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HWWA HAMBURG

DISCUSSION PAPER

Spatial Structural Change - Evidence and Prospects

Franz-Josef Bade
Annekatrin Niebuhr
Matthias Schönert

HWWA DISCUSSION PAPER

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Spatial Structural Change - Evidence and Prospects

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The present paper summarises the results of the research project „Regional Quality of Employment“ carried out at the University of Dortmund, Faculty of Spatial Planning. Financial support was granted by the Deutsche Forschungsgemeinschaft. A revised version will be published in the Volume „Technological Change and Regional Development in Europe“. The subject of the paper is assigned to the HWWA’s research programme „European Integration and Spatial Development“.

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Abstract

Main topics of the following analysis are the development of spatial structure and the question whether the economic disparities between agglomerations and peripheral areas will con- or diverge. Frequently, economic disparities are measured by per capita income. Because of the relationship between income growth and employment change, a separate analysis of both quantitative components seems to be more appropriate. Furthermore, to reduce the uncertainty concerning the future development of regional disparities human capital - owing to its decisive importance for economic and technological competitiveness - is considered as well. Consequently this study of regional disparities is based on the analysis of time-series for several indicators from 1976 to 1996. Due to this long period the data is constrained to the old FRG. The central tendencies of spatial structural change - on the one side (relative) gains of urban fringe and peripheral areas, on the other side (relative) losses of agglomerations and their centres - prove to be extremely stable for all indicators on the level of spatial categories. The stability of spatial structural change suggests that the deconcentration process will continue in the near future.

Zusammenfassung

Die folgende Analyse beschäftigt sich mit der Entwicklung des räumlichen Strukturwandels und der Frage, ob die Unterschiede in der Wirtschaftskraft zwischen Verdichtungsräumen und ländlich-peripheren Regionen kon- oder divergieren. Üblicherweise wird die Wirtschaftskraft mit dem Pro-Kopf-Einkommen bewertet. Aufgrund der Zusammenhänge zwischen Einkommens- und Beschäftigungsentwicklung erscheint eine getrennte Analyse der Indikatoren angemessener. Um die Unsicherheit, die bezüglich der zukünftigen Entwicklung regionaler Disparitäten besteht, zu reduzieren, wird zudem das regionale Humankapital analysiert, weil das Humankapital eine zentrale Determinante der Wettbewerbsfähigkeit von Regionen ist. Die Untersuchung regionaler Disparitäten basiert auf Zeitreihen für mehrere Indikatoren von 1976 bis 1996, die sich aufgrund des langen Zeitraums auf die alten Bundesländer beschränken. Die zentralen Tendenzen des räumlichen Strukturwandels - auf der einen Seite (relative) Gewinne sowohl des Verdichtungsumlandes als auch der peripheren Regionen, auf der anderen Seite (relative) Verluste sowohl der Verdichtungszentren als auch der Verdichtungsräume insgesamt - erweisen sich in den Analysen als äußerst stabil. Die Stabilität des räumlichen Strukturwandels deutet eher auf eine Fortsetzung der räumlichen Dekonzentration als auf eine Umkehr der Disurbanisierung zugunsten der Verdichtungsräume hin.

JEL: O18, R11

1. INTRODUCTION

According to the results of one current report on European regional prospects (*ERECO* 1997) in Europe convergence can not be expected. This conclusion is remarkable for two reasons. First, it belongs to a growing number of recent studies (see *Irmen*/*Blach* 1997, *Klemmer* 1996 or *Stahl* 1997) with an quite sceptical assessment concerning the further development of regional disparities - after a period of predominantly optimistic appraisals (e.g. *Seitz* 1995). The special issue „Regional Futures“ (1997, Vol. 31) of Regional Studies can also be assigned to the currently increasing number of rather crit i-cal opinions. In their introducing survey the editors point out that a (further) decline of regional differences in economic performance is unlikely to occur (*Asheim*/*Dunford* 1997). The analysis of *Fagerberg*/*Vespagen* (1996), *Fagerberg*/*Verspagen*/*Caniëls* (1997) provides corresponding evidence. They conclude that regional disparities - after a decrease in the 1970s - have in recent years stopped decl ining.

Second, the change of expectations goes hand in hand with a change of focus. Whereas earlier studies were mainly concerned with regional differences in employment growth, recent investigations focus on regional convergence of per capita income. However, both indicators do not necessarily lead to unambiguous inference: The ratio income per capita is influenced by changes in both numerator and denominator. Therefore, „the same statistical rate of productivity growth can in fact be the outcome of very different processes“ (*Camagni*/*Cappellin* 1984: 154).

Although the ambivalent interpretation of per capita income is rather well-known in development theory (e.g. *Nohlen*/*Nuscheler* 1992), its critical importance is rarely acknowledged in the recent debate on regional convergence. One of the few exceptions is the study of *Blanchard*/*Katz* (1992). They show that dynamic regions in the US with an above-average growth of employment and income realise corresponding increases of per capita income only with a certain delay. If income and employment evolve in the same direction, the ensuing variation of income per capita must inevitably be smaller than the over all change in income. In contrast, the change of income per capita will surpass the over all change in income, if denominator and numerator of the ratio move in reverse directions. Consequently, solely analysing per capita income tends to under-estimate the success of dynamic regions, whereas it overestimates economic growth of declining regions where decreases of employment are stronger than those of income (see *Cuadrado-Roura*/*Mancha*/*Garrido* 1997 for corresponding evidence for Europe).

A further limitation of previous studies concerns the reliability of conclusions about future con- or divergence tendencies. Most convergence studies are based on cross-sectional analysis of time-series consisting out of a few discontinuous data points (e.g. *Sala-i-Martin* 1996 or *Seitz* 1995). Frequently the long-term growth path of a region is entirely determined by the comparison of two observations.[1] The dynamic phenomenon of economic growth is condensed to an average rate of change that implies a constant slope of each regions time trend. Consequently, neither the direction of change nor its stability can be thoroughly investigated (*Quah* 1993: 427). Thus, *Carlino*/*Mills* (1996: 598) conclude (in contrast to the above-mentioned scepticism about regional disparities) that „cross-sectional studies generally offer evidence in support of convergence, whereas time-series studies find the opposite to be true".

The intention of the following analysis is to remedy these deficiencies and derive precise conclusions on the stability of spatial structural change in general and on the development of agglomerations and rural areas in particular. The present paper differs from previous studies in several respects and uses an alternative approach to provide evidence on regional disparities and their prospective development.

First, instead of investigating convergence of per capita income we analyse both employment and income, separately. Our belief is that in order to achieve reliable results an analysis of both indicators seems to be more appropriate. To take adequately into account the dynamics of regional growth paths the analysis is based on time-series for these indicators from 1976 to 1996. However, due to this long period, the data is constrained to the old FRG.

Second, in order to supply a comprehensive assessment of future development of regional disparities a forward-looking indicator is included as well. We use human capital as an indicator for regional growth prospects, because the regional stock of human capital is commonly considered as a central precondition for sucessful development - particularly with regard to rapid technological change.

The rest of the paper is organised as follows. Section 2 provides a brief survey of empirical evidence on regional disparities. Deficiencies of previous findings and reasons for the still controversial debate on regional disparities are discussed. In section 3 the central tendencies of spatial structural change in West-Germany are examined. We propose a distinct methodology in order to remedy existing deficits. Applied methods, data

1 Rare exceptions are the studies of *Carlino*/*Mills* (1996), *Canova*/*Marcet* (1995) or *Tondl* (1997).

sets and regional system are described. Section 3.2 focuses on the quantitative aspects of spatial structural change. Substantial trends of regional income and employment growth are determined and their stability is discussed. By comparing the spatial growth tendencies of both variables conclusions with respect to regional development of income per capita are derived. Section 3.3 considers the regional growth process from a forward-looking perspective. Regional development of human capital is analysed with the purpose of providing a broader basis for an evaluation of future growth paths. Finally, in section 4 we give a summary of the results derived and discuss the implications for further development of regional disparities in West-Germany.

2. SPATIAL STRUCTURAL CHANGE - EMPIRICAL EVIDENCE AND DEFICITS

Most of the studies investigating the spatial distribution of economic activity in Germany are restricted to employment data. Although they largely differ in methods and data base, they generally come to the same conclusion that rural-peripheral regions are favoured by the long-term changes in spatial structure (e.g. *Bade* 1987; *Peschel*/*Bröcker* 1990: 77). As in other industrialised countries (e.g. *Keeble* 1986, *Frey* 1993, *Molle* 1997) the agglomerations in Germany realised a far less successful development as could be expected on account of the persistently quoted agglomeration economies, obviously anticipated in the concerns cited above.[2]

Spatial deconcentration of economic activity takes place on two levels, analogous to the different scale of the process labeled as suburbanisation and disurbanisation.[3] *Suburbanisation* involves small scale changes inside agglomerations, i.e. the urban fringe clearly achieves a more favourable development than the agglomeration centres (e.g. *Gatzweiler*/*Schliebe* 1982, *Bucher*/*Kocks* 1987, *Bade* 1987, 1991, *Seitz* 1996). The densely populated agglomeration cores attain the lowest employment growth of all spatial categories. Suburbanisation is not restricted to the large agglomerations. The small scale shifts of economic weight can be observed for the remaining cities in Germany too. Though, in these areas the intra-regional differences in growth rates are weaker (*Irmen*/*Blach* 1994: 451).

2 For a discussion on the relative advantages of agglomerations in the course of structural change see e.g. *Gaebe* (1987: 199-205) or *Bade* (1997: 248-249).

3 For distinguishing processes of spatial deconcentration several terms as e.g. „Counterurbanization“ (*Berry* 1964) are employed. Counterurbanization is primarily used in Anglo-Saxon literature. A survey on the various definitions is provided by *Gaebe* (1988) or *Irmen*/*Blach* (1994: 446).

Disurbanisation of economic activity can be observed already since the 1960s. This large scale process of deconcentration is characterised by a negative correlation between regions degree of density and growth (see *Uebe* 1967, *Hoppen* 1979, *Nieth* 1980, *Peschel* 1983). The unfavourable development of the agglomerations in total results in a declining share in national amount of economic activity - despite high growth rates of the urban fringe. All studies provide evidence for a slow, but nevertheless definite d e-crease of spatial concentration. Disurbanisation can not (alone) be explained by subu r-banisation and spatial expansion of agglomerations: First, distance between some of the particularly dynamic regions and the agglomerations is too large. Second, the regions located in the direct neighbourhood of agglomerations often achieve only modest growth rates (*Bade* 1987, 1991).

Despite these undeniably positive findings for rural regions their growth prospects are now as ever subject of a controversial discussion. This is to some extent due to the the o-retically based supposition that in the last years the general economic conditions have changed to the debit of rural regions, e.g. as a consequence of establishing the common market, opening of Eastern European countries and progressive international division of labour (see e.g. *Klemmer* 1996; *Stahl* 1997 or *Irmen*/*Blach* 1997).

Moreover this uncertainty about further development of regional disparities has empir i-cal reasons. It is in part due to the neglect of forward-looking variables like human capital, though in some studies the spatial structure of this indicator is analysed. In these studies human capital is usually measured by educational level of employees or R&D-employment. Summarising the results of previous studies the spatial structure of human capital is characterised by a significant centre-periphery-differential. With in-creasing agglomeration of a region the share of highly skilled labour or R&D-employees in total employment rises. Compared with agglomerated regions rural areas are poorly endowed with human capital (e.g. *Recker*/*Schütte* 1982, *Müller* 1984, *Bade* 1987, *Pliquett* 1988, *Legler* 1994, *Gehrke*/*Legler* 1998, *ZEW et al*. 2000).

Far more uncertain are the findings concerning the *development* of these disparities. Uncertainty exists in twofold respect: First, the conclusions drawn are not unambiguous. Some authors expect a deepening of disparities (e.g. *Böltken*/*Irmen*/*Runge* 1988, *Beise*/*Gehrke*/*Legler* 1999), others suppose that the spatial concentration of human c a-pital will decline (e.g. *Franck* 1995, *Bade* 1997). Second, the uncertainty is once more caused by the restricted empirical basis. The majority of studies are constrained to just a

few observation for the cross-sectional data set. [4] The consequences for the reliability of conclusions - especially with regard to regional growth prospects - were mentioned above.

The intention of the present paper is to remedy the uncertainty about regional growth prospects by providing comprehensive evidence on the central tendencies of spatial structural change in Germany. Furthermore, human capital as a forward-looking indicator is analysed in order to supply additional information on the future development of regional disparities.

3. CENTRAL TENDENCIES OF SPATIAL STRUCTURAL CHANGE

3.1 Data and regional system

Basis of the empirical study is a combination of three data sources that allows a comprehensive time-series analysis of regional development in West-Germany between 1976 and 1996.

To investigate quantitative aspects of spatial development all available data sources were used:

- Official estimates of regional employment from the *Arbeitskreis „Erwerbstätigenrechnung des Bundes und der Länder"* for 1980 and 1987 until 1994.

- Regional data on gross value added from national accounts of the German *Länder* for 1980, 1990 and 1992.

- Regional employment covered by social insurance system (about 80% of all employment) and regional sum of wages and salaries from German employment statistics, annual data for 1976 until 1996.

Time-series for entire regional employment and gross value added were generated by calculating the missing observations of official data using the corresponding annual information from the employment statistic (see *Bade*/*Niebuhr* 1999 for a detailed description of estimation-method).

4 The analysis of human capital on a regional level is usually limited to one or two observations.

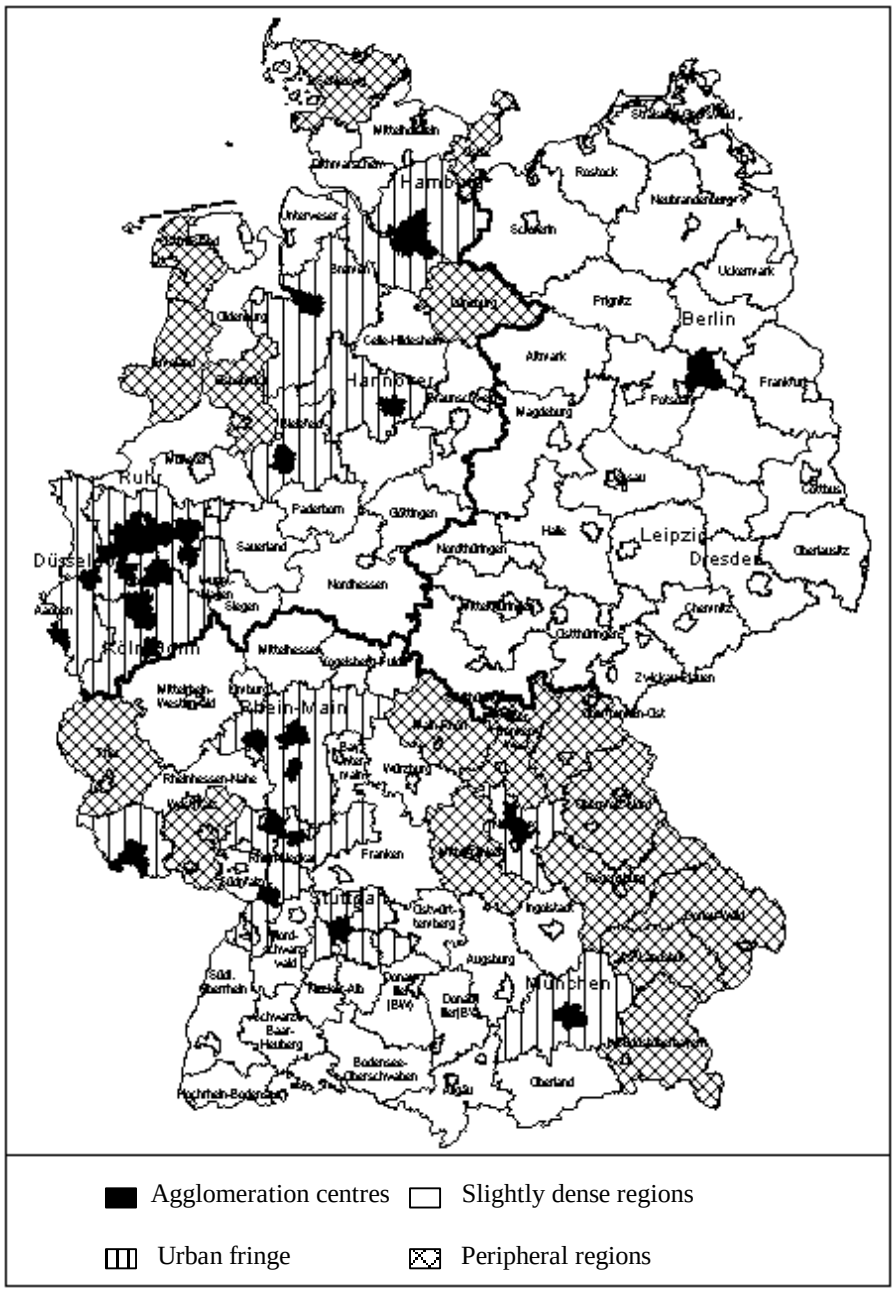
The analysis of regional human capital is based on data from German employment statistics. Beside the availability of annual data the employment statistic possesses the advantage that the data set is differentiated for level of education as well as for occupation of the employees (see *Bade*/*Schönert* 1997). So the employment statistic allows consistent time-series analysis of both forward-looking variables - highly skilled labour and R&D-employment - from 1976 to 1996.

Special emphasis is given to large scale changes of spatial structure. Therefore, the following description focuses on the development of spatial categories. The presented findings are restricted to the comparison of the corresponding growth paths, although we are aware of the fact that individual development in these spatial categories is not homogenous. But the conclusions derived below are not affected by this limitation. Detailed results for selected regions are provided in *Bade*/*Schönert* (1997) and *Bade*/*Niebuhr* (1999). The analysis of central tendencies in regional development is based on a division into four spatial categories according to the criteria location and density (see Figure 3.1). Starting points of this regional system are the large agglomerations in West-Germany[5] that are partitioned into agglomeration centre and urban fringe. By means of this subdivision shifts in economic weight between core and fringe of agglomerations can be recorded. The area outside the agglomerations comprises the peripheral regions that are characterised by an unfavourable peripheral location and an extremely low population density. The remaining regions outside the agglomerations are designated as slightly dense regions.

The data set permits a time-series study of regional development based on several indicators. Thus, the analysis offers a comprehensive insight into the past and future dynamics of spatial structural change. We concentrate on relative development of spatial categories, i.e. on regional growth paths relative to national average. Hence, general effects like cyclical fluctuations are excluded. They affect the whole economy and all region in roughly the same manner. However, in this paper spatial particularities are the focus of interest. Development relative to national average coincides with the change of regional share in entire (national) amount of the indicator considered.

5 Due to the long-term character of the study the analysis is restricted to West-Germany. For East-Germany neither the required data sets are available nor could a time-series analysis provide reasonable conclusions in view of the transformation process.

Figure. 3.1: Regional system



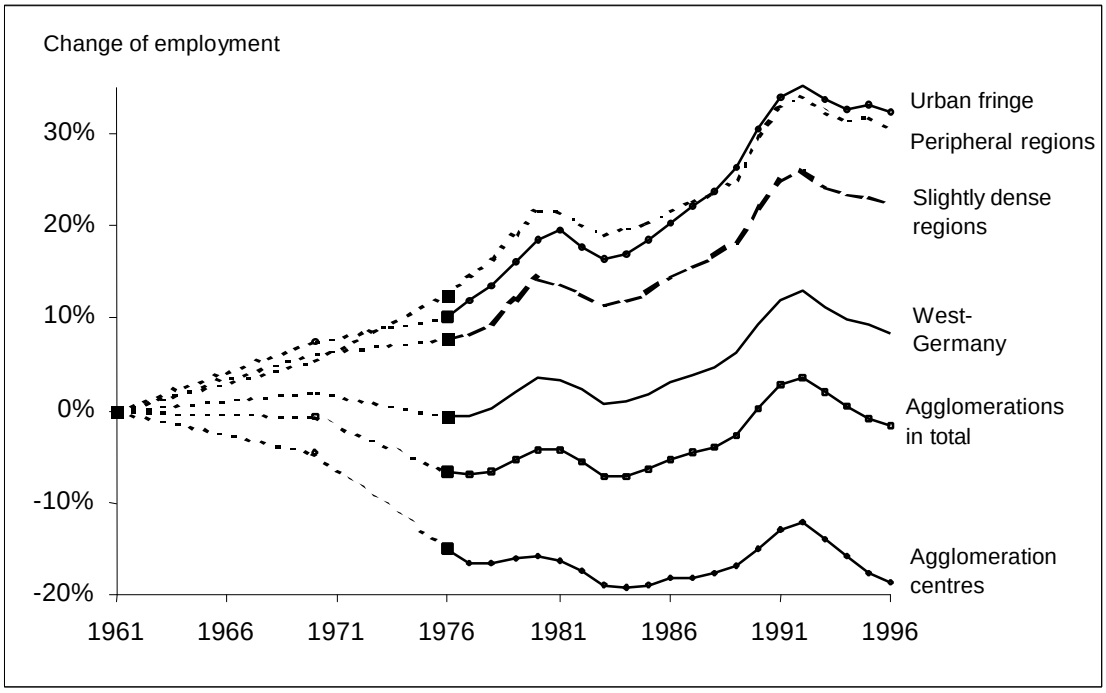
Source: Bade, F.-J. (1991).

3.2 The quantitative perspective - employment and income

Figure 3.2 provides a first insight into the development and stability of spatial structural change in West-Germany. In order to supply an impression of the long-term tendencies employment data from earlier Arbeitsstättenzählungen are exploited. Employment growth since 1961 is characterised by obvious differences between spatial categories.

Both urban fringe and peripheral regions achieved an employment increase of roughly 30% since the earlier 1960s. The agglomeration centres are unambiguously on the losing side, if spatial structural change of employment is considered. In the agglomeration cores the number of employed persons declined by 20%.

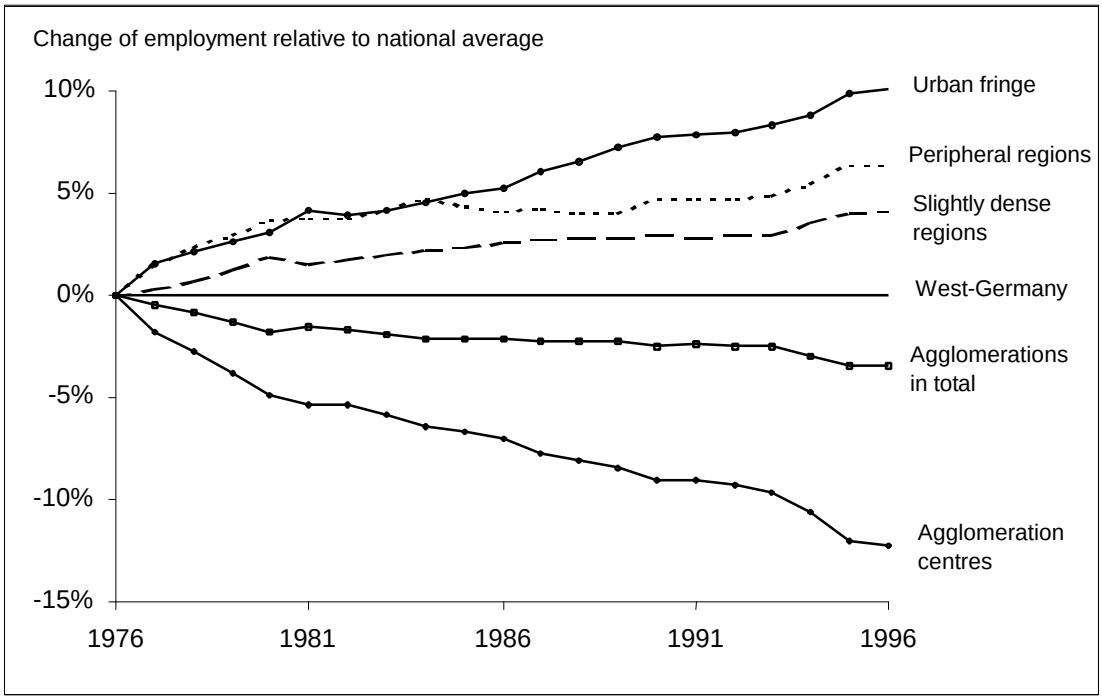
Figure. 3.2: Employment growth of spatial categories since 1961



Source: Arbeitsstättenzählung, Arbeitskreis Erwerbstätigenrechnung der Länder, employment statistic, own calculations.

However, for the agglomerations *in total* employment growth is balanced: gains of the urban fringe compensate for the losses of the cores. But the development simultaneously indicates that this result is not least due to the economic upturn since the mid of the 1980s. The effects of the upswing (as well as the impact of recessions e.g. after 1982 or 1993) are apparent in the growth paths of all spatial categories. In the following we accentuate the regional particularities of development by excluding these national effects. For that purpose development of spatial categories is analysed relative to average (national) employment growth (see Figure 3.3). In contrast to the description of absolute growth trends (since 1961) the analysis of relative growth paths is restricted to the period between 1976 and 1996, due to the limited availability of annual data.

Figure. 3.3: Relative employment growth paths of spatial categories since 1976



Source: Arbeitsstättenzählung, Arbeitskreis Erwerbstätigenrechnung der Länder, employment statistic, own calculations.

The relative development of spatial categories since 1976 is characterised by immediately perceptible trends. Because of an employment growth below average the share of agglomeration centres in national employment declined by roughly 12%. In contrast to this, especially the urban fringe (+10%) and the peripheral regions (+6%) increased their corresponding shares. As a result of the unfavourable development in the agglomeration centres the economic weight of agglomerations in total decreased as well (-3%), despite the dynamic growth process in the urban fringe. Even without a detailed statistical analysis[6] it is obvious that the spatial deconcentration on both scales, i.e. suburbanisation and disurbanisation can be assessed as long-term trends. In so far the results of earlier studies are clearly confirmed. However, at the same time we recognise that intensity and direction of spatial structural change are not constant in the course of time. For example relative growth paths of peripheral regions and agglomerations initially diverge clearly. Though, by the mid of the 1980s dynamic of the peripheral regions weakens, whereas the agglomerations achieve an average employment growth until the early 1990s. Subsequently the relative growth paths of both spatial categories start to diverge again.

6 „But what is wrong with visual examination of time-series data? Don't we see one part of truth with the naked eye, another part through the microscope?" (*Brems* 1977: 84).

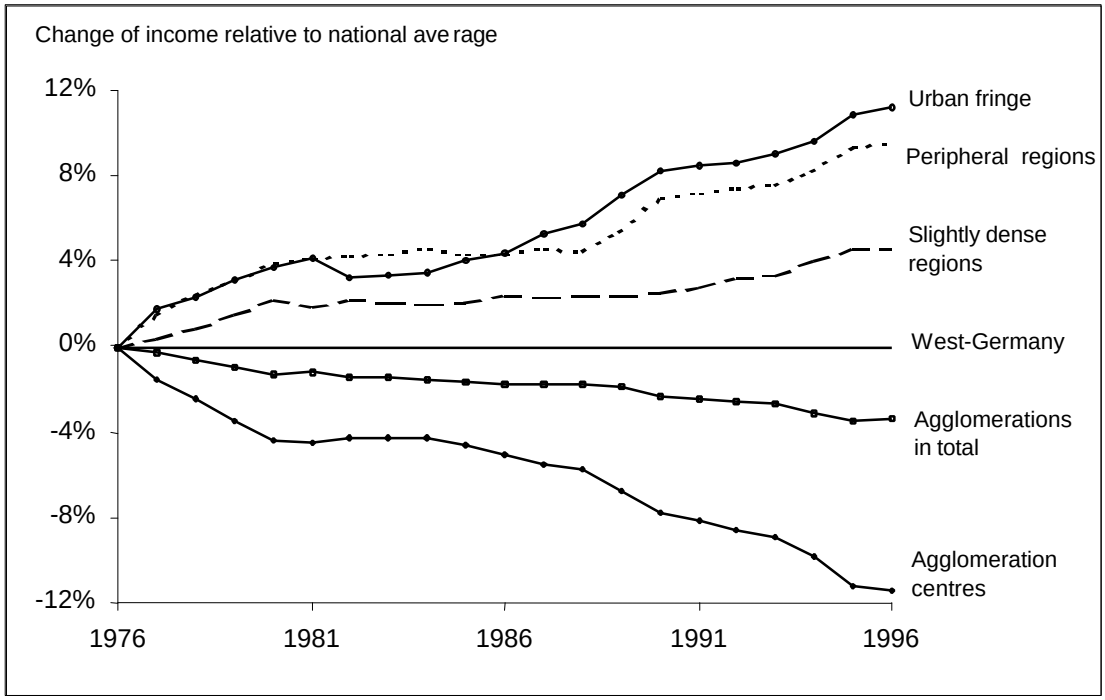
Variations of that kind can be observed for the relative growth paths of other spatial categories as well. These deviations raise the question whether we can consider the central tendencies of spatial structural change as stable, or whether the variations constitute (statistically detectable) structural changes. Elsewhere we carried out a detailed statistical analysis (see *Bade*/*Niebuhr* 1999). Here we confine ourselves to the corresponding findings. The following results are based on a stability analysis of an assumed linear trend of relative growth path (estimated by OLS or GLS) and tests of structural change (F-test and CHOW-test). More or less pronounced deviations from the estimated linear trend are identified for all spatial categories. But F-test and CHOW-test reject the hypothesis of structural change for each relative growth path examined. Therefore, we can conclude that no general alteration of the direction of spatial structural change has occurred. The relative growth paths of spatial categories are stable, merely the intensity of spatial growth discrepancies fluctuates in time.

We complete our analysis of the quantitative aspects of spatial structural change with a brief study of regional income growth (see Figure 3.4). The relative development of income for spatial categories exhibits the same general tendencies as regional employment growth: on the one side gains particularly of the urban fringe and peripheral regions, on the other side losses of the agglomerations and their centres. Moreover, for most spatial categories the changes in economic weight - measured by share in national employment or income - are of the same magnitude. The share of agglomeration centres in national production declined by roughly 11% (employment: -12%), while the urban fringe realised an increase of about 11% (employment: +10%). As for employment the income share of agglomerations in total declined by 3%.

Only for the peripheral regions there is a rather pronounced deviation from the relative growth path of employment. Whereas for employment the respective share rose by approximately 6%, the relative gain in income of peripheral regions (nearly +10%) is clearly higher. This difference between development of income and employment growth of peripheral regions - from a relative perspective - is largely due to the higher dynamic of income growth in the 1990s. The relative growth paths started to deviate in 1988, although for both indicators gains of peripheral regions increased in this period. This result coincides with the observation that income per capita of peripheral regions not converged to national average before 1988. In total - for the whole period between 1976 and 1996 - peripheral regions could attain only a modest decrease of the gap in per capita income. Measured in percent of national average income per capita of peripheral regions increased from 81,4% to 83,7%. Caused by the parallel (relative) growth of in-

come and employment, the relation of income per capita to corresponding national a v-erage remained almost unchanged. This applies especially to the other spatial categ o-ries.

Figure. 3.4: Relative income growth paths of spatial categories since 1976



Source: National accounts of the German Länder, employment statistic, own calculations.

These findings confirm the results of *Blanchard*/*Katz* (1992) cited in the introduction: If income and employment evolve in the same direction, the variation of income per capita is comparatively small. In contrast, the change in income per capita surpasses the over all change in income, if income and employment evolve in reverse directions. The d e-velopment of urban fringe and agglomeration centres provides evidence for both cases. Growth of employment and income is far above-average in the urban fringe. Neverth e-less, the increase of income per capita (+157%) in the urban fringe does not deviate from the development in the agglomeration centres. But in the agglomeration centres growth of income in total is below-average and employment even d eclined (-4%) between 1976 and 1996.

Summarising it can be stated, that from a quantitative perspective the deconcentration as a central tendency of spatial structural change proves to be rather stable. For the r e-gional development of both indicators a decline of concentration on the large agglo me-

rations in West-Germany is characteristic. On the whole, no fundamental change of direction has taken place. As far as there are deviations from the development trends, they rather indicate further spatial deconcentration in disfavour of agglomerations. Thus, so far the results confirm the findings of convergence studies that discover (relative) b-convergence for regions in West-Germany (see *Seitz* 1995 and *Schalk*/*Untiedt* 1996). But at the same time the almost unchanged relations of income per capita relative to national average point to a rather modest convergence of absolute levels.

3.3 Regional growth prospects - human capital

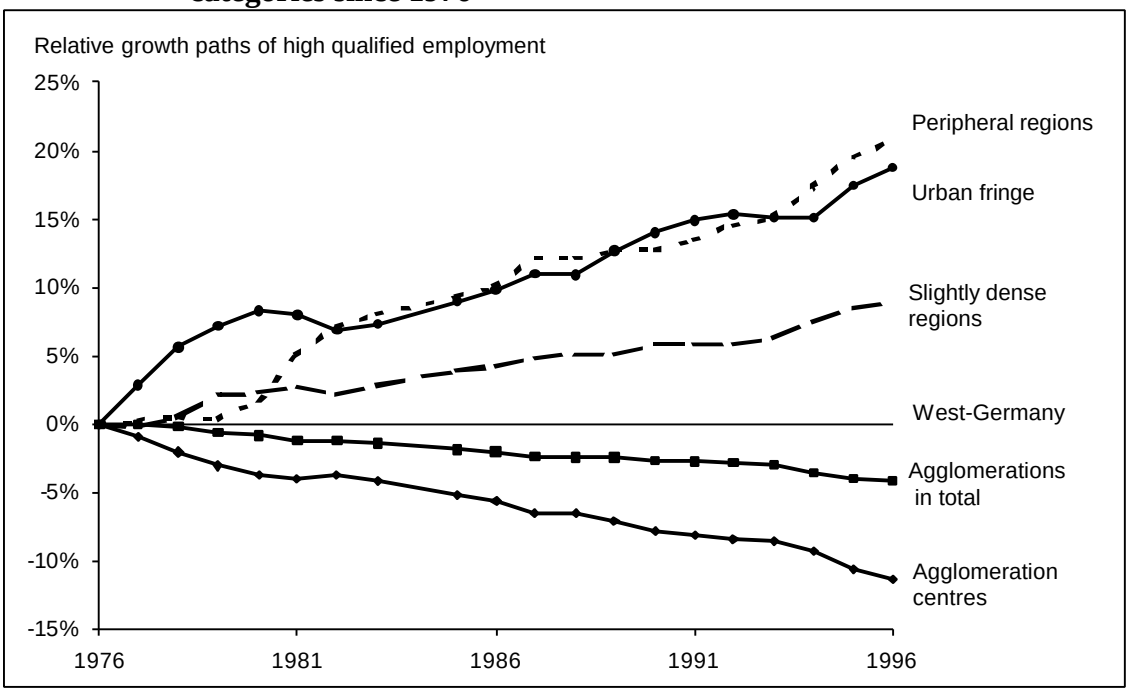
Technological change is commonly viewed as a decisive factor of the future development of regional disparities. A central presumption in this context is that regional competitiveness in industrialised countries founds on the ability to transform knowledge into innovation. Hence, the capability of a region to cope with technological change is a decisive determinant of its growth perspectives (e.g. *Tödtling* 1990, *Freeman* 1994). Undisputed the human capital of a region is one of the most important locational conditions for coping with the effects of rapid technological change. For instance growth theory emphasises the role of technological progress for economic growth on the one side and its close relation to the education and abilities of the work force on the other side (e.g. *Kuznets* 1961, *Denison* 1961, *Griliches* 1996). Therefore, human capital - measured by educational level of the workforce or R&D-employment - supplies important information about the regional development prospects in technological change.

The enduring trend of rising human capital is a conspicuous feature of structural change in industrialised countries (e.g. *Buttler*/*Tessaring* 1993). This development is reflected by employment data, i.e. by the enormous increase of the number of employees with an academic degree. Between 1976 and 1996 growth of highly qualified employment in West-Germany amounted to roughly 150%, whereas the number of employees without vocational training decreased by 34%. These changes of qualification structure generally characterise the development of all regions. Nevertheless, the results of previous studies point to a significant *centre-periphery-differential*. Far more uncertain are the findings concerning the *development* of these disparities (see chapter 2).

On the level of spatial categories significant growth differences can be observed between 1976 and 1996 (see Figure 3.5). Due to a continuous below-average growth of highly skilled employment the relative development of agglomeration centres is cha-

racterised by a stable decline of the corresponding share in national stock of human capital (in total about -11%). As a result of these (relative) losses even the agglomer a-tions in total only realised a modest increase of employees with academic education and a decreasing share (-4%). On the other side the relative growth paths of peripheral r e-gions (+20%) and urban fringe (+18%) reveal an extremely favourable development clearly above national average. On the whole, the relative growth paths of spatial cat e-gories prove to be very stable. Irrespective of the economy-wide conditions the growth of peripheral regions exceeds on average the national development by about 1% per year. In contrast to this, growth of the agglomeration centres is annually more than 0,5% below average growth in West-Germany.

Figure. 3.5: Relative higher qualification employment growth paths of spatial categories since 1976

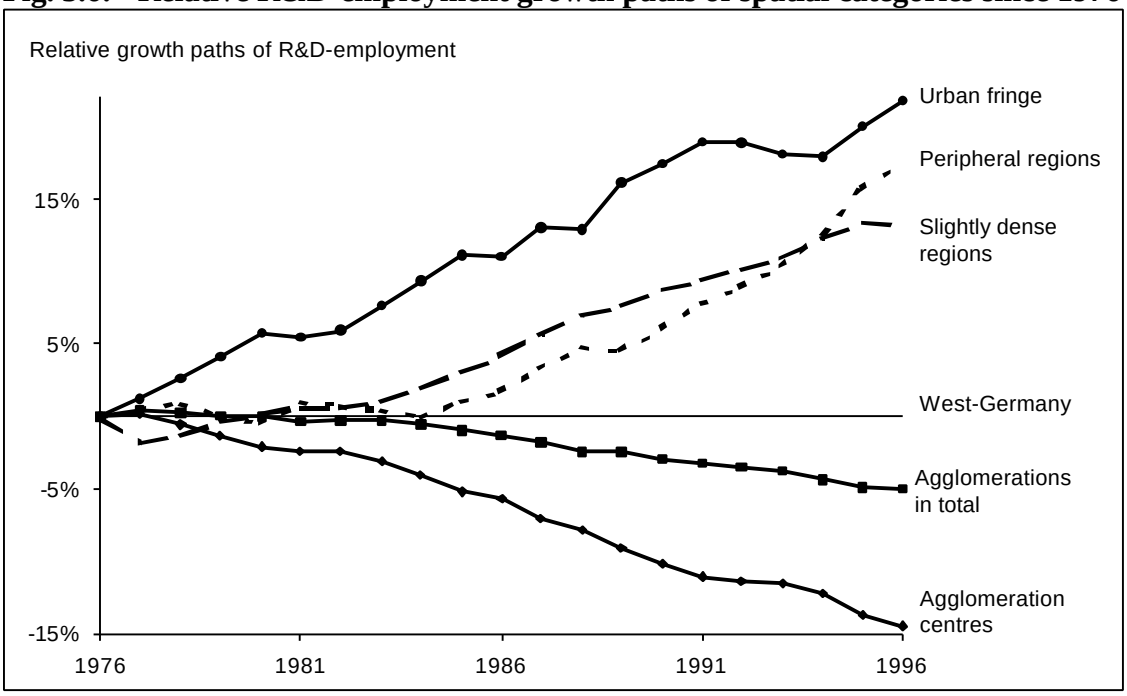


Source: Employment statistic, own calculations

Of course the approximation of human capital - measured by educational level solely - neglects personal qualities like capacity and motivation. Furthermore, the formal degree of employees provides no information about the characteristics of the corresponding work place. The frequently cited example of the taxi driver with an academic degree demonstrates that education only contributes to an increase of human capital, if the ac-quired skills are actually used in the production process. Additionally considering the functional characteristics of a work place remedies this deficit, because the function

measures the real occupation of an employee. In this context research and development (R&D) is a widespread indicator. The importance of R&D bases on the technical ability of enterprises to innovate, which results in the development of innovative products and processes. The innovative potential of the staff is in fact no guarantee for economic su c-cess of an enterprise, but it is - particularly with regard to technological change - an important precondition for a successful development.

Fig. 3.6: Relative R&D-employment growth paths of spatial categories since 1976



Source: Employment statistic, own calculations

The expansion of R&D-employment is - like the rising qualification of work force - a common and apparent trend of structural change. Between 1976 and 1996 the number of employees in R&D in West-Germany increased by roughly 74%. The development of spatial categories exhibits a pattern that closely resembles the general spatial tendencies of human capital measured by the degrees. Over the entire period the agglomeration centres and the agglomerations in total constantly attain a below-average growth of R&D-employment, while all other spatial categories realise growth rates above national average (see Figure 3.6). Slight deviations from the spatial growth paths of human capital can be observed for the regions outside the agglomerated areas. For R&D-employment the favourable development outside the large agglomerations sets in d e-layed, particularly for peripheral regions. Whereas above-average growth of highly

skilled employment is noticeable since the beginning of the observation period, signif i-cant (relative) gains in R&D-employment become evident not until the 1980s. However, for the change over the entire period this is of minor importance: the peri pheral regions achieved an almost identical increase of the share in national amount for both R&D and highly skilled employment (+18% resp. +21%).

It can be stated that the spatial development of human capital indicators is characterised by significant similarities. The agglomeration centres are definitely the loosers of spatial structural change. Over the whole period analysed their growth was below national a v-erage. The impressive increases of the urban fringe can not compensate for the unf a-vourable development of the agglomeration centres. As a consequence the share of a g-glomerations in national human capital declined continuously. Summarising, the central tendencies of spatial structural change - on the one side (relative) gains of urban fringe and peripheral areas, on the other side (relative) losses of agglomerations and their ce n-tres - prove to be very stable for human capital on the level of spatial categories. T he stability of spatial structural change suggests that the deconcentration process of human capital, which is one of the most important regional conditions for coping with techn o-logical change, will continue in the near future.

4. CONCLUSIONS

The empirical results of the present paper reveal that the long-term process of spatial deconcentration has not come to an end. Despite fundamental changes of the general economic conditions - like establishment of the common market or the opening of Eas t-ern European countries - the relative growth paths of spatial categories are extremely stable. The deviations from the development trends rather indicate further spatial deco n-centration in disfavour of agglomerations. The concerns that economic conditions changed to the debit of rural-peripheral regions and cause an extension of regional di s-parities have not proven to be just ified so far.

Furthermore, spatial deconcentration applies as well to essential factors of regional growth prospects like highly skilled labour or R&D. As for the quantitative indicators above-average growth of these crucial factors is not restricted to the urban fringe. Also regions that are characterised by a disadvantageous peripheral location realise a favou r-able development. So both past development from a quantitative perspective and spatial

structural change of human capital point to a sustained decline of regional disparities in West-Germany.

Irrespective of the definitely positive findings for peripheral regions we ought to be cautious for several reasons. First, there are exceptions from the rule, i.e. some peripheral regions deviate from the above-average development observed for the corresponding spatial category. Therefore, the process of deconcentration, that characterises regional growth *on average*, should first of all be considered as an encouraging sign. In contrast to the traditional prejudices concerning backwardness and poor growth prospects of peripheral regions the deconcentration proves that rural areas are able to attain the prerequisites essential in a setting of rapid structural and technolog ical changes.

Second, the below-average development of the agglomeration centres frequently implies an absolute increase of the variable analysed, especially when qualitative indicators like income per capita or human capital are considered. Apart from periods of severe recessions the amount of these variables increases in the agglomeration centres. Only employment differs from the other indicators in this respect. Whereas in the long term employment in total tends to decline in the agglomeration centres, the number of highly qualified employees and the amount of jobs in sophisticated service functions will probably increase further - even though below-average.

Finally, it has to be considered that regarding the share of high-quality jobs in total employment there still exist significant disparities between agglomerated and rural areas. Although at first glance it seems paradox, these differences more likely tend to widen than to weaken in future. This development is an inevitably consequence of the still growing amount of these activities in agglomerated areas. Even a below-average growth rate of agglomeration centres will cause an increasing gap between the shares of high-quality jobs in total employment (measured by percentage points). Due to the general increases of income, the same coherence applies to the regional differences in per capita income despite the detectable b-convergence. Studies of regional disparities usually analyse convergence from a relative perspective. Such an analysis applied to generally growing economies is continuously confronted with a possible (seeming) contradiction: relative convergence might coincide with divergence of absolute levels. So, the issue of convergence or divergence remains frequently a matter of interpretation as well (see *Bröcker* 1998: 108-109).

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