
***Extended abtract***

# EXTENDED ABSTRACT

**Title: Location patterns and determinants of creative industries sub-sectors in Spain**

**Authors and e-mail of all: Daniel Sánchez-Serra daniel.sanchezserra@oecd.org**

**Department: Directorate for Education and Skills**

**University: Organisation for Economic Co-operation and Development (OECD)**

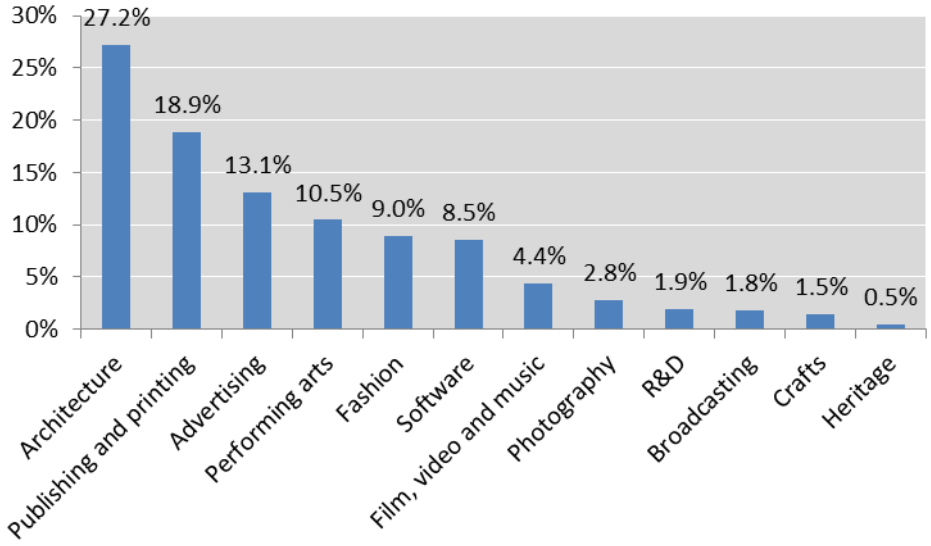
**Subject area:** *Creative Industries: Location Patterns and Growth Generation*

**Abstract:** Creative industries can be defined as those industries that produce and commercialize creative goods and services. Over the last years, creative industries have been contributing significantly to the wealth of countries, thus becoming an object of interest for academics and policymakers. And these industries seem to be relevant also in the years to come. According to the European Commission (2010a), much of the future prosperity of European countries will depend on the capacity to use the resources, knowledge and creativity that already exist in the territory. In this line, the EU considered the creative industries as a driving force to reach the goal established in the Lisbon agenda to make Europe «*the most competitive and dynamic knowledge-based economy*».

There is not yet a general consensus about what is the proper list of creative industries. However, 12 creative sub-sectors appear to be recurrent in the national, international and academic classifications of creative industries used in the literature. These sub-sectors are: Fashion; Publishing and printing; Film, video and music; Crafts; Software; R&D; Architecture; Photography; Advertising; Broadcasting; Heritage and Performing arts.

Based on ORBIS-2011 data around 7% of firms belong to the creative industries sub-sector in Spain. Indeed, in the year 2009, Spain accounted for 44,882 firms in creative industries. These firms were mainly concentrated in three sub-sectors (Figure 1): Architecture, Publishing and printing and Advertising concentrate almost 60% of the firms in creative industries in Spain. Architecture is the largest creative sub-sector in Spain accounting for more than 12,000 firms and representing around 27% of all firms in creative industries in Spain, followed by Publishing and printing (19%) and advertising (13%). The remaining firms in creative industries are distributed across 9 creative sub-sectors Heritage being the smallest creative sub-sector in Spain accounting for less than 1% of the firms in creative industries.

*Figure 1. Share of creative industries by sub-sector in Spain, 2009*




*Source: Own calculations based on ORBIS-2011 database.*

Several authors have pointed out that these industries are not uniformly distributed in the space. Indeed, they tend to concentrate in the space giving place to more creative intensive locations such as local creative systems and creative clusters. In this research, all Spanish firms in creative industries have been geolocalised and aggregated for each of the 806 Local Labour Systems (LLS) identified in Spain. These data reveal that creative firms tend to concentrate in big cities. Indeed, 45% of the firms in creative industries concentrated in the top-5 LLS being Madrid and Barcelona the ones that account for the largest shares (24% and 13%, respectively), followed by Valencia (4%), Bilbao (3%) and Sevilla (2%).

Despite the fact that big cities tend to concentrate the largest share of firms in creative industries, other cities concentrate a substantive share of creative industries in specific creative sub-sectors. For example, Córdoba concentrates the largest share of firms in the Craft sub-sector (22%), and Elche concentrates one of the largest shares of firms in the Fashion sub-sector (10%), just after Madrid (10%).

Recently there has been a growing interest in the determinants of the localisation of creative industries in the space. Empirical studies in this area confirm not only the relevance of traditional agglomeration economies (localisation and urbanisation economies), but also specific creative forces to explain the location patterns of creative industries. However, given the heterogeneity of location patterns of firms in different creative sub-sectors, a different combination of location determinants associated to each sub-sector is expected.

Location determinants considered in this study are computed according to the variables described in Table 1.

This document seeks to identify the main location determinants behind each of the creative industries sub-sectors. In order to achieve that and given the fact that: 1) the

number of firms in creative industries sub-sectors by LLS is a nonnegative integer variable, and 2) there is a large number of LLS without firms in creative industries, it is recommended to estimate the regressions using a Negative Binomial Regression Model (NBRM).

The model used here is based on Ellison and Glaeser (1994/1997, p. 892), who suggest a location model based on the existence of natural advantages and externalities or inter-firm spillovers inside the same industry. This model assumes an industry divided in *N* business units, which choose in a consecutive way their location among the *M* areas in which the territory is divided. In this case, and to make the model tractable, the authors take only one company to illustrate the model. Thus, the *k*th business will maximize its profits through their decision to locate $v_k$ inside the area *i*, by the following function:

$$\log \pi_{ki} = \log \overline{\pi}_i + g_i(v_1,...,v_{k-1}) + \varepsilon_{ki} \qquad [1]$$

where $\overline{\pi}_i$ is a random variable reflecting the probability of locating in area *i* (as influenced by observed and unobserved area characteristics), $v_j$ is the location of the business *j*, while $\varepsilon_{ki}$ is the random component.

Equation *[1]* shows that the profits derived from the location of a business are related to two elements. Firstly, they are related to an average measure of the territory profitability (*general-economic factors*), and secondly, to a random variable that collects idiosyncratic elements of the industry (*specific-creative forces*). The authors suggest a simple parametric specification of this model:

$$\log \pi_{ki} = \log(\pi_i) + \sum_{l \neq k} e_{kl}(1-u_{li})(-\infty) + \varepsilon_{ki} \qquad [2]$$

where $e_{kl}$ is the Bernouilli random variable equal to one with probability $\gamma_0$ that indicates whether a potential valuable spillover exists between each pair of plants, and $u_{li}$ is an indicator for whether plant *l* is located in area *i* ($v_l$=*i*), and $\varepsilon_{ki}$, again, is a random component independent from $e_{kl}$.


Table 1. Location determinants

| | Variable | Indicator computation |
|---|---|---|
| Localisation economies | Creative firm size | $Firm\ size_{ij} = \frac{L_{ij}}{F_{ij}}$ where *L* refers to the employment (jobs) and *F* refers to the number of firms, *i* refers to the creative industry sub sector and *j* refers to the LLS. |
| | Creative competition – Scale effects | $Competition_{ij} = \frac{1}{\sum_{i,j}\left[\left(\frac{F_{s,i,j}}{F_{ij}}\right)^2\right]}$ where *s* refers to the size of the industry which can be micro (<10 employees), small (<50 employees), medium (< 250 employees), large (< 1,000 employees) and very large (>=1000 employees), *i* refers to the creative industry sub-sector and *j* refers to the LLS. |
| | Creative filière | $Filiere_{ij} = \frac{1}{\sum_{i,j}\left[\left(\frac{L_{i,j}}{L_{ij}}\right)^2\right]}$ , where *L* refers to the employment, *i* refers to the creative industry sub-sectors and *j* refers to the LLS. |
| | Creative specialisation externalities (or Creative knowledge spillovers) | $Creative\ externalities_{ij} = \frac{\left(F_{ij}/F_i\right)}{\left(F_j/F\right)}$ , where *F* refers to the number of firms, *i* refers to the creative industry sub-sector and *j* refers to the LLS. |
| | Creative clusters | Number of creative clusters by LLS |
| Urbanisation economies | Population | $Population_j = \frac{P_j}{1{,}000}$ , where *P* refers to the total population and *j* refers to the LLS. |

| | |
|---|---|
| | |
| Employment density (potential size) | $$Employment\ density_j = \frac{L_j}{A_j}$$ , where *A* refers to the total land, *L* refers to the total employment and *j* refers to the LLS. |
| Spatial population concentration | $$GINI_j = \frac{1}{2}\sum_{i=1}^{n}\left\lvert \frac{P_{mun}}{P_j} - \frac{A_{mun}}{A_j} \right\rvert$$ , where $P_{mun}$ refers to the total population of one of the *n* municipality inside the LLS. $P_j$ refers to the total population of the LLS. $A_{mun}$ refers to the total surface in km$^2$ of one of the *n* municipalities inside the LLS. And $A_j$ refers to the total size in km$^2$ of the LLS. |
| Labour supply | $$Labour\ supply_j = \frac{L_j}{P_j}$$ , where L refers to the total number of employees, *P* refers to total population and *j* refers to the LLS. |
| Diversity externalities | $$Diversity\ externalities_{ij} = \frac{1}{\sum_i \left[\left(\frac{L_{ij}}{L_j}\right)^2\right]}$$ , where $L_i$ refers to the employment in 62 industrial sectors at NACE 2 digits and *j* refers to the LLS. |
| Infrastructures | $$Infrastructures_j = \frac{length\ of\ roads_j}{Population_j}$$ , where *roads* refers to the length of motorways, primary, secondary and tertiary national roads and *j* refers to the LLS. |
| Public services | $$Public\ services_j = \frac{PS_j}{Population_j}$$ , where *PS* refers to the number of Police offices, Postboxes, Postoffices, Hospitals, Pharmacies, Fire Stations, Kindergartens, Kiosks, Car Parks, Court |

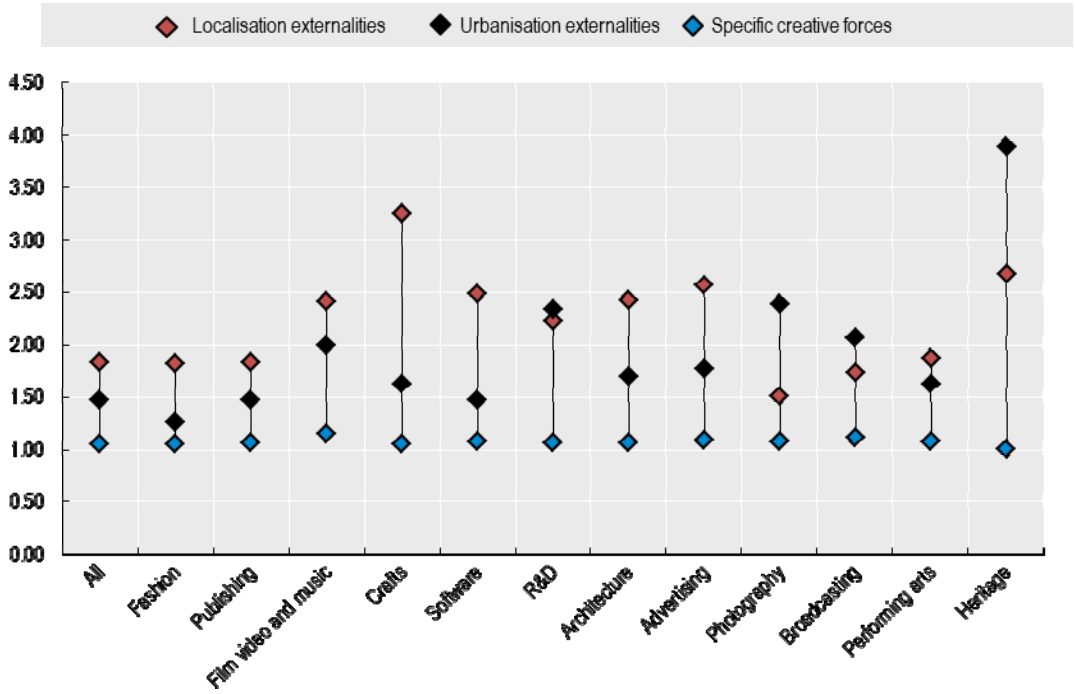
| | | |
|---|---|---|
| | | Houses, Prisons, Telephone boxes, Stations, Airports, Universities and Schools and *j* refers to the LLS. |
| | Social capital | $Social\ capital_j = \frac{T_j}{Population_j}$ , where *T* refers to the people that say, generally speaking, "most people can be trusted" and *j* refers to the NUTS 2. |
| Specific creative forces | Capital region (political power) | $1 = capital\ region$ |
| | Heritage (cultural infrastructure) | $Heritage_j = \frac{Art_j + Buildings_j + Cultural\ Heritage_j}{Population_j}$ x10,000 where *j* refers to the LLS. |
| | Quality of the environment (air quality) | $Pollution_j = \frac{CO2_j}{Population_j}$ , where CO2 refer to the number of tonnes of CO2 emissions and *j* refers to the LLS. |
| | Touristic services | $Touristic\ services_{ij} = \frac{\left(S_i / S\right)}{\left(P_i / P\right)}$ , where *P* refers to total population and *S* refers to the touristic services such as coffee shops, pubs, nightclubs, restaurants, fast food, attractions and bakeries and *j* refers to the LLS. |
| | Tolerance | Percentage of people that wouldn't like to have Muslims as neighbours. |
| | Human capital | $Human\ capital_j = \frac{H_j}{P24_j}$ , where *H* refers to the total population with at least tertiary education attainment while P24 refers to total population above 24 years old and *j* refers to the LLS. |

| | | |
|---|---|---|
| | Analytic specialisation externalities | $Analytic\ spillovers_{ij} = \frac{\left(L_{ij}/L_i\right)}{\left(L_j/L\right)}$ , where $L_i$ refers to the employment in high tech industries. NACE rev 1.1. (6411, 6412, 6420, 6511, 6512, 6521, 6522, 6523, 6601, 6602, 6603, 6711, 6712, 6713, 6720, 7110, 7121, 7122, 7123, 7131, 7132, 7133, 7134, 7140, 7210, 7230, 7240, 7250, 7411, 7412, 7413, 7414, 7415, 7430, 7450, 7460, 7470, 7482, 7485, 7486, 8010, 8021, 8022, 8030, 8041, 8042, 8511, 8512, 8513, 8514, 8520, 8531, 8532, 3530, 2441, 2442, 3001, 3002, 3210, 3220, 3230, 3310, 3320, 3330, 3340, 3350) and *j* refers to the LLS. |
| | Synthetic specialisation externalities | $Synthetic\ spillovers_{ij} = \frac{\left(L_{ij}/L_i\right)}{\left(L_j/L\right)}$ , where $L_i$ refers to the employment in high tech industries. NACE rev 1.1. (3110, 3120, 3130, 3140, 3150, 3161, 3162, 3410, 3420, 3430, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2420, 2430, 2451, 2452, 2461, 2462, 2463, 2464, 2465, 2466, 2470, 3520, 3541, 3542, 3543, 3550, 2911, 2912, 2913, 2914, 2921, 2922, 2923, 2924, 2931, 2932, 2941, 2942, 2943, 2951, 2952, 2953, 2954, 2955, 2956, 2960, 2971, 2972, 3511, 3512, 2511, 2512, 2513, 2521, 2522, 2523, 2524, 2310, 2320, 2330, 2611, 2612, 2613, 2614, 2615, 2621, 2622, 2623, 2624, 2625, 2626, 2630, 2640, 2651, 2652, 2653, 2661, 2662, 2663, 2664, 2665, 2666, 2670, 2681, 2682, 2710, 2721, 2722, 2731, 2732, 2733, 2734, 2741, 2742, 2743, 2744, 2745, 2751, 2752, 2753, 2754, 2811, 2812, 2821, 2822, 2830, 2840, 2851, 2852, 2861, 2862, 2863, 2871, 2872, 2873, 2874, 2875) and *j* refers to the LLS. |
| | Innovation | $Innovation_j = \frac{PAT_j}{Population_j} \text{x1,000}$ , where *PAT* stands for average total patents (2000-2010) and *j* refers to the LLS. |
| | Patronage | $Patronage_j = \frac{K_j}{Population_j} x10,000$ , where *K* stands for the number of AMTs and Banks and *j* refers to the LLS. |

Estimates by creative industry sub-sector are presented in table 2. This table displays the maximum reported incidence ratio obtained for each of the dependent variables after adjusting for multicollinearity issues.

According to the analysis conducted, it is observed that in general all main location forces have a positive impact on the location of firms in different creative industries sub-sectors. However, not all regressors have the same effect on the location of firms in the different creative sub-sectors. Indeed, while the localisation economies seem to be the most important predictor for the majority of sub-sectors, the urbanisation economies seem to be more relevant for the R&D, Photography, Broadcasting and Heritage creative sub-sectors.

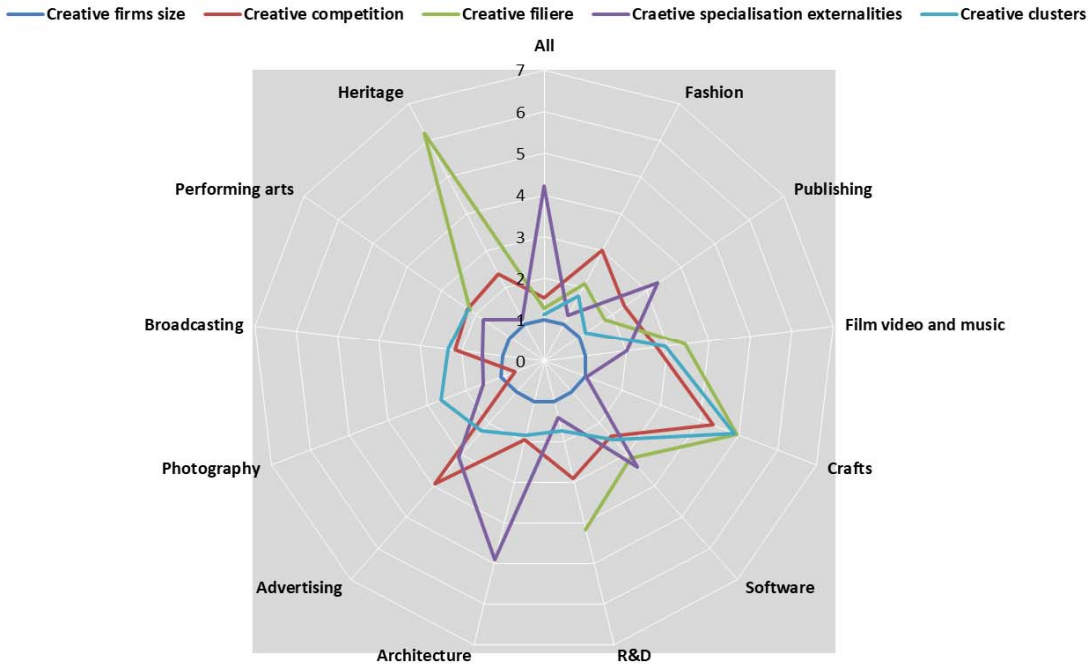
Figure 2. Average reported incidence ratio by main location forces.




*Note 1: The Reported Incidence Ratios (IRR) represent the change in the dependent variable for a one unit increase in the independent variable, given the other variables are held constant in the model. The percentage increase or decrease is determined by the amount the IRR is either above or below 1. As a result, an IRR below 1 indicates a negative relationship between the dependent and the independent variable. On the contrary, an IRR above 1 specifies a positive relationship between them.*

As presented in figure 3, creative specialisation externalities seem to be the most significant localisation determinant not only when looking at all firms in creative industries, but also when considering Architecture, Software and Publishing separately. However, other creative sub-sectors are localised in LLS with other localisation economies. For example creative filière seems to be the major localisation determinant for firms in the Film, video and music, Craft, R&D and Heritage sub-sectors. Also creative competition seems to have a higher coefficient when considering the Advertising and Fashion sub-sector. Finally, the presence of creative clusters seems to be the most important localisation determinant for creative industrial sub-sectors such as Broadcasting and Photography.

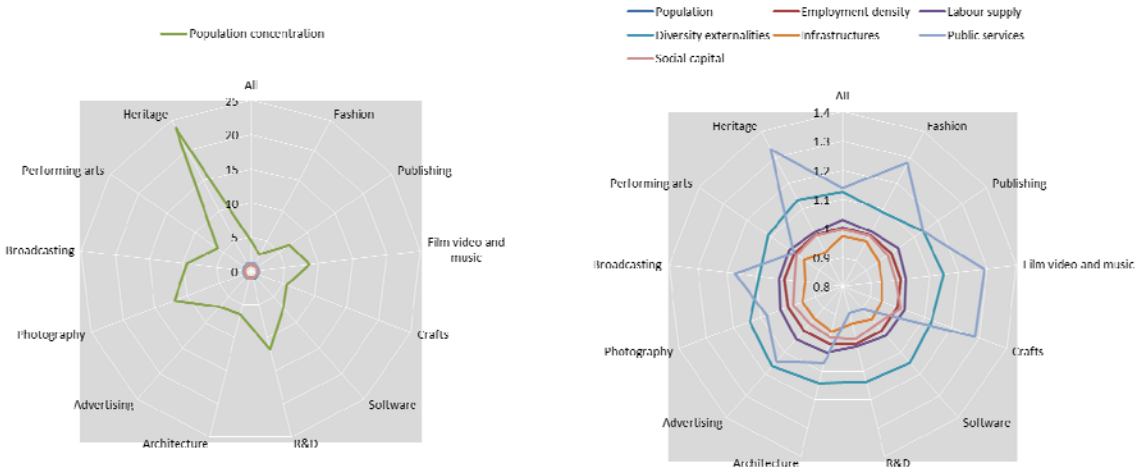
Figure 3. Maximum reported Incidence Rate Ratios by localisation economies and creative industry sub-sector




*Note 1: Creative specialisation externalities have been separated from the other localisation economies for a better display.*
*Note 2: This figure shows the maximum Incidence Rate Ratio that can be observed in the regressions.*

When looking at the urbanisation economies (Figure 4), population concentration seems to be the most important driver for all creative industry sub-sectors. This determinant is particularly important for sub-sectors such as Heritage, R&D and Photography (above 10 Incidence Rate Ratios). Public services appears to be the second most important urbanisation determinant when looking at all creative industries together. This is also true for individual sub-sectors such as Heritage, Fashion, Film, video and music, Crafts and Broadcasting, while the remaining sub-sectors seem to benefit from locations with high diversity externalities.

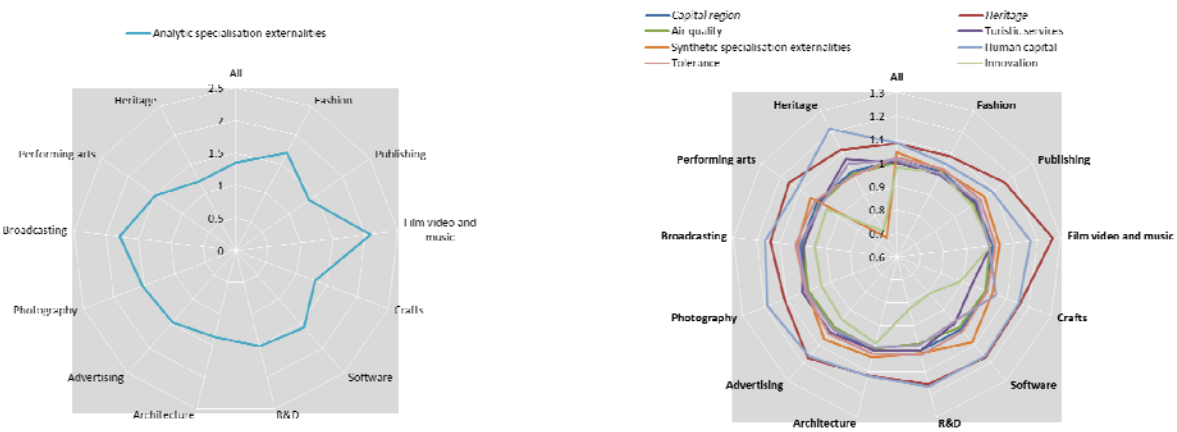
Figure 4. Maximum reported Incidence Rate Ratios by urbanisation economies and creative industry sub-sector




*Note 1: Creative specialisation externalities have been separated from the other localisation economies for a better display.*
*Note 2: This figure shows the maximum Incidence Rate Ratio that can be observed in the regressions.*

When looking at the creative specific regressors, it can be observed that analytic specialisation externalities seem to be the most significant regressor, followed by human capital and heritage. The last two regressors have the same impact on creative sub-sectors such as Advertising, Architecture, R&D and Software, however, human capital seems to prevail in the Heritage, Broadcasting and Photography sub-sectors.

Figure 5. Maximum reported Incidence Rate Ratios by specific creative forces and creative industry sub-sector




*Note 1: Creative specialisation externalities have been separated from the other localisation economies for a better display.*
*Note 2: This figure shows the maximum Incidence Rate Ratio that can be observed in the regressions.*

All in all, this study contributes to the literature of creative industries by examining the spatial location and the location determinants of the different creative industries sub-sectors in Spain using plant-level microdata. Based on this information it has been proven that despite the fact that creative industries tend to cluster in capital cities, creative industries sub-sectors have distinct location patterns.


Using a negative binomial regression model on the analysis of the location patterns in the different creative industry sub-sectors it has been shown that localisation economies are the main driving factors for the location of firms in creative industries. However differences in the main forces driving the location of creative industries sub-sectors have been identified.

**Keywords:** *creative industries; industrial location; count data models*
**JEL codes:** R10, R30