Creative Class and Regional Growth: Empirical Evidence from Seven European Countries

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Key words:
creativity
innovation
entrepreneurship
regional development

abstract

This article analyzes the regional distribution and economic effect of the "creative class" on the basis of a unique data set that covers more than 500 regions in 7 European countries. The creative class is unevenly geographically distributed across Europe; the analyses show that a regional climate of tolerance and openness has a strong and positive effect on a region's share of these people. Regional job opportunities also have a large effect on the size of a region's population of the creative class. The findings reveal some evidence of a positive relationship among creative class occupation, employment growth, and entrepreneurship at the regional level in a number of European countries. On the basis of the analysis, however, it is not clear whether human capital, measured by creative occupation, outperforms indicators that are based on formal education, or if formal education has the stronger effect.

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In his book *The Rise of the Creative Class*, Richard Florida (2004) argued that creative people are key drivers of urban and regional growth. His ideas on the creative class have attracted international attention from scholars, as well as from policymakers and civic leaders (Lang and Danielsen 2005). What makes these ideas particularly interesting from a geographic perspective is that the creative class is not evenly distributed across cities and regions. According to Florida, the creative class is especially attracted to places that are characterized by an urban climate of tolerance that is open to new ideas and new people. Florida stated that this type of "people's climate," rather than a "business climate" (such as one with low taxes or a rich supply of physical infrastructure per se), is crucial for regional development. Creative people not only generate novelties[1] but also attract new economic activities, resulting in innovative businesses in the region. In other words, jobs follow people, instead of people following jobs.

The objective of this article is to test some of Florida's ideas across different European countries at a detailed regional scale. We present information on the scale and distribution of creative class occupations in these countries. Our analyses are based on a large research project[2] on the creative class and regional growth in seven European countries (Denmark, England and Wales, Finland, Germany, the Netherlands, Norway, and Sweden). For most of these seven countries, the data are at the level of NUTS 3 regions, which more or less correspond to city regions or labor market areas.[3] At this spatial level, place of residence and place of work usually coincide within the same region, which makes it a relevant scale for analyzing the relationship between the creative class and regional economic development. Data at the regional level were collected for each country from national sources and made as comparable as possible by using similar definitions.[4] The data set includes information on 503 European regions.

On the basis of this unique European database, we investigated the answers to three research questions: (1) how big are the differences in the share of the creative class across European regions, and how concentrated is the regional distribution? (2) what determines a region's share of the creative population? and (3) how does the creative class affect entrepreneurship, innovation, and regional growth?

Because of data limitations, the analyses of the effects of the creative class on regional development are restricted to only a few European countries. In the next section, we briefly describe the main ideas of Florida's work, which we tested with the European data

[1] Florida (2004, 33) identified three forms of creativity—*technological* (invention), *economic* (entrepreneurship), and *artistic and cultural*—that "are in fact deeply interrelated. Not only do they share a common thought process, but they reinforce each other through cross-fertilization and mutual stimulation."

[2] The European research project entitled "Technology, Talent and Tolerance in European Cities: A Comparative Analysis" was supervised by Bjørn Asheim and Meric Gertler and financed by the European Science Foundation, among other national financial sources. Data were collected by seven European teams during 2004–6 from national data sources that were made comparable between the seven participating countries. The members of the national teams were Kristina Vaarst Andersen and Mark Lorenzen (Denmark); Irina van Aalst, Oedzge Atzema, Ron Boschma, and Frank van Oort (the Netherlands); Mika Raunio and Markku Sotarauta (Finland); Michael Fritsch (Germany); Arne Isaksen and Markus Bugge (Norway); Bjørn Asheim and Høgni Kalsø Hansen (Sweden); and Phil Cooke and Nick Clifton (England and Wales).

[3] NUTS (*Nomenclature des Unites Territoriales Statistiques*) is a hierarchical regional classification system used for the member states of the European Union. The NUTS 1 regions are the national states, but the NUTS 3 regions are much smaller. Because the NUTS 3 regions for Germany are not always functional units, the analysis for this country is at the level of planning regions, which are functional regions in the sense of travel-to-work areas that comprise at least one city and its surroundings. For a more detailed description of the German data, see Fritsch (2007).

[4] All information is based on national registers. Employment figures refer to full-time employment. Employees are assigned to the region of their workplace.

set. Details on this data set are presented in the third section, and the geographic distribution of the creative class in the seven European countries is presented in the fourth section. We then attempt to explain this spatial pattern by means of regression analyses in the fifth section. In the sixth section, we assess the effects of the creative class on entrepreneurship, employment growth, and innovation in several European countries at the regional level and present our conclusions in the final section.

Creative Class, Urban Climate, and Regional Growth

Florida's (2004) main hypothesis is that the creative class is a key driver of urban and regional growth. Hence, it is the nature of the population in a place (i.e., creative or not) that makes the difference. According to Florida, regions with a high share of creative people will perform better economically because they generate more innovations, have a higher level of entrepreneurship, and attract creative businesses.

With its focus on creative individuals and their occupations, Florida's theory is a departure from several branches of literature in economic geography. According to Florida, the creative class consists of people who are engaged in creative and innovative jobs. Hence, it is what people actually *do*, rather than their industry affiliations or educational attainment, that makes them economically productive (Markusen, Wassall, DeNatale, and Cohen 2006). Thus, regional development is primarily based not on particular industries (like high-technology or creative industries) but on creative occupations that are not particularly industry specific. This abandonment of a sector perspective also makes Florida's theory different from the literature on agglomeration externalities (Glaeser, Kallal, Schinkmann, and Shleifer 1992), which has basically investigated whether regional specialization (localization economies) or regional diversity (Jacobs's externalities) enhances innovation and regional growth. Instead of emphasizing knowledge spillovers between firms and industries, Florida has focused on creative individuals who generate spillovers and innovation within a city or region (Stolarick and Florida 2006). This focus is in line with the work of Zucker, Darby, and Brewer (1998) and Almeida and Kogut (1999), which showed that the transfer of knowledge and skills embodied in individuals is a crucial mechanism through which spillovers occur at the regional level.

Florida's theory is also regarded as a refinement of the relationship between human capital and regional development because of its focus on the creativity of individuals instead of their educational attainment. According to Florida, the accumulation of creative capital does not necessarily depend on formal education, examples being poets and artists who may be highly creative but without formal training. More important, human capital does not contribute to regional development per se as long as what people *know* is not related to what people actually *do*; in other words, it does not matter how much human capital a person has if it is not applied in a creative and economically viable manner (Marlet and van Woerkens 2004).

A basic element of Florida's approach is that geography matters. In fact, Florida (2004, 30) made the rather extreme claim that "places have replaced companies as the key organizing units in our economy." According to Florida, the creative class is not evenly distributed across space: not every city or region is equally well supplied with members of the creative class. Instead, the creative class is attracted to places that are characterized by, among other things, an urban climate of tolerance that is open to new ideas and newcomers. Its members have a nonconformist lifestyle that combines disciplined work ethics with hedonistic values. Florida assumed that creative people are attracted to tolerant and open-minded regional societies that offer a diverse population with different

cultural and ethnical backgrounds because creative people view a tolerant environment as being especially positive and because diversity inspires innovation (Andersen and Lorenzen 2005). The creative class also attaches a high value to urban facilities and small-scale cultural services, such as movie theaters, bars, museums, art galleries, restaurants, and trendy shops.

In other words, Florida has emphasized the sociocultural underpinnings of regional development. A tolerant, diverse, and open-minded urban culture is a major economic asset because it attracts the creative class. As a consequence, urban cultural artifacts are valued for their economic utility (Peck 2005). According to Florida, these are not places with high levels of social capital, and he was critical of Putnam (2000), who stressed the positive effect of social capital on regional development. Florida believes that homogeneous communities that have strong ties between their members can have an adverse effect on growth, claiming that such environments often tend to suppress new ideas and creativity. Therefore, the future is moving toward "places with looser networks and weaker ties" that "are more open to newcomers and thus promote novel combinations of resources and ideas" (Florida 2004, 273).

According to Florida, it is this type of "people's climate" that is crucial for regional growth, a view that is in stark contrast with conventional explanations of growth that emphasize the importance of the "business climate," such as low taxes or a rich supply of physical infrastructure. The essence of Florida's proposition is that places with a good "people's climate" retain and attract creative people, who, in turn, induce new economic activities, such as startups and innovation. Thus, the creative class is not attracted to places with high growth per se. On the contrary, regional growth is expected to be a result of the presence of creative people, or, in Florida's terminology, jobs will follow people, instead of people following jobs (Florida 2004).

Florida's latest research has stressed the importance of knowledge spillovers for regional growth. Knudsen, Florida, Gates, and Stolarick (2007) combined the argument on the effect of the creative class with endogenous growth theory. Endogenous growth theory is based on the idea that human capital and knowledge accumulate in cities because a great number of highly educated and skilled people have intimate interactions, thereby increasing their own knowledge as well as each other's (Lucas 1988). A key hypothesis of this approach is that a certain level of human capital that is concentrated in one place generates more spillover benefits than does the same level of human capital that is spread across several locations (Martin and Sunley 1998). Accordingly, Knudsen, Florida, Gates, and Stolarick (2007) assumed that the effect of the creative class on innovation should be relatively pronounced in high-density areas. In regression analyses that used the number of patents per 100,000 inhabitants as the dependent variable, they found a highly significant positive impact for an interaction variable of the share of the creative class and urban density.

Florida's ideas have provoked considerable controversy, much of which has centered on the question of whether and, if so, to what extent, members of the creative class are different from other educated and skilled people. According to Glaeser (2004), creative capital closely corresponds to human capital, as conventionally measured by educational attainment, because most members of the creative class are skilled and highly educated. Glaeser thus claimed that there is no benefit to be gained in including indicators of the creative class in a growth model that already accounts for the effect of human capital in terms of education. Conducting regression analyses with Florida's data, Glaeser showed that the creative class variables become negative and statistically insignificant when an indicator for the level of qualifications (i.e., education) of the regional population is included. In contrast, other empirical studies (e.g., Marlet and van Woerkens 2004;

McGranahan and Wojan 2007; Florida, Mellander, and Stolarick 2008) have demonstrated that indicators for creative class and education are both good predictors of urban and regional growth and that indicators for the creative class perform better than do the indicators for education. These latter results tend to suggest that creative capital converts human potential (as measured by educational attainment) into something that is economically useful. It could be argued that Florida's indicators for the creative class and conventional measures for educational attainment are both proxies for the same thing: human capital. Therefore, the real question is what kind of human capital is more important for regional development. We provide some empirical answers to this question in the sixth section.

How to Measure the Creative Class?

Florida based his classification of the creative class on professions, not on qualification levels or industry affiliations, because professions provide a better description of what people actually do (Markusen, Wassall, DeNatale, and Cohen 2006). According to Florida, the creative class is comprised of people who are engaged in creative and innovative jobs. Hence, members of the creative class may be found in every industry, and thus empirical research needs to identify and separate these people from workers who are engaged in noncreative tasks. Even though creative and cultural industries may have certain definite characteristics (Power and Scott 2004), the creative class is not found only in those industries (see also Stam, de Jong, and Marlet 2008).

The concept underlying how to measure the creative class sounds plausible and appealing, but it is not without its difficulties. One problem is that professions in the data sets are categorized by the skill content and characteristics of the work process (Markusen, Wassall, DeNatale, and Cohen 2006). As a consequence, professions that are assigned to the creative class tend to be biased toward those that require a fairly high level of education, thus excluding creative workers with lower levels of education. Another problem is how to distinguish between creative and noncreative occupations, a difficulty for which Florida has been strongly criticized (Markusen 2006). Florida (2004) defined creative people as workers who are engaged in identifying problems, figuring out new solutions, and combining pieces of knowledge in new and innovative ways. This is, however, a vague definition that does not give much practical help in deciding either what is creative or how to measure creativity.

In our analyses, we took three steps to define and measure the creative class. First, as a starting point, we adopted Florida's (2004) definitions of creative occupations, distinguishing among the creative core, creative professionals, and bohemians. Members of the *creative core* are those "whose economic function is to create new ideas, new technology and/or new creative content" (Florida 2004, 8). These individuals are chiefly found "in science and engineering, architecture and design, education, arts, music and entertainment" (Florida 2004, 8). *Creative professionals* are those who work in "business and finance, law, health care and related fields" (Florida 2004, 8). They "engage in complex problem solving that involves a great deal of independent judgment and requires high levels of education" (Florida 2004, 8).[5] *Bohemians* are engaged in cultural and artistic occupations. Bohemians have two roles: they are part of the creative class and are a sign of an urban culture of tolerance; thus, they play a key role in attracting the two other categories of the creative class.

[5] "[A]ll members of the Creative Class . . . share a common creative ethos that values creativity, individuality, difference and merit. For the members of the Creative Class, every aspect and every manifestation of creativity—technological, cultural and economic—is interlinked and inseparable" (Florida 2004, 8).

Table 1

The Creative Occupations

Groups of Creative People	Occupations (ISCO Code)
Creative core	Physicists, chemists, and related professionals (211)
	Mathematicians, statisticians, and related professionals (212)
	Computing professionals (213)
	Architects, engineers, and related professionals (214)
	Life science professionals (221)
	Health professionals (except nursing) (222)
	College, university, and higher education teaching professionals (231)
	Secondary education teaching professionals (232)
	Primary and preprimary education teaching professionals (233)
	Special-education teaching professionals (234)
	Other teaching professionals (235)
	Archivists, librarians, and related information professionals (243)
	Social sciences and related professionals (244)
	Public service administrative professionals (247)
Creative professionals	Legislators, senior officials, and managers (1)
	Nursing and midwifery professionals (223)
	Business professionals (241)
	Legal professionals (242)
	Physical and engineering science associate professionals (31)
	Life science and health associate professionals (32)
	Finance and sales associate professionals (341)
	Business services agents and trade brokers (342)
	Administrative associate professionals (343)
	Police inspectors and detectives (345)
	Social work associate professionals (346)
Bohemians	Writers and creative or performing artists (245)
	Photographers and image and sound recording equipment operators (3131)
	Artistic, entertainment, and sports associate professionals (347)
	Fashion and other models (521)

Second, to achieve an international comparison, we used the International Standard Classification of Occupations (ISCO 88) to select professions that belong to the creative class at the three-digit level. This classification scheme was developed by the International Labour Office (ILO; 1988) and is based on the types of skills that are necessary for a specific profession. The selected ISCO categories are presented in Table 1.[6]

Third, each country team assigned these classifications to its national data sources in an effort to make the data as comparable as possible. However, because of the availability of data and different ways of measurement, country-specific effects in the data that result in limited comparability among countries are unavoidable. In our analyses, we accounted for this problem by running multivariate estimation models for each country separately.

[6] Detailed information on the structure of occupations within the different categories of creative class is available for Germany, where engineers made up more than 26 percent of the creative core, followed by data processing professionals, who accounted for about 18 percent of creative core employment in 2002. Teachers accounted for 3.3 percent of the creative core, and physicians made up about 9 percent. The largest groups of creative professionals were business professionals and life science and health associate professionals. The exclusion of certain professions with a relatively small share for which the creative character may appear doubtful (e.g., teachers and physicians) does not lead to changes in the basic results.

Because of the special character of bohemian occupations, we departed from Florida's approach (2004) of including bohemians in the creative core and instead created a separate category specifically for them. Accordingly, we used two different definitions of the creative class: creative class A is the sum of the creative core and the creative professionals; creative class B contains the creative core, the creative professionals, and the bohemians.

Regional Distribution of the Creative Class in Europe[7]

As we mentioned earlier, Florida did not expect the creative class to be evenly distributed among cities and regions. In this section, we describe the spatial pattern of the creative class in the regions of seven European countries.[8] First, we look at the spatial distribution in each country. The descriptive statistics of the regional share of the creative class in the total population (see Table 2) clearly indicate that the creative class is, indeed, very unevenly distributed in the European countries in our sample.[9] In each country, we found the highest share for creative professionals, followed by the creative core. The median values for the share of bohemians are much lower and constitute considerably less than 1 percent of the population. There is, however, a pronounced variation of these figures across regions within the countries.

After identifying the professional categories of the creative class, we calculated their numbers in each country and region, making use of national employment data by profession and by region in or around the year 2002.[10] Our results show that the creative class (including the bohemians) consisted of about 26,065,907 persons in 2002, or about 37.7 percent of the total workforce in the 7 European countries and about 15 percent of the countries' total populations. The total workforce was calculated for each country as the total number of workers who worked at least half the regular full-time employment hours per week. The creative professionals formed the largest category (18,179,184 persons), followed by the creative core (6,782,995 persons). The number of bohemians was comparatively small, amounting to 1,103,728 employees.

Figures 1 to 4 show the spread of creative occupations for the entire creative class (i.e., including the bohemians, what we call creative class B) and the subcategories within each

[7] We are indebted to Florian Noseleit for his support in preparing the data and figures and to Jarno Hoekman for drawing the maps.

[8] The total number of regions included in our analysis is 503. For the Netherlands (40 regions) and England and Wales (106 regions), we used data at the NUTS 3 level. Because the NUTS 3 regions for Germany are not always functional units, the analysis for this country is at the level of 93 planning regions, which are functional regions in the sense of travel-to-work areas and include at least one city and its surroundings (for details, see Fritsch 2007). For Sweden, we used 70 city regions, which are defined as labor market regions (A-Regioner) on the basis of travel-to-work patterns. The data for Finland are at the level of 82 labor market regions that are combinations of NUTS 3 regions. This regional level is provided for the purposes of regional planning and policy. The 77 Norwegian regions are so-called city regions, which are NUTS 3 regions or combinations of several NUTS 4 designations for the larger cities. The 35 Danish regions are functional city regions.

[9] We used the share of creative occupations in the total population as an indicator for regional creativity, not the share in overall employment, as Florida (2004) did. We prefer the share in total population because this measure also accounts for the nonemployed living in the region. Both denominators (employment and population) lead to about the same pattern of results.

[10] The data on the creative class for Denmark are from 1999, for Finland from 2000, for England and Wales from 2001, and for Norway from 2004. The workforce data are for 2002.

Table 2

Descriptive Statistics for the Distribution of the Creative Class Occupations Across European Regions in 2002, as a Percentage of the Total Population

	Mean	Median	Minimum	Maximum	Standard Deviation
Creative core					
Denmark	4.303	4.239	2.998	6.422	0.817
England and Wales	4.140	3.999	2.074	8.692	1.060
Finland	3.643	3.231	1.871	7.793	1.160
Germany	2.674	2.502	1.461	5.971	0.839
The Netherlands	4.981	4.826	2.569	7.722	1.324
Norway	1.200	0.984	0.217	5.279	0.968
Sweden	3.845	3.447	2.624	8.682	1.156
Creative professionals					
Denmark	8.462	8.406	5.952	13.479	1.699
England and Wales	11.305	10.916	6.850	20.581	2.525
Finland	6.764	6.551	4.248	13.966	1.891
Germany	7.869	7.657	5.753	13.073	1.283
The Netherlands	15.494	15.568	12.316	19.088	1.632
Norway	4.575	4.125	2.59	12.616	1.647
Sweden	8.687	8.541	5.853	14.354	1.534
Creative class A					
Denmark	12.765	12.567	8.951	19.001	2.261
England and Wales	15.445	15.000	9.155	29.273	3.465
Finland	10.407	9.774	6.401	21.759	2.962
Germany	10.543	10.189	7.214	19.044	2.010
The Netherlands	20.475	20.302	15.107	25.575	2.605
Norway	5.775	5.112	2.843	17.895	2.516
Sweden	12.532	11.968	8.573	21.270	2.525
Bohemians					
Denmark	0.438	0.343	0.221	2.235	0.532
England and Wales	0.771	0.705	0.298	4.090	0.493
Finland	0.313	0.268	0.125	1.139	0.164
Germany	0.337	0.290	0.121	1.240	0.196
The Netherlands	0.689	0.588	0.188	2.078	0.385
Norway	0.103	0.082	0.0	0.556	0.085
Sweden	0.296	0.264	0.117	1.059	0.138
Creative class B					
Denmark	13.203	13.015	9.347	19.895	2.332
England and Wales	16.216	15.570	9.589	33.364	3.827
Finland	10.720	9.992	6.586	22.898	3.108
Germany	10.880	10.479	7.356	20.284	2.178
The Netherlands	21.164	21.089	15.456	26.852	2.857
Norway	5.878	5.151	2.851	18.452	2.589
Sweden	12.828	12.208	8.788	22.329	2.670

of the seven European countries. The line in the middle of the shaded box indicates the median value. The shaded box comprises the values of the second and third quartiles (i.e., between the 25th and 75th percentile of the distribution). The lines extending from the boxes (whiskers) show the adjacent values. The adjacent values were calculated by using the interquartile range (IQR), which is the difference between the first and third quartile values (Q3—Q1). The upper adjacent value is the highest data value that is less than or equal to the third quartile plus 1.5 * IQR; the lower adjacent value is the smallest data value

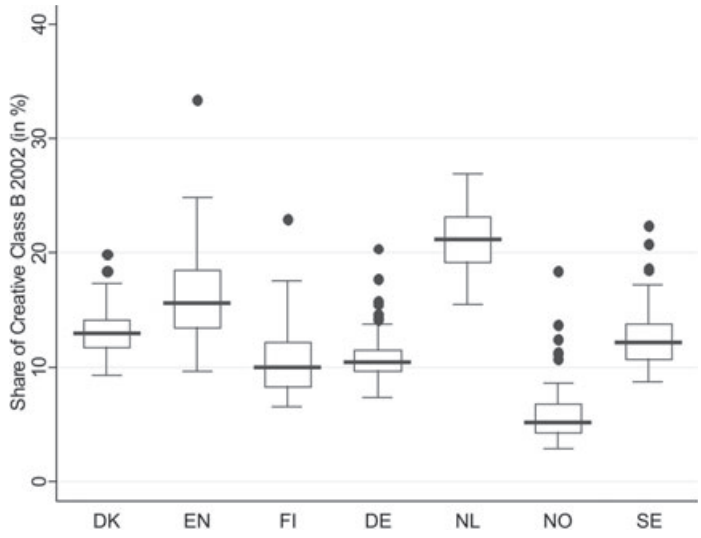

Figure 1. Spatial distribution of the share of the creative class (creative class B) occupations in the total populations in the European countries in 2002.

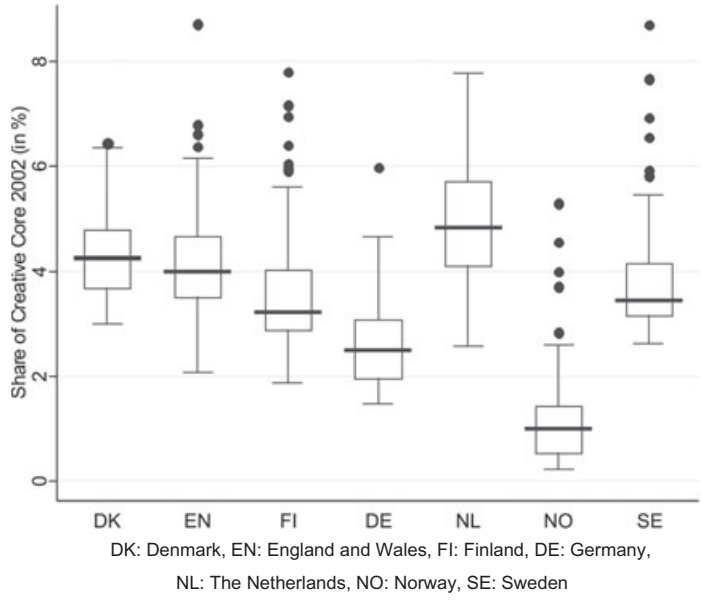

Figure 2. Spatial distribution of the share of creative core occupations in the populations in the European countries in 2002.

that is greater than or equal to the first quartile minus 1.5 * IQR. Values exceeding the upper and lower adjacent values are termed outside values and are displayed as markers. Differences in the level of the shares among countries may have been caused by different definitions and procedures of data collection and thus should be interpreted with caution.

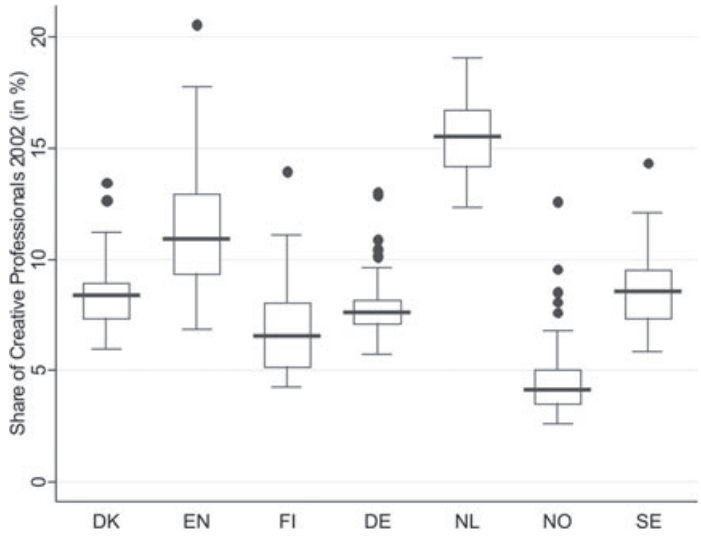

Figure 3. Spatial distribution of the share of creative professional occupations in the populations in the European countries in 2002.

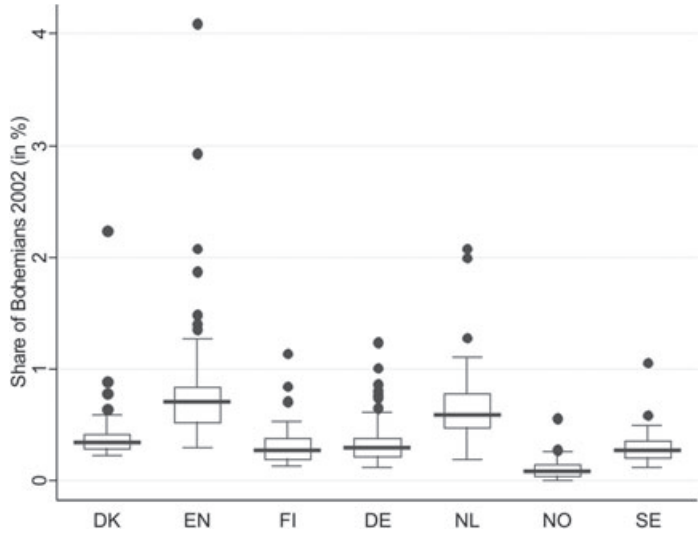

Figure 4. Spatial distribution of the share of bohemian occupations in the populations in the European countries in 2002.

Nevertheless, the figures suggest that, broadly speaking, the Netherlands is well supplied with all categories of the creative class, whereas Norway is less so.[11]

[11] The low figures for the creative class in Norway are due to a number of causes. First, the Norwegian figures do not include employees in the public health sector, which has relatively many creative class workers.

Each of Figures 1–4 displays outlier regions with relatively high shares of creative population. All these outlier regions include the main cities of the respective country. In Germany, the Munich region has the highest values in all categories of creative occupations, followed by Frankfurt, Hamburg, Stuttgart, and Berlin. In Denmark, the outliers are Arhus and Copenhagen. In Finland, the outlier is Helsinki. In the Netherlands, the leading regions are part of the northern wing of the Randstad area, with high scores for Amsterdam, Haarlem, and Utrecht. In Norway, the highest share of creative occupations by far is found in Oslo, followed by Kongsberg, and Trondheim. The leading Swedish region is Stockholm, with Uppsala, Linköping, and Gothenburg next in line. In England, it is not surprising that the London region has the highest share.

In Figure 5, we project the regional share of the creative class in the total population for six European countries. Large parts of the Netherlands and England show relatively high scores, especially compared to Norway and Finland. Figure 6 shows a similar spatial pattern for creative professionals. More pronounced differences are found in Figure 7, which projects the regional shares of bohemians. The English regions score particularly high on bohemians; there are profound intracountry differences for the remaining five European countries. Figure 8 reveals that parts of the Netherlands, Sweden, England, and Finland score high on shares of the creative core.

Table 3 presents the Gini coefficients for the spatial concentration of population and different categories of employment. The Gini coefficient is a common measure for describing the degree of spatial concentration. It can take values between 0 (even distribution across regions) and 1 (extreme concentration in one region). With respect to all indicators, we note two broad groups of countries. One group consists of Germany, the Netherlands, and England and Wales, and the other consists of the Scandinavian countries, which show much lower Gini coefficients than those of the first group. One plausible explanation for this finding is the urban pattern of the countries—the first group of countries is more decentralized than the second. We also observe that in each country, all creative class categories are more unevenly distributed than the population as a whole: with the exception of the Netherlands, the creative class categories are more spatially concentrated than is overall employment. In all the countries, employment in high-technology industries[12] has a higher degree of spatial concentration than do the creative core and creative professional occupations. Also, the spatial distribution of employees with a tertiary education tends to be more concentrated than does the spatial distribution of the creative core and the creative professionals. According to the Gini coefficients, the regional concentration of bohemians is always higher than that of the creative core, creative professionals, and employees with a tertiary degree. The spatial concentration of employees in high-technology industries and of bohemians is about equal. A correlation analysis suggested a high level of spatial coincidence of the shares of high-technology employment, creative core, creative professionals, and employees with a tertiary degree. However, the relationship between the regional share of bohemians and of

Second, the Norwegian regions are comparatively small, and the most peripheral regions do not contain a city or town, which particularly lowers the share of members of the creative class in these small, peripheral regions of the country.

[12] Following the definition of the Milken Institute (also used by Florida), the NACE categories 244, 300, 321–23, 331–35, 341–43, and 353 have been classified as high-technology industries. However, in contrast to the Milken Institute definition (DeVol and Koepp 2004), we also included knowledge-intensive service industries (NACE categories 642, 721–26, 731, 732, 742, and 743). NACE (*Nomenclature générale des Activités Economique*) is an international industry classification system.

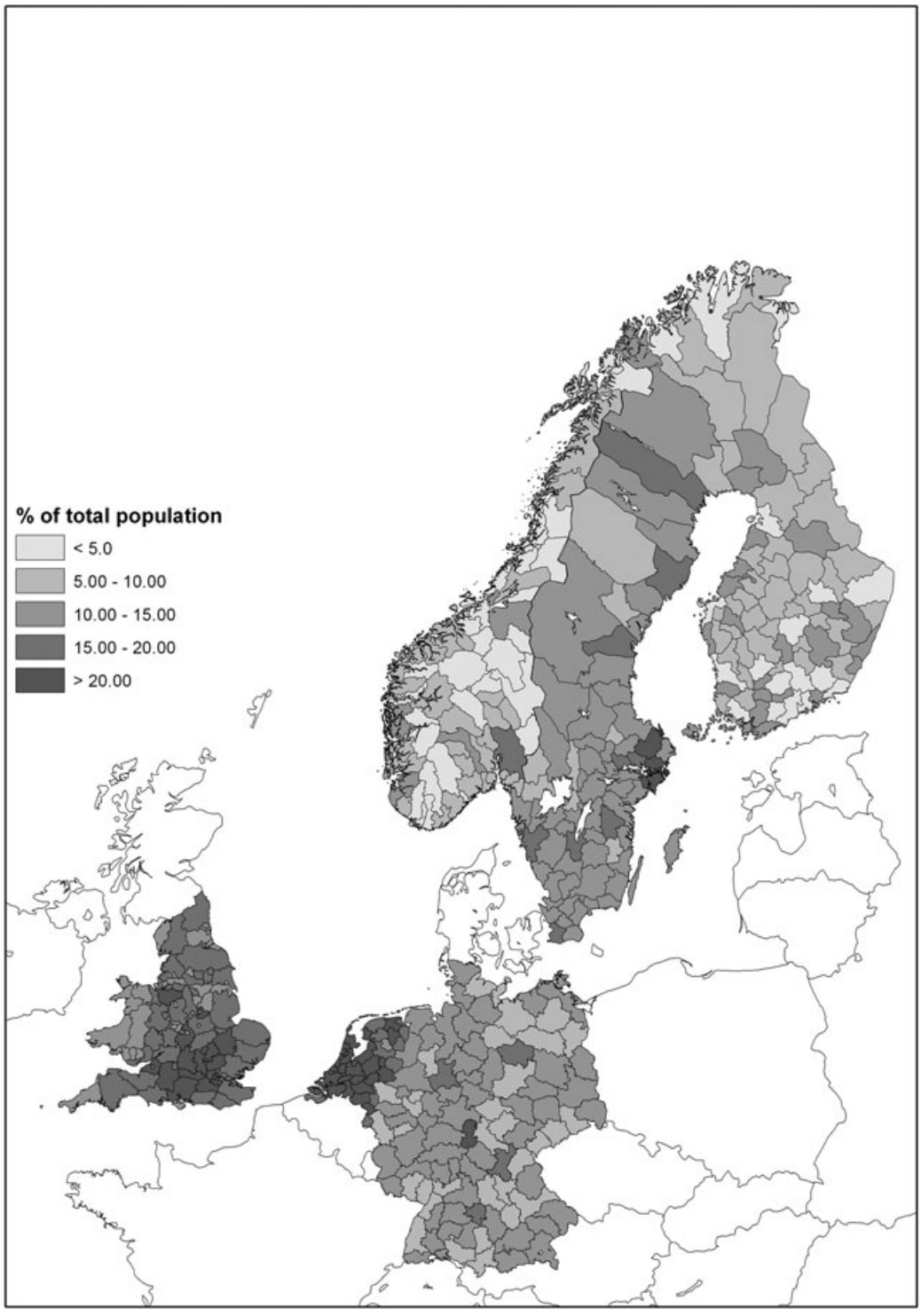

Figure 5. Spatial distribution of the share of the creative class in the populations in six European countries in 2002.

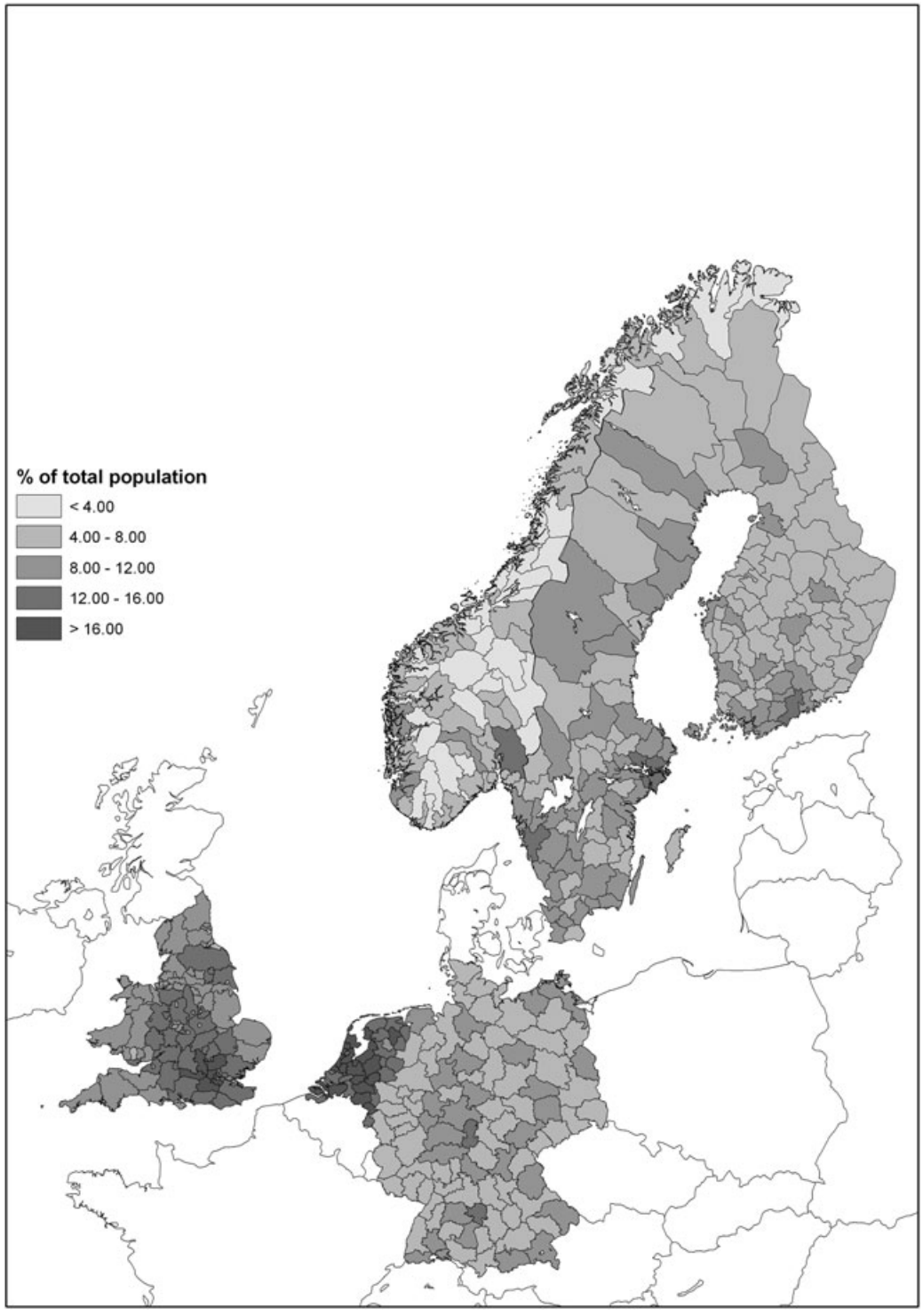

Figure 6. Spatial distribution of the share of the creative professionals in the populations in six European countries in 2002.

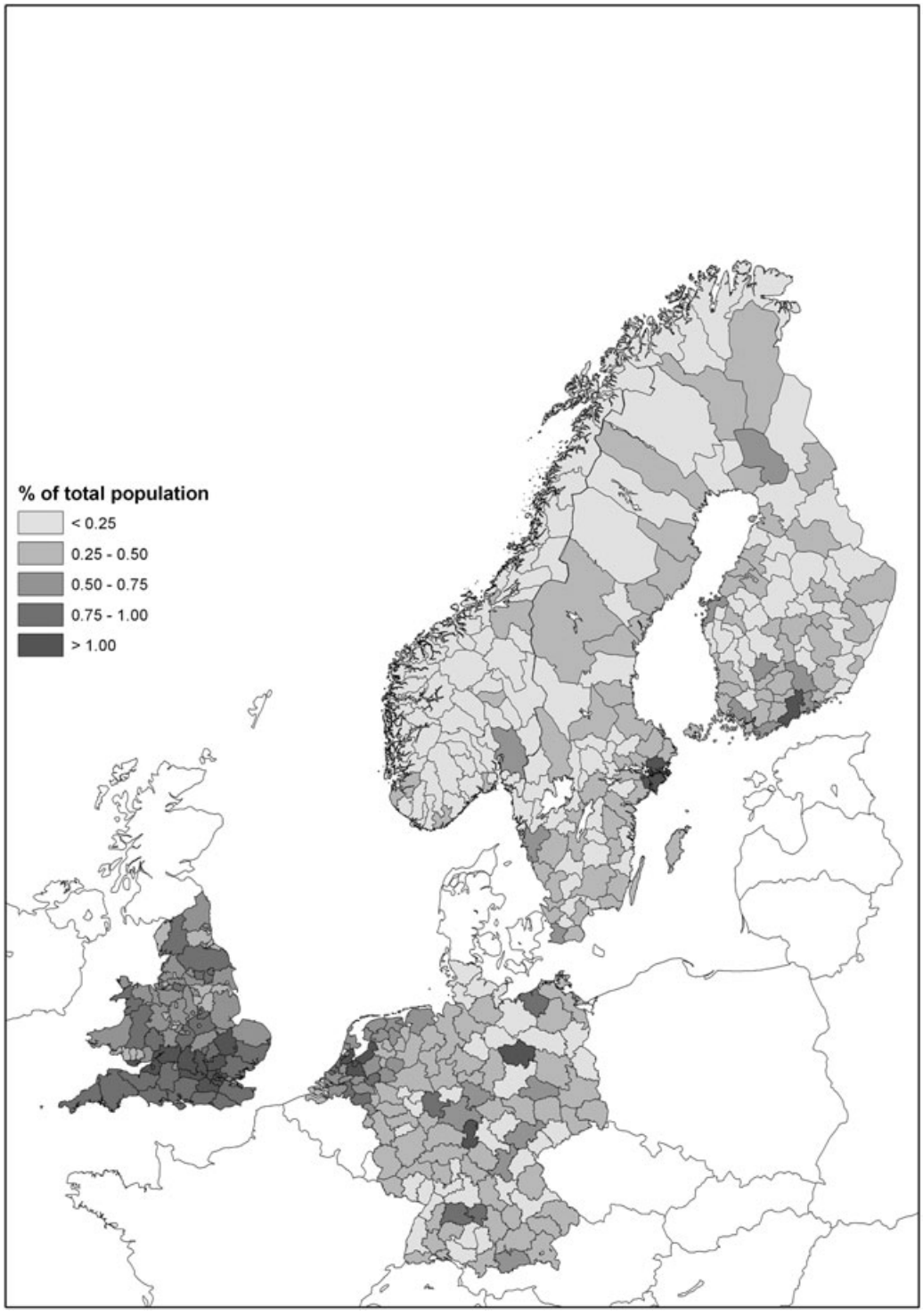

Figure 7. Spatial distribution of the share of bohemians in the populations in six European countries in 2002.

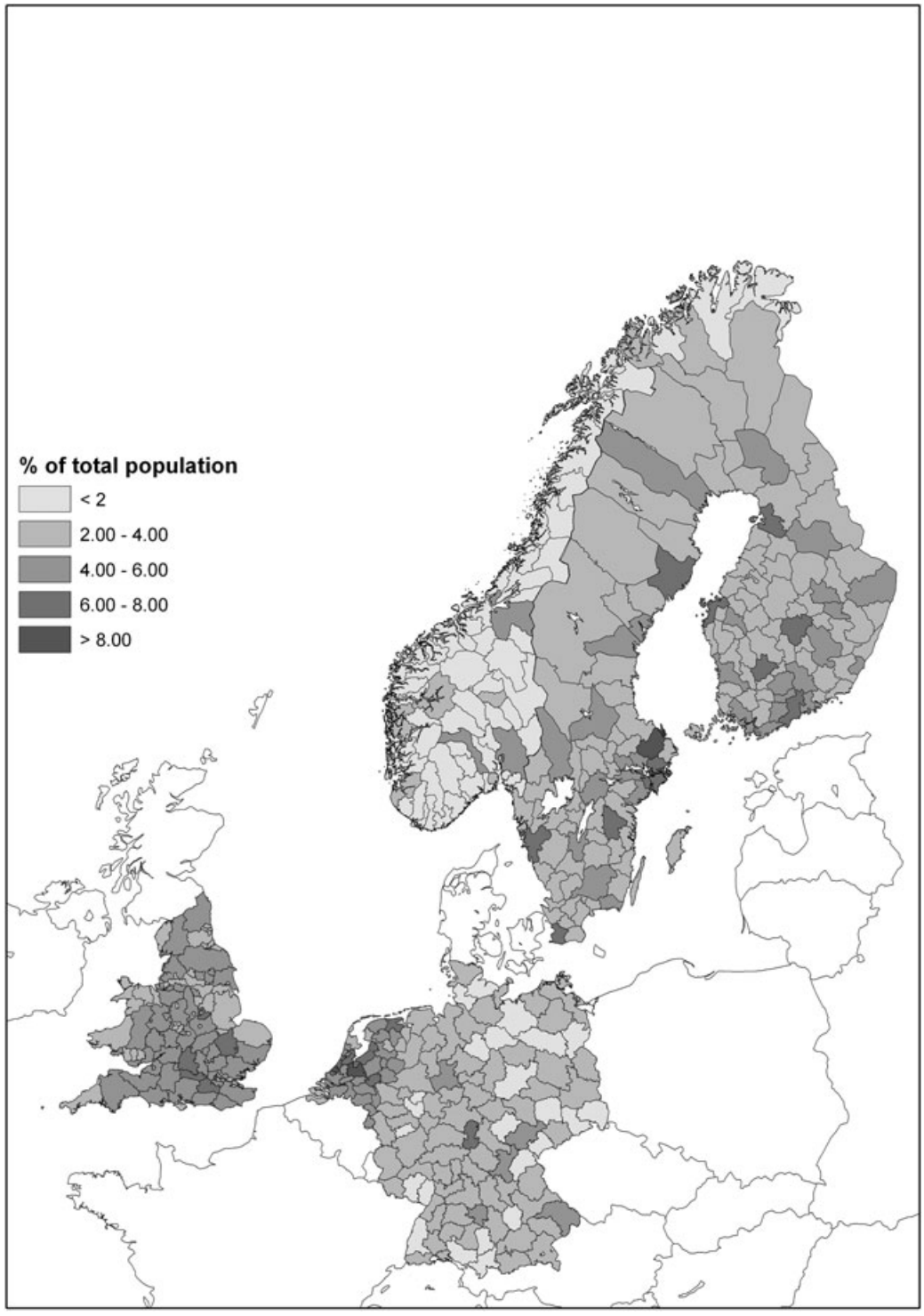

Figure 8. Spatial distribution of the share of the creative core in the populations in six European countries in 2002.

Table 3

Gini Coefficients for the Regional Concentration of Various Employment Categories in 2002

	DK	EN	FI	DE	NL	NO	SE
Creative core	0.748	0.438	0.712	0.471	0.447	0.837	0.645
Creative professionals	0.747	0.444	0.695	0.421	0.385	0.769	0.610
Creative class A	0.747	0.442	0.701	0.432	0.399	0.785	0.620
Bohemians	0.806	0.563	0.780	0.580	0.527	0.853	0.738
Creative class B	0.749	0.448	0.704	0.437	0.403	0.787	0.624
Population	0.689	0.384	0.560	0.352	0.381	0.624	0.518
Employment	0.704	0.415	0.624	0.394	0.437	0.663	0.554
Employees with bachelor's or master's degrees	0.762	0.518	0.738	0.534	0.417	0.734	0.674
Employees in high-technology industries	0.837	0.495	0.815	0.537	0.563	0.851	0.744

Note: DK: Denmark, EN: England and Wales, FI: Finland, DE: Germany, NL: The Netherlands, NO: Norway, and SE: Sweden.

high-technology employees is considerably lower, suggesting less spatial coincidence of high-technology employment and artistic occupations.[13]

What Explains the Uneven Distribution of the Creative Class Across European Regions?

The previous section demonstrated that some regions in Europe have considerably higher shares of the creative class than do others. To discover why, we conducted multiple regressions that allowed us to assess the relative importance of the different factors.[14] The dependent variable in these regressions is the regional population share of employees in creative occupations in 2002. Again, we divided the creative class into three categories—the creative core, creative professionals, and bohemians—because different explanations may be significant for each type. We ran the various regressions separately for the five countries for which we had a sufficient number of cases (regions) in our data set: England and Wales, Finland, Germany, the Netherlands, Norway, and Sweden.

Following Florida's (2004) hypothesis regarding where creative people will choose to locate, we tested the impact of three types of influences on the share of creative occupations in each region. The first type of influence is *regional culture*, which is closely associated with particular cultural qualities of a region, such as a climate of tolerance and openness. We calculated two indicators to account for this effect.[15] The first is the *share of the regional population in bohemian occupations*. We used this measure to explain the employment share of people in creative core and creative professional occupations.

[13] For the whole sample, the Spearman rank correlation coefficients between the regional share of high-technology employment and the share of creative core employment and of creative professionals are 0.65 and 0.48, respectively. For the relationship between the share of high-technology employees and the share of bohemians, it is 0.30. All correlation coefficients are statistically significant at the 1-percent level.

[14] Some authors have criticized Florida because his argument rests on suggestive correlations rather than causality (e.g., Peck 2005; Markusen and Schrock 2006). Florida conducted multivariate analyses to test a number of his theses in various publications, for example, Florida (2002a, 2002b); Lee, Florida, and Acs (2004); Knudsen, Florida, Gates, and Stolarick (2007); and Florida, Mellander, and Stolarick (2008).

[15] Another indicator of a tolerant and open urban climate that Florida applied in his analysis for the United States is the so-called gay index, which measures "the over- or under-representation of coupled gay people in a region relative to the United States as a whole" (Florida 2004, 333). This type of index could not be calculated for the European countries owing to the lack of data at the NUTS 3 level.

According to Florida (2004), this bohemian index should have a positive effect on the presence of other creative occupations because a high proportion of bohemians indicates a kind of local culture, lifestyle, and set of values that are different from those of the mainstream. Being artistically creative, according to Florida (2004), bohemians add a sense of liveliness to a location ("the place to be") as well as tolerance (openness to different lifestyles and values), which makes the region attractive to the other two types of the creative class. The second measure of regional culture is the share of foreign-born people, which is expected to have a positive effect on the presence of creative occupations.[16] Following Florida (2004), this *openness index* is used as a proxy for the degree of open-mindedness, tolerance, and cultural diversity in a region.

The second type of explanatory factors can be called *regional facilities.* We used two indicators that measure the regional provision of types of facilities that can be expected to have a positive impact on the share of creative people in a region. First, the *public provision index* measures the share of the labor force working in public health care and public education (NACE codes 80 and 85). Second, the *cultural opportunity index* is the share of the workforce that is active in cultural and recreational activities. These types of activities are defined by NACE codes 553 (restaurants), 554 (bars), 921 (activities in the field of film and video), 922 (radio and television), 923 (entertainment), 925 (libraries, public archives, museums, and other cultural activities), and 926 (sports). Following Florida, we expect that both kinds of facilities are highly valued by the creative class. However, both indexes have the potential problem that the respective industries may include employees in occupations that have been classified as "creative" (see Table 1). To avoid the possibility that the same person would enter both sides of the regression equation, we also ran the models excluding the *public provision index* and the *cultural opportunity index*.

The third factor that may explain the share of creative occupations in a region is the region's economic condition, particularly employment opportunities. We measured a region's job opportunities by its *annual employment growth rate* in the preceding 10 years (1993–2002). We expect to find a positive sign for this variable because job growth may attract creative people to a region ("people follow jobs"). However, if the locational decisions of the creative class are governed mainly by other regional characteristics, such as a climate of tolerance, the effect of prior employment growth should be relatively small.

We included *population density* as a "catch-all" variable for several regional factors, including land prices, wage levels, and so forth, that tend to be associated with this indicator. In particular, the results for this variable will show the effect of an urban atmosphere per se, compared to a cultural climate, on the presence of creative people in a region.[17] We accounted for spatial autocorrelation by including a spatial error term (spatial error model).[18] Appendix Table A1 presents some descriptive statistics for the variables included in the analysis. In the regressions for Germany, a dummy variable with

[16] This indicator is not without controversy. Especially in the current cultural and political climate of many European countries, a large number of foreign-born people in cities may be accompanied by a lack of tolerance. A better indicator may be the rate of labor market participation by immigrants (e.g., Hansen 2007) because, among other things, it reflects how open the region is to absorbing and integrating people of different nationalities and cultures into the regional labor market. However, such an indicator was not available for our European countries at the regional level.

[17] Because the relationship between the size of the core and the respective hinterland is not identical in the functional regions in our sample, the figures for the population density of a region as a whole may not be perfectly comparable. However, regressions using more fine-grained regions, which were available for Germany, did lead to similar results (Fritsch 2007).

[18] The spatial lag model assumes that the error terms for adjacent regions are not independent, which may occur because certain influences affect spatial entities larger than the regions of our analysis. To account

the value 1 for a location in former socialist East Germany (otherwise the value of this variable is 0) is included to account for the fact that this part of the country was governed by a specific growth regime in the period under study (Fritsch 2004). Most variables were entered as logarithmic values (logarithmus naturalis) because the distribution of the logarithmic values tends to correspond much better to the assumption of a normal distribution than do the original values. In particular, taking the logarithms reduces the effect of extreme values ("outliers") on the results. Another reason is that if the dependent and the independent variable are logarithmic values, the estimated coefficient for the relationship can be interpreted as an elasticity that gives the percentage change of the dependent variable resulting from a 1-percent change in the independent variable. A comparison of elasticities gives the relative importance of the different influences. The percentage of employment change during previous years was not entered in logarithmic form because of a number of negative values for this variable for which the logarithm is not defined.

For some of the relationships between the variables included in the empirical models the direction of causality is not entirely clear. It may be argued, for instance, that it is not that the creative class is attracted by the presence of bohemians but that bohemians follow the creative class because it represents their clientele. Also, it could be that the creative class is not lured by a region's employment growth but is, instead, the cause of it. A more detailed analysis of the direction of causality would require a two-stage least-squares procedure or a simultaneous equation system. However, a two-stage least-squares model would not result in any improvement in the results presented here because practically the same variables would have to be included at both stages, given that the available data set does not provide adequate alternative variables. Nevertheless, we were able to shed some light on the question of causality with regard to the role of bohemians by running all models explaining the share of creative core and creative professional occupations without the share of bohemians. Because some persons who are included in the public provision index and the cultural opportunity index may also be members of the creative class according to our definition (e.g., teachers, life science, and health associate professionals), we also estimated a version without these two indices.

Tables 4 and 5 show the results of the regression analyses for the employment share of creative core and creative professional occupations, respectively, and Table 6 presents the estimates for the share of bohemians. A key finding, and one that we expected, is that there is a strong positive statistical relationship between the share of bohemians in a region and the same region's share of creative core and creative professional occupations in all six European countries. However, if the bohemians are omitted from the models that explain the share of creative core and creative professional occupations, the explained variance declines little. Broadly speaking, we found support for a strong and positive impact of the openness index on bohemians in all European countries in our sample, except Sweden. This is also true for most of the countries with respect to the creative core (except the Netherlands) and the creative professionals (except the Netherlands and Sweden). The effect of the openness index on the presence of creative people tends to be more pronounced if the share of bohemians and the public provision index, as well as the cultural opportunity index, are omitted (Models 2 and 3 of Tables 4 and 5), pointing to the importance of a tolerant atmosphere for bohemians. The results for the openness index may be somewhat affected by the positive correlation with population density. In fact, in models in which the openness index has a negative sign, we found a pronounced positive

for this spatial autocorrelation, we included the weighted average of the disturbance terms of adjacent regions in our models. For details, see Anselin (1988).

Table 4

Regressions Explaining the Share of Creative Core Employment (Spatial Error Models)

	England and Wales			Finland			Germany			The Netherlands			Norway			Sweden		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Share of bohemians (ln)	0.237**	—	—	0.263**	—	—	0.311**	—	—	0.135*	—	—	0.320**	—	—	0.378**	—	—
	(3.84)			(5.07)			(6.96)			(2.28)			(3.26)			(5.44)		
Openness index (ln)	0.113*	0.215**	0.248**	0.023	0.083**	0.147**	0.133	0.248**	0.296**	0.039	0.095	0.078	0.129	0.235	0.594**	0.137*	0.047	0.002
	(2.80)	(6.70)	(7.66)	(0.92)	(3.72)	(5.06)	(1.70)[a]	(3.56)[a]	(3.64)[a]	(0.50)	(1.21)	(0.89)	(0.83)	(1.45)	(3.23)	(2.11)	(0.63)	(0.03)
Public provision index (ln)	0.078	0.018	—	0.352**	0.504**	—	0.232**	0.486**	—	0.245**	0.260**	—	2.064**	2.065**	—	0.613**	0.406**	—
	(0.86)	(0.19)		(4.28)	(4.76)		(2.54)	(3.72)		(3.34)	(2.95)		(5.04)	(4.72)		(9.02)	(5.91)	
Cultural opportunity index (ln)	0.066	0.221**	—	0.044	0.155**	—	–0.020	0.166*	—	0.011	0.052	—	0.076	0.442**	—	–0.037	0.204**	—
	(0.82)	(2.97)		(0.99)	(4.28)		(0.27)	(2.55)		(0.13)	(0.61)		(0.39)	(2.67)		(0.53)	(3.03)	
Population density (ln)	–0.067**	–0.091**	–0.089**	0.017	0.026*	0.062**	0.100*	0.140**	0.167**	0.172**	0.181**	0.225**	0.198**	0.266**	0.194**	0.001	0.054	0.008
	(4.16)	(5.81)	(5.69)	(1.25)	(2.17)	(3.28)	(2.47)	(3.47)	(3.57)	(4.76)	(4.41)	(5.53)	(3.25)	(4.34)	(2.60)	(0.02)	(1.50)	(0.22)
Employment growth 1993–2002	0.055**	0.007**	0.009**	0.007**	0.008**	0.012**	0.063*	0.010**	0.010*	0.073**	0.012**	0.015**	–0.042	0.000	0.001	0.090*	0.018**	0.017**
	(3.38)	(3.94)	(4.96)	(5.00)	(5.91)	(5.58)	(2.05)	(2.70)	(2.41)	(4.36)	(3.96)	(4.42)	(0.58)	(0.02)	(0.12)	(2.39)	(3.94)	(3.34)
Dummy variable for East Germany	—	—	—	—	—	—	0.500**	0.655**	0.823**	—	—	—	—	—	—	—	—	—
							(4.48)[a]	(6.53)[a]	(7.29)[a]									
Constant	1.340**	1.199**	1.356**	0.770**	0.061	0.914**	0.042	–1.138**	–0.651**	–0.140	–0.464*	–0.271	–5.031**	–6.139**	–1.13**	–0.012	–0.016	1.259**
	(7.41)	(6.34)	(14.45)	(4.00)	(0.68)	(13.39)	(0.67)	(4.29)	(3.65)	(0.60)	(1.96)	(1.23)	(4.45)	(5.34)	(4.70)	(0.33)	(0.30)	(8.16)
Lambda	0.003	0.003	0.002	–0.009	–0.152*	–0.007	0.102*	–0.119	–0.005	–0.048	–0.045	–0.064	0.000	–0.003	0.027	0.159**	0.151**	–0.012
	(0.80)	(0.58)	(0.43)	(0.87)	(2.44)	(0.53)	(2.21)	(1.04)	(0.25)	(0.63)	(1.01)	(1.08)	(0.07)	(0.54)	(1.12)	(4.84)	(3.80)	(0.82)
Wald test of lambda = 0	0.639	0.341	0.184	0.754	5.960*	0.284	4.882*	1.088	0.063	0.403	1.021	1.177	0.005	0.296	1.258	23.468**	14.460**	0.671
LM test of lambda = 0	0.673	0.147	0.020	0.772	1.705	0.160	1.545	2.610	1.093	0.007	0.052	0.034	0.003	0.000	0.015	12.896**	14.475**	5.575*
Variance ratio	0.641	0.585	0.529	0.862	0.862	0.705	0.818	0.660	0.564	0.764	0.696	0.730	0.614	0.552	0.325	0.748	0.654	0.240
Log likelihood	50.093	43.191	36.864	70.806	61.487	40.371	48.340	34.940	21.645	24.384	21.816	15.622	–45.969	–50.950	–67.109	42.744	30.307	8.613
Number of observations	105	105	105	82	82	82	93	93	93	40	40	40	77	77	77	70	70	70

Note: Robust estimates (z values in parentheses).

* Statistically significant at the 5% level, ** statistically significant at the 1% level.

[a] Variance inflation factor (vif) for variable >6 <8.

Table 5

Regressions Explaining the Share of Creative Professionals (Spatial Error Models)

	England and Wales			Finland			Germany			The Netherlands			Norway			Sweden		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Share of bohemians (ln)	0.219**	—	—	0.204**	—	—	0.170**	—	—	0.079*	—	—	0.097**	—	—	0.257**	—	—
	(5.44)			(4.24)			(5.00)			(2.26)			(2.65)			(5.08)		
Openness index (ln)	0.057*	0.152**	0.190**	0.094**	0.136**	0.165**	0.057	0.097*	0.152**	–0.116*	–0.086	–0.075	0.136*	0.168**	0.265**	0.028	–0.003	–0.039
	(2.17)	(6.87)	(7.61)	(4.04)	(5.90)	(7.53)	(0.157)[a]	(2.43)[a]	(3.29)[a]	(2.57)	(1.87)	(1.61)	(2.28)	(2.75)	(4.50)	(0.81)	(0.07)	(0.087)
Public provision index (ln)	–0.327**	–0.382**	—	–0.041	–0.005	—	–0.006	0.087	—	0.017	0.040	—	0.257	0.207	—	0.082	0.143	—
	(5.53)	(5.78)		(0.56)	(0.07)		(0.09)	(1.18)		(0.33)	(0.75)		(1.68)	(1.49)		(0.749)	(1.11)	
Cultural opportunity index (ln)	0.155**	0.299**	—	0.022	0.113**	—	0.079	0.199**	—	0.047	0.067	—	0.061	0.180**	—	–0.006	0.148**	—
	(2.93)	(5.81)		(0.53)	(2.84)		(1.93)	(5.32)		(0.98)	(1.36)		(0.83)	(2.95)		(0.13)	(3.54)	
Population density (ln)	–0.027*	–0.050**	–0.068**	0.080**	0.094**	0.099**	0.013	0.057*	0.71*	0.077**	0.085**	0.089**	0.088**	0.105**	0.096**	0.016	0.048**	0.040
	(2.59)	(4.61)	(5.53)	(6.05)	(6.74)	(6.99)	(0.57)	(2.41)	(2.52)	(3.61)	(3.82)	(3.92)	(3.86)	(4.71)	(4.00)	(1.00)	(2.75)	(2.12)
Employment growth 1993–2002	0.064**	0.008**	0.011**	0.053**	0.059**	0.070**	0.014	0.003	0.003	0.013	0.003	0.003	0.069*	0.009**	0.010**	0.056*	0.012**	0.016**
	(6.13)	(6.47)	(7.93)	(3.69)	(3.72)	(4.38)	(0.88)	(1.31)	(1.46)	(1.38)	(1.54)	(1.83)	(2.47)	(2.98)	(2.86)	(2.49)	(4.54)	(5.87)
Dummy variable for East Germany	—	—	—	—	—	—	0.041	0.131*	0.243**	—	—	—	—	—	—	—	—	—
							(0.78)	(2.33)	(3.78)[a]									
Constant	2.978**	2.846**	2.268**	1.947**	1.553**	1.477**	2.076**	1.404**	1.305**	2.451**	2.234**	2.28**	0.661	0.442	0.908**	2.116**	1.556**	2.033**
	(25.23)	(21.76)	(31.01)	(10.87)	(9.16)	(32.82)	(11.02)	(9.17)	(11.69)	(16.01)	(17.63)	(19.36)	(1.57)	(2.26)	(11.20)	(86.54)	(4.35)	(26.54)
Lambda	0.001	0.001	0.002	–0.006	–0.007	–0.007	0.005	0.013**	0.009	–0.002	–0.000	0.000	–0.013	–0.034	–0.025	0.003**	0.038	–0.000
	(0.70)	(0.44)	(0.73)	(1.59)	(1.42)	(1.15)	(1.71)	(2.78)	(1.54)	(0.48)	(0.11)	(0.07)	(0.75)	(0.91)	(1.64)	(6.54)	(0.73)	(0.06)
Wald test of lambda = 0	0.489	0.196	0.526	2.521	2.004	1.331	2.916	7.749**	2.386	0.226	0.011	0.005	0.563	0.819	2.682	0.727	0.539	0.004
LM test of lambda = 0	0.325	0.293	0.059	0.371	1.956	1.324	4.864*	5.351*	3.371	0.065	0.016	0.136	0.076	0.235	0.132	0.152	0.064	1.405
Variance ratio	0.796	0.736	0.629	0.872	0.845	0.824	0.671	0.588	0.431	0.446	0.381	0.327	0.672	0.638	0.578	0.751	0.662	0.585
Log likelihood	94.727	81.692	63.493	75.677	67.527	63.319	102.185	91.127	73.752	45.668	43.257	41.460	28.168	24.722	18.861	74.767	63.773	55.677
Number of observations	105	105	105	82	82	82	93	93	93	40	40	40	77	77	77	70	70	70

Note: Robust estimates (z values in parentheses).

* Statistically significant at the 5% level, ** satistically significant at the 1% level.

[a] Variance inflation factor (vif) for variable >6 <8.

Table 6

Regressions Explaining the Share of Bohemian Employment (Spatial Error Models)

	England and Wales		Finland		Germany		The Netherlands		Norway		Sweden	
	1	2	1	2	1	2	1	2	1	2	1	2
Openness index (ln)	0.434**	0.525**	0.203**	0.317**	0.227*	0.429**	0.405*	0.442*	0.330	0.814**	−0.118	−0.246*
	(9.20)	(10.07)	(4.15)	(5.79)	(2.15)[a]	(2.99)[a]	(2.08)	(2.18)	(1.86)	(4.04)	(1.45)	(2.21)
Public provision index (ln)	−0.245	—	0.190	—	0.551**	—	0.273	—	0.005	—	0.233	—
	(1.75)		(1.12)		(2.76)		(1.20)		(0.01)		(0.89)	
Cultural opportunity index (ln)	0.651**	—	0.435**	—	0.715**	—	0.267	—	1.141**	—	0.601**	—
	(5.93)		(5.26)		(7.12)		(1.26)		(6.39)		(7.00)	
Population density (ln)	−0.105**	−0.113**	0.072*	0.107**	0.248**	0.304**	0.098	0.121	0.211**	0.182*	0.122**	0.112*
	(4.54)	(4.39)	(2.44)	(3.08)	(4.14)	(3.61)	(1.03)	(1.20)	(3.17)	(2.23)	(3.51)	(2.36)
Employment growth 1993–2002	0.061*	0.094**	0.087	0.085*	−0.052	0.087	0.028	0.042	0.126	0.165	0.197**	0.341**
	(2.03)	(3.41)	(0.84)	(2.22)	(1.08)	(1.20)	(0.62)	(0.91)	(1.50)	(1.58)	(4.19)	(5.62)
Dummy variable for East Germany	—	—	—	—	0.500**	0.953**	—	—	—	—	—	—
					(3.34)[a]	(4.77)[a]						
Constant	−0.611*	−0.721**	−1.937**	−1.793**	−3.868**	−3.868**	−2.744**	−2.417**	−3.470**	−3.950**	−2.156**	−1.192**
	(2.23)	(4.67)	(5.59)	(16.78)	(9.65)	(11.99)	(5.06)	(4.72)	(2.80)	(14.27)	(2.99)	(6.36)
Lambda	0.004	0.006	0.008	0.006	−0.013*	−0.005	−0.019	−0.027	0.013	0.014	0.00	0.023
	(0.26)	(0.42)	(0.23)	(0.53)	(2.31)	(0.73)	(1.27)	(1.58)	(1.23)	(1.43)	(0.12)	(1.67)
Wald test of lambda = 0	0.065	0.180	0.054	0.278	5.319*	0.527	1.603	2.486	1.514	2.059	0.014	2.782
LM test of lambda = 0	0.044	0.106	0.804	2.671	0.003	0.012	0.913	0.426	0.032	0.067	0.004	0.864
Variance ratio	0.698	0.586	0.735	0.620	0.706	0.473	0.406	0.332	0.604	0.395	0.750	0.576
Log likelihood	1.866	−14.417	−7.785	−7.306	−2.158	−32.763	−14.676	−16.983	−57.447	−74.850	14.611	−7.047
Number of observations	105	105	82	82	93	93	40	40	77	77	70	70

Note: Robust estimates (z values in parentheses)

* Statistically significant at the 5% level, ** statistically significant at the 1% level.

[a] Variance inflation factor (vif) for variable >6 <8.

impact of population density, and vice versa. In sum, we found some support for Florida's thesis that a regional climate of tolerance and openness has a positive impact on the presence of the creative class.

The coefficients for the public provision index show a positive sign for creative core employment in five of the six countries (see Table 4), but the same is nonsignificant or even significantly negative in the models for the creative professionals (see Table 5). Apparently, creative core members are sensitive to the regional supply of public services in health care and education, whereas this is not true of creative professionals or, except in Germany, of bohemians.

The cultural opportunity index is statistically significant only in explaining the share of creative core and creative professional occupations when the share of bohemians is omitted (with the exception of England and Wales in the estimations for creative professionals). This is further evidence of the pronounced positive relationship between this index and the presence of bohemians, which is also indicated by the high values of the cultural opportunity index in explaining the share of bohemians (see Table 6). This finding could be interpreted as an indication that a high level of cultural amenities in a region attracts bohemians. However, we cannot rule out that the correlation between the employment share of cultural industries and bohemian occupations is partly caused by some overlap between the two categories; that is, some bohemians may be employed in cultural industries.

Because the presence of creative occupations could be a result of rich employment opportunities in cultural industries, as well as in those sectors that are included in the public provision index, all regressions were run without the public provision and cultural opportunity indexes (Model 3 in Tables 4 and 5). The differences between the coefficients in Models 2 and 3 indicate that the effect of the openness index and of population density becomes even stronger, but the decrease in the explained variance is not large.

An urban climate per se, as proxied by population density, has a positive effect on the presence of the creative class in five of the six European countries. England and Wales, alone, shows a persistent negative impact of population density on the regional share of the creative class. As far as employment growth in preceding years is concerned, we found a positive effect on the employment shares of creative core occupations in all the countries except Norway (Table 4). With regard to the share of creative professionals (see Table 5), we found a strong impact of past changes in employment in England and Wales, Finland, Norway, and Sweden. Past employment growth has a statistically significant impact on bohemians in three of the six countries: England and Wales, Finland, and Sweden. The different statistical tests for lambda being unequal to 0 show that spatial autocorrelation occurs only rarely and does not appear to be pronounced, probably because most of the regions in our sample are functional units. The variance inflation factor (vif) indicates possible multicollinearity problems only for the openness index and the dummy variable for location in East Germany, but the values of this measure are less than 8, which is acceptable.[19] The obvious reason for the close statistical relationship between the two variables is the much lower presence of foreign-born people in East Germany because of its 40-year history of being a secluded society under a socialist regime.[20]

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[19] According to a widely accepted rule of thumb, multicollineary should be regarded as a serious problem if the vif exceeds a value of 6 or even 10 (see Hill and Adkins 2001). In the large majority of cases, the value of the vif was well below 3, indicating no multicollinearity problem. Cases in which the vif was greater than 6 are marked with an "a" in the tables.

[20] Although there was little migration into East Germany during its socialistic period, West Germany experienced a massive inflow of workers and their families, particularly from Mediterranean countries, resulting in a much larger foreign-born population than was found in East Germany.

The results of the regression analyses confirm most of our expectations. First, the outcomes clearly show that there is a close relationship between the presence of bohemians and the other categories of the creative class at the regional level in all six European countries. The openness index has the expected positive impact on the presence of bohemians and the creative core, but the effect is weaker than that of bohemians. We can, therefore, conclude that a regional climate of tolerance and openness tends to attract members of the creative class. The cultural opportunity index, which indicates the level of cultural and recreational activities, is in many cases statistically significant for explaining creative core and creative professional employment only if the share of bohemians is omitted. The close statistical relationship between the cultural opportunity index and employment in bohemian occupations is particularly obvious in models explaining the share of bohemians. Public provisions of health care and education are important for creative core employment in four of the five countries. However, this result should be regarded with some caution because these sectors constitute occupations that, according to our definition (see Table 1), belong to the creative core.[21] The public provision index is nonsignificant or statistically negatively significant in the models for the share of creative professionals; however, it has a positive impact on bohemian employment in one European country—Germany.

Annual regional employment growth in preceding years has a statistically significant impact on the share of creative core employment in four of the five countries, Norway being the exception. While employment opportunities play a significant role in explaining the share of creative professionals in three of the five countries, they appear less important to employment in bohemian occupations. These results suggest that creative people do follow jobs, but, given the effect of the other variables in the regressions, the influence of employment growth is far from dominant. Our results indicate that a location characterized by an atmosphere of openness, cultural opportunity, and the presence of bohemians is of at least equal importance as employment opportunities. Population density seems to have a positive effect on all types of creative class employment, although the identification of this impact suffers from the pronounced positive correlation of population density with other indicators, particularly the openness index.

The Effect of Education and Creative Class on Regional Growth in Europe

Our analyses show that the creative class tends to concentrate in certain regions in Europe, but constitutes only a small share in many other regions. How important is it to have a high share of the creative class, economically? To answer this question, we assess the effect of the creative class on regional growth by means of a regression analysis. Such an analysis requires data for past periods that need to be related to indicators of regional development in subsequent years. Unfortunately, such information is not available for most of the European countries in our project, and we thus had to restrict our analysis to Germany and the Netherlands. These two countries provide indicators for the qualification of the regional workforce, the creative class in 1996, and changes in regional employment over the 1996–2002 period. We also tested the effect of the qualification of the workforce on regional development to investigate Glaeser's (2004) criticism that Florida's indicators for creative occupation are actually measures of qualification rather

[21] However, excluding such occupations (e.g., physicians and teachers) from the creative core does not lead to substantially different results.

Table 7

The Effect of the Creative Class and Higher Education on Regional Employment Growth 1996–2002 in Germany (Spatial Error Models)

	1	2	3	4	5	6
Higher education 1996 (ln)	4.019**	—	—	—	—	—
	(2.99)					
Creative class A 1996 (ln)	—	8.696	—	—	—	—
		(1.81)				
Creative core 1996 (ln)	—	—	3.325	—	—	—
			(1.75)			
Creative professionals 1996 (ln)	—	—	—	–2.894*	—	—
				(2.22)		
Bohemians 1996 (ln)	—	—	—	—	2.215**	—
					(2.94)	
Creative class B 1996 (ln)	—	—	—	—	—	8.765
						(1.92)
Population density 1996 (ln)	–1.120*	–0.677	–1.000	1.562*	0.038	–0.754
	(2.40)	(0.90)	(1.53)	(2.13)	(0.15)	(1.00)
Dummy variable for East Germany	–14.987**	–17.115**	–13.734**	–10.646**	–11.333**	–17.176**
	(6.42)	(17.16)	(5.88)	(5.08)	(5.62)	(17.16)
Constant	0.046	–24.168	–0.0426	0.021	0.026	–24.189
	(0.09)	(1.63)	(0.08)	(0.04)	(0.05)	(1.72)
Lambda	0.169**	–0.005	0.168**	0.183**	0.180**	–0.004
	(5.94)	(0.39)	(5.80)	(7.74)	(7.80)	(0.37)
Wald test of lambda = 0	35.247**	0.149	33.662**	59.946**	60.800**	0.136
LM test of lambda = 0	4.082*	6.667*	6.938**	5.861*	6.209*	6.749**
Variance ratio	0.428	0.792	0.431	0.372	0.360	0.793
Log likelihood	–242.672	–253.430	–245.441	–244.597	–242.881	–253.224
Number of observations	93	93	93	93	93	93

Note: *Z* values in parentheses.
* Statistically significant at the 5% level, ** statistically significant at the 1% level.

than of creativity. The indicator for education was constructed on the basis of the International Standard Classification of Education (ISCED; UNESCO 1997). Group 5A and Group 6 of this classification can be associated with the level of bachelor's degree or higher, and we assigned these categories to the national statistics in Germany and the Netherlands. The indicator for education measures the share of people in a region with a bachelor's degree (tertiary degree) or higher. In the regressions for Germany, we again included a dummy variable for East Germany to account for the obviously different growth regimes in the two parts of the country (Fritsch 2004). Population density was included as a control variable for all kinds of regional effects. We accounted for spatial autocorrelation by including the weighted average error term of adjacent regions (spatial error model).

We are unable to present a full-fledged regional growth model because of missing data on a number of key factors, such as the regional capital stock. Therefore, we restrict ourselves to simple regressions of the effect of a qualified workforce and employees in creative class occupations on changes in regional employment, which should be regarded as a first rough test. The results of the regressions are shown in Table 7 (Germany) and Table 8 (the Netherlands).[22] The effect of higher education on subsequent employment

[22] Multicollinearity is not an issue in these regressions, since the values of the variance inflation factors (vif) for all variables are well below 3.

Table 8

The Effect of the Creative Class and Higher Education on Regional Employment Growth 1996–2002 in the Netherlands (Spatial Error Models)

	1	2	3	4	5	6
Higher education 1996 (ln)	28.511**	—	—	—	—	—
	(3.35)					
Creative class A 1996 (ln)	—	28.768**	—	—	—	—
		(3.98)				
Creative core 1996 (ln)	—	—	19.996**	—	—	—
			(9.66)			
Creative professionals 1996 (ln)	—	—	—	21.554**	—	—
				(2.94)		
Bohemians 1996 (ln)	—	—	—	—	7.424**	—
					(4.28)	
Creative class B 1996 (ln)	—	—	—	—	—	29.977**
						(4.27)
Population density 1996 (ln)	−1.533	−1.314	−5.299**	−0.629	−4.372**	−1.601
	(1.20)	(1.07)	(6.15)	(0.46)	(3.29)	(1.33)
Constant	−73.527*	−82.620**	6.046*	−53.637	45.124**	−86.561**
	(2.30)	(2.81)	(2.05)	(1.82)	(5.38)	(3.04)
Lambda	0.006	0.005	−0.341**	0.005	−0.010	0.005
	(0.70)	(0.71)	(4.05)	(0.37)	(0.70)	
Wald test of lambda = 0	0.496	0.503	16.408**	0.139	0.486	0.551
LM test of lambda = 0	1.040	0.875	2.150	0.859	0.017	0.779
Variance ratio	0.249	0.312	0.399	0.204	0.345	0.340
Log likelihood	−134.602	−132.811	−124.455	−135.599	−131.411	−131.957
Number of observations	40	40	40	40	40	40

Note: *Z* values in parentheses.
* Statistically significant at the 5% level, ** statistically significant at the 1% level.

growth is positive in both countries (Model 1). In the Netherlands, all indicators for creative class have a highly significant positive effect on regional development. For Germany, the share of bohemians is the only creative class indicator that is statistically positively significant at the 1-percent level; the effect of creative class and creative core occupations fail to be statistically significant at the 5-percent level (but are statistically significant at the 10-percent level). We found a significantly negative coefficient for the effect of creative professionals on regional growth in Germany. The economic effect of population density tends to be negative in both countries, suggesting that employment growth in the more urbanized regions was poor during the period of analysis. The high coefficients of the dummy variable for East German regions clearly indicate the different employment pattern in this part of the country. According to the values for lambda, spatial autocorrelation played a role in Germany but not in the Netherlands.

Because of the pronounced correlation between some of the indicators for the creative class and the measure for higher education (see Appendix Table A2 for details), including these indicators in the same model is of doubtful utility, particularly in the case of Germany. If we included both types of indicators in one model, the creative class measures would tend to dominate the education measure in the Netherlands,[23] whereas in Germany, the qualification indicator remains statistically significant and the creative class indicators have no effect.

[23] These results are similar to those found in a study of 50 Dutch cities (Marlet and van Woerkens 2004). Employment growth in those cities for 1993–2004 could be attributed to both the level of education and the

We demonstrated a positive effect of creative class on regional growth in the Netherlands, but the cause of the effect is not clear. Florida (2003, 40; 2004, 8) argued that artistic/cultural creativity, technological creativity (innovation), and economic creativity (entrepreneurship) are interlinked and reinforce each other, suggesting that there should be a positive relationship among creativity, the formation of new businesses, and innovation (Lee, Florida, and Acs 2004; Hackler and Mayer 2008).

To test this conjecture, we first examined three European countries at the regional level to find out whether there is an effect of higher education (the share of employees with tertiary degrees) and creative class (the share of employees in creative occupations) on the formation of new businesses (Lee, Florida, and Acs 2004). Data for this type of analysis were available for Germany, Norway, and Sweden. We distinguished between the formation of new businesses in general and the formation of new businesses in high-technology industries. Startup rates were measured as the number of startups per 1,000 inhabitants in 2002. A spatial error regression model was applied with the startup rate as the dependent variable and the share of employees with tertiary degrees or in creative occupations as the independent variable. Compared to simple correlations, such a regression model has the advantage of being able to control for the effect of spatial autocorrelation. One should be well aware, however, of the exploratory character of these analyses, since a detailed investigation of the formation of new businesses in a region would require accounting for all other potential influences (for such an analysis, see Fritsch and Falck 2007), which is far beyond the scope of this article. Because of the exploratory character of this analysis, we report the regression coefficients for the respective education or occupation variable, but not for the full models. As expected, we found significantly positive effects of a workforce that is highly educated and/or in creative occupations on regional startup rates in the three European countries (see Table 9). In Sweden, however, the effect of the employment share in creative core and creative professional occupations is not statistically significant for the overall startup rate. The coefficients for the different indicators show no clear trend toward a higher impact of a workforce with higher education compared to that of people in creative occupations. However, we found a relatively weak effect for the share of bohemians, hinting at a lesser role of artistic occupations for the formation of new businesses. In most cases, the level of significance of an education or creative class indicator is particularly high for startups in high-technology industries.

Finally, to test the effect of higher education and creative class on innovation, we used data on patents, which were available at the regional level only for the German regions in the 1996–2002 period. Similar to our investigation of regional startup rates, we estimated regressions with the number of patents per 10,000 inhabitants in the period 1996–2002 as the dependent variable.[24] In these regressions, we again controlled for spatial autocorrelation by applying a spatial error model. Independent variables were the share of employees with tertiary degrees and the share of employees in creative class occupations.

share of the creative class, but especially to the latter. Partly on the basis of these results, Marlet and van Woerkens (2004) concluded that Florida had just proposed a better indicator for human capital because creative capital accounts for what people do (i.e., using their skills and knowledge in a creative manner), rather than what people just know (as proxied by educational attainment). When human capital is coupled with creativity in such a way, both become more closely connected to regional growth. This line of reasoning was recently embraced by Florida himself (Florida, Mellander, and Stolarick 2008).

[24] The data on patents were taken from Greif and Schmiedl (2002) and Schmiedl (2006). Patents were assigned to the residence of the inventor.

Table 9

Regression Coefficients for the Effect of Employees with Tertiary Degrees and in Creative Occupations on Regional Startup Rates in 2002 in Three European Countries (Spatial Error Models)

	Share of Employees with Tertiary Degree (ln)	Share of Creative Core (ln)	Share of Creative Professionals (ln)	Share of Creative Class A (ln)	Share of Bohemians (ln)
Germany (93 regions)					
Startup rate, overall	0.4001**	0.3611**	1.2607**	1.1079**	0.3611**
	(4.60)	(5.60)	(18.37)	(18.54)	(5.60)
Startup rate, high-technology	0.0738**	0.0987**	0.1860**	0.1680**	0.0541**
	(10.40)	(8.32)	(7.91)	(8.79)	(7.54)
Norway (77 regions)					
Startup rate, overall	4.7800**	0.9791**	3.2471**	2.5291**	1.0292**
	(3.68)	(2.86)	(4.01)	(3.80)	(3.70)
Startup rate, high-technology	1.0930**	0.2744**	0.7441**	0.5958**	0.2135**
	(4.73)	(4.85)	(5.25)	(5.01)	(4.35)
Sweden (70 regions)					
Startup rate, overall	2.0371**	0.6808	0.3806	0.4953	0.6732*
	(11.06)	(1.45)	(0.59)	(0.80)	(2.35)
Startup rate, high-technology	0.3288**	0.3978**	0.6103**	0.5848**	0.2857**
	(6.67)	(7.42)	(8.99)	(10.10)	(10.97)

Note: Robust estimates (z values in parentheses).
* Statistically significant at the 5% level, ** statistically significant at the 1% level.

Table 10

Regression Coefficients for the Impact of Employees with Higher Education and in Creative Occupation in 1996 on the Number of Patents per 10,000 Inhabitants in German Regions During the 1996–2002 Period (Spatial Error Models)

	Share of Employees with Higher Education (ln)	Share of Creative Core (ln)	Share of Creative Professionals (ln)	Share of Creative Class A (ln)	Share of Bohemians (ln)
Number of patents per 10,000 inhabitants	0.1644**	0.1575**	0.1001**	0.0717**	0.0632
	(6.38)	(5.88)	(2.66)	(4.07)	(1.66)

Note: Robust estimates (z values in parentheses).
*Statistically significant at the 5% level, ** statistically significant at the 1% level.

Table 10 shows a positive effect of the regional level of qualification and of the employment share of creative core and creative professional occupations at the beginning of the observation period, in 1996. That such an effect cannot be found for the share of bohemian employment indicates that the link between artistic occupations and patenting is weak or even nonexistent, which is not surprising, since it is not even possible to patent art or culture. Obviously, the presence of art and culture in a region is not sufficient for achieving high levels of patenting. Patenting requires considerable research-and-development activity of highly skilled people, whether in creative or noncreative occupations. However, patents may not be the best indicator of innovation in regard to the creative class because many members of this class are active in sectors (such as services and low-technology sectors) that do not have a high intensity of patents.

Conclusion

Our analyses, based on a unique data set of more than 500 regions in 7 European countries, provide strong empirical evidence that the creative class is unevenly distributed across Europe. The regression analyses clearly show that a regional climate of tolerance and openness has a positive effect on the regional share of the creative class. Our results suggest that this cultural effect is more important than an urban climate per se. The provision of public facilities in health care and education has only a minor, if any, impact on the presence of the creative class, which is also true for the regional supply of cultural and recreational amenities. The effect of regional job opportunities on the creative class is quite significant, however.

Our results are mixed with respect to the relationship between the creative class and regional development in a number of European countries. For example, in the Netherlands, the creative class measures had a positive effect on employment growth in subsequent periods, but the estimate for Germany showed such a positive effect only for the share of bohemian occupations. A regional analysis of three European countries pointed to a positive relationship between both employment with high educational levels and in creative industries and regional start-up rates. For German regions, we also found a positive relationship between creative core and creative professional occupations and the level of patenting in subsequent years. However, the effect of employees with high educational levels on patenting activity was stronger than that of creative core and creative professional occupations.

Although we were able to shed light on the role of the creative class, further research is necessary to obtain a better understanding of the relevant relationships. There is no question that better indicators for measuring creativity are a prerequisite for this task (Rantisi and Leslie 2006). In particular, studies are needed that account for all three types of creativity mentioned by Florida (2004): creativity in the artistic, technological (innovation), and economic (entrepreneurship) spheres. We need to define more precisely, for instance, which workers really are creative in order to link them more directly to the other variables in the analysis.

Such studies should also attempt to come to a better understanding of the relationship between creativity and education, as well as the role of knowledge spillovers. As we mentioned earlier, human capital (including the role of knowledge spillovers) and creative capital are two different explanations for regional growth and need to be disentangled in empirical analyses. The question of whether the local presence of highly educated and creative people contributes to regional growth or whether it generates localized knowledge spillovers, with a consequent effect on regional growth, needs to be clarified in empirical analyses. After conducting an analysis of patents, Bettencourt, Lobo, and Strumsky (2007) concluded that big cities in the United States are more innovative than are smaller cities because they happen to house a disproportionately large number of inventors, not because inventors in big cities are more productive owing to local knowledge spillovers. The same question can be asked about the creative class: are cities or regions performing better because they have a relatively high number of members of the creative class, or because their members of the creative class are more productive because of local buzz, or some combination of both?

Another possible extension of the analytical framework is to include the effect of the diversity of creative occupations in regions in addition to population characteristics, such as levels of education and creativity. Doing so would allow researchers to control for the effects of Jacobs's externalities. Florida had high praise for diversity in cities and regions, but it remains to be discovered if certain types of diversity or, for that matter, creativity,

are more conducive to innovation and growth. Since the creative class consists of many diverse occupations, there is a need to disaggregate the creative class when assessing its spatial and economic consequences (Markusen 2006). Some creative jobs are more likely to induce knowledge spillovers or to support each other's presence in a region. Stolarick and Florida (2006) suggested this may be the case for technicians and art designers. The importance of relatedness or related variety for regional growth has been demonstrated recently in empirical studies that have taken a sector perspective (Frenken, van Oort, and Verburg 2007; Boschma and Iammarino 2009). Assessing the impact of labor mobility on the performance of plants, Boschma, Eriksson, and Lindgren (2009) found empirical evidence that establishments perform better when they employ individuals with related skills and when they hire new employees who bring in new knowledge that is related (but not similar or unrelated) to the existing knowledge base of the plant. This concept of relatedness could be extended to creative individuals: is a high degree of diversity in creative people merely a good thing for regional and urban development, or do certain combinations of creative occupations in a region reinforce each other's presence and induce knowledge spillovers because of complementary skills and, therefore, have an additional economic effect?

Another important project for further research is to provide more evidence for the relationship among a climate of tolerance, the presence of the creative class, and regional growth. First, more direct indicators are needed to measure a climate of tolerance or a culture of openness; it is simply not enough to assume that a more diverse population is more tolerant. For instance, regional unemployment rates among foreign-born or non-Western people could provide an indication of the extent to which the regional community is open to newcomers and how well they are integrated in the local labor market. Another more direct indicator is racial tolerance, as measured, for instance, by attitudes toward interracial marriage (Sharp and Joslyn 2008). Using these indicators would shed more light on whether a strong presence of the creative class in a region goes hand in hand with higher levels of tolerance. Second, researchers need to specify clearly the mechanisms by which a regional climate of tolerance may affect regional growth and in what ways such a climate could be created by public policy (Peck 2005). Third, a more dynamic approach to this topic should be taken, instead of simply assuming that creativity is inherent in members of the creative class (Scott 2006). Researchers need to explore how creativity and cultural openness develop and are enhanced in particular places through the interactions of creative people both at their places of employment and during social events. There is also a need to determine whether the creative class grows or declines in situ because production activities that employ creative people expand or shrink over time, or whether these swings are merely due to this class's penchant for migration, as suggested by Florida and others. Such a dynamic perspective would also throw more light on the direction of causality: do successful regions create, retain, and attract creative capital, or vice versa, or, again, is it some combination of both (Markusen 2006)?

Finally, our empirical outcomes call for a comparative theory of the creative class that accounts for differences among countries. For example, patterns of urbanization and levels of tolerance differ considerably among countries, and so do labor mobility and institutions. The question is how these factors affect the spatial concentration of the creative class, and whether the impact of the creative class on urban and regional growth depends on these national characteristics. For instance, we found that the creative class was more unevenly distributed in the Scandinavian countries, which are much more centralized than Germany, the Netherlands, and England and Wales. May this creative class distribution reflect the particular national urban patterns? Moreover, we found that

the effect of the public provision index on the creative class was systematically different in England and Wales than in the other countries in our analyses. Note that England and Wales is the only country in our sample that has a liberal market economy, according to Hall and Soskice (2001), and the effect of public provision was either nonsignificant or negative there, whereas it was positive or nonsignificant in the other countries. Does this finding indicate a lower appreciation of public facilities in liberal market economies? And, if so, what are the implications for the creative class and, by extension, regional growth?

Completely understanding the complex relationship between creativity and regional growth poses many challenges. These challenges will require a certain amount of, shall we say, *creativity* to address.

Appendixes

Table A1

Descriptive Statistics for Variables

Variable	Mean	Median	Minimum	Maximum	Standard Deviation
Bohemian index (ln)					
England and Wales	–0.374	–0.349	–1.210	1.409	0.438
Finland	–1.263	–1.315	–2.078	0.130	0.432
Germany	–1.216	–1.238	–2.110	0.215	0.487
The Netherlands	–0.488	–0.531	–1.672	0.732	0.417
Norway	–2.574	–2.496	–5.048	–0.586	0.847
Sweden	–1.299	–1.333	–2.145	0.057	0.396
Openness index (ln)					
England and Wales	1.641	1.600	0.465	4.018	0.664
Finland	0.687	0.460	–0.566	2.251	0.641
Germany	1.785	1.886	0.434	2.853	0.667
The Netherlands	1.974	1.999	1.280	3.042	0.417
Norway	1.207	1.196	0.164	2.372	1.211
Sweden	2.068	2.069	1.268	2.912	0.409
Public provision index (ln)					
England and Wales	2.212	2.185	0.263	2.637	0.284
Finland	2.069	2.016	1.745	2.842	0.196
Germany	1.580	1.597	1.155	1.958	0.160
The Netherlands	1.631	1.576	1.211	2.540	0.276
Norway	2.527	2.528	2.267	3.000	0.137
Sweden	2.528	2.532	2.250	2.857	0.108
Cultural opportunity index (ln)					
England and Wales	0.955	0.953	0.263	2.637	0.284
Finland	–0.136	–0.127	–1.110	0.950	0.411
Germany	–0.320	–0.388	–0.853	0.587	0.309
The Netherlands	0.669	0.685	0.091	1.681	0.305
Norway	0.027	0.037	–1.061	0.933	0.376
Sweden	0.057	0.093	–0.604	1.154	0.331
Employment change 1993–2002					
England and Wales	2.350	2.260	0.094	6.464	1.042
Finland	0.080	0.067	–0.161	0.357	0.103
Germany	–0.376	–0.266	–2.780	1.604	0.886
The Netherlands	3.346	3.342	–0.100	8.232	1.353
Norway	1.008	1.005	–2.174	3.862	0.881
Sweden	0.492	0.449	–1.393	2.287	0.742

Table A2

Correlation Coefficients of Creative Class Indicators and the Share of Employees with a Tertiary Degree, 1996: Germany and the Netherlands

	Germany	The Netherlands
Creative class A 1996 (ln)	0.699	0.788
Creative core 1996 (ln)	0.905	0.692
Creative professionals 1996 (ln)	0.249	0.642
Bohemians 1996 (ln)	0.719	0.393
Creative class B 1996 (ln)	0.712	0.808

references

Almeida, P., and Kogut, B. 1999. Localization of knowledge and the mobility of engineers in regional networks. *Management Science* 45:905–17.

Andersen, K. V., and Lorenzen, M. 2005. The geography of the Danish creative class: A mapping and analysis. Copenhagen Business School, Copenhagen. Available online: http://www.kreativeklasse.dk/index.php?id=75

Anselin, L. 1988. *Spatial econometrics: Methods and models*. Dordrecht, the Netherlands: Kluwer Academic.

Bettencourt, L. M. A.; Lobo, J.; and Strumsky, D. 2007. Invention in the city: Increasing returns to patenting as a scale function of metropolitan size. *Research Policy* 36:107–20.

Boschma, R.; Eriksson, R.; and Lindgren, U. 2009. How does labour mobility affect the performance of plants? The importance of relatedness and geographical proximity. *Journal of Economic Geography* 9:169–90.

Boschma, R., and Iammarino, S. 2009. Related variety, trade linkages, and regional growth in Italy. *Economic Geography* 85:289–311.

DeVol, R., and Koepp, R., with Ki, J. 2004. *State technology and science index: Enduring lessons for the intangible economy*. Santa Monica, Calif.: Milken Institute. Available online: http://www.milkeninstitute.org/publications/download.taf?pubtype=pdf&pubid=304&file=/pdf/state_tech_sci_index04.pdf

Florida, R. L. 2002a. The economic geography of talent. *Annals of the Association of American Geographers* 92:743–55.

———. 2002b. Bohemia and economic geography. *Journal of Economic Geography* 2:55–71.

———. 2003. Entrepreneurship, creativity and regional economic growth. In *The emergence of entrepreneurship policy: Governance, start-ups, and growth in the US knowledge economy*, ed. D. M. Hart, 39–58. Cambridge, U.K.: Cambridge University Press.

———. 2004. *The rise of the creative class*. Revised paperback ed. New York: Basic Books.

Florida, R.; Mellander, C.; and Stolarick, K. 2008. Inside the black box of regional development: Human capital, the creative class and tolerance. *Journal of Economic Geography* 8:615–49.

Frenken, K.; van Oort, F. G.; and Verburg, T. 2007. Related variety, unrelated variety and regional economic growth. *Regional Studies* 41:685–97.

Fritsch, M. 2004. Entrepreneurship, entry and performance of new businesses compared in two growth regimes: East and West Germany. *Journal of Evolutionary Economics* 14:525–42.

———. 2007. The geography and the effect of creative people in Germany. Jena Economic Research Papers 001–2007. Friedrich-Schiller-University and Max Planck Institute of Economics, Jena, Germany. Available online: http://www.jenecon.de

Fritsch, M., and Falck, O. 2007. New business formation by industry over space and time: A multi-dimensional analysis. *Regional Studies* 41:157–72.

Glaeser, E. L. 2004. Review of Richard Florida's *The rise of the creative class*. *Regional Science and Urban Economics* 35:593–96.

Glaeser, E. L.; Kallal, H. D.; Schinkmann, J. A.; and Shleifer, A. 1992. Growth in cities. *Journal of Political Economy* 100:1126–52.

Greif, S., and Schmiedl, D. 2002. *Patentatlas Deutschland—Dynamik und Strukturen der Erfindungstätigkeit* [Patent atlas Germany—Dynamics and structure of inventive activity]. Munich: Deutsches Patent- und Markenamt.

Hackler, D., and Mayer, H. 2008. Diversity, entrepreneurship, and the urban environment. *Journal of Urban Affairs* 30:273–307.

Hall, P. A., and Soskice D., eds. 2001. *Varieties of capitalism: The institutional foundations of comparative advantage*. Oxford, U.K.: Oxford University Press.

Hansen, H. K. 2007. Technology, talent and tolerance: The geography of the creative class in Sweden. Rapporter och Notitser 169. Lund, Sweden: Lund Universitet, Department of Social and Economic Geography.

Hill, C., and Adkins, L. 2001. Collinearity. In *A companion to theoretical econometrics*, ed. B. Baltagi, 257–78. Oxford, U.K.: Blackwell.

International Labour Organization. 1988. ISCO: International standard classification of occupations. Geneva: ILO. Available online: http://www.ilo.org/public/english/bureau/stat/isco/isco88/index.htm

Knudsen, B.; Florida, R. L.; Gates, G.; and Stolarick, K. 2007. Urban density, creativity, and innovation. Available online: http://creativeclass.com/rfcgdb/articles/Urban_Density_Creativity_and_Innovation.pdf

Lang, R., and Danielsen, K. 2005. Review roundtable: Cities and the creative class. *Journal of the American Planning Association* 71:203–20.

Lee, S. Y.; Florida, R.; and Acs, Z. 2004. Creativity and entrepreneurship: A regional analysis of new firm formation. *Regional Studies* 38:879–91.

Lucas, R. E. 1988. On the mechanism of economic development. *Journal of Monetary Economics* 22:3–42.

Markusen, A. 2006. Urban development and the politics of a creative class: Evidence from the study of artists. *Environment and Planning A* 38:1921–40.

Markusen, A., and Schrock, G. 2006. The artistic dividend: Urban specialization and economic development implications. *Urban Studies* 43:1661–86.

Markusen, A.; Wassall, G. H.; DeNatale, D.; and Cohen, R. 2006. Defining the cultural economy: Industry and occupational approaches. Paper presented at the 53rd annual meeting of the North American Regional Science Association, Toronto, 16–18 November.

Marlet, G., and van Woerkens, C. 2004. Skills and creativity in a cross-section of Dutch cities. Discussion Paper Series 04-29. Koopmans Research Institute, Utrecht.

Martin, R., and Sunley, P. 1998. Slow convergence? The new endogenous growth theory and regional development. *Economic Geography* 74:201–27.

McGranahan, D., and Wojan, T. 2007. Recasting the creative class to examine growth: Processes in rural and urban counties. *Regional Studies* 41:197–216.

Peck, J. 2005. Struggling with the creative class. *International Journal of Urban and Regional Research* 29:740–70.

Power, D., and Scott, A. 2004. *Cultural industries and the production of culture*. London: Routledge.

Putnam, R. D. 2000. *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.

Rantisi, N. M., and Leslie, D. 2006. Guest editorial. Placing the creative economy: Scale, politics, and the material. *Environment and Planning A* 38:1789–97.

Schmiedl, D. 2006. *Patentatlas Deutschland—Ausgabe 2006* [Patent atlas Germany—2006 edition]. Munich: Deutsches Patent- und Markenamt.

Scott, A. J. 2006. Creative cities: Conceptual issues and policy questions. *Journal of Urban Affairs* 28:1–17.

Sharp, E. B., and Joslyn, M. R. 2008. Culture, segregation and tolerance in urban America. *Social Science Quarterly* 89:573–91.

Stam, E.; de Jong, J. P. J.; and Marlet, G. 2008. Creative industries in the Netherlands: Structure, development, innovativeness and effects on urban growth. *Geografiska Annaler Series B, Human Geography* 90:119–32.

Stolarick, K., and Florida, R. 2006. Creativity, connections and innovations: A study of linkages in the Montreal region. *Environment and Planning A* 38:1799–817.

UNESCO. 1997. *International standard classification of education: ISCED 1997*. Paris: United Nations Educational, Scientific and Cultural Organization. Available online: http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm

Zucker, L.; Darby, M.; and Brewer, M. 1998. Intellectual human capital and the birth of biotechnology enterprises. *American Economic Review* 88:290–306.