The Creative Class, Bohemians and Local Labor Market Performance –

A Micro-data Panel Study for Germany 1975-2004

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Summary

Richard Florida's thought-provoking concept of the Creative Class can be seen a fruitful contribution for our understanding of regional economic development because it stresses the importance of professional activities and the potential role of the cultural milieu for attracting knowledge carriers and innovative people to a location. However, previous attempts to corroborate the basic pillars of Florida's theory typically suffer from serious deficiencies. Since correlation does not imply a causal relationship and reverse causality might be an important issue in the context of regional development, modern empirical techniques are required to look deeper at the phenomena.

The present paper aims at scrutinizing two basic hypotheses of Richard Florida's concept of the Creative Class. The first is that the regional concentration of the Creative Class entails better economic performance as measured by employment growth or an increasing wage bill. Moreover, the Creative Class concept should outperform "traditional" indicators of human capital such as the share of high-skilled workers in the regional labour force. Using a large micro data set for West Germany for the observation period 1975 to 2004 containing information on professional activities, we are able to collect panel data for 323 NUTS 3 regions. Indeed, our results indicate that Florida's classification scheme for creative people seems have remarkable explanatory power for regional economic performance. On the basis of dynamic panel estimation we find evidence for the Creative Class playing an important role in regional economic development. In addition, the concept of measuring regional innovative capabilities by counting high-skilled persons seems to be less adequate when it comes to identify the growth potential of a region. Therefore, our econometric investigation confirms the first part of Florida's story. The empirical findings, however, are at odds with the second part. According to Florida; the Creative Class has a taste for a liberal cultural milieu which is typically indicated by a regional concentration of Bohemians, whereas favourable economic conditions do not play a major role. For German data we cannot support this view. There is no evidence for the Creative Class following the Bohemians. By contrast, we find some support for the hypothesis that creative workers prefer living in economically prosperous regions. Moreover, the concentration of other high-skilled people seems to matter more than the concentration of Bohemians. Therefore, we are sceptical vis-à-vis a simplistic adaption of Florida's concept by local policy makers true to the motto "Let's create a liberal cultural scene; this will attract creative people and the region becomes an economic hot spot". Regional economic development seems to be somewhat more complex.

Zusammenfassung

Richard Floridas Ansatz zur Erklärung regionaler Entwicklung hat weltweit nicht nur in akademischen Kreisen, sondern auch in der breiten Öffentlichkeit große Aufmerksamkeit erregt, weil er eine Verbindung zwischen Kulturfaktoren und ökonomischem Erfolg herstellt. Florida zufolge profitiert ein Standort entscheidend von der Existenz einer Gruppe von Ideengebern, der sogenannten Kreativen Klasse. Der Kreativen Klasse sind Wissenschaftler, Erfinder, Ingenieure ebenso zuzurechnen wie Medienfachleute, Schriftsteller und andere Kulturschaffende. Dieser Personenkreis ist interregional sehr mobil und bei der Ortwahl nicht nur einkommensorientiert. Eine wesentliche Rolle spielt die Attraktivität eines Standorts und dabei insbesondere auch ein weltoffenes, tolerantes Milieu. Angezeigt wird die Existenz eines solchen Milieus u.a. durch die Zahl der dort lebenden Bohemiens.

Im Kern lässt sich die Floridas Theorie auf zwei Aussagen reduzieren: (i) Eine lokale Konzentration von Bohemiens wirkt als Magnet für die Kreative Klasse. (ii) Die Anhäufung von kreativen Personen an einem Standort verbessert die Bedingungen für Wirtschaftswachstum und Beschäftigung. Der Aufsatz zielt darauf ab, diese beiden Hypothesen auf der Basis eines umfangreichen Datensatzes mit Hilfe moderner ökonometrischer Verfahren empirisch zu überprüfen. Dabei verwenden wir die Beschäftigtenstichprobe des IAB, in der zwei Prozent aller sozialversicherungspflichtig Beschäftigten in Deutschland u.a. mit detaillierter Berufsbezeichnung, Qualifikation und Regionalinformation enthalten sind. Anhand der Berufsbezeichnungen ordnen wir Personen der Kreativen Klasse sowie den Bohemiens zu. Den regionalen Wirtschaftserfolg messen wir alternativ durch Beschäftigungswachstum oder eine Steigerung der Lohnsumme insgesamt.

Auf deskriptiver Ebene ergibt sich in der Tat eine deutliche Korrelation zwischen dem Anteil der Bohemiens an den Beschäftigten und der Größe der Kreativen Klasse. Allerdings sagt ein solcher Zusammenhang noch nichts über die Wirkungsrichtung aus, da es unklar bleibt, ob die Bohemiens den Kreativen folgen oder umgekehrt. Möglich ist auch, dass sich beide Gruppen verstärkt in wirtschaftlich starken Regionen ansiedeln.

Mit Hilfe moderner dynamischer Panelverfahren kann die Wirkungsrichtung identifiziert werden. Wir stellen fest, dass die Größe der Kreativen Klasse in der Abgrenzung von Florida tatsächlich ein wichtiger Erklärungsfaktor für den wirtschaftlichen Erfolg von Regionen ist. Dieser berufsbezogene Indikator ist einem herkömmlichen Qualifikationsmaß (Anteil der Hochqualifizierten) sogar überlegen. Damit finden wir Hypothese (ii) bestätigt. In einem zweiten Ansatz untersuchen wir, ob eine Konzentration von Bohemiens eine Konzentration der Kreativen Klasse nach sich zieht (Hypothese (i)). Die Testergebnisse erbringen hierfür jedoch keinen Beleg. Eine verkürzte Rezeption von Floridas Theorie durch regionale Wirtschaftspolitik nach dem Motto: „Lasst uns Bohemiens attrahieren, dann kommen die Kreativen und damit das Wirtschaftswachstum" findet keine Unterstützung. Regionale Entwicklung erweist sich als ein Prozess, der weitaus komplizierter ist.

The Creative Class, Bohemians and Local Labor
Market Performance -
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Abstract

The paper aims at testing Florida's concept of the Creative Class using panel data for 323 West German regions for the time period 1975 – 2004. Applying a dynamic system approach based on GMM, we find that the local concentration of the Creative Class has predictive power for the economic development of a region and tends to outperform traditional indicators of human capital. However, our results do not support Florida's assertion that the creative workers flock where the Bohemians are. According to our findings, the Creative Class is attracted by favorable economic conditions as indicated by employment growth or an increasing wage bill.

Keywords: Culture, Regional Development, Bohemians, Creative Class, Dynamic Panel Methods

JEL-classification: Z10, C23, R1, O1, O3

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1 Introduction

The influence of culture on local growth and development is one of the most debated themes of regional economics in the last five or ten years. Especially Richard Florida's bestseller *The Rise of the Creative Class* (Florida 2002) has led to a highly controversial discussion inside and outside the discipline. The Creative Class concept is build around the idea that specific creative occupations within the labor force have a crucial influence on socio-economic development (Florida, Gates 2001; Florida 2002a; Lee, Florida, Acs 2004). Furthermore, this particular segment of the labour force tends to be attracted by a creative milieu which can be approximated by the presence of Bohemians (Florida 2002b). Therefore, Florida's Creative Class concept is often interpreted as a paradigm for the impact of culture on sustainable development. For many observers this concept is attractive with its plea for diversity and cultural richness as a prerequisite for superior economic performance in a knowledge society. The cornerstones of Richard Florida's concept are appealing for policy makers, both on the local as well as on the national or supernational level.[1] Yet, the unconventional ideas have been subject not only to exalted applause of decent disciples, but also faced many critics and attacks. The tone of some of Florida's opponents led the author to writing his reply 'The Revenge of the Squelcher'. In his review of Florida's main work Glaeser 2005: 593 states that: "The natural response of an academic to seeing a fellow academic experience such success is, of course, unbridled envy". Although there might be enough scope for reasonable criticism, Glaeser argues for taking the concept seriously. In the passionate debate over the 'blessing' or 'curse' of the Creative Class[2] the untested assumptions in Florida's argumentation and possible deficiencies in his or his follower's empirical methodology are sometimes overlooked. Therefore it is important to scrutinize the role of creative persons for local growth and development as well as to investigate factors that might lead to a local concentration of creative workers.

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[1] As an indication of the latter, the European Commission has recently launched a research agenda on the role of culture and the EU's cultural industries as a booster of creativity, innovation and growth in the EU (European Commission 2008).
[2] See, for instance, Malanga (2004).

The adherents of Florida's concept can be divided into the 'believers' and academic supporters. Among the 'believers' are urban administrators, politicians and other decision makers who draw a justification of alternative forms of investments, in cultural amenities and events, for instance. The academic advocates try to strengthen the theoretical basis of the creativity concept and look for sound empirical strategies to corroborate the main assertions. However, little has been done on order to obtain "hard" econometric testing of the major assumptions underlying his concept.

The aim of the our paper is to shed some light on the basic relationships asserted by the creative-class concept using a large German micro panel data set and applying (dynamic) panel data methods. The remainder of the paper is structured as follows: In the next section we survey the pros and the cons of Florida's concept as viewed in a fast growing strand of theoretical and empirical literature. Section 3 provides an outline of the data source and gives some descriptive evidence. In section 4 we present our estimation strategy and the achieved econometric results. Section 5 concludes.

2   The concept and previous studies

2.1   Florida's concept of the Creative Class

We start with briefly sketching the original lines of thinking being elaborated in Florida's monographs on the Creative Class (Florida 2002a, 2005) and in a series of articles together with coauthors (Florida and Gates 2001, Florida 2002b, 2004, Lee et al. 2004, Knudsen et al. 2005). Florida concept builds on classical contributions on bohemia as well as on urban development pioneers such as Jacobs (1961) who recognize creativity and diversity as 'engines' for city growth. Florida's notion of creativity goes beyond the technological, information and knowledge aspects of it. Activating the full potential of this key factor for economic development would require harnessing creativity in all its forms (Florida 2002a).

According to Florida, the Creative Class possesses a specific type of human capital being associated with high level creative skills. This group consists of two parts: the creative core and the creative professionals. The creative core includes:

> "… scientists and engineers, university professors, poets and novelists, artists, entertainers, actors, designers and architects, as well as the thought leadership of modern society: nonfiction writers, editors, cultural figures, think-thank researchers, analysts and other opinion makers. Whether they are software programmers or engineers, architects or filmmakers, they fully engage in the creative process…" (Florida 2002a:69)

The creative core produces a climate in which new ideas, blue prints, forms and designs are generated that are readily transferable into new products or services. The transferability depends on a further specific group of workers, the creative professionals. This group is able to support the implementation of the innovative process. It encompasses an ample range of professional activities. According to Florida creative professionals can be found especially in knowledge-intensive industries such as high-tech sectors, financial services, the legal and health care professions, and business management. What characterizes these specialists is that they

> "… engage in creative problem solving, drawing on complex bodies of knowledge to solve specific problems. … They apply or combine standard approaches in unique ways to fit the situation, exercise a great deal of judgment, perhaps try something radically new from time to time." (Florida 2002a: 69).

The author stresses that being a creative professional typically requires a high degree of formal education. Typical examples are "… physicians, lawyers and managers and also a growing number of technicians…" (Florida 2002a: 69). The presence of the Creative Class triggers knowledge spillovers which generate synergies for endogenous growth (Knudsen et al. 2007).

An important aspect is the mobility of the Creative Class. Florida emphasizes that monetary incentives have only a limited effect, because creative workers are motivated primarily intrinsically and value individuality, challenge and responsibility. Hence these people cannot be attracted by offering high salaries or stock options alone. Factors that are perhaps more decisive are the cultural

amenities in a location and a diverse and open milieu (see Florida 2002a, 2004). For the latter the presence of *Bohemians* could of paramount importance.[3]

Hence the spatial concentration of the Creative Class might crucially depend on the spatial concentration of Bohemians because the latter indicates an environment "… that attracts other types of talented or high human capital individuals," (Florida 2002b:55). According to the author, innovative hot spots are characterized by the three big T's, "technology, talent and tolerance". These ingredients are simultaneously required to attract creative people as well as to stimulate economic growth and development.

2.2   Pros and cons

Most of the debate on Florida's concept (for instance, Malanga 2004; Kotkin 2004, 2005; Daly 2004; Nathan 2005) is based on theoretical reasoning rather than on empirical evidence. Beside this, some authors critically discuss the interpretation and implementation of Florida's concept in local policy debates. Others attempt to substitute the concept of the Creative Class with some 'creative city' effect of globalization (Scott 2006).

In the following we concentrate on the main topical lines of criticism based on empirical evidence. First of all, Florida is criticized for using "suggestive correlations" to corroborate his basic arguments (Markusen and Johnson 2006). According to his opponents, his empirical strategy is based on simple descriptive evidence or regression analyses which do not provide a robust test of the main hypotheses. The logic of testing is criticized of not only disregarding causality but is also accused of circularity. Observation and characteristics of the Internet bubble burst cities are taken as a model in his measure of economic success. Hence it is not surprising that these particular cities rank highest in Florida's estimates of economic performance according to his creativity concepts (Malanga 2004). Another objection in this context regards the claim that "jobs follow people". It is

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[3] Using the definition by Boschma and Fritsch (2007:8) Bohemians consists of writers and creative or performing artists; photographers and image and sound recording equipment operators, artistic, entertainment, and sports associate

argued that a more standard economic explanation would be rather that a skilled workforce attracts the employers.

Florida is also criticized for providing non-reliable empirical results. If re-ranked according to job growth as a well-established measure for the economic growth of a locality, the leaders in Florida's ranking go among the last– like New York for example (Malanga 2004; Kotkin 2004, 2005; Nathan 2005). Moreover, the construction of the Creative Class and its value system is seen as deficient. The critics question whether the attraction power of cultural amenities deserves to be highlighted and whether these "weak" locational factors are really important as an incentive for all different types and categories of creative people. These preferences seem to differ between age groups (Clark 2002; Nathan 2005) and type of locality (Guatier et al. 2005; McGranahan and Wojan 2007).

A further strand of the literature questions the transferability of Florida's concept to the European context (Nathan 2005 for the UK and Mattsson 2007 for Sweden). An important aspect is the difference in mobility. Cultural differences and in particular differences in languages are a barrier for mobility between European countries (see, for example, Belot and Ederveen 2005). Moreover, cultural amenities and cultural sites might be much more decentralized in the European context compared to the US because of historical reasons. For instance, Germany was characterized by a large number of minor states before 1871. Both factors would lead to a less obvious concentration of creative workers in the EU.

Finally, the implications of Florida's concept for local economic policies are highly debatable. Even if there is such a relationship between creativity and economic growth, the question arises whether it is a prudent strategy to invest in attractive amenities in order to pool creative people (Turok 2004). Real evidence that such a 'bohemistic' investment will be an efficient instrument for spurring economic growth is lacking. Some of the critics are claiming that there are some cases

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professionals; fashion and other models.

where following Florida's strategy has led to a lag in development and an increase in the crime rate (Malanga 2004).

Despite these critical arguments, the ideas of the existence of a Creative Class and its importance for economic development have found a lot of adherents also in the academic profession. What makes Florida's concept special is the fact that his classification primarily focuses on professions, not on qualifications or industries (Glaeser 2005, Nathan 2005). Behind this stands the implicit assumption that the analysis of occupational activities might open a superior way of measuring the contribution of human capital to regional economic development.

Florida (2004) has given some detailed answers to the mentioned criticisms. However, it seems that he himself (as most of his critics) fails to recognize the need of "hard" econometric testing of the major assumptions underlying his concept. Several studies have recently tried to fill this gap which will be surveyed in subsection 2.3.

As an alternative approach to Florida there is a strand of literature dealing with the impact of the local human capital endowment − as measured by the share of high-skilled workers − on future economic growth (e.g. Rauch 1993). Rauch's results show that the geographic concentration of human capital has a strong positive influence on the wage level and land rents. Simon (1998) uses regression analysis for human capital and growth and comes to the conclusion that cities with higher average levels of human capital can be expected to achieve higher employment growth. Additional supportive evidence for the strong effect of human capital on local employment growth comes from Simon and Nardinelli (2002) who use data on city growth for the period 1900-1990 with a variety of control variables.

Another flow of research regards the destination choice of migrants. Hunt and Mueller (2004) investigate the influence of variables such as returns to skill, amenities, fixed costs, distance, difference in languages as well as and border effects. According to the results individuals with higher qualification migrate to areas with higher returns. Further support of the same idea comes

from Shapiro (2005) who calibrates a neoclassical city growth model (based on Roback (1982).

According to his data an increase in a metropolitan area's concentration of human capital leads to

employment growth in this area. The results show that around 60% of the employment growth

effect is determined by the enhanced productivity growth, but the rest 40% seems to be determined

by the quality of life at local level.

2.3   Previous studies testing Florida's concept

The attraction of the Creative Class by a bohemian milieu has been repeatedly the focus of

econometric research. Fritsch and Stuetzer (2008) regress the share of the Creative Class on a

contemporaneous artist-Bohemian index and other variables describing local amenities and living

conditions for the creative milieu. Using German cross-sectional data for 2004, the authors find

highly significant positive effects for the artist-Bohemian index and interpret this as evidence for a

the view that soft locational factors play a key role in attracting creative people.

In the same vein of research, Boschma and Fritsch (2007) analyze the regional distribution of the

Creative Class and its effects for more than 450 European regions in eight different countries. They

find a highly uneven geographic distribution which is influenced not only by the level of

urbanization but also by factors such as climate of tolerance and openness. Boschma and Fritsch

first make a more precise differentiation of the groups of Florida's Creative Class. While Florida

determines the Creative Class as composed by creative core and creative professionals, Boschma

and Fritsch extract the Bohemians from the creative core and therefore recognize three groups

forming the Creative Class: Bohemians, creative core (excluding Bohemians) and creative

professionals. Using this differentiated concept Boschma and Fritsch run regressions with various

specifications in order to test Florida's thesis that the spatial concentration of Creative Class is

influenced by the concentration of Bohemians. In particular, they regress the three endogenous

variables – the log of the creative core, creative professionals, Creative Class – on independent

variables such as the share of Bohemians, an openness index, a public provision index, a cultural

opportunity index (the share of work force active in cultural and recreational activities), long-run employment growth and population density. The latter is thought of as a 'catch-all' variable explaining factors like land prices, regional wage levels etc. In order to check the explanatory power of the specific regressors, the authors omit the share of Bohemians and the cultural opportunity index, respectively, and compare the reduced model to a full specification. Since the goodness of fit markedly drops especially if the share of Bohemians is excluded, Boschma and Fritsch conclude that there is an important effect of this group on the size of the Creative Class in its different modifications. Additionally, the authors find a positive significant effect on employment growth and new business formation. They support the view that the creative occupation indicator is more significant a measure for human capital than formal education.

Wojan et al. (2007) apply a two-step procedure for U.S. data. In a first step, they regress the regional share of the Creative Class on a large set of explanatory variables in a cross section. From this equation they calculate an expected size of the Creative Class for each location. Positive deviations from this expected value –the residual of the regression– are interpreted as an indicator of a favorable cultural milieu and vice versa. In a second step, the authors regress different indicators of local economic performance on a set of explanatory variables including the residual from the first stage regression. Taking into account different forms of spatial autocorrelation they find evidence for the positive impact of a creative milieu on economic development.

Evidence for a significant effect of Bohemians on the concentration of creative workers is provided also by Glaeser (2005). To test the validity of Florida's claims, Glaeser uses data for 242 U.S. areas in the 1990s. Glaeser runs separate regressions of population growth on the share of local workers in the creative core, patents per capita in 1990, the Gay Index and the Bohemian Index additionally to a schooling variable. The share of Bohemians turns out to be the only variable which does eliminate the schooling effect. Hence Glaeser concludes: "The raw correlation between the Bohemian Index and growth is almost about the same as the raw correlation between growth and

the number of college graduates. Maybe there is something to this bohemianism after all." (Glaeser 2005: 596). All in all, Glaeser expresses a differentiated view on Florida's work. On the one hand he sees it as a popularization of the standard concept for local development stressing the high importance to cities of attracting human capital. On the other hand he is at odds with Florida's polarization between Creative Class and human capital. Glaeser argues that there is lack of empirical evidence for this differentiation.

The reviewed empirical literature has some major deficiencies. Although some of these studies use sophisticated econometric methods, they do not deal adequately with the severe problems of causality and endogeneity in which Florida's concept is trapped. Most of the literature so far has interpreted correlation or a positive estimated coefficient in a multivariate regression as a causal linkage. Although the main claim of Florida that Bohemians attract the Creative Class is plausible at first glance it may well be the other way around. A traditional explanation could simply be that the Creative Class is interested in theatres and cultural environment and expresses a demand for "culture". Hence when a locality with a concentration of creative people starts to develop economically, new market opens for the product of the Bohemians. As a consequence of this, Bohemians are flocked to this locality. A higher concentration of Bohemians in places where the Creative Class is concentrated then might generate a creative milieu. The crucial point for a sound empirical approach is to take this reverse causality adequately into account. Moreover, the question arises which variables can be truly considered as exogenous. For example, McGranahan, Wojan (2007) include population density, human capital and labor market indicators as exogenous variables in their specification. These variables, however, are determined by economic forces which themselves are influenced by the Creative Class according to Florida's theory.

To the best of our knowledge, the empirical attempts to test Florida's main hypothesis have not used panel data methods so far. The advantage of panel data is the possibility to include regional fixed effects. This seems to be important in our context, because unobserved heterogeneity of

different locations may play a major role. The fixed-effects method eliminates at least the part of this heterogeneity which is constant over time. Moreover, with dynamic panel methods it is possible to tackle the endogeneity problem. Therefore, we will apply these particular methods in the empirical part of our paper.

3 Data and descriptive evidence

3.1 Data and definition of variables

The data source used in this paper is a two percent random sample from the Employment Statistics of the Institute for Employment Research, Nuremberg (IABREG).[4] It includes all workers, employees and trainees obliged to pay social insurance contributions for the time period 1975 to 2004. Not included in the data are self-employed persons, civil servants, marginally employed persons and students enrolled in higher education. The employment register contains detailed histories for each worker's time in employment. Here we consider all persons who were employed on 30th June of each year. Besides detailed information on professions, the data set contains personal characteristics of workers like gender, age and education as well as some basic information about the employer (industry affiliation, location, firm size).

The qualification of the workers in the sample can be subdivided into three broad categories: (i) low-skilled: persons with no occupational qualification regardless of level of schooling, that is, with or without upper secondary education (Abitur); (ii) skilled: persons with an occupational qualification whether or not they have an upper secondary education (Abitur); (iii) highly skilled: persons with upper secondary education who are holding a degree from a university, polytechnic, or college of higher education.

Because there are still large structural differences between the eastern and the western part of Germany, we restrict the analysis to workers in West Germany. We exclude part-time workers,

apprentices, and workers with more than one employment contract. Moreover, we drop all observations with no valid information on earnings, age, skills or the region of the workplace.

Since our aim is to test the validity of Florida's assumptions, we will stick to his original definitions as far as possible. However, following Boschma and Fritsch we extract the Bohemians as a separate entity.[5] According to these authors we define Bohemians as writers and creative or performing artists; photographers and image and sound recording equipment operators, artistic, entertainment, and sports associate professionals; fashion and other models (see Boschma and Fritsch 2007:8). We further recast the grouping of the Creative Class which is divided into Bohemians (BOH), Other Creative Core (OCC) and Creative Professionals (CPR). As an alternative to Florida's concept we also defined three further indicators: the share of high-skilled workers (HS), the share of workers in Mathematics, Engineering, Natural Sciences and Techniques (MENT) and the share of workers with a background in Humanities (HUM).

These classifications are applied to West German data for the period 1975 to 2004. Information on professional activities in the data set consists of a three-digit index of occupations which roughly differentiates between 300 categories (for a detailed view on the classification see Table A1 in the appendix).

3.2 Descriptive evidence

We first consider the correlations between the regional indicator variables in 1990 and 2004. Perhaps not surprisingly, Table 1 shows a high correlation between the share of high-skilled workers (HS) and the Creative Class excluding Bohemians (OCC). The correlation is especially strong in 1990 (0.92), but declined somewhat in 2004 (0.88). A markedly lower correlation is found between OCC and the share of Bohemians (BOH). The share of workers in MENT professions is

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[4] For a description of the data source see Bender and Haas (2002).

[5] Boschma and Fritsch also stick to Florida's definitions and try to create an internationally comparable definition of Bohemians and the other professions in the Creative Class. Their classification aims to be applicable in European context with minor adjustment of the national data available. To achieve this, they are using the International Standard

highly correlated with OCC and HS. The same is true for Bohemians and the share of workers with a background in Humanities. In general, all correlations appear to be smaller in 2004 as compared to 1990.

+++ include Table 1 about here +++

Figure 1 depicts the development over time of the share of Bohemians (BOH) and the remainder of the Creative Class (OCC) in metropolitan areas (region type 1), urban areas with an core city of intermediate size (region type 2) and rural areas (region type 3). It is shown that both indicators are highest for metropolitan areas and lowest for rural regions. Hence there is some evidence that the share of Bohemians and the other Creative Class is increasing with population density. Moreover, both time series show a clear upward trend in all region types.

+++ include Figure 1 about here +++

We next reproduce one of the "suggestive correlations" which have been interpreted as evidence for Florida's hypotheses. In a cross section for 2004, we ran a regression for the share of the Creative Class excluding Bohemians (OCC) using a constant and the share of bohemians (BOH) as explanatory variables. This gives a coefficient for BOH of 1.6 with a t-statistic of 6.5. Using robust heteroscedasticity standard errors shows that the t-statistics is not significant (1.55). However, excluding an outlier and the few observations where the share of Bohemians is zero yields a coefficient of 4.20 with a heteroscedasticity robust t-statistic of 7.16. At first glimpse one might therefore conclude that there is a strong and statistically highly significant influence of Bohemians on the Creative Class. Figure 2 gives a scatter plot of the relationship between the two variables and the corresponding regression line. This again shows a strong correlation. However, this descriptive evidence cannot be considered a valid test of the hypothesis.

Classification of Occupations (ISCO 88), tailored by the International Labour Office (ILO), at the 3-digit level to define Florida's Creative Class according to the European definitions of occupations.

+++ include Figure 2 about here +++

4   Estimation strategy and econometric results

4.1   Estimation strategy

Our two main hypotheses to be tested will be:

H1: A higher regional concentration of the Creative Class is followed by higher economic performance of the region.

H2: A higher regional concentration of the Bohemians attracts other Creative Class people to those regions.

A possible indicator of economic performance is the growth of the regional Gross Domestic Product (GDP). However, as statistics for local GDP on county level are not available for a long-term analysis, we concentrate on the growth rate of employment and the wage bill. The empirical investigations of the two hypotheses are seriously plagued with endogeneity and reverse causality issues. Does the Creative Class trigger employment growth and a higher wage bill or does a successful economic environment lead to an inflow of creative people into the region? Is it that the Bohemian environment that attracts creative and economically successful people or is it the demand for cultural activities expressed by the (typically high-income) members of the Creative Class? Since both directions of causality are theoretically plausible, correlation or static regression analyses are not adequate for assessing Florida's hypotheses. In contrast to a simple approach, an empirical investigation also has to control for a bulk of other influences on regional economic performance as well as the spatial concentration of creative workers. Moreover, it is likely that the concentration index for both groups at the regional level changes only slowly over time. This sluggishness is typically modeled by a dynamic specification.

4.2   Empirical findings using a dynamic panel approach

Our estimation approach assumes that the relationship between the key variables become effective over a longer time span. Therefore we collapsed our data to six five-year periods by taking averages over

regional variables.[6] To this modified data set we applied different versions of a dynamic panel estimator which takes account of endogeneity of the relevant variables. We started by testing H1 (superiority of the Creative Class concept). In principle, two main variants of dynamic panel approach are available, both based on the generalized method of moments (GMM). These are the classic Arellano-Bond (1991) difference estimator and the Blundell-Bond (1996) system estimator. Whereas the former uses lagged level information as instruments for variables transformed to differences (or orthogonal deviations), the latter does the reverse by employing level variables by past differences. As, for instance, Roodman (2006: 29) points out, "… for random walk–like variables, past changes may indeed be more predictive of current levels than past levels are of current changes …". This is likely to be the case here.

Let x_{it} be an endogenous variable. Then the lagged difference $\Delta x_{i,t-1}$ and all higher lags should not correlate with the error term ε_{it}, provided there is no serial correlation in the error process. Note that in case that x_{it} is assumed to be predetermined, the current difference, $\Delta x_{i,t}$, can serve as an instrument as well. In system GMM an assumption on initial conditions has to hold implying that – controlled for other covariates – the deviations of the initial observations, x_{i1}, must not correlate with the regional fixed effects. The technique proposed by Blundell, Bond (1996) exploits these and other moment conditions in a system approach (for a closer description see Bond (2001)).

Note that stationarity is required for the Blundell-Bond approach, i.e. the (sum of) coefficient(s) on the lagged dependent variable must have absolute value less than unity.

For explaining regional economic performance as measured by the log of regional employment we used the log of median wage (earnings), the log of average firm size (LFSIZE) and the share of female workers (FEM) as regional variables.[7] Additionally, we alternatively included the share of the Creative Class workers (OCC) or the share of high-skilled workers (HS). In the specification we

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[6] Another reason for collapsing the data to quinquennial averages is that the GMM approach is appropriate especially for panel data with a large number of cross-sectional units and only a few time period observations.

used (lagged levels) GMM-type instruments for the log of employment (LEMP), the log of the median daily gross wage (LW) and the human capital variables (OCC or HS).[8] As standard instruments differences of all twofold lagged variables were employed. Moreover, in all specification we included dummy variables for each time period in the sample, and – insofar levels were concerned – dummy variables for the type of the region.[9] Throughout the following estimates we used Windmeijer's (2005) correction of standard errors.

Beside the GMM estimators we used a simple OLS regression disregarding the panel structure of data and a fixed effects panel (FEP) model which are not reported in detail. Theoretically the former should produce an upward bias for the coefficient of the lagged endogenous variable, whereas the latter should do the reverse. As recommended by Bond (2002), the (theoretically unbiased) GMM estimates of these coefficients should lie in the range spanned by FEP and OLS estimates.

Using the GMM system estimator for the regional economic performance indicators (employment, wage bill) leads to a sum of coefficients on the lagged endogenous variables which is very close to unity. We therefore decided to go back to the Arellano-Bond (1991) difference estimator for the investigation of H1.[10] The maximal lag length was chosen to three 5-years periods.[11]

The coefficient of the 1-period lagged endogenous variable is estimated between 0.279 (FEP) and 1.352 (OLS), and the sum of coefficients of the lagged endogenous variable between 0.432 (FEP) and 0.991 (OLS). The estimate for the difference GMM approach fits well to the requirements: the coefficient of $LEMP_{i,t-1}$ is 0.873 and the sum of coefficients of all three lagged endogenous is 0.831 (see Table 2a).

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[7] The share of female workers, however, was significant in neither specification and therefore excluded from the model.
[8] This implies the introduction of separate instruments for each period unless collapsed.
[9] We used a classification from the *Bundesamt für Bauwesen und Raumordnung* (BBR) in Bonn, ranging from metropolitan cities (regional type 1) to rural areas in the periphery (type 9).
[10] The fact that regional employment might be close to a random walk implies that the validity of the instruments has to be scrutinized by the corresponding tests.
[11] Lag 2 and 3 of the endogenous variable are highly significant. If excluded, the test statistics deteriorate markedly. By contrast, for the explanatory variables lags higher than order 1 were not significant. We therefore excluded it in order to obtain a parsimonious specification.

In Table 2a we present one and two step estimates for three different specifications. In the first we used the Creative Class as a regressor, in the second the share of high-skilled workers and in the final one both. First one can note that the 1 and 2-step estimates of the coefficients are quite similar for a given specification. In all variants we find a high degree of inertia in regional employment and the same sign pattern for all coefficients. For the current log median wage and average firm size there is a positive effect on employment. In both cases this effect is mitigated by the coefficient of the one-period lag of the corresponding variable which bears a negative sign. The share of workers from the Creative Class in the first specification exceeds the value 2 and is higher than the coefficient of the share of high-skilled workers in the second specification. Both are statistically highly significant. However, if included simultaneously in the third specification, only the coefficient of the Creative Class remains (weakly) statistically significant. According to the result, the Creative Class concept seems to outperform a traditional measure of human capital also here.

+++ include Table 2a about here +++

With respect to the test statistics, the validity of the assumptions for the dynamic panel method differs widely across specifications. Whereas all tests do not reject the over-identification and exogeneity restrictions underlying the approach, this is not the case for the second and third specification. Note that the null is rejected especially for both variants of the Hansen test. Also under this aspect, the first specification is clearly preferable.

In Table 2b we repeat the analysis for the log of the wage bill as the dependent variable. Qualitatively all results are very similar to those of Table 2a. Again, there is a high degree of sluggishness in the dependent variable. Also here the share of the Creative Class performs as a better measure for predicting local development. Hence the results are robust with respect to the choice of the regional economic performance indicator.

+++ include Table 2b about here +++

Table 3 shows the implied long-run effects on regional employment and the wage bill, respectively. The results show that a 10 percent higher regional wage would increase employment (through migration and higher participation) by between 0.2 and 0.5 percent. An increase of the share of the Creative Class by 10 percentage points would increase regional employment by between 0.8 to 1.3 percent. This is higher than the long-run effect initiated by increasing the share of high-skilled workers. Finally, doubling average firm size would lead to 0.1 to 0.5 percent higher employment.

Interestingly, the long-run effects for the wage bill are qualitatively and quantitatively rather similar.

<div align="center">+++ include Table 3 about here +++</div>

For investigating the question "who is attracting the Creative Class?" the dynamic panel method is used again. Here we employed the Blundell-Bond (1996) system estimator. We find considerable inertia in the regional distribution of the Creative Class (see Table 4).[12] Contrary to Florida's assumptions, our estimates show that employment growth and the growth of the wage bill affect the regional concentration of the Creative Class. Hence creative persons seem to be concerned with regional economic conditions. In specification 1 we additionally included the share of high-skilled persons as an explanatory variable and in specification 2 the share of Bohemians. It turns out that specification 1 clearly outperforms specification 2. Although both variants pass the test statistics with respect to the adequacy of instruments with only one or two exceptions, there is some indication for serial correlation in the latter. Moreover, the share of Bohemians is not significant in the 1-step estimates (where the corresponding standard errors are more reliable compared to the 2-step procedure). By contrast, the effect of the high-skilled on the Creative Class is highly significant in all variants. Again, this result does not corroborate a basic assertion in Florida's work.

<div align="center">+++ include Table 4 about here +++</div>

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[12] Here lags of order higher than 1 for the endogenous and explanatory variables were not significant, whereas the first lag at least in the two-step specification was always significant.

5 Conclusions

Richard Florida's thought-provoking concept of the Creative Class can be seen a fruitful contribution for our understanding of regional economic development because it stresses the importance of professional activities and the potential role of the cultural milieu for attracting knowledge carriers and innovative people to a location. However, previous attempts to corroborate the basic pillars of Florida's theory typically suffer from serious deficiencies. Since correlation does not imply a causal relationship and reverse causality might be an important issue in the context of regional development, modern empirical techniques are required to look deeper at the phenomena.

The present paper aims at scrutinizing two basic hypotheses of Richard Florida's concept of the Creative Class. The first is that the regional concentration of the Creative Class entails better economic performance as measured by employment growth or an increasing wage bill. Moreover, the Creative Class concept should outperform "traditional" indicators of human capital such as the share of high-skilled workers in the regional labor force. Using a large micro data set for West Germany for the observation period 1975 to 2004 containing information on professional activities, we are able to collect panel data for 323 NUTS 3 regions. Indeed, our results indicate that Florida's classification scheme for creative people seems have remarkable explanatory power for regional economic performance. On the basis of dynamic panel estimation we find evidence for the Creative Class playing an important role in regional economic development. In addition, the concept of measuring regional innovative capabilities by counting high-skilled persons seems to be less adequate when it comes to identify the growth potential of a region. Our econometric investigation confirms the first part of Florida's story. The empirical findings, however, are at odds with the second part. According to Florida; the Creative Class has a taste for a liberal cultural milieu which is typically indicated by a regional concentration of Bohemians, whereas favorable economic conditions do not play a major role. For German data we cannot support this view. There is no evidence for the Creative Class following the Bohemians. By contrast, we find some support for the hypothesis that creative workers prefer living in economically prosperous regions. Moreover, the

concentration of other high-skilled people seems to matter more than the concentration of Bohemians. Therefore, we are skeptical vis-à-vis a simplistic adaption of Florida's concept by local policy makers true to the motto "Let's create a liberal cultural scene; this will attract creative people and the region becomes an economic hot spot". Regional economic development seems to be somewhat more complex.

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Table 1: Correlations between the shares of different group of workers in the total regional workforce (West Germany, 1990 and 2004)

Variables (share of the respective group in total regional workforce)		1990					
		BOH	OCC	CPR	HS	MENT	HUM
Bohemians	BOH	1.000					
Other Creative Core	OCC	0.384	1.000				
Creative Professionals	CPR	0.259	0.560	1.000			
High-Skilled	HS	0.467	0.915	0.551	1.000		
Math., Eng., Nat.Sc.,Techn.	MENT	0.278	0.915	0.566	0.848	1.000	
Humanities	HUM	0.962	0.363	0.229	0.438	0.246	1.000
		2004					
		BOH	OCC	CPR	HS	MENT	HUM
Bohemians	BOH	1.000					
Other Creative Core	OCC	0.342	1.000				
Creative Professionals	CPR	0.173	0.456	1.000			
High-Skilled	HS	0.430	0.880	0.405	1.000		
Math., Eng., Nat.Sc.,Techn.	MENT	0.216	0.894	0.463	0.756	1.000	
Humanities	HUM	0.969	0.339	0.142	0.421	0.200	1.000

Table 2a: Dynamic Panel Estimates for Regional Log Employment (Difference GMM, 5 years periods 1975-2004, 323 West German regions)

Variable	Diff-GMM - 1 step coeff.	t-stat	Diff-GMM - 2 step coeff.	t-stat	Diff-GMM - 1 step coeff.	t-stat	Diff-GMM - 2 step coeff.	t-stat	Diff-GMM - 1 step coeff.	t-stat	Diff-GMM - 2 step coeff.	t-stat
	(1)		(2)		(3)		(4)		(5)		(6)	
ln Empl. L1	0.873	5.79	0.840	6.20	0.776	5.30	0.842	6.66	0.683	5.48	0.714	6.62
ln Empl. L2	-0.263	-3.24	-0.243	-3.14	-0.239	-2.99	-0.231	-3.09	-0.220	-3.21	-0.208	-3.25
ln Empl. L3	0.221	2.63	0.241	3.21	0.290	4.16	0.251	4.02	0.272	4.45	0.246	4.52
ln Median Wage	1.129	2.43	0.942	2.20	0.986	2.68	0.909	2.69	0.720	2.29	0.645	2.17
ln Median Wage L1	-0.507	-1.64	-0.335	-1.18	-0.443	-1.64	-0.224	-0.88	-0.200	-0.84	-0.115	-0.54
Other Creative Class	2.318	2.82	2.246	2.90	-	-	-	-	2.251	1.83	2.731	2.54
Share of High Skilled	-	-	-	-	1.253	2.66	1.493	3.43	-0.180	-0.19	-0.508	-0.62
ln Firm Size	0.198	4.17	0.163	3.85	0.166	4.30	0.136	4.06	0.151	4.02	0.125	4.54
ln Firm Size L1	-0.120	-4.21	-0.107	-4.21	-0.100	-4.63	-0.105	-5.42	-0.092	-4.12	-0.086	-4.82
Year Dummies	yes		yes		yes		yes		yes		yes	
	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.
F-Stat.	35.43	0.000	44.61	0.000	45.01	0.000	58.62	0.000	55.17	0.000	70.20	0.000
Sargan Overid.Test	20.38	0.255	20.38	0.255	36.83	0.004	36.83	0.004	50.98	0.035	50.98	0.001
Hansen Overid.Test	18.98	0.330	18.98	0.330	32.68	0.012	32.68	0.012	44.07	0.172	44.07	0.005
Exogeneity Test (H)	10.50	0.232	10.50	0.232	12.97	0.113	12.97	0.113	24.94	0.105	24.94	0.024
Exogeneity Test (D)	8.48	0.486	8.48	0.486	19.71	0.020	19.71	0.020	19.14	0.400	19.14	0.039
# of instruments	27		27		27		27		34		34	

Notes: All estimates are with 5-years period average data for 1975 to 2004 for N=323 West German regions. Calculation were made in Stata 9.1 using xtabond2 (see Roodman 2006); t-statistics were calculated by using Windmeijer's (2006) finite sample correction; Sargan (Hansen) Overid.Test: Sargan (Hansen) test of over-identification restrictions; Exogeneity Test (H, D); Difference-in-Hansen tests of exogeneity of instrument subsets (Hansen, Difference), see Hayashi (2000);.F-Stat.: General F-Statistic of the model; Arellano-Bond (AR2): Test statistic for serial correlation of order 2 (cannot be calculated here since T=3, only). *Data Source*: IAB employment statistics.

Table 2b: Dynamic Panel Estimates for Regional Log Wage Bill (Difference GMM, 5 years periods 1975-2004, 323 West German regions)

Variable	DIFF-GMM - 1 step		DIFF-GMM - 2 step		DIFF-GMM - 1 step		DIFF-GMM - 2 step		DIFF-GMM - 1 step		DIFF-GMM - 2 step	
	coeff.	t-stat	coeff.	t-stat	coeff.	t-stat	coeff.	t-stat	coeff.	t-stat	coeff.	t-stat
	(1)		(2)		(3)		(4)		(5)		(6)	
ln Wage Bill L1	0.848	6.15	0.841	6.82	0.769	6.00	0.824	7.39	0.696	6.05	0.712	7.28
ln Wage Bill L2	-0.175	-2.63	-0.171	-2.79	-0.155	-2.50	-0.151	-2.68	-0.149	-2.61	-0.144	-2.78
ln Wage Bill L3	0.172	2.74	0.173	2.94	0.233	4.25	0.182	3.60	0.205	3.98	0.177	3.82
ln Median Wage	1.834	3.82	1.779	4.03	1.616	4.25	1.701	4.87	1.427	4.36	1.470	4.85
ln Median Wage L1	-1.280	-3.35	-1.074	-3.06	-1.120	-3.72	-0.911	-3.22	-0.788	-2.73	-0.653	-2.60
Other Creative Class	2.654	3.32	2.448	3.27	-	-	-	-	2.448	1.99	2.516	2.35
Share of High Skilled	-	-	-	-	1.463	3.26	1.573	3.81	-0.103	-0.11	-0.116	-0.14
ln Firm Size	0.221	4.96	0.185	4.58	0.186	5.34	0.155	5.02	0.168	5.37	0.162	6.55
ln Firm Size L1	-0.124	-4.94	-0.114	-4.92	-0.106	-5.74	-0.111	-6.43	-0.099	-5.11	-0.101	-6.22
Year Dummies	yes		yes		yes		yes		yes		yes	
	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.
F-Stat.	281.70	0.000	332.07	0.000	371.07	0.000	424.61	0.000	404.65	0.000	469.24	0.000
Sargan Overid.Test	27.43	0.052	27.43	0.052	47.98	0.000	47.98	0.000	63.35	0.000	63.35	0.000
Hansen Overid.Test	21.93	0.188	21.93	0.188	37.60	0.003	37.60	0.003	50.78	0.001	50.78	0.001
Exogeneity Test (H)	13.32	0.101	13.32	0.101	17.87	0.022	17.87	0.022	29.34	0.006	29.34	0.006
Exogeneity Test (D)	8.60	0.475	8.60	0.475	19.73	0.020	19.73	0.020	21.45	0.018	21.45	0.018
# of instruments	27		27		27		27		34		34	

Notes: See table 2a.

**Table 3: Long-run Effects on Regional Employment and Wage Bill
(Dynamic Panel Estimates, 323 West German Regions 1985-2004)**

Variable	Long-run effect on regional employment (x 100)					
	Specification 1		Specification 2		Specification 3	
	1-step	2-step	1-step	2-step	1-step	2-step
ln Wage	3.689	3.767	3.126	4.971	1.963	2.141
Other Creative Class (OCC)	13.751	13.945	-	-	8.500	11.026
High Skilled (HS)	-	-	7.218	10.835	-0.680	-2.053
Firm Size (FS)	0.466	0.342	0.375	0.223	0.221	0.160
Variable	Long-run effect on regional wage bill (x 100)					
	Specification 1		Specification 2		Specification 3	
	1-step	2-step	1-step	2-step	1-step	2-step
ln Wage	3.556	4.485	3.229	5.435	2.585	3.206
Other Creative Class (OCC)	17.038	15.577	-	-	9.888	9.870
High Skilled (HS)	-	-	9.508	10.822	-0.415	-0.456
Firm Size (FS)	0.618	0.451	0.520	0.306	0.276	0.238

Notes: Long-run effects calculated from Table 2.

Table 4: Alternative Specifications for Explaining the Concentration of the Creative Class
(Dynamic Panel Estimates, 323 West German Regions, 1985-2004)

| Variable	Sys-GMM - 1 step coeff.	t-stat	Sys-GMM - 2 step coeff.	t-stat	Sys-GMM - 1 step coeff.	t-stat	Sys-GMM - 2 step coeff.	t-stat
	(1)		(2)		(3)		(4)	
specification 1								
const.	-0.005	-1.41	-0.006	-1.75	-0.007	-1.51	-0.007	-1.79
Creative L1	0.923	39.91	0.913	52.99	0.917	42.07	0.903	55.74
High Skilled	0.466	4.47	0.430	6.20	0.460	4.85	0.491	7.75
High Skilled L1	-0.381	-3.57	-0.331	-4.65	-0.370	-3.82	-0.390	-6.02
ln Empl.	2.615	4.18	2.391	5.61	-	-	-	-
ln Empl.L1	-2.622	-4.17	-2.404	-5.60	-	-	-	-
ln Wage Bill	-	-	-	-	2.891	5.37	2.467	6.45
ln Wage Bill L1	-	-	-	-	-2.898	-5.45	-2.466	-6.51
	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.
F-Stat.	1130.51	0	1951.36	0	1174.91	0	2274.79	0
Arellano-Bond (AR2)	-1.56	0.119	-1.56	0.119	-1.45	0.147	-1.39	0.165
Sargan Overid.Test	100.53	0	100.53	0	118.04	0	118.04	0
Hansen Overid.Test	69.28	0.079	69.28	0.079	80.28	0.111	80.28	0.111
GMM instruments (L)	43.32	0.255	43.32	0.255	47.72	0.403	47.72	0.403
iv instruments (L)	25.96	0.055	25.96	0.055	32.56	0.038	32.56	0.038
GMM instruments (D)	45.12	0.169	45.12	0.169	55.42	0.278	55.42	0.278
iv instruments (D)	24.16	0.115	24.16	0.115	24.16	0.072	24.16	0.072
# of instruments	74		74		87		87	
specification 2								
const.	-0.014	-3.15	-0.011	-2.94	-0.019	-3.18	-0.012	-2.69
Creative L1	1.061	72.45	1.061	92.83	1.058	73.18	1.062	97.29
Bohemians	-0.220	-1.32	-0.284	-2.41	-0.208	-1.33	-0.249	-2.31
Bohemians L1	0.214	1.26	0.326	2.51	0.206	1.29	0.302	2.52
ln Empl.	3.081	4.67	2.439	5.01	-	-	-	-
ln Empl.L1	-3.015	-4.58	-2.399	-4.97	-	-	-	-
ln Wage Bill	-	-	-	-	3.046	5.07	2.232	5.00
ln Wage Bill L1	-	-	-	-	-2.971	-5.05	-2.186	-4.99
	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.	test-stat.	p.-val.
F-Stat.	1015.41	0	1571.3	0	1002.83	0	1668.28	0
Arellano-Bond (AR2)	-1.98	0.048	-1.93	0.054	-1.88	0.061	-1.81	0.071
Sargan Overid.Test	113.84	0	113.84	0	136.16	0	136.16	0
Hansen Overid.Test	67.43	0.104	67.43	0.104	84.83	0.059	84.83	0.059
GMM instruments (L)	51.5	0.071	51.5	0.071	59.79	0.083	59.79	0.083
iv instruments (L)	15.94	0.458	15.94	0.458	25.05	0.2	25.05	0.2
GMM instruments (D)	45.5	0.159	45.5	0.159	58.15	0.2	58.15	0.2
iv instruments (D)	24.16	0.187	24.16	0.187	24.16	0.045	24.16	0.045
# of instruments	74		74		87		87	

Notes: see Table 2.
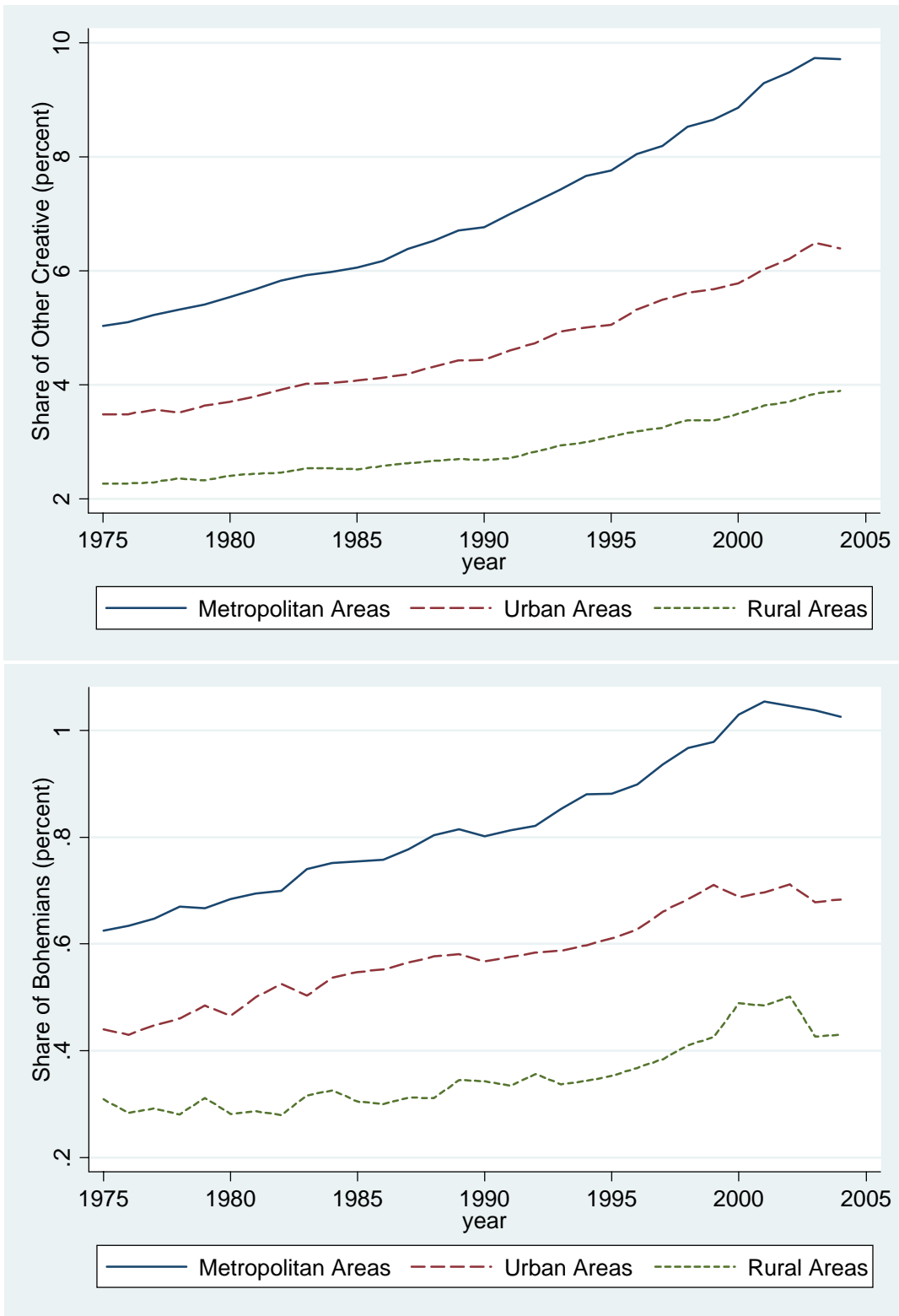
Figure 1: Development of the Share of Bohemians and Other Creatives by Region Type (West Germany , 1975-2004 in percent)
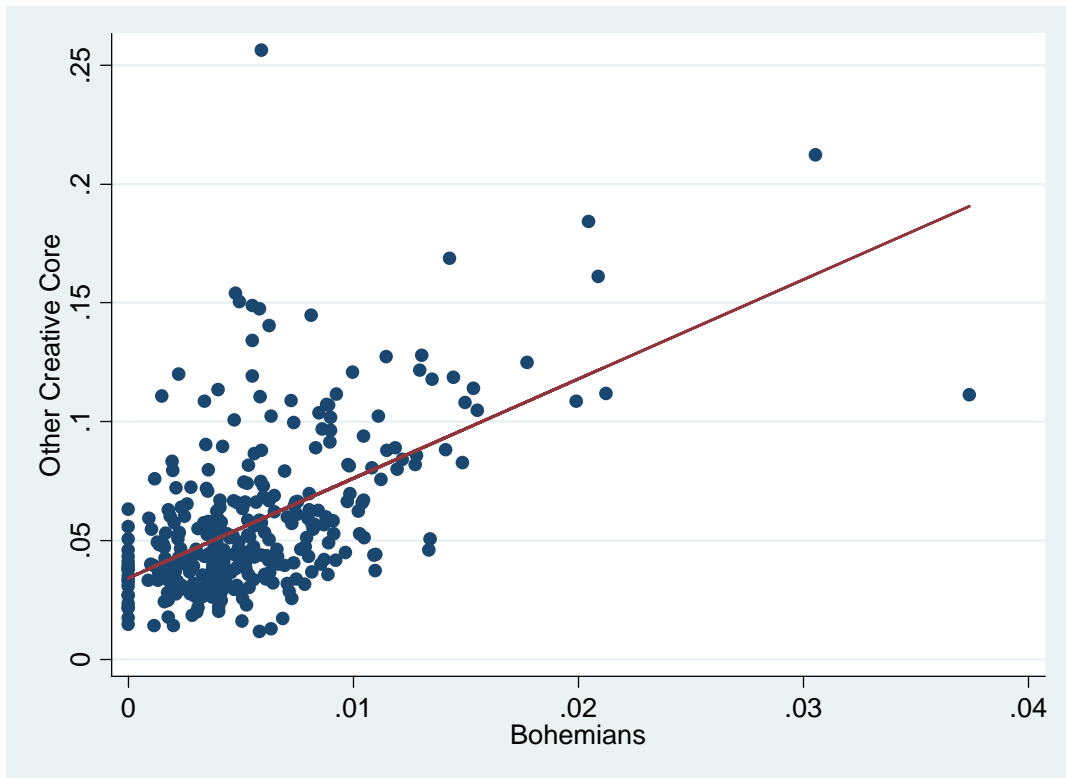
Figure 2: Correlation between Bohemians and Other Creatives (West Germany, 326 counties 2004)

Note: **One outlier (Baden-Baden) excluded**

Table A1: **The Creative Occupations**

Florida's Definition Components	IAB Database Code
Bohemians	
writers and creative or performing artists	821: Publizisten 823:Bibliothekare, Archivare, Museumsfachleute 831: Musiker 832: Darstellende Künstler 833: Bildende Künstler, Grafiker
photographers and image and sound recording equipment operators; fashion and other models	837: Photographen 835: Künstlerische und zugeordnete Berufe der Bühnen-, Bild- und Tontechnik
artistic, entertainment, and sports associate professionals	838: Artisten, Berufssportler, künstlerische Hilfsberufe
Other Creative Core	
scientists, think-thank researchers	881: Wirtschafts- und Sozialwissenschaftler, a.n.g., Statistiker 882: Geisteswissenschaftler, a.n.g. 883: Naturwissenschaftler, a.n.g.
engineers	601: Ingenieure des Maschinen- und Fahrzeugbaues 602: Elektroingenieure 603: Architekten, Bauingenieure 604: Vermessungsingenieure 605: Bergbau-, Hütten-, Gießereiingenieure 606: Übrige Fertigungsingenieure 607: Sonstige Ingenieure 611: Chemiker, Chemieingenieure 612: Physiker, Physikingenieure, Mathematiker
university professors	871: Hochschullehrer, Dozenten an höheren Fachschulen und Akademien
editors	Dispersed in the other categories
Analysts, entrepreneurs, leading administrators	751 : Unternehmer, Geschäftsführer, Geschäftsbereichsleiter 752 : Unternehmensberater, Organisatoren 762 : Leitende und administrativ entscheidende
opinion makers	Dispersed in the other categories
software programmers/engineers	774 : Datenverarbeitungsfachleute
Gardening Architects	52 Gartenarchitekten, Gartenverwalter
Creative Professionals	
high-tech sectors services, technicians	621 Maschinenbautechniker 622 Techniker des Elektofaches 623 Bautechniker 624 Vermessungstechniker 625 Bergbau-, Hütten-, Gießereitechniker 626 Chemietechniker, Physikotechniker 627 Übrige Fertigungstechniker 628 Sonstige Techniker 629 Industriemeister, Werkmeister 631 Biologisch-technische Sonderfachkräfte 632 Physikalisch- und mathematisch-technische

	633 Chemielaboranten
	634 Photolaboranten
	635 Technische Zeichner
financial services	691 Bankfachleute
	753 Wirtschaftsprüfer, Steuerberater
legal services	813 Rechtsvertreter, -berater
business services	703 Werbefachleute
	822 Dolmetscher, Übersetzer

Alternative Classifications	IAB Database Code
Mathematics, Engineering, Natural Science, Technics	
engineers and technicians	601 Ingenieure des Maschinen- und Fahrzeugbaues
	602 Elektroingenieure
	603 Architekten, Bauingenieure
	604 Vermessungsingenieure
	605 Bergbau-, Hütten-, Gießereiingenieure
	606 Übrige Fertigungsingenieure
	607 Sonstige Ingenieure
	611 Chemiker, Chemieingenieure
mathematicians and natural scientists	612 Physiker, Physikingenieure, Mathematiker
	883 Naturwissenschaftler, a.n.g.

Humanities, Culture	
cultural figures	821 Publizisten
	831 Musiker
	832 Darstellende Künstler
	833 Bildende Künstler, Graphiker
	835 Künstlerische und zugeordnete Berufe der Bühnen-,
	837 Photographen
humanities	882 Geisteswissenschaftler, a.n.g.