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**Hermann Knödler
Ulrich Albertshauser**

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HWWA DISCUSSION PAPER

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Contents

	Page
1 Introduction	7
2 Regional economic development and FDI flows	7
2.1 Theoretical approaches to FDI	8
2.2 Theoretical approaches to regional development	10
2.3 Agglomerations, FDI flows and regional effects	11
2.3.1 FDI flows and regional development	11
2.3.2 Agglomerations and regional development	12
2.3.3 Interactions between agglomeration effects, FDI flows and regional development perspectives	14
3 Database and regional classification for FDI-activities	15
3.1 <i>INDAT</i> -database	15
3.2 Regional classification	15
4 Classification of West German regions: winners and losers	17
5 Empirical results	20
5.1 Economic performance of FDI-active, FDI-controlled and FDI-passive manufacturing firms	20
5.2 Industrial agglomerations and periphery: Shares of multinational enterprises	21
5.3 FDI and regional economic growth in 31 West German regions (NUTS 2)	22
5.4 Development perspectives by 31 West German regions (NUTS 2)	26
5.5 Long term development perspectives	27
6 Conclusions and policy recommendations	29
Appendix	33
References	37
List of Tables	
Table 1: FDI flows and classification of regions	19
Table 2: FDI and economic performance in different types of firms 1986 to 1996	20
Table 3: Shares of multinational firms in agglomerated and peripheral regions (1996)	22
List of Figures	
Figure 1: Regional agglomeration balance	13
Figure 2: Interactions between agglomeration effects, FDI flows and regional development	14
Figure 3: Regional classification and firms' data	16
Figure 4: Winners and losers among West German regions in the process of industrial glocalisation	26
Figure 5: Long term development perspectives of West German regions: Market access to economic growth regions (indicator m^{ij})	28

Summary

The present paper examines the economic development perspectives of the manufacturing sector of 31 major West German regions in the process of globalisation. Public statistics do not provide FDI data on a regional basis. Therefore our study was based on indicators based on the data from the *INDAT*-file which gives information about some 6,500 West German manufacturing firms in 1986, 1990 and 1996. The paper draws a stylised picture of the regional structure of West German FDI involvement in the manufacturing sector.

The present participation in glocalisation benefits and the mid term development perspectives showed that Hamburg, Darmstadt and Oberbayern belong to the winners of glocalisation. In order to evaluate the long term development perspectives of the industrial cores we checked which regions had far above average access to the future growing areas of the world through FDI outflows. It turned out, that Oberbayern, Stuttgart and Hamburg face the best long term perspectives.

Between 1986 and 1996 disparities between the investigated regions with regard to their integration in the global division of labour through FDI-flows have decreased, especially between peripheral regions.

Zusammenfassung

Die vorliegende Studie untersucht die ökonomischen Entwicklungsperspektiven des Verarbeitenden Gewerbes von 31 westdeutschen Regionen im Globalisierungsprozess. Die amtliche Statistik liefert keine regionalen Direktinvestitionsdaten. Daher basiert die vorliegende Untersuchung auf Indikatoren der Unternehmensdatenbank *INDAT*, die Informationen über rund 6500 westdeutsche Industrieunternehmen für die Berichtsjahre 1986, 1990 und 1996 enthält. Die Studie zeichnet ein Bild der regionalen Verteilung des Direktinvestitionsengagements im westdeutschen Verarbeitenden Gewerbe.

Die gegenwärtige Partizipation an den Glocalisierungsgewinnen und die mittelfristigen Entwicklungsperspektiven zeigen, dass die Regionen Hamburg, Darmstadt und Oberbayern zu den Gewinnern der Glocalisierung gehören. Um die langfristigen Entwicklungsperspektiven industrieller Kerne im Glocalisierungsprozess zu bewerten, untersuchen wir den Marktzugang zu den zukünftigen globalen Wachstumsregionen durch Direktinvestitionen. Hier zeigte sich, dass die Regionen Oberbayern, Stuttgart und Hamburg die besten langfristigen Entwicklungsperspektiven aufweisen.

Zwischen 1986 und 1996 haben sich die Disparitäten zwischen den untersuchten Regionen hinsichtlich ihrer Integration in die internationale Arbeitsteilung durch Direktinvestitionsströme verringert, insbesondere zwischen peripheren Regionen.

JEL-Codes: F23, O18, R11

Keywords: Regional Development, Agglomeration, Glocalisation, Manufacturing, Foreign Direct Investment

1 Introduction

Within the ongoing process of globalisation national borders lost importance in the global competition for international investment capital. At the same time regional determinants of location quality gained importance for multinational enterprises (*Lammers* 1999, pp. 30) which have been the driving forces of the globalisation process. Therefore, economists addressed global competition between regions for investment capital more intensively in recent years. In this context of increasing factor mobility the immobile regional factors show increased importance. The notion of “glocalisation“ reflects this regional perspective.

The major objectives of our paper are to work out, empirically, the different positions of the manufacturing sector in 31 West German regions with regard to foreign direct investment (FDI) flows and to evaluate regional manufacturing’s development perspectives within the system of global division of labour. Also, we give first empirical findings of regional disparities in FDI activities based on the INDAT file which cannot be gained from public statistics.

As regional development potentials cannot be observed directly, we choose FDI-related indicators from the INDAT-file to identify the future development potential of the investigated regions. The starting point of our analysis is FDI and its impact on regional economic development (section 2). We assume FDI to have positive impact on regional economic development and get empirical support for our assumption. Database for regional FDI activities and regional classification are essential for the study (section 3). Based on these considerations we define four types of regions which take different positions in the system of global division of labour (section 4). We then proceed with an analysis of the databank INDAT, which allows the attribution of 31 West German regions to the four types of regions. Thus we are able to identify winners and losers among the investigated regions (section 5). We do not intend to explain the existence of agglomerations by theoretical modelling.

2 Regional economic development and FDI flows

The new concept of glocalisation is almost unknown in economic science. It was the *World Bank* which placed “localisation“ alongside “globalisation“ and hence attracted public attention to the idea of “glocalisation“ (Handelsblatt 1999, p. 10). Therefore, a

theory of glocalisation can not be expected up to now, but there are different theoretical strains. In order to process “glocalisation“ theoretically, economists should have a look at theoretical approaches for both globalisation and regional development. Theoretical approaches for globalisation often make a start with the theory of multinational enterprises. We have chosen FDI based indicators to examine regional glocalisation perspectives because of their extraordinary dynamics compared with other economic developments and because FDI represents the process of globalisation in an impressive way.

2.1 Theoretical approaches to FDI

FDI is defined as cross-border investment by domestic firms abroad. In order to separate FDI from portfolio investment, FDI is characterized by a lasting interest of the investor. In practice FDI is reflected in takeovers or equity participation of existing foreign enterprises, or in the establishment of new enterprises in foreign countries by domestic firms. The purpose of domestic firms doing investment abroad is to gain control over economic decisions of foreign firms or affiliates. As the control-orientation of FDI cannot be identified when collecting FDI data, it is common statistical practice to accept all capital flows with a minimum level of 10% of the entitled shares as FDI. If a domestic enterprise holds at least 10% of the shares of at least one foreign company we talk about a multinational enterprise.

We distinguish between FDI capital leaving a certain country or region (FDI outflows = capital exports) and FDI capital that flows into a certain country or region (FDI inflows = capital imports). There have been many theoretical explanations for FDI. A glance at some relevant literature of recent years suggests that there have been about 40 different explanations for FDI, some of them turning out as combinations of other existing approaches (*Knödler* 1999b, p. 18). For the present study we refer to three theoretical approaches which are either popular in literature or useful for our purpose, or even both: (1) *Vernon*‘s product cycle approach; (2) *Dunning*‘s eclectic paradigm; (3) company size approach. As we argue on a microdata basis, it makes sense to explain FDI and its impact through theoretical approaches related to single firms.

(1) *Vernon*‘s product cycle approach explains FDI as a firm’s reaction to product imitations by rivals, or to a drop in sales because of domestic market saturation. A product innovation, which is in an advanced stage of the product cycle after successful market introduction and standardisation of production, could require FDI for two reasons:

Firstly, domestic markets could be supplied at lower prices by a network of traditional expensive domestic production plants and new foreign production plants with lower production costs. This leads to relatively lower consumer prices by mixed calculation which could increase total sales again. Secondly, there is a chance of increasing exports through foreign sales affiliates which are closer to the local markets (cf. *Adebahr* 1981, pp. 113; *Deitmers* 1982, pp. 208). Actually a positive relation between FDI and exports has been observed empirically (cf. *Gundlach/Nunnenkamp* 1994, pp. 212; *Härtel/Jungnickel* 1998, p. 124). Empirical support for the product cycle approach is rare, because real enterprises produce several products at the same time, which are at different stages of the cycle. Thus, FDI flows are difficult to relate to single FDI-projects and product innovations.

(2) *Dunning*'s eclectic paradigm explains FDI by a simultaneous occurrence of three necessary conditions for a domestic parent company: (I) Company-specific competitive advantages, e.g. product innovation, management know-how; (II) internalisation advantages, e.g. protection against foreign cooperation partners who might imitate the domestic firm's competitive advantage; (III) location advantages, e.g. lower labour costs, faster working bureaucracy (cf. *Dunning* 1991, pp. 120-125).

(3) According to the company size approach, bigger companies realise various advantages compared to small and midsize enterprises. These advantages result from more experience in doing business in foreign markets and from bigger financial resources. So it can easily be understood that small manufacturing firms with little experience in foreign markets will hesitate to undertake FDI (cf. *Fujita* 1998, pp. 140). There are empirical findings which support these considerations (cf. *Knödler* 1999b, p. 33; *Löbbecke et al.* 1997, p. 142).

These theoretical approaches can be used to explain different kinds of FDI, e.g. establishment of foreign production plants or equity participation at foreign trading companies. Modifications of these theoretical approaches could also help in understanding national investment flows between different regions within a country, certainly with different emphasis because the location disparities will be smaller within a country than between regions from different countries.

2.2 Theoretical approaches to regional development

Regional sciences' perspective defines a region as a certain group of locations that have common facts related to economic, social or geographic issues. A certain density of population or industry in a regional urban area is called agglomeration. Regional economic growth disparities are in the focus of regional sciences. In the 1990s spatial issues gained importance in the economic field of research and theoretical explanation. This emerged the "new economic geography". Major possible causes for the development and agglomeration disparities of regions could be seen in the following theoretical aspects:

- (1) Emergence of agglomerations by the neighbourhood principle, i.e. minimisation of local distance transaction costs, or more generally, by backward and forward linkages. This decrease of costs leads to advantages of localisation and urbanisation that attract further settlements of manufacturing firms in the same industry and its direct suppliers as well as other industries and service sector firms.
- (2) Interaction models are based on different kinds of gravitation approaches which explain the interactions via economic flows between regions through interaction potentials, number and size of economic opportunities and translocation.
- (3) Regional polarisation theory explains regional disparities by different kinds and mobility of growth determinants. A result of such polarisation processes could be the growth of agglomerations at the cost of the surrounding peripheral area.
- (4) New economic geography assumes industrial firms to produce with increasing returns to scale which implies imperfect competition.

The decrease of transport and communication costs is seen to be a major condition for the globalisation process (cf. *Duwendag* 1998, S. 513). That's why the minimisation of transaction costs seems to play a subordinate role for the emergence of agglomerations today. Neither the emergence of new agglomerations nor their fast decomposition can be observed nowadays, at least not in Europe. Maybe the growth of European agglomerations in the 20th century has been related to sunk costs of a high level which prevent a fast decomposition. It might also be possible that European agglomerations, in spite of the process of globalisation, still offer certain advantages to firms. Decreasing transport

costs might improve the competitiveness of industrial enterprises located in the periphery and thus lead to deglomeration processes (cf. *Krieger-Boden* 1999, p. 238).

2.3 Agglomeration, FDI flows, and regional impact

The impact of FDI flows and agglomerations on regional development will finally concern all economic macro- and micro-variables. Our theoretical pre-considerations suggest the following conclusions for the interactions between agglomeration effects and FDI flows with regard to regional development.

2.3.1 FDI flows and regional development

According to the eclectic paradigm, realising FDI abroad requires company-specific competitive advantages. The product cycle approach even relates directly to product innovations. Opening up foreign markets raises the domestic export production in case of sales affiliates abroad. Taking foreign production plants into account will drop total production costs which creates an additional market potential to be served. This implies that a higher share of multinational enterprises within a certain region increases the number of innovative and export oriented firms. We assume these multinational firms to show a better domestic economic performance compared to uninautational firms, which leads to growth and welfare gains in the regions concerned through FDI outflows. The product cycle approach indicates negative regional welfare effects in a short term perspective if domestic production is relocated abroad. In a long term perspective we have to keep in mind that all regional production plants of the concerned firm might have to be closed down if foreign locational advantages are not used.

FDI inflows mean a transfer of technological and managerial know-how into the recipient region which will in a long term perspective induce additional growth effects. Empirical research supports the existence of local spillovers in technology (cf. *Niebuhr* 2000, p. 7; *Welsch* 2000, pp. 50-52). Also, dynamic processes through positive externalities out of the transfers mentioned before will accelerate the growth effects. The diffusion of these effects to the real economic development is difficult to measure and works only in the long run. If *Dunning*'s eclectic approach holds true, FDI-inflows originate from firms with competitive advantages, e.g. product innovations. In this case, taking monopolistic prices might be seen as disadvantage for customers in the FDI re-

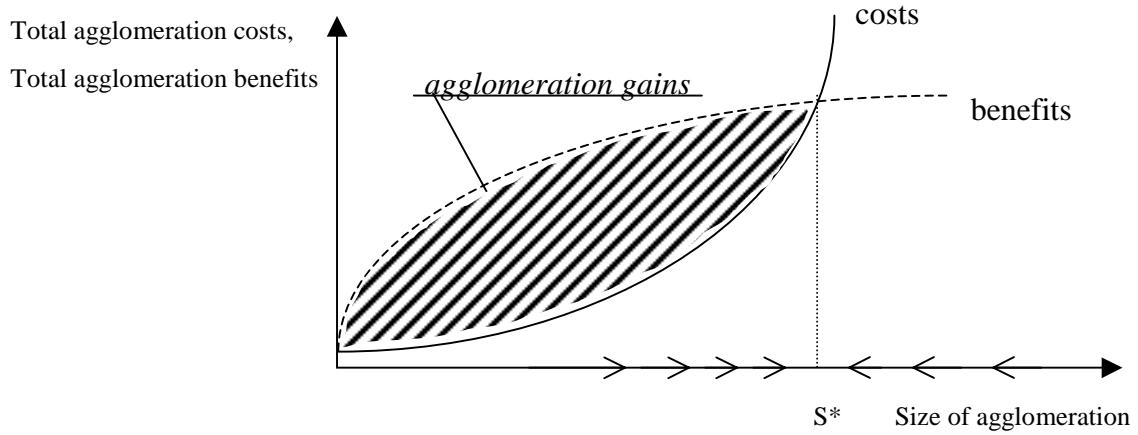
cipient region. This point of view has been widespread in the 1970s, but in the 1990s FDI inflows were seen more optimistic because of complementary effects to local firms, even empirically based on case studies or panel data research (cf. *Aitken/Harrison* 1999, pp. 605-606; *Markusen/Venables* 1999, p. 336). On the other hand, deliverance of these product innovations through foreign exports would increase regional buyers import expenses by rising transportation costs, or there would even be welfare losses because of non-availability of certain goods or knowledge.

2.3.2 *Agglomerations and regional development*

For the present study regional sciences' approaches suggest that agglomerations offer economic advantages for firms located in the agglomerations compared to firms located in the periphery. For the manufacturing sector there are neighbourhood advantages because of supplier relations to other manufacturing firms (localisation advantages). There are also general agglomeration advantages which include a bigger labour supply as well as better infrastructure services (urbanisation advantages). These agglomeration advantages state external economies and improve the supply-side conditions for manufacturing firms (centripetal forces). On the other hand, agglomerations cause agglomeration disadvantages (external diseconomies, centrifugal forces), e.g. higher ground and labour prices or narrow capacities in infrastructure because of overcrowding (cf. *Krieger-Boden* 1999, pp. 237-238; *Krugman* 1998, pp. 8-12; *Moomaw/Shatter* 1996, pp. 13-17). The effects described above will improve the economic performance of enterprises inside agglomerations, if agglomeration costs do not exceed agglomeration advantages. Agglomeration advantages might thus reflect in a circle of industrial concentration or in a self-reinforcing process (cf. *Lammers/Stiller* 2000, p. 12; *Puga* 1999, p. 305). These developments can also be expressed by the concept of the "agglomeration balance": This concept describes the result of offsetting agglomeration advantages against disadvantages in a region (Figure 1).

We assume that total agglomeration benefits increase with the size of an agglomeration with strict positive but decreasing rates. Agglomeration costs also increase with the agglomeration size, but with increasing rates. S^* represents the optimum size of an agglomeration: the total costs and benefits of the agglomeration sum up to zero. Left of S^* an agglomeration will continue to grow (marginal agglomeration gains), right of S^* an

Figure 1: Regional agglomeration balance



agglomeration will get smaller. These developments are indicated by the arrows besides S^* . Increasing agglomeration costs will make the surrounding periphery of an agglomeration more attractive to be a manufacturing location. Also, peripheral regions must offer a compensating wage differential in order to attract firms and investment. (Krugman/Venables 1990, p. 57). This process leads to growing agglomerations: What once has been periphery is then part of an agglomeration with bigger stretch.

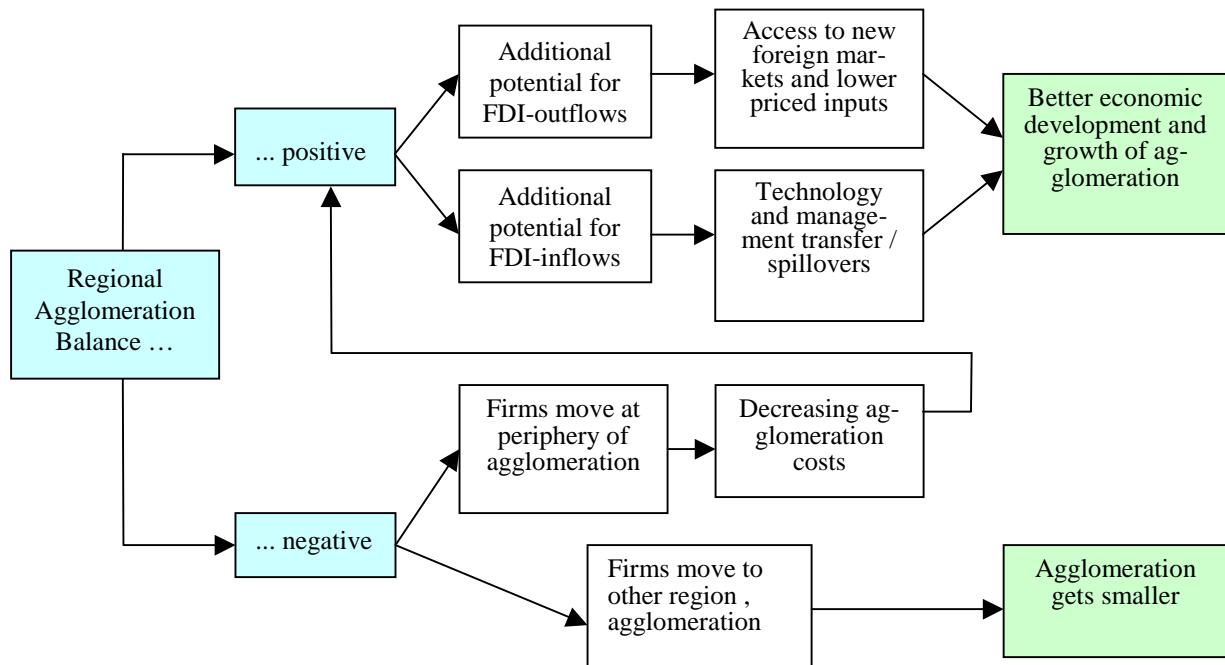
It could therefore be expected that manufacturing firms located in agglomerations might produce more successfully than firms in the periphery, and that agglomerations will continue to grow. We also suppose that the economic performance of agglomeration firms improves the more positive the agglomeration balance is. Furthermore the greater innovation potential of multinational firms supports the growth determinants which are important within the polarisation theory framework.

Figure 1 also illustrates the role of regional policy: Improving the regional infrastructure will lower the agglomeration costs and increase agglomeration benefits. This leads to a shift of the relevant curve(s) and to another optimum agglomeration size (cf. Müller 1977, p. 459).

2.3.3 Interactions between agglomeration effects, FDI flows and regional development perspectives

So, we conclude: Firms located in agglomerations have a special kind of competitive advantage compared to firms in the periphery because of agglomeration benefits. Therefore, the economic dynamics of agglomerations tend to be higher than that of peripheral regions. Additionally, agglomerations with positive agglomeration balances are superior to agglomerations with negative agglomeration balances. Growing integration in the global division of labour improves the development potentials of agglomerations because of the positive effects related to FDI. Figure 2 shows the assumed interactions between agglomerations, FDI flows and regional development perspectives.

Figure 2: Interactions between agglomeration effects, FDI flows and regional development



In order to identify the development perspectives of selected industrial agglomerations we focus on the role of FDI outflows and FDI inflows. We assume economic development perspectives to improve with the integration in the international division of labour through FDI flows.

3 Database and regional classification for FDI-activities

3.1 INDAT-database

The database on FDI-activities within the present empirical survey has been drawn from the manufacturing databank INDAT. This database contains information about sales, numbers of employees, FDI target regions etc. for up to 6,494 West German manufacturing firms with 20 or more employees for 1986, 1990 and 1996. Regional classification is available based on German postal-code areas and the official NUTS 2 classification used by Eurostat (cf. Table A3 in the appendix).¹ The total number of employees of all recorded firms sums up to more than 2 million for each year. Holding and group data have not been recorded. As information about monetary FDI flows and stocks has been difficult to obtain, the INDAT file only covers the criterion “multinational firm” (firms which own FDI, or firms controlled by foreign FDI) versus “uninational firm”. For most multinational firms there is information about the countries in which FDI stocks were held and about the function of FDI (with/without production abroad) in the years reported on. In some cases, information on the number of employees in foreign affiliates is available. For 1996 there are some 1,700 multinational firms out of a total of 6,494 manufacturing firms. The original data was collected from a commercial data suppliers’ publications and was then investigated and completed by a questionnaire. The data supplier’s information turned out to be very reliable (cf. *Knödler* 1999b, pp. 2-17).

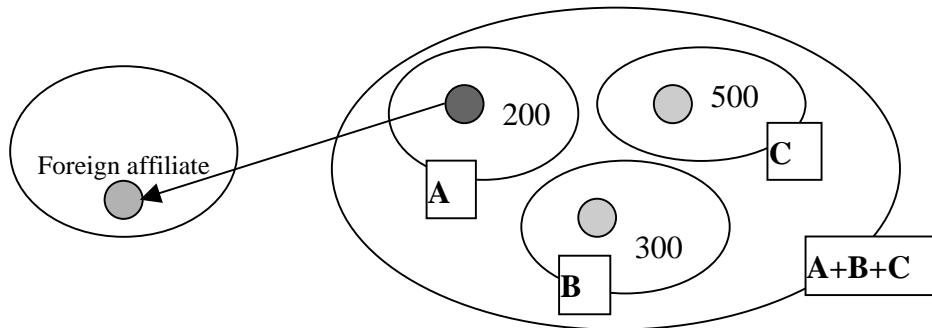
3.2 Regional classification

While even national FDI data from different sources sometimes make economists feel insecure (cf. *Jost* 1997, pp. 5-21), economists might feel even worse when investigating regional FDI activities and their effects. Even if official statistics could supply regional FDI data there would be statistical problems. Conclusions drawn from regional FDI data are restricted because the statistical data units “enterprise” or “group” might have production plants in many regions. This might cause data distortions because all of the sales, employees etc. of a single enterprise with plants in various regions might be recorded for the region where the firm’s headquarters is located. An attribution of all FDI related data of a single company to different regions with production plants seems neither statistically sensible nor realizable in practice. This problem is illustrated by Fig-

¹ The next year of report will be 1999; data will be collected in 2001. Also, regional classification will be available then on a NUTS 3 level.

ure 3. In our example the multinational firm's headquarters is located in Region A. The company runs one foreign affiliate abroad and three production plants in domestic regions A, B and C. The numbers indicate the number of employees at each location. If we define the investigated region only as region A, we make an attribution of the company total employment of 1,000 employees to region A, although only 20% of the employees are actually located in this region.

Figure 3: Regional classification and firms' data



Annotations: Regions A, B, C are domestic regions; numbers refer to regional employees of one multinational enterprise whose headquarters is located in region A.

Taking into account regions A+B+C as one regional unit (e.g. NUTS 2 region) will cover all domestic employees of the firm within one bigger region. Bigger regions improve data quality with regard to the coverage of all employees of an enterprise completely. On the other hand, there is a loss of regional information by levelled data, whereas smaller regional units bear the risk of coincidental data distortions (cf. Waniek 1995, pp. 16). As a consequence of bigger defined regions the number of regions will drop. If we were able to get statistical data for the three domestic local production plants in regions A, B and C (e.g. NUTS 3 regions) of the enterprise reported on, we would get into trouble with the identification of the foreign affiliate's impact to each of the domestic plants. Because of these considerations it is advisable for empirical FDI research not to define the investigated regions too small. The remaining statistical inexactness cannot be eliminated completely. In the present study we used FDI related data on the company level, i.e. no data for company groups, holdings and local plants. Also, we attributed all company employees and sales to the region where the headquarters of the companies were located.²

2 These distortions increase with the number of big firms in the database. In our study we took some 1,700 multinational enterprises out of 31 West German regions into account. Out of this file, some 10

Another aspect refers to growing agglomerations: if agglomerations get bigger by new firms settling at the periphery (cf. Figure 2), regional classification might be adapted to the agglomerations at present state. This aspect could be important for long-term studies.

According to the NUTS 2 classification of regions by Eurostat we differentiate between 31 West-German regions (cf. Figure 4, Table A1, A3).³ The INDAT file is currently not available for NUTS 3 regional classification.

4 Classification of West German regions: winners and losers

The classification of regions is based on their integration in the global division of labour. We used different measures for FDI-outflows and FDI-inflows due to data restrictions.

The identification of **FDI-outflows** in the present study has been measured by the number α of countries in which a region's industrial firms are represented by FDI on average, e.g.: firm A owns FDI-stocks in five countries, firm B owns FDI-stocks in one country and firm C owns no FDI-stocks abroad, so that on average each firm of the region is represented in two countries ($\alpha = 2$). The different regions are denoted by i , the single regional firms by j . The total number of regional firms is represented by f , the number of countries, in which firm j owns FDI-stocks, is given by C_{ij} .

$$\alpha_i = \frac{\sum_j C_{ij}}{f_i} \quad (1)$$

We use α as a proxy for FDI-activities abroad because no monetary FDI flow data by regions or agglomerations were available. Alternatively we could have estimated different levels of regional FDI-outflows by the share of regional firms that own FDI-stocks

firms had more than 5,000 up to 10,000 domestic employees, some 10 firms had more than 10,000 domestic employees in the year of report 1996. So we suppose, that the distortion through the problem mentioned before is rather small. Also, the big German chemical enterprise BASF AG recently published data indicating that about 42% of all employees of the holding are employed at the company headquarters at Ludwigshafen (Handelsblatt 2000, p. 16). That's another argument that the headquarters location is at least an important location of big firms' production plants.

³ There has been one exception from the NUTS 2 classification concerning Berlin: We only refer to West Berlin manufacturing firms so that we took the NUTS 3 code DE301 for West Berlin (instead of DE3 = Berlin).

abroad among all regional firms. Using the number α of countries in which firms are represented by FDI allows to differentiate between different levels of firms' FDI activities. Bigger domestic firms usually are represented in more countries through FDI than smaller firms and invest bigger monetary FDI volumes abroad (cf. *Knödler* 1999b, p. 38). Also, if a firm owned FDI-stocks in the beginning of a certain research period and expanded FDI-activities to other countries until the end of the research period, we are able to catch this higher activity by the α -values, which would not be the case when using the share of regional firms which own FDI-stocks abroad. With our indicator α we are not able to identify additional FDI-outflows to countries, in which a firm has been investing before.

It is interesting to compare the change of the indicator α and the share of firms, which held FDI-stocks abroad, with the change of the monetary FDI-stocks held by German manufacturing firms abroad. For the manufacturing sector we get an increase of the monetary German FDI stocks abroad from 91,815 to 186,741 million D-Mark (+103%) between 1986 and 1996 according to Bundesbank statistics (*Knödler* 1999a, p. 29). The share of West German manufacturing firms, which held FDI-stocks abroad, increased from 18.8% in 1986 to 26.3% in 1996 (+39.9%) according to the INDAT-file (*Knödler* 1999a, p. 52). The α -value increased from 0.55 in 1986 to 1.09 in 1996 (+98.2%) according to the INDAT-file (cf. Table A2). Therefore we assume the α -value to be a reliable proxy to describe regional changes and differences in FDI-activities of regional manufacturing firms.

We measured regional disparities of **FDI-inflows** by the share β of foreign affiliates among all industrial firms of a certain region i . The number A of foreign affiliates within a certain region i is related to all regional industrial firms f .

$$\beta_i = \frac{A_i}{f_i} \quad (2)$$

As the INDAT-file gives no information about foreign investments in German manufacturing firms with equity participation up to 50%, we have only information about foreign affiliates and not about all manufacturing firms which are partially owned (equity participation <50%) by foreign investors. As there is a global trend for takeovers we assume that the role of partially foreign owned German manufacturing firms has been decreasing in the period reported on (cf. *Wortmann* 1999, p. 113). Also, the role of newly established production firms (Greenfield investments) by foreign FDI-inflows to Germany is probably rather small and therefore does not harm our conclusions drawn

from the β -values. Compared to the monetary values of foreign FDI-stocks in the German manufacturing sector, the β -value of 5.1% in 1986 and 5.8% (+13.7%) (source: analysis of the databank INDAT based on 6,494 West German manufacturing firms) seems to be an acceptable indicator of FDI-inflows to the German manufacturing sector between 1986 and 1996. Actually, foreign FDI stocks in the German manufacturing sector amounted to 63,474 million D-Mark in 1986, and to 104,915 millions D-Mark in 1996 (+65.3%) (Deutsche Bundesbank 1992, p. 25; 1998, p. 47).

There are different ways to identify winners and losers among the investigated regions. As a reference ratio we use the average shares of α and β for the examined 31 regions. Based on these considerations we classify four types of regions, which we assume to have different development perspectives depending on their α - and β -values. The classification is shown in Table 1.

In West German manufacturing FDI outflows reached a far higher volume than FDI inflows during the last two decades (cf. Deutsche Bundesbank 1998, pp. 32, 66; *Duwendag* 1999, pp. 118-120; *Jost* 1997, pp. 5-7). These different levels of monetary flows and the assumption that FDI inflows have a more indirect long-term impact than FDI outflows are the reasons why we assume FDI outflows to be more important for the position of German industrial regions than FDI inflows.

Table 1: FDI flows and classification of regions

		β_i	
		below average	above average
α_i	below average	Region Type B (<i>Weak Integration</i>)	Region Type D (<i>Intermediate Integration</i>)
	above average	Region Type C (<i>Intermediate Integration</i>)	Region Type A (<i>Strong Integration</i>)

Regions Type A: Above average FDI outflows and inflows mean strong integration in the global division of labour and permit high participation in the welfare gains through glocalisation (“winners”)

Regions Type B: Below average FDI outflows and inflows mean weak integration in the global division of labour and prevent participation in the welfare gains through glocalisation (“losers”)

Regions Type C: Above average FDI outflows and below average FDI inflows mean intermediate integration in the global division of labour and permit a restricted participation in the welfare gains through glocalisation because of a lack of FDI inflows (“potential winners”)

Regions Type D: Below average FDI outflows and above average FDI inflows mean intermediate integration in the global division of labour and permit a restricted participation in the welfare gains through glocalisation because of a lack of FDI outflows (“potential losers”)

This classification does not explain the causes of the different regional development perspectives. Regional sciences suggest various reasons for different regional scenarios. Even historical accidental or irrational events could intensify different regional structures and influence current and future development perspectives. In the context of this paper, the endowment of a region with specific factors might be responsible for the identified differences in the economic integration through FDI. This does not restrict our conclusions for the development perspectives of regional manufacturing firms in the process of glocalisation.

5 Empirical results

5.1 *Economic performance of FDI-active, FDI-controlled and FDI-passive manufacturing firms*

Based on the INDAT-file we first had to check whether our theoretical reflections about the economic performance of domestic manufacturing enterprises are correct. In order to figure this out, we compared the average change of sales and employment between 1986 and 1996 of domestic firms that hold FDI stocks abroad („FDI-active firms“) with the performance of affiliates owned by foreign enterprises or groups („FDI-controlled firms“) and uninational firms („FDI-passive firms“). The results are shown in Table 2. It is obvious that FDI-active firms showed a better performance than FDI-passive firms with regard to sales and employment numbers. Consequently, our presumptions that FDI leads to a better economic performance through company-specific advantages and the opening-up of foreign markets have been confirmed.

Table 2: FDI and economic performance in different types of firms 1986 to 1996

Type of firm	Change of employment 1986 – 1996	Change of sales 1986 - 1996
FDI-active	+12.9% (1,343)	+65.5% (1,038)
FDI-passive	+9.1% (3,893)	+61.2% (2,738)
FDI-controlled	+7.0% (301)	+59.6% (248)

Annotations: Changes 1986 to 1996 as averages based on single firms' data; sales data in current prices; numbers in parentheses: numbers of recorded firms for each kind of firm. Database: Data-bank INDAT; firms with employment and/or sales information in the years of report 1986 and 1996.

This does not hold true for FDI controlled firms which show a slightly worse performance in sales and employment than FDI-passive firms.⁴ The above-mentioned transfer effects of technology and management know-how cannot directly be shown with the available data. An indication for the potential of these transfer effects might be seen in the fact that FDI-controlled firms are characterised by a higher share of salaried employees than FDI-passive firms, i.e. relatively higher qualified workers are represented above average (44.4% versus 35.2% in all recorded firms; source: analysis of the data-bank INDAT; based on 442 FDI-active and 953 FDI-passive firms in the year of report 1996).

5.2 Industrial agglomerations and periphery: Shares of multinational enterprises

Based on the theoretical pre-considerations there are different kinds of agglomeration advantages. Hence, the share of FDI-active and FDI-controlled firms is probably higher in agglomerated areas than in the peripheral areas. As the regions according to the NUTS 2 classification do not only contain urban agglomerations we checked the share of multinational enterprises for two groups of regions in the NUTS 2 classification. We decided to accept the 15 regions with the highest density of population as agglomerated regions, the 16 regions with the lowest density of population as peripheral regions.

A comparison between the shares of the 15 agglomerated regions and the other regions (= periphery) shows for the year of report 1996, that in agglomerations 31.3% of all recorded enterprises held shares of FDI abroad (periphery: 25.4%) and that 9.1% of all recorded enterprises were FDI-controlled firms (periphery: 4.6%). Obviously agglomerations are more strongly integrated in the global division of labour than the periphery. The results are given in Table 3.

⁴ The data does not allow conclusions about productivity gaps between the three types of firms because sales include inputs obtained from other firms in the production chain. Increasing division of labour and hence buying more inputs from other firms could raise sales but not productivity. Additionally, FDI-controlled firms in the manufacturing sector often support high technology goods and Research & development services so that their productivity is difficult to compare with the productivity of FDI-active and FDI-passive firms. Also, the data in Table 2 does not differentiate industries, company sizes and level of equity participation which influence productivity (cf. Aitken/Harrison 1999, pp. 609-617).

Table 3: Shares of multinational firms in agglomerated and peripheral regions (1996)

Type of region	Total number of recorded firms	Share of FDI active firms (%)		Share of FDI controlled firms (%)	
		1986	1996	1986	1996
Agglomerated regions*	4,172	20.6	28.4	5.7	6.3
Peripheral regions	2,322	15.8	22.3	4.2	4.9

Annotations: FDI active firms = firms that owned FDI stocks abroad; FDI controlled firms = firms owned by foreign investors (capital share 50% and more). Shares of firms: FDI active and FDI controlled firms related to all firms in the relevant regions.

*Agglomerated regions refer to the following NUTS regions (cf. Table A3 in the appendix): DE301, DE5, DE6, DEA1, DEA2, DEC, DEA5, DE71, DE11, DE12, DEB3, DEA3, DEA4, DE92, DE21.

Source: Analysis of the databank INDAT, total of 6.494 manufacturing firms; Eurostat 1999, pp. 68-77.

The gap in the shares of FDI-active firms between agglomerated regions and peripheral regions increased between 1986 and 1996 (4.8% to 6.1%) if measured in percentage points. The gap for FDI controlled firms has been about stable in the period reported on.

It is noteworthy that the share of German manufacturing firms which owned FDI-stocks abroad between 1986 and 1996 increased in all agglomerations reported on, while the share of manufacturing firms owned by foreign investors decreased in some agglomerations. This can be seen from Table A2 in the appendix.

Because of capital market liberalization and free trade we would expect disparities in regional FDI involvement to have disappeared since globalisation started off in the mid 1980s. Actually, the coefficients of variation for the regional shares of FDI-active and FDI-passive firms decreased between 1986 and 1996. But there have been significantly different developments between agglomerated and peripheral regions: disparities decreased much stronger in peripheral regions than in agglomerated regions (cf. Table A2 in the appendix).

5.3 *FDI and regional economic growth in 31 West German regions (NUTS 2)*

In order to check the empirical role of regional infrastructure, agglomeration, industry-structure and FDI-outflows on economic growth we estimated the following regression on the basis of 31 German regions. The interesting question is not so much the quantitative measurement of FDI's impact on regional growth but the direction and strength of

the correlation compared to other determinants. We neglect spatial associations in economic growth of neighbouring regions and technological spillovers which have been found for German regions (cf. *Niebuhr* 2000, p. 29). Also, we neglect the role of the regional service sector among the explanatory variables of regional growth. Subsidy payments from EU infrastructure programs probably do not have major impact on economic development of West German regions.

$$\text{GROWTH} = \beta_0 + \beta_1 \text{STR} + \beta_2 \text{AGG} + \beta_3 \text{IND} + \beta_4 \text{SIZ} + \beta_5 \text{OUT} + \beta_6 \text{INF}$$

The regional data is given by Table A1 in the appendix. Economic growth (GROWTH) refers to the average annual growth rate of the regional per-capita GDP at current prices between 1984 and 1996. Growth data originates from the Eurostat Statistical yearbooks of regions.⁵ The explanatory variables and their data sources are the following:

STR: The initial level of **infrastructure endowment** was taken from a comparison of EU infrastructure endowment in the mid 1980s. The indicator contains information about transportation, telecommunication, energy and education (*Biehl* 1995, pp. 70-72). We assume that infrastructure endowment cannot be changed rapidly so that regional disparities in the research period did not change dramatically. Depending on the agglomeration effects we expect increasing economic growth with better infrastructure endowment.

AGG: We measure the various grades of regional **agglomeration** through the density of population per km² (Eurostat 1989, p. 2) in the beginning of the period reported on. The theoretical influence of different levels of agglomeration on regional growth is undetermined because positive agglomeration effects could be compensated by overcrowding effects.

IND: The share of firms which belong to those **industries** that show a far above average FDI-activity. We expect a higher share of FDI-active and hence more successful firms with an increasing share of regional firms out of certain industries: The relevant major industries for FDI outflows are machinery, automotive and electronical industry (cf. *Knödler* 1999b, p. 26). These industries show a far above average share of FDI-active firms among all of each industry's firms and therefore might be more successful on

⁵ The average annual economic growth has been calculated for the research period 1984 to 1996 based on GDP per inhabitant at current prices (Eurostat 2000, pp. 40-42; Eurostat 1989, pp. 2-3). The original data was related to EU-averages and had to be transformed to regional GDP in ECU with GDP data from the European Commission (European Commission 1998, p. 243).

global markets. We included this parameter in our regression to figure out regional policy options, e.g. should certain industries be encouraged to settle down by local political and administrative authorities?

SIZ: The share of firms which belong to those classes of **company sizes** which show a far above activity of FDI flows. This class of company size is represented by firms with 500 and more employees for both FDI-active and FDI-controlled firms (cf. *Knödler* 1999b, p. 33; based on the year of report 1996; analysis of the databank INDAT). We expect a higher economic growth with an increasing share of regional firms which have 500 and more employees. This aspect refers to the company size approach of FDI outflows.

OUT: The increase of the average number α of countries in which regional firms are represented through FDI. Because of the dynamics of FDI outflows since the middle of the 1980s we used the change of the α -values for the regression analysis (see Table A1 in the appendix). We expect higher regional economic growth with increasing α -values.

INF: The increase of the share of FDI-controlled firms is used as an indicator for FDI inflows (see Table A1 in the appendix). We expect long-term positive growth effects, although weaker than coming along with FDI outflows.

The quantitative relations between the six determinants mentioned above are described by the following equation (t-values in parentheses):⁶

$$\text{GROWTH} = 2.84 + 0.0281 \text{ STR} - 0.0010 \text{ AGL} + 0.0375 \text{ IND} + 0.0268 \text{ SIZ} + 0.0038 \text{ OUT} + 0.0054 \text{ INF}$$

$$R^2 = 0.65$$

$$(2.86)*** \quad (-4.73)*** \quad (3.01)*** \quad (1.27) \quad (3.24)*** \quad (2.87)***$$

It turns out that there is a significant positive statistical correlation between regional economic growth and increasing FDI outflows for the investigated regions. This could either mean that more successful firms tend to invest abroad or that investment abroad makes firms more successful. Both cases indicate that regions with a higher FDI activity take better chances on their future economic development perspectives.

There is also a significant positive statistical correlation between regional economic growth and increasing shares of FDI-controlled regional firms. According to the

⁶ Significance levels of the two tailed test: *** 99% ** 95% * 90%

INDAT-file FDI-controlled firms were characterized by slower economic growth than FDI-active and FDI-passive firms (see Table 2). Hence the positive contribution of foreign manufacturing affiliates in West Germany might result out of technology spillovers.

A certain composition of different types of firms within an investigated region could show regional policy which kinds of firms should be supported in order to use glocalisation benefits for industrial cores. The results show that the share of big firms has no significant impact on regional growth. If we accept that bigger firms benefit from increasing returns of scale, this matter is not a major reason for regional growth disparities, at least not in our modelling framework. The industry structure in form of the share of above average FDI active industries did show the positive influence that we expected. Obviously the composition of agglomerations by different industries is responsible for different growth with regard to global division of labour in form of FDI outflows. These regional industry clusters often emerge from historic developments (cf. *Welsch* 2000, p. 47).

An increasing level of agglomeration slows down regional growth which is indicated by the negative sign of the coefficient for the agglomeration indicator used in the regression above. The benefits of regional growth of highly agglomerated regions are working out in neighbouring regions or work only in human capital intensive industries. Corresponding results have been found for the regional growth of employment (cf. *Bode* 1999, pp. 28-29; *Niebuhr* 2000, p. 28).

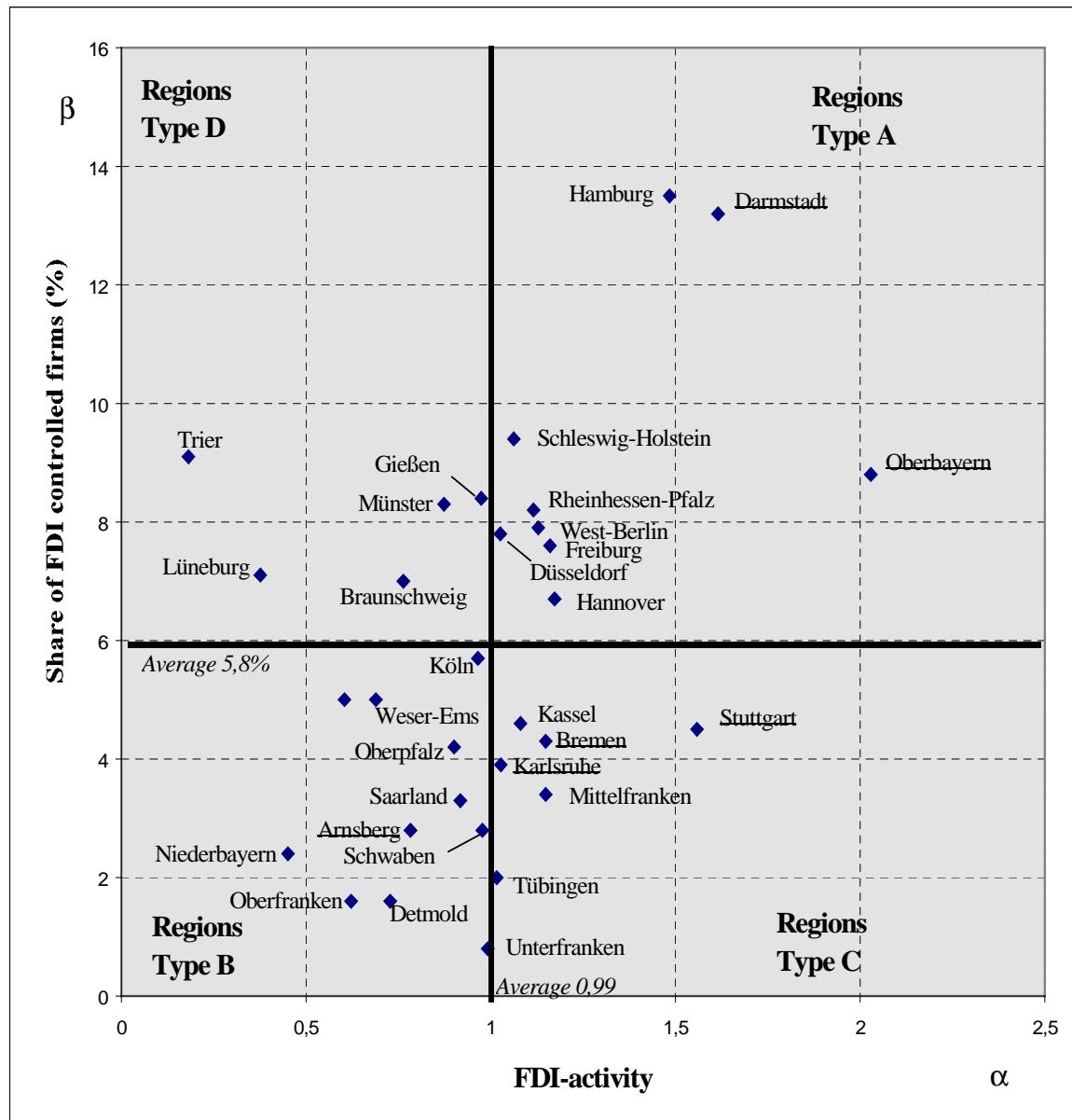
Better local infrastructure endowment supports regional growth because agglomeration costs decrease with better infrastructure endowment. The positive sign of the coefficient therefore could be expected.

Regional economic policy must therefore either support local firms which belong to globalizing industries or improve infrastructure endowment to create additional local productivity that might make firms invest abroad or attract foreign investment.

5.4 Development perspectives by 31 West German regions (NUTS 2)

The combination of the FDI-activity (α -values) and the shares of FDI-controlled firms (β -values) by regions on the NUTS 2 classification leads to the empirical results shown

Figure 4: Winners and losers among West German regions in the process of industrial glocalisation



Annotations: Rhombs (◆) represent the α - β -combinations for the year of report 1996; the black lines indicate the average values for the year of report 1996 (averages based on 31 regions); the data can be found in Table A1 in the appendix.

Underlined regions: agglomerated regions (= 15 regions with the highest density of population among the 31 regions investigated).

Source: Analysis of the databank INDAT.

in Figure 4 for the year of report 1996. Hamburg, Darmstadt and Oberbayern are characterized by an outstanding integration in the international division of labour. Therefore their industrial cores face good economic development perspectives in the further process of glocalisation. The reason for the good position of Oberbayern is that the industrial agglomeration of München forms the industrial core of this region. Darmstadt includes the industrial cores of Frankfurt area (cf. Table A3 in the appendix).

Niederbayern, Oberfranken and Detmold are the regions whose industrial sectors will be under pressure in the glocalisation process based on the winner-loser-classification given in Table 1.

There is a certain distortion in the regional classification because Berlin, Bremen and Hamburg represent NUTS 2 regions without their peripheral areas. Therefore it is problematic to compare the NUTS 2 regions directly when figuring out the development perspectives of industrial agglomerations in the glocalisation process.

5.5 Long term development perspectives

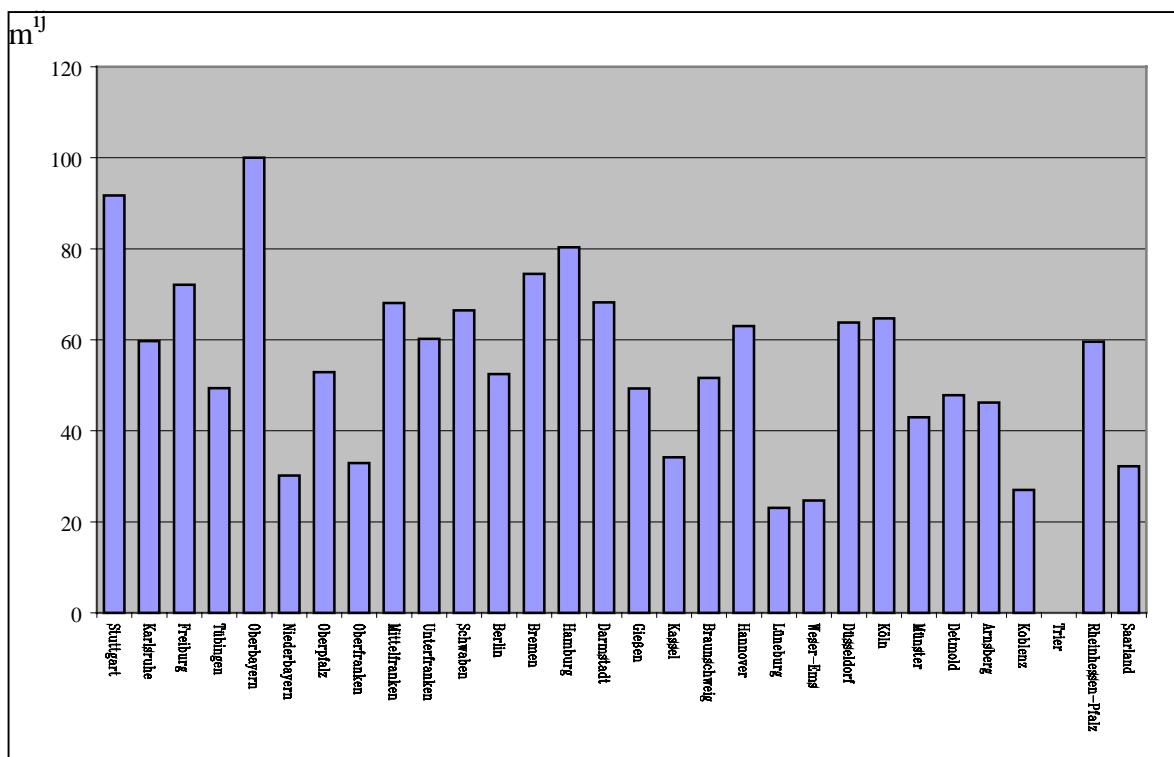
In order to get more information about the long term development perspectives of industrial regions we used an indicator m^{ij} which is based on the share of a region's FDI-active firms related to certain FDI target areas and the GDP_j of these areas j . The indicator increases with the share γ^{ij} of FDI-active firms in region i and with the GDP of the target areas j representing sales market potentials. We assume USA, China and the Asia and Pacific region to be major growing areas of the world economy in the long run. The shares of regional firms with FDI stocks in these target areas can be seen from Table A2 in the appendix. All GDP values refer to 1998, because no long term forecast about economic growth was available.

$$m^{ij} = \sum_j \gamma^{ij} GDP_j \quad (3)$$

The indicator represents the foreign market volume to which a region's firms have access through FDI. This could be called "market access indicator". Absolute levels of this indicator are not of interest for the current study. Therefore we set the highest m^{ij} -value equal to 100. With regard to the major global areas of economic growth we use the relative position of the investigated West German regions in order to evaluate the

long term chances of participating in global growth.⁷ The higher the value of the indicator m^{ij} , the more access does region i have to growing markets through FDI. In Figure 5 the results for m^{ij} and 31 regions are shown. If we accept the assumption that West German industrial agglomerations will benefit from the international division of labour in the next decades if they are well represented in the economically strongest growing areas, we have a clear result: Oberbayern, Stuttgart and Hamburg have the best access to the future growing areas of the world economy through FDI. The manufacturing sectors of Lüneburg, Weser-Ems and Koblenz will have problems to participate in the future growth areas mentioned before. Trier is not represented in these areas at all.

Figure 5: Long term development perspectives of West German regions: Market access to economic growth regions (indicator m^{ij})



Annotations: Indicator m represents the market access value to foreign markets through FDI by 31 West German regions; data can be found in Table A2 in the appendix.

Sources: Databank INDAT; World Bank 2000, pp. 230-231; own calculations.

⁷ This refers also to the question: How long is the long term perspective? In the present study we think about a period long enough to have significant impact on the domestic regions' economic development by relative high economic growth at foreign markets. Thus, long term in our framework is more than a decade, maybe up to the time of a *Kondratjeff* business cycle.

As we deal with a long term perspective, this conclusion holds true only under the proposition that the investigated regions keep their FDI activities on the present level. For the agglomerations of types B, C and D (cf. Figure 4) this has an important implication: There might be chances for these regions to catch up with the A-type regions by increasing their FDI activities in the above mentioned FDI target areas.

6 Conclusions and policy recommendations

Multinational enterprises can be seen as the link of regions and local authorities to the globalisation process. We now have to evaluate the empirical findings with regard to regional policy options. We do not address the question if regional disparities of integration in global division of labour should be compensated by political means. As far as we deal with market conform regional policies we accept regional competition. Subsidies are seen to be a rather important aspect in location quality out of the firms' point of view (cf. Grabow et al. 1995, p. 224). Furthermore, we cannot answer up to which extent FDI flows should be strengthened by regional policy. It is obvious that regional policy has no direct influence on company size and industry structure. There are only indirect possibilities to influence the before mentioned variables.

The regional FDI disparities observed in our survey do not only concern the difference between agglomeration and periphery. Data analysis also shows strong differences between the reported agglomerated regions. There are six major reasons to be taken into account discussing regional FDI disparities:

1. The agglomeration costs in the industrial regions type B are significantly higher than in Type A and their agglomeration balance is negative.
2. The industry structure of the region types A and B is very different. From the industry specific level of internationalisation a different integration into the global division of labour results and hence different development perspectives.
3. The manufacturing sector within a single region is able to transform the factor endowments via an evolutionary process into specific resources which increase international attractiveness. This ability is distributed unequally among the different types of regions.

4. The regions are characterised by a different quality of innovative potentials firstly to support the building up of local networks among the companies and secondly to supply the necessary institutional arrangements.
5. The regional specific policy of the various region types has impact on the global integration, e.g. subsidy payments, consulting and infrastructure services.
6. Local politicians might oppose FDI inflows because they fear a loss of influence. This kind of local protectionism does not only hinder the attraction of foreign capital and know how but also the attraction of global brainpower. Politicians might blame structural local problems on the globalisation and thus profit from local isolation in local and regional elections.

A detailed analysis of the agglomerations with regard to their specific factor endowments cannot be carried out within this framework. But some empirical studies seem to support our assumptions. A ZEW-study has investigated the local concentration of regional innovation potentials within Germany. Although the definition of the regions is different from the one in this paper, there are some similarities between our classification of A-type regions and the study's regions with a great variety of educational and research institutions (cf. *Beise/Gerke* 1998, pp. 20). In a historic perspective special industry clusters seem to be responsible for successful regional development (cf. *Welsch* 2000, pp. 46-48).

The six reasons concerning the regions' different international integration and welfare perspectives demonstrate that only a part of the competition factors can be changed by regional politics. Other variables are based on geographic or historic circumstances out of reach for an intervention. Additionally, regional policy and regional planning policy is confronted with the problem of uncertainty regarding the identification of special factors that limit a region's development.

(1) Inflows: The improvement of regional location determinants could attract foreign FDI capital. In this context there seem to be, in particular, opportunities of improving the regional infrastructure in order to make foreign firms invest in the region. The ideal scenario would be the establishment of new production plants. Takeovers of existing local firms can probably not be influenced by regional policy.

(2) Outflows: There is no way of influencing FDI outflows in a direct way because local firms make their FDI decisions autonomously. But there is still the possibility of improving regional supply side conditions to create additional financial resources, and hence, enable firms to open up foreign markets by export-oriented FDI outflows. Another regional policy strategy could be the attraction of future-oriented industries which are engaged to an above average extent in FDI.

As empirical surveys reveal, there are two major motivations for West German manufacturing firms to invest abroad: domestic labour costs and access to foreign markets. These major motivations seem to be of the same importance (cf. *Knödler* 1999a, pp. 75-79). Wage bargaining and company strategies are not to be influenced directly by local authorities. Therefore the possibilities for local authorities to make regional firms invest abroad are rather limited per se.

The regional policy options depend on the special conditions of attracting or realising FDI flows, on the transmission channels (direct vs. indirect) and regional factor endowments. This can be illustrated with the following aspects:

- Regional policy should support the development of “service-industrial-districts“ where innovative industrial cores as well as innovative service sectors guarantee stable employment (cf. *Dahte/Schmid* 2000, p. 288). This might push both FDI outflows and FDI inflows.
- An example for the support of company networks can be seen in the Enterprise Forum for the upper management established in Boston 1978 (cf. *Moss Kanter* 2000, p. 265).
- The West German city of Ludwigshafen negotiated several years with the French trading company Decathlon and recently allowed the establishment of a sales centre at the border of the city. Major argument for the decision has been the creation of 120 new jobs in order to compensate the loss of employment in the industry sector (*Schrott* 2000, p. 27).
- The general quality of life can be important for managers when deciding to stay in a certain regional plant. Then, quality of life (cultural, social and intellectual surrounding) keeps brainpower at a certain location (cf. *Moss Kanter* 2000, p. 278, with regard to the Boston area).
- Regular meetings of local politicians, researchers and top managers help to coordinate and to prepare important location and investment decisions from different points of view.

- Local authorities from Spartanburg/USA prepared the decision of the German automobile company BMW to establish the Spartanburg production plant on several informal contacts and visits abroad in 1992 (cf. *Moss Kanter* 2000, p. 335).

The empirical results suggest that it is necessary for industrial regions to achieve high shares of FDI-active and FDI-controlled firms. These results of our ex-post analysis should not be misunderstood in a way such as: If a bad-run and non-innovative local industrial firm could be moved to invest abroad through regional domestic authorities it will become a well managed and innovative high-tech-enterprise overnight. It is necessary for regional policy to support supply-side conditions and regional infrastructure. But this policy does not guarantee the success in order to take the chances of glocalisation. Our study confirms the role of regions in the process of globalisation and shows the necessity of regional glocalisation policies. The rising inequality among industrial agglomerations will be one of the major political challenges of the current decade that cannot be ignored because glocalisation might lead to further deindustrialization of peripheral regions.

Appendix

Table A1: Regional data and structure of investigated firms by regions

Region ¹	Average growth rate of GDP (%) ²	Index of infra-structure ³	Level of Agglo-meration (inhabitants per km ²) ⁴	Share of FDI-active industries (%) ⁵	Share of large firms (%) ⁶	FDI-activity (α -value) ⁷		Share of FDI-controlled firms (β -value; %) ⁸
						1996 / change	1996 / change	
<u>Stuttgart</u>	5.39	30.674	328	45.4	21.6	1.56	97.5	4.5 17.4
<u>Karlsruhe</u>	5.71	42.910	346	31.7	15.1	1.03	104.8	3.9 -18.8
Freiburg	5.48	28.343	201	33.2	13.1	1.16	83.4	7.6 13.0
Tübingen	5.82	25.783	171	36.6	19.1	1.02	133.6	2.0 -28.6
<u>Oberbayern</u>	6.42	35.933	211	33.0	21.2	2.03	101.0	8.8 17.4
Niederbayern	5.59	27.779	98	17.1	18.3	0.45	311.1	2.4 0.0
Oberpfalz	6.42	20.941	99	23.9	21.1	0.90	146.2	4.2 200.0
Oberfranken	6.17	21.379	144	16.6	17.1	0.62	103.4	1.6 200.0
Mittelfranken	5.34	26.116	209	23.6	24.1	1.15	57.5	3.4 50.0
Unterfranken	6.20	27.639	141	27.9	18.6	0.99	93.9	0.8 0.0
Schwaben	5.48	24.273	154	28.4	24.4	0.98	84.9	2.8 25.0
<u>Berlin1</u>	3.25	71.919	3,859	35.6	11.9	1.13	119.2	7.9 60.0
<u>Bremen</u>	5.48	74.922	1,640	40.4	12.8	1.15	92.9	4.3 0.0
<u>Hamburg</u>	5.43	100.000	2,102	20.6	23.8	1.48	64.0	13.5 0.0
<u>Darmstadt</u>	6.52	36.941	456	35.4	20.4	1.62	54.6	13.2 12.8
Gießen	6.52	25.077	179	30.3	18.5	0.97	286.7	8.4 11.1
Kassel	6.33	26.289	142	19.5	12.6	1.08	394.7	4.6 33.3
Braunschweig	5.06	31.551	198	22.8	26.3	0.76	128.9	7.0 33.3
<u>Hannover</u>	5.67	33.958	223	21.8	16.2	1.17	121.1	6.7 9.1
Lüneburg	5.55	26.138	96	22.4	12.9	0.38	220.0	7.1 -14.3
Weser-Ems	5.92	36.244	142	21.7	21.1	0.69	217.1	5.0 14.3
<u>Düsseldorf</u>	4.96	52.230	955	30.7	16.1	1.03	82.8	7.8 -2.3
<u>Köln</u>	5.27	43.219	527	31.3	15.8	0.97	71.4	5.7 33.3
<u>Münster</u>	5.11	40.042	248	24.8	17.4	0.87	97.1	8.3 46.2
<u>Detmold</u>	5.35	31.534	274	24.9	14.7	0.73	153.3	1.6 25.0
<u>Arnsberg</u>	5.13	35.329	446	35.3	14.8	0.78	113.4	2.8 16.7
Koblenz	4.94	25.271	167	18.0	15.8	0.60	35.5	5.0 16.7
Trier	5.01	24.459	95	11.4	13.6	0.18	166.7	9.1 33.3
<u>Rheinhessen-Pfalz</u>	4.15	35.437	263	19.0	15.0	1.12	80.2	8.2 9.1
<u>Saarland</u>	5.20	36.106	408	26.2	24.6	0.92	100.0	3.3 -33.3
<u>Schleswig-H.</u>	5.73	32.320	166	32.7	11.3	1.06	156.1	9.4 15.4
Average	-	-	-	-	-	0.99	5.8	

1 Regions according to the NUTS 2 classification by Eurostat (cf. Table A3)

2 Average annual growth of GDP between 1984 and 1996 based on Eurostat regional data; own calculations.

3 Data from *Biehl* 1995, pp. 70-72 for the year of report 1985.

4 Data by Eurostat for the year of report 1984.

5 Analysis of the databank INDAT; industrial classification SYPRO; shares based on numbers of firms from machinery, automotive and electronical industries.

6 Analysis of the databank INDAT; year of report 1996; firms with 500 and more employees.

7 Analysis of the databank INDAT; α -value year of report 1996; change between 1986 and 1996 in %.

8 Analysis of the databank INDAT; β -value year of report 1996; change between 1986 and 1996 in %.

Underlined regions: agglomerated regions (= 15 regions with the highest density of population among the 31 regions investigated).

Table A2: Shares of regional manufacturing firms with FDI-stocks, in USA, China and the Asian-Pacific region, share of FDI-controlled firms and market access indicator m^{ij}

Region ¹	Share of FDI-active firms		Share of FDI-controlled firms		Number of firms in the INDAT-file	Share γ^{ij} of firms with FDI in ...			Market access indicator m^{ij} ³
	1986 (%)	1996 (%)	1986 (%)	1996 (%)		USA (%) ²	China (%) ²	Asia-Pacific region (%) ²	
<u>Stuttgart</u>	23.9	31.8	3.8	4.5	603	15.1	2.7	9.1	91.7
<u>Karlsruhe</u>	18.4	24.5	4.8	3.9	331	9.4	3.0	6.3	59.7
Freiburg	20.4	25.4	6.7	7.6	343	12.8	2.3	5.8	72.1
Tübingen	13.4	21.1	2.8	2.0	246	8.5	3.3	4.1	49.4
<u>Oberbayern</u>	25.8	35.0	7.5	8.8	306	17.3	4.6	8.5	100.0
Niederbayern	8.5	17.1	2.4	2.4	82	6.1	2.4	1.2	30.2
Oberpfalz	11.3	23.9	1.4	4.2	71	8.5	1.4	5.6	52.9
Oberfranken	10.9	19.2	0.5	1.6	193	6.2	1.6	2.1	32.9
Mittelfranken	19.5	28.7	2.3	3.4	174	11.5	2.3	6.3	68.1
Unterfranken	17.8	20.2	0.8	0.8	129	10.1	3.9	5.4	60.2
Schwaben	22.2	29.0	2.3	2.8	176	11.4	0.6	6.3	66.5
<u>Berlin¹</u>	17.8	16.8	5.0	7.9	101	8.9	1.0	5.0	52.5
<u>Bremen</u>	25.5	36.2	4.3	4.3	47	12.8	4.3	6.4	74.5
<u>Hamburg</u>	19.8	31.0	13.5	13.5	126	15.1	1.6	5.6	80.3
<u>Darmstadt</u>	23.7	31.5	11.7	13.2	333	11.4	3.3	6.3	68.2
Gießen	16.0	19.3	7.6	8.4	119	8.4	3.4	4.2	49.3
Kassel	16.1	25.3	3.4	4.6	87	5.8	6.9	2.3	34.2
Braunschweig	12.3	21.9	5.3	7.0	114	9.7	1.8	3.5	51.6
<u>Hannover</u>	16.8	25.7	6.1	6.7	179	10.1	1.7	6.7	63.0
Lüneburg	14.1	20.0	8.2	7.1	85	4.7	0.0	1.2	23.1
Weser-Ems	13.0	25.5	4.3	5.0	161	5.0	0.6	1.2	24.7
<u>Düsseldorf</u>	24.4	32.0	8.0	7.8	540	10.6	2.8	6.1	63.8
<u>Köln</u>	23.0	29.6	4.3	5.7	348	12.4	2.3	4.0	64.7
<u>Münster</u>	15.2	25.2	5.7	8.3	230	7.4	0.9	3.9	43.0
<u>Detmold</u>	12.1	20.1	1.3	1.6	313	8.6	0.6	3.8	47.8
<u>Arnsberg</u>	14.4	24.7	2.4	2.8	507	7.9	1.8	4.1	46.2
Koblenz	16.5	19.4	4.3	5.0	139	4.3	0.7	2.9	27.0
Trier	6.8	13.6	6.8	9.1	44	0.0	0.0	0.0	0.0
<u>Rheinhessen-Pfalz</u>	23.8	29.3	7.5	8.2	147	10.2	1.4	5.4	59.6
<u>Saarland</u>	29.5	24.6	4.9	3.3	61	6.6	0.0	1.6	32.2
<u>Schleswig-H.</u>	15.7	20.8	8.2	9.4	159	9.4	1.9	5.0	55.4
	0.31	0.22	0.59	0.54		Coefficient of variation			
	0.23	0.19	0.52	0.51		- all regions			
	0.28	0.18	0.61	0.54		- 15 agglomerated regions			
						- 16 peripheral regions			

1 Regions according to the NUTS 2 classification by Eurostat (cf. Table A3).

2 Analysis of the databank INDAT; Asia and the Pacific Region: Indonesia, South Korea, Japan, Philippines, India, Malaysia, Australia, Vietnam, Cambodia, Thailand

3 Own calculations; best indicator value = 100; GDP based on World Bank 2000, pp. 230-231; GDP in 1998: USA 7921.3 billions US-\$; China 928.9 billions US-\$; Asia and the Pacific Region 5817.0 billions US-\$.

Underlined regions: agglomerated regions (= 15 regions with the highest density of population among the 31 regions investigated).

Table A3: NUTS 2 classification of West German regions (Nomenclature des Unités Territoriales Statistiques)

Region ¹	NUTS 2 Codes ²	Including following NUTS 3 regions
<u>Stuttgart</u>	DE11	Stuttgart (Stadtkreis), Böblingen, Esslingen, Göppingen, Ludwigsburg, Rems-Murr-Kreis, Heilbronn (Stadtkreis), Heilbronn (Landkreis), Hohenlohekreis, Schwäbisch Hall, Main-Tauber-Kreis, Heidenheim, Ostalbkreis.
<u>Karlsruhe</u>	DE12	Baden-Baden (Stadtkreis), Karlsruhe (Stadtkreis), Karlsruhe (Landkreis), Rastatt, Heidelberg (Stadtkreis), Mannheim (Stadtkreis), Neckar-Odenwald-Kreis, Rhein-Neckar-Kreis, Pforzheim (Stadtkreis), Calw, Enzkreis, Freudenstadt.
Freiburg	DE13	Freiburg/Br. (Stadtkreis), Breisgau-Hochschwarzwald, Emmendingen, Ortenaukreis, Rottweil, Schwarzwald-Baar-Kreis, Tuttlingen, Konstanz, Lörrach, Waldhut.
Tübingen	DE14	Reutlingen, Tübingen (Landkreis), Zollernalbkreis, Ulm (Stadtkreis), Alb-Donau-Kreis, Biberach, Bodenseekreis, Ravensburg, Sigmaringen.
<u>Oberbayern</u>	DE21	Ingolstadt (Kreisfreie Stadt), München (Kreisfreie Stadt), Rosenheim (Kreisfreie Stadt), Altötting, Berchtesgadener Land, Bad-Tölz-Wolfratshausen, Dachau, Ebersberg, Eichstätt, Erding, Freising, Fürstenfeldbruck, Garmisch-Partenkirchen, Landsberg/Lech, Miesbach, Mühldorf/Inn, München (Landkreis), Neuburg-Schrobenhausen, Pfaffenhofen/Ilm, Rosenheim (Landkreis), Starnberg, Traunstein, Weilheim-Schongau.
Niederbayern	DE22	Landshut (Kreisfreie Stadt), Passau (Kreisfreie Stadt), Straubing (Kreisfreie Stadt), Deggendorf, Freyung-Grafenau, Kelheim, Landshut (Landkreis), Passau (Landkreis), Regen, Rottal-Inn, Straubing-Bogen, Dingolfing-Landau.
Oberpfalz	DE23	Amberg (Kreisfreie Stadt), Regensburg (Kreisfreie Stadt), Weiden/Opf. (Kreisfreie Stadt), Amberg-Sulzbach, Cham, Neumarkt/Opf., Neustadt/Waldnaab, Regensburg (Landkreis), Schwandorf, Tirschenreuth.
Oberfranken	DE24	Bamberg (Kreisfreie Stadt), Bayreuth (Kreisfreie Stadt), Coburg (Kreisfreie Stadt), Hof (Kreisfreie Stadt), Bamberg (Landkreis), Bayreuth (Landkreis), Coburg (Landkreis), Forchheim, Hof (Landkreis), Kronach, Kulmbach, Lichtenfels, Wunsiedel.
Mittelfranken	DE25	Ansbach (Kreisfreie Stadt), Erlangen (Kreisfreie Stadt), Fürth (Kreisfreie Stadt), Nürnberg (Kreisfreie Stadt), Schwabach (Kreisfreie Stadt), Ansbach (Landkreis), Erlangen-Höchstadt, Fürth (Landkreis), Nürnberger Land, Neustadt/Aisch-Bad Windsheim, Roth, Weißenburg-Gunzenhausen.
Unterfranken	DE26	Aschaffenburg (Kreisfreie Stadt), Schweinfurt (Kreisfreie Stadt), Würzburg (Kreisfreie Stadt), Aschaffenburg (Landkreis), Bad Kissingen, Rhön-Grabfeld, Hassberge, Kitzingen, Miltenberg, Main-Spessart, Schweinfurt (Landkreis), Würzburg (Landkreis).
Schwaben	DE27	Augsburg (Kreisfreie Stadt), Kaufbeuren (Kreisfreie Stadt), Kempten/Allgäu (Kreisfreie Stadt), Memmingen (Kreisfreie Stadt), Aichach-Friedberg, Augsburg (Landkreis), Dillingen/Donau, Günzburg, Neu-Ulm, Lindau, Ostallgäu, Unterallgäu, Donau-Ries, Oberallgäu.
<u>Berlin¹</u>	DE3 ¹	Berlin-West, Berlin-Ost ¹
<u>Bremen</u>	DE5	Bremen (Kreisfreie Stadt), Bremerhaven (Kreisfreie Stadt)
<u>Hamburg</u>	DE6	Hamburg
<u>Darmstadt</u>	DE71	Darmstadt (Kreisfreie Stadt), Frankfurt/Main (Kreisfreie Stadt), Offenbach/Main (Kreisfreie Stadt), Wiesbaden (Kreisfreie Stadt), Bergstraße, Darmstadt-Dieburg, Groß-Gerau, Hochtaunuskreis, Main-Kinzig-Kreis, Main-Taunus-Kreis, Odenwaldkreis, Offenbach (Landkreis), Rheingau-Taunus-Kreis, Wetteraukreis.
Gießen	DE72	Gießen (Landkreis), Lahn-Dill-Kreis, Limburg-Weilburg, Marburg-Biedenkopf, Vogelsbergkreis.
Kassel	DE73	Kassel (Kreisfreie Stadt), Fulda, Hersfeld-Rotenburg, Kassel (Landkreis), Schwalm-Eder-Kreis, Waldeck-Frankenberg, Werra-Meißner-Kreis.
Braunschweig	DE91	Braunschweig (Kreisfreie Stadt), Salzgitter (Kreisfreie Stadt), Wolfsburg (Kreisfreie Stadt), Gifhorn, Göttingen, Goslar, Helmstedt, Northeim, Osterode/Harz, Peine, Wolfenbüttel.
Hannover	DE92	Hannover (Kreisfreie Stadt), Diepholz, Hameln-Pyrmont, Hannover (Landkreis),

		Hildesheim, Nienburg/Weser, Schaumburg.
Lüneburg	DE93	Celle, Cuxhaven, Harburg, Lüchow-Dannenberg, Lüneburg (Landkreis), Osterholz, Rotenburg/Wümme, Soltau-Fallingbostel, Stade, Uelzen, Verden.
Weser-Ems	DE94	Delmenhorst (Kreisfreie Stadt), Emden (Kreisfreie Stadt), Oldenburg (Kreisfreie Stadt), Osnabrück (Kreisfreie Stadt), Wilhelmshaven (Kreisfreie Stadt), Ammerland, Aurich, Cloppenburg, Emsland, Friesland, Grafschaft Bentheim, Leer, Oldenburg (Landkreis), Osnabrück (Landkreis), Vechta, Wesermarsch, Wittmund.
Düsseldorf	DEA1	Düsseldorf (Kreisfreie Stadt), Duisburg (Kreisfreie Stadt), Essen (Kreisfreie Stadt), Krefeld (Kreisfreie Stadt), Mönchengladbach (Kreisfreie Stadt), Mülheim/Ruhr (Kreisfreie Stadt), Oberhausen (Kreisfreie Stadt), Remscheid (Kreisfreie Stadt), Söldingen (Kreisfreie Stadt), Wuppertal (Kreisfreie Stadt), Kleve, Mettmann, Neuss, Viersen, Wesel.
Köln	DEA2	Aachen (Kreisfreie Stadt), Bonn (Kreisfreie Stadt), Köln (Kreisfreie Stadt), Leverkusen (Kreisfreie Stadt), Aachen (Landkreis), Düren, Erftkreis, Euskirchen, Heinsberg, Oberbergischer Kreis, Rheinisch-Bergischer-Kreis, Rhein-Sieg-Kreis.
Münster	DEA3	Bottrop (Kreisfreie Stadt), Gelsenkirchen (Kreisfreie Stadt), Münster (Kreisfreie Stadt), Borken, Coesfeld, Recklinghausen, Steinfurt, Warendorf.
Detmold	DEA4	Bielefeld (Kreisfreie Stadt), Gütersloh, Herford, Höxter, Lippe, Minden-Lübbecke, Paderborn.
Arnsberg	DEA5	Bochum (Kreisfreie Stadt), Dortmund (Kreisfreie Stadt), Hagen (Kreisfreie Stadt), Hamm (Kreisfreie Stadt), Herne (Kreisfreie Stadt), Ennepe-Ruhr-Kreis, Hochsauerlandkreis, Märkischer Kreis, Olpe, Siegen-Wittgenstein, Soest, Unna.
Koblenz	DEB1	Koblenz (Kreisfreie Stadt), Ahrweiler, Altenkirchen/Westerwald, Bad Kreuznach, Birkenfeld, Cochem-Zell, Mayen-Koblenz, Neuwied, Rhein-Hunsrück-Kreis, Rhein-Lahn-Kreis, Westerwaldkreis.
Trier	DEB2	Trier (Kreisfreie Stadt), Bernkastel-Wittlich, Bitburg-Prüm, Daun, Trier-Saarburg.
Rheinhessen-Pfalz	DEB3	Frankenthal/Pfalz (Kreisfreie Stadt), Kaiserslautern (Kreisfreie Stadt), Landau/Pfalz (Kreisfreie Stadt), Ludwigshafen/Rhein (Kreisfreie Stadt), Mainz (Kreisfreie Stadt), Neustadt/Weinstr. (Kreisfreie Stadt), Pirmasens (Kreisfreie Stadt), Speyer (Kreisfreie Stadt), Worms (Kreisfreie Stadt), Zweiibrücken (Kreisfreie Stadt), Alzey-Worms, Bad Dürkheim, Donnersbergkreis, Germersheim, Kaiserslautern (Landkreis), Kusel, Südliche Weinstraße, Ludwigshafen (Landkreis), Mainz-Bingen, Südwestpfalz.
Saarland	DEC	Saarbrücken (Stadtverband), Merzig-Wadern, Neunkirchen, Saarlouis, Saarpfalz-Kreis, Sankt Wendel.
Schleswig-Holstein	DEF	Flensburg (Kreisfreie Stadt), Kiel (Kreisfreie Stadt), Lübeck (Kreisfreie Stadt), Neumünster (Kreisfreie Stadt), Dithmarschen, Herzogtum Lauenburg, Nordfriesland, Ostholstein, Pinneberg, Plön, Rendsburg-Eckernförde, Schleswig-Flensburg, Segeberg, Steinburg, Stormarn.

1 In the present study: all calculations refer to West-Berlin (=DE301).

2 Eurostat 1999, pp. 68-76.

Underlined regions: agglomerated regions (= 15 regions with the highest density of population among the 31 regions investigated; rest: peripheral regions).

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