

Russo, Antonio Paolo; Domínguez, Alan Quaglieri; Crociata, Alessandro; Agovino, Massimiliano

Conference Paper

The nexus between creative workforce and economic development: looking for the causal relation

52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Russo, Antonio Paolo; Domínguez, Alan Quaglieri; Crociata, Alessandro; Agovino, Massimiliano (2012) : The nexus between creative workforce and economic development: looking for the causal relation, 52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/120564>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

The nexus between creative workforce and economic development: looking for the causal relation

ZZA. SS- Creative industries and wealth in European Regions: causality issues

Antonio Russo (1), Alan Quaglieri Domínguez (1), Alessandro Crociata (2), Massimiliano Agovino (2)

Building on work funded by the ESPON 2013 Program, the paper analyses the regional development of the “creative workforce” among its active population against regional economic growth, measured by changes in per capita GDP over the period 2001-2008 in 317 NUTS2 regions of the ESPON space (EU29 plus partner and candidate countries). The analysis establishes and explores regional typologies in this relationship, but also addresses the issue of causal relationships between the two dimensions, trying to bridge different perspectives: an “industrial district” approach by which creative places are more innovative and thus have higher chances to grow, and a “new geographic” approach à la Florida by which wealthier and more attractive places have higher chances to attract creative people, whether or not this really translate into economic development.

This issue is of particular relevance for policymakers designing regional development strategies around innovation issues: is it more important to focus on attracting creative workers through “place investments” so that potentials for innovation are boosted, or to make sure that localised creativity is transformed into real opportunities for growth? And, how is the regional context influencing that decision?

We employ statistical techniques on available data series for this analysis, but we will also look at concrete cases of different typologies of regions where this relation seems to have been working in opposite directions, trying to identify the determinants.

Key words: Creative workforce, innovation, economic development, causality

JEL codes: Z10, O15, R11

(1) University Rovira i Virgili, Tarragona. Research Group “Territorial Analysis and Tourism Studies”

(2) University "G. d'Annunzio", Chieti-Pescara. Dipartimento di Metodi Quantitativi e Teoria Economica

1. INTRODUCTION: THE GEOGRAPHY OF CREATIVITY (AND INNOVATION) IN EUROPE

A number of research and policy reports have focused in the recent years on the dimension of the creative and cultural industries in Europe. The European Cluster Observatory report on the Creative and Cultural Industries (Power and Nielsén, 2010) estimates that Europe's creative and cultural industries employed a total of 6,576,558 persons, namely 2.71% of the whole European labour market¹. These industries exhibit such strong growth that «regional creative and cultural specialisation explains 60% of the variance in GDP per capita» (p.4), and 'regions with high concentrations of creative and cultural industries have Europe's highest prosperity levels' (p.6). Other reports (for instance, KEA, 2006 and EUROSTAT, 2011) account that the creative industries employ a large and increasing share of the European workforce (3.6 million for EUROSTAT, or 1.7% of total employment, rising over the 3.1 million calculated by KEA), and situate them as engines of growth (2.6% of the European GDP according to KEA). Besides they are found to be relevant for social cohesion, on account of their regional distribution and specialisation, as well as gender stratification in employment.

Though few such studies focus on analysing the drivers and mechanisms by which creative sectors foster growth, the assumption – referring to much literature in the field such as the well-known and widely accepted (by policymakers) works of Richard Florida or Allen J. Scott – is that there exists a direct link between localised creativity and capacity to innovate, and this leads to higher opportunities for a competitive and resilient regional economy: one that is anchored to places to a larger degree than most “footloose” sectors of advanced capitalism, but that at the same time has the kind of global connections which put creative places in the map of the global knowledge economy.

These facts are frequently far too easily transposed to the policy domain, with discourses that assign the creative industries a regenerating power, and justify investments in their attraction and development. However the complexity of the processes by which creative talent is attracted into places, nurtured, and brought to effectively contribute to socio-economic performance, or the way in which mainstream economic sectors can be brought to benefit from a creative local atmosphere, cast relevant doubts upon the effectiveness of these simplistic policy recipes.

A European policy targeting creativity and innovation should be based on a better knowledge of these processes, for instance incorporating concerns about the differential capacity of places to attract creative workers, on the processes of development of creative industries and on the mechanisms of “transmission” between them and the wider regional economies or specific sectors that are traditionally the real engines of employment and growth. As claimed by Scott (1997), ‘the geography of culture is stretched across a tense force-field of local and global relationships’ (p. 324),

¹ Counting employees only, and not sole traders.

while the regenerative impacts of cultural production is remarkably driven by dynamics of *clusterization* (Mommaa, 2004; Russo and Van der Borg, 2010).

In any case, accounts of the real dimensions of the “cultural economy” (with the partial – and sectorial – exception of the quoted EUROSTAT 2011 report) tend to oversee that possibly a very large part of the contribution of creativity and the (re)production of the symbolic to economic performance of firms and regions is not directly related to the “cultural economy” but rather *embedded in other economic sectors*: from the mainstream industrial sectors, where increasingly, added value and competitiveness are crucially dependent on their capacity to produce and convey “meaning” to culture-aware consumers, to the service sectors catering for consumers and firms, who are increasingly producers of idiosyncratic knowledge and experiences.

According to this view, the leading edge of growth and innovation in the contemporary economy is constituted by sectors such as the high-technology industry, neo-artisanal manufacturing, business and financial services. Together these sectors constitute a sort of “new economy” (Trip, 2007) that is strongly reliant on the creation of new symbolic meaning, something which is closely associated with situated knowledge and its articulation with global cultural and information flows. Designers, writers, architects, performers, researchers, and the like today are notably not confined in their “parental” economic sectors but constitute valuable human resources that promote the symbolic realm within any economic sector, contributing crucially to penetrate new markets and fidelise old ones, establish new communication styles, and also promoting cohesion and sense of belonging in organisational terms.

Without the pretension of addressing the full range of problems implied by the regenerative powers of creativity, we aim at a better understanding of the regional patterns in creative work and its relationship with economic development, which may hint at a complex geography of growth processes for which creative professions are either a driver or a levelling force. In this way we expect to increase the knowledge of European policymakers and regional stakeholders about issues such as in which kind of regions it is more likely that creative workers would increase or migrate to, what have been the trends in recent years, and whether they have been attracted by a buoyant economic environment or have contributed to it; in this way they will be in the position of designing more effective actions (for instance in relation to human mobility or cluster development).

This research agenda calls for an approach to the study of creativity based on employment classes rather than economic sectors, on a closer look at the regional specificities in this distribution and evolution trends, and on the association, including the causal relationship, between creative work and economic growth. We assume creative workers as a dynamic asset, characterised by a mobility which is constrained by attachment to specific places as suggested by Martin-Brelot *et al.* (2010), and at the same time tied to certain place characteristics as in the Florida literature.

Thus in the present paper we address the following questions, which we nevertheless consider as basic in order to proceed in this direction with further research:

- What has been the *spatial evolution of the creative workforce* throughout the 2000 decade? Is there any clue that regions that have been lagging behind in the “culturalisation” of their economy are catching up?
- What is the degree of association between the *growth* in creative jobs and *general economic growth*, as measured by p.c. GDP? Are there signs of a causal relation between these two dimensions, and of its direction?
- Are there any *geographical specificities* in these relationships? And in particular, are urban areas growing more “creative” than rural and peripheral ones, widening the existing gap, or are the latter catching up? Is there any clear continental pattern in the evolution of the creative economy?

To start addressing these questions, section 2 will introduce the methodology of analysis and an illustration of the data sources used in this study. Next, section 3 presents our results regarding the geographical distribution and trends of the creative workforce. Section 4 looks at the relationship between creative work and economic development, while section 5 addresses the question of the causal relationship between creative work and economic development and discusses our findings in the light of the existing literature. Finally section 6 concludes with a number of insights that could be important inputs for policy and further research.

This paper builds on the evidence collected within the framework of the ESPON 2013 project “Update of Maps and Related Data on Creative Workforce as Bearer of Innovation” (2011-2012) and used in the publication of the ESPON programme ‘Territorial Observation No. 5. Territorial Dynamics in Europe: The Creative Workforce’ (http://www.espon.eu/main/Menu_Publications/Menu_TerritorialObservations/CreativeWorkforce.html). We acknowledge Ms Fiammetta Brandajs for the production of maps included in this paper.

2. DATA SOURCES AND DATA MINING METHODS

The basic contribution of our paper looks at regional data on creative occupations across the different economic sectors and their development in time. For this we use employment data by selected professional classes as provided by the Labour Force Survey division of EUROSTAT (an approach similar to that developed by Higgs et al., 2008, in their study of the British creative economy), considering the NUTS2 regional level as the finest spatial delimitation for which such extraction produces statistically significant results for every spatial unit (it is estimated to be reliable for populations of over 300,000 per spatial unit, which is a reasonable dimension for NUTS2 region, but would fail at finer spatial levels), and allowing to distinguish predominantly urban from predominantly rural regions and a certain consistency in “cultural regions” with autonomous governance systems.

The account of the creative workforce of Europe is based on an average of values of the population in selected ISCO-88 classes (4 digits) over the 2001-2004 and 2005-2008 period in NUTS2 regions in 33 countries (EU-27, plus partner countries Norway, Switzerland and Iceland, and candidate countries Macedonia, Croatia and Turkey). The averaging is meant to ensure a higher level of accuracy of the data on the creative professions derived from the Labour Force Survey of EUROSTAT, which is low at the level of singular years due to the number of variables involved in the extraction².

The LFS extraction has picked the estimated n. of workers by 4-digit ISCO-88 professions, selecting among classes of creative occupations according to the most popular classifications of creative professions in the literature (see Table I in Annex). In various national cases where 4-digit data were not available (see complete account of data cover in Table II in Annex), a procedure was followed to estimate 4-digit data from the share of population of selected 4-digit classes within each relevant 3-digit class in countries where the 4-digit detail was available.

In addition, we have contrasted the data on the creative workforce in each NUTS2 region in the two reference periods (2001-2004 and 2005-2008) with the respective dimension of the active population, and with the p.c. GDP at current prices, using annual EUROSTAT data averaged over the same periods. In a few countries with data gaps we used instead spurious national sources or have applied extrapolation and regionalisation techniques. Whenever data gaps of either the creative workforce series or the reference series of active population and p.c. GDP were found at NUTS2 level (but data were instead available at NUTS0 or NUTS1 level), we applied “regionalisation” procedures. We have only applied this procedure when it did not result in an excessive loss or distortion of the information.

In order to address considerations of spatial and geographical specificities in the evolution of the creative workforce, we have used datasets regarding settlement structures (i.e. urban vs. rural settlements) and other geographical specificities (coastal regions, islands, border regions, etc.) derived from ESPON typologies and available in the online ESPON DataBase 2013.

3. DIMENSION AND EVOLUTION OF THE CREATIVE WORKFORCE IN EUROPE

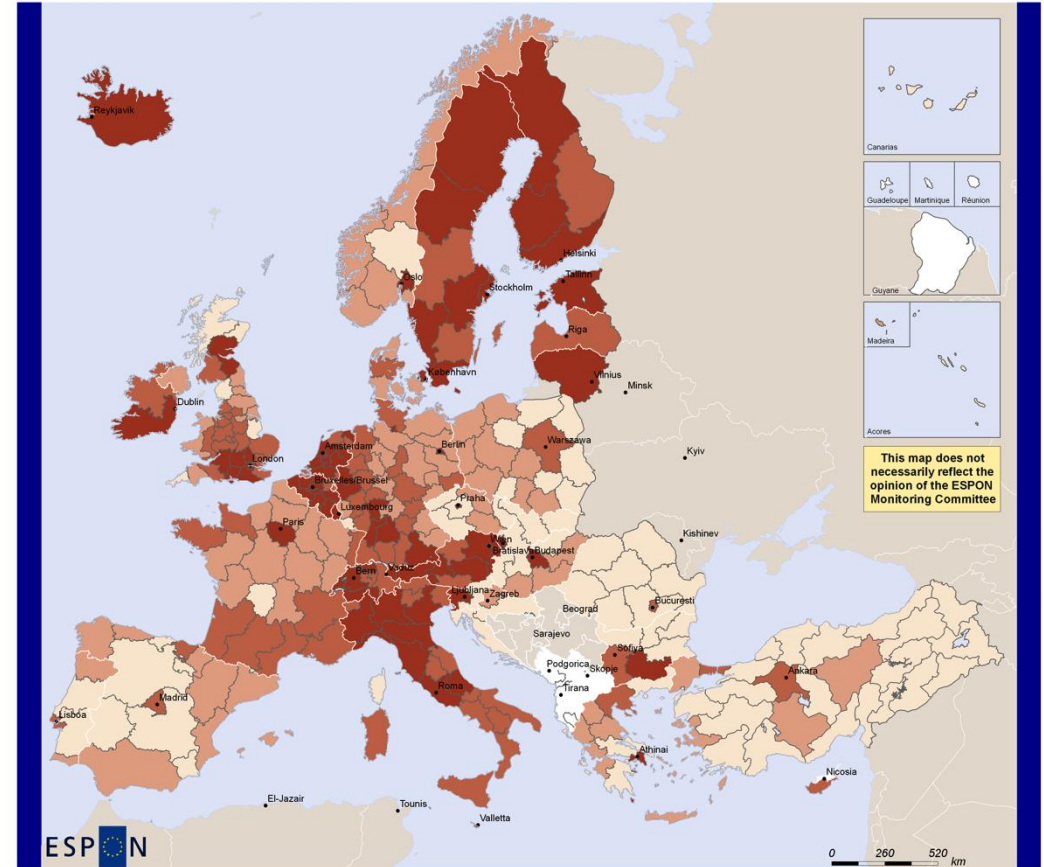
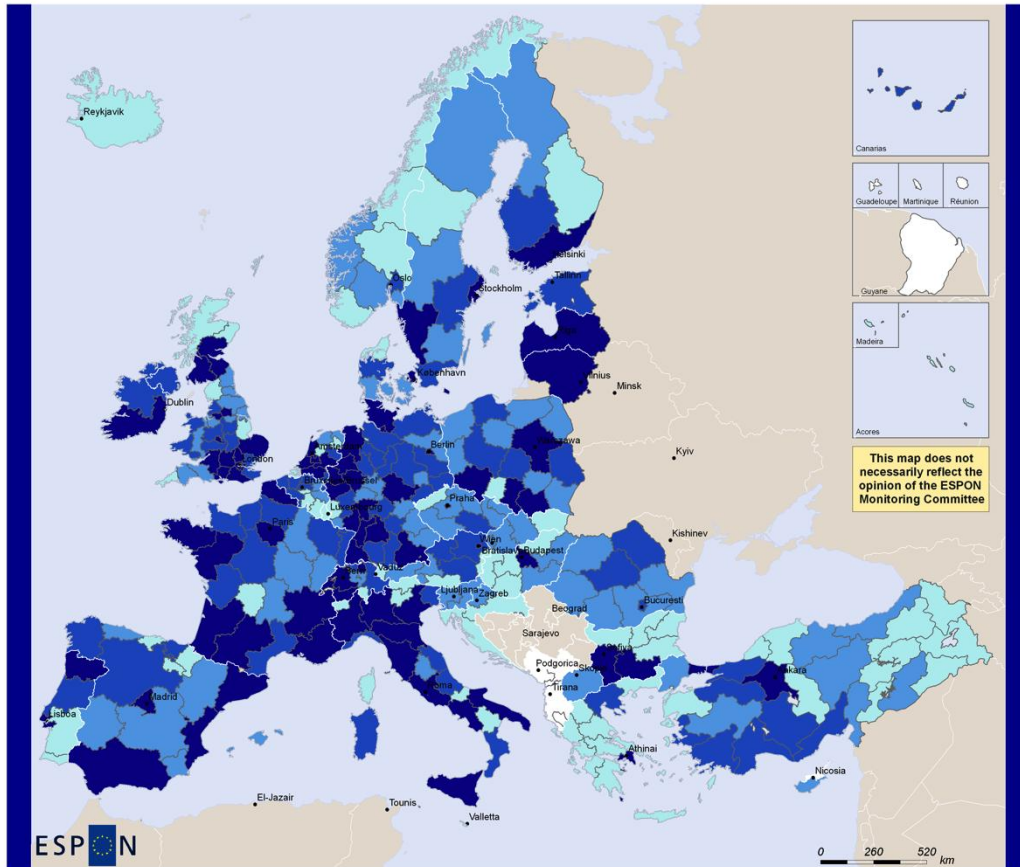
The estimated number of creative workers in Europe in the 2005-2008 period is 19,217,583. Larger countries (Germany, the UK, France, and Italy) lead the ranking (see Table 1, columns 1-4), and together they hold the 51.6% of the total European creative workforce, versus the 53.2% in the 2001-2004 period. Globally, the European creative workforce has increased by 12.7% between the two reference periods, and has become less concentrated, with only Italy and Poland increasing their share.

² Although in some countries 2009 data are also available and might be included in the analysis, we chose to delimit the analysis to 2008 for two reasons: the necessity to produce a cross-analysis with p.c. GDP data, which are available for most European regions only until 2008; and the intention to skip the “financial meltdown” years, which would disturb the analysis, and moreover is likely to have produced structural effects which can only be monitored some years in the future.

Table 1 – Dimension and evolution of the creative workforce, national data, periods 2001-2004 and 2005-2008

Country	1	2	3	4	5	6	7
	Creative workforce (abs. N. of jobs), averaged over 2001-04 period	Creative workforce (abs. N. of jobs), averaged over 2005-08 period	Abs. Change in creative workforce from 01-04 to 05-08	Perc. change in creative workforce from 01-04 to 05-08	Creative workforce per 1,000 head of active population, averaged over 2001-04 period	Creative workforce per 1,000 head of active population, averaged over 2005-08 period	Perc. change of creative workforce per 1,000 head of active pop. from 01-04 to 05-08
Austria	309,666.30	400,198.41	90,532.11	29.24%	79.2	96.3	21.62%
Belgium	404,866.43	441,404.15	36,537.72	9.02%	91.5	94.0	2.69%
Bulgaria	186,481.15	235,904.36	49,423.21	26.50%	56.5	68.5	21.25%
Croatia	61,755.62	72,077.16	10,321.55	16.71%	33.7	40.4	19.82%
Cyprus	24,161.85	27,341.93	3,180.08	13.16%	72.0	71.4	-0.96%
Czech Rep.	231,093.15	300,311.38	69,218.24	29.95%	45.3	57.7	27.55%
Denmark	204,060.03	217,682.36	13,622.34	6.68%	72.1	74.2	2.98%
Estonia	45,651.33	57,383.05	11,731.72	25.70%	69.3	84.1	21.29%
Finland	249,860.68	280,970.22	31,109.54	12.45%	96.0	105.6	9.93%
France	1,951,383.11	2,134,433.36	183,050.26	9.38%	71.7	77.1	7.58%
FYR Macedonia	no data	25,096.61	no data	no data	no data	no data	no data
Germany	3,266,440.69	3,238,130.34	-28,310.35	-0.87%	82.2	77.7	-5.44%
Greece	285,921.23	330,400.87	44,479.64	15.56%	60.9	67.5	10.85%
Hungary	245,121.84	272,022.14	26,900.31	10.97%	59.3	64.4	8.58%
Iceland	13,108.91	16,016.88	2,907.97	22.18%	81.6	91.7	12.34%
Ireland	164,188.27	188,425.18	24,236.91	14.76%	87.2	87.4	0.24%
Italy	1,617,754.39	2,045,377.86	427,623.47	26.43%	67.2	82.7	23.04%
Latvia	77,218.73	93,611.64	16,392.91	21.23%	68.8	79.6	15.70%
Lithuania	109,357.67	144,433.40	35,075.73	32.07%	67.0	90.1	34.44%
Luxembourg	13,783.23	20,172.97	6,389.75	46.36%	71.2	97.0	36.23%
Malta	22,820.00	13,411.63	-9,408.38	-41.23%	143.4	81.2	-43.40%
Norway	147,376.44	170,535.36	23,158.92	15.71%	62.5	68.9	10.24%
Poland	702,076.79	947,576.32	245,499.54	34.97%	41.0	55.9	36.44%
Portugal	291,525.48	313,529.89	22,004.40	7.55%	53.8	56.0	4.21%
Romania	238,126.70	330,891.39	92,764.68	38.96%	22.9	33.3	45.24%
Slovakia	108,779.35	118,054.82	9,275.47	8.53%	41.4	44.4	7.16%
Slovenia	56,210.97	66,686.97	10,476.00	18.64%	57.4	64.8	12.92%
Spain	1,068,202.16	1,268,950.05	200,747.89	18.79%	55.8	58.0	3.93%
Sweden	428,378.19	487,657.35	59,279.15	13.84%	93.9	101.6	8.30%
Switzerland	384,726.73	432,605.13	47,878.40	12.44%	93.9	101.6	8.23%
The Netherlands	912,615.81	874,148.50	-38,467.31	-4.22%	108.8	100.8	-7.32%
Turkey	976,129.03	1,157,127.10	180,998.08	18.54%	47.6	50.6	6.21%
United Kingdom	2,228,125.75	2,495,014.64	266,888.89	11.98%	75.7	81.4	7.57%
TOTAL	17,026,967.98	19,217,583.44	2,165,518.84	12.72%	66.8	72.1	8.06%

Fig. 1 a-b – Creative workforce contingents (left) and creative workforce as a share of the active population (right)



 EUROPEAN UNION
 Part-financed by the European Regional Development Fund
 INVESTING IN YOUR FUTURE
 Regional level: NUTS 2
 Source: Own elaboration on EUROSTAT/LFS data
 Origin of data: EUROSTAT/LFS data
 Authors: A.P. Russo, A. Quagliari, F. Brandajs
 © EuroGeographics Association for administrative boundaries

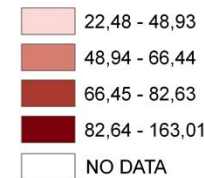
 EUROPEAN UNION
 Part-financed by the European Regional Development Fund
 INVESTING IN YOUR FUTURE
 Regional level: NUTS 2
 Source: Own elaboration on EUROSTAT/LFS data
 Origin of data: EUROSTAT/LFS data
 Authors: A.P. Russo, A. Quagliari, F. Brandajs
 © EuroGeographics Association for administrative boundaries

N. of jobs



Creative workforce, n. of jobs. Annual data averaged over 2005-08 period. See report for specification of creative workforce ISCO-88 classes

N. of jobs per 1,000 head of active population



Creative workforce per 1,000 head of active population, both variables averaged over 2005-08 period.

Weighing the creative workforce over the active population (Table 1, columns 5-7) returns that 7.2% of the workforce of Europe has creative professions in the second reference period (was 6.8% in the first). The highest share of creative workers on the active population are found in Finland, Sweden, Switzerland and the Netherlands, all with more than 10% of the active population being creative professionals. Poland, Luxemburg, Lithuania and Czech Rep. are the countries that experienced the largest increments (25-40%) of the value of this index, while only Germany, the Netherlands and Malta, together with Cyprus, experienced a decrease; also in relative terms, the creative workforce has grown more evenly spread between the reference periods.

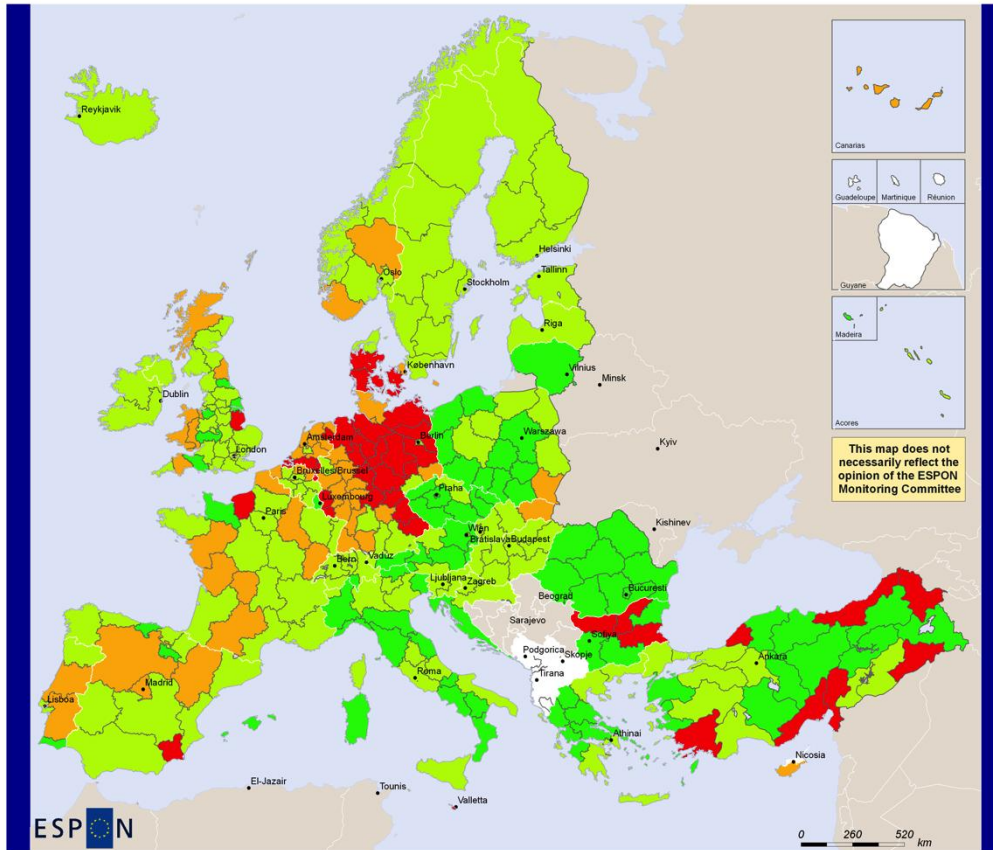
Looking at regional data, Fig. 1a-b provide an illustration of the spatial distribution of, namely, the creative workforce contingents and the share of creative workers in the active population in the last reference period. A sort of “brown banana” is nuanced, extending to the Scandinavian and Baltic countries, and to Mediterranean region.

Fig. 2a maps the percentage change of the index that returns dimension of the creative workforce as a share of the active population between the two periods. Positive values mean that the creative workers have grown more than the active population, while negative values pick regions where the growth of creative workers has been inferior to that of the active population, irrespective of the sign of the absolute change. Among regions that experienced the highest growth rates in this index, it is remarkable that **none of the largest urban regions in Europe are present**. Instead, we find sensible growth in predominantly rural or mountain regions like Basilicata (60%), La Rioja (59%), Lincolnshire (49%) and West Macedonia (43%); some popular island tourist destinations like Corsica (74%), Madeira (51%), the Balearic Islands (47%) and Sardinia (31%); a few regions including second cities in their national systems (the region of Breslau, with 76%, the highest growth rate in Europe among all NUTS2 regions, and the region of Krakow, +59%); and a number of regions including small universities cities, like Olomuc (46%) or Durham (38%).

Among the regions with the worst negative growth rates, there are most industrial regions in Germany (among which, Bremen -20.6%, Hannover -21.3%, Kassel -26.5%, Saarland -28.2%, and in The Netherlands (Noord-Brabant -10.9%, Drenthe -14.6%, Limburg -9.9%). Non-core industrial regions in the north of France, Spain and Bulgaria also have negative growth rates.

Map 2b “distils” this analysis, highlighting regions that experienced a sensible change, captured by a transition between quartiles of the distribution of the creative workforce indicator. In this map we recognize with more clarity some clues of a progressive catch-up in terms of creative workers attracted or retained into regions that have been lagging behind in the early 2000s; both geographically, as will be seen below, and in terms of regional typologies, with non-core and peripheral regions doing best.

Fig. 2 a-b – Evolution of the dimension of the creative workforce in percentage changes of the index (left) and as quartile transition in distributions (right)



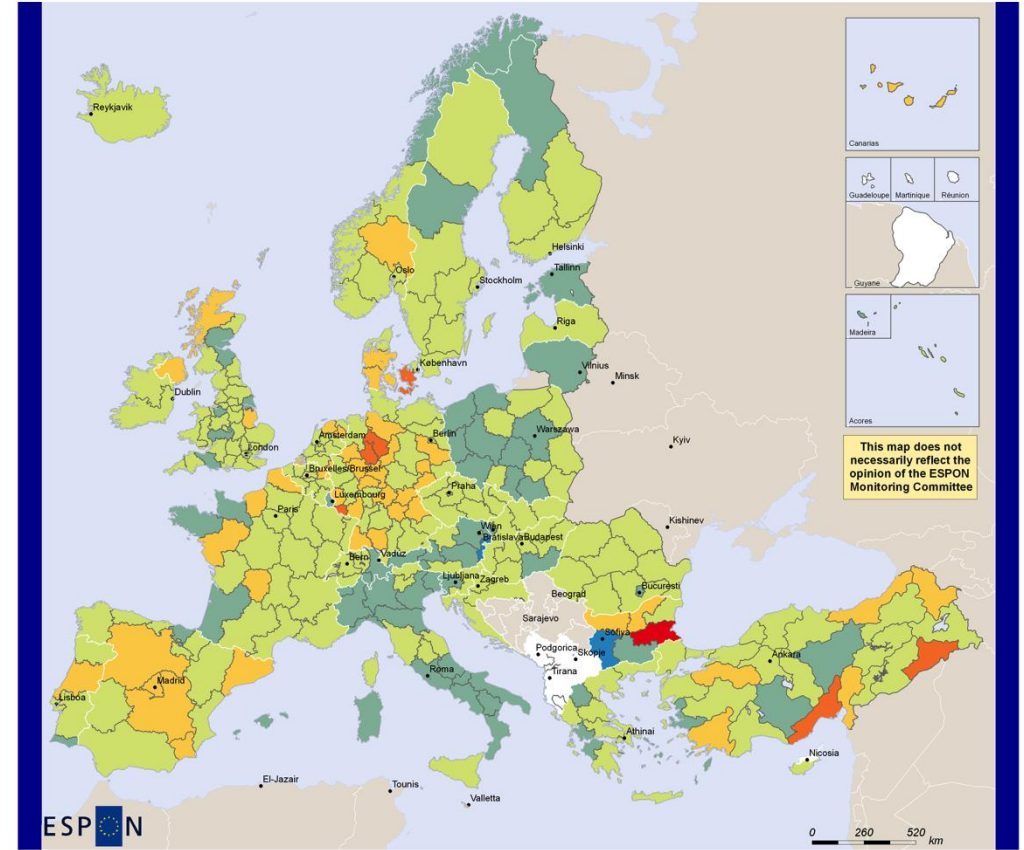
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Regional level: NUTS 2
Source: Own elaboration on EUROSTAT/LFS data
Origin of data: EUROSTAT/LFS data
Authors: A.P. Russo, A. Quagliari, F. Brandajs
© EuroGeographics Association for administrative boundaries

Perc. change

- 60,58% - -10,00%
- 10,00% - 0,00%
- 0,00% - 23,47%
- 23,48% - 176,09%
- NO DATA

Perc. change in the n. of jobs per 1,000 head of active pop., 2001-04 to 2005-08 [(value of indicator in 05-08 - value of indicator in 01-04) / value of indicator in 01-04]



EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Regional level: NUTS 2
Source: Own elaboration on EUROSTAT/LFS data
Origin of data: EUROSTAT/LFS data
Authors: A.P. Russo, A. Quagliari, F. Brandajs
© EuroGeographics Association for administrative boundaries

Typology

- 3 very strong decrease
- 2 strong decrease
- 1 moderate decrease
- 0 no significant change
- 1 moderate increase
- 2 strong increase
- 3 very strong increase
- NO DATA

Quartile changes (abs. difference) in the distribution of creative workforce (abs. n. of jobs per 1,000 head of active population), 2001-04 to 2005-08

Another factor standing out from these two maps is the good performance of mature tourist coastal and island regions, such as the Balearic Islands, the Valencia coast, Algarve, Galicia, the Basque coast, Sardinia, some coastal and island regions of Greece, and Brittany. This seems to confirm Anton Clavé & González Reverté's (2007) argument on processes of tourism development as singular forms of "creative" urbanisation. On the other hand we see from this map how the industrial core of the pentagon, as well as the two main urban regions of Spain, register a relative slowdown of their creative population as a share of the active population. For instance, Madrid and Barcelona, in spite of registering a large (and moderately increasing) contingent of creative workers, experienced a larger increase in the "non-creative" professionals, diluting the potential for innovation of their economies. The situation for "core" industrial regions, as explained before, is different, in that many such regions registered a net decrease of creative workers. These territorial trends will be commented upon in further detail in the last part of this section.

4. RELATION BETWEEN CREATIVE WORKFORCE AND ECONOMIC GROWTH

The next object of our analysis is the relation between the evolution of the creative workforce and economic growth, captured by a simple per capita GDP indicator. The calculated degree of correlation between the evolution of the two indicators confirms that the general trend is that wealthier regions have a higher share of creative workers among their active population both in the 2001-2004 ($R^2: 0.37$) and 2005-2008 ($R^2: 0.41$) periods. The diagram Figure 3 illustrates this correlation at national level in the second period.

Fig. 3 – Cross-plot of creative workforce and p.c. GDP, 2005-08. National averages.

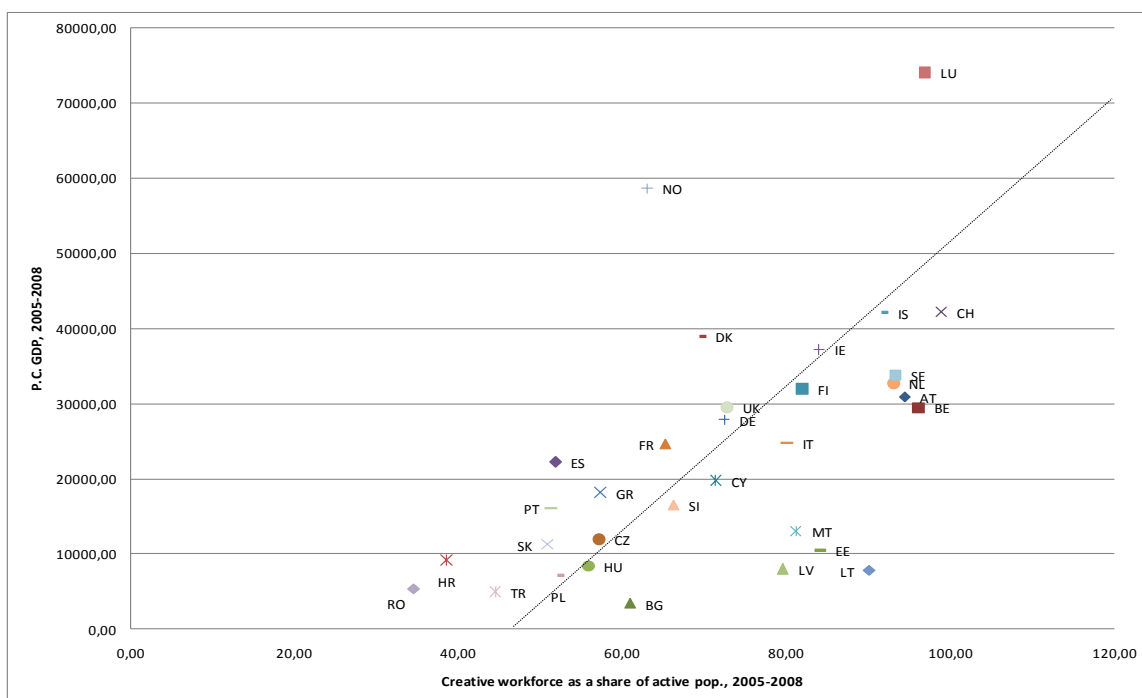
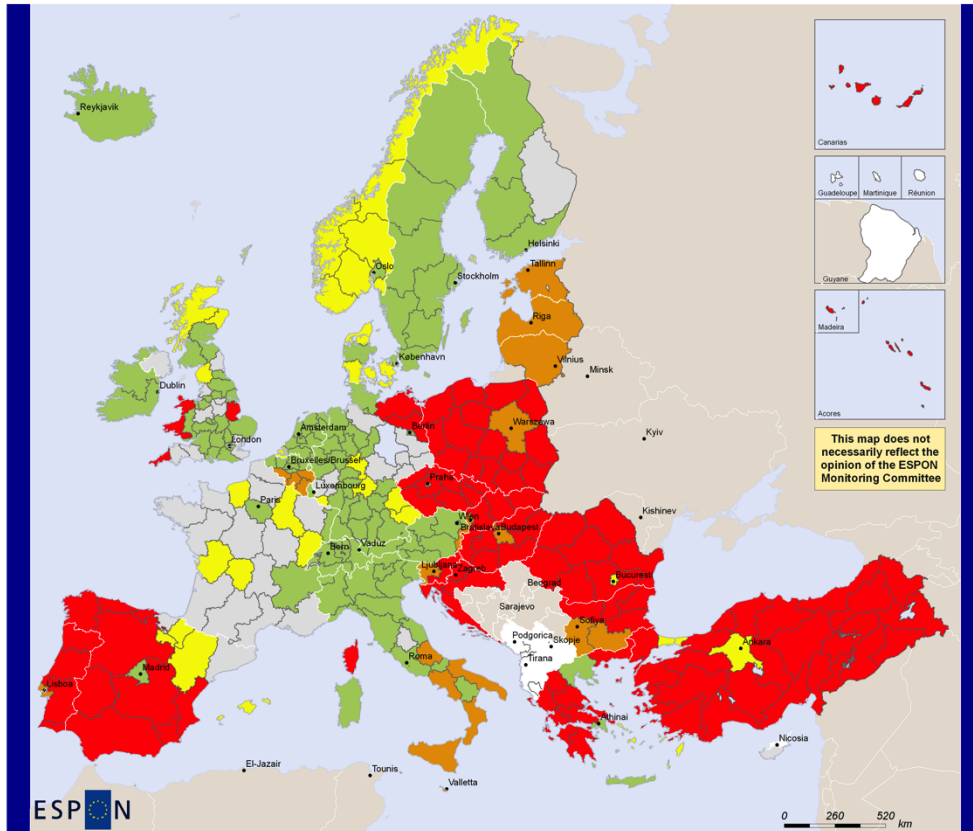


Fig. 4 – (a) Relationship between dimension of the creative workforce and p.c. GDP, 2005-08; (b) Relative co-evolution of creative workforce and p.c. GDP between 2001-04 and 2005-08



EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Regional level: NUTS 2
Source: Own elaboration on EUROSTAT/LFS data
Origin of data: EUROSTAT/LFS data
Authors: A.P. Russo, A. Quagliari, F. Brandajs
© EuroGeographics Association for administrative boundaries

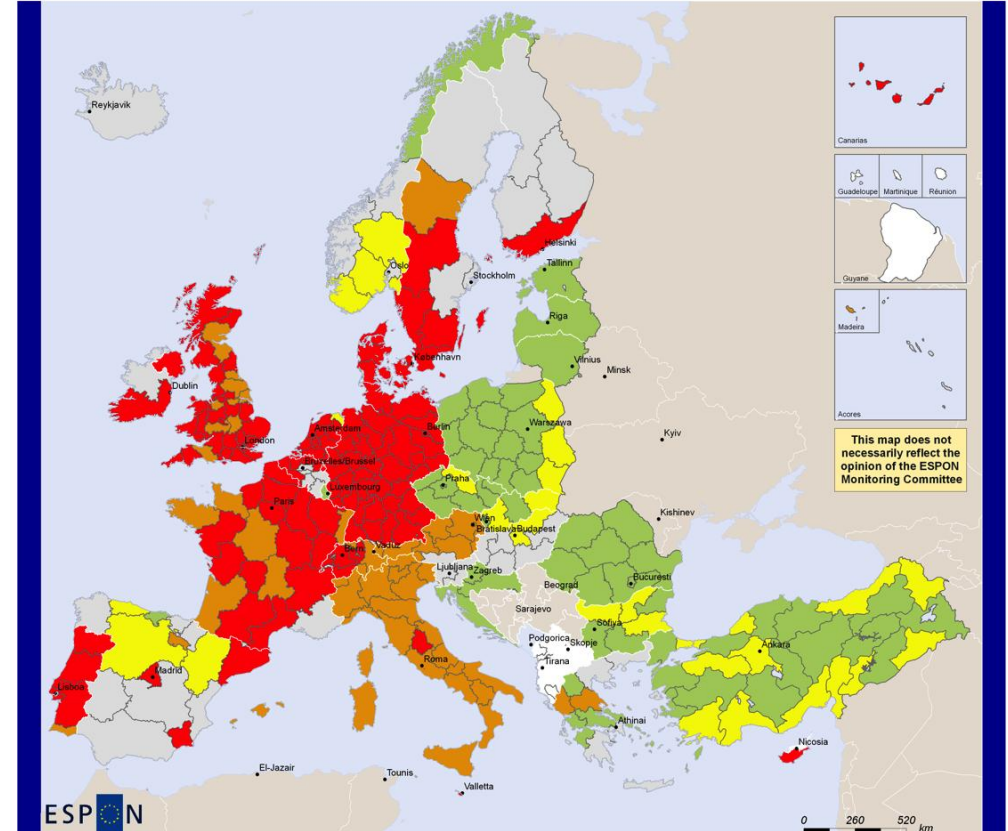
Typology



- 0 = NUTS2 region with no significant co-deviation of creative workforce and p.c. GDP from distributions' means
- 1 = NUTS2 region with high creative workforce, high p.c. GDP
- 2 = NUTS2 region with low creative workforce, high p.c. GDP
- 3 = NUTS2 region with low creative workforce, low p.c. GDP
- 4 = NUTS2 region with high creative workforce, low p.c. GDP

□ NO DATA

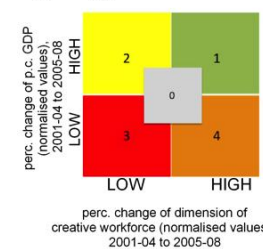
Typology based on cross-plotting the dimension of creative workforce and p.c. GDP in 2005-08 period. Classes refer to combination of signs of normalised indicators (x_n and y_n) with respect to available values in the ESPON space. Threshold value 0.25 for "non-significant" deviations from means ($x_n^2 + y_n^2 < 0.25$).



EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Regional level: NUTS 2
Source: Own elaboration on EUROSTAT/LFS data
Origin of data: EUROSTAT/LFS data
Authors: A.P. Russo, A. Quagliari, F. Brandajs
© EuroGeographics Association for administrative boundaries

Typology



- 0: NUTS2 region with no significant co-deviation of change rates from distributions' means
- 1: Growth in p.c. GDP; growth in dimension of creative workforce
- 2: Growth in p.c. GDP; decrease in dimension of creative workforce
- 3: Decrease in p.c. GDP; decrease in dimension of creative workforce
- 4: Decrease in p.c. GDP; growth in dimension of creative workforce

□ NO DATA

Typology based on cross-plotting the perc. change of dimension of creative workforce from 2001-04 to 2005-08, and p.c. GDP, perc. change from 01-04 to 05-08. Classes refer to combination of signs of normalised indicators (x_n and y_n) with respect to available values in the ESPON space. Threshold value 0.25 for "non-significant" deviations from means ($x_n^2 + y_n^2 < 0.25$).

Moving again to the regional level, Figure 4a maps out the association between high values of creative workers and p.c. GDP for the second reference period in “blue banana” regions plus Ireland and Iceland (and the Madrid region), while the same association, but with negative values, holds in most of Eastern Europe, of the Iberian peninsula, in Southern and insular Italy.

A negative association between the two variables is found in few other regions, like the Baltic countries (high contingents of creative workforce, low p.c. GDP) and in regions of western and central Europe like in Central France, northern England and Scotland, Norway (low contingents of creative workforce, high p.c. GDP).

Concerning the dynamic from 2001-04 to 2005-08, Figure 4b classifies regions according to the sign of changes in both variables, using normalised change rates. Here we consider positive and negative changes in both variables as differences from the European means³.

We have isolated a class of regions where changes in both variables are small⁴ (coloured in grey): in these regions, it is very difficult to find a significant diachronic association between creative workforce and economic growth. Regions coloured in green and red exhibit “expected” change signs in the two variables. In “green” regions, a relative positive change of the p.c. GDP is accompanied by a relative positive change in the creative workforce, while “red” regions experience relative negative change rates of both variables. We expect these effects from the research and conceptualisations on the mobile character of the creative class, as for instance in Florida (2000): growing places attract symbolic workers, while places experiencing an economic downturn, tend to lose them to more thriving places, triggering a “global competition for talent” and to some extent making economic cycles endogenous (place with problems lose out those human resources that are more important for economic and social innovation, and would thus represent a primary asset for breakthroughs allowing these regions to catch up).

Among “green” regions in Fig. 4b we find most Polish and Czech regions, Romania and Croatia, large parts of continental Greece and Turkey, and the three Baltic countries, which by 2008 are positioned as one among the most dynamic regions of creativity in Europe. Though this possibility should be reviewed on the base of detailed research, it may be proposed that the strategic orientation of structural funds available to these

³ Cross-correlating p.c. GDP growth against the relative change of the index of creative workers as a share of the active population, we find a rather low fit, but a significant Pearson index at 1% significance range, indicating that changes in one variable are to some extent related with changes in the other (at least at regional level).

⁴ For these normalised variables, we have set a threshold value of the covariance at 0.25. Thus, regions falling in these class fit the condition $x^2+y^2<0.25$, where x^2 is the normalised value of the change in creative workforce as a share of the active pop. between 01-04 and 05-08, and y^2 is the normalised value of changes of p.c. GDP in that period. It should be notes that being normalised variables, positive and negative changes are “relative to the distribution mean” and the four classes presented here refer to relative trends rather than absolute change rates.

regions throughout the 2000s towards the development of SMEs in creative and knowledge-intensive sectors has been one of the main drivers of this “leverage”. In particular, an important consideration in the framework of the structural funds was given to the strategic relation between culture and tourism as priority area for the regional competitiveness and employment creation (CSES-ERICarts, 2010).

On the other hand, “red” regions are economically thriving regions that have seen a relative deceleration of growth and have also lost some of their primacy in terms of creative resources. Possibly the reasons for this are to be sought in the loss of urban and environmental quality that accompany mature economic regions, where rising property prices, agglomeration disadvantages and a certain orientation to “mainstream” socioeconomic pathways may start to deplete their attractiveness and capacity of retention for young creative talents in search of convenient and inclusive location to start a new career, as is suggested in Russo and Van der Borg (2010). In this group there are also a few “tigers” whose economy boomed in the 2000s, like Cyprus and some Irish regions, where probably the first effects of the crisis were already taking their toll by the last part of the reference period.

At the other end of the spectrum, there are also a few yellow and orange spots: respectively, regions where a relative growth in p.c. GDP has been accompanied by a relative decrease of the creative workforce, and regions where the opposite has occurred – in spite of having nurtured or attracted a larger than average share of creative workers, this has not prevented a downturn in economic growth.

Regarding “yellow” regions, the interpretation of this trend is that economic growth in the last decade has been mainly driven by “non-innovative” sectors. Disregarding Norwegian regions, whose value are probably biased from the fact that regional data on p.c. GDP growth had to be estimated from national data, this odd trend seems to be limited to a few non-core Spanish regions (whose economic boom in the 2000s has been notoriously driven by the construction sector, with a subsequent “bubble burst” at the end of the decade aggravating the effects of the economic crisis) and lagging rural and industrial regions at the eastern border of Europe. The most immediate, though very general message from this type of growth in the post-crisis economic situation is that it is hardly a resilient one: economic development that is not accompanied by investments and other public policy initiative to attract and retain a creative workforce is doomed to be short of innovative capacity and thus subject to economic downturns and declines in competitiveness.

Finally, “orange” regions – where the creative workforce has grown at a faster pace than the economy, or even with opposite signs – may be seen as regions that have not been able to fully capitalise on their creative workforce, because of lack of institutional capacity or a certain “impermeability” between the cultural sphere and the mainstream economic sectors, that are not capable of taking full advantage of the economic potential represented by the creative class. Possibly, these regions are big in public cultural employment, more as a reflex of the importance of their “institutional” cultural sectors in the past than of the most recent dynamics, which indeed should

show a reduction of such jobs as a consequence of the adjustments to public budgets (a disaggregated analysis of the composition of the creative workforce and the consideration of post-crisis data should reveal this).

More than three quarters of the NUTS2 regions did not experience a significant transition in the relationship between their distributions of creative workforce and p.c. GDP. Among the 20.6% that does, seven regions have accomplished a transition between one of the two “odd” quadrants to the superior one (as in the legend of Fig. 4a). Thus, Ostschweiz in Switzerland, Valle d'Aosta, Provincia Autonoma Bolzano, Friuli-Venezia Giulia in Italy, and Cheshire in the UK, have passed from being regions with above-average GDP but a relatively low contingent of creative workforce in 2001-04 to improve their score even to this latter respect. Arguably, in these regions the good living conditions and a progressive cultural policy might have had the effect to retain creative talent or attract new creative workers. Noticeably, some of these are wealthy Alpine regions with medium-sized cities enjoying a very high quality of life, like St. Gallen, Aosta, Udine, or Bolzano, which come regularly at the top of their national rankings of “good cities to live”. Mirroring these cases, two regions seem to have improved substantially their economic situation, possibly counting on a good endowment of creative workers. It is the case of Praha and Attiki: two capital city regions of countries with economic problem, which have pointed decidedly on culture and creativity as an urban brand to attract tourists and investments.

Finally, it is worth noting that while none of the 1st quadrant regions of Fig. 4a loses substantially their economic advantage in the second period, a few of them experienced a substantial erosion of their primacy in terms of creative workforce, which might ring as an alarm bell for the future. It is the case of three German regions (Oberpfalz, Unterfranken and Kassel), two Danish regions (Sjælland, Syddanmark) and the Dutch region of Zeeland. In the only case of Lincolnshire, a high p.c. GDP in the first period could not be sustained face to a low share of creative workers, and this region found itself in the 3rd quadrant in the second period.

However complex explication of these “transition” effects may be (the contribution of creative work to economic development being only one between many factors that influence it), it is interesting to notice that some regions that have been catching up in economic terms during the 2005-2008 period have also experienced a sensible growth in their creative workforce, which should guarantee that their growth is more resilient.

Finally, we have looked into the association of the endowment and change of creative workforce with specific territorial features. For that we tested the correlation between the relative dimension of the creative workforce in 2005 and 2008 and a number of territorial features, such as the “urban” character of the regions⁵, including the national capital city, being a border, coastal, mountain or island regions, and the

⁵ We calculated this indicator as an elaboration from the ESPON typology on Urban and Metropolitan Areas at NUTS3 level. “Predominantly urban” NUTS2 regions include at least one medium or large metropolitan region according to that typology, while “predominantly rural” NUTS2 region include only small metropolitan regions or none.

geographic location distinguishing 5 zones. Concerning the latter, the share of creative workers among the active population is at 79.3 in the total of regions of Western Europe and 78.3 in Northern Europe, but only gets to 48.5 in South-eastern Europe, whereas it has values of 63 and 64.9 in Central Europe and South-western Europe respectively.

The correlation test reveals a strong and significant level of clustering of the creative workforce in urban areas and especially capital cities. Urban regions have 73.7 creative workers per 1,000 active citizens, compared to 61.0 of predominantly rural areas; and they concentrate the 89.4% of the creative workforce with only the 86.7% of the active population. Again, this comes with no surprise confirming the intuitions and research carried out by sociologists, urban geographers and economists on “urban milieus of innovation”. Explanations of the dynamism of the regional economy should also consider the distance and the level of interconnection between urban areas. In this light, the strength of the Dutch creative economy, for instance, could be partly explained with the predominant urban character of the territory and the very short distances between the regional poles both at national level and in the context of North-Western Europe.

A closer analysis of these trends reveals also some hints of a stratification of the spatial trends in the association of creative workforce with the economic status. Regarding the 2005-2008 situation, there is a significant correlation between the position in quadrants of Fig. 4a and the dominant type of settlement structure. Being a predominantly urban region increases the chances to be in the “green” quadrant characterised by higher-than-average creative workforce contingents *and* p.c. GDP, and capital city regions score particularly well to that respect, while predominantly rural regions are overrepresented among those with lower-than-average creative workforce contingents *and* p.c. GDP (“red” quadrant). Regarding the two “odd” quadrants, the high p.c. GDP / low creative workforce combination (“yellow” quadrant) is more characteristic of predominantly rural areas (some examples are La Rioja in Spain, Franche-Comte in France, Zeeland in the Netherlands, Northern Norway and the Highlands and Islands of Scotland), while the low p.c. GDP / high creative workforce combination (“orange” quadrant) is likelier to be found in predominantly urban areas, like the Liege region, southern Italian regions like Campania, Sicily and Apulia, the metropolitan area of Lisbon and the capital city region of Bratislava.

Regarding border regions, regions with “internal” EU borders are likelier to be in the green quadrant, while having “external” EU borders increases the chances to be in the “red” quadrant. Coastal regions are over-represented among regions in the “green” quadrant and so are regions with no mountainous areas. Western European regions are clearly over-represented among regions in the “green” quadrant and conversely are central and south-eastern European regions among those in the “red” quadrant.

Looking at change rates, a simultaneous decline in the relative contingents of creative workforce and p.c. GDP compared to the overall trend (third quadrant, “red” regions in Fig. 4b) is much likelier to be observed in predominantly urban regions than in

predominantly rural ones, again a sign of relative “convergence”. Mountain regions are likelier to make the best transition to the “green” quadrant as do regions in central and south-eastern European regions.

5. CREATIVE WORKFORCE AND ECONOMIC DEVELOPMENT: CAUSAL RELATIONS AND SPATIAL STRATIFICATION

In this section, we deploy econometric techniques to learn more about the link between creative workforce and economic development, and their co-evolution, which has been analysed in the previous section in purely descriptive and speculative terms.

5.1 Preliminary analysis: tests for causality relationships

The procedure used to test the *causality* relationship in a panel data is derived from by Holtz-Eakin et al. (1988). The Granger causality test for panel data appears in the following way:

$$[1] \quad y_{it} = \alpha_0 + \sum_{j=1}^m \alpha_j y_{it-j} + \sum_{j=1}^m \delta_j x_{it-j} + f_i + u_{it}$$

Where $i = 1, \dots, N$ are the observation units and $t = 1, \dots, m$ represents the time *index*. The model in differences allow us eliminate the fixed effects (f_i)

$$[2] \quad y_{it} - y_{it-1} = \alpha_0 + \sum_{j=1}^m \alpha_j (y_{it-j} - y_{it-j-1}) + \sum_{j=1}^m \delta_j (x_{it-j} - x_{it-j-1}) + (u_{it} - u_{it-1})$$

This specification introduces a simultaneity problem because the error term is correlated with $y_{it} - y_{it-j-1}$

In this case it is possible to get a consistent estimate applying the method of the instrumental variables in 2 stages (2SLS).

In order to verify if x causes y it will be necessary to test the joint hypothesis:

$$H_0 : \delta_1 = \delta_2 = \dots = \delta_m = 0$$

If the null hypothesis is rejected than x Granger causes y .

The Granger test performed on the variables CW (creative workforce contingents, years 2001-2008) and PCGDP (per capita GDP, years 2001-2008)⁶ shows that **PCGDP Granger-causes CW** (regression 1, Table 2). In particular, we observe that the null hypothesis of Granger test which assumes that PCGDP does not cause CW is rejected at 1%.

⁶ In this case these variables are measured in non-averaged yearly rates and thus they are subject to some degree of inaccuracy due to the sample size of the extraction of values from the LFS survey.

Table 2 - Granger causality test⁷

Regression 1 <i>Dependent variable: D.CW</i>		Regression 2 <i>Dependent variable: D.PCGDP</i>	
D2.CW	0.8047*** (12.41)	D2.CW	0.00075 (0.77)
D3.CW	-0.2260*** (-6.83)	D3.CW	-0.00010 (-0.19)
D2.PCGDP	-1.2585*** (-4.85)	D2.PCGDP	1.1419*** (12.04)
D3.PCGDP	0.6344*** (3.51)	D3.PCGDP	-0.2972 *** (-4.32)
Dummy (temporal)	YES	Dummy (temporal)	YES
GRANGER TEST	26.28***	GRANGER TEST	2.25
HANSEN J STATISTIC	1.429	HANSEN J STATISTIC	3.845

***, **, *: 1, 5, 10%; by D, D2, D3 we denote respectively, the first, second and third difference of the variables

Conversely, when we test whether CW Granger-causes PCGDP, the Granger test does not reject the null hypothesis; consequently, we can conclude that **CW does not cause PCGDP**, and by verifying the presence of a single causal relationship, we also reject the hypothesis of simultaneity.

5.2 Regression analysis

In this section we deploy a static panel data analysis modeled as in the following equation:

$$[3] \quad CW_{i,t} = \alpha + \beta_1 PCGDP_{i,t} + u_{it}$$

Where:

- CW_{it} is the dependent variable “contingents of creative workers”, the subscript i refers to the statistic unity (the region) and t refers to the time;
- α, β are the parameters that must be estimated;
- $PCGDP_{it}$ is the regressor variable (per capita GDP);
- $u_{i,t}$ is the stochastic error term.

⁷ In all these estimates the lags of the dependent variable have been used as instruments (Hsiao, 1986). The Hansen test of over-identification did not reject the null hypothesis in all the estimates and this result confirms the validity of the instruments. The test has been conducted for different numbers of lags. Here we report the results in which the regressors are significant.

In the panel analysis we distinguish between fixed effects (FE) and random effects (RE). In particular, in a panel analysis the error can be decomposed in: $u_{it} = \mu_i + \lambda_t + v_{it}$, where μ_i ⁸ represents a specific individual effect, λ_t ⁹ represents a specific temporal effect and v_{it} is the stochastic error term. In the panel with random effects, these three variables are independent and have identically distributed random noise, assumed uncorrelated with the explanatory variables included in the model.

In the panel with fixed effects, on the contrary, μ_i is not a random variable but a parameter to be estimated and it is specific to the region; it captures a structural aspect of the region that differentiates it from other regions. Also λ_t is a parameter that captures annual changes that are common to all regions.¹⁰

We also propose, in this study, a **dynamic analysis with panel data**, providing a dynamic model for panel data whose specification is given by the equation:

$$[4] \quad CW_{i,t} = \beta_1 CW_{i,t-1} + \beta_2 PCGDP_{i,t} + \beta_3 PCGDP_{i,t-1} + \mu_i + \lambda_t + v_{it}$$

The denotations are the same as in equation [3], except the terms of the dependent variable and the regressor, CW and PCGDP, lagged respectively for one period, $CW_{i,t-1}$ and $PCGDP_{i,t-1}$.¹¹

⁸ The Region-specific variable, time-invariant and activated by regional dummy, captures how each region deviates from the average structural relationship common to all regions (the regional fixed effect).

⁹ It is the time-specific variable, activated by time dummies, useful to purify the structural relationship, which is common to all regions, from cyclical variations that are also common to all regions.

¹⁰ The choice between the fixed or random effects is not simple and can be solved with the Hausman test that allows a comparison between the results of alternative estimators. Specifically, we will have under the null hypothesis that the RE model is the best (the GLS estimates are BLUE), while under the alternative hypothesis, the statistical properties of the GLS estimator of the RE model no longer apply. The estimate of the FE model is consistent both under the null hypothesis that under the alternative hypothesis, but is not efficient under the null hypothesis. Consequently, under the null hypothesis, the estimates are statistically similar and, therefore, we choose the RE model; vice versa, under the alternative, we will choose the FE model because it is efficient.

¹¹ The estimation of this model is subject to several problems. First, using panel data, ordinary least square (OLS) coefficients are biased when: unobservable region-specific effects (μ_i) are statistically significant; and the regressors and such effects are correlated. In addition, as far as the lagged dependent variable, $CW_{i,t-1}$, is concerned, OLS return inconsistent estimates as $CW_{i,t-1}$ and μ_i are necessarily correlated, even if the idiosyncratic component of the error term is serially uncorrelated. A solution to these problems is to eliminate the term μ_i by taking first differences by equation [4]. OLS still does not consistently estimate the parameters of interest because first differencing introduces correlation between the lagged dependent variable and differenced error terms: $CW_{i,t-1}$ and u_{it} are correlated through the terms $CW_{i,t-1}$ and u_{it-1} .

One way to overcome these problems is the use of an instrumental variables procedure applied to a dynamic model of panel data. In particular, we refer to a GMM estimator that uses the dynamic properties of the data to generate proper instrumental variables (Arellano and Bond, 1991; Arellano and Bover, 1995). The GMM estimator allows to control for weak endogeneity by using the instrumental variables, which consist of appropriate lagged values of the explanatory variables. To deal with the fact that measurement errors are likely to be determined not only by random errors but by specific and persistent characteristics of each region, we use the GMM-system (Arellano and Bover, 1995; Blundell

Since the consistency of the parameters obtained by means of the GMM estimator depends crucially on the validity of the instruments, we consider two specification tests: the Sargan test of over-identifying restrictions, which tests the null hypothesis of overall validity of the instruments used; and the test for serial correlation of the error term, which tests the null hypothesis that the differenced error term is first- and second-order serially correlated. Failure to reject the null hypothesis of no second order serial correlation implies that the original error term is serially uncorrelated and the moment conditions are correctly specified.

5.3 Empirical results

As for as the static estimates are concerned (equation 1, Table 3), we observe that the Hausman test rejects the null hypothesis, and leads us to prefer fixed effects to random ones. The fixed effects results show that the coefficient associated to PCGDP is not significant; in practice, an increase of PCGDP has no effect on CW. A different result is obtained from the analysis conducted with a panel with random effects: in this case, the parameter associated with PCGDP is positive (expected sign) and is also significant. Unfortunately, this result is not relevant because the Hausman test leads us to prefer fixed effects to random ones.

These results seem to indicate that per capita rents have no relevance in determining the CW. However, it could be argued that the “attraction effect” of buoyant economic conditions is subject to a time lag: the time that is need for the news to propagate and mobilize migration flows. Moreover, it is expected that “mobile” creative workers would flow into places where there is already a sizeable creative population (and have developed some kind of brand of creative places). Thus, in equation 2 we introduce among the regressors, besides the same-year PCGDP, also one-period lags of the PCGDP as well as of the dependent variable, CW. In this dynamic model for the reasons discussed in the previous paragraph, we will not proceed with an OLS estimator but with a GMM-system estimator.

The results of dynamic estimates (GMM system) bring out the relevance (significant) of the coefficient associated with the lag of PCGDP ($PCGDP_{(t-1)}$); this shows that **an increase in PCGDP affects CW only after one year**. The coefficient associated with same-year PCGDP continues to be negative and not significant, as in static analysis’ results. Also the lag of the dependent variable ($CW_{(t-1)}$) turns out to be a significant instrument for CW: **an increase in CW in the past has a positive effect on CW in the present**.

and Bond, 1998) that combines into a single system the regression equation in both differences and level. The GMM-system estimator allows controlling for unobserved region-specific effects that are potentially correlated with the explanatory variables.

Table 3 - Fixed, random and GMM regressions

Dependent variable: CW	STATIC PANEL (eq. 1)		DYNAMIC PANEL (eq. 2)
	FIXED EFFECTS	RANDOM EFFECTS	GMM - system
PCGDP _t	-0.1487 (-0.75)	0.6207*** (3.82)	-0.3309 (-0.84)
PCGDP _(t-1)			1.2768** (2.36)
CW _(t-1)			0.6982*** (5.37)
Constant	65563.04*** (14.75)	48517.37*** (9.81)	
Hausman test	44.55***		
Wald test			397.08***
Sargan test			261.92
Serial correlation: first order			-2.50**
Serial correlation: second order			0.37

NOTES

- First-order and second-order tests test for serial correlation of the error term, distributed as standard normal N(0,1) under the null hypothesis of no serial correlation.
- The Sargan test is a test of over-identifying restrictions, distributed as chi-square under the null hypothesis of instrument validity.
- ***, **, *: indicate coefficient significant at the 1, 5, 10%.
- All variables, in GMM-system estimator, are instrumented using lag (t-2).

The Sargan test, which allows us to verify the validity of the instruments, does not reject the null hypothesis and this confirms the validity of instruments used. The Wald test of significance of parameters leads us to reject the null hypothesis of no significant of the parameters. In addition, there is evidence of serial correlation of first order (we reject the null hypothesis); whereas, there is no evidence of the presence of second-order serial correlation (the null hypothesis is not rejected)¹².

5.4 Spatial stratification

As a last step of this spatial econometric analysis we implemented the Granger test on clusters of regions in order to verify whether the results previously obtained on the whole sample of European regions could be confirmed, i.e- the PCGDP Granger-causes CW. In particular, we referred two types of segmentation:

¹² The consistency of the GMM estimator requires that there is no serial correlation of the second order in the differenced error term.

- The first is based on the status of eligibility for European funding, classifying all EU NUTS2 regions into Competitiveness and Employment Regions (first cluster) and Convergence Regions (second cluster).
- The second is based on the ATTREG typology of attractive regions¹³ and classifies regions into overheating regions (first cluster) and regions that are not overheating (second cluster).

The rationale of using the first typology in evaluating the causality between creative workers and economic conditions is that we expect to some extent that in economically buoyant regions high salaries attract creative workers, while in lagging regions the relative scarcity of creative workers might be contributing to economic decline. As for the second typology, the causal (and positive) relation between CW and PCGDP would be observed in regions that have not been overheating whereas overheating regions might be those in which the relation is reversed, that is greater economic wealth might be a determinant of expulsion for creative workers due to diseconomies of congestion from “excessive attractiveness”.

In summary, we found that Granger causality test returns different results depending on the type of segmentation. Specifically, we observe that:

- In the case of segmentation based on the eligibility criteria, when we consider the regions belonging to the first cluster (Competitiveness and Employment Regions) there emerges an absence of any causal relationship between PCGDP and CW; instead, in the case of regions belonging to the second cluster (Convergence Regions) emerges a bidirectional relationship in which PCGDP Granger-causes CW and vice versa.
- In the case of segmentation based on ATTREG criteria, the results in terms of causality: PCGDP Granger-causes CW both in the first cluster of regions (Overheating regions) and in the second cluster of regions (not overheating regions). This result is consistent with results obtained previously for the entire sample of regions.

These results are not what we expected, although a different segmentation and a more sophisticated specification might derive different results. This point is to be picked up in future research.

5.5 Discussion of results

Our results need to be evaluated against the long lasting hype about culture and creativity as potential key drivers of local development processes. In particular, they seem to challenge some of Florida’s findings (2002, 2005, 2008), consistently with the criticism moved to his work on the grounds that it lacks empirical corroboration in independent tests (see e.g. Hoyman and Faricy, 2009) or from the sociological point of view, arguing that it is based on shaky foundations (see e.g. Markusen, 2006) or an

¹³ This typology is based on a hierarchical clustering of NUTS2 regions produced by the ESPON ATTREG project (http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/attreg.html) based on values of net migration rates and visitor attraction rates (arrivals in commercial establishments per 1,000 head of residents). See Smith and Atkinson, 2011.

ideological biased approach (Feinstein, 2005), or again for its conceptual regulatory framework (see e.g. Sacco and Crociata, 2012).

Sticking to mere regional economic considerations, we have found that whereas the presence of creative workers does not per se explain a better economic performance, the contrary is true: economic buoyancy does seem to cause an increase in creative workers and especially this is true after a lag of time and subject to lock-in effects, which may imply that two processes are possibly simultaneously taking place:

- a *short term effect* by which well-off regions have higher chances to attract creative workers from other regions where these earn lower salaries, a classical production link, and besides they tend to migrate where a critical mass of creative workers is already present (in this latter sense picking up Florida's argument on the capacity of the creative class to "make places attractive" for the high-end of the labour market),
- a *longer term effect* by which economically buoyant regions are those places where there are higher chances that a creative economy is developed through a consumption link (there is a wealthier and more sophisticated local market for creative and designed products, which opens new opportunities for creative producers and engenders a process of specialization of the local workforce.

In either cases, a different specification of creative workforce would probably produce different results; for instance it was highlighted by Marrocu and Paci (2011) that creative workers do not per se engender processes of innovation, while highly educated people do, and are found to cause economic development – and these may be rather attracted into places by quality of life and services than by the presence of a creative community.

In any case, our findings indicate that regional economies are not boosted by mere creativity according to a simple "plug and play mechanism". The counter example from our study is the case of many Italian regions, that for Tinagli and Florida (2005) is a remarkably creative country in terms of Florida's "3 T's" but with important capacity building problems, or Austria and many regions of France. Not surprisingly, these are regions that cluster a very important cultural heritage and cultural institutions: the creative workforce is then largely relegated in "cultural industries" with a very important symbolic role for their countries but a marginal effect in terms of economic development. In times of serious financial crisis and spending reviews the dependence on public bodies shows the fragility of the creative sector in these regions. The "symbolic" value of main creative sectors only seems legitimate drastic reduction of public investment, hence, of the creative workforce. The direction and the quality of the public investment in the creative sector matter. Indeed, countries and regions that experienced different spending policies more focused on R&D in strategic creative sector seems more prepared for dealing with the current economic crisis.

To conclude, our exploratory results refute a commonly accepted (especially among policymakers) causal scheme by which cultural and creative attractors cause a multiplier effects by boosting local economy in a sort of post-industrial Keynesianism. It is illusory that a true long-term growth dynamics can be originated in this way;

rather, it is more likely that large cultural and creative attractors will have a positive impact on the local economy if the latter is *already* highly productive and efficiently organized (Plaza, 2008).

6. CONCLUSIONS

The recently approved “Territorial Agenda of the European Union 2020. Towards an Inclusive, Smart and Sustainable Europe of Diverse Regions”, agreed at the Informal Ministerial Meeting of Ministers responsible for Spatial Planning and Territorial Development on 19th May 2011 in Gödöllő, Hungary, identifies accelerating globalisation and growing vulnerability to external shocks experienced by local and regional communities as well as the still present challenge of the core-periphery division even on the national scale as among the most important challenges faced by the EU for the sustainable development of the European society. Countering these trends, it proposes and encourages, among other things, polycentric territorial development, which should foster the territorial competitiveness of the EU territory also outside the core Pentagon area, and the development of innovation and smart specialisation strategies in a place-based approach making the best use of social capital and territorial assets to achieve greater and integrated competitiveness.

This paper presents, first, some evidence suggesting that the implementation of these directives and their translation into regional policies should not overlook the role and spatial effects of the creative economy in Europe. In fact, it was shown that there exist clear spatial patterns in the distribution and evolution of the creative workforce of Europe, and its association with economic growth, whose main pointers are the following:

1. The creative workforce contingents have been growing more evenly spread across the European in the years of economic buoyancy of the 2001-2008 period, although the largest countries (Germany, France, Italy and the UK) still retain almost 40% of the total creative workforce.
2. In relative terms, that is, as a share of the regional active population, the creative workforce is largest in Finland, Sweden, Switzerland and the Netherlands, all with more than 10% of the active population employed in creative professions. Poland, Luxemburg, Lithuania and Czech Republic are the countries that experienced the largest relative increments in relation to their active population, while only Germany, the Netherlands and Malta, together with Cyprus, faced a decrease in the relative dimension of their creative workforce from 2001-04 to 2005-08.
3. The creative workforce is concentrated in core regions, urban areas and capital cities as opposed to regions that are lagging behind and outside of the pentagon; however, the latter regions have given the most visible signs of dynamism in the latter period, possibly as an effect of an effective pumping of structural funds in these regions to strengthen the “lever” effect exercised by cultural and creative industries (for instance, funding SME and not necessarily cultural programmes).

4. There was in 2001-04 and there still is in 2005-08 a moderate and positive association between creative workforce (as a share of the active population) and economic performance. Regions with above-average contingents of creative workforce tend to also have above-average p.c. GDP levels: this was the case mainly of pentagon regions plus Ireland and Iceland in 2001-04, and in general of predominantly urban regions. Vice versa, regions scoring low in terms of creative workforce also scored low in terms of p.c. GDP (most of South-Eastern and Central Europe, of the Iberian peninsula, in Southern and insular Italy, and in general predominantly rural regions).
5. An “odd” negative association between p.c. GDP and creative workforce is found in a few regions, like the Baltic countries (high contingents of creative workforce, low p.c. GDP) and in regions of western and central Europe like in Central France, northern England and Scotland, Norway (low contingents of creative workforce, high p.c. GDP).
6. Some regions that have been catching up in economic terms from the 2001-04 to the 2005-08 period have also experienced a sensible growth in their creative workforce. It is the case among others, of most Polish and Czech regions, of the three Baltic countries, and of the Basque region in Spain. Mountain regions have scored particularly well to this respect.
7. Some others have experienced negative change rates both in creative workforce and p.c. GDP. Predominantly urban regions are overrepresented in this category: possibly the reasons for this are to be sought in the loss of urban and environmental quality that accompanies mature economic regions. Catalonia is part of this group together with a few “tigers” whose economy boomed in the 2000s, like Cyprus and some Irish regions, and were starting to be affected by the global crisis by the last part of the second reference period.
8. An economically buoyant situation is a magnet for creative workers and more in general is likely to engender longer term processes of development of a creative economy, while the contrary (that creative workers cause economic development) is not proved, and this trend is observed in general for all types of regions without distinctions according to the economic situation or the past history of economic development.

From these crude facts, a richer narrative could be reconstructed. The epicentre of the post-industrial economic revolution during the past decades has been the city (or urban region), which, also through its role of a “symbolic production milieu”, has acquired a fundamental role as the main node of global networks and flows (Amin & Thrift, 2007). In many cases, the success of western metropolitan areas, not only in nurturing and especially attracting creative talent, but also in leading the creative economic sectors to become drivers of innovation for the broader regional economies within a global positioning strategy, has implied the subtraction of equal opportunities

to disadvantaged areas at the geographical or economic periphery of Europe, or in rural and periurban regions progressively transformed into “dormitory” towns.

Creative workers have been nurtured, attracted and retained in the largest and most dynamic urban areas of Europe in the last two decades, as part and parcel of a wide-spanning socioeconomic transformation from an industrial to a post-industrial society, closely tied to the emergence of a global “symbolic economy” which transcends boundaries between sectors. Creative professionals have been at the forefront of innovation in all the leading industries, and have “made place”, that is, established a comparative unique advantage for regions and cities where territory – mostly the urban postmodern – and society have merged into idiosyncratic landscapes of creativity and social innovation. Yet our econometric analysis indicates that the causal effect between creative work and place performance is not direct and simple, but is likely to be complex and strongly mediated by policy and governance conditions, as is anticipated by, among others, Servillo et al. (2012).

Two paradigmatic examples of a close relationship between proficiency in creative work and a successful bet on innovation as motor of general economic growth are provided by Finland and the Netherlands. Starting from the early 1990, Finland focused its efforts on R&D, becoming the world leader in gross expenditure on R&D as a percentage of GDP with investments that rose from 2% to 3.5% in ten years (1991-2001) (Finnish Ministry of Education, 2010). Netherlands as well decided for strongly supporting innovation through public policies and investment. Unlike the Finnish case, the Dutch government support is rather indirect, namely through R&D tax incentives (OECD, 2010).

These examples seem to confirm the intuition that more than ever before, *firms follow people*, or rather *localised skills*, at least as much as the other way round. The much theorised-upon hyper-mobility of the creative workforce, probably realer in the US than in Europe and only if limited to the upper echelons of the job market, guarantees that such advantages are rapidly lost if cities and regions are not retentive of their creative workers: either because they cannot reach a critical mass that ensures some rooting of this human capital in place, or because they lose out their place qualities to the diseconomies of growth. Thus, the mobility of creative workers becomes a disequilibrium factor for regional cohesion: some places get all the best creative talents, at national or international scale, because they are already “cool” and they so become even “cooler”: innovative, dynamic, educated, wealthy... But of course there are losers in this game, and if regional divergence is a matter of uneven distribution of capital assets and production factors, the impact of creative professionals on places is probably deepening differences, or has been doing this for a long time.

Our analysis, though necessarily carried out at a regional scale which blurs some of the more “local” phenomena, and also probably excessively superficial as far as the effects of creative workers on economic development are concerned (that is, not really solving the conundrum of the causal relationship between the two variables), discloses a

somewhat more promising picture in the most recent period before the economic meltdown of 2008.

While in some regions the correlation between the two basic variables in our study – creative workers as a share of active population and per capita GDP – is positive as expected, which calls for a further strengthening of the creative economy and its institutional foundations in order to keep on developing in a resilient way or to invert the downturn produce by the economic crisis, in regions where this association is negative, which are interestingly spatially clustered as discussed above, the consequences that one may draw policy-wise seem to go hand in hand with the recommendation of the Territorial Agenda 2020: a more integrative and “smart” development for regions that have grown leaving behind their creative class, and a greater capacity to capitalise on territorial assets for regions that have lagged behind economically in spite of the dimensions and quality of their creative workforce, to be spurred through finely designed capacity building and networking policies within a multi-scale governance framework.

Regions with a low rate of creative workforce and high p.c. GDP (“yellow” regions in Fig. 4a), or having experienced low or negative growth rates of their creative industries workforce as compared to their p.c. GDP (“yellow” regions in Fig. 4b) should take this as a warning that their economic growth may not be sustained by an adequate base of “creative human capital”, either as creative workers in their leading economic sectors, which may push innovation from within, or as symbolic mediators and consumers in the local society, which may be a “pull” factor for a more innovative local production milieu. In either cases, production sectors and the local economy at large is doomed to lose their competitive edge. This situation may have been provoked by different (and largely interrelated) factors, such as the over-reliance on “traditional” economic sectors and production methods, or, more probably, the incapacity of places to be and stay attractive for talented, creative workers. The causes of this latter problem may be complex and apply to very different contexts: either a problem of “lack of cultural centrality” of these places, which is likely to drain young talented creative workers out of peripheral, non-urban regions towards the dynamic hubs of the knowledge economy, or the opposite situation in which such hubs are congested, overtly gentrified urban regions that erect increasingly high barriers (or economic or cultural nature) to the inflow of creative talent. Local policies should accordingly deal with these issues, on one hand investing in qualities of place that may revert their attractiveness, or managing the “social integration” of creative capital in large cities, for instance making sure that there is an adequate supply of affordable housing and services for the young.

Conversely, regions with a high rate of creative workforce and low p.c. GDP (“orange” regions in Fig. 4a), or having experienced high growth rates of their creative industries workforce as compared to their p.c. GDP (“orange” regions in Fig. 4b) should be concerned about making their creative capital “matter” for economic growth. They may be regions offering good place amenities and showcasing substantial cultural

assets which employ people in cultural industries, but they could not make a complete transition to a post-industrial economy where creative workers are a springboard for innovation in the local economy. Adequate local policy should target these shortcomings, for instance designing arrangements and platforms for the “transfer” of creative knowledge into the local economy.

Finally, regions that experience structural problems both with their creative workforce, and with their economic growth (“red” regions in both Fig. 4a and b), should evaluate what investments in the cultural and creative infrastructure could represent a “first step” to trigger an economic regeneration trajectory. For instance, the development of cultural events, cultural tourism and research clusters. This, indeed, is the current policy of Cyprus: 100% of the European Structural Funds devoted to culture is invested in one of the three implementation codes available, namely the ‘development of cultural infrastructure’, while Finland is allocating only 24,8% and Italy 19,5% to this line of investments (CSES-ERICarts, 2010).

At EU level, similar initiatives could again be designed so as to achieve these “balancing” effects and within the context of a borderless Europe they may even have greater chances to bring about territorial cohesion as far as the innovation potential from creative human capital is concerned. For instance, inter-regional migration as well as educational, infrastructure and tourism policy programmes could be designed to as to favour, for instance, local “virtuous cycles of creativity” in the smart development of rural and peripheral regions; but also target consistently urban areas so as to integrate the objective of the attraction and inclusion of talent as a pillars of sustainable economic development.

Obviously, however, the financial meltdown of the years immediately following the period of this study has somewhat compromised the positive outlook. With few exceptions, the global crisis seems to have struck harder on regions that had been experiencing a spectacular recovery in the previous years. If their burgeoning creative workforce could account for at least a small part of this recovery in a number of regions with specific characteristics, as we tried to argue using evidence from this study, it is not possible to demonstrate with the available data that indeed these regions have been more resilient than others to the present economic difficulties in the short term. As an example, the meltdown of the construction sector in tourist coasts of the Mediterranean is likely to have offset the possible gains that these regions experienced in the previous years in terms of innovation potential.

Our suggestion, though, is that these very regions may well be the better equipped to find their own way to recovery in the medium term, when the most devastating effects of the crisis will be over, on condition that they will be able to retain the creative workforce that they have nurtured and attracted – which obviously hints at courageous “retention policies” to be carried out at local level; thus, away from simplistic “plug and play” attraction policies for the creative class and towards a more courageous, long-term and sophisticated policy of “in bred” development of talent.

If instead these will lack, and the propensity to migrate will prevail, as certain signs seem to show (increasing numbers of highly skilled workers are reported to be fleeing from countries that are experiencing the worst effects of the crisis, like Spain, Italy or Greece, looking for jobs in the pentagon area or in emerging economies outside of Europe) we could be experiencing again a “polarising” trend leading to a less cohesive Europe.

Data limitations (in time and scale) and the purely geo-statistical approach of this paper clearly constrain its capacity to provide incontrovertible answers to all these issues, and should be complemented by a finer-scale analysis as well as by case study-based research focusing on drivers and processes of transmission between creativity and economic performance, which we leave for future research.

REFERENCES

Amin, A., and Thrift, N. (2007). Cultural-economy and cities. *Progress in human geography* 31(2): 143-161.

Anton Clavé, S., and González Reverté F., eds. (2007). *A propósito del turismo. La construcción social del espacio turístico*. Barcelona: Editorial UOC.

Arellano, M., and Bond, S.R. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58: 277-297.

Arellano, M., and Bover, O. (1995). Another look at the instrumental-variable estimation of error-components models. *Journal of Econometrics* 68: 29-52.

Blundell, R.W. and Bond, S.R. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics* 87: 115-143.

CSES-ERICarts (2010). *Study on the Contribution of Culture to Local and Regional Development - Evidence from the Structural Funds. Final Report*. Available from http://ec.europa.eu/culture/key-documents/doc2942_en.htm [accessed 8 August 2011].

EUROSTAT (2010). *Cultural statistics. Pocketbook edition*. [online]. Available from http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-32-10-374/EN/KS-32-10-374-EN.PDF. [accessed 8 May 2012].

Fainstein, S. (2005). Cities and Diversity. Should We Want It? Can We Plan for It?. *Urban Affairs Review* 41(1): 3-19.

Finnish Ministry of Education – Department for Cultural, Sport and Youth Policy (2010). *Creative Economy and Culture in the Innovation Policy*. Available from <http://www.minedu.fi/export/sites/default/OPM/Julkaisut/2010/liitteet/OPM13.pdf?lang=> [accessed 1 August 2011].

Florida, R. (2002). *The rise of the creative class*. Basic Books, New York.

- Florida, R. (2005). *The flight of the creative class*. Harper Collins, New York.
- Florida, R. (2008). *Who's your city?* Basic Books, New York.
- Higgs, P., Cunningham, S. and Bakhshi, H. (2008). *Beyond the Creative Industries: Mapping the Creative Economy in the United Kingdom*. [online]. Available from <http://www.nesta.org.uk/beyond-the-creative-industries/>. [accessed 8 June 2011].
- Holtz-Eakin, D., Newey, W., Rosen, H.S. (1988). Estimating vector autoregressions with panel data. *Econometrica* 56: 1371-1396.
- Hoyman, M. and C. Faricy (2009). It takes a village: A test of the creative class, social capital and human capital theories. *Urban Affairs Review* 44(3): 311-333.
- Hsiao, C. (1986). Analysis of panel data. *Econometric Society Monograph* #11.
- KEA European Affairs (2006). *The Economy of Culture in Europe*. Bruxelles. [Online]. Available from <http://www.kernnet.com/kea/Ecoculture/ecoculturepage.htm> [accessed 1 august 2010].
- Markusen, A. (2006). Urban development and the politics of creative class: Evidence from the study of artists. *Environment and Planning A* 38(10): 1921-1940.
- Marrocu, E., and Paci, R., (2010). Education or Just Creativity: What Matters Most for Economic Performance, Crenos Working Paper n.31, University of Cagliari.
- Martin-Brelot, H., Grossetti, M., Eckert, D., Gritsai, O. And Kovács, Z. (2010). The Spatial Mobility of the 'Creative Class': A European Perspective. *International Journal of Urban and Regional Research* 34(4): 854-870.
- Mommaas, H. (2004). Cultural clusters and the post-industrial city: Towards the remapping of urban cultural policy. *Urban Studies* 41: 507-532.
- OECD (2010). OECD Science, Technology and Industry Outlook 2010. Highlights. Available from <http://www.oecd.org/dataoecd/38/13/46674411.pdf> [accessed 1 August 2011].
- Plaza, B. (2008). On some challenges and conditions for the Guggenheim Museum Bilbao to be an effective economic re-activator. *International Journal of Urban and Regional Research* 32(2): 506-517.
- Power, D., and Nielsén, T. (2010). *Priority Sector Report: Creative and Cultural Industries*. Europe Innova, European Cluster Observatory. [online]. Available from http://lerondpointdici.fr/__oneclick_uploads/2010/05/rapport-eco-creative-2010-cee.pdf. [accessed 8 June 2011].
- Russo, A.P. and van der Borg, J. (2010). An urban policy framework for culture-oriented economic development: lessons from Holland. *Urban Geography* 31(5): 668-690.
- Sacco, P.L. and Crociata A. (2012). A conceptual regulatory framework for design and evaluation of complex, participative cultural planning strategies. *International Journal of Urban and Regional Research*, forthcoming.

Scott, A.J. (1997). The cultural economy of cities. *International Journal of Urban and Regional Research* 21(2): 323-339.

Smith, I., and Atkinson, R. (2011). Mobility and the smart, green and inclusive Europe. *Local economy* 26(6-7): 562-576.

Tinagli, I., and Florida R. (2005). *L'Italia nell'era creativa*. Creativity Group Europe, Milano.

Trip, J.J. (2007). Assessing Quality of Place: a Comparative Analysis of Amsterdam and Rotterdam. *Journal of Urban Affairs* 29(5): 501–517.

ANNEX I

Table I: List of ISCO-88 4D codes included in cultural workforce statistics

2131	Computer systems designers and analysts
2132	Computer programmers
2139	Computing professionals not elsewhere classified
2141	Architects, town and traffic planners
2310	College, university and higher education teaching professionals
2320	Secondary education teaching professionals
2431	Archivists and curators
2432	Librarians and related information professionals
2442	Sociologists, anthropologists and related professionals
2443	Philosophers, historians and political scientists*
2444	Philologists, translators
2451	Authors, journalists and other writers
2452	Sculptors, painters and related artists
2453	Composers, musicians and singers
2454	Choreographers and dancers
2455	Film, stage and related actors and directors
3131	Photographers and image and sound equipment operators
3429	Business service agents and trade brokers not elsewhere classified
3460	Social work associate professionals
3471	Decorators and commercial designers
3472	Radio, television and other announcers
3473	Street, night club and related musicians, singers and dancers
3474	Clowns, magicians, acrobats and related associate professionals
3475	Athletes, sportspersons and related associate professionals*
3480	Religious associate professionals
5113	Travel guides
5210	Fashion and other models
7311	Precision-instrument makers and repairers
7312	Musical instrument makers and tuners
7313	Jewellery and precious-metal workers
7321	Abrasive wheel formers, potters and related workers
7322	Glass makers, cutters, grinders and finishers
7323	Glass engravers and etchers
7324	Glass, ceramics and related decorative painters
7331	Handicraft workers in wood and related materials
7332	Handicraft workers in textile, leather and related materials
7341	Compositors, typesetters and related workers
7342	Stereotypers and electrotypers
7343	Printing engravers and etchers
7344	Photographic and related workers
7345	Bookbinders and related workers
7346	Silk-screen, block and textile printers

* ISCO4D sectors not included in ESPON 1.3.3

Table II: Regional data cover

	Creative workforce 2001-2004	Creative workforce 2005-2008	Active pop.	GDP p.c.
AT	4D	4D	NUTS2	NUTS2
BE	3D	3D	NUTS2	NUTS2
BG	3D	3D	⁽³⁾	NUTS2
CH	4D	4D	NUTS2	NUTS 0
CY	3D	3D	NUTS2	NUTS2
CZ	4D	4D	NUTS2	NUTS2
DE	3D	3D	⁽⁴⁾	NUTS2
DK	⁽¹⁾	3D	⁽⁵⁾	NUTS2
EE	4D	4D	NUTS2	NUTS2
ES	3D	3D	NUTS2	NUTS2
FI	4D	4D	NUTS2	NUTS2
FR	3D	3D	NUTS2	NUTS2
GR	3D	3D	NUTS2	NUTS2
HR	no data	4D	⁽⁶⁾	NUTS2
HU	4D	4D	NUTS2	NUTS2
IE	3D	3D	NUTS2	NUTS2
IS	4D	4D	NUTS2	NUTS2
IT	3D	3D	NUTS2	NUTS2
LI	no data	no data	NUTS2	NUTS2
LT	4D	4D	NUTS2	NUTS2
LU	4D	4D	NUTS2	NUTS2
LV	3D	3D	NUTS2	NUTS2
MK	no data	4D	NUTS2	NUTS2
MT	4D	4D	NUTS2	NUTS2
NL	3D	3D	NUTS2	NUTS2
NO	4D	4D	NUTS2	NUTS 0
PL	4D	4D	NUTS2	NUTS2
PT	4D	4D	NUTS2	NUTS2
RO	⁽²⁾	4D	NUTS2	NUTS2
SE	4D	4D	NUTS2	NUTS2
SI	4D	4D	NUTS2	NUTS2
SK	4D	4D	NUTS2	NUTS2
TR	no data	3D	⁽⁷⁾	⁽⁸⁾
UK	4D	4D	NUTS2	NUTS2

Legend:

ISCO-88 data on cultural professions (columns 2, 3):

- 4D: 4-digit data available
- 3D: 3-digit ISCO-88 data available

EUROSTAT data on active population and GDP per capita:

- NUTS2: data at NUTS2 level available
- NUTS0: data at NUTS0 level available only

Notes:

- (1) In Denmark, cult.-workforce data are only available at NUTS0 level in the 2001-2004 period. A procedure of regionalisation has been deployed.
- (2) In Romania, 1-digit data only are available for the 2001-2004 period. A procedure of estimation of 4-digit data with a lower degree of accuracy has been deployed.
- (3) In Bulgaria, no data are available at NUTS0 level in the 2001-2002 period. The active population average for the 2001-2004 period has been calculated using 2003 and 2004 data only.
- (4) In three German regions, namely Brandenburg (DE4), Rheinland-Pfalz (DEB), Sachsen-Anhalt (DEE), there are data limitations on the active population data series. Moreover, in DE4, creative workforce data for 2001, 2002 and 2003 are missing. In DEB, creative workforce data for 2001 is missing. In DEE creative workforce data for the period 2001-2006 are missing, as well as the data of active population for the first reference period. The related averages of creative workforce data for the 2001-2004 and 2005-2008 periods have been calculated using the available data. In the case of Sachsen-Anhalt we used a “retropolation” procedure to estimate active population data for the first reference period.

- (5) In Denmark, no data at NUTS0 level are available for the 2001-2006 period; NUTS2 data from Denmark Statistikbank have been used instead. The active population average for the 2005-2008 period has been calculated using the 2007 and 2008 data only. A “retropolation” procedure has been used to estimate active population data for the first reference period.
- (6) In Croatia, no data at NUTS0 level are available in the 2001-2006 period; NUTS2 data from the Croatian Bureau of Statistics (year: 2001; active population over 25 y.o.) have been used instead. The active population average for the 2005-2008 period has been calculated using the 2007 and 2008 data only. A “retropolation” procedure has been used to estimate active population data for the first reference period.
- (7) In Turkey, no data at NUTS0 level are available in the 2001-2005 period. The active population average for the 2005-2008 period has been calculated using the 2007 and 2008 data only. A “retropolation” procedure has been used to estimate active population data for the first reference period.
- (8) In Turkey, no data are available at NUTS0 level in the 2002-2003 and 2007-2008 periods. The GDP per capita averages for the 2001-2004 and 2005-2008 periods have been calculated using the available data.