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The Spatial Pattern of Creative Industries in a Transformation Economy: the Case of Slovakia[1)]

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with 12 Fig. and 3 Tab. in the text

Contents

Zusammenfassung

Das räumliche Muster der "creative industries" in der Transformationswirtschaft: der Fall der Slowakei

Dieser Beitrag analysiert die räumliche Verteilung der "creative industries" in der Slowakei und deren Veränderung seit dem Übergang des Landes von einer Planungs- zu einer Marktwirtschaft. Wir verwenden Mikrodaten über einzelne Betriebe,

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die Informationen über den genauen Standort und über weitere Charakteristika enthalten. Dies erlaubt die Anwendung von Methoden der „Point-Pattern-" und der „Count-Data"-Analyse. Die empirische Untersuchung zeigt, dass sich der Sektor in der Slowakei trotz der Geschichte der Transformation sehr ähnlich verhält wie in anderen Ländern und auch mit den wichtigsten Hypothesen der Literatur in Einklang ist. Die Betriebe sind stark in den größeren Städten konzentriert, besonders in Pressburg [Bratislava]. Die Konzentration unterscheidet sich nach Kategorien, wobei die Unternehmensdienstleistungen am stärksten räumlich konzentriert sind. Über die Zeit betrachtet zeigen jüngere Unternehmen ein signifikant weniger konzentriertes räumliches Muster als die älteren. Dennoch ist auch diese Gruppe in den größeren Städten konzentriert.

Summary

This paper analyses the spatial pattern of creative industry firms in Slovakia and its evolution since the transformation from a planning to a market economy. We use micro-level data about creative industry firms that give the exact location of these firms in addition to other characteristics. This allows for the application of point pattern and of count data analyses. The empirical investigation shows that despite of the country's heritage as a transition economy, creative industries in Slovakia behave very similarly to those in other countries and confirm the main hypotheses of the literature. The firms are strongly concentrated in the larger cities, particularly in Bratislava. This concentration differs between sector categories, with business services showing the most concentrated pattern. As far as the evolution of the pattern is concerned, new firms show a significantly less concentrated spatial pattern than the older firms. Nevertheless, the pattern is still concentrated in the larger cities.

1 Introduction

Interest in the creative industries has increased with the development of new economic growth concepts, which understand knowledge as a major factor of long-term economic growth and emphasise the importance of human creativity and innovation. According to several studies (KEA 2006; UNCTAD, 2008; HIGGS, CUNNINGHAM & BAKHSHI 2008), creative industries contribute around 2.6% to the European Union (EU) Gross Domestic Product (GDP), providing jobs for 5% to 10% of the workforce and are among the fastest growing sectors. The importance of creativity in economic development was popularised mainly due to the work of HOWKINS (2002), FLORIDA (2002, 2005, 2009), CLARK (2004) and others. Although the concept has been criticised (GLAESER 2004; PECK 2005; MARKUSSEN 2006; NATHAN 2007; PRATT 2008; MALANGA 2008), an important part of the academic discussion is now devoted to the issue of creativity in economic development.

Creativity also became an important element of development policies since the early 1990s (FLEW & CUNNINGHAM 2010). Strategies to support the development of creativity can be found in urban, regional and national development strategies (LANDRY 2000) and as part of the development strategies of international institutions (EUROPEAN COMMISSION 2010; UNESCO 2006; UNCTAD 2008). FLEW & CUNNINGHAM (2010) show that the policy focus has gradually shifted from a supply side and artist-centred approach in the 1970s to the promotion of Small and Medium-size Enterprises (SMEs) in the creative industries today. As firms become the main target of the policy, promotion of the development of a creative economy is increasingly being integrated into enterprise and innovation policy.

The growing importance of creative industries has stimulated interest in the spatial organisation of that sector. Research results show that the creative industries tend to concentrate in large cities, form clusters, or tend to be organised in networks. Spatial concentration of firms, especially in big cities, is a specific feature of the creative industries. Our article focuses on the spatial pattern of creative industries and its evolution over time and investigates this issue in the context of a post-socialist country, Slovakia. Analysing the development of creative industries in the context of Slovakia is particularly interesting because of the specific role the literature attributes to creative industries in local and regional development. As will be discussed in more detail later, creative industries are considered pioneers of the economic reconstruction towards a knowledge-based economy. Because of their small scale, low capital requirements, and high reliance on knowledge and skills, creative industry firms are relatively easy to establish and should therefore have played an important role in the economic transformation of Slovakia.

It is surprising that so far only few authors have studied creative industries in the context of economic transformation. It seems that the massive economic reorganisation that accompanied this transition from a planning to a market economy has created a "blank slate" that constitutes almost ideal initial conditions for studying the evolution of creative industries. But, systematic academic research on creative industries in transformation economies is scarce and only a few projects or studies deal with this topic (e.g. MUSTERD 2007; JÜRISSON 2007; KLOUDOVÁ 2009; RUMPEL et al. 2010). Because of this, the empirical analysis of the evolution of creative industries in a post-socialist country of Central Europe can also contribute to our understanding of the creative industry and of the role it plays in developing a local or regional economy since it adds a new context to the discussion.

It is our goal in this paper to explore the evolution of the spatial pattern of creative industries in the transition from a planning to a market economy and afterwards. The paper is divided into three parts. In the first part we present the theoretical background of creative industries, focusing on definition and classification, spatial aspects of their development and their contribution to economic development. The second part presents the institutional context of the evolution of creative industries in Slovakia between 1990 and 2011. In the third part we explore the spatial aspects of the evolution of creative industries in Slovakia. This empirical analysis is based on descriptive statistics, point pattern and count data analysis. The paper closes with conclusions.

2 Theoretical background

The creative economy links together the ideas of creative industries, cultural industries, creative cities, creative clusters and creative class (HOWKINS 2002). Interconnection of the concepts and their relationship to other topics is illustrated by Figure 1. This semantic map is based on a key-word analysis of 491 articles in the Scopus database, dealing with the creative economy. The size of the circle represents the frequency of that key word; line thickness indicates the frequency of co-occurrence of keywords in the same article. For better visibility, lines representing frequency less than four have been removed. The semantic map demonstrates the complexity of the term and the many aspects related with creative industries. We will use this map for structuring the discussion in the rest of this section.

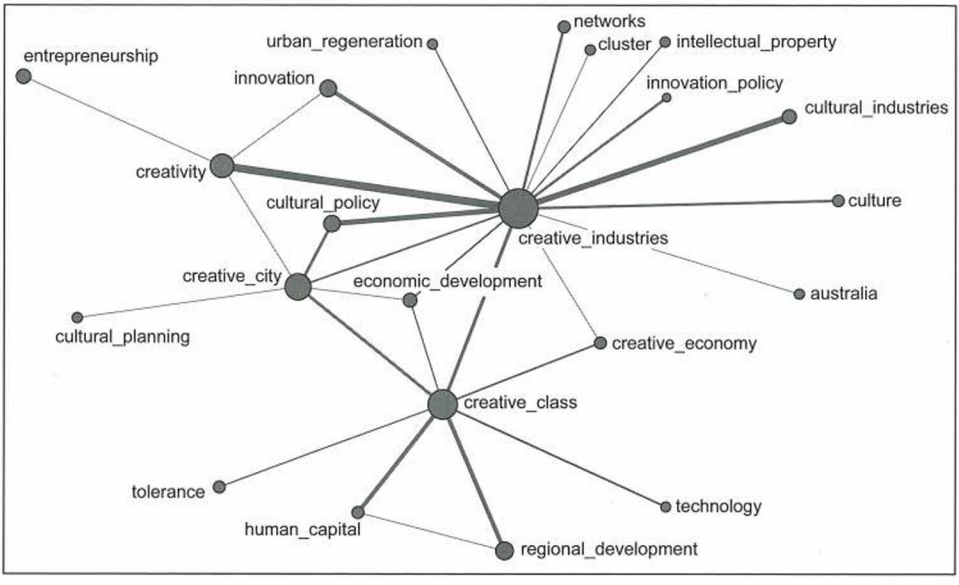


Fig. 1: Semantic map of the creative industries

2.1 Definition and classification

As reflected in Figure 1, the concept of *creative industries* follows the parallel concept of *cultural industries* (and *cultural policy*). The use of the term *cultural industries* originates from the trend of commercialising cultural activities in the 1980s. The concept of *creative industries* was used significantly after 1997 in connection with the implementation of neo-liberal policies in the United Kingdom (GARNHAM 2005; FLEW & CUNNINGHAM 2010). Some authors and organisations use the terms *cultural industries* or *cultural and creative industries* together, and some of them consider them as interchangeable (PRATT 1997; SCOTT 2004; MARKUSSEN et. al. 2008). The use of the concepts of *creative* or *cultural industries* is determined by the institutional

context (GALLOWAY & DUNLOP 2007). Creative industries are usually defined as those industries in which individual creative work and talent of individuals are essential inputs and where the outputs of the sector can be considered as an intellectual property (GALLOWAY & DUNLOP 2007).

There are many different definitions of creative industries. Some of the classifications emphasise the cultural and symbolic value of their output (O'CONNOR 2000; MARKUSSEN et al. 2008; UNESCO 2006); others consider the intangible nature of their output and its protection in the form of intellectual property (WIPO 2003) as more important. It is generally agreed that the creative industries represent a diverse group of companies.

The classification combines industries that are labour intensive and artisanal (arts, crafts, etc.) and industries that are industrialised in their mode of production (film). At the same time it includes companies that provide commercial services (architecture, advertising) as well as companies and organisations that are publicly funded (FLEW & CUNNINGHAM 2010). Despite of these differences, there is consensus that the core of the creative industries are publishing and literature; performing arts; music, film, video, and photography; broadcasting (television and radio); visual arts and crafts; advertising, design, including fashion; museums, galleries, and libraries; and interactive media (Web, games, mobile, etc.) (FLEW & CUNNINGHAM 2010). STAM et al. (2008) combine FLORIDA's creative class classification with the classification of creative industries and consider as a core three groups of industries: arts (visual arts performing arts), media and entertainment (media, publishing), and business services (architecture, technical design, advertising, fashion design).

2.2 Concentration in cities

The semantic map in Figure 1 also suggests that one of the typical features of firms in creative industries is their spatial concentration and particularly their concentration in urban areas (FLORIDA 2002; LAZARETTI et al. 2008; PRATT 1997). Reasons for the concentration of firms in cities are largely based on theories of agglomeration economies. Firms located in urban areas benefit from localisation economies and particularly urbanisation economies. Increasing returns of scale for the co-located industries in cities result from the spatial proximity to the large markets, availability of specialised suppliers and services, and access to knowledge spill-overs. Knowledge spill-overs are considered to be the main reason for the concentration of creative industries in large cities.

Clusters of firms in the creative industries are geographically smaller compared to industrial clusters, in some cases creating cultural quarters (MONTGOMERY 2003). The proximity of firms in the same industry is particularly important for cultural products. They are characterised by high uncertainty and depend upon acceptance by a wider audience. So being located in the vicinity of peers is an important factor for their success. For example, the music industry creates so-called musical scenes with specific music genres such as Jazz in New Orleans or Country Music in Nashville. POTTS et al. (2008) suggest that the feedback from social networks is a specific characteristic

of the creative industries. Individual artists can compare their activities, which leads to stronger rivalry and stimulates differentiation of artistic expression (KARLSSON 2011). Despite the growing importance of Information and Communication Technology (ICT), which facilitate the dissemination of creative products, local culture and local cultural buzz remain important, constituting one of the key characteristics of the creative industries.

CAVES (2003) emphasises the role of facilitators (publishers, recording companies, art dealers), whose mission is to bring work of creative industries to potential consumers. Concentration of supporting industries such as advertising or media is an important location factor for the art industries. Location close to major events (culture, sport, as well as crime, scandals, etc.) and central administration (policy) is essential for the publishing and media sector, as it favours quick access to major news, which is crucial for their competitive position (VANG 2005).

Unlike traditional business sectors creative industries do not form extensive value chains, but organise around projects (GRABHER 2002). Project organisation requires the coordination of various project participants, and location in the large cities gives access to a diversity of competencies and to face to face mediated buzz (VANG 2005). Creative industries are characterised by small firms, freelancing, part time jobs and temporary positions (SCOTT 2004), which increases the importance of the social networks. Products and services are usually unique, tailored to the customer, who is often involved in the production process. Provision of business services requires intensive interaction with customers, based on personal communication, so the spatial proximity to clients is very important as well.

2.3 Creative class

Another line of arguments concerning the concentration of the creative industries in large cities comes from the creative class concept (FLORIDA 2002). Location of companies in the creative industries is closely linked to the localisation choice of the workers in the creative professions – the creative class. The creative class is concentrated in cities, which are open to new ideas and have low entry barriers to human capital, i.e. a tolerant environment. The diversity of people in cities allows for new combinations of different experiences and knowledge and brings up new ideas and innovative solutions. The creative class looks for cities with a high level of urban amenities, which include specific architectural and natural settings, good public services and transport, or a wide range of goods and services (GLAESER et al. 2000; KNAPP & GRAVES 1989) which meet their life style.

2.4 Evolutionary approach

Although there exist large multinational companies in creative industries, small firms (often with no employees) dominate the sector. In general, the rate of creation of small firms is higher in regions where there is a higher proportion of employment

in SMEs, a favourable industrial structure (industries with low entry barriers), an embedded business culture, where wages are high and unemployment is low (FRITSCH 1991, 2008; STAM 2010). As goods and services produced by the creative industries are valued by consumers with higher incomes (STAM et al. 2008) large cities provide better conditions for the establishment and development of these companies.

The authors generally do not explain the circumstances that could lead to a new industrial trajectory (ARTHUR 1994; KRUGMAN 1991). Alternatively, they consider the initial events that led to the development of new industries, as historical accidents. Emerging industries in the region are represented at their beginning only by a small group of firms that do not benefit from externalities such as a major labour market, specialised services or knowledge spill-overs (BOSCHMA & WENTING 2007). As DAHL (2011) showed, the first generation companies are usually spin-offs, established by entrepreneurs from related industries. Urbanisation economies dominate over localisation economies. Emerging industries benefit from the availability of labour, capital and infrastructure in related industries, especially in urban regions. Emerging industries can therefore be found in cognitive fields (NOTEBOOM 2002) closely related to dominant regional industries (FRENKEN et al. 2007).

Although the spatial arrangement of new industries is uncertain and emerging industries do not have specific location preferences, regional conditions (knowledge, skills or infrastructure) may play generic roles (BOSCHMA & FRENKEN 2006) at the start of the sector. Location of future generations of spin-offs follow the localisation of the parent companies and the whole process deepens and stabilises the spatial distribution of industries over time (KLEPPER 2002, 2010). Increasing concentrations of firms in the region indicate favourable location conditions for other businesses. Mimetic behaviour of similar companies further deepens the concentration (SUIRE & VICENTE 2009). Growing numbers of firms in the newly established industry contribute to increased competition and rivalry (PORTER 1990), which may lead to the termination, respectively, leaving of less successful companies. As shown by HEEBELS & BOSCHMA (2011) in a study of publishing companies in Amsterdam, a higher rate of clustering meant higher exits of firms. Increased competition for labour, capital and business premises causes negative agglomeration effects and may result in spatial diffusion of companies in later stages.

2.5 Economic development

The diversity of people and industries in cities allows for the creation and dissemination of new ideas, thereby supporting economic growth (JACOBS 1960; FLORIDA 2002; FLORIDA et al. 2008). Contrary to the traditional theories of human capital, which emphasise education as key aspect of human capital, FLORIDA provides a creative class concept, which stresses the importance of work experience and professional competence. From his perspective the economic growth of cities results from technology, talent and tolerance in a city. These three factors do not increase creativity, but act as a magnet for the creative class (PRATT 2008). As ACS & MEGYESI (2009) comment, one possible explanation is that tolerance helps convert education into business activities.

Empirical studies have examined the relationship between creative class occupation and economic growth, employment growth, productivity or regional entrepreneurship (FLORIDA et al. 2008; MCGRANAHAN & WOJAN 2005; BOSCHMA & FRITSCH 2009; WEDEMAIER 2010). MCGRANAHAN & WOJAN tested whether the creative class concept is valid only in urban areas or also rural amenities will attract creative workers. Their analysis showed that the positive relationship between employment in creative occupations and employment growth is valid in both urban and rural areas. But they also found that rural amenities tend to attract creative workers. BOSCHMA & FRITSCH (2009) analysed economic effects of the creative class in seven European countries. They provide empirical evidence that the creative class is not equally distributed across Europe and that the regional climate of tolerance and openness has a positive effect on the concentration of the creative class in a region.

At the same time the results of the impact on regional development were not so straightforward. WEDEMAIER (2010) studied the impact of the creative sector (employees, bohemians) on the growth of employment in German regions. Although she found a positive relation between creative sector growth and growth of employment, the evidence that diversity contributes to growth was weaker. The mechanism is more effective in urban regions, which indicates that a critical mass of people is necessary for the economic development based on the creative sector.

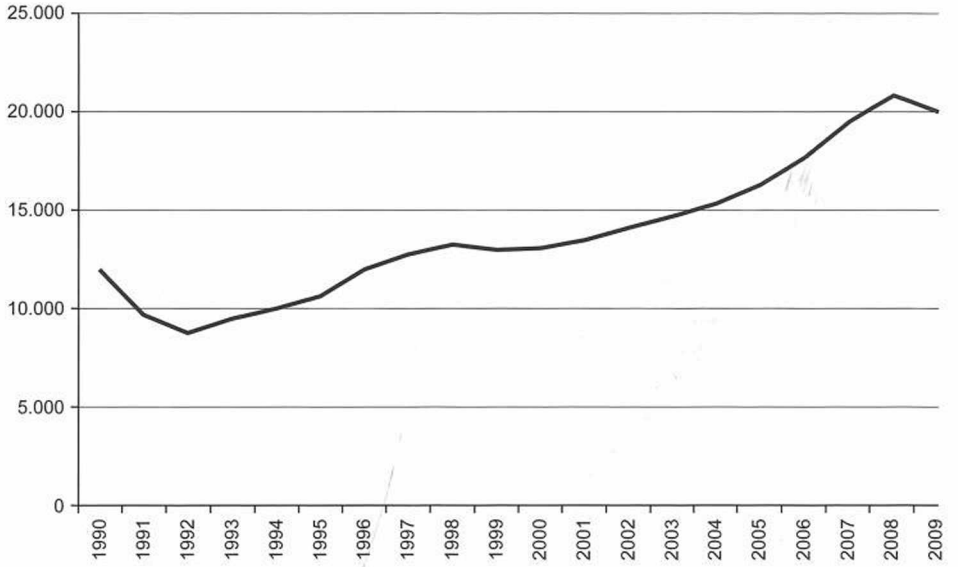
As we already mentioned, there is wide critical discussion of the creative class concept. MALANGA (2008) points out that in fact there is only a small correlation between creative class and economic growth. In fact, a large number of creative cities are lagging behind when using indicators of population growth, jobs, and new firm formation (MALANGA 2008). Similarly, RAUSCH & NEGREY (2006) found no relationship between the size of the creative class and the economic performance of cities in the U.S., but found a positive correlation between performance of the cities, tolerance and the relative concentration of immigrants. Although FLORIDA emphasises openness (tolerance) over urban achievements, MARLET & WOERKENS (2007) showed in a Dutch case study that aesthetic quality and natural environment significantly explained the proportion of creative class, as well as its growth in cities, while tolerance was not a significant factor.

Applying the creative class concept in practice, however, faces the risk of polarisation of society and economy (PECK 2005; OAKLEY 2006; NATHAN 2007; JARVIS et. al. 2009). OAKLEY (2006) warns that a too narrow focus of the regional development policy on the creative industries risks the creation of a polarised and unstable economy. The high mobility of creative entrepreneurs and the ephemeral nature of their commodities indicate that the growth of the sector may not be very stable, especially during economic recessions (PRATT 2009). Similarly, NATHAN (2007) criticises the excessive concentration of urban regeneration policy on creativity, diversity and lifestyle. Especially in small and medium-sized cities, the development of the economic base, skills and qualifications, transport infrastructure and public services could deliver better results.

3 Economic development of Slovakia between 1990 and 2011

Slovakia is located in Central Europe, bordering Austria, Czechia, Poland, Ukraine and Hungary. Slovakia became an independent state in 1993. In 2011 it had 5.423 million inhabitants and an area of about 49,000 square kilometres. The capital Bratislava is located in the south-west corner of the country and is the largest city with 431,061 inhabitants.

The economic development of Slovakia was strongly influenced by the transition from the centrally planned economy to the free market economy, which started with the collapse of the communist system in 1989. The transformation process began with the liberalisation of prices and foreign trade, abolition of businesses subsidies and with the introduction of commercial loans. Restitution of property dispossessed after 1948, privatisation of small (since 1991) and large enterprises (since 1992) established a new entrepreneurial sector dominated by private ownership. In this early period economic growth was hampered by the slow and complicated privatisation of large state companies and by institutional changes related to the constitution of the independent Slovak Republic in 1993.



Data source: HESTON, SUMMERS & ATEN 2011

Fig. 2: Development of GDP (PPP converted GDP per capita [chain series], at 2005 constant prices)

In 1994 the economy started to grow. Until 1996 economic growth was unstable and influenced by various factors, in particular the national demand and investment. Distrust in the political situation in the country resulted in a lack of Foreign Direct

Investment (FDI). Until 1998 the political system of the Slovak Republic was considered to be unstable and the country faced criticism from international organisations.

The new government elected in 1998 tried to stabilise the economy through various measures. This resulted in a slight slowdown of GDP growth and rising unemployment until 2002. Later governments focused on strengthening the international reputation of Slovakia and introduced a series of economic reforms. Accession of Slovakia to the EU and membership in NATO since 2004 substantially improved the picture for international investors. In addition, Slovakia introduced a series of reforms, such as a tax reform (with a flat tax rate), a pension system reform, a health care reform, and a social system reform. Low wages, low taxes and a skilled workforce attracted substantial inflows of foreign investments, particularly in the automotive and electronics industry. The subsequent rapid economic growth, largely driven by exports, culminated in a 10.5% growth rate in 2007. The increase of real wages between 2004 and 2008 was accompanied by a decline of the unemployment rate from 18.1% to 9.6%. In 2009, Slovakia joined the Euro area. Despite of the global economic crisis, which resulted in a recession in 2009, Slovakia is still one of the fastest growing economies in the EU.

The transformation of the Slovak economy was characterised by the transition from manufacturing, which dominated before 1989 to services. The institutional changes created on the one hand opportunities for individual creativity and talent (both artistic and business) and on the other hand increased the demand for business services. It seems that the input of this component of the creative industries was essential for the emergence of the new private business sector.

4 Data, methods, and results

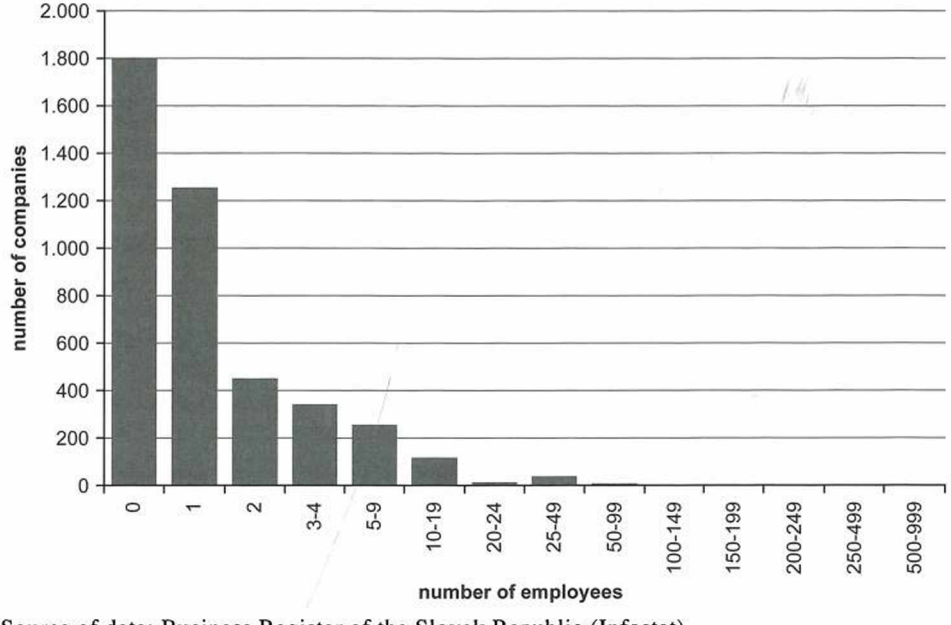
The information about the firms of the creative industries, their characteristics and locations originates from the Business Register of the Slovak Republic (Infostat). The database encompasses individual data on 207,763 business organisations registered in Slovakia until April 2012. Individual firm entries include the name of the firm, its date of registration, legal form, type of ownership, activity status, revenue category, employment category, exact location and industrial classification (NACE Rev. 2.0). Following the classification of creative industries (Table 1 in the Annex) suggested by STAM et al. (2008) we have identified 7,753 profit oriented creative industry firms, which were active in April 2012.

Companies that were founded earlier, but went out of business before April 2012, are not included in the data. Because of that, one has to be cautious with comparisons over time. Although the dataset includes information about the year of founding of each company, we cannot draw strong conclusions about the temporal dynamics of the founding activity of creative industry firms in Slovakia. This limitation only applies to the temporal dimension, not necessarily to the spatial structure and its evolution, which is the main focus of our analysis. When we assume that the exit rate of creative industry companies is not strongly influenced by location, the spatial pattern and its evolution over time will not be biased by the loss of companies from the database. The need to make this assumption is a major threat for the validity of our empirical analysis.

A major advantage of the database is that it provides information about the individual firms including the exact address. This allows us to geocode the location of the creative industry companies in Slovakia and to use methods of spatial point pattern analysis for the analysis of our research question. Spatial point pattern analysis investigates the location of objects in a certain area and derives conclusions therefrom about the point process that generated this spatial pattern. For some analyses we will have to aggregate the spatial distribution of creative industry firms to the commune level. In these cases we need to treat the information about the number of firms as count data. The respective methods will be discussed later in this section.

Before we deal with the spatial pattern of the creative industry firms in Slovakia and its evolution, let us briefly discuss some of the other features of companies. In particular, we will deal with their size, their age, and their sector composition.

Creative industry firms in Slovakia are quite small. This is in accordance with the respective literature. Figure 3 shows the number of creative industry companies in Slovakia by their number of employees. Over 40% of the companies have no employees, 80% of them employ 2 people or less. Only 1% of the creative industry companies in Slovakia employ 25 people or more, the largest one belongs to the category employing 500–999 employees. The average number of employees per company falls between 2.2 and 3.6 persons.[2)]



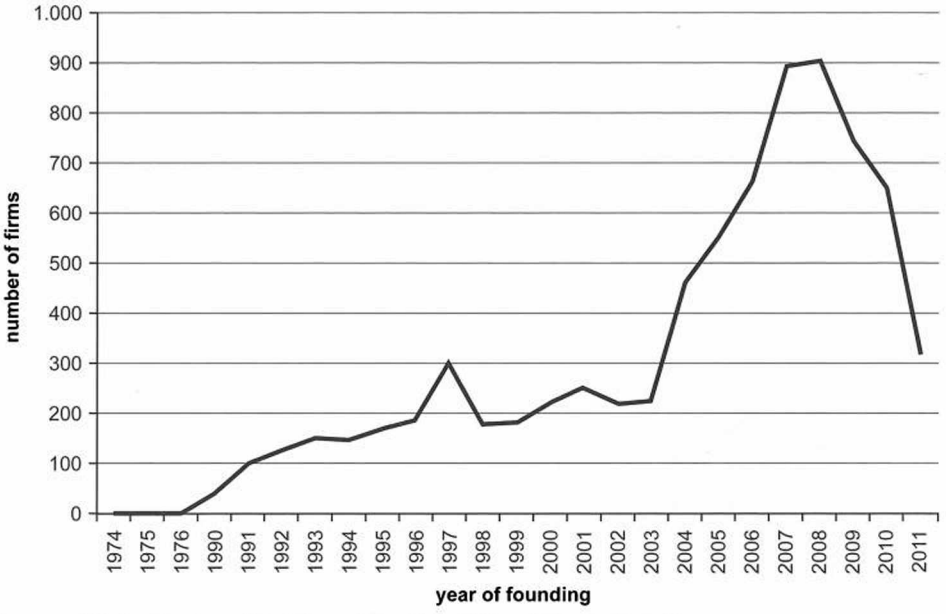
Source of data: Business Register of the Slovak Republic (Infostat)

Fig. 3: Creative industry companies by number of employees

[2)] This range results from using the lower and the upper end of the range of all the categories, respectively, in the calculation of the means.

The oldest company in the dataset was founded in 1974, another in 1975, and two more in 1976. These four companies are the only ones that have survived from the communist years. All the other companies were started after the change of the system in 1989. Figure 4 shows the number of creative industry firms by their year of founding. Since it is incomplete and therefore misleading, the year 2012 is suppressed in the figure. The Figure shows a strong increase over the years. The largest age category with over 900 is formed by companies founded in 2008. Taking into account the caveats mentioned above, the graph seems to show a substantial increase in the founding activity starting with the year 2004. In this year Slovakia joined the European Union. The graph also shows the effect of the economic crisis, with declining numbers in 2009 and the following years.

For the following analysis we group the companies into three categories: the "old" (founded 1996 or earlier), the "middle" (founded 1997–2003), and the "new" (founded 2004 or later). The year 1997 was selected because it is considered to mark the end of the immediate transition period.[3)] The choice of 2004 as a boundary year is motivated by Slovakia's entrance to the EU. In Figure 4 the three periods also show different characteristics. The first one is characterised by an almost continuous increase, the second one by a levelling off of the graph, and the third one by the massive peak in the latest years.



Source of data: Business Register of the Slovak Republic (Infostat)

Fig. 4: Creative industry companies by year of founding (1974–2011)

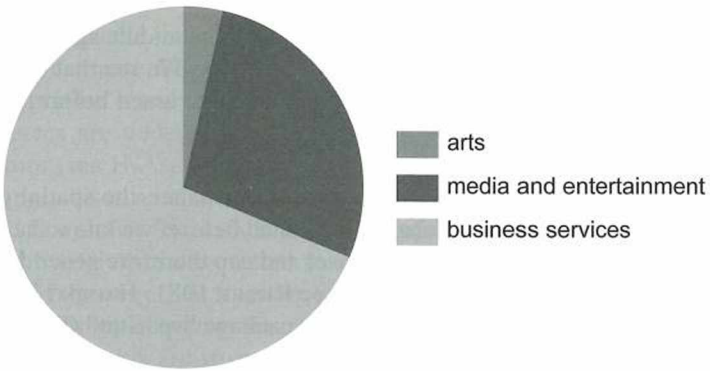
[3)] By 1997 the Slovak Republic was recognised by the European Commission as a country with a functioning market economy (EUROPEAN COMMISSION, 1998).

As has been mentioned above, depending on the definition of creative industry, various sectors are combined under this label. For our analysis we use the categorisation proposed by STAM et al. (2008) and form the following three categories:

(1) Arts,
(2) Media and entertainment, and
(3) Business services.

With 5,329 companies, *Business services* is by far the largest category (69% of companies). *Media and entertainment* consists of 2,145 companies (28%), *Arts* of 279 companies (4%). Figure 5 shows this distribution of companies by sector category. The companies in the *Arts* category are the smallest with an estimated average number of employees between 1.4 and 2.2. *Business services* firms are somewhat larger (1.8–2.7 employees in average). In average the largest firms are found in the category *Media and entertainment* with estimated 3.4–5.8 employees.

The firms in the three sector categories differ significantly by age (Chi-square = 70.13, DF = 4). The highest proportion of old companies (16.36%) is found in the *Media and entertainment* category (see Tab. 1). On the other hand, old companies are clearly underrepresented among the *Business services* (10.15%). An interesting case is the *Arts* companies, among which the old companies and the new companies are



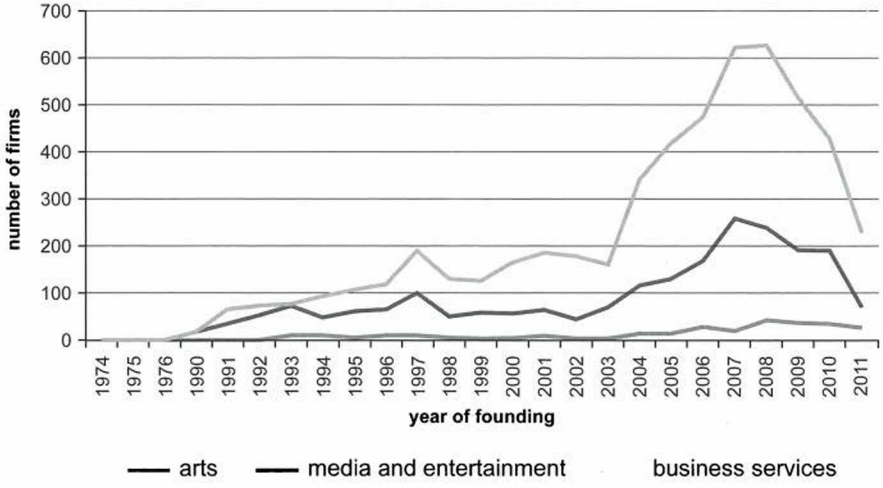
Source of data: Business Register of the Slovak Republic (Infostat)

Fig. 5: Creative industry firms by sector category (2011)

	old	middle	new
Arts	15.41%	11.83%	72.76%
Media and entertainment	16.36%	19.95%	63.68%
Business services	10.15%	21.09%	68.76%
Total	12.06%	20.44%	67.50%

Source of data: Business Register of the Slovak Republic (Infostat)

Table 1: Age distribution of firms by sector category (2011)



Source of data: Business Register of the Slovak Republic (Infostat)

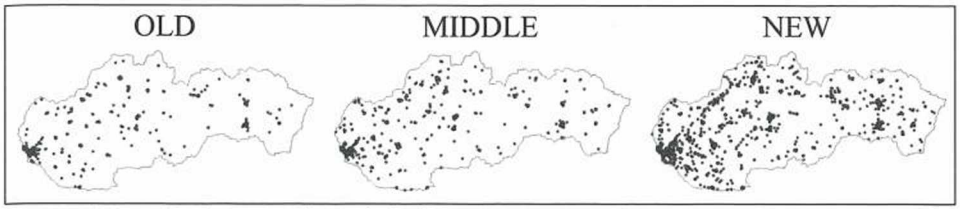
Fig. 6: Creative industry companies by year of founding (1974–2011) and sector category

overrepresented. In relative terms, they lack the middle aged category. Figure 6 breaks down the graph in Figure 4 by sector category. We see that despite of the differences between the sector categories that we have discussed before, over the years all three sector categories follow a similar path.

Now let us turn to the focus area of our paper, the spatial pattern of creative industry in Slovakia. As we have mentioned before, we know the exact addresses of the creative industry firms in the dataset and can therefore geocode them. This allows for the use of point pattern analysis (see RIPLEY 1981; HAINING 2003; BIVAND 2008). For this step of the analysis we use the R-package "spatstat" (BADDELEY & TURNER 2005).

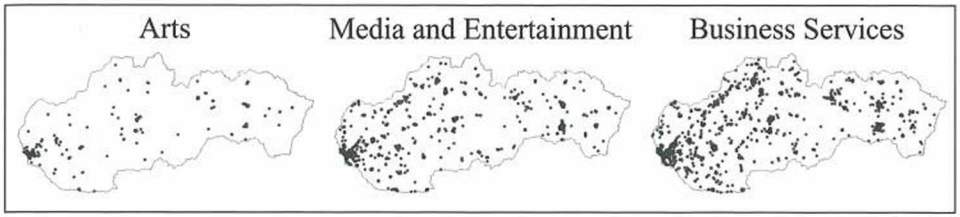
Figure 7 and Figure 8 show the location patterns of creative industry companies in Slovakia by age and sector category, respectively. These patterns respectively the aggregate pattern of all creative industry firms will be analysed in the rest of the paper. All maps show concentrations in the cities, particularly in Bratislava in the West of the state and in Košice and Prešov in the eastern part. The maps alone, however, cannot answer the question of how the location pattern evolved over time and how it differs by sector category. More detailed analysis is needed for that.

A commonly used measure in point pattern analysis is RIPLEY's K-function. It is based on the $n*(n-1)$ pairwise distances between n locations in a dataset. The K-function is then a "weighted and renormalised empirical distribution function of the pairwise distances" (BADDELEY 2010, p. 125). This function can be compared to that of some reference point pattern, usually that of "Complete Spatial Randomness" (CSR), where the points are assumed to be distributed in the area of observation completely



Source of data: Business Register of the Slovak Republic (Infostat)

Fig. 7: Point patterns of creative industry firms by age category (2011)



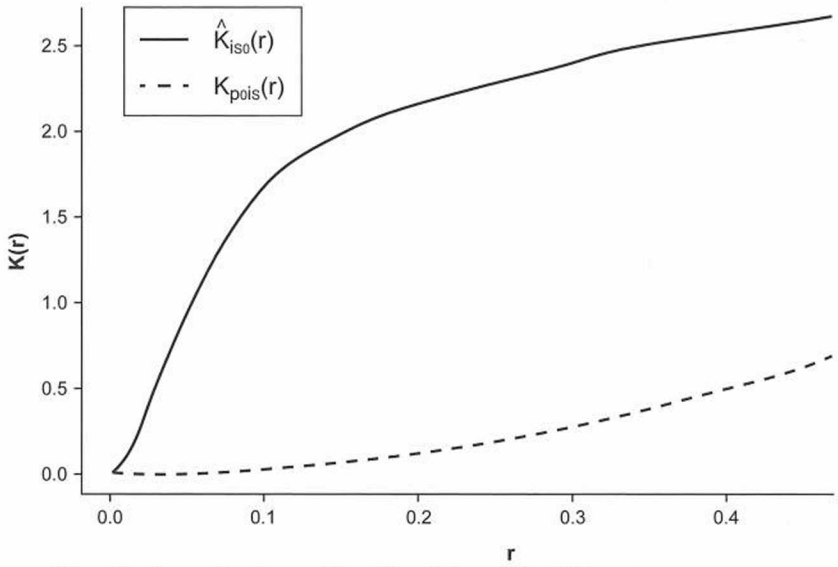
Source of data: Business Register of the Slovak Republic (Infostat)

Fig. 8: Point pattern of creative industry firms by sector category (2011)

at random. Because it is restricted to a certain area, the empirical application of the K-function gives a biased estimate. The reason for the bias lies in the fact that objects outside the area of observation – and the distances to them – cannot be observed. In particular longer distances are underestimated. Various options for correction are proposed in the literature (see HAASE 1995; GOREAUD & PÉLISSIER 1999; YAMADA & ROGERSON 2003). We apply "isotropic" correction in our estimations.

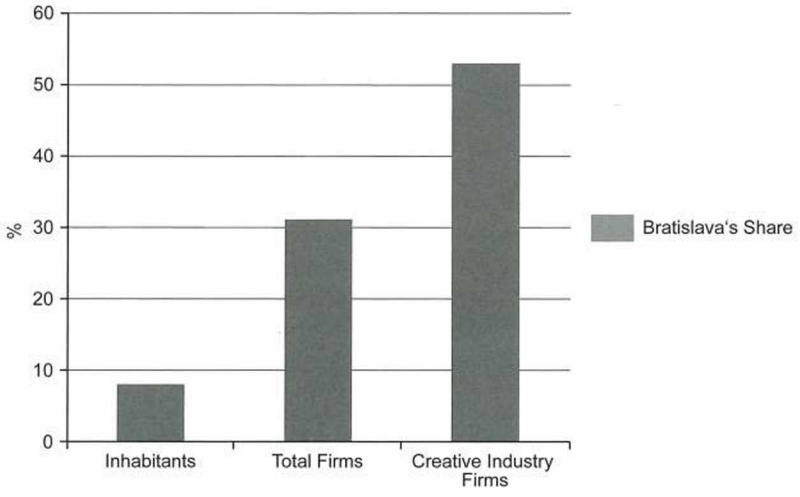
In Figure 9 the solid line shows RIPLEY's K-function for all creative industry firms in Slovakia. The dotted line gives the expected function under the CSR-hypothesis. From the steep increase of the empirical function relative to the hypothetical one, we see that short distances are strongly overrepresented in the data. This indicates that the creative industry firms in Slovakia are strongly spatially clustered, because many of them are located in a short distance from each other. The K-function analysis cannot inform us about the location of the cluster or clusters. However, from the theoretical literature we suspect that it will be the Slovak cities and Bratislava in particular where the creative industry firms concentrate. To analyse this hypothesis we need to move from individual locations to distinct spatial units (communes) and from a point pattern to a count data analysis.

When we aggregate the individual data of creative industry firms to communes, instead of locations we get the number of firms in every commune. In theoretical terms this measure is related to the point pattern. Under the CSR-hypothesis the number of observations in any subdivision of the area under investigation follows a Poisson distribution with the expected number of observation being proportional to the area of that subdivision. Since the numbers of creative industry firms in the communes are non-negative integers, we need to use count data methods in the analysis.



Source of data: Business Register of the Slovak Republic (Infostat)

Fig. 9: RIPLEY's K-function for creative industry firms in Slovakia



Source of data: Business Register of the Slovak Republic (Infostat) and Statistical Office of the Slovak Republic (RegDat database)

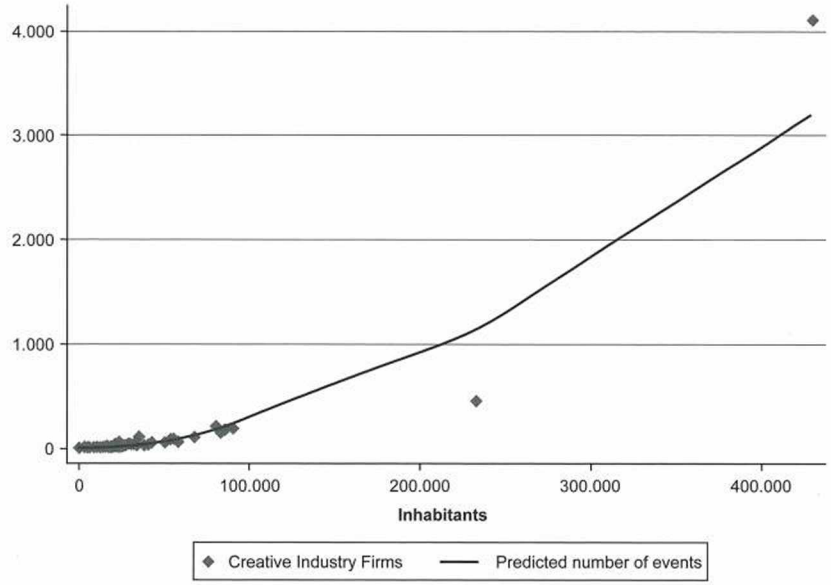
Fig. 10: Bratislava's share of inhabitants, firms, and creative industry firms (2011)

To check, whether creative industry firms are really concentrated in Bratislava, we calculate Bratislava's share of all creative industry firms in Slovakia and compare this share to that of population and that of the number of all firms. Figure 10 shows the respective figures and confirms the hypothesis. While only 8% of the population and a third of the Slovak companies can be found in Bratislava, more than half of the creative industry firms are located there. This result is in line with the theoretical literature and with the results of the point pattern analysis.

Since our research question does not just refer to Bratislava, but to Slovakia as a whole, we need to investigate the distribution of the creative industry firms over all the communes. For that we plot the number of creative industry firms in the communes against their number of inhabitants and their total number of firms respectively, and estimate Poisson regression models for the same relations. Figure 11 shows the scatterplot of the number of creative industry firms by number of inhabitants in the Slovak communes, Figure 12 shows the same by total number of firms. The line marked "Predicted number of events" shows the predictions from the respective Poisson model regressions. Both figures show a clear progressive relation, which is much stronger with respect to inhabitants than with respect to firms. This results from the fact that the number of firms is more spatially concentrated than the number of inhabitants, as is also indicated by Figure 10. The two distinctive observations in the scatterplots are Bratislava and Košice. It can be suspected that it is these two observations that really produce the progressive relation. In order to check for this, we excluded step by step the largest ten communes from the calculations. The progressive relation, however, remains intact and statistically significant in all cases.

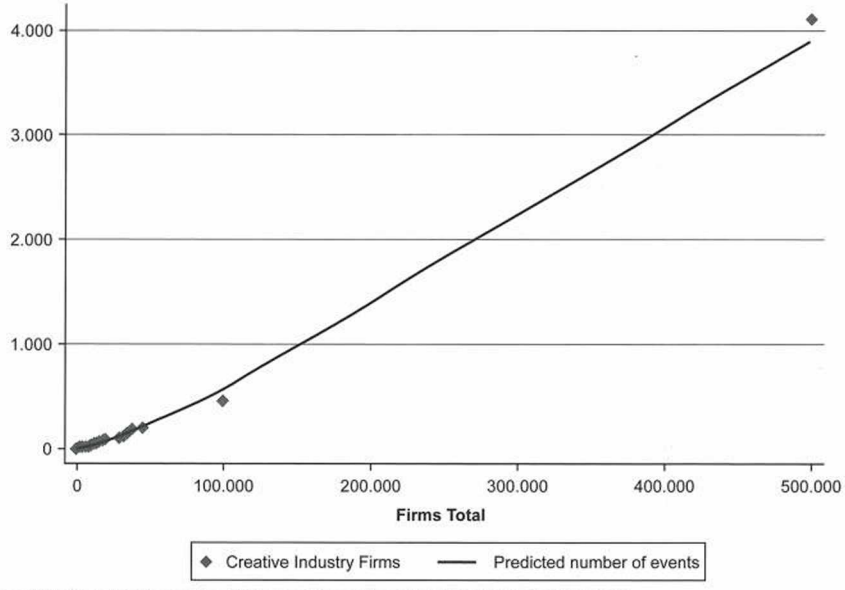
The shape of this relation shows, how strongly the number of creative industry firms is concentrated relative to the reference distribution of inhabitants or firms, respectively. We can investigate the shape by use of a Poisson regression of the number of firms on the logarithm of the number of inhabitants and of the number of firms, respectively. A coefficient of 1 represents a linear function (proportional relation), a coefficient larger than 1 a convex function (progressive relation), a coefficient smaller than 1 represents a concave function (digressive relation). With this Poisson regression method we can also investigate sub-categories of creative industry firms and thus test whether one is more or less spatially concentrated than another.

Table 2 shows the results of the Poisson regression with the logarithm of the number of inhabitants as the explanatory variable; Table 3 shows the corresponding results using the logarithm of the total number of firms as explanatory variable. Column *coeff.* lists the coefficient of the respective explanatory variable, column *std. err.* the estimated standard error. Column *p(coeff=1)* shows the probability that the estimated coefficient is equal to 1, *# obs.* gives the number of observations, *Pseudo* R^2 the pseudo r-square of the Poisson regression.



Source of data: Business Register of the Slovak Republic (Infostat) and Statistical Office of the Slovak Republic (RegDat database)

Fig. 11: Number of creative industry firms in communes by number of inhabitants (2011)



Source of data: Business Register of the Slovak Republic (Infostat)

Fig. 12: Number of creative industry firms in communes by number of firms (2011)

Dependent variable	coeff.	std.err.	p(coeff=1)	# obs.	Pseudo R2
All	1.67	0.007	0	2889	0.937
Old	1.76	0.023	6.58E-239	2889	0.916
Middle	1.72	0.017	0	2889	0.914
New	1.64	0.009	0	2889	0.924
Arts	1.60	0.036	7.86E-61	2889	0.822
Media and entertainment	1.66	0.014	0	2889	0.908
Business services	1.68	0.009	0	2889	0.937

Table 2: Results of the Poisson regression, explanatory variable *ln* (inhabitants)

Dependent variable	coeff.	std.err.	p(coeff=1)	# obs.	Pseudo R2
All	1.19	0.005	0	2678	0.962
Old	1.24	0.015	1.63E-57	2678	0.934
Middle	1.22	0.011	7.18E-85	2678	0.933
New	1.18	0.006	3.52E-199	2678	0.950
Arts	1.14	0.024	9.91E-09	2678	0.839
Media and entertainment	1.19	0.009	8.43E-90	2678	0.934
Business services	1.20	0.006	2.85E-241	2678	0.955

Table 3: Results of the Poisson regression, explanatory variable *ln* (firms)

The coefficients based on the number of inhabitants are much larger than those based on the number of firms. This reflects the marked difference in the curvature of the functions that we already saw comparing Figure 11 and Figure 12.

Concerning the age categories, we see that in both tables the coefficient for the category *new* is much smaller than that for the other two categories, indicating that new creative industry firms are less concentrated in the larger communes than the other two categories. When we test the coefficients pairwise for equality, we find that the coefficient for category *new* differs significantly (at the 1% level) from that of the other categories, but that the difference between categories *old* and *middle* is not statistically significant. This suggests that the location pattern of the creative industry firms founded after 2003 differs from that of the older companies. The result is compatible with the theoretical argument that in a spatially concentrated sector, new entrants may be pushed out by the existing level of competition.

As far as the sector categories are concerned, *Arts* is less spatially concentrated than the other two sectors. The spatially most concentrated sector category is *Business services*. This makes sense when one takes into account that many sectors of the *Arts* category deliver to inhabitants, while the *Business services* deliver to the spatially more concentrated businesses. The difference, however, is less pronounced than in the case of the age categories. The difference between the coefficient for *Arts* and that

for *Business services* is significant only at the 5%-level. All the other differences are statistically insignificant.

In summarizing our empirical analysis of the spatial pattern of creative industry firms in Slovakia, we found that also in a transition economy like Slovakia, creative industry follows the usual spatial pattern. The sector is strongly concentrated in the cities, and more so than population or the total number of firms. While less than 8% of population and less than a third of all companies are located in Bratislava, over half of the creative industry firms are found there. The most spatially concentrated sector category is *Business services*. These results are in line with the argument of agglomeration economies in two ways. First, creative industry firms in general and business services in particular reflect the spatial concentration of economic actors (firms and inhabitants) and concentrate in the cities. Second, because of the size of the respective market and the need of creative industry firms to network with other firms in their sector they concentrate more in larger cities than in smaller ones. Other aspects related to the size of the city may be relevant as well. Dense social ties in the local community of creative workers allow for easier and faster knowledge diffusion. Moreover, the formation of a creative class may also contribute to the spatial arrangement of creative businesses.

The fact that the firms categorised as *new* are significantly less concentrated than the others supports the hypothesis of spatial diffusion. Higher office rents, labour costs, and more fierce competition in the larger cities seem to create negative agglomeration economies that drive new firms toward lower levels of concentration. One should note, however, that the above mentioned result of concentration also holds for the new firms; only the degree of concentration is lower.

5 Conclusion

In this paper we investigated the spatial pattern of creative industry in Slovakia and its evolution over time. Slovakia is an interesting case because its transition from a planning to a market economic system generated opportunities for the service sector and for creative industries in particular. The analysis is based on a micro-dataset of creative industry firms, which provides information about the exact spatial location of the individual firms in addition to other characteristics. We use methods of point pattern and count data analysis for the empirical investigation.

In Section 2 of the paper we discuss a number of theoretical arguments concerning creative industries and their role in economic development. This discussion generates a number of hypotheses about the spatial distribution of creative industry firms and its evolution over time. Based on the literature we can expect a strongly concentrated pattern with the firms being concentrated in larger cities. The literature also suggests that with increasing numbers of firms in these sectors, their spatial concentration will decrease due to increasing competition.

The empirical investigation confirms the hypotheses. The point pattern analysis shows that the pattern of creative industry firms in Slovakia differs significantly from a random spatial distribution and that it is strongly concentrated. Descriptive analysis and the estimation of Poisson models confirm this result and demonstrate that the creative industries are strongly concentrated in the larger cities of Slovakia and particularly in Bratislava. This concentration is most pronounced in the category *Business services* which supplies to business, which are more spatially concentrated than population. When we compare the locational patterns of creative industry firms by age, we also find confirmation for the hypothesis of (relative) de-concentration. Creative industry firms categorised as *new* (founded 2004 or later) show a significantly lower degree of spatial concentration than the older firms. The development of the creative industries over time seems to generate also negative agglomeration economies that push newcomers toward a less centralised location pattern.

Our analysis shows that despite of the peculiarities of the process of transformation, creative industries in Slovakia behave very similarly with respect to location to their counterparts in other countries. As in other countries, the creative industries sector in Slovakia is characterised by strong growth and strong spatial concentration in the larger cities. In the most recent time periods this concentrated pattern becomes significantly more de-centralised, but still at a high level of concentration.

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Annex

	NACE rev. 2	Description
Arts	59200	Sound recording and music publishing activities
	90010	Performing arts
	90020	Support activities to performing arts
	90030	Artistic creation
	90040	Operation of arts facilities
Business services	71110	Architectural activities
	73110	Advertising agencies
	73120	Media representation
	74100	Specialised design activities
Media and entertainment	58210	Publishing of computer games
	60100	Radio broadcasting
	60200	Television programming and broadcasting activities
	18200	Reproduction of recorded media
	58290	Other software publishing
	74200	Photographic activities
	59110	Motion picture, video and television programme production activities
	59120	Motion picture, video and television programme post-production activities
	59130	Motion picture, video and television programme distribution activities
	59140	Motion picture projection activities
	18110	Printing of newspapers
	18130	Pre-press and pre-media services
	58110	Book publishing
	58130	Publishing of newspapers
	58140	Publishing of journals and periodicals
	58190	Other publishing activities
	63910	News agency activities

Tab. 1: Definition of the creative industries