

# CREATIVE INDUSTRIES IN THE CZECH REPUBLIC: A SPATIAL PERSPECTIVE

*Ondřej Slach, Jaroslav Koutský, Josef Novotný, Jan Ženka*

## Introduction

It was approximately around the end of the 1990s when terms creative industries and creative class entered academic and public policy discourse and have become to large extent fashionable topics in the field of urban and regional development. This happened despite the fact that both concepts show a number of ambiguities with respect to their theoretical, methodological-empirical and even application underpinnings [42]. Increased interest in the issue of creative industries has been reflected on the one hand by their dynamically increased importance in national and regional economies [40] and on the other hand it reflects a shift away from used to symbolic value of products [27] as well as broader social changes in the form of pluralisation and individualization (distinction) of life styles [18]. Creative industries are assumed to have positive role in creating innovations and jobs as well as benefits for urban regeneration [24]. Therefore, naturally, it is not surprising that the concept of creative industries is increasingly popular in transition economies CEEs [43], [37] including the Czech Republic [38], [25]. However, if the discussions of these concepts in the context of advanced economies produced certain ambiguities, then we can notice often uncritical adoption of these foreign theoretical postulates and examples of good practices without necessary contextualization in their discussions in the Czech Republic [46]. In addition, a major problem is relatively weak empirical evidence on the topic in the Czech Republic, which can also be attributed to insufficient or lacking regional economic statistics. In the following text we attempt to describe and explain current spatial differentiation of creative industries in the Czech Republic. On the level of municipalities

with extended competences (206 regions) we test the effects of population size, population and employment density, economic specialization, and economic performance on the location and geographical concentration of creative industries. Firstly, the topic of creative industries will be briefly defined followed by a brief outline of the position of creative industries in national economies of European countries. The article will then proceed to the empirical analysis of creative industries in the Czech Republic. The analytical part of the text is divided into two sections. The first one provides a descriptive overview of key indicators of employment in creative industries at the level of municipalities with extended competence. The second section then applies more advanced statistical methods in order to examine correlates of regional employment in creative industries.

## 1. Creative Industries and Their Spatial Dimension

The literature offers a variety of approaches to define creative industries [15]. The most often applied approach is the sector definition, which also encompasses the classical definition by DCMS [7]. It defines creative industries as: *“activities which have their origin in individual creativity, skill and talent, and which have the potential for wealth and job creation through the generation and exploitation of intellectual property with the key sectors being: advertising, architecture, the art and antiques market, crafts, design, designer fashion, film, interactive leisure software, music, the performing arts, publishing, software and television and radio”* (p. 10). This is a very pragmatic definition that includes industries whose products are of a hybrid nature; that is both material (e.g. print, clothes) or immaterial (e.g. advertisement,

## Economics

film). In addition, it also includes some of the classical low-tech industries (print, furniture manufacturing) together with some knowledge-intensive services (advertisement). Besides that, sectoral definition of creative industries includes industries which differ from each other in their knowledge basis (software – analytical versus music, film – symbolic [1]) and project ecologies (software production/orchestration, advertisement/improvisation [16], [17]), or of ownership status (private and public) [11]. A significant advance in the topic was brought by the division into traditional cultural industries (print, film, performing arts) and into non-traditional creative industries (advertisement, design, software) [28], which we follow in many parts of this text. High diversity and fragmentation of creative industries have raised a number of critical reactions [36]. However, these critiques have not led to complete rejection of the concept of creative industries itself. Rather, they have pointed at the need to understand creative industries as a set of diverse industries that may vary in their spatial patterns and innovation regimes etc. This diversity has to be kept in mind when analysing creative industries as an aggregate segment of an economy, examining their regional distribution, and making inferences about possible practical implications [22].

In general, creative industries are usually concentrated in urban spaces and they are also considered as a kind of “urban nature” [28]. Their most significant concentrations tend to be in large cities that, as “privileged sites” [41], offer geographically concentrated critical mass of capital, knowledge, institutions, and infrastructure. Apart from the size, important role is played by usually more diversified economic structure of large cities in comparison to often more specialized economic structure of small towns [9]. As it has already been outlined, some of the creative industries are of a relatively smaller scale for which diversified economic structure offers more suitable conditions than specialized economic environment, which is typically more convenient for more mature industries characteristic by low innovation demand and standardized production (e.g. manufacturing of basic metals, cement or bricks) [10]. In other words, specialization tends to be better for maintenance of existing industries (due to MAR externalities), while creative industries capitalize on

local diversity [20]. The relationship between industrial diversity (and economies of scope) versus specialization (and economies of scale) and the age of an industry in terms of its stage in its life cycle have been documented on examples of creative industries [13] and beyond [33].

Large cities, therefore, offer a combination of urbanization economies [31] as well as so-called Jacobs externalities that stem from coexistence of diverse industries [14]. If we take into account the innovation regime of creative industries which is based more on combination of existing knowledge rather than on new knowledge in terms of scientific discoveries and technology transfers [1], we can consider the importance of diversity as a key factor for localisation of creative industries. Nevertheless, the important fact is that large cities offer not only urban advantages but also partial field specializations that are significant for higher efficiency in incremental innovations [29] so that the term “diversified specialisation” [12] have been used to bridge specialization/ /diversity duality.

City size has positive effect from both demand and supply perspective. It is important for both creative industries oriented towards customers (audience) and for creative industries focused on purchasers (B2B) [39]. Higher purchasing power in large cities allows absorption of relatively expensive “new” products (see [45]) which is important within creative industries that have high production costs and low reproduction costs [30]. Empirically, Henderson [19] shows high production costs of large cities when he points at comparatively lower productivity in textiles industry in the US metropolitan areas with over 1 million inhabitants relative to smaller cities.

Simultaneously, creative industries can not only be perceived as one part of an economy but especially as a system of the production of symbols and meanings. That means that market value of creative industries cannot be explained solely based on the demand and supply comparisons, or based on a clearly defined value but it is necessary to understand them in context of social networks that create, legitimize and consume them [26].

Nevertheless, high geographic concentration of economic activities can, when it exceeds a certain critical scale, generate agglomeration

## **Ekonomie**

disadvantages (related to congestion costs and higher input prices) that cause pressures on relocation of these activities through the process of suburbanization towards hinterland of metropolitan areas. In other words, the process of concentration can be accompanied by processes of de-concentration at the meso-level (within metropolitan regions) as well as macro level (within states). Again, knowledge- and capital-demands of an industry in question play an important role here, with low knowledge-demands and high capital demands contributing to the deconcentration.

### **2. Creative and Cultural Industries in an International Perspective**

In the following sections we attempt to provide an “input parameter overview” of traditional cultural industries and non-traditional creative industries (together abbreviated as CCI). The core of the text focuses on the situation in the Czech Republic but we also try to put this evidence into wider European context. Despite gradual improvement of methodological clarity and precision of treatment of this subject, it is necessary to acknowledge certain limits of international statistics and comparisons. Although the authors engaged in this topic have increasingly acknowledged the distinction between traditional cultural industries and non-traditional creative industries, the comparability of their empirical work across countries is limited due to national specifics in the data collection, different classifications and aggregations of industries used among other problematic issues. Despite these complications, an international overview can still be valuable for understanding the global context and indicating basic parameters of creative industries from the point of view of employment, structural and spatial patterns.

Total employment in cultural and creative industries in Europe was in 2006 approximately 6.5 mil. workers which stands for 2.71 % of the total number of workers in the labour market [34]. In most of the European countries, the portion of employed in CCI represents from 2 % to 4 % of total employment (only in Poland, Bulgaria and Romania (1.18 %) is their share lower than 2 %). In the category of the biggest states the number of employed in CCI is around a million (Great Britain, Germany) [8], [32], in states with medium-sized labour market the

number of employed ranges from 500 thousand to 1 million (France, Italy, Spain), in smaller countries it involves tens to hundred thousand workers. Employment in CCI ranges from 60 thousand (Slovakia, 2.3 % of total employment) to 162 thousand (Poland, 1.7 % of total employment) in transition states of Central Europe [32]. Overall, employment in traditional cultural industries tends to be higher than in non-traditional creative industries, with the latter corresponding approximately to one third of the former. The validity of the expectation that CCI are predominantly concentrated in urban centres, as it was outlined above, can be mostly confirmed by the evidence from the European countries. The intensity of employment in CCI in individual states of Europe is tightly interrelated with the hierarchy of their settlement systems. Dominant position belongs to the capital or to the most important cities – e.g. Spain (Madrid and Barcelona together account for approximately 45 % of the national CCI employment), Italy (Rome and Milan account for 35 %), Sweden (Stockholm account for 30 %), Germany (Berlin, Hamburg, and Munich account for 18 %), or Romania (Bucharest accounts for 42.6 %, though the importance of CCI in total employment tends to be lower in Eastern European countries).

In terms of employment size differentiation within the CCI category, architecture and engineering and software and computer services are generally the two most significant industry groups. Some countries (i.e. Spain) also record significant number of employed in the group of printing and publishing industries. There doesn't seem to be any uniform spatial pattern with respect to distribution of individual groups of industries within the CCI category. The evidence from individual countries uncovers spatial concentrations of selected branches or industries such as the TV and radio production and reproduction of video, or film and photography being concentrated in specific (especially the capital) urban centres of given countries (see e.g. DePropis et al, 2009 for Great Britain). On the other hand, other relevant branches of CCI, e.g. Software, Advertising or Publishing tend to be more evenly distributed in space [28].

Because of geographical proximity, historical links, and structural similarity of the territory, Austria provides especially valuable case for

the comparison with the Czech Republic. Total number of employed in CCI in Austria is approx. 130 thousand workers which is about 20 thousand less than in CR [8]. It proportionally corresponds to the difference in the size of labour force in these two countries. A closer look at spatial dimension of CCI in Austria (see [44]) shows existing link between employment in traditional and non-traditional cultural industries. As in other European countries, the capital Vienna takes the first place in terms of the absolute number of employed in CCI (47 thousand workers), though the city's relative share in the total Austrian employment is smaller (6.1%) than is usual in other European states. However, this is not in contradiction to the argument about predominantly urban concentration of CCI. The biggest five Austrian cities (Vienna, Linz, Graz, Salzburg, Innsbruck) account for 60 % of the total national employment in traditional creative industries and for 53 % in traditional cultural industries, respectively, though their aggregate share in total population is less than 30 %. On the other hand, the example of Austria shows that localisation of CCI is not necessarily solely a matter of large metropolitan cities but that we can observe their significant spatial concentrations in hinterlands of the main urban centres too [44]. This fact is demonstrated by distribution of CCI (jobs in these industries) within broader functional economic areas, as they have emerged from complex urbanization and suburbanization processes. The authors of the study focusing on CCI in Austria [44] also refute expectation about possible spatial differentiation of particular CCI industries with respect to their localisation into urban centres and their hinterlands according to their "degree of creativeness" (concentration of more creative activities in the centre and more routine activities in smaller towns in the hinterland). It turns out that differences in patterns of distribution between particular branch specializations are very small particularly with respect to non-traditional creative industries (increased specialization of Vienna in RaD and television production serves as an exception). Differences in branch specialization of CCI can be traced among individual agglomerations (e.g. Linz and its surrounding specialized in technically oriented branches, Salzburg and its surrounding in reproduction of recorded media, Vienna

and its surrounding in Supporting activities to performing arts).

### 3. Spatial Distribution of Creative Industries (CI) in the Czech Republic – Data and Methods

For this empirical analysis, we mostly draw on 2009 regional level data from the Czech Statistical Office [4], [5]. In addition to publicly available data, our analysis works with a unique data set compiled from raw microeconomic firm level data aggregated into 206 regions in terms of the municipalities with extended competence (below we use term regions when referring to these administrative units). The data cover employment figures and financial indicators such as production, value added and wages disaggregated to particular industries according to NACE 2-digit classification.

Although covering the economically most important sectors of the Czech economy, the data exclude several sectors such as mining and quarrying (approximately 1 % of total employment); energy, water distribution, sewerage and waste management (2 %); wholesale and retail trade, repair of motor vehicles and motorcycles (12 % nationally and 14 % in Prague), and public services (21 % nationally and nearly 20 % in Prague) [4]. Therefore, our data cover approximately two thirds of the national level employment. We still regard the data informative and applicable for our purposes. That is because we mainly concentrate on specific segment of CI employment for which data are available and, moreover, with the exception of mining sector with known spatial concentrations into a few mining regions, the economic activities not covered by our data (most notably public services and retail) can be assumed to have quite even spatial distribution across the country in terms of their shares in total regional employment. As such, we expect that the exclusion of these figures (from denominator when calculating relative employment shares of CI) will cause rather negligible bias in our examination of regional patterns.

The research on creative industries in the Czech Republic is in short supply. The existing empirical evidence primarily focuses on CI in solely selected regions, while drawing on individual firm level data for these regions [38], [3]. To our best knowledge, our paper provides the first attempt to systematically describe the

## Ekonomie

pattern of CI spatial distribution for whole country and examine correlates of the regional differences.

For the purposes of the analysis we follow the definition of creative industries by Power [35] updated by NACE rev. 2 with some modifications. The following industry groups have been included into the group of CI industries (2 digit NACE codes in the parentheses):

- Printing and reproduction of recorded media (C-18);
- Publishing activities (J-58);
- Motion picture, video and television programme production, sound recording and music publishing activities (J-59);
- Programming and broadcasting activities (J-60);
- Architectural and engineering activities, technical testing and analysis (M-71);
- Advertising and market research (M-73);
- Other professional, scientist and technical activities (M-74).

Unlike in the Power's definition [35], public cultural industries (R-91) have not been considered here in the CI group. This is because (i) these data are unavailable and (ii) will not be primarily analysed, public cultural industries (R-90, 92) and from our point of view predominantly retail services G-47. As such, the following categories of market-oriented creative industries will be analysed. In some of the empirical works on this topic we can find that NACE categories of C-13 (Manufacture of textiles), C-14 (Manufacture of wearing apparel), C-31 (Manufacture of furniture) are also included as CI [40]. The inclusion of these so-called customer-oriented branches [21] of manufacturing industry makes sense in more advanced economies because of comparatively higher costs stimulate the production of small series of rather unique products with high added (symbolic) value. However, in less developed economies, where the Czech Republic also belongs to, these industries still mostly produce larger series of goods with a lower value added and, implicitly, a lower degree of creativeness. An indirect confirmation of this argument is a lack of negative correlation between the productivity in these industries and population size. As noted above in a reference to the work by Henderson [19], such a relationship is expected for the CI

industries. On the basis of this finding and the knowledge about the nature of these industries in the Czech context, we consider their exclusion from the CI for the purposes of our analysis as substantiated.

The overall share of the CI jobs (as defined above) in the total national employment (as covered by our data) is 7 % and the total amount of jobs corresponds to approximately 189 thousand. If considering overall national employment size including sectors not covered by our data (3.8 mil.), the relative share of CI jobs in total employment can be estimate to around 5 %). The composition of employment shares of particular industry groups within our category shows dominant position of architectural and engineering activities (41% of aggregate CI employment), followed by other professional, scientist and technical activities (18 %), advertising and market research (15 %), printing and reproduction of recorded media (14 %) and publishing activities (9 %).

## 4. Regional Distribution of Creative Industries – Description of the Patterns

Creative industries (CI) in the Czech Republic are significantly regionally concentrated mainly in large cities with a clear dominance of Prague. Prague itself accounts for almost 40 % of CI employment in the country (see details in Table 1) and its shares in the CI production and CI value added are even higher (see Table 2). The dominance of Prague in the national CI is considerably higher than the dominance of the capital cities in majority of other European countries (see previous chapter). These data confirm international position of Prague as a global gamma city [2], or generally strong position of the capitals within the whole CEES. Super-dominant position of Prague is also evident when considering the shares of the next two major centres, Brno and Ostrava. These cities accommodate, respectively, 9 % and 3 % of all CI jobs in the country. Subsequent ranking is determined mostly by population size or vertical geographical location (exceptions are explained below). Noteworthy is relatively low number of CI employed in Ostrava, which is related to past industrial specialization of Ostrava.

**Tab. 1: Top 10 Czech Regions with Highest Employment in Creative Industries (2009)**

Region/NACE	18	58	59	60	71	73	74	CI
Praha	7,562	10,185	2,627	1,378	23,566	14,161	10,901	70,379
Brno	1,646	1,205	207	91	8,753	2,510	2,453	16,867
Ostrava	727	438	93	54	3,776	786	1,336	7,208
Plzeň	871	244	60	24	2,389	377	1,368	5,333
Č. Budějovice	950	964	35	7	1,789	740	743	5,228
Olomouc	490	209	56	2	1,489	381	557	3,184
Zlín	707	85	71	9	1,459	268	394	2,993
Hradec Králové	273	92	34	3	1,768	261	454	2,885
Černošice	510	162	65	9	895	416	795	2,852
Pardubice	344	146	37	0	1,363	619	321	2,829
<b>ČR</b>	<b>26,829</b>	<b>17,996</b>	<b>4,540</b>	<b>1,760</b>	<b>76,953</b>	<b>27,642</b>	<b>33,785</b>	<b>189,505</b>

Source: CSO [4]; the authors

High concentration of CI is also apparent when considering the three most populous metropolitan areas (compounds of regions delimited according to Čermák et al. [6]), each with more than 500 thousand inhabitants that account together for 50 % of all CI jobs in the country. There have been notable effects of suburbanization within the Prague metropolitan area explaining high intensity of CI in the Prague's

hinterland regions such as Černošice and Brandýs nad Labem. Such processes have been less evident within other metropolitan areas, where the urban centres clearly dominate with respect to the concentration of CI (except printing). It can be assumed that in these areas a critical level of concentration, above which congestion costs and other agglomeration diseconomies become an issue, has not been reached.

**Tab. 2: Concentration Ratio – Share of the Largest Unit i.e. Prague in Total Employment in Czechia (%)**

NACE codes:	18	58	59	60	71	73	74	CI	M	T
Employment	28.2	56.6	57.9	78.3	30.6	51.2	32.3	<b>38.2</b>	10.0	23.3
Production	41.3	71.1	81.2	94.8	39.6	74.7	41.7	<b>54.3</b>	10.5	28.3
Value added	35.1	67.5	72.0	96.2	38.8	69.8	38.7	<b>49.3</b>	12.3	35.1

Source: CSO [4]; the authors, CI=Creative industries, M=Manufacturing, T= Total employment /industries covered by our database/

Overall, we can distinguish between two groups of CI according to the degree of spatial concentration. Print, architectural and engineering activities, other professional, scientific and other technical activities (NACE 18, 71, 74)

belong to the first group, publishing, activities in the area of films, programme production and broadcasting and advertisement (NACE 58, 59, 60, 73) to the second, spatially more concentrated group (see Tables 2 and 3).

## Ekonomie

**Tab. 3:** Herfindahl Index of Spatial Concentration (1 is maximum, concentration of all employment in a single unit)

NACE codes:	18	58	59	60	71	73	74	CI	M	T
Employment	0.09	0.33	0.34	0.62	0.11	0.27	0.12	0.16	0.02	0.06
Production	0.18	0.51	0.66	0.90	0.18	0.56	0.19	0.31	0.03	0.09
Value added	0.14	0.46	0.52	0.93	0.17	0.49	0.16	0.25	0.03	0.13

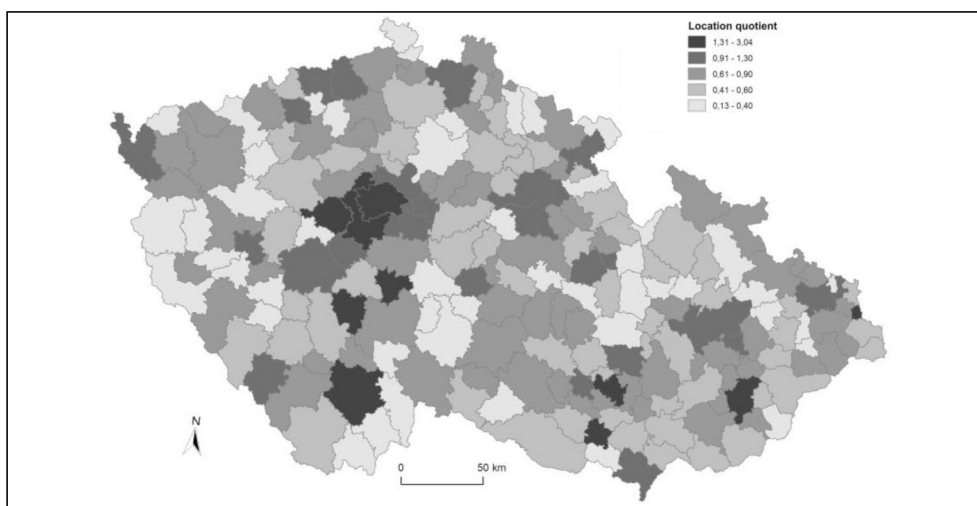
Source: CSO [4]; the authors; CI=Creative industries, M=Manufacturing, T= Total employment /industries covered by our database/

Three major metropolitan areas concentrate 66 % of jobs in advertising and on the other hand only 47 % of jobs in print. The comparison of the measures of spatial concentration for CI and manufacturing as a whole in Table 3 confirms generally higher spatial concentration of CI as well as differences between particular industries within CI group as mentioned above.

More detailed picture of spatial distribution offers relative concentration expressed by a localization quotient (a ratio between CI employment and overall employment in all industries in the region / a ratio between CI employment and overall employment in all industries in the Czech Republic). The quotient enables to identify a degree of specialization (above-average concentration) of creative

industries in the observed spatial units; nevertheless low numbers in creative industries employment lead to an explanatory ambiguity. Distinctive representation of small regions in creative industries (from their relative specialization point of view) does not correspond with the theoretical prerequisites. The region with the highest specialization rate is Český Těšín, followed by other smaller regions such as Beroun or Pohořelice regions (see Figure 1). The reason for this fact lays primarily in historical localization of the particular productions counted nowadays among researched creative industries. The second type of regions is represented by large cities or smaller regions specialized in one or two industries.

**Fig. 1:** Location Quotient of Creative Industries (2009)



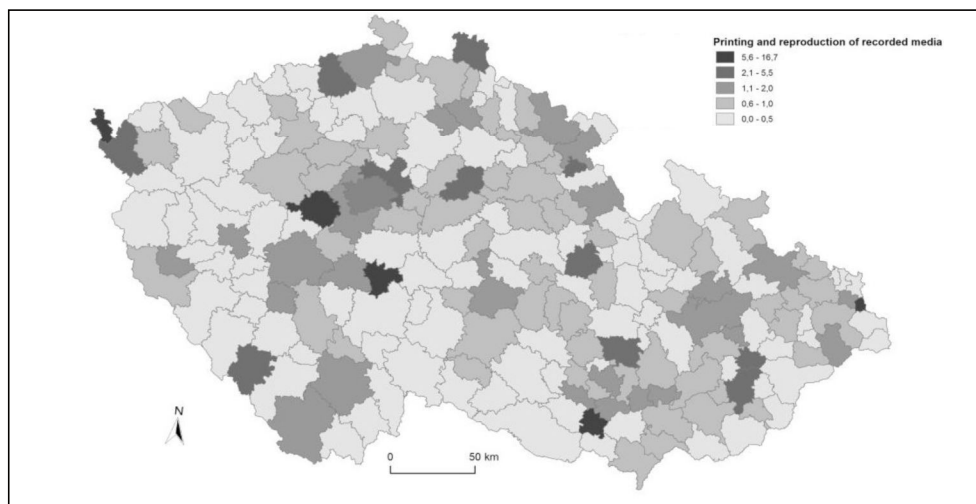
Source: CSO [4] [5]; the authors

## Economics

As mentioned above there are two different groups of creative industries from the spatial concentration point of view (for more see table 3) on the national level. The industry with the highest level of de-concentration on the national level is printing and reproduction of recorded media. At the same time it shows higher level of concentration on the regional level (see Figure 2). This industry has strong influence on the position of small regions within overall relative CI specialization, as e.g. printing in Český Těšín, Pohořelice, Votice or reproduction of recorded media in Beroun. It proves importance of specialization in connection with technological demands and economies of scope on one hand and lower knowledge

intensity on the other hand. The highest level of specialization in NACE 71 is held by Milevsko. A strong level of specialization is also in others regions (Brno, Zlín, Rožnov pod Radhoštěm) which implies close links to regional industrial base and consequently rather weak position of architecture in the given industry. Within the last branch (NACE 74) in group of less concentrated creative industries high specialization can be seen especially in smaller regions which are of two types. Firstly there are small regions with relatively strong base of cultural industries (Telč – LQ 2.85, Litomyšl – LQ 2.14) and secondly there are regions located in the commuting hinterlands of the largest cities (Černošice, Lysá nad Labem.)

**Fig. 2: Location Quotient of Industry Printing and Reproduction of Recorded Media (2009)**



Source: CSO [4] [5]; the authors

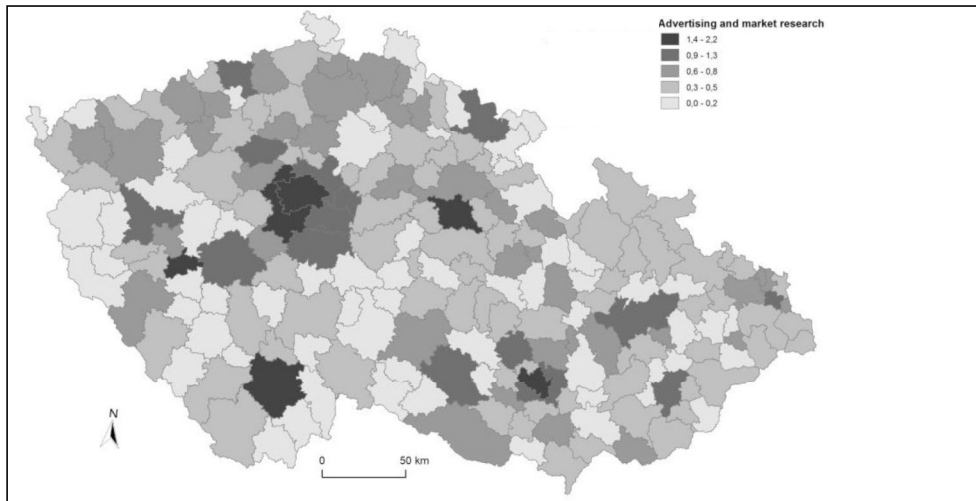
The second group of industries includes NACE 58, 59, 60, 73. Advertising and market research shows far stronger connection to localisation within main population centres, or their suburban zones (e.g. Černošice, Blovice, Říčany) (see Figure 3). Within publishing activities the highest number of industry specialization can be seen in Břeclav (LQ 4.9), České Budějovice (LQ 2.8), Prague (LQ 2.4) and in regions concentrating printing activities such as Český Těšín (LQ 1.77). Specific category is represented by NACE 60 that is

connected to presence of the Czech Television while its importance for employment in creative industries is of marginal nature only. Relatively analogous situation is at NACE 59 where except from Prague and partially also except from Brno a certain level of specialisation can be seen in regions with historic tradition (Zlín, LQ 1.45) or in regions in suburbs of Prague (Říčany – the highest LQ 4.05, Černošice, Kralupy nad Vltavou), however only dozens of jobs are in questions.



## Ekonomie

**Fig. 3: Location Quotient of Industry Advertising and Market Research (2009)**



Source: CSO [4] [5]; the authors

From the perspective of relative concentration within all sectors Prague dominates in the second, spatially more concentrated, group which implies existing diversified specialization i.e. combination of localization and urban economies. Presence of diversified specialization can be traced in Brno and, surprisingly, in České Budějovice, probably because there is no large city in its market catchment area. Agglomeration of Zlín, too, is shown to have positive values within specialized diversity where the important role is played by, apart from the industrial tradition, also by history of film production.

### 5. Multivariate Regression Analysis of Spatial Distribution of CI

In this section we examine correlates of regional variation in the CI employment intensity in a multivariate regression framework. The discussion and descriptive outline above provided us with several suggestions about possible correlates (predictors) of CI intensity that can be examined in our analysis.

The main dependent variable in our analysis is the share of CI employment in total regional employment. The regional variation in the dependent variable is displayed in Figure 1 (is the same as regional variability of location quotient).

Firstly, as extensively elaborated above, we can expect that the regional employment intensity in CI will significantly be higher in larger cities. We thus consider regional population size and population density (expressed as the number of inhabitants per square km) as the two independent variables. Although related, these two variables don't bear identical information and we test both of them in our analysis (see detail in Table 4).

Note that our dependent variable measures the share of CI in total employment and not in total population. At the same time, the regional variation in population size does not proportionally reflect variation in the size of regional employment due to commuting for work. We attempt to test this "commuting effect" and the hypothesis that the regions with higher intensity of employment (that is those with positive net balance of migration for work) will also have relatively higher share of employment in creative industries. In other words, in this way we examine whether there is greater tendency to commute (across administrative boundaries of regions considered here) for employment in CI in comparison to commuting for work in other economic activities.

Our additional hypothesis expects a negative relationship between the intensity of employment

## Economics

in CI and employment in manufacturing. Again, related to the discussion in previous sections, this is to say that we assume that CI tend to concentrate outside of industrial regions specialized mainly on manufacturing. For these purposes we consider the share of employment in manufacturing (NACE categories C10–C33 excluding C18, which is contained in creative industries category) as another independent variable in our analysis.

Another argument related to previous hypothesis and extensively elaborate above is that the relative importance of CI will be negatively related to the specialization of local

economy. From several possible indicators of economic specialization we use the Herfindahl index (HHI) calculated from the relative shares of those employed in individual economic sectors. Formally, it is denoted as:

$$HHI = \sum_k e_k^2 \quad (1)$$

where  $e_k$  is the relative share of employment in a sector  $k$  in total employment. Higher values of HHI signify higher specialization. In addition, we also control for regional differences in economic level considering per capita value added among independent variables.

**Tab. 4: List of Variables Employed in the Analysis**

Variable	Proxy indicator and year or period	Abbrev.	Mean	Std. Dev.	Source of data
Importance of creative industries	Share of creative industries in total employment 2009	CREATIVE	0.045	0.025	CSO [4]
Urbanization economies	Population 2009	POP	51004 inhabitants	94805	CSO [5]
	Population density 2009	DENSITY	158 inhabitants per sq. km	241	CSO [4]
Employment intensity (commuting effect)	Employment size relative to population size	EMP_INT	0.208	0.062	CSO [5]
Importance of manufacturing	Share of manufacturing in total employment	MANUF	0.529	0.110	CSO [4]
Economic specialization	Herfindahl index For employment in 2009	HHI	0.084	0.044	CSO [4]
Present economic performance	Value added per capita 2009	VA	95.373 CZK	55.698	CSO [4]

Note: For all variables N=206 Czech regions

Source: own

### **Design of the Analysis and Results**

We test the relationships outlined above in a multiple regression framework. After appropriate checks of the distribution of raw data we decided to use logarithmic transformations of the dependent variable and some of the independent variables (signified by the prefix “ln” in the tables below). We firstly examined the full model containing all of the considered independent predictors (Table 5). The first model (1) presents estimates obtained by running traditional OLS regression. According to our expectations, these results suggest significant positive effects of population density

on the importance of CI in regional economies and significant negative relationship with the employment in manufacturing as well as with economic specialization. By contrast, the coefficients for other examined variables have been found insignificant.

As we work with spatial data we have to be concerned with potential spatial autocorrelation in these data because it can violate some of the assumption of OLS regression. We thus additionally check the results obtained by OLS by running two spatial regressions in terms of the spatial lag and spatial error models (models 2 and 3 in Table 5). The former model contains

## Ekonomie

a spatially lagged dependent variable (W\_CREATIVE) among independent variables in order to capture possible effects of spatial autocorrelation of dependent variable. The latter model (3) then includes another variable denoted as  $\lambda$  which is to capture potential effects of spatially correlated errors. The results provided by these spatial regression models are very similar to those obtained by OLS regression including the overall fit of the models. It suggests that the spatial autocorrelation doesn't cause significant complications in the case of this analysis so that we consider the OLS results presented above as relevant.

Appropriate regression diagnostics indicated possible concerns with a mild collinearity

(mostly because of simultaneous inclusion of POP and DENSITY variables) and with heteroscedasticity also related to the existence of some outlier observations in our data set. In order to confirm the robustness of the effects of our focus variables obtained in models presented in Table 5, we also tried to run reduced OLS models when excluding a) Ln\_POP variable and b) most influential observations identified on the basis of z-scores of original data. Although these exclusions influenced the beta coefficients of particular variables, the significant effects of Ln\_HHI (negative effects) and Ln\_DENSITY (positive effect) on the importance of creative industries have remained.

**Tab. 5: Correlates of the Share of Employment in Creative industries – Full Model  
Estimated by OLS Regression and Maximum Likelihood Spatial Regressions**

	(1) OLS MODEL		(2) MAX. LIKELIHOOD SPATIAL LAG MODEL		(3) MAX. LIKELIHOOD SPATIAL ERROR MODEL	
	B	Std. error	B	Std. error	B	Std. error
Ln_POP	-0.101	0.063	-0.105*	0.062	-0.106*	0.062
Ln_DENSITY	0.229***	0.046	0.237***	0.047	0.229***	0.043
EMP_INT	1.059	0.931	1.042	0.917	1.126	0.904
MANUF	-2.137***	0.290	-2.143***	0.285	-2.128***	0.283
Ln_HHI	-0.385***	0.096	-0.387***	0.095	-0.393***	0.094
Ln_VA	0.041	0.120	0.045	0.118	0.038	0.116
W_CREATIVE	-	-	-0.052	0.092	-	-
$\lambda$	-	-	-	-	-0.073	0.113
R <sup>2</sup>	0.496		0.497		0.497	
Akaike criterion	176		178		175	

Note: Significant at \*10%; \*\*5%; \*\*\*1%. W\_CREATIVE refers to spatially lagged variable of the employment share of creative industries.  $\lambda$  is spatial autoregressive coefficient capturing effects of spatially correlated errors.

Source: own

## Conclusions

This text dealt with spatial dimension of creative industries in the Czech Republic while factors influencing spatial concentration of creative industries were not neglected either. The main conclusions of this text can be summarized into the following points.

Firstly, selected creative industries show strong spatial concentration into urban regions, namely the three largest metropolitan regions in the Czech Republic – Prague, Brno and Ostrava. Therefore location patterns of the CI

correspond to the settlement hierarchy of urban system in the Czech Republic. and share many similar features with other analysed European countries. Nevertheless, the position of Prague in a national urban system is significantly stronger than it is the position of other European capitals. On the other hand, Ostrava concentrates less employment in CI than one could expect considering its population and economic base.

Secondly, from the perspective of spatial regimes, two groups of industries, according to the degree of concentration, were identified.

## Economics

The least concentrated industry is Printing and reproduction of recorded media and on the other hand the most concentrated are Programming and broadcasting activities. The former shows strong tendencies for concentration into small regions, while the latter is highly concentrated into the largest cities, namely Prague. This finding supports the assumption that mature and new industries differ from each other in their overall spatial patterns and location requirements. Mature industries (print, apparel) are mostly found in smaller regions, while new industries (e.g. advertising) or symbolic creative industries (film, television) are more spatially concentrated in large urban regions.

Thirdly, an advanced statistical analysis was executed in addition to the descriptive analysis. This confirmed positive relationship between regional population density and localization of creative industries and on the contrary negative relationships between localization of creative industries and, respectively, employment in manufacturing and industrial specialization. The results suggest that premises stated in theory can be confirmed, namely that urban economies in combination with economies of scale have positive influence on the presence of creative industries in regions. These findings can help to understand the small importance of creative industries in the old industrial regions (Ostrava, Ústí nad Labem) and peripheral regions. At the same time they show that some of the smaller regions can also be usually specialized only in one creative industry (e.g. Litomyšl, Telč).

The text and the empirical analyses presented in it have been of rather partial nature due to limited data available. Despite this partiality it offers certain implications for the practice of regional development in the Czech Republic (also see [23]). First, it shows that support of creative industries as a whole for smaller regions without urban economies is highly questionable which has been illustrated in the example of Germany by Mossig [32]. If there is to be support for creative industries in small regions, then it should be in terms of focused support of the selected creative industry in connection to regional production system (sectoral specialization). Nevertheless, due to trends in some sectors of creative industries (e.g. digitalization) institutional support of

printing probably does not bring growth potential even though this industry is relatively concentrated in small regions. Support of creative industries as a whole seems to be relevant in Brno and Prague as they both have (different) existing diversified specializations. Others, similarly to smaller regions, can consider sectoral specializations in connection to production characteristics of the region in order to increase added value of products (NACE 71) which relates even to the above mentioned old industrial regions. Nevertheless, in other creative industries their future importance can be understood as rather partial. Certain exception can be represented by Zlín (NACE 59) but both in terms of absolute employment and in terms of trends in film industry the question is whether film industry can become a more significant employer in this region.

All in all, creative and cultural industries have become one of the possible “hopes” of regional development. This analysis shows to the fact that their support and development is not likely to be the remedy for all the regions in the Czech Republic. On the other hand it does not mean complete refusal of the whole concept but rather understanding the limits/potentials of this concept and greater stress on variety of regional production systems as well as the necessity to work with the concept of creative industries in their regional context. Only in this way we can avoid high expectations or even disillusionment in connection to this “fashionable” even though promising concept of regional development.

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**Mgr. Ondřej Slach**

University of Ostrava  
Faculty of Science  
Department of Human Geography and  
Regional Development  
ondrej.slach@osu.cz

**RNDr. Jaroslav Koutský, Ph.D.**

J. E. Purkyně University in Ústí nad Labem  
Faculty of Social and Economic Studies  
Department of Regional and  
Local Development  
jaroslav.koutsky@ujep.cz

## **Ekonomie**

**RNDr. Josef Novotný, Ph.D.**  
Charles University in Prague  
Faculty of Science  
Department of Regional and  
Local Development  
pepino@natur.cuni.cz

**RNDr. Jan Ženka, Ph.D.**  
University of Ostrava  
Faculty of Science  
Department of Human Geography and  
Regional Development  
jan.zenka@osu.cz

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