, Valencia, Alava and Guipúzcoa attract the attention in terms of the sharing creative employment in total employment in 2004. In terms of the creative capital development of Spain's provinces, Table 1 illustrates that between 1996 and 2004 Castellon and Valencia had the most highly increased rate of creative employment. The rise in the proportion of creative employment in total employment went from 0.01% in 1996 to 0.42 % in 2004 in Valencia, from 0.01% in 1996 to 0.43% in 2004 in Castellon, while from 0.27% in 1996 to 0.52% in 2004 for Madrid (see Table 1). And yet despite the changes in the rankings according to creative employment, the same provinces quite remained in the same clusters from 1996 to 2004 (see Table 1).

Both in 1996 and in 2004, taking the ratios for the whole of Spain, Barcelona stood out as a leader in terms of creative employment, while Madrid as a leader in terms of highly educated employment. The proportion of highly educated people in total employment rose in Madrid from 15.97% in 1996 to 21.97% in 2004, in Barcelona from 9.85% in 1996 to 15.04% in 2004, while from 15.68% in 1996 to 16.98% in 2004 for Vizcaya (see table 1).

According to the creative capital, Barcelona, Zaragoza, Madrid and Vizcaya make up the first cluster in both 1996 and 2004. According to the highly educated employment, Madrid and Vizcaya make up the first cluster in 1996 and in 2004, while Sevilla comes third, Salamanca comes forth, Zaragoza and Barcelona follows in 1996. In 2004, Granada, Navarra and Barcelona follow them respectively (see Table 1).

Some differences can be observed between the trends in the dispersion of creative employment and highly skilled employment. For example; Granada and Salamanca just only gained positions in terms of highly educated employment while Girona, Alicante and Castellon have better position only for creative employment in 2004. Girona, Alicante, Castellon and Valencia gained positions from 1996 to 2004 in terms of creative employment while, Alava and Guipúzcoa gained positions from 1996 to 2004 in terms of both creative and highly educated employment (see Table 1).
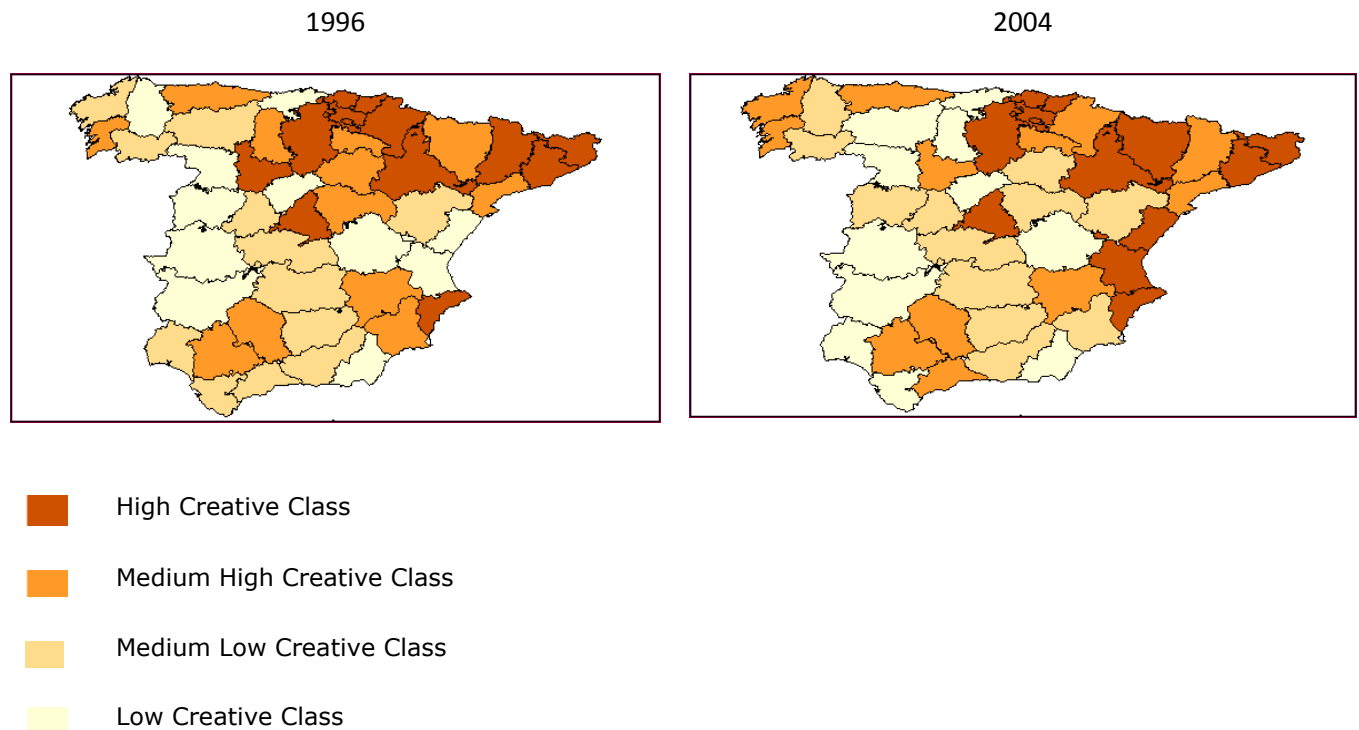
In addition to providing information about creative employment in Spain, Figure 1 illustrates the spatial distribution of creative capital among the provinces. For both years figures indicate that there are high regional differences in terms of creative employment endowments and this picture is persistent. The north east geography seems to be highly concentrated in terms of creative employment. There is also Madrid at the center but it seems that it acts as an outlier. Indeed, even taking into consideration developments in terms of creative capital, the north-south pattern inequalities seems to be persistent.

Table 1: The ranking of the Spanish provinces

provinces	increase rate of creative employment* 1996-2004 %	increase rate of total employment** 1996-2004 %	share of creative employment in total employment 1996 %	share of creative employment in total employment 2004 %	share of employment with un. degree or higher*** in total employment 1996 %	share of employment with un. degree or higher in total employment 2004 %
Almería	87.53	22.04	0.03	0.17	6.30	9.49
Cádiz	76.05	21.95	0.06	0.21	6.27	8.25
Córdoba	74.01	23.23	0.09	0.27	5.40	10.33
Granada	78.01	25.11	0.07	0.23	8.60	15.36
Huelva	72.58	12.77	0.06	0.20	3.86	5.41
Jaén	77.00	28.62	0.06	0.18	4.89	10.44
Málaga	85.06	36.18	0.07	0.31	6.58	8.43
Sevilla	72.21	27.76	0.11	0.29	10.53	12.96
Huesca	73.48	23.17	0.11	0.31	6.45	8.36
Teruel	78.21	0.17	0.06	0.26	3.43	7.57
Zaragoza	61.20	24.98	0.28	0.55	9.88	13.75
Asturias	71.44	14.58	0.11	0.32	7.19	9.11
Baleares	79.00	34.41	0.11	0.34	5.28	6.24
Las Palmas	92.59	33.65	0.04	0.33	4.42	8.82
Santa Cruz de Tenerife	93.26	24.95	0.03	0.29	6.74	11.36
Cantabria	72.25	27.00	0.05	0.14	7.12	8.39
Ávila	76.87	18.28	0.06	0.20	6.10	7.57
Burgos	75.47	19.93	0.11	0.37	5.28	10.87
León	73.14	11.99	0.06	0.20	6.44	9.03
Palencia	69.72	21.65	0.07	0.18	6.17	9.00
Salamanca	86.97	14.09	0.04	0.25	10.14	12.55
Segovia	73.85	13.58	0.05	0.17	7.53	11.71
Soria	61.63	19.21	0.09	0.19	5.77	9.58
Valladolid	68.47	18.05	0.12	0.32	9.21	10.50
Zamora	79.25	10.00	0.04	0.15	6.22	9.20
Albacete	78.39	28.14	0.08	0.28	7.55	9.13
Ciudad Real	78.50	28.76	0.07	0.22	6.37	7.91
Cuenca	76.86	26.09	0.04	0.14	5.04	6.63
Guadalajara	73.21	24.03	0.08	0.23	6.58	12.25
Toledo	77.85	17.50	0.07	0.26	5.15	6.80
Barcelona	64.12	25.36	0.32	0.67	9.85	14.04
Girona	75.32	29.88	0.16	0.44	6.91	8.25
Lleida	72.92	15.14	0.10	0.32	6.42	10.69
Tarragona	77.19	29.35	0.10	0.31	6.10	8.87
Alicante	71.12	28.71	0.17	0.43	5.66	9.97
Castellón	98.75	19.50	0.01	0.43	6.60	8.34
Valencia	98.98	26.38	0.01	0.42	8.33	13.76
Badajoz	80.50	19.99	0.04	0.18	6.11	7.80
Cáceres	88.60	15.24	0.03	0.19	6.09	7.98
A Coruña	78.00	7.43	0.07	0.28	6.92	11.19
Lugo	81.70	-11.96	0.04	0.24	3.42	9.35
Ourense	73.97	5.88	0.07	0.26	6.62	12.68
Pontevedra	80.93	15.54	0.07	0.32	5.83	7.71
Madrid	64.20	31.95	0.27	0.52	15.97	21.07
Murcia	76.03	31.38	0.08	0.24	7.88	9.68
Navarra	64.29	29.07	0.17	0.34	8.29	14.16
Álava	69.73	19.14	0.16	0.43	8.10	13.21
Guipúzcoa	71.94	23.89	0.15	0.40	8.67	13.63
Vizcaya	65.75	25.77	0.21	0.45	15.68	16.98
La Rioja	71.18	25.26	0.11	0.27	7.55	9.97

Source: authors' own calculations, * from SABI database, ** from INE, *** from IVIE

Figure 1: Spatial Distribution of Creative Capital in Spain (per 10.000 employers)

1996   2004

High Creative Class

Medium High Creative Class

Medium Low Creative Class

Low Creative Class

Source: SABI

4. DISPERSION OF CREATIVE CAPITAL AND ITS IMPACT ON REGIONAL DIFFERENCES

4.1.   Methods and Data

Based on the major objective of the study a two-step analysis is implemented. First we analyze the dispersion of creative capital associated with the dispersion of employment, human capital and regional inequalities. Second, this dispersion is tried to be used as a possible factor behind the differences in Spain. Regional inequalities are visualized by looking at the geographical pattern of GDP per capita. Moreover, some other regional characteristics of provinces are controlled. Differences in the employment structure are observed by looking at the share of service and manufacturing employment in the total employment of provinces. The creative capital variable is the number of creative employment. For the empirical analysis, the different categories of creative people are identified by their occupation. The main data source used for this research is the SABI database. We consider the creative capital consisting of high-tech, knowledge intensive services, real estate, architecture and engineering, research and development, advertising and market research, professional, scientific and technical activities, financial and insurance activities, creative activities such as publishing, software publishing, telecommunications,

and computer programming occupations. Finally to get some clues about the human capital base of the provinces; we have two measures of human capital as a control variable: percentage of the population with a bachelor's degree or higher from INE, percentage of the employment with a bachelor's degree or higher from IVIE. We observed spatial differences between the two human capital measurements.

The first set of analysis is about the dispersion and local patterns of creative capital in Spain. While there are different ways to see how creative capital is dispersed, we prefer to increase the attention on the spatial concentration. First the spatial autocorrelation is computed (see equation1, Moran's I). Next based on the general characteristic of this global measure, to evaluate the local reflections we also compute the local indicator of spatial association - LISA - (see equation 2 and see Anselin, 1993). By doing so, we have possibility to decompose the spatial concentration of creative capital in Spain.

(eq.1.)
$$Moran's\ I = \frac{w_{ij}}{n} \frac{\sum_i \sum_j w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}$$

(eq.2)
$$LISA = (x_i - \bar{x})\sum_j w_{if}(x_j - \bar{x})$$

The second analysis refers to the investigation of the creative capital dispersions' impact on regional differences in Spain. A very basic yet informative model is constructed as in equation 3 for year 2004. The nice thing about the model is that it also controls for the spatial effects coming from regional differences.

(eq. 3)
$$\ln pgdp = \alpha + \beta \ln crea + \delta man + \phi ser + \rho W \ln pgdp + \varepsilon$$

Table 2: Description of the independent and dependent variables

| Variable	Measure	Source
Independent		
Creative Employment *Explanatory/ Controls*	Percentage of creative employment in the selected sectors (according to CNAE * classifications), in total employment by Provinces of Spain from 1996 to 2004 (the data are not available for Ceuta and Melilla)	'Sistema Anual de Balances Ibéricos' (**SABI**) database**
Human capital	Percentage of employment with a bachelor's degree and higher in total employment by Provinces of Spain from 1996 to 2004	Instituto Valenciano de Investigaciones Económicas **(IVIE)**
	Percentage of the population with a bachelor's degree and higher in total population by provinces of Spain from 1996 to 2004	Instituto Nacional de Estadística **(INE)**
Manufacture based employment	Percentage of manufacture employment in total employment by Provinces of Spain from 1996 to 2004	Instituto Nacional de Estadística **(INE)**
Service based employment	Percentage of service sector employment in total employment by Provinces of Spain from 1996 to 2004	Instituto Nacional de Estadística **(INE)**
Dependent		
GDP per capita	Per capita income (GDP) per year by Provinces of Spain from 1996 to 2004	Instituto Nacional de Estadística **(INE)**

* Spanish National Classification of Economic Activities
** Data classified at four-4 digit level for selected occupations. Given data availability for all variables selected, data can be collected from 1996 to (up to) 2004.

4.2.   Findings

To broaden the preliminary picture regarding the dispersion that summarized above, the spatial association as well as its decomposition is informative. First global spatial autocorrelation is computed for creative employment. The preferred weight matrix is a contiguity one (w=1 if i and j are neighbors, w=0 otherwise). Results indicate that for both 1996 and 2004 creative employment is spatially dependent (Moran's I for 1996 and 2004 are 0.2783 and 0.2296 respectively). Since this finding only gives clues at a very general level (global in this sense) its decomposition can increase the information set regarding the dispersion of creative employment at the local level. Figure 2 gives the decomposition of the global measure by using the so called Local Indicator of Spatial Association (LISA) approach. Findings indicate that there are hot spots in mostly the north eastern geography of Spain. This is in line with the preliminary findings about how creative employment endowments differ in Spain (compare figures 1 and 2).

Figure 2: Decomposition of Spatial Autocorrelation for Creative Capital

1996   2004

Moran's I=0.2783*** (p-value: 0.00)   Moran's I=0.2296** (p-value: 0.01)
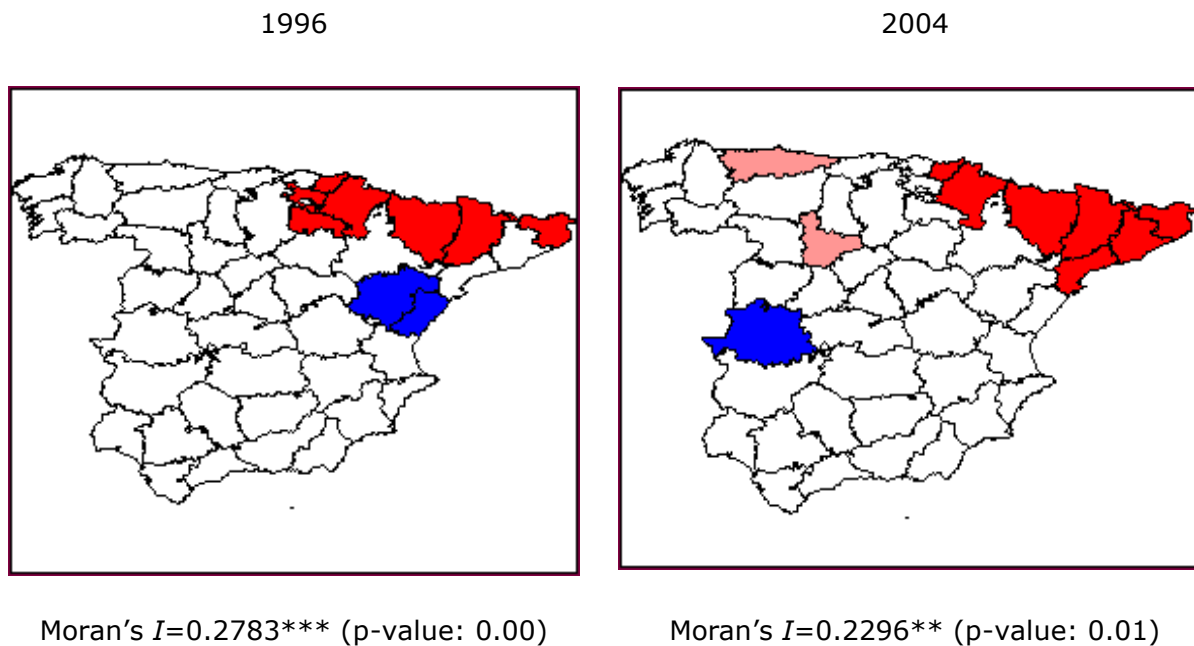
■, ■ are the clusters for high and low creative employment values respectively.

■ represents the outliers of high creative employment volume surrounded by low volume.

Source: SABI, own calculations

Both figure 1 as well as the LISA plots in figure 2 underlines that creative capital is spatially unequal in Spain. In line with central aim of this research, our central concern is to carry out this discussion towards the relationship between this unequal pattern and general regional differences in Spain. Figure 3 gives us the first clue about the similarity between the geographical patterns in regional inequalities and creative employment endowments. Given that provinces with low per capita GDP clusters vanishes from 1996 to 2004, figure 3 confirms that provinces forming hot spots of high per capita income is persistent. The striking issue here is that these location area also the ones that are realizing high creative employment volumes. Girona, Barcelona, Leida, Tarragona, Huesca, Navarra, Vizcaya, Guipúzcoa and Alava come in to prominence.

Figure 3: Decomposition of Spatial Autocorrelation for GDP per capita

| 1996	2004
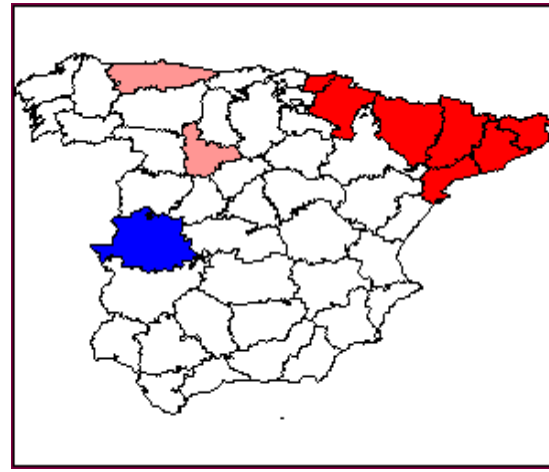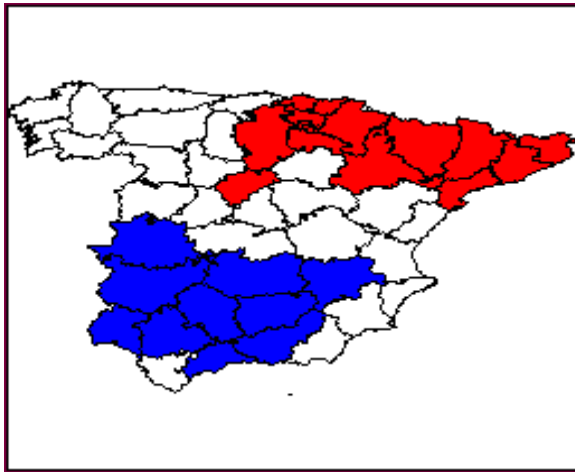
Moran's I=0.7687*** (p-value: 0.00)   Moran's I=0.6684** (p-value: 0.01)

■, ■ are the clusters for high and low per capita GDP respectively.

■ represents the outliers of per capita GDP volume surrounded by low volume.

Source: INE, own calculations

The similarity that we detect when we compare the spatial concentration becomes stronger when we have a short look about the direct relation between creativity and regional difference measures. In our view, both the spatial concentration investigation as well as the scatter plot in figure 4 validates our concerns related with the validity of the theoretical arguments about the impact of creative capital on regional differences. However these preliminary findings are still insufficient to assess the robustness of the relationship.

Figure 4: Relationship between Creative Class and Regional Income
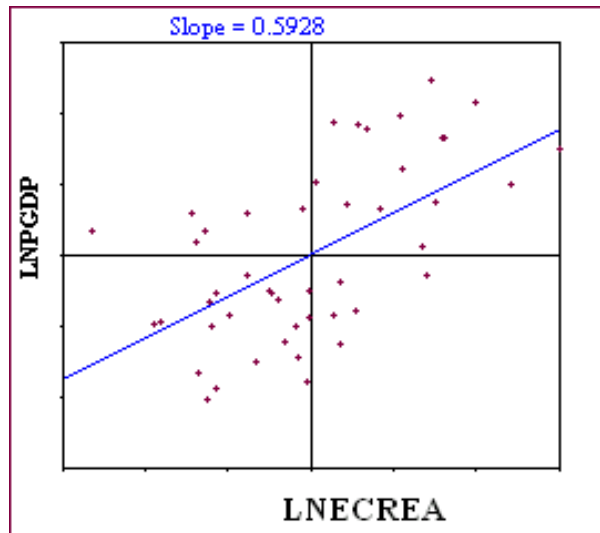
Source: INE, SABI

We believe findings so far should increase the awareness of social scientists as well as policy makers in terms of the role of creative capital on regional development. Yet it is still a necessity to check the detected relation in the spatial analysis. Aiming to do so, the model given in equation 3 is estimated for year 2004. Models running from I to III is our robustness check and they contain valuable information about regional development differences in Spain. However, we need to remark that models estimated do not aim to explain the background determinants of regional differences in Spain; rather they aim to test the impact of creative employment. Models I and II clearly shows that creative employment is influencing the differences in regional income per capita in Spain. Yet it is remarkable that sectoral composition seems to be vital but with very low significance. Finally note that spatial dependency, which is controlled by the spatial autoregressive parameter, is significant; meaning that per capita income in a province is both influenced by its surrounding and also affecting its geography. However, it is interesting that in the final model (model III), once we control for the human capital development level of the population for each provinces, creative capital (as well as sectoral composition) fails to explain the regional income differences. Note that spatial autoregressive term is still significant. We believe the fall in the significance of the creative capital is related with the high correlation between creative capital and human capital level of population (close to 0.60). Especially employment with university degree should be by construction related with the creative capital. In short results of the third model should not be regarded as the insufficiency of the creative capital to explain regional differences; rather it should be remarked that human capital development is dominating the impact of the creative capital.

Table 3: Creative Capital and Regional Differences- 2004

	(I)	(II)	(III)
Creative Emp. (% total)	0.196*** (0.049)	0.112* (0.067)	0.071 (0.065)
Manufacturing (of total)	-	0.681* (0.408)	0.443 (0.401)
Services (% of total)	-	0.568* (0.312)	0.284 (0.315)
Population with BA Degree	-	-	0.027** (0.010)
ρ	0.707*** (0.094)	0.711*** (0.096)	0.686*** (0.097)
R^2	0.74	0.76	0.78

*, ** and *** represents significance at 10%, 5% and 1% respectively

Standard errors in ( ) for coefficient estimates

Based on these results, we believe examining the connection between how human capital accumulation and creative employment endowments are linked is an emerging study area. In this sense figure 5 shows the human capital accumulation (employment with BA degree) and the creative capital (creative employment) for a nine year interval. First two figures represent the change. We prefer to divide the geography into four quantiles based on their potential. For instance the growth in these measures should be regarded as potentials. These figures underline that there is much or less a similar pattern in terms of human capital and creative capital potential of provinces in Spain. Yet the improvements in the Southern Spain should be connected to recent developments in Spain in terms of regional convergence. We believe this potential figures as well as the endowments illustrations in again figure 5, validates our concerns about the interconnection between creative class and human capital development. Although dispersion of the human capital potential as well as its endowment is more homogenously dispersed in population, still locations with high BA degrees are realizing high creative based employment. We believe this explains why the creative capital variable fails to explain the regional differences once we also account for the human capital variable in our analysis reported in table 3.

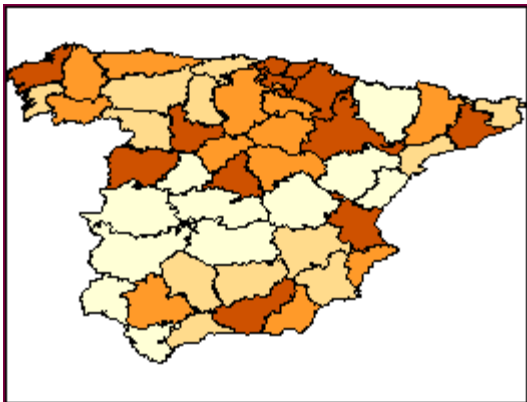Figure 5: Human Capital and Creative Capital Potentials

Change in the number of people with BA
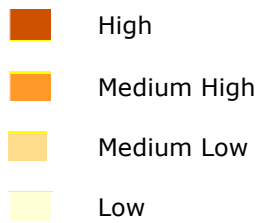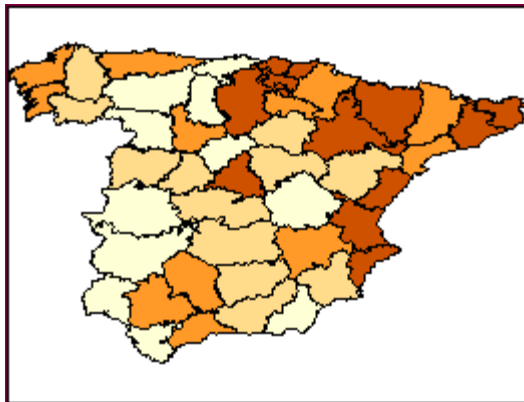Degree (1996-2004)
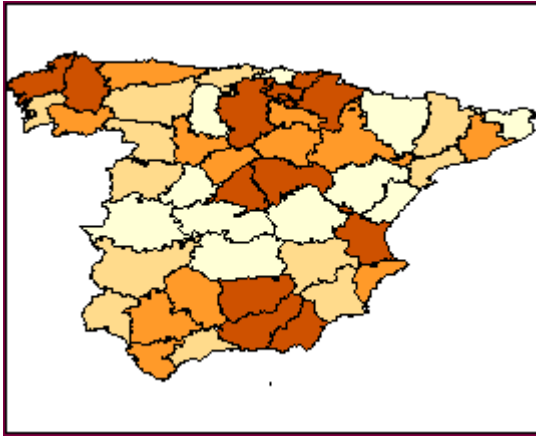
Change in the number of employment in
Creative Class
(1996-2004)
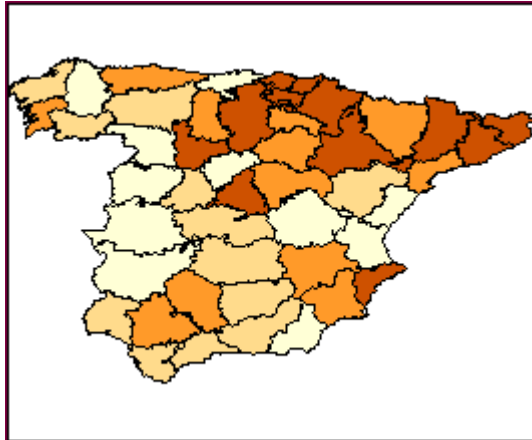
Population with BA Degree (2004)

Creative Class (2004)

High

Medium High

Medium Low

Low

Source: INE, SABI, own calculations

5. CONCLUSION

Results indicate that for both 1996 and 2004 creative employment is spatially dependent and creative capital is spatially unequal. There are hot spots in mostly north eastern geography of Spain, similar with the geographical pattern in regional inequalities. Developed regions are also the ones that are realizing high creative employment. Provinces with low income per capita clusters vanish from 1996 to 2004, while creative capital clusters and human capital concentrations are mostly the same in the same period.

Although some differences can be observed between the trends in the dispersion of creative employment and highly skilled employment, there is much or less a similar pattern in terms of human capital and creative potential of provinces in Spain. Both in 1996 and in 2004, Barcelona stood out as a leader in terms of creative employment, while Madrid as a leader in terms of highly educated employment. Increase rate of the creative employment from 1996 to 2004, 50% and more in all provinces of the country. The north east geography seems to be highly concentrated in terms of creative employment.

Creative employment is influencing the differences in regional income per capita in Spain. Indeed, even taking into consideration developments in terms of creative capital, the north-south pattern inequalities seems to be persistent. It is remarkable that sectorial composition by presenting the share of service and manufacture employment in total employment seems to be vital but with very low significance.

We believe our results can be considered important from a number of different perspectives. First, the spatial distribution of the creative capital and of the human capital indicators present identical geographically patterns. Second, the dispersion in creative capital follows a trend towards a more equal distribution to income per capita.

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