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Creative Class vs. Individual Creativity – A Multi-level Approach to the Geography of Creativity

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Abstract

For more than ten years the creative class debate is on the agenda in economic geography literature and stimulated a wide range of studies. It is believed that the spatial concentration of creative individuals lead to positive regional economic effects and that those creative individuals agglomerated in urban and amenity-rich regions characterised by a climate of tolerance (cf. Florida, 2002c). However, previous empirical studies relied on occupation or industry based definitions as a proxy to identify creative individuals and aggregated regional numbers (e.g. share of creative class). Thus, results are potentially distorted. Instead of observing creative individual's behaviour there are occupation or industry specific characteristics in a region that might correlate with a concentration of those individuals (cf. Storper and Scott, 2008). Moreover, using aggregated data bears the risk of ecological fallacy (cf. Robinson, 1950). Thus, the article builds upon insights from psychology and the data of the German Socio-Economic Panel to directly identify creative individuals based on their personality traits. Applying multilevel regression analysis, hypotheses derived from the creative class literature are tested comparing creative individuals with the rest of the workforce. The analysis controls for the individual and industry level to isolate the influence of regional characteristics. The empirical results show some evidence for Florida's hypotheses. Individual characteristics turn out to be the most significant differences, followed by characteristics at the industry level. Regional factors are less important, but urbanity and the share of bohemians are significant predictors. However, the location of creative class can be explained more precisely by their level of human capital and the location of the industries they are working in.

Keywords: creative class, creativity, big five, personality traits, occupation, social psychology, economic geography

JEL Codes: O31, O18, R12

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1 Introduction

For more than ten years the topics creative class, creative industries and creative regions are on the agenda in economic geography literature. Contributions mainly focus on the distribution, mobility and economic impact of creative individuals or companies from a regional perspective. Above all, it is the work of Florida, who gives attention to creative individuals. His quantitative occupational approach can be seen as the prototype and dominant approach, which was adopted in a wide range of other studies (cf. Florida and Mellander, 2010; Florida, 2002a, 2002c, 2005, 2008; Florida et al., 2008; Lee et al., 2004). More recently, there is a growing body of literature empirically testing Florida's hypotheses for regions outside the U.S. (cf. Boschma and Fritsch, 2009; Clifton, 2008; Clifton et al., 2013; Fritsch and Stuetzer, 2009, 2012; Krätke, 2010; Marlet and Van Woerkens, 2007; Marrocu and Paci, 2012; Westlund and Calidoni, 2010) However, the occupational approach raised critics and remains fuzzy (cf. Glaeser, 2005; Markusen, 2006; Peck, 2005; Pratt, 2008; Storper and Scott, 2008).

Previous studies empirically relied on occupation or industry based definitions as a proxy to identify creative individuals and aggregated regional numbers (e.g. share of creative class). Thus, results are potentially distorted. Instead of observing creative individual's behaviour there are occupation or industry specific characteristics in a region that might correlate with a concentration of creative individuals (cf. Storper and Scott, 2008). Moreover, using aggregated data bears the risk of ecological fallacy (cf. Robinson, 1950).

Hitherto, economic geographers seem to have ignored insides from other disciplines studying creativity. In psychology it is not a dichotomy of creative and non-creative individuals, instead it is acknowledged that creativity is a matter of degree (cf. Kozbelt et al., 2010). The five-factor model – or big five model – is a well-recognized concept from psychology to describe an individual's personality based on five basic dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. The dimension openness captures creative, innovative and artistic performance and interest of an individual (cf. McCrae and John, 1992). Thus, it should be a more direct measure to identify creative individuals than the approximation by occupations.

Therefore, the central research gap is a direct measure of creative individuals and an analysis of the characteristics of their regional environment. The article thereby focuses on the questions: Which regional characteristics known from creative class literature shape the geography of creative individuals identified by the psychological approach? How do these results differ in comparison to studies relying on the conventional creative class definition? Is

creativity the decisive factor in explaining the spatial distribution of creative individuals or do individual and industry characteristics matter as well?

The German Socio-Economic Panel (SOEP) serves as a representative and reliable database for individuals in German regions. Applying multilevel regression analysis, hypotheses derived from the creative class literature are tested comparing creative individuals with the rest of the workforce. The dominant approach in economic geography – and in creative class literature – is to use aggregated data on the regional level to explain phenomena on the individual level. This could lead to ecological interference fallacy meaning that correlations on a higher level are not identical with the corresponding correlations on the lower level (cf. Robinson, 1950). With respect to the creative class literature, there are possible inference problems regarding the effects of creative people in a region and the cause of their presence. For example findings on the regional level suggest that a high concentration of creative class members results in higher start-up rates (cf. Lee et al., 2004). However, using aggregated data it is not provable if creative individuals in a region cause higher entrepreneurial activities due to their own start-ups. Thus, the article relies on multilevel analysis to model the influence of and cross-level effects between the individual, industry and regional level.

Thereby the article contributes to the creative class literature using a new approach to identify creative individuals, a more advanced method and unique data.

The article is structured as follows. First, the creative class concept and the five factor model from social psychology are introduced. Next, empirical results from economic geography literature are discussed and deficits are pointed out. Then, section 3 concludes research gaps and hypotheses. In section 4, the data, methods and empirical models are laid out. Section 5 deals with descriptive statistics and multilevel models to compare creative individuals with the rest of the workforce to explain the geography of creativity. Finally, results are summed up and further needs for research as well as policy implications are addressed.

2 The Creative Class Debate and The Five Factor Model

2.1 The Creative Class Debate in Economic Geography

Traditionally human capital was measured in form of highly qualified labour (e.g. people with a bachelor degree and above). Instead, Florida argues that it is not important what people have learnt, but rather what they actually do. Therefore he developed an alternative definition of human capital based on occupations: the *creative class* (cf. Florida, 2002c; Florida et al., 2008). Members of the creative class *"...add economic value through their creativity"* (Florida, 2002c, page 68) and *"...engage in complex problem solving that involves a great*

deal of independent judgment and requires high levels of education or human capital" (Florida, 2002c, page 8). The creative class can be divided into two subgroups. The *Super-Creative Core* consists of professions like scientists, engineers, university professors, artists, designer etc. They are *"...producing new forms or designs that are readily transferable and widely useful..."* (Florida, 2002c, page 69). The second group is called *creative professionals.* They work in knowledge-intensive industries, financial services, legal services, health care, and business management. Creative professionals are creative since they solve specific problems in everyday business (cf. Florida, 2002c).

Sometimes bohemians are extracted from the creative core, because they play a distinct role in Florida's view. Bohemians are cultural or artistic creative and often work in creative industries. They belong to occupations like artists, musicians, writers, models and designers (cf. Faggian et al., 2012; Florida, 2002a).

Furthermore, Florida introduced the model of the three Ts of regional economic growth. This model suggests a causal chain of tolerance, talents and technology. The mechanism starts with an urban, amenity-rich and tolerant climate at place. One indicator for such a local environment is a concentration of bohemians. These places attract further and other creative class members (core and professionals). Technology comes into play as high-tech companies in search of talents relocate or start new businesses in these regions. Another source of technology is the creative class itself due to high start-up rates of its members. Hence, Florida combines his view of human capital with former (regional) growth theories and Jane Jacobs' ideas (cf. Jacobs, 1969) of the role of diversity for innovations (cf. Florida, 2002c; Florida et al., 2008).

Florida's concept and definition raised some critics among the scientific community. These critics mainly focus on the fuzzy definition, the causal relation of the three Ts and policy implications inspired by Florida's ideas (cf. Glaeser, 2005; Markusen, 2006; Peck, 2005; Pratt, 2008; Storper and Scott, 2008).

On the one hand the definition of the creative class is criticised because the difference to the conventional human capital measure remains unclear. Empirically, Glaeser (2005) could not find other or additional explanatory power of the creative class measure compared to the share of highly qualified labour on the regional level in explaining regional growth rates (Glaeser, 2005). On the other hand the classification of which occupation belongs to the creative class and which not seems arbitrary. Markusen (2006) argues that it is not clear why for instance drafting technicians are part of the creative class but tailors are not. Both occupations could be attributed as creative jobs, if not the latter even more. Furthermore, it is questionable which

commonalties regarding life style and political attitude the members of the creative class share to justify the label ‘class’. For example, considering the commonalities of engineers and artists, the former use to live in suburban municipalities and tend to vote right, whereas artists prefer inner urban neighbourhoods and are prone to vote left (cf. Markusen, 2006).

Moreover, members do not only differ with respect to their residential choice or voting preferences, but likewise in their socio-economic status. Especially, bohemians are characterised by precarious and insecure working conditions with a high share of self-employment and lower wages compared to labour with similar qualifications (cf. Comunian et al., 2010; Faggian et al., 2012).

Critics concerning the model of three Ts are mostly related to the mobility of creative class members and the relocation of companies in search for labour. As Sternberg (2012) concludes, most existing empirical evidence points to the importance of job availability and private motives to move. And the example of Silicon Valley illustrates that there were fast growing high-tech companies in the first place that could attracted highly qualified labour from outside the region (cf. Sternberg, 2012). It seems more plausible that people “...*choose to locate on the basis of some sort of structured match between their talents and the forms of economic specialization and labor demand to be found in the places where they eventually settle.*” (Storper and Scott, 2008, page 162).

Whereas, the effects of a concentration of creative class on regional economic development are less controversial discussed. However, not only the mere concentration of creative individuals in a region should cause growth. It more reasonable that there is interdependency of human capital and related or matching industries on the regional level leading to growth (cf. Storper and Scott, 2008).

Despite of empirical and theoretical lacks of Florida’s hypotheses many municipalities try to implement policies inspired by Florida’s ideas (cf. Malanga, 2004). These policies focus on ‘people climate’ instead of ‘business climate’ which aims at investments in soft location factor that should induce cumulative and self-reinforcing regional growth. However, Pratt (2008) argues that this leads to competition between municipalities, but unlike companies under free market condition municipalities cannot quite the market cf. (cf. Pratt, 2008).

Even if investments in soft location factor are successful in the short run, it is doubtful if this is the case in the long run. If many municipalities follow this strategy it loses its uniqueness and authenticity to attract talents (cf. Peck, 2005).

In addition to conflicts between regions there could be conflicts within a region. The immigration of creative class members into central neighbourhoods with socially mixed

population and attractive buildings could cause gentrification. Where part of the indigenous population is forced to move out of their neighbourhoods (cf. Peck, 2005).

Summarising the theoretical debate it gets obvious that the many shortcomings of the creative class concept are the fuzzy definition and the negligence of the relevance of the interplay of human capital and the industrial specialisation in a region.

2.2 The Big Five Model of Personality

The five-factor model – or big five model – is a concept from psychology to describe an individual's personality based on five basic dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience[1] (cf. McCrae and John, 1992).

The big five model has its roots in two approaches: psycho-lexical studies and personality questionnaires. The former can be traced back to Allport and Odbert (1936). They used adjectives from dictionaries describing personality and formed 35 rating scales of distinct meaning. Their research was followed by intense and systematic work of Cattell (1943) who found 19 primary factors and 8 second-order factors. Later on, Fiske (1949) used Cattells data, but only found five relevant and distinguishable factors. Tupes and Christal (1992) came to the same solution. They termed these five factors: surgency, emotional stability, agreeableness, dependability, and culture. Norman (1963) further elaborated the concept of personality traits and derived the "Norman's Big Five" or simply "Big Five": extraversion, emotional stability, agreeableness, conscientiousness, and culture. During the 1960s and 1970s the interest in the psycho-lexical approach in mainstream personality research ceased. Interest arouse in the 1980s with reanalyses of earlier data and new empirical studies. Studies from different languages (e.g. Japanese, Chinese, and German) provided evidence for the universal structure of personality traits. Five dimensions were found in the case of Chinese and German. The German study resulted in a nearly perfect replication of what was found in the English language whereas the Chinese study showed some differences in the meaning of the five dimensions (cf. Barrick and Mount, 1991; Digman, 1990; McCrae and John, 1992).

The second approach of personality questionnaires is rooted in personality theory and psychartric nosology. This approach resulted in a vast number of different scales created by individual researchers to measure personality. Despite of the diversity of these studies Eysenck and Eysneck (1964) and Eysenck (1967) identified two recurring factors:

[1] The five factors' names slightly differ in literature. Neuroticism is sometimes termed emotional stability for instance. Some publications use the first letters of the factors as abbreviation, others use roman letters (McCrae and John, 1992).

neuroticism and extraversion. While the relevance of the two dimensions were confirmed by further research, it got obvious that they did not cover the whole scope of personality. Tellegen and Aktinson (1974) as well as Costa and McCrae (1976) found facts for a third dimension, named openness to absorbing and self-altering experience or openness to experience. From that point of time the two approaches were combined to the recent five-factor model (cf. McCrae and John, 1992).

The history of the five-factor model shows that there were many rival – but often similar – approaches in psychology to describe personalities. The big five model helped to develop a common taxonomy. However, the interpretation of the meaning and content of the factors as well as the way they are studied still differs considerably. Thus, this study mainly relies on definitions from a standard textbook based on a meta-analysis of the field in psychology (cf. John and Srivastava, 1999).

The big five model is hierarchical in its nature. All of the five factors could be understand as a superstructure comprising several traits of a lower level. The first factor extraversion (or energy, enthusiasm) covers traits such as sociability, activity, assertiveness, and positive emotionality. Agreeableness (or altruism, affection) represents altruism, tender-mindedness, trust, and modesty, which are prosocial traits. Conscientiousness (or control, constraint) signifies traits facilitating task- and goal-orientated behaviour like following norms and rules, planning, and prioritizing tasks. Negative emotionality is included in neuroticism (or negative affectivity, nervousness) and covers feeling anxious, nervous, sad, and tense. The last factor, openness to experience (or originality, open-mindedness) is related to the cognitive and experiential life of one's person and its differences in originality and complexity (cf. John and Srivastava, 1999, page 121).

This study is only interested in openness to experience. It is often related to creativity and originality, but is different from IQ. It accounts for the individual's differences in creative, innovative and artistic performance and interest (cf. John and Srivastava, 1999).

A limitation of the five-factor model is that it was designed to describe individual's personalities and the interplay of the five dimensions, but it was not intended to explain ones personality or the relations among the dimensions. Moreover, it is a static approach and does not capture dynamics. As the model is hierarchical in its nature, the big five are very broad and in some situations not specific enough. There are concepts of mid-level and low-level dimensions in psychology, but they are not as well developed and empirical tested as the five-factor model (cf. John and Srivastava, 1999).

2.3 Empirical Results on The Geography of The Creative Class and Creativity

Florida's own results are mostly based on aggregated data for U.S. metropolitan standard areas (MSA). In his first articles he used the conventional definition of human capital (share of people with bachelor's degree or above). In 'The Economic Geography of Talent' he firstly laid out his idea of the 3 T's. He found statistical support for the attraction of human capital by diversity (share of same sex couple households) and amenities (share of bohemians) as well as an association of talents and the concentration of high-tech companies and high regional incomes (cf. Florida, 2002b). He further explored the relationship to other regional factors. Results show that there is a relation between diversity, creativity, human capital and firm growth rates (cf. Lee et al., 2004). There is further evidence for different effects of creative class and conventional human capital measures on regional wage and income levels. The creative class is more associated with high regional wage levels and human capital with income levels (cf. Florida et al., 2008). In addition, the concentration of creative class members has a positive effect on housing values, too (cf. Florida and Mellander, 2010).

While Florida focuses on metropolitan areas Wojan, Lambert and McGranahan (2007b) and Wojan, Lambert and McGranahan (2007a) could show that the concentration of artists and creative professions in rural areas is related to natural amenities, population density, young and educated population as well as a strong creative milieu (cf. Wojan et al., 2007a, 2007b).

Recently there are more and more studies for regions outside the U.S. Regarding Europe Boschma and Fritsch (2009) used regional data for seven European countries. Their results reveal that creative class members are unevenly distributed across European regions and factors like diversity and openness as well as job opportunities best predict this pattern. There is less evidence for amenities playing an important role in the European context. Results for effects of the creative class are mixed. In some countries there are relations of regional concentration of creative class and low unemployment rates, high patents and start-up rates (cf. Boschma and Fritsch, 2009). Lorenzen and Andersen (2009) find support for eight European countries that centrality in urban hierarchy plays an important role to explain regional patterns of the concentration of creative class. These results are further supported by other studies for different European countries or specific groups of countries. For Nordic countries there is support for quality of place and job growth, but theses differ with respect to the city size. Thus, results mainly hold for big cities (cf. Andersen, Hansen, et al., 2010). In the United Kingdom there is evidence for quality of place and creative class concentration and concentration of creative class and regional growth (cf. Clifton, 2008). A comparison of

Sweden and the UK reveals differences between countries from different capitalism regimes. Employment growth in UK is more associated with the concentration of the creative class compared to Swedish regions, while the opposite is true for population growth. Thus, this study highlights the context-dependency of the creative class hypotheses (cf. Clifton et al., 2013).

In Dutch regions there is evidence for creative class concentration fostering employment growth and start-up rates (cf. Marlet and Van Woerkens, 2007).

Fritsch and Stuetzer (2009, 2012) show that the concentration of creative class in Germany is related to urbanity, diversity (ethnic and cultural), public and health care supply as well as regional growth (cf. Fritsch and Stuetzer, 2009, 2012). Moreover, Möller and Tubadji (2004) prove that in German regions concentration of creative occupations is mostly related to sound economic conditions and not to amenities (cf. Möller and Tubadji, 2004). Alfken et al. (2013) focus on regional growth rates of freelance artists in Germany to capture the dynamics of agglomeration and provide evidence for regional factors shaping the process of concentration of creative occupations. They show that especially urbanity and the concentration of artists affect regional growth rates of artists' population.

Beside the sensitivity of results to the regional context (e.g. urbanity and capitalism regime) disaggregation of creative class into narrow occupation groups or according to specific industries deliver different results. Florida et al. (2008) show that effects of the spatial concentration of specific occupation group varies. For instance there are positive correlations for concentration of technical and business occupations and regional wages, but negative correlations of the concentration of education and healthcare occupation and regional wages (cf. Florida et al., 2008).

Aggregating occupations according to knowledge bases Asheim and Hansen (2009) reveal that labour from different knowledge bases react differently to business or people climate. Regional factors associated with people climate seem to attract mostly labour from the symbolic knowledge base and less from the synthetic knowledge base. The latter are more attracted by business climate (cf. Asheim and Hansen, 2009; Asheim et al., 2007). Another study disentangles occupation into creative graduates, bohemians, and non-creative graduates demonstrating that a concentration of highly educated people can explain regional production efficiency. This is less the case for non-creative graduates and for bohemians not at all (cf. Marrocu and Paci, 2012).

While in his early works Florida adopts an occupational approach to identify creative individuals, in his 2008 book "Who's Your City?" he refers to insights from psychology to

better describe creative peoples' differences in moving decision and wealth creation (Florida, 2008). Therefore, he highlights the work of Rentfrow et al. (2008), who for the first time systematically analysed the spatial distribution of people with specific psychological characteristics on a sub-national level. Even though they only deliver descriptive evidence and the authors themselves declare their work as 'preliminary results' for U.S. states only, this approach seems fruitful and has the potential to overcome some of the obstacles of the creative class literature and in addition broaden their perspective. Especially, the fuzziness of the occupational approach can be addressed (cf. Rentfrow et al., 2008).

Accordingly to Rentfrow et al. (2008) there is a large number of research that addresses the differences of personalities across countries. But almost all of them are limited to the level of nations or even combine nations to regions of large geographic extent. Few empirical studies exist for the sub-national level and are concentrated on U.S. States exclusively (cf. Krug and Kulhavy, 1973; Plaut et al., 2002; Rentfrow et al., 2008, 2013). Therefore, the remainder of the sections refer mainly to the studies of Rentfrow et al. (2008) and Rentfrow et al. (2013). Furthermore, the summary is restricted to results related to openness or creativity.

Central results from recent studies on the geographical distribution of openness reveal clustered patterns on the sub-national level. At the State-level of the U.S. Rentfrow et al. (2008) identifies New England, Mid-Atlantic, West Coast states, Midwest and South Central states as regions with high level of openness. These high values are associated with regional socio-economic and demographic variables. Openness is significant and positive correlated with liberal values like attitude towards marijuana consumption, abortion and homosexual marriage. Furthermore, there are positive correlations with the proportion of people working in artistic occupations or computer industries. Rentfrow et al. (2008) conclude that "...state-level O [openness] reflects, among other things, the extent to which individuals in a state are intellectual and creative." (cf. Rentfrow et al., 2008, page 360).

Elaborating their methodical approach Rentfrow et al. (2013) identify states with distinct personality profiles. They could ascertain three characteristic profiles that are regionally clustered: friendly and conventional, temperamental and uninhibited as well as relaxed and creative regions. The latter are of interests concerning the own approach. These regions are located along the West Coast, Rocky Mountains and Sunbelt. Again, relationship between personality and regional variables are found. Relaxed and creative regions are ethnical more divers, wealthier, have a higher educated population, show higher residential mobility, vote more often democrats and are more innovative compared to other regions. But these regions

exhibit lower levels of social capital and are associated with higher crime rates (cf. Rentfrow et al., 2013).

Concerning the sub-national level and the geography of personalities there are more specific research questions. In an international comparison of the U.S., the United Kingdom and Germany Obschonka et al. (2013) analyse the regional distribution of entrepreneurship-prone personality profiles. Again it is shown that these are not randomly distributed, but regionally clustered. These entrepreneurship-prone personality profiles correlate with regional characteristics that are known from research of regional entrepreneurship revealing entrepreneurship activities at the regional level like self-employment, business start-ups and establishment entry rates (cf. Obschonka et al., 2013).

Summarizing results from previous studies it is shown that empirical results differ with respect to the disaggregation of creative class as well as different regional contexts. However, especially for Europe and Germany urbanity, a creative milieu, economic prosperity, innovation and entrepreneurial activities are associated with the spatial concentration of creative class. Looking at regional creative personality profiles some of these results are replicable, at least for the U.S:

3 Research gaps and hypotheses

The discussion of the theoretical debate of the creative class concept and the empirical results of this stream of literature has uncovered relevant shortcomings and research gaps. On the one hand the concept of creative class lacks a theoretically based definition of membership. And on the other hand it neglects the interdependency of industrial specialisation in a region and labour markets. Moreover, empirical results from previous studies revealed that the disaggregation of creative class into occupational or industry specific groups as well as the regional context affect correlations of concentration of creative individuals and regional characteristics.

Therefore, the main aim of the article is to tests hypotheses from creative class literature with a newly derived definition of creative individuals. The new definition is based on a well-recognized concept from psychology. The five factor model – or big five – is a concept from psychology to describe an individual’s personality based on five basic dimensions. One dimension is openness. It captures creative, innovative and artistic performance and interest of an individual. Thus, it should be a more direct measure to identify creative people than using occupations as approximation.

The following hypotheses are derived from the creative class literature presented in section 2 and relate to regional characteristics that are associated with the spatial concentration of creative individuals. Creative individuals are compared to the rest of the workforce to unravel distinct regional characteristics that are related to their regional environment.

Hypothesis 1: Creative individuals are associated with an urban, amenity-rich and open environment. They are more likely to live in regions that...

a) are urban.
b) exhibit high shares of bohemians.

Hypothesis 2: Creative individuals are associated with regional prosperity. They are more likely to live in regions that...

a) reveal a higher GDP per capita.
b) show more entrepreneurial activities in form of self-employment.
c) with higher numbers of patents per inhabitant.

4 Data and Methods

4.1 Data

The German Socio-Economic Panel (SOEP) gathers representative micro data for Germany since 25 years covering social-, economic and behavioural scientific topics. Since 1984 in the Federal Republic of Germany and since 1990 for whole Germany the same people are surveyed on a yearly base regarding individual and household aspects. From time to time there are questions on special topics which are not included regularly into the panel. In the year 2005 and 2009 information on personality traits in form of the big five model were gathered (cf. www.diw.de/soep).

The construction of the personality trait questions underwent a pre-test with 750 random participants who were asked 25 questions. Subsequently, the number of questions was condensed to 15 questions. By means of reliability tests it was ensured that these 15 questions sufficiently reproduce the results from the 25 question survey (cf. Gerlitz and Schupp, 2005).

Empirics of this article are based on the data from the year 2009.

The corresponding 15 questions are shown in

Table 1. Answers were rated on a likert scale from 1 to 7. As every scale is represented by three questions, the overall score is calculated as the sum of three scores. Since these scores range from 3 to 21, the scale was normalized to scores between 0 and 18 (cf. Gerlitz and Schupp, 2005).

Table 1 SOEP question

I see myself as someone who ...	
… does a thorough job	conscientiousness
… is communicative, talkative	extraversion
… is sometimes somewhat rude to others	agreeableness
… is original, comes up with new ideas	openness
… worries a lot	neuroticism
… has a forgiving nature	agreeableness
… tends to be lazy	conscientiousness
… is outgoing, sociable	extraversion
… values artistic experiences	openness
… gets nervous easily	neuroticism
… does things effectively and efficiently	conscientiousness
… is reserved	extraversion
… is considerate and kind to others	agreeableness
… has an active imagination	openness
… is relaxed, handles stress well	neuroticism

Source: SOEP

In addition to the traits the variables age, gender, academic degree, income and self-employment from the SOEP are used. According to Florida's hypotheses and the literature review, the regional variables GDP per capita, share of self-employed, patents per inhabitants, share of bohemians and urbanity are included. Most regional data is derived from the INKAR dataset for the year 2009. The share of bohemians in 2009 is derived from the data of the Social Security Insurance for Artists and Writers (Künstlersozialkasse, short: KSK). The variable patents per 100,000 inhabitants is calculated as the mean of EPO and PCT patents between 2005 and 2010 based on the RegPat dataset from the OECD[2]. Dummy-variables for urban and rural regions are based on the definition of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (Bundesinstitut für Bau-, Stadt- und Raumforschung, short; BBSR).

The regional level is 'Raumordnungsregionen' which represent German planning regions (cf. BBSR).

Sectoral dummies are high-tech, high-tech knowledge based services and cultural activities based on NACE (Nomenclature des statistiques des activités économiques de la Communauté

[2] The data was kindly provided by Jérôme Stuck (Institute of Economic and Cultural Geography, Leibniz University of Hannover, Schneiderberg 50, 30167 Hanover, Germany, e-mail: stuck@wigeo.uni-hannover.de)

européenne) codes[3] (for further details about variables and data sources see Table 8 in the appendix).

In the empirical part of the article we refer to creative individuals that are defined as follows: creative individuals are those 5 % of individual of the workforce that have the highest scores of openness corresponding to a score of 16 or above. All empirical models were run with different thresholds ranging from 5 to 45 % to ensure rigour and staple results. These analyses did not reveal systematic differences.

Table 2 creative class and creative individuals (95%-quantile)

	openness < 16	openness ≥ 16	N
bohemians	68.9 %	31.1%	126
core	89.6 %	10.4 %	1767
professionals	91.9 %	8.1 %	3280
rest	94.0 %	6.0 %	6395
N	10738	887	11625

Source: SOEP own calculation

When we compare Florida's occupational[4] with the psychological approach, both definitions are overlapping in total 9.7 %. This by implication means that more than 80 % of the SOEP sample differs with respect to their membership of the rivalling definitions. Looking at the different subgroups of the creative class we find considerable differences of intersections of both definitions. As shown in Table 2 31.1 % of the bohemians are part of the creative individuals. Whereas, the overlap accounts only 10.4 % for core members and 8.1 % for professionals. Remarkably, 6.0 % of the individuals which do not belong to the creative class are counted among the psychological approach.

Table 3 creative class and openness

	openness				
class	median	mean	min	max	N
bohemians	14	13.41	2	18	188
core	11	11.21	0	18	1777
professionals	11	10.66	0	18	3305
rest	10	9.94	0	18	6440

Source: SOEP own calculation

However, looking at the distribution of openness within the creative class, Florida does not seem to be completely wrong with his approach. As Table 3 suggest in the mean members of

[3]The definition is based on NACE 2-digit level (Rev 1.1): high technology manufacturing (30, 32, 33); high-tech knowledge intensive services (64, 72, 73); culture (92)

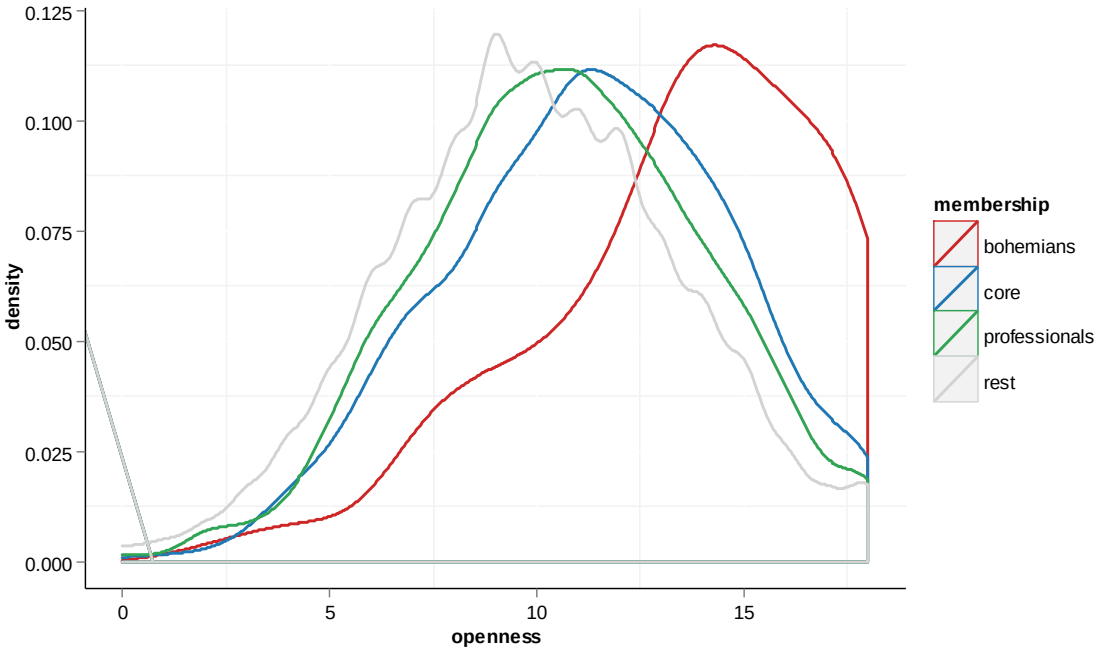
(cf. http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/DE/htec_esms.htm)

[4] The defintion is based on ISCO 88 and adopted from Boschma and Fritsch (2009, p. 369).

the creative class are indeed more open. Due to high absolute numbers these differences are statically highly significant.

Furthermore, we can find considerable differences within the creative class. As to be expected, bohemians score highest in the mean, followed by members of the core and professionals. The distribution bohemians is most skewed, there are comparatively more individuals with high scores than with low (see Figure 1).

Figure 1 distribution openness and class membership



Source: SOEP own calculation

Thus, there are considerable differences identifying creative individuals based on occupation or directly measuring individual creativity.

4.2 Multilevel logistic regression

The dominant approach in economic geography – and in creative class literature – is to use aggregated data on the regional level to explain phenomena on the individual level. This could lead to ecological interference fallacy meaning that correlations on a higher level are not identical with the corresponding correlations on the lower level. For instance, employees tend to vote democratic or left. Thus, a high number of employees should lead to democratic party governments. Infect, industrial countries with a high share of employees more often have leading conservative parties (cf. Langer, 2009).

With respect to the creative class literature, there are possible inference problems regarding the effects of the presence of creative individuals in a region and the cause of their presence. For example, there are findings that a high concentration of creative class members results in

higher start-up rates (see section 2). Using of aggregated data one cannot infer that higher start-up rates are caused by establishments of creative individuals themselves.

The same is true for the concentration of bohemians that correlates with the share of other creative class members (see section 2). Do they really migrate to places because of bohemians? The consideration of individual characteristics are important, because it reduces the risk of ecological inference fallacy since the variables of the lower level of individual and the related variables of the higher level of regions are included in analyses at the same time.

Furthermore, the analyses comprise sectoral characteristics. The consideration of sectors is based on Asheim et al. (2007) and Asheim and Hansen (2009) showing that the responds to regional characteristics differ between labour from different knowledge bases and takes the theoretical argument of Storper and Scott (2008) into account that the relation of regional industrial specialisation and labour markets is interdependent.

Thus, applying multilevel regression analysis the risk of ecological fallacy is reduced. Multilevel regression analyses integrate micro and macro information into a single model. In social science there are often information on the level of individuals and group level information about groups individuals are nested in. A common assumption of regression analysis is that observations are independently and identically distributed, but this is not the case for nested data sets where correlation of individuals of the same group could accrue (cf. de Leeuw and Meijer, 2008).

The empirical models in this paper are multilevel logistic regressions with the aim to compare creative individuals to the rest of the workforce regarding their regional environment while controlling for the individual and sector level. Thus, controlling for other variables the effect of regional variables is isolated. In the language of multilevel analysis the model is estimated as a random intercept model. This implies that the average / likelihood of the outcome can vary from region to region as well as sector to sector. A random slope or random intercept and slope model is not applied as there is no theoretical reason to assume that the causal relation of dependent and independent variables varies between regions or sectors.

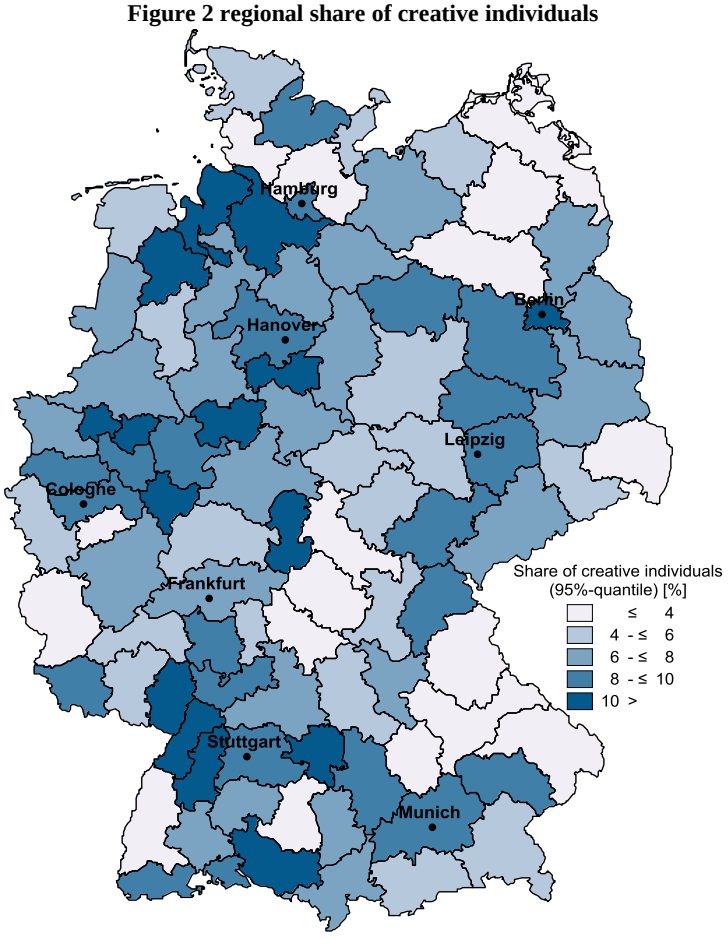
5 Empirical results

5.1 Geography of Creative Individuals

First we have a look on the spatial distribution of creative individuals As the SOEP only provides a sample of 11,625 individuals engaging in the labour market for the year 2009, one has to be cautious to generalise and aggregate results on the regional level. Samples size per planning region varies from 27 to 451 individuals.

One can identify concentration of creative individuals in agglomerations, but these do not necessarily have to be the most densely populated ones. This is the case for neighbouring regions of Hanover, Cologne, Frankfurt, Hamburg and Stuttgart. More peripheral regions such as parts of East Bavaria and North East Germany exhibit low concentrations. Exceptional high shares can be found in North Germany regions like Bremerhaven and Oldenburg, which might be a sample bias due to low numbers of observation in these regions.

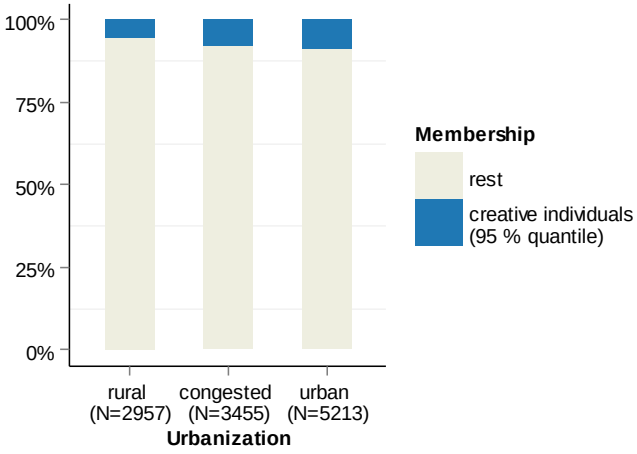
Figure 2 regional share of creative individuals



Source: SOEP own calculation

Next, we analyse creative individuals with respect to regional socio-economic characteristics. One argument put forward by Florida is that creativity is mostly an urban or metropolitan phenomenon. Analysing the variation of the concentration of creative individuals between regions of different degrees of urbanisation, it get obvious that there is a relationship between the degree of urbanisation and the share of creative individuals.

Figure 3 distribution of creative individuals and urbanisation



Source: SOEP own calculation

Figure 3 reveals the distribution of creative individuals and urbanisation. The share of creative individuals on the workforce increases with the degree of urbanity, the share increase from 5.6 to 8.7 %. This relation is highly significant according to a Mann-Whitney test. The share of bohemians is both an indicator for tolerance and for cultural amenities (cf. Florida and Mellander, 2010; Florida, 2002a). Considering the mean share of bohemians in a region it gets obvious that the concentration is on average higher in regions where creative individuals live.

Table 4 regional characteristics

	share bohemians [%]			GDP per capita [10,000 €]			share self-employed [%]			Patents per 100,000 inhabitants			
	mean	median	sd	mean	median	sd	mean	median	sd	mean	median	sd	N
creative individuals	2.2	1.4	2.1	29.3	27.6	7.0	10.9	10.7	1.6	46.4	35.4	31.2	887
rest	2.0	1.3	1.8	28.8	27.2	6.9	11.0	10.8	1.7	44.8	35.1	30.6	10,738
	p = 0.0003438			p = 0.02925			p = 0.0525			p = 0.1543			

Source: SOEP own calculation

The economic prosperity of a region should depend on the presence of creative individuals in a region. This seems to be true for creative individuals as the mean of GDP per capita is higher. But considering the median, differences become less pronounced between the two groups.

Another claim is that the regional concentration of creative class members lead to higher start-up rates (cf. Lee et al., 2004). As a rough proxy for entrepreneurial activities the regional share of self-employed is considered. The regional share is on average higher in case of creative individuals. However, differences are low and only significant at the 10%-level.

The last regional characteristic to be considered is innovativeness. Innovations are represented by patents per 100,000 inhabitants. It is argued that the concentration of creative people in a region results in more innovations. This is partly confirmed by research by Boschma and Fritsch (2009) as well as Rentfrow et al. (2013). Table 4 reveals that in the mean in regions

where creative individuals reside the number of patents per inhabitants is higher, but the relation is statistically insignificant.

In the next section we apply multilevel logistic regressions to compare the creative individuals with the rest of the workforce. Multilevel analysis allow to control for nested regional and sectoral effects and thus deliver sounder empirical evidence. Additionally, analysis is carried out on the individual level, which should avoid ecological fallacy.

5.2 Multilevel Analysis

The multilevel analysis compares creative individuals with the rest of the workforce with respect to hypotheses from creative class literature. In addition, the same models are estimated for the occupational approach to unravel the impact of definitions. Furthermore, regressions control for the individual, regional and sectoral effects, thus leading to unbiased estimations.

The data have a three-level non-hierarchical structure with 11,625 individuals nested in 96 planning regions and four sectors.

A first step in multilevel analyses is to fit the null model, which only comprises the intercept and level effects. To estimate the effects of levels it is common to calculate the variance partition coefficient. In case of logistic regressions there are alternative approaches, here the 'latent variable approach' described by Browne et al. (2005) is applied.

Table 5 variance partition coefficient

	region	sector
creative individuals	3.6 %	10.9 %
creative class	4.2 %	5,4 %
core	2.8 %	17.0 %
professionals	1.5 %	18..6 %
bohemians	3.8 %	67.1 %

Source: SOEP own calculation

Considering the null models the effect of the regional level varies from 1.5 – 4.2 % and the sector level from 5.4 – 67.1 % of total variance. Hence, the sector level seems more important than the regional level to explain differences of creative individuals and the rest of the workforce.

Table 6 displays empirical evidence for creative individuals, the creative class and its subgroups. Statistically significant effects are dominated by variables on the individual and sector level. Only a few regional variables are significant.

Creative individuals are higher educated, earn more and are more often self-employed than the rest of the workforce[5]. Overall they tend to work more frequently in the cultural sector. On the regional level the only significant variable is the rural dummy, which is negative. Meaning that on average they live less often in rural regions. This result reflects the analysis of the spatial distribution of creative individuals (see Figure 2).

Table 6 multilevel regressions: urban and rural dummies

model	creative individuals	creative class	core	professionals	bohemians
	coef. (odds)	coef. (odds)	coef. (odds)	coef. (odds)	coef. (odds)
(intercept)	-3.122454*** (0.044)	-3.847792*** (0.0213)	-6.915432*** (0.001)	-3.450004*** (0.0317)	-9.985275*** (0)
individual					
openness	-	0.039883*** (1.0407)	0.053173*** (1.0546)	0.023966*** (1.0243)	0.18912*** (1.2082)
gender (female = 1)	0.520011*** (1.682)	0.612973*** (1.8459)	0.255678*** (1.2913)	0.671924*** (1.958)	-0.143831 (0.866)
age	0.003709 (1.0037)	-0.013684*** (0.9864)	-0.017786*** (0.9824)	-0.010607*** (0.9894)	-0.025676*** (0.9747)
degree	0.134866*** (1.1444)	0.555464*** (1.7428)	1.1364*** (3.1155)	0.376412*** (1.457)	0.533624*** (1.7051)
income	6.1e-05** (1.0001)	0.000697*** (1.0007)	0.000661*** (1.0007)	0.000674*** (1.0007)	0.000133 (1.0001)
self-employed	0.510145*** (1.6655)	0.859106*** (2.361)	0.104149 (1.1098)	0.889902*** (2.4349)	1.363846*** (3.9112)
region					
GDP per capita	-0.003002 (0.997)	0.012966** (1.0131)	0.008893 (1.0089)	0.010859* (1.0109)	0.033083** (1.0336)
share self-employed	-0.029139 (0.9713)	0.028643 (1.0291)	0.031626 (1.0321)	0.01836 (1.0185)	0.166579*** (1.1813)
patents per inhabitant	0.000615 (1.0006)	0.000142 (1.0001)	0.001363 (1.0014)	0.000152 (1.0002)	0.00038 (1.0004)
urban	0.0435 (1.0445)	0.1157 (1.1227)	0.167884 (1.1828)	0.07551 (1.0784)	0.457089* (1.5795)
rural	-0.332806** (0.7169)	-0.124237 (0.8832)	-0.17368 (0.8406)	-0.114698 (0.8916)	-0.325424 (0.7222)
sector					
high	0.119603 (1.127)	0.011654 (1.0117)	-1.104987** (0.3312)	0.273498 (1.3146)	-
hkis	-0.098439 (0.9063)	0.759003*** (2.1361)	1.384914*** (3.9945)	0.625442*** (1.8691)	0.938611** (2.5564)
culture	1.126255*** (3.0841)	0.60004*** (1.8222)	0.034232 (1.0348)	-0.357003 (0.6998)	3.564663*** (35.3275)

Source: SOEP own calculation

[5] Age and gender serve as control variables and are not interpreted.

The model for the whole creative class shows that their members score higher in openness, are better educated, earn more and are more often self-employed compared to the rest of the workforce. Creative class members are clearly associated with high-tech knowledge intensive services and the cultural sector. GDP per capita is the only regional variable that is significant. The analyses of the subgroups of creative class reveal differences of significance and direction of influence of variables. Core members differ on the individual level as they are not associated with self-employment. However, regional variables do not exert influence in this model. Thus, they do not differ significantly from a regional perspective compared to the rest of the workforce. With regard to the sector they tend to work in high-tech knowledge intensive services and less in high technology manufacturing. The model for professionals is similar to the overall model, but the variable 'culture' is insignificant. Bohemians are more open, higher educated and more often self-employed. Their earnings are not statically different. As to be expected, they often work in culture. They are also more often engaged in high-tech KIS. Thus, form the individual and sector level they are quite similar compared to creative individuals defined by an open personality. From a regional perspective, there are interesting differences compared to the overall and other models. Bohemians tend to live in urban, economic prosperous region with a high share of self-employed labour.

Regarding models from Table 6 a relation of creative people's regional environment and innovations cannot be observed.

Additional regressions were run with the share of bohemians as an independent variable, because of multicollinearity in conjunction with urban and rural dummies. These regressions do not show important differences regarding the individual or sector level, but differences accrue on the regional level. The share of bohemians in a region now dominates and is significant in all models except for creative individuals. Regarding the model for creative individuals, the share of self-employed is negative and significant. In the overall model for the creative class GDP per capita is now insignificant. In the model for core members the share of bohemians and patents per inhabitants are positive and significant. In the model for professional GDP per capita is insignificant again. Large differences can be observed in case of bohemians, where the share of self-employed and GDP per capita are insignificant.

Summarizing theses results, the degree of urbanity, the share of bohemians, the share of self-employed, GDP per capita and innovation are significant regional characteristics.

Analyses are static in nature which implies that an assertion about the causality is difficult. The presence of creative individuals can be cause of prosperity or the economic opportunities

(job, demand, and entrepreneurial environment) cause the presence of creative individuals (immigration or inertia).

Table 7 multilevel regressions: share of bohemians

model	95 %-quantile	creative class	core	professionals	bohemians
	coef. (odds)	coef. (odds)	coef. (odds)	coef. (odds)	coef. (odds)
(intercept)	-2.603535*** (0.074)	-3.394724*** (0.0335)	-6.110007*** (0.0022)	-3.102442*** (0.0449)	-8.286918*** (3e-04)
individual					
openness	-	0.039792*** (1.0406)	0.052675*** (1.0541)	0.023981*** (1.0243)	0.188636*** (1.2076)
gender (female = 1)	0.51862*** (1.6797)	0.6127*** (1.8454)	0.250906*** (1.2852)	0.671016*** (1.9562)	-0.152732 (0.8584)
age	0.003642 (1.0036)	-0.01368*** (0.9864)	-0.017897*** (0.9823)	-0.010614*** (0.9894)	-0.025526*** (0.9748)
degree	0.133338*** (1.1426)	0.553027*** (1.7385)	1.128939*** (3.0924)	0.374455*** (1.4542)	0.520105*** (1.6822)
income	6.1e-05** (1.0001)	0.000698*** (1.0007)	0.000662*** (1.0007)	0.000675*** (1.0007)	0.000136 (1.0001)
self-employed	0.513774*** (1.6716)	0.858377*** (2.3593)	0.105483 (1.1112)	0.888597*** (2.4317)	1.38408*** (3.9912)
region					
GDP per capita	-0.007097 (0.9929)	0.007883 (1.0079)	0.000307 (1.0003)	0.007181 (1.0072)	0.022926 (1.0232)
share bohemians	0.054165 (1.0557)	0.062651*** (1.0647)	0.09025*** (1.0944)	0.044599** (1.0456)	0.154041*** (1.1665)
share self-employed	-0.088651*** (0.9152)	-0.012777 (0.9873)	-0.035828 (0.9648)	-0.014524 (0.9856)	0.011777 (1.0118)
patents per inhabitant	0.002571 (1.0026)	0.001317 (1.0013)	0.002989* (1.003)	0.001078 (1.0011)	0.003719 (1.0037)
sector					
high	0.126047 (1.1343)	0.014544 (1.0147)	-1.093** (0.3352)	0.277282 (1.3195)	-
hkis	-0.096109 (0.9084)	0.757673*** (2.1333)	1.380971*** (3.9788)	0.62529*** (1.8688)	0.964602** (2.6237)
culture	1.122208*** (3.0716)	0.589415*** (1.8029)	0.021249 (1.0215)	-0.37287 (0.6888)	3.537311*** (34.3744)

Source: SOEP own calculation

GDP per capita is only significant in the creative class, professional and the bohemian model and its impact is stronger in the latter. The effect of GDP per capita disappears in models including the share of bohemians as independent variable. Hence, its effect seems to be especially related to bohemians. As bohemians are not economically more prosperous compared to the rest of the workforce, bohemians should not cause the higher GDP per capita in the first places. It is more likely a demand effect. People in regions with higher GDP per

capita are able to spend more money on cultural or artistic products and services. Thus, local demand conditions are decisive (cf. Markusen, 2010).

The degree of urbanity exerts influence in the models for bohemians and creative individuals. From a theoretical point of view Jacobs externalities might be relevant in this respect. Due to the presence and density of a diverse set of people and industries in urban regions, individuals and companies are exposed to various sources of inspiration that foster their own creativity ((cf. Jacobs, 1969). Drake (2003) argues that the urban environment itself exerts influence on creativity of artists. There are three mechanisms that foster the creativity of artists in an urban environment. Firstly, the urban environment can act as visual stimuli. Secondly, local social and cultural events can be a source of inspiration. Thirdly, the local image functions as a brand, thus influencing the style of artists (cf. Drake, 2003). Creative products are symbolic and aesthetic in their nature and place image could be part of the product. This means that some of these symbolic or aesthetic products refer to meaning that is related to the urban environment or local traditions of production and services like Hollywood film industry, fashion from Paris and publishing in London (cf. Scott, 2001).

Another explanation could be the high proportion of solo entrepreneurs in cultural and creative occupations and the blurring of work and leisure time, which is especially pronounced regarding artists (cf. Eikhof and Haunschild, 2006). Thus, artists might be disproportional influenced by the supply with cultural activities and other stimuli offered by the urban environment as they can directly transfer these stimuli to their profession.

There is no empirical evidence for a relation of urbanity and the presence of core members or professionals. This could be explained by the concept of knowledge bases. This concept makes assertions about the location of industries from different knowledge bases. Core members and professionals could mostly be assigned to the analytic or synthetic knowledge base. Two circumstances might explain why urbanisation does not necessarily influence the location of these industries, core members and professionals respectively. The first aspect is the production of new knowledge in these industries. Knowledge is produced in small teams of scientists or engineers, taking place in universities, research institutes or R & D departments of companies. The second aspect is the distribution of the knowledge. Regarding the synthetic knowledge base codified knowledge is most important. Codified knowledge is extremely mobile. Thus, it is transferable via modern communication technology over long distance. Face-to-face contact is not as important as regarding the other knowledge bases. Overall there is less relevance of an urban environment (cf. Asheim et al., 2007; Coenen, 2005).

Patents as an indicator for innovation are only significant in the model for core members. This result is similar to that of Boschma and Fritsch (2009) they found a relationship between patents and the concentration of highly educated people, core members and professionals, but not for bohemians. The fact that on average core members posses higher degrees and that results do not show are relation of bohemians or creative individuals and innovations, the level of human capital and the industry individuals are working in seem to be the explaining factor. This reflects Glaeser (2005) who showed that for the regional level, the creative class has not more predictive power than educational attainment in explaining regional growth rates.

If the share of bohemians is included in regressions, it dominates the influence of regional factors. This result can be interpreted as prove of one of Florida's hypotheses. He argues that the concentration of bohemians signals an environment of *"...low barriers to entry for human capital...."* (Florida, 2002b, page 743). Places with high concentrations of bohemians are seen as an indicator for openness to diversity, innovation and creativity. Other creative class members are attracted by such an environment. These members in turn work in high-tech industries or establish new high-tech companies (cf. Florida, 2002a). Looking at the results for core members this hypothesis seems partly true. Core members live in regions with high concentrations of bohemians and with higher patent rates. But these regions are not characterised by higher entrepreneurial activities and core members are less likely to start a business.

Another explanation is the evolutionary view of Rentfrow et al. (2008). Creative individuals self-select by migration to creative environments or they shape the creativity of their peers. So that on the one hand over time more and more creative people migrate to regions with high shares of bohemians – while less creative individuals might migrate to other places – and less creative people in these regions become more creative over time due to the presence of other highly creative people. The high share of bohemians could be the expression of an above average level of creativity among the population which work in creative occupation or consume cultural and artistic products (cf. Rentfrow et al., 2008). However, there is no statistical evidence for creative individuals clustering in regions with a creative milieu.

The share of self-employed is relevant with respect to bohemians. An entrepreneurial environment seems to attract or generate bohemian entrepreneurs. Thus, evidence from previous studies that the presence of creative labour is associated with entrepreneurship activities can only be replicated for bohemians (cf. Boschma and Fritsch, 2009; Lee et al., 2004; Marlet and Van Woerkens, 2007). Rentfrow et al. (2013) shows that this is also true for

creativity personality profiles on U.S. State-level. Own results do not or even observe negative effects of self-employment in regions of creative individuals. Thus, own results hint to occupation specific effects and not creativity in general.

Lastly, cross-level effects are considered, meaning the effect of variables from different levels on each other. There are two cross-level effects that are significant with respect to bohemians. Bohemians are to a large share self-employed and live in regions with high shares of self-employment. Results approve that there is even a cross-level effect, which means that in regions with high entrepreneurial activities the probability is higher being self-employed. This might have to do with role models. If there are a lot of other entrepreneurs in a region they could act as role models and affect the decision being self-employed (cf. Davidsson, 1995; Lafuente et al., 2007).

Furthermore, there is evidence for a cross-level effect of urbanity and the cultural sector. Bohemians living in urban regions are less likely working in the cultural sector. A similar relation is significant, too. Bohemians in regions with a high share of bohemians are less often engaged in the cultural sector. This could hint to rivalry among artist in dense places as shown by Hracs et al. (2011) and Alfken et al. (2013). Another explanation could be good job opportunities outside the cultural sector in urban regions, like higher education or public service. Alternatively, individuals might start their own businesses outside the cultural sector. However, there are no cross-level effect of urbanity and self-employment.

Cross-level effects cannot be detected in other models and / or combination of variables.

The next section summarises the main finding and hint to further need for research.

6 Conclusion

More than ten years after “The Rise of the Creative Class” there is still an ongoing debate in the scientific community. One of the main problems of the creative class debate is the fuzziness of the definition and its overlap with the conventional human capital measures. As Glaeser (2005) has shown for the regional level, the creative class has not more predictive power than educational attainment in explaining regional growth rates. This article gets down to the root of Florida’s concept by applying a concept from psychology – the big five – which directly captures creativity of individuals. Thus, it avoids conflations with human capital and is more explicit in defining creativity of individuals than occupational or industry definitions.

Another lack is methodical in nature. Most approaches in economic geography as well as in creative class literature use aggregated data to explain causality on the individual level. To

overcome this problem of potential ecological interference fallacy a multilevel regression approach was adopted.

The guiding questions were: Which regional characteristics known from creative class literature shape the geography of creative individuals identified by the psychological approach? How do these results differ in comparison to studies relying on the conventional creative class definition? Is creativity the decisive factor in explaining the spatial distribution of creative individuals or do individual and industry characteristics matter as well?

To answer the first two questions hypotheses from creative class literature were derived and multilevel ordinal regression analyses were applied. Creative individuals and creative class members were compared to the rest of the workforce.

The empirical analysis reveals a mixed picture. Overall, it gets obvious that the regional level only plays a minor role. Creative individuals and members of the creative class differ mainly in their individual and sectoral characteristics compared to the rest of workforce. They are more creative, better educated, earn more and are more often self-employed. They tend to work in high-tech knowledge intensive services and the cultural sector. The newly derived definition only differs with respect to high-tech knowledge intensive services not playing a significant role. Furthermore, there are differences within the creative class. Core members differ in that they are less likely self-employed and less often employed in high technology industries. Professionals are not associated with the cultural sector. Bohemians differ since they do not earn significantly more. Overall, looking at individual and sectoral similarities creative individuals and bohemians are most similar.

However, there is little support for hypotheses 1 and 2 that regional factors playing a significant role. Firstly, **hypothesis 1** states: Creative individuals are associated with an urban, amenity-rich and open environment. They are more likely to live in regions that **a)** are urban and **b)** exhibit high shares of bohemians. There is evidence for urbanity as an important factor. Creative individuals live in regions that are in the mean less likely rural. In case of creative class bohemians are more likely to live in urban regions. There is only support for hypothesis 1 b) regarding creative class models, where the share of bohemians is positive and significant including the model for all subgroups.

Effects of the concentration of creative individuals are test in **hypothesis 2**: Creative individuals are associated with regional prosperity. They are more likely to live in regions that reveal **a)** a higher GDP per capita, **b)** show more entrepreneurial activities in form of self-employement and **c)** with higher numbers of patents per inhabitant.

Hypothesis 2 a) has to be rejected for creative individuals. Statically significant correlations are found in models for professionals and bohemians. Only in case of bohemians the relation is highly significant. In conjunction with lower individual economic performance it is concluded that the demand conditions for cultural products are favourable in economic prosperous regions and not that bohemians causing prosperity.

Entrepreneurial activities (hypothesis 2 b)) are negatively associated with creative individuals. This result is puzzling and there is further need for explanation. Bohemians are revealing a positive relation to the regional share of self-employed and there is even a positive cross-level effect of being self-employed and regional entrepreneurial activities. There seems to be a reinforcing mechanism which might have to do with role models.

Regarding the last hypothesis 2 c) only the model for core members shows positive and significant coefficients of patents per inhabitant. Again this should be occupational specific effects and effects related to the level of human capital. Core members posses on average the highest degrees and are composed of occupations like scientists, engineers and university professors which are related to R & D activities.

Summarising these results there is only little statistical support for creative class hypotheses to be relevant to creative individuals. However, supportive evidence is partly found for the conventional approach based on occupations.

Effect that can be observed like higher GDP per capita in case of bohemians and higher patent rates in case of core members are best explained by their profession and industry characteristics. Like rates of patent grants in high-tech industries or the demand conditions of the cultural sector. As these effects are not observed for creative individuals defined by their personality, creativity per se seems not to be the causal mechanism.

However, urbanity is relevant with regard to bohemians and creative individuals defined by openness. Hence, (artistic) creativity might benefit from Jacob's externalities.

Higher shares of bohemians matter with respect to the creative class and subgroup models, but not for creative individuals. These environments might reflect what Florida calls 'low barriers to entry for human capital'.

Nevertheless, the empirical approach of this article has some shortcomings. The data set covers only 12,000 individuals in nearly 100 regions, thus on average there are only about 120 individuals per region. If the creative class is disaggregated into core, bohemians and professional numbers a decreasing even further. Thus, assertions about certain region are not valid. Moreover, analyses are static in nature and do not capture dynamics, which should be relevant when exploring agglomeration effects and causality of regional economic effects.

One way to further explore the relation of creativity and geography could be gathering better data on personality traits with greater sample sizes. As this data is rare today, occupational approaches to creativity seem at the moment unavoidable. Thus, to establish causality multilevel and dynamic approaches seem fruitful for the near future. Due to high heterogeneity of results even within the creative class it seems reasonable for further research to constrain analyses to specific occupations.

Another promising empirical approach is qualitative research. It directly delivers deep insides in to decisions and motives of individuals (cf. Yin, 2009). First empirical evidence from qualitative research on creative class show that hard location factor are like job opportunities, housing market and public provision are more important than soft location factor like amenities, diversity and openness. Furthermore, results point to the importance of social ties to family and friends being relevant for location choice (cf. Andersen, Bugge, et al., 2010; Lawton et al., 2013). Lawton et al. (2013) conclude *"Yet, no discernible pattern could be found in our results that might differentiate the residential preferences of the 'creative class' from those outlined in the existing body of literature on the general population."* (Lawton et al., 2013, page 55)

As an implication of this article, policies inspired by Florida's ideas should more carefully consider the target group of policies. On the one hand regional effects seem to be better explained by sector characteristics than creativity per se. And on the other hand there are even considerable differences within the creative class. Policies might create the conditions that help to enable people to make economically use of their creativity. Results suggest that classic business and industry specific rather than people climate measures might be more effective.

Overall, the article has shown that the combination of the big five concept and theories from creative class literature is fruitful. The combination of economic geography and psychology is a possible future conjunction for both disciplines.

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Appendix

Table 8 list of variables

name	description	source
openness	personlity trait openness, scores 0 -18	SOEP
gender	male = 0, female = 1	SOEP
age	age in years	SOEP
degree	in school; inadequately = 0; 'general elementary' = 1; 'middle vocational' = 2; 'vocational + Abi' = 3; 'higher vocational' = 4; 'higher education' = 5	SOEP
income	net monthly income EUR	SOEP
self-employed	self-employed = 1, employee = 0	SOEP
GDP per capita	GDP per capita in 1,000 EUR	INKAR
share self-employed	self-employed per 100 working population	INKAR
patents per inhabitant	mean of EPO and PCT patents between 2005-10 per 100,000 inhabitants	RegPat database; provided by Jérôme Stuck
urban	urban regions = 1; congested and rural regions = 0	INKAR
rural	rural regions = 1; congested and urban regions = 0	INKAR
high	high technology manufacturing = 1	SOEP
hkis	high -tech knowledge intensive services = 1	SOEP
culture	cultural activities = 1	SOEP

Source: SOEP own calculation