

PAPER

Title: Cultural and Creative Industries as drivers of Employment Growth at Local Level

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Abstract:

Do Cultural and Creative Industries (CCIs) fulfill their role as engines for economic growth? This topic has taken considerable attention among economists and policy makers in the last two decades, as governments started to look for “hard” evidence that explains the dynamics of those industries and their ability to impact economic activity. In preceding literature, there exists a general argument that, by and large, CCIs are vital in encouraging economic growth in urban cities and regions. This is a very relevant issue in view of empirical evidence suggesting potentialities of these industries in developed economies. The Catalan case is of utmost interest in view that CCIs are of noticeable importance and, consequently, they are potentially capable to help local economies.

Concretely, this paper focuses on trends of CCIs in Catalonia at local level in order to identify their effect over employment growth/generation between 2001 and 2011. Using data from Catalan Statistical Institute (IDESCAT) and Spanish Statistical Institute (INE), we carry econometric and spatial analyses in order to explore the impact on employment along with the respective spatial dynamics. We also explore whether CCIs can be substantial drivers of economic growth for smaller areas not previously specialized in them or if, by the contrary, they need to agglomerate in large urban areas. As we are interested in such approach, we will focus on what is happening and what is being done in small and medium peripheral Catalan cities as well as in the capital, Barcelona, trying to identify and quantify how selected cultural activities / infrastructures located there are contributing to economic growth of their respective areas. Hence, this study contributes to the literature of empirical evidence on economic contribution of CCIs, the dynamics of employment in creative economies and the generated spillovers on regional and local levels.

Keywords: *creative industries, cities*

JEL codes: R11

1. Introduction

Do Cultural and Creative Industries (CCIs) fulfil their role as engines for economic growth? This topic has taken considerable attention among economists and policy makers in the last two decades, as governments started to look for “hard” evidence explaining the dynamics of those industries and their ability to impact economic activity. In preceding literature, there exists a general argument that, by and large, CCIs are vital in encouraging economic growth in urban areas and regions. Theoretically speaking, there also exists a debate on whether local growth is encouraged by specialization or diversity among sectors and within, taking into consideration the geographical dimension which has been profoundly presented in preceding literature. Accordingly, one can ask to what extent does “space” in terms of geographical location of firms, proximity and accessibility (infrastructure) manipulate industries’ growth? Investments in Cultural and Creative Industries have been subject to much debate in the recent decades in Spain, Europe and globally. Main discussions involve their economic contributions. How does the composition of economic activities within regions influence the growth of those activities and eventually cities and regions? How important is the creative class for regional and local economic development and employment growth? Do specific locations with “special” spatial and market structure trends provide a unique environment for the creative class to prosper? And if yes, what are the spatial characteristics which generate such spillovers? Noting that this study rests in the heart of *agglomeration economies*, the relevant theories and empirics on urbanization, specialization, diversity and related variety are pointed out in the following sections, aside the economic contribution of CCIs and the creative class to help understand what drives a specific behavior of the creative class and employment generation.

This paper aims to explore whether the cultural and creative industries can act as a driver of regional economic growth in Catalonia by focusing on the economic impact of creative class on employment growth. The Catalan case is of utmost interest in view that CCIs are of noticeable importance and, consequently, they are potentially capable to help local economies. As we are interested in such regional approach, we will focus on what is happening and what is being done in small and medium peripheral Catalan cities

but also in the capital, Barcelona, trying to identify and quantify how selected cultural activities / infrastructures located there are contributing to economic growth of their respective areas. Also, we present several employment indicators that quantify the dimension of the cultural-creative field's contribution, and identify local and regional drivers of employment growth.

This paper explicitly inspects the issues of agglomeration economies from an empirical point of view. Numerous studies have investigated this issue in Europe, though primarily using regional-level data. In Catalonia, there is no study which investigates this issue on a local-level. This study is original in terms of the data utilized in the Catalan case, and the phenomenon addressed in this area focusing empirically on the creative class and creative industries.

The structure of this paper is the following. Second section reviews literature and addresses main points raised by scholars, third section provides the theoretical framework of the study, the fourth section details characteristics of dataset and provides some descriptive statistics, fifth section describes methods and discusses main results, and sixth section concludes and indicate directions of further analyses.

2. CCIs as Drivers of Employment and Economic Growth

The impact of cultural and creative industries on economic growth has been taking considerable attention among economists and, specially, policy-makers, indicating an aspiration amongst governments to exploit cultural and creative production in order to foster both employment and economic growth. These potentialities of CCIs arise especially from their creativity side and its role over economic development (Gouvea and Vora, 2018), from the higher spending on intangibles at CCIs (Scheffel and Thomas, 2011) and from CCIs stronger growth capacity related to other industries, as demonstrated, for instance, by Scheffel and Thomas (2011) for the UK's case. Nevertheless, some of previous empirical evidence is based mainly on economic intuitions and on indirect empirical evidence rather than on solid evidence (Banks and O'Connor, 2009).

The ability to “quantify” and empirically investigate this relationship is still limited, despite the significant arguments among researchers in this field on the importance of CCIs and their respective positive impact on several dimensions within local and regional economies. Prevailing arguments on the potential impacts of CCIs on economic growth can be categorized into five key groupings compiled preceding literature (Evans, 2005; Potts, 2009; Stam et al., 2008; Markusen et al., 2008; Silver et al., 2011; O’Connor et al., 2018)

- 1) Consumption: creating demand for goods and services, boosting demand for housing, developing leisure amenities, boosting creative production, influencing lifestyle location and consumption pattern decisions.
- 2) Income from Employment and Entrepreneurship: generating direct income from provided goods and services, creating job opportunities in this sector, supplying other sectors with ideas, products, services and labor, boosting entrepreneurship (both creative and non-creative)
- 3) Income from Image and Trade: generating income from exporting products and services, generating income from enhancing cities’ public image, reputation and fame
- 4) Clustering and its advantages: expansion and growth of cultural and creative neighborhoods and districts, arousal of networks of cooperation within the creative sector through creative milieus, facilitation of ideas’ exchange and spillovers to other sectors
- 5) Urban activities: contribute to more creative, inclusive and sustainable approaches to urban planning and governance.

In any case, as importance of CCIs is stronger for developed economies, there are some concerns about causality between weight of these industries and growth. In this sense, Potts (2009, p.4) suggests two hypotheses regarding CCIs relationship with economic evolution: “The first is that the structure of the economic system is evolving, with the CIs becoming a more significant component of the economic order. The second is that the CIs are themselves part of the process of economic evolution across the economic order”.

In addition to previous positive effects over growth, CCIs are also hypothesized to exert different positive effects over regional and local economies, as Semandand Carroll (2016) show for Dallas Ft. Worth area. Concretely, they indicate that the region's creative economy has driven the development of cultural districts and may be a contributing factor helping to retain and attract an educated, highly skilled workforce and creating a "buzz" that plays a role in the decision-making process of firms looking to relocate to the region.

Unfortunately, research on the effects of CCIs suffers from extreme heterogeneity of data sets and geographical areas, variables to be measured, specific focus, demand vs. supply effects and industry's delimitation.

In terms of data sets and geographical areas, empirical evidence is provided for many areas in (mainly) capitalist economies, from countries to regions and cities (Piergiovanni et al., 2011; Mossig, 2010; Banks and O'Connor, 2009; Potts, 2009; Potts et al., 2008; Stam et al., 2008; Florida, 2002), and also for a wide typology of economic areas ranging from developed countries as US (Americans for the Arts, 2017) or UK (Department of Culture, Media and Sport, 2011), to developing countries (Ginsborough and Throsby, 2006).

In terms of variables to be measured, Evans (2005) suggested different measurements to evaluate the evidence of culture's contribution to the economic "regeneration" in order to enrich the available literature with "hard" evidence. Among the examples of evidence of impact, Evans (2005) mentioned the following ones: Increased property values/rents (residential and business), Corporate involvement in the local cultural sector (leading to support in cash and in kind), Higher resident and visitor spend arising from cultural activity (arts and cultural tourism), Job creation (direct, indirect, induced); enterprise (new firms/start-ups, turnover/ value added), Employer location/retention; Retention of graduates in the area (including artists/creatives), Creative clusters and quarters; Production chain, local economy and procurement; joint R&D, Public-private-voluntary sector partnerships ('mixed economy'), Investment (public-private sector leverage). In a similar way, Potts et al. (2008) propose and test four models of the relation between the CIs and the aggregate economy, mainly using data on relative

growth rates, employment, entrepreneurship, income and profit for many countries over a decade period.

Similarly, Piergiovanni et al (2011) explore the impact of a series of factors, including creativity, intellectual property rights activities, new business formation, and the provision of amenities, on economic growth for 103 Italian provinces over the period spanning 2001 to 2006. Provincial growth rates are measured in terms of employment growth and value-added growth. The findings reveal that an increase in the number of firms active in the creative industries and net entry have a positive effect on regional employment growth. The share of legal immigrants is also found to positively impact employment growth. A high number of university faculties is found to lead to less employment growth, whereas trademarks, patents, cultural amenities, and industrial districts have no significant effect. Value-added growth is for a large part determined by employment growth, but no additional productivity-enhancing effects of the factors discussed are found. Creative industries, new business formation, and regional economic growth. Apart from the specific variables to be measured when dealing with the quantification of CCIs contribution, what is clear is that CCIs have close linkages with many other industries, as highlighted by Cohendet et al. (2009): “Creative industries can be a significant contributor to national economic growth as creative goods and services comprise an important element in the international trade of most countries and thus come under the policy surveillance of ministries of trade, the employment effects of the creative industries are significant, making them an area of interest in labour-market policy; there is a close association between the creative industries – particularly the performing and visual arts and the provision of heritage services – and the contribution of tourism to the economic viability of towns, cities and regions”.

In terms of research focus, an important point is to identify the sources of the potentialities of CCIs, being that some authors point to the role played by “artists”, primarily represented as Bohemians the creative class, whilst others focus on the specificities of innovation in CCIs.

Regarding the “artists”, a number of researchers evaluated the impact of CCIs on economic growth and development by taking “artists’ contribution” as a proxy, with the

artists being conceptualized as the principal group of workers expected to be employed in firms within CCIs, self-employed as freelancers or creative entrepreneurs (Pratt, 2004;Throsby, 2008;Heebelsand Van Aalst, 2010). Markusenet al. (2008) stated that artists contribute to the regional growth in the course of their respective attraction to tourists from other regions, their creation of employment opportunities in non-art businesses, alongside their individual exporting activities (direct sales and income). Taking the dimension of local wages, Silver and Mill (2013) argued that there might be a significant association between the presence of artists in a specific area and the rising of the aggregate local wages in this area, unlike the case of other creative class professionals whose presence is associated with lower local wages. Furthermore, researchers argue that workers in CCIs contribute to the growth of the “new” economy which involves Information technologies and digital developments (Landry, 2008); in addition to their generation of “agglomeration benefits” (Murzyn-KupiszandDzialek, 2017), mainly income from innovation and creativity employment (Gabe and Abel, 2010), development of clusters in tourism attraction (Rutten, 2006), promoting corresponding areas as touristic attractions and creating positive image and fame. This argument was further validated by Silver et al. (2011) who explained that artists in CCIs contribute to the development of experiences for residents and tourists by altering urban areas to “theatrical” ones.

Regarding to the innovation activities, considering both innovation and employment spillovers in Netherlands, Stam et al. (2008) find that firms in creative industries located in urban areas are more innovative than their rural counterparts, but with the exception of the metropolitan city of Amsterdam, there is *no* measurable spill-over effect from creative industries. The presence of the creative class-see: *Florida (2002)*-(in all kinds of industries other than creative ones) appears to be a much stronger driver of employment growth than creative industries in Netherlands. In their study, Stam et al. (2008) attempt to empirically investigate the impact of creative industries on economic growth, as measured by innovation generated, though arguing that there is no “one-to-one relation between the number of firms in creative industries to economic growth”. Similarly, using data for Dallas-Ft. Worth region Semanand Carroll (2016) show that creative industries are a significant driver of innovation and entrepreneurship.

Related with artists' role and innovative activities, some authors have introduced the notion of "creative milieu" (Tornqvist, 1983). Concretely, Landry (2008) elaborated on this by arguing that the indirect effect of creative milieu is represented in the channeling of ideas within a knowledge economy (Markusen, 2006). CCIs as well have a positive impact on short term spending, through direct, indirect and induced economic effects (also called multiplier effects) (Murzyn-Kupisz and Działek, 2017) in addition to long term impacts that can be explained through altering location choices on people, businesses, and investors (Bille and Schulze, 2011). In a similar way, Coll-Martínez and Arauzo-Carod (2017) and Wojan et al. (2007) demonstrate the positive role of the so-called "creative milieu" over attraction of new firms.

In terms of demand vs. supply effects, employees in the creative class does develop specific preferences in terms of urban lifestyle, which increases demand to cultural and creative venues, theaters, libraries, etc. (Bille, 2010). Another argument conducted by Miles (2005) states that CCIs indirectly contribute to the consumption of other types of services by "shaping" the context and making it more appealing, such as designing public spaces, architecture, performances, etc. Other studies also pinpointed how workers in the creative class can improve the productive capabilities and competencies of other sectors by making them more original, innovative and resourceful, given the stipulation of ideas and creative input (Styhre and Eriksson, 2008), besides serving in smoothing the progress of the exchange of idea and formation of informal networks within cities through their respective function in launching and developing "third place" such as cafes and art galleries (Molotch and Treskon, 2009).

Navarro et al. (2012) argue that in addition to human capital and creativity, cultural consumption opportunities play an important role in explaining local development and growth. They promote the attraction of visitors, as well as the attraction of the creative class, improving local income and wages. Their paper analyses the relative importance of cultural consumption opportunities, as cultural scenes, explaining income differences among Spanish municipalities. Indices to measure talent, creative class, and different kinds of opportunities for cultural consumption at the local level are proposed, using multivariate regression analysis to show their complementary impact on local income. In addition to human capital and the creative class, the main results show that different

kinds of opportunities for cultural consumption (cultural scenes) have an independent impact on local income.

In terms of industry's delimitation, despite of growing efforts to settle down widely accepted classifications of CCIs, heterogeneities are still important. On this sense, UNCTAD presents a clear, wide and inclusive typology that is being accepted by many researchers (UNCTAD, 2008, p. 15): "Creative Economy" is an evolving concept based on creative assets potentially generating economic growth and development. It can foster income-generation, job creation and export earnings while promoting social inclusion, cultural diversity and human development. It embraces economic, cultural and social aspects interacting with technology, intellectual property and tourism objective. It is a set of knowledge-based economic activities with a development dimension and cross-cutting linkages at macro and micro levels to the overall economy. It is a feasible development option calling for innovative, multidisciplinary policy responses and inter-ministerial action. At the heart of the creative economy are the creative industries".

2.1 The Creative Class

One approach to measure the Cultural and creative industries is to consider the Creative Class, a term initially defined by Richard Florida (2004) in his book "The Rise of the Creative Class" and been put in practice among policy makers and academic in the field since then. The Creative class is a major contributor to the economy and is influenced by, and influences, agglomeration economies as seen in previous literature. Creative people benefit from regional knowledge externalities and have always been associated with creative cities (Andersson et al., 2014). Florida (2004) argues that the creative class is a major driver for urban and regional growth. In this study we adopt the definition and classification of the Creative Class as first introduced by Florida (2004, p.8) as follows: The creative core or *Super creative* are those whose economic function is to create new ideas, new technology and/or new context. These individuals are mainly found in science, engineering, architecture and design, education, arts, music and entertainment. The *Creative Professionals* are those whose economic function rests in business and finance, law, healthcare and related fields; where the latter group of professionals engage in complex problem solving that involves a great deal of

independent judgment and requires high level of education. The third group is the *Bohemians*, who are engaged in cultural, creative and artistic professions and who play two major roles, one of which is to be part of the creative class and the second is to attract other categories of the creative class due to the urban generation potential of this category. This category includes writers, performing artists, photographers, sports associate professionals, fashion and art models, among other artistic and entertainment professionals (Florida, 2004).

3. Theoretical Framework and Empirics: Urbanization, Agglomeration, Related Variety

The theoretical framework for our empirical analysis is an adaptation from Glaeser et al. (1992); a model which has been commonly used by many similar studies among which are the following De Voorde & De Groot (2008), Bishop & Gripaio (2009), Eriksson et al. (2017), O'Connor et al. (2018). The model presents an econometric approach to evaluating agglomeration economies. By definition, agglomeration economies stand for external economies of scale which are generated from the concentration of firms in geographical proximity that lead to numerous advantages in terms of productivity, knowledge spillovers and profits. Agglomeration economies typically spring from different sources: urbanization economies, localization economies and Jacobs' externalities. Urbanization economies stand for the external factors which have effects on the firm located in a specific region regardless of the nature of the sector in which it operates; mainly reflected in population density, universities, infrastructure including transportation, which facilitates knowledge creation and thus boosts innovation (Frenken et al., 2007).

Localization economies are generated from sectoral specialization and are only available to firms operating in the same sectors (Glaeser et al., 1992; Henderson et al., 1995). Also known as MAR Externalities as the concept was first theorized by Marshall (1920) and later developed by Arrow (1962) and Romer (1986). Those externalities are related to specialized composition of sectors, thus stand for the clustering of producers in same or similar sectors (i.e. specialization) in specific economic activity, and are generated from intra-sectoral knowledge spillovers which create short-term economic growth. Hence, localization economies are associated with high local concentration

levels; i.e. the region is specialized in few sectors (Frenken et al., 2007). This generates advantages in terms of employment as argued by De Vor& De Groot (2008) as high concentration of an industry can attract and sustain a large labour force with the skills demanded by that industry.

As for Jacob's externalities, mainly stem from variety and diversity in local industrial structure within a region (diversification into a bulky mixture of sectors) which fosters the creation of new markets, radical innovation and regional economic growth. A further branched concept, building on Jacob's hypothesis, is *related variety* "RV".

The latter typology, introduced by Frenken et al. (2007), differs in the sense that it is not RV *per se* that influences regional & urban growth, but to a certain extent RV among sectors that are technologically interconnected to one another is what matters. Hence, RV stands for the "inter-relatedness" among unrelated economic activities (sectors) which occur in a specific region and benefit not only essentially from geographic proximity but also from technological relatedness which makes technological spillovers useful for innovation, knowledge transfer, economic growth and development (Johnston et al., 2017). Still, one noteworthy dimension of externalities is competition, mainly associated with Porter (1990), and frequently regarded as an explanatory factor in agglomeration economies (Combes, 2002; Content &Frenken, 2016).

The main study that empirically assessed the effect of MAR vs. Jacob's externalities among other local determinants on regional growth, measured by employment growth at the city-industry level, is the study of Glaeser et al. (1992) which was later followed by a wide range of studies with mixed findings.¹Glaeser et al. (1992) emphasize the importance of Jacobs and Porter externalities. By analyzing employment growth in 170 US cities between 1956 and 1987, the authors find that (1) local competition and urban variety promote employment growth in industries and significant knowledge spillovers occur among rather than within industries (hence confirming Jacobs externalities) (2) regional industrial specialization reduces employment growth (hence abandoning the MAR externalities).

Comparably, Henderson et al. (1995) find opposing results that support MAR externalities. The authors analyze employment growth in the US metropolitan areas

¹ For detailed literature, See De Groot et al. (2016) and Content &Frenken (2016)

between 1970 and 1987 and find that localization (specialization), along with competition, encourage employment growth for mature industries. However, they reported positive effects of diversity on employment growth among new high-tech industries, supporting Jacobs externalities in this case.

Those findings were later questioned by Combes (2000) through his assessment of methodology used as he questions the positive effect of specialization noting that the insertion of a specialization index and total employment among the regressors generates bias towards specialization coefficient and might cause misleading interpretation and upholds endogeneity concerns (Combes and Gobillon, 2014). Combes (2000) conducted his analysis in the French context for the period of 1984 to 1993 and found dissimilar effects for manufacturing and service sectors. He concludes that Jacobs's externalities are favorable for employment growth in service sectors while in manufacturing industrial mix and variety diminishes employment growth.

A detailed survey of literature on related empirical studies was presented by De Groot et al. (2016). The authors reflect on the absence of clear cut-evidence on the impact of localization and Jacobs externalities. The authors compile more than 300 studies and find an almost equivalent number of studies that approve MAR (specialization) hypothesis in explaining city's growth and others that don't. Considering Jacobs externalities, they find 122 studies that confirm Jacob's theory, 46 ones that disapprove it, but surprisingly 143 studies that find insignificant outcomes which reflect the inability of Jacob's theory to explain the economic growth in regions. As for competition, the majority of the studies confirmed its ability to explain cities' growth, with the majority of the studies finding a positive relationship between competition and economic growth and development in cities.

In more recent studies, Frenken et al. (2007) further developed on Jacobs externalities by addressing regional diversification (also identified at portfolio theory). The author introduces the concepts of related variety (Jacobs externalities generated within sectors) and Unrelated Variety (externalities generated between sectors), indexed by Entropy measures. His analysis covers the Netherlands between 1996 and 2002 and confirms that Jacobs externalities enhance employment growth, whilst unrelated variety reduces unemployment growth. Similar studies in Spain for Boschma et al., (2012) confirm

those findings on the significant positive contribution of related variety to regional employment growth.

De Vor& De Groot (2008) use data on employment growth of site-industries on 68 formal industrial sites in the municipality of Amsterdam (1998-2006) and find that at the site-industry level, specialization slows down growth. As well, the authors find significant contribution of urbanization economies as they note that industrial sites that are easily accessible from the highway grow relatively fast similarly to sites located in the Amsterdam harbour area, which reflects that importance of geographic proximity to urban areas and access to transportation and similar benefits generated from urban infrastructure.

Alike further investigations on spatial externalities' impact in the UK are conducted by Bishop and Gripaos (2009). The authors find that (1) specialization has a negative impact on growth (2) the impact of diversity is heterogeneous across sectors (3) strong local competition has a generally positive impact. Similarly, focusing on the UK's services sector, Johnston and Huggins (2017), argue that diversity and related variety have significant positive implications on regional development. The authors find a positive impact of related variety on employment growth in sector-intensive economies, hence emphasizing its importance of diversity and urbanization over specialization in what they refer to as "lighter" industries (as compared to manufacturing). The latter point was emphasized as well in the study of Mameli et al (2013) who argue for the need to take the nature of the sector into consideration and to differentiate the analysis between manufacturing and services sectors. The authors investigate the impact of diversity on regional employment growth in Italy (1991-2001) and strong supporting evidence for the general positive effect of a diversified sectoral on local employment growth seems, with big role of RV in services industries and no role for RV in manufacturing.

Another study for Van Oort et al (2014) assessed the data covering 205 European regions (2000-2010). The authors confirm the hypotheses that related variety is significantly related to employment growth, noting its main influence in small and medium-sized cities. However, they do not find any robust relationship between

unrelated variety and unemployment growth. Content and Frenken (2016) conduct a literature review covering 21 prominent studies following Frenken (2007) and further validate the initial hypothesis that related variety supports employment growth, despite their reflection on some studies which mediate the growth effects of related variety by the nature of the sector, essentially acknowledging knowledge intensive ones.

Unlike previous studies, in the Finnish context, a study is conducted by Hartog et al (2012) for the period 1993 to 2006 finds that generally related variety does not influence regional employment growth, with the exception for high-tech sectors. Hence, they emphasize the importance of taking the nature of the sector into consideration and the degree of technological weight involved within, which might have impact on how employment growth in different sectors respond to regional industrial structure differently.

Summing up, though it looks complex to identify clear-cut conclusions on the nature of the relationship between different externalities and employment growth on a local level, this framework is evaluated as a valuable framework to investigate the performance of sectors-cities, their trends and economies, which will be the basis for the methodology in this study.

4. Data

4.1 Study area

The data in this paper refer to Catalonia², an autonomous region in northeastern Spain whose capital is Barcelona. Our analysis is carried out at local level for 451 municipalities in Catalonia.³ Noting that the major purpose of this paper is to investigate the dynamics of employment in creative economies and the generated spillovers on local levels, we attempt to include the main hubs of the region as well as surrounding peripheral areas. In other words, extended metropolitan areas (MAs) of Catalonia are included in this study. The designation of the geographical scope of this paper has taken considerable thought in line with the nature of the study and the spatial continuity among municipalities and their economic connections on one hand and data limitations

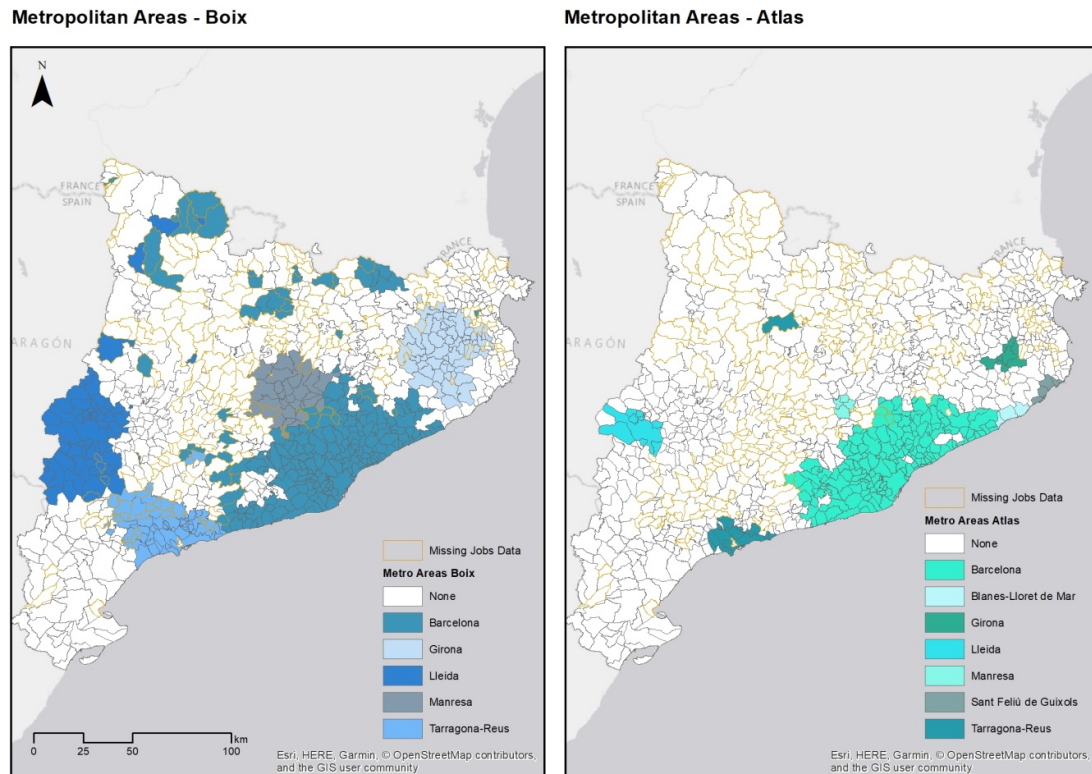
² Catalonia has about 7.5 million inhabitants (15 per cent of Spain's population) and an area of 31,895 km². It accounts for 19 per cent of the Spanish gross domestic product.

³ Current number of Catalan municipalities is 948, but we use only those that existed during the period (2001-2011) considered (i.e., 946).

on the other. Two approaches were shortlisted to identify the Metropolitan areas (1) based on a study of Trullén and Boix (2005) and (2) Atlas & official Spanish identification for Catalan MAs (Figure 1). The latter was then disregarded because it covers a smaller number of municipalities, which would bias, and even constrain the ability of this study to measure spill over effects of CCIs.

In the profound literature on employment growth, the majority of the studies have taken a regional or national-level approach (for example O'Connor et al., 2018 in Ireland; Eriksson et al., 2017 for Denmark and Sweden; Hartog et al., 2012 in Finland) others have considered the county-levels, considering both metropolitan and non-metropolitan counties (for example Fallah et al., 2013 for U.S.) or city-levels focusing on urban cities only (Illy et al., 2011 in Germany). We follow studies that focus on local-municipalities level such as Glaeser (1992), the study from which our econometric model is adapted, Henderson et al., (1995) and Combes (2000). Blein et al. (2006).

Figure 1 Metropolitan Area of Catalonia Trullén and Boix (2005) vs. Atlas (2004)



Source: Own Elaboration

4.2 Datasets

The classification proposal on creative class identifies 3 segments within: Creative Professionals (CP) Supercreative (SC) and Bohemians (BO). As mentioned earlier, this study can follow two approaches. The first one is to consider employment data at the industry level where separate creative sectors can be identified based on 3 and 4-digit classification provided by CNAE, similarly to the sectoral classification methodology used in previous studies. The second one is to consider employment data at the profession level and in our case we make use of this classification for the “Creative Class”, mainly due to data considerations.

Data is collected from different sources. To start with, the general employment growth data is obtained from the IDESCAT (Statistical Institute of Catalonia) and the Census of Population and Housing of years 2001 and 2011 from the National Institute of Statistics. As well, other sources have been used mainly JMAC from IDESCAT and Trullén and Boix (2005) for geographical data the covers spatial dimension and Coll-Martinez and Arauzo-Carod (2017) for Location Quotient (used as an index to assess the degree of specialization in the creative class). Table 1 below provides a brief description on data collected and allocated.

Table 1 Variables and Data Sources

Variable	Definition	Year	Source
CODE	Municipality Code		IDESCAT
NAME	Municipality Name		IDESCAT
COUNTY	County Number		IDESCAT
SEA	Dummy of seaside (1:seaside)		IDESCAT
AMBA	Dummy of Metropolitan Area (1:Barcelona)	2001	JMAC from Trullén and Boix (2005)
AMGI	Dummy of Metropolitan Area (1:Girona)	2001	JMAC from Trullén and Boix(2005)
AMTA	Dummy of Metropolitan Area (1:Tarragona-Reus)	2001	JMAC from Trullén and Boix(2005)
AMLL	Dummy of Metropolitan Area (1:Lleida)	2001	JMAC from Trullén and Boix(2005)
AMMA	Dummy of Metropolitan Area (1:Manresa)	2001	JMAC from Trullén and Boix(2005)
DIST-CAP	Distance to Barcelona (km)	2001	JMAC
INFRAAERO	Mean distance to closest airport (BCM, GI, RE) (minutes)	2001	JMAC
MEDUNI	Intermediate University Degree (% of workers)	2001	JMAC from IDESCAT
SUR_T	Total surface of the Municipality	2001	IDESCAT
SMALL	Jobs in firms with – employees (%)	2001	JMAC from IDESCAT
OCU_IND	Jobs in Manufacturing (%)	2001	JMAC from IDESCAT
SuperCreative 11	Number of employed people	2011	Census of Population & Housing of 2011 (National Institute of Statistics)
CreativePro11	Number of employed people	2011	Census of Population & Housing of 2011 (National Institute of Statistics)
Bohemian11	Number of employed people in Bohemian Work	2011	Census of Population & Housing of 2011 (National Institute of Statistics)
CreativeClass 11	Sum of supercreative, Creative Pro & Bohemians	2011	Census of Population & Housing of 2011 (National Institute of Statistics)
SuperCreative 01	Number of employed people	2001	Census of Population & Housing of 2001 (National Institute of Statistics)
CreativePro01	Number of employed people	2001	Census of Population & Housing of 2001 (National Institute of Statistics)

Bohemian01	Number of employed people in Bohemian Work	2001	Census of Population & Housing of 2001 (National Institute of Statistics)
CreativeClass 01	Sum of supercreative, Creative Pro & Bohemians	2001	Census of Population & Housing of 2001 (National Institute of Statistics)
Emp_pop_01	Employed population in 2001	2001	Census of Population & Housing of 2001 (National Institute of Statistics)
Emp_pop_11	Employed Population 2011	2011	Census of Population & Housing of 2011 (National Institute of Statistics)
LQ	Location Quotient for Creative Class in Catalonia	2004	Coll-Martinez & Arauzo-Carod (2017)

4.3 Variables and estimation

Data is collected for all Catalan municipalities, then reduced to 451 municipalities considering the geographical scope of the study. Taking into account the missings in the data, only observations from 420 municipalities were run in the regression. There is a significant different between the size of the municipalities and their economic potential in terms of population, employment and urbanization, specially as compared to Barcelona which stands out; this would generate spillovers which makes it essential to check for spatial autocorrelation. The three categories of the Creative Class, despite noticeable differences in their employment values (variations from zero employees to 25,000, and Barcelona with exception of a range within the 200,000 employees) are all responsible for the growth rates in the Creative Class, and thus none of them is disregarded noting their equivalent contribution to employment.

In the selection of independent variables, numerous factors have been taken into consideration (1) the variables used in major preceding studies (presented in Table 2) (2) the scope of this study (3) geographical nature of the Catalan case (4) data missings and limitations (5) correlation among variable and goodness-of-fit potential.

Table 2 Variables used in Preceding Literature on Agglomeration Economies

Variables	Dependent Variable	Sector Specialization	Employment Concentration	Diversity	Unrelated Variables	Competition	Urbanization Economies	Spatial Heterogeneity	Level of Human Capital	Income Distribution
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Authors	Employment Growth ⁴	Location Quotient ⁵	Specialization Index	Location Quotient	Other sectors' emp ⁶	Inverse HHI ⁷	Entropy Measure	Size-band data ⁸	Number of firms per	Population Density	Reg/Pop Dummies	Regional Dummies	Residence/Work Ratio ¹⁰	High Education	Gini Coefficient
Glaeser et al. (1992)	✓		✓		✓				✓			✓			
Henderson et al.	✓		✓			✓								✓	
Combès (2000)	✓		✓			✓				✓		✓			
Bishop & Griupai os		✓					✓		✓	✓		✓			
Eriksson et al. (2017)	✓			✓	✓				✓		✓		✓	✓	✓
De Sanata Ribeiro	✓	✓	✓		✓					✓					
Wang et al. (2016)	✓			✓	✓		✓		✓						

Source: Prepared by the Authors

All explanatory variables are measured in 2001. According from previous concerns, our dependent variable is the change of local employment between census of 2001 and 2011. As we assume that specialisation in creative industries is a key driver of employment growth we will focus our analysis on several indicators of that specialisation. In addition to that and according to previous literature we include

⁴ The change in the log of employment in a sector in a particular area over a period of time

⁵ The proportion of local employment accounted for by a sector in a specific locality divided by the proportion of employment accounted for by the sector nationally. This measure is interchangeably used among studies for measuring degree of specialization and degree of concentration (a methodological concern raised by Francasso and VittucciMarzetti (2017))

⁶ Logarithmic value of total employment minus the industry class in question

⁷ The inverse of an Herfindahl index of sectoral concentration based on the share of all sectors, except the one considered.

⁸ The proportion of establishments in the sector with 10 or fewer employees relative to the proportion in this category as a whole

⁹ Population per Square Kilometre

¹⁰ An indicator to control for the differences among the qualitative functionality of municipalities (residential municipalities vs. employment municipalities)

¹¹ Proportion of Workers with at least a Bachelor's degree

different vectors of variables referred to a combination of social, economic, geographical and infrastructural factors.

Consequently, these variables include several vectors related to *i)* agglomeration economies, *ii)* transport infrastructures, *iii)* population, *iv)* socioeconomic conditions, *v)* geographical location, and *vi)* education.

As mentioned earlier, the theoretical framework for our empirical analysis is an adaptation from Glaeser et al. (1992); a model which have been commonly used by many similar studies among which are the following De Voor& De Groot (2008), Bishop & Grippaios (2009), Eriksson et al, (2017), O'Connor et al. (2018). Criticisms and alterations have been suggested to enhance this model, mainly the input provided by Combes (2000). However, it is essential to mention that the geographical scope of the study (local-municipality level) and quality of the data available delimits, to a certain extent, the incorporation of the advancement possibilities of the model, unless where possible and data allows.

Table 3 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Ration Job to Population 2001 (jobpop01)	419	0.3209668	0.2477549	0.034965	2.675403
Creative Class 2001 (cc01)	420	1190.098	9928.992	0	200085
Super Creative 2001 (sc01)	420	134.8524	1359.699	0	27582
Creative Professional (cp01)	420	987.4667	7926.457	0	159367
Bohemians 2001 (bo01)	420	67.77857	646.9156	0	13136
Sea Side (Sea)	420	0.0928571	0.2905783	0	1
County Capital (Capcounty)	420	0.0309524	0.1733953	0	1
Distance To Barcelona (Distance)	420	72.24762	41.91263	0	193
Rail	420	0.1380952	0.3454114	0	1
Jobs in other industries (OCU_IND)	420	24.09762	10.44488	1	55
Jobs in Firms with 0-50 employees in % (SMALL)	420	277.5619	118.924	1	374
Location Quotient LQ)	420	0.5760315	0.5427993	0	4.648263

Total Surface of the Municipality (SUR_T)	420	183.331	132.9714	1	526
Intermediate University Degree (University)	420	314.7357	169.2494	1	605
Mean Distance to Closest Airport (Airport)	420	36.56905	29.8597	0	180

Concretely, dependent variable is defined as percentage employment change at municipality level during the period 2001-2011. As for independent variables, they are calculated as well at municipality level (except for that relative to metropolitan area) and are referred to 2001. All explanatory variables are measured in 2001 and are in log form (except for geographical dummies that represent Metropolitan Areas and sea side). For agglomeration economies and sector specialization, we use *Location Quotient*. Models presented by Glaeser et al. (1992), Handerson et al. (1995) and the further contributions by Combes et al. (2008) were recently revisited by Francasso and Vittucci Marzetti (2017) who examine the confusion around the definition and estimation of localization economies in empirical work and the ambiguous referencing to specialization and concentration in Glaeser et al. (1992) and Handerson et al. (1995). Hence, we follow their suggestion that applied researchers can “select between the size of the local industry, the specialization index and the location quotient to proxy for these externalities as far as they also encompass a correct proxy for the size of the local economy”. The specialization level of creative class is represented by Location Quotient for the creative class in total, adapted from Coll-Martinez and Arauzo Carod (2017). Similar approach was used by Alanon-Pardo et al. (2017). Another variable used as a correct proxy to measure specialization is the initial state of the creative class in the base year 2001.

As well as agglomeration economies variables include *jobpop01*. Population density and employment for 2001 are substituted by the ratio (*jobpop01*) as the two variables are highly correlated. Second, transport infrastructure variables which are also indicators of urbanization economies include rail and airport, which represent the access of the municipality to transportation infrastructure and its connection ability within metropolitan areas of Catalonia. For Diversity, we use the percentage of jobs in other industries. Instead of following other studies in the usage of the inverse HHI, because it

happened to have high correlation with other variables in our case, we use this variable as a proxy to the diversity in the economy, which means percentage of people working outside the creative class.

We use a dummy for county capital, and other variables we use for Spatial Heterogeneity are dummies allocated to the Metropolitan Area, *sea* (whether the municipality is on the seaside or not), and the distance of the municipality to Barcelona city (the capital of Catalonia). For the human capital we use *University*, which is in line with previous research as a minimum of higher education. Table 4 below presents the correlation matrix for the variables included. *We run the first OLS regressions without GINI Coefficient, Entropy Measure AND Spatial Lagged variables. Those three considerations are to be taken into account as the paper progress.*

Table 4 Correlation Matrix

	jobpop01	cc01	sc01	cp01	bo01	Sea	Capcounty
jobpop01	1						
cc01	0.082	1					
sc01	0.0786	0.9982*	1				
cp01	0.083	0.9999*	0.9974*	1			
bo01	0.0759	0.9985*	0.9986*	0.9978*	1		
Sea	-0.0132	0.1977*	0.1833*	0.2006*	1901	1	
CapCounty	0.0879	0.3649*	0.3436*	0.3704*	0.34	0.1797*	1
Distance	-0.2593*	-0.1475*	-0.1287*	-0.1514	0.1379	-0.2198*	-0.0684
Rail	0.0834	0.2130*	0.1916*	0.2183	0.1927	0.4664*	0.2871*
OCU_IND	0.3465*	-0.0099	-0.0187	0.0083	0.0111	-0.1209*	0.022
SMALL	-0.5355*	-0.1510*	-0.1368*	0.1545	0.1367	-0.0663	-0.1585*
LQ	0.2357*	0.1143*	0.1042*	0.1166	0.107	0.067	0.0929
SUR_T	-0.0736	0.1217*	0.1226*	0.122	0.1148	-0.0942	0.1575*
University	-0.062	0.0682	0.0728	0.0678	0.0634	0.0801	0.0366
Airport	-0.2501*	-0.0788	-0.0689	0.081	0.0714	-0.1420*	-0.0915

	Distance	Rail	OCU_IND	SMALL	LQ	SUR_T	University	Airport
Distance	1							
Rail	-0.1450*	1						
OCU_IND	-0.6305*	0.0505	1					
SMALL	0.3753*	-0.2362*	-0.4608	1				
LQ	-0.4641*	0.1111*	0.4966*	-0.3099	1			
SUR_T	0.2579*	0.0386	-0.1826*	0.0923	-0.097	1		
University	0.0242	-0.0008	-0.2652*	0.1695	0.0308	-0.023	1	
Airport	0.5077*	-0.1310*	-0.3611*	0.2449	-0.2197	0.3496*	0.0912	1

Significance level (p<0.05)

Consequently, we further aim to estimate the local employment change as a function of the local specific characteristics previously described as well as spatially weighted factors as follows:

$$N_{ij} = \beta X_j + \beta W X_j + \varepsilon_{ij}$$

where N_{ij} is the employment change to industry i located in the municipality j , X_j include the previously explained set of covariates, $W X_j$ include the spatially weighted average of neighbour municipalities of some of previous covariates and ε_{ij} is an error term.

5. Empirical analysis

Empirical analysis includes a spatial exploratory analysis intended to identify spatial patterns regarding both dependent and independent variables, and an econometric analysis in which causality relationships between employment growth and their determinants are identified.

5.1 Spatial Exploratory Analysis

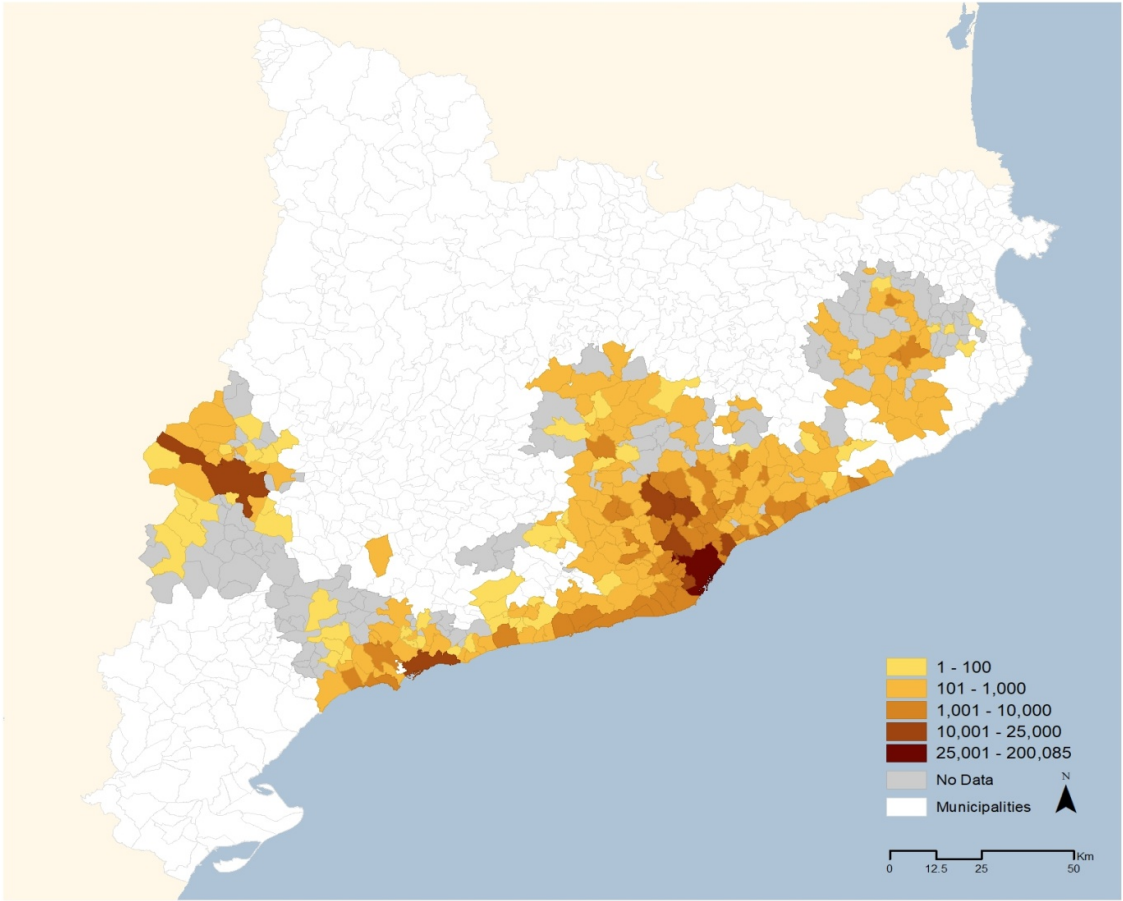
To start with, we visualize the trends of the Creative Class between 2001 and 2011.

Figure 2 shows a geographical representation for the Creative Class in 2001 and further classifications for the SuperCreative, Creative Professionals and Bohemians. Figure 3 represents the same for 2011. Figure 4 then provides a representation for the employment change in the Creative Class between 2001 and 2011.

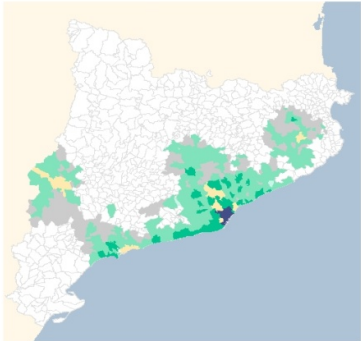
The figure shows clearly a growth in the employment in the creative class in more urban areas, close to capitals of counties at the expense of the creative class in suburbs and more rural areas of the Metropolitan areas of Catalonia. This growth rate is to be further analyzed using econometric methods. The geographical distribution of employment both in general terms and at the Creative Class level will be further explored mainly through using different indicators in order to check similarity/dissimilarity among municipalities. Among these indicators we will concentrate over Dissimilarity Index (Wong, 1993), Gini Index (Duncan and Duncan, 1955) and Entropy Index (Theil, 1972). In addition, spatial autocorrelation is also visited.

Figure 2 Creative Class in Metropolitan Area of Catalonia in 2001

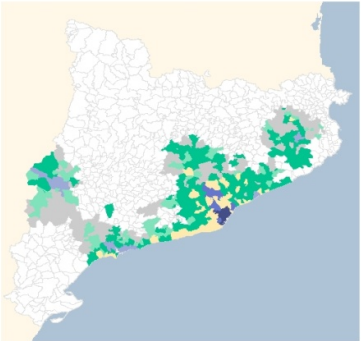
CC 2001



SC 2001



CP 2001



B 2001

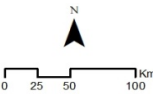
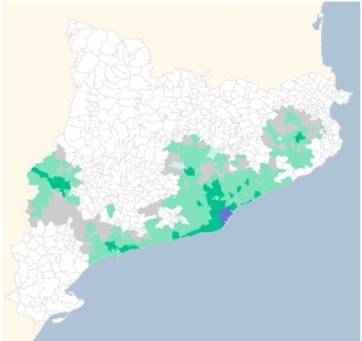
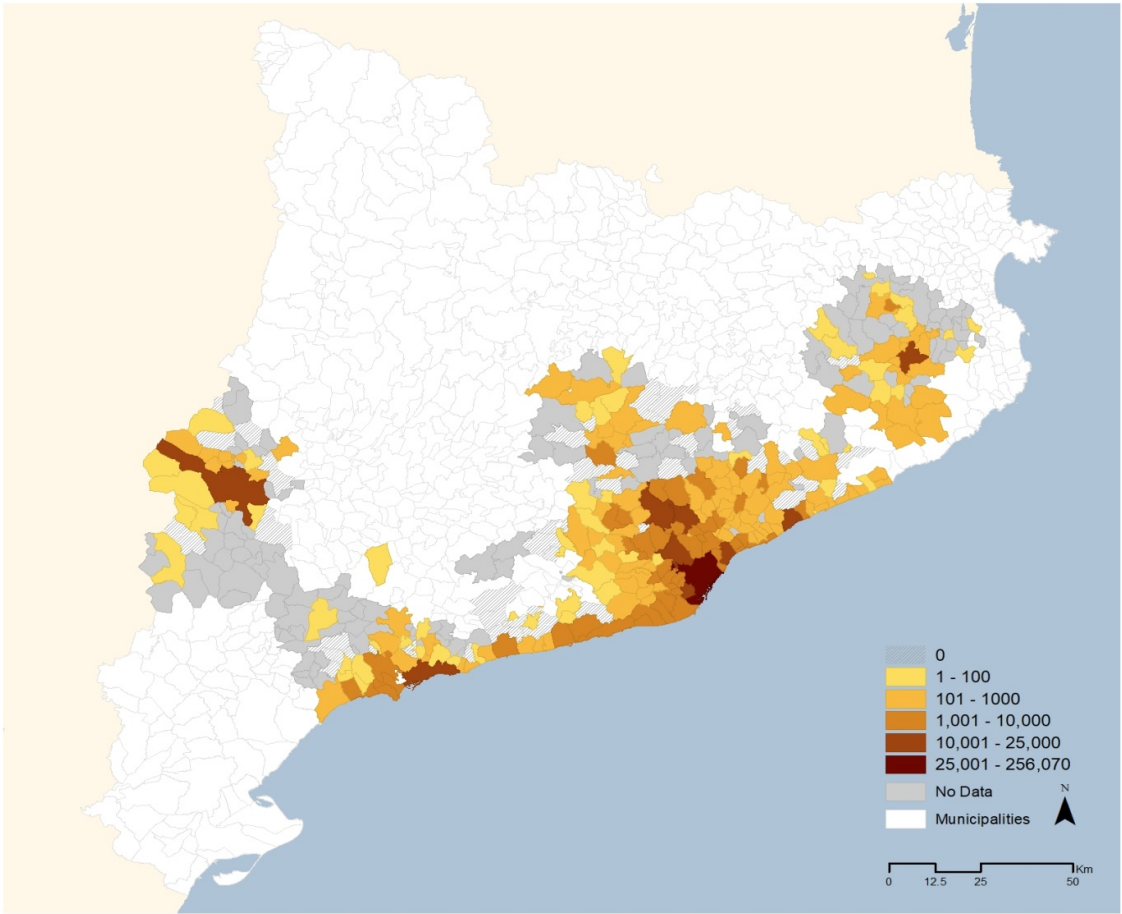
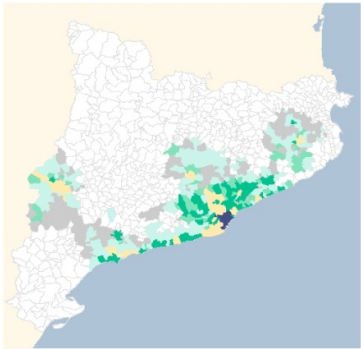


Figure 3 Creative Class in Metropolitan Area of Catalonia in 2011

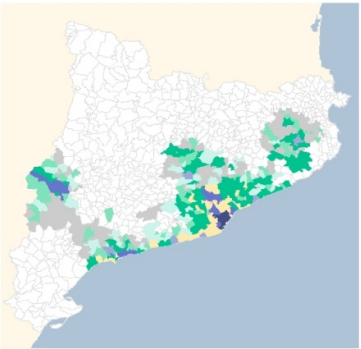
CC 2011



SC 2011



CP 2011



B 2011

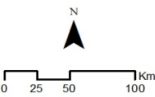
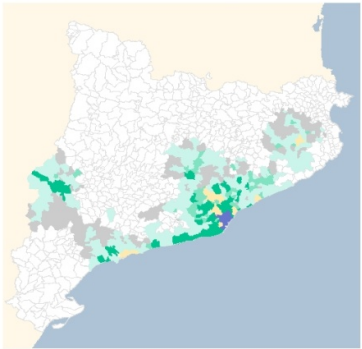
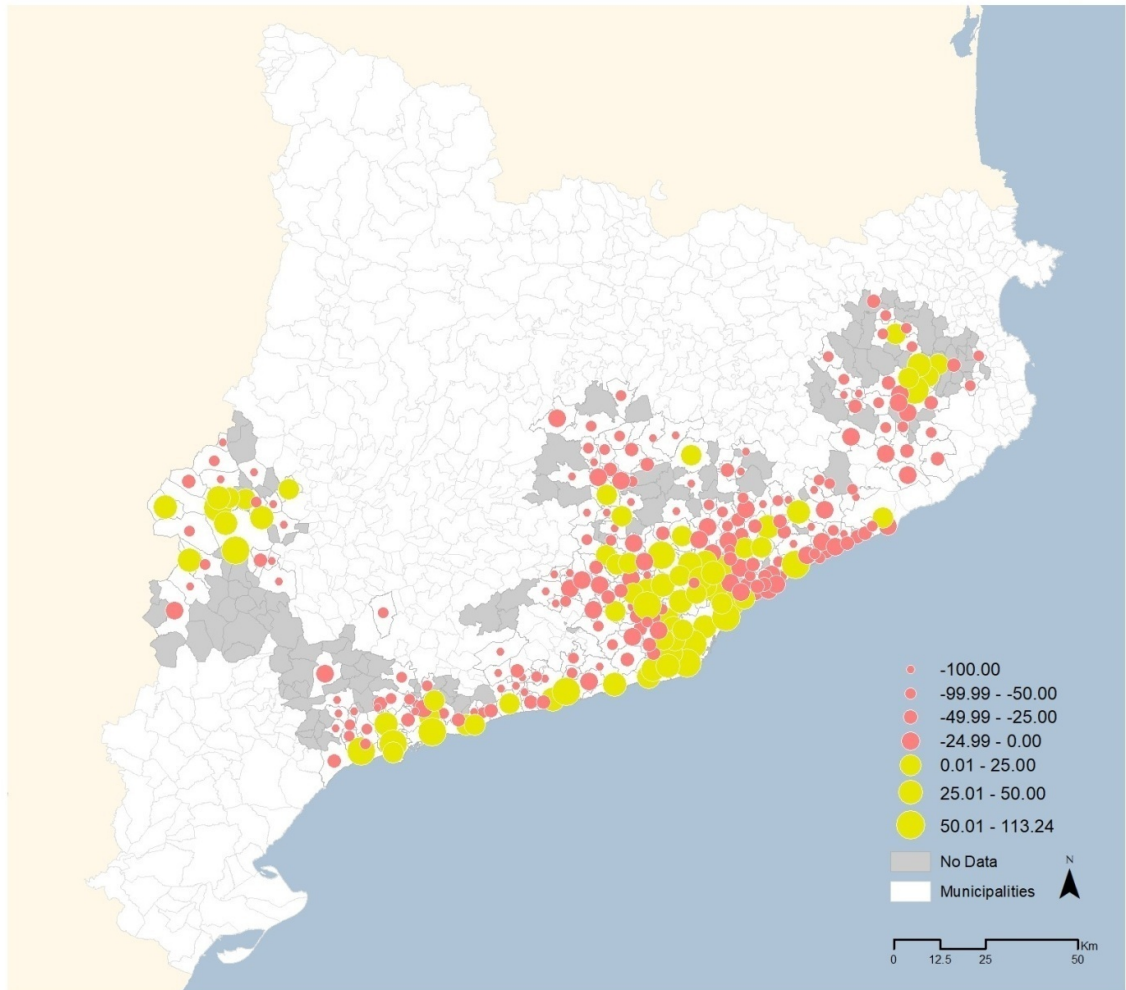


Figure 4 Percentage Growth of Creative Class (2001-2011)

CC Growth Percentage 2001 - 2011



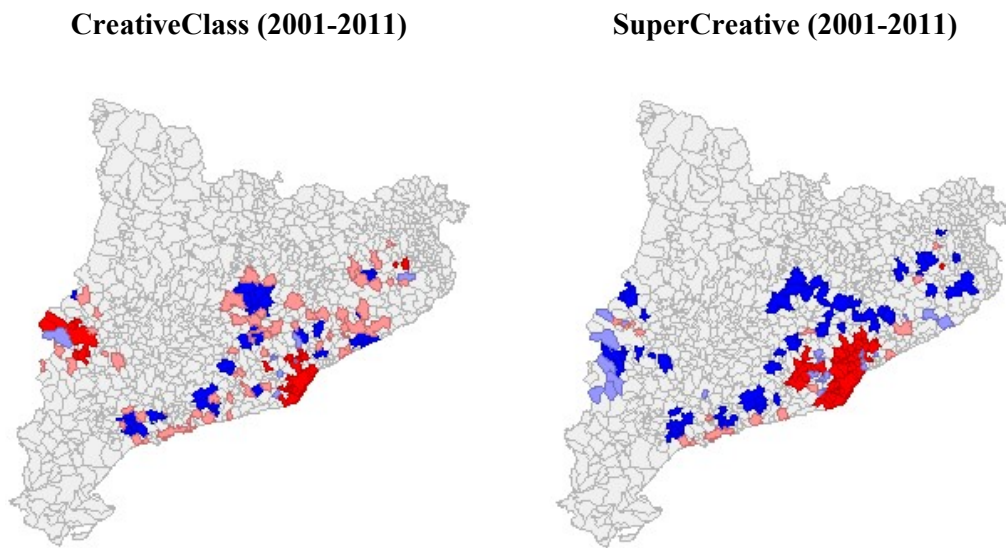
In order to take into account spatial issues in terms of location of CCIs and also in terms of potential interactions across close areas we have *i)* calculated a W spatial weight matrix (row-standardised) and *ii)* analysed the existence of spatial autocorrelation phenomena for the explanatory variables. Concretely, W is a symmetric matrix with 1/0 values indicating whether two municipalities are neighbours or not (here, neighbourhood is defined considering the 5 closest municipalities)¹². Later on, this W matrix is used in order to calculate the existence of both global and local spatial autocorrelation (LISA) of dependent variables. In this sense, global autocorrelation

¹² Although there are different criterion for neighbourhood (i.e., spatial contiguity, distance rings, etc.) in view of number and spatial distribution of geographical areas used in this paper, using N closest neighbours seems to be the more appropriate strategy. Nevertheless, alternative neighbour definitions will be tested in order to avoid any bias.

(Moran's I) provides a general overview about the way in which dependent variable distribute across close locations, whilst the local index of spatial association (LISA) allows to identify if that spatial autocorrelation applies uniformly or if, on the contrary, is concentrated in some areas (i.e., municipalities).

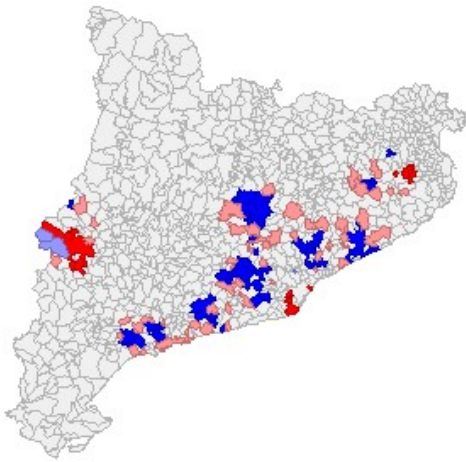
A first approach to Moran's I¹³ shows that there is some (minor) spatial autocorrelation for dependent variables, specially for growth of Creative Professionals between 2001 and 2011 (0.250) and for Creative Class (0.203), whilst it is of less importance for Super Creative (0.152), Bohemians (0.053), and for the total employment growth (0.032). In terms of the local index of spatial association (LISA) the situation is slightly different, as there is some positive high-high local spatial autocorrelation at the core of the metropolitan area of Barcelona, specially for the growth of SuperCreative and Bohemian groups and, to a lesser extent, for Creative Class. In opposite terms there is still low-low local spatial autocorrelation at the periphery of the core of the metropolitan areas considered in this analysis, but in a more dispersed way (see Figure 5).

Figure 5: Local Index of Spatial Association (LISA)

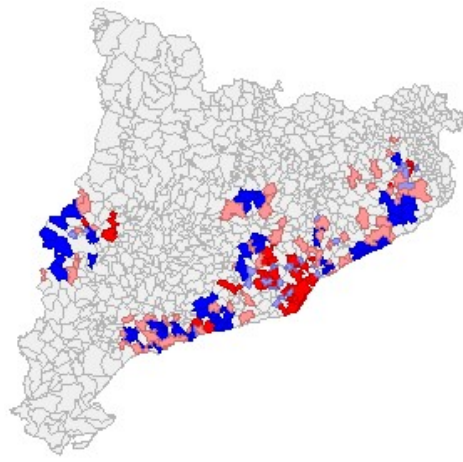


¹³ In this preliminary analysis, spatial autocorrelation is calculated for all Catalan municipalities, although econometric analysis concentrates on 420 of them. Reason behind this strategy is lack of data regarding CCI's for smaller municipalities. Nevertheless, as these municipalities are quite clustered inland and both extreme North and South areas of Catalonia, global results are only partially affected.

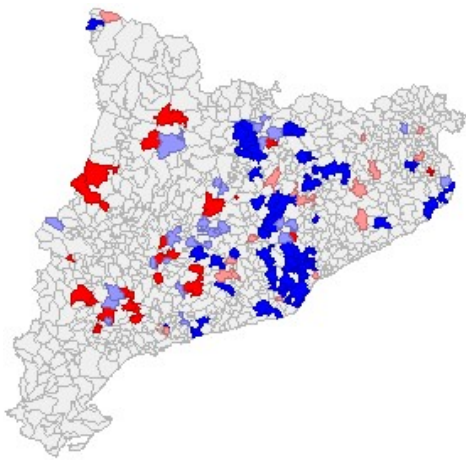
CreativeProfessionals (2001-2011)



Bohemian (2001-2011)



Total Employment (2001-2011)



Source: own elaboration.

5.2 Econometric model

As we have explained previously, this paper examines the impact on CCIs on local employment growth in Catalan municipalities. Our econometric strategy consists on estimating a baseline OLS model without spatial effects and then add spatial lagged variables of explanatory variables that may suffer from spatial dependence and, later on, to estimate alternative spatial models as spatial lag and spatial error ones.

As there are missing values for creative class employment in smaller municipalities we focus only of 420 Catalan municipalities, those that correspond to metropolitan areas of Barcelona, Reus-Tarragona, Girona and Lleida, as identified by Trullén and Boix (2005). Concretely, regressions are conducted by including the three categories of creative class (Creative Professionals, Super creative and Bohemians). This strategy is similar to that of Glaeser et al. (1992) and Combes (2000), but instead of using industries we use professional categories. Then, regressions are performed on each of the categories separately, keeping all municipalities under study, as noted by Combes (2000) “to avoid introducing a selectivity bias”, divergent from Glaeser et al. (1992).

In this sense, the first specification is an OLS model without any kind of spatial effects, assuming that there is no any spatial interaction across observations (i.e., municipalities), so they geographical position is not being considered at all. The second specification adds some spatially lagged variables to previous list of covariates. This is done trying to take into account that as some of these covariates have a broader spatial range and, therefore, there are some homogeneities that go beyond municipal borders, then considering values in a group of neighbor municipalities instead only on a single one should be a better strategy. A brief representation of **_preliminary** results is provided in Table 5. As well, the Variance Inflation factor was measured to check for multi-collinearity and all scores for the models and variables were below 1.60.

Table 5 Preliminary Results OLS Regression

Variable	CREATIVE_CL~S	SUPER_CREAT~E	CREATIVE_PR~L	BOHEMIAN	TOTAL_JOBS	W_CREATIVE_~S
LocationQu~t	6.0269089	6.8416451	7.3522239**	1.7431541	13.897849	5.7964464
capcom	-10.265351	1.7388884	-12.937454*	.34767505	-1.3013257	-12.153975
dist__pro	.14489469	-.05847046	.1471728	-.12224805	.0055602	.10574701
HIGHUNI	-.06978175***	-.09351548***	-.07002095***	-.04195098***	-.00427244	-.06468453***
OCU_SER	-.23240699***	-.29638841***	-.27594633***	-.15644477***	-.10509148	-.20285364***
jobpop01	35.438814**	33.070395*	31.475893*	26.365842**	2.6760627	31.67182*
cc01rel	134.50667***				-80.117475***	134.93489***
sc01rel		1429.4595***				
cp01rel			151.5148***			
bo01rel				1882.1681***		
WJOBSS01						.05931289**
WCC01						-.13143671**
WSC01						
WCP01						
WBO01						
_cons	34.065914***	62.288512***	36.790558***	36.657172***	92.047539***	23.826833**
N	419	419	419	419	419	419
r2_a	.43066672	.3759286	.47163845	.44022536	.04236846	.44483992

Variable	W_SUPER_CRE~E	W_CREATIVE_~L	W_BOHEMIAN	W_TOTAL_JOBS
LocationQu~t	4.1277017	6.6842031*	.13630779	11.192846
capcom	-3.2639714	-15.17137**	-4.0597354	-1.0354732
dist__pro	-.02826163	.11140932	-.08002034	.12874173
HIGHUNI	-.08507329***	-.06413735***	-.03697652***	-.0088282
OCU_SER	-.27819877***	-.2451125***	-.13796424***	-.16566392
jobpop01	20.382837	25.735248*	16.422046*	-3.4953141
cc01rel				-103.21102***
sc01rel	1251.0365***			
cp01rel		148.55152***		
bo01rel			1663.7909***	
WJOBSS01	.06430428***	.06958272***	.0558227***	-.06370334
WCC01				.21941079**
WSC01	-.12940602*			
WCP01		-.14472233**		
WBO01			-.14304673***	
_cons	44.811531***	24.394814**	21.022579***	99.36681***
N	419	419	419	419
r2_a	.39775953	.49304769	.47664694	.0593859

6. Conclusions

This paper is about cultural and creative industries. Concretely, we are interested in analysing i) what explains employment growth in these industries and ii) how local specialisation in these industries may boost employment growth in all the economy. Our interest in cultural and creative industries comes from their increasing role in developed country and the existence of positive externalities that arise from them and benefit the rest of economic activities, even if they have no direct relationship with them.

Although this paper is very preliminary, our first results corroborate our expectations in terms of cultural and creative industries as growth drivers for the whole economy. Nevertheless, additional work is to be done in order to get consistent and complete results.

It is noticeable that these results lead to some important policy implications. Roughly, they point to the relevance of public investments and public promotion of cultural and creative industries as dynamism generated by these industries spreads over their borders. Additionally, it is important to consider that cultural and creative industries use high skilled workers that contribute to overall productivity growth for the whole economy, and that there are also other external effects as country's reputation.

As this is a very preliminary version, we leave for ongoing research several relevant aspects as, among others, extension of the dataset in order to cover all Catalan municipalities, testing of alternative W matrices in order to check robustness of results, use of additional spatial regression techniques in order to better account for spatial dependence, and exploration of new / alternative exploratory variables that may explain employment growth.

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