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## Conference Paper

# Classification of regional labour markets for purposes of research and of labour market policy

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**Uwe Blien, Franziska Hirschenauer, Phan thi Hong Van<sup>1</sup>**

## **Classification of regional labour markets for purposes of research and of labour market policy**

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### **Summary:**

In many countries labour market policy has to deal with fairly large and persistent regional labour market disparities. In the case of Germany, parts of the country are affected by a deep unemployment crisis whereas others show nearly full employment. Since these disparities cannot be reduced to only one dimension a classification system of labour markets was developed. The criterion of this system was the identification of the “regional disadvantage” for the success of labour market policy.

To optimise the results a new two-step classification method was applied. The first step included regression analyses to identify the exogenous determinants of the success of labour market policy. In the second step, different types of labour markets are determined from a specific variant of cluster analysis which used the weighted variables identified as significant in the first step.

This classification has been used in the Federal Employment Agency for many applications of labour market policy, e.g. in the decentralised management. Besides that, the new classification obtained has also been employed in research, for example in the evaluation of labour market policy.

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<sup>1</sup> The authors (except Phan) were members of project group 2.5 in the context of the masterplan for the reorganisation of the Federal Employment Agency (Bundesagentur für Arbeit). The project was headed by Uwe Blien. Many thanks go to the other members of the project group, Manfred Arendt, Hans Jürgen Braun, Dieter-Michael Gunst, Sibel Kilcioglu, Helmut Kleinschmidt, Martina Musati, Hermann Roß, Dieter Vollkommer, Jochen Wein, and to Johann Bacher (University of Erlangen-Nuremberg) and Michael Wiedenbeck (ZUMA) for methodical advice, to Hannelore Brehm and Karen Scott for valuable support with the analyses and in drawing up the report. All responsibility for the article presented here, however, remains with the authors.

## **1 Introduction**

In Europe, regional labour market disparities within many countries are of about the same magnitude as are differences between countries (Südekum 2005). Strategies of research and strategies of labour market policy have to deal with the variation in the labour market situation. For the development of an appropriate policy response it is helpful to condense these disparities and thus to classify regional labour markets into types.

In the case of Germany a new classification scheme for regional labour markets has been widely applied for purposes of practical labour market policy and of scientific research. This paper describes the design of this classification scheme, which was developed by a special project group (see footnote 1 – the project report is Blien et al. 2004). The starting point of the project was the observation that in Germany regional labour markets display considerable variation in important economic variables. Regional unemployment rates vary between 4 and 27% (Sept. 2004) and other variables show similar patterns.

The types to be identified could not simply reflect differences in the unemployment rate since other dimensions were not perfectly correlated but were also important for the success of labour market policy. The labour market problems of large cities were quite different from those of the rural countryside - even if unemployment rates were taken into account. Finding a clear solution to this problem was not an easy task.

Classification systems are quite familiar from regional analyses, but in many cases the results are not completely convincing. The selection of the classification variables usually poses some difficulties. Often, the selection follows an arbitrary decision based on “expert knowledge” rather than on a methodological principle which could be replicated by a third person. Normally, classification systems follow a specific purpose, which could often be described by a causal process. But normally a technique is lacking to choose the variables included. There are cluster analyses which include variables from both sides of an equation which could express the intended causal relationship. And even if the variables chosen represent only the causal influences (and not also the response variable), it is not clear how the basic equation could be translated into a classification. Looking at the literature it seems there is no convincing method available relating regression and cluster analysis.

In our case, the classification was intended to represent both the magnitude and nature of the problems labour market policy has to deal with. In short, we were interested in mapping the disadvantage for the success of measures. So we developed a new approach. For the classification of regional labour markets, represented here by employment office areas, a two-step procedure was adopted. In the first step, the exogenous determinants of the success in labour market policy were derived; in the second step these determinants – suitably weighted – were

used to identify the types. This procedure was meant to ensure that the classification obtained was grounded on variables reflecting the basic conditions for labour market policy.<sup>2</sup>

In the analyses of the exogenous determinants it is shown how large the “handicap” associated with the respective labour market situation is for the individual employment agency. It is clear, for example, that different rates of underemployment are also associated with different probabilities of being integrated into the labour market following employment and training measures. It is precisely this “handicap” that is used for the classification in the second step.

The regression analyses in the first stage and the subsequent weighting of the classification variables constitute the main differences to many of the existing regional classification schemes, that often seem arbitrary with respect to the choice of variables. The combination of regression and cluster analyses suggested in this paper offers a new approach to labour market research. It enables deeper insights as the classification goes beyond descriptives and reflects the causal processes underlying labour market outcomes. This claim is based on the fact that the regression analyses are conducted on a sound theoretical basis, as will be shown.

## **2 The method in two steps**

### **2.1 Background**

For the analyses of the determinants of labour market policy success two basic criteria were chosen. The first one is the flow of unemployed people into employment and the second one is the rate of people integrated in the labour market after passing a labour market policy measure.

In the case of the flow out of unemployment into employment, a well-known theoretical basis was available, which uses a so-called matching function. A recent overview on this matter is provided by Petrongolo and Pissarides (2001), analyses of eastern Germany using panel data collected by the Federal Employment Agency have been conducted by Burda (1994).

The matching function is based on the idea that in order to produce an exit out of unemployment into employment, an unemployed person and a vacancy must come together. Other characteristics included describe how effectively this process runs, in other words, how rapidly the supply on the labour market balances out the demand. As the exits out of unemployment refer to a certain period of time, it is possible to make a direct connection with the business-policy objective of the Federal Employment Agency of “reducing the duration of unemployment”. The more rapidly a vacancy can be filled with an unemployed person, the shorter the duration of unemployment will be, other things being equal. At the same time, as long as the supply of available vacancies is not yet exhausted, the exit rate out of unemployment into employment will also rise.

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<sup>2</sup> Our approach referred to experiences made in the United Kingdom with the classification of the Job-centre Plus districts (Schütz 2003). There again a two-step procedure was chosen. The main difference was that in the UK case only two variables were used which simplifies the technique greatly.

As mentioned at the beginning, the results of the analyses on the basic conditions were decisive for the selection of the classification variables: only the variables that had proved to be key determinants of the success of the employment office were included in the regional classification as classification variables. The variables were also weighted according to their importance for the success of labour market policy. The actual division of the regional units into types was done with the aid of cluster analysis methods.

In both the regression analyses and the cluster analysis, the spatial reference units were the employment office areas. In the case of Berlin, however, there was a deviation from this principle: the five Berlin districts were combined into one spatial unit, firstly because of the high level of commuting within the city, and secondly because of the frequent reorganisation of the Berlin employment offices and the associated jumps in the data series.

Even though alternative spatial reference frameworks were not under discussion – due to the objectives of the project – it must nevertheless be emphasised that the 180 employment office areas are only suitable to a limited extent as spatial units of analysis. In many cases they do not represent functional spatial units and it is therefore quite possible that neighbouring areas which are closely linked with each other are actually assigned to different types if they show differences in the key base dimensions of the labour market situation.

The following sections first present the analyses that were necessary for selecting and weighting the variables which were then used in a cluster analysis in the next step. The exact definition of the variables included is given in Appendix 2. The following definitions were used for the two dependent variables:

- the integration rate of people completing further vocational training measures (without subsequent support, for 2001) and
- the exit rate out of unemployment into non-assisted employment (for 2002).

## **2.2 Integration rate for further vocational training measures**

The first of the two selected success dimensions of labour market policy is described by the regional integration rate following further vocational training measures provided by the Federal Employment Agency. Because of the greater meaningfulness, the integration rate without subsequent support is used, i.e. in the numerator of the rate only those integrations into the primary labour market are taken into account which are achieved without the aid of further employment or training measures.

A previous study by Hirschenauer (2003) proved in particular the dominating influence of the underemployment rate which includes – beside the unemployed – all those who participate in measures of active labour market policy. A number of other regional context variables are also included. Table 1 contains a summary of the results for the “best” model determined.

Once again the outstanding negative impact that the *underemployment rate* has on the integration rate is confirmed: the higher the regional underemployment rate, the lower the regional

integration rate. In a bivariate regression with the underemployment rate the R-square was no less than 84%. In addition to the underemployment rate, two further variables prove to be significant: *the rate of hirings in employment subject to the payment of social security contributions*, which has a positive impact on the integration rate, and the dummy variable of *eastern Germany*, which produces a negative effect. In eastern Germany the integration rate is generally almost 3% lower, even if account is taken of the differences in underemployment and hirings.

**Table 1: Regression analysis of the regional integration rate for further vocational training measures, without subsequent support, for 2001**  
(176 employment offices; Berlin offices combined;  $R^2 = 86.0\%$ , adj.  $R^2 = 85.7\%$ )

**Coefficients <sup>a</sup>**

Model		Non-standardised coefficients		Standardised coefficients	T	Significance
		B	Standard error	Beta		
1	(Constant)	74.873	2.516		29.756	0.000
	Underemployment rate 2001 (Log.)	-15.229	0.943	-0.804	-16.144	0.000
	Eastern Germany	-2.731	1.117	-0.122	-2.445	0.016
	Hirings in employment 2001	0.201	0.059	0.099	3.427	0.001

a. Dependent variable: integration rate for further training without subsequent support 2001

Including the underemployment rate as a logarithm leads to a slightly better model fit than when the rate is used in linear form. According to this the relationship is non-linear. The R-square is 86.0% (adjusted R-square 85.7). If only western German *Länder* (Federal States) or only eastern German *Länder* are included in the analysis, then this results in R-squares of 63% and 55% respectively. These values are still high, a certain drop in the R-square arises naturally due to the reduction of the range of the most important independent variable, the underemployment rate. This reduction is associated with the division of the data.

If one starts out from the ‘explained’ variation of 86%, the ‘remainder’ of 14% contains all other conceivable influences on the integration rate, i.e. unobserved variables (such as the regional structure of participants), distinctive regional features, measurement errors and finally differences in the efficiency of labour market policy.

The T-values are calculated by dividing the coefficients of the independent variables by the standard error of the estimated parameter as usual. Therefore they are an indicator of how closely the relevant independent variable is linked with the dependent variable. This is why they are used in the cluster analysis as weights of the variables (see below).

In principle it would also be possible to imagine alternatives to the procedure described here. Thus for instance a “structural model” could be used which takes variables that explain the

underemployment rate instead of using the underemployment rate itself. One possibility of this is employment growth and another is demographic variables. What speaks against this, however, is the fact that there is no generally accepted model of regional underemployment (cf. on this subject Elhorst 2003) which could be implemented for the present purposes. This is because information about demographic characteristics, i.e. in particular about labour force participation and migration, are not available with the accuracy required. Such variables would be necessary for a substitution of the underemployment rate.

In test calculations the underemployment rate was simply replaced by the rate of employment growth and further variables were included (degree of tertiarisation, commuter interconnections etc.). This still resulted in high values for the R-square when eastern and western Germany were analysed together; when the data were divided however, the values fell considerably. Once again it becomes clear that the underemployment rate constitutes the main individual basic condition for the rate of integration into employment after further vocational training, and that it is therefore advisable to hold on to it in the models.

Table 1 contains only a few independent variables. A greater number of further variables was tested in the analyses for the integration rate. However, they proved to be insignificant – especially after the underemployment rate was included in the model. Some of these variables were:

- Duration and rate of vacancies
- Proportion of recipients of social assistance
- Population density
- Overall employment growth
- Employment growth by sector
- Composition of employment by qualification level
- Composition of unemployment by qualification level etc.

The analyses mentioned earlier in which eastern and western Germany were dealt with separately produced no additional findings. Only the degree of tertiarisation (i.e. the proportion of service-sector-employment in total employment) proved to be relevant in some specifications.

If many variables are found to be insignificant, this does not mean that they are irrelevant for labour market policy. On the one hand their effects are only not detectable, on the other hand they are represented in the variables that have already been included. As mentioned earlier, one will be able to assume that the rate of employment growth is of key importance for the labour market. Different growth rates are reflected in different underemployment rates however, and are then no longer significant in the regression analysis.

The regression analyses are also of interest in themselves (cf. on this subject Hirschenauer 2003). The expected values for individual employment agencies which can be determined using these analyses show what integration rate an employment office could achieve if no local characteristics played a role.

### 2.3 Exit rate from unemployment into non-assisted employment

The analysis of the exogenous determinants of the exit from unemployment follows a widely-used approach with a sound theoretical basis, which uses a so-called matching function. In this approach it is assumed that for an exit out of unemployment into employment it is necessary for an unemployed individual and a vacancy to come together. This is why the different causal influences have a multiplicative effect and not an additive one as is shown in equation (1).

$$M_r = A_r U_r^\alpha V_r^\beta \quad (1)$$

Here M describes the matches on a regional labour market (employment office area) r, operationalised with the exits out of unemployment into employment. U is an indicator for unemployment, V for the vacancies, A is an efficiency parameter and  $\alpha$  and  $\beta$  are partial elasticities. The analogy of a Cobb-Douglas production function, the labour market produces outputs, i.e. matches, dependent on inputs, in other words, vacancies and unemployed people.

A lot of work has been published about this approach. An international overview is provided in Petrongolo, Pissarides (2001) and analyses with a regional orientation are Burda (1994) and Sunde (2002) and with reference to regional evaluation of labour market policy Hujer, Blien, Caliendo, Zeiss (2002) and Hagen (2003).

The implementation of the approach in empirical analyses is simple. In order to change to a conventional regression estimate of a linear equation, the logarithm of (1) is found. The parameter  $A_r$  can be further resolved into regional variables that determine the efficiency of the matching and into the regression constant.

Table 2 shows the results. Once again a large proportion of the variation of the dependent variables can be described by the model approach. Here it amounts to 93.5% (adjusted 93.3%).

However, with these results it must be taken into account that one key independent variable, the rate of vacancies reported to the Federal Employment Agency, is only available with a market share of the employment offices which varies from region to region. Supplementary analyses using the IAB survey of the supply of jobs in the economy (Magvas, Spitznagel 2002), which are not described in detail here, show that the market share is negatively correlated with the labour market situation. The higher the level of unemployment, the larger the market share of the employment offices is.

The IAB survey can not be utilised for analyses at the level of small area units as the sample is too small. Thus all that remains for the analyses are the vacancies reported by the Federal Employment Agency, which, however, reflect the market share of the Federal Employment Agency and the labour market situation together. For this reason the results for the matching function obtained including this variable must be used with caution. In the literature the problem has so far been ignored; only Sunde (2002) deals with it. At any rate the mentioned analyses using the IAB survey on the supply of jobs show that the variation in the market



share is clearly smaller than the variation in the labour market situation. The results of the matching function are not for itself of interest, but to serve as an input to the classification procedure. For this reason it is advisable to include the variable of vacancies in the cluster analyses, albeit with a low weight. However, this is the case anyway, since only a relatively small T-value was established for the variable of vacancies.

It seems to be counterintuitive that a positive coefficient is determined for the unemployment rate. This corresponds with expectations, however, since the outflow from unemployment into employment can only reach higher levels in areas where there is a sufficiently large potential of unemployed people.

**Table 2: Regression analysis of the regional exit rate from unemployment (as a log.) into non-assisted employment 2002**  
(176 employment offices; Berlin combined;  $R^2 = 93.5\%$ , adj.  $R^2 = 93.3\%$ )

**Coefficients <sup>a</sup>**

Model	Non-standardised coefficients		Standardised coefficients	T	Significance
	B	Standard error	Beta		
1 (Constant)	1.034	0.078		13.315	0.000
Eastern Germany	0.170	0.034	0.232	4.962	0.000
Unemp. rate 2002 (Log.)	0.395	0.035	0.587	11.440	0.000
Rate of vacancies 2002 (Log.)	4.130E-02	0.020	0.045	2.071	0.040
Adjusted pop. density (Log.)	-6.75E-02	0.008	-0.209	-7.966	0.000
Rate of recipients of social assistance (Log.)	6.848E-02	0.021	0.113	3.257	0.001
Seasonal span of unemp. 2001	1.287E-02	0.001	0.535	20.734	0.000

a. dependent variable: exit from unemployment into non-assisted employment 2002

## 2.4 Consequence for the classification of employment office areas

From the results of the regression analyses for the determinants of labour market policy it is possible to gather how close the relationship is between the dependent and the independent variables. The variables determined in the two regression analyses as being significant influences for the basic conditions of labour market policy are used in a cluster analysis for the classification. Here the T-values of the regression analyses serve as weights for the classification variables (for general information on the technique of weighting cf. Wishart 2000: 29f.). This guarantees that as much information as possible from the causal analyses is used for the

classification: variables that proved in the regression analyses to have a formative influence on the basic conditions of labour market policy are given a correspondingly large weight in the classification.

The T-values from the two regression analyses are added together for each variable. In order to simplify the calculations, instead of the unemployment rate from the matching function, the underemployment rate is used a second time. This is justified by the fact that the unemployment and the underemployment rates correlate with 0.98.

Table 3 shows the variables and the weights used. What becomes clear in particular is the outstanding significance of the regional underemployment rate. For the variable of “vacancies” on the other hand there is a low weight, which is quite correct, as the low T-value in the regression analysis is caused by the varying market share of the Federal Employment Agency. In Table 3 the following modifications were made to the weights determined directly from the regression analyses: as the analyses additionally conducted for eastern and western Germany separately had shown that the degree of tertiarisation is also of importance, this was also included in the cluster analysis. The seasonal span was given a lower weight as it constitutes more an additional characteristic than a fundamental structural dimension of regions.

The characteristic of eastern Germany proved to be unnecessary: if this variable is used with the given weight, the same result is obtained as when the variable is removed from the analysis altogether. The labour markets of eastern and western Germany still differ so greatly that the other variables included are already sufficient to make a differentiation. This is evidence of the stability of the cluster analysis result.

**Table 3: Weights determined in the analyses of the determinants for variables used in the classification of the regions**

<b>Variable</b>	<i>Weight</i>
Underemployment rate 2002	27.844
Eastern Germany	7.407
Hiring rate 2001	3.427
Rate of vacancies 2002	2.071
Adjusted population density 2000	7.966
Seasonal span 2001	5.367
Rate of recipients of social assistance 1999	3.257
Degree of tertiarisation 2001	2.500

## **2.5 Procedure used in the cluster analysis**

The results of the described regression analyses suggested using a larger number of classification variables for forming regional types. As the basic conditions of labour market policy are

of multi-dimensional nature, it was not possible to form the types “by hand”, for example by graphing bivariate data on a scatterplot and using threshold values for classification. Instead it was necessary to use a formal procedure of cluster analysis. With this procedure groups were formed which are distinguished by a large degree of inner homogeneity (great similarity between the members of a group) and simultaneously by a large degree of external heterogeneity (great dissimilarity between the types). The procedure of cluster analysis generates clusters, i.e. groups, which are interpreted as types.

The variables named in Table 3 with the weights given there were included in the classification procedure as classification variables. Before the weighting the variables were each standardised (z-transformed) by subtracting the mean in each case and then dividing the result by the standard deviation.

The squared Euclidean distance  $D$  was selected as the measure of similarity between the employment offices:

$$D_{rs} = \sum_{j=1}^J (x_{rj} - x_{sj})^2$$

Here  $r$  and  $s$  are two cases (employment office areas),  $j$  is an index for the variables used,  $x$  represents the corresponding variable values. Ward’s method (cf. for example Bacher 1994, chapter 3) is used for the clustering; this is a hierarchical-agglomerative method in which successive cases are combined. The procedure begins with a situation in which each employment office represents its own cluster. At the end all the employment offices are fused into just one cluster. A certain intermediate stage can be understood as the appropriate partitioning. Ward’s method is characterised by its combining into groups such cases which produce the smallest possible increase in a given measure of heterogeneity, the variance criterion  $F$ . For the  $p$ -te cluster it is:

$$F_p = \sum_{i=1}^{n_p} \sum_{j=1}^J (x_{ij} - \bar{x}_{ij})^2$$

Here  $\bar{x}_{ij}$  is the mean of the  $j$  variable in group  $i$ , in other words  $\bar{x}_{ij} = \frac{1}{n_p} \sum_{i=1}^{n_p} x_{ij}$ , where  $n_p$

represents the number of cases in group  $p$ . Ward’s method has the advantage over other methods of clustering that it tends to lead to clusters of a similar size and that in particular singularities (clusters with only one region) are less likely than with other methods. However, Ward’s method has the characteristic – like all hierarchical procedures – that spatial units that were joined together in a certain stage of aggregation are no longer assigned to different clusters in the further course of the aggregation process. This can lead to spatial units showing a greater distance to the centroid of their own cluster than to the centroid of a different cluster. This problem arises in particular when the cluster centroid moves in the course of the agglom-

eration process. In the interest of keeping the procedure transparent, it was decided to do without “additional processing” of the result, e. g. by using the k-means procedure.

A cluster solution with 12 spatial types was selected. Diverse assessments showed that this solution is appropriate for the problem of the *comparison types*. The solution is satisfactory with respect to the coherence of the combinations of variables and the range of values of the variables for individual clusters. In the following section the types are characterised more closely so that the result can be assessed.

In a concluding step these *comparison types* were joined together into five *strategy types*. In the aggregation to the strategy types only two variables were used, these were the underemployment rate and the population density. Once again extensive tests were conducted to examine whether the result was coherent from content-related viewpoints. These assessments reached a positive result: the strategy types are suitable for deriving strategies as is shown in the following description.

Further tests conducted on the robustness of the results incorporated the time dimension. Analyses on the basis of data for past periods of time lead us to expect that the classification is a stable one. If variables are used with a lag of one year, there are only a few shifts in the classification of the employment office areas. Nevertheless, for use in research and in practical purposes of labour market policy the classification must be checked regularly.

### **3 The result**

#### **3.1 *Comparison types***

Two classifications were determined; a more precise one for comparison purposes and a more coarse one for strategy development. The latter one is produced from the former one by means of aggregation. The choice of a finer partitioning for the *comparison types* permits a greater inner homogeneity of the classes. This makes comparisons of the employment offices easier, e.g. for evaluation studies and for purposes of controlling by the Federal Employment Agency.

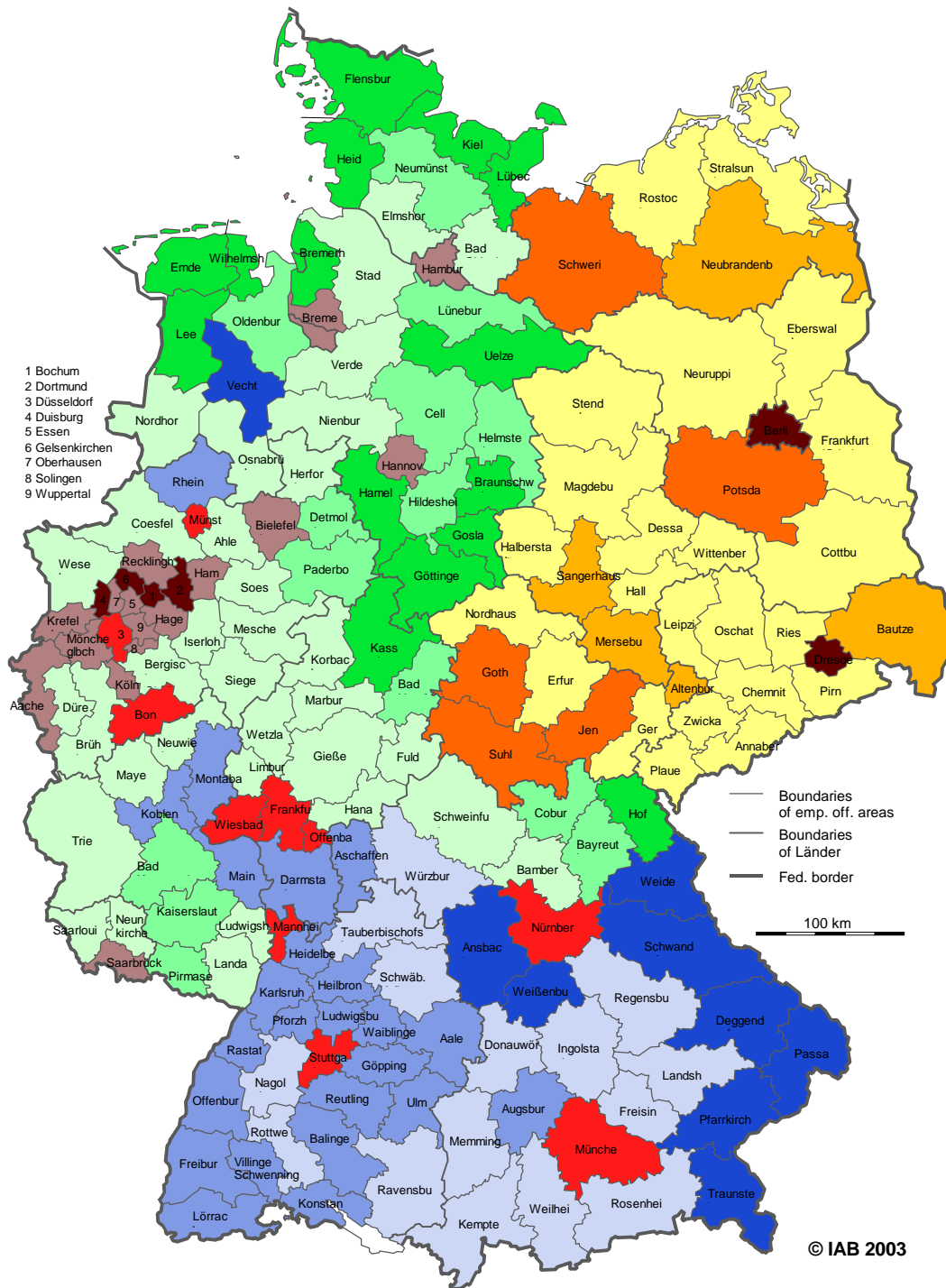
The 12 types determined are shown in Map 1. Together with their descriptions and the employment office areas assigned to each of them they can be seen in detail in Table 4, which also contains a rough description of the types. This is based essentially on comparisons of the cluster centroids and the national means of the classification variables. The regional values of the classification variables sorted according to type (and *Land*) can be found in detail in the table in Appendix 1.













Details regarding the internal homogeneity and external heterogeneity of the regional groups can be found in Figure 1, which contains 12 boxplots. They show for the individual spatial types the median (horizontal line within the box), the 2<sup>nd</sup> and 3<sup>rd</sup> quartiles (lower and upper edges of the box) and the minimum and maximum regional values of the particular classifica-

tion variable being examined (ends of the lines coming out of the box). Outliers are symbolised by stars, extreme outliers by circles.

# Map 1:

Classification of employment office areas by underemployment rate, population density, seasonal span, hiring rate, rate of social assistance recipients, degree of tertiarisation and vacancy rate



- |   |           |   |   |           |   |
|---|-----------|---|---|-----------|---|
|  | Type Ia   | areas in eastern Germany with poorest labour markets condit's                   |  | Type IIIb | rural areas with average unemployment                               |
|  | Type Ib   | areas in eastern Germany with poor labour market condit's                       |  | Type IIIc | mainly rural areas with below-average unemp. and low dynamics       |
|  | Type Ic   | areas in eastern Germany with high unemp., some on border to west               |  | Type IV   | centres with good labour market sit. and strong dynamics            |
|  | Type IIa  | areas characterised by big cities, with high unemployment                       |  | Type Va   | rural areas with good lab. market sit. and strong seasonal dynamics |
|  | Type IIb  | areas characterised mainly by big cities, with moderately high unemp.           |  | Type Vb   | areas with SME structure with good labour market situation          |
|  | Type IIIa | medium-sized towns and rural areas with above-average unemp., but mod. dynamics |  | Type Vc   | areas with best labour market sit. and strong dynamics              |

**Table 4: Classification of employment agency areas by comparison types / strategy types**

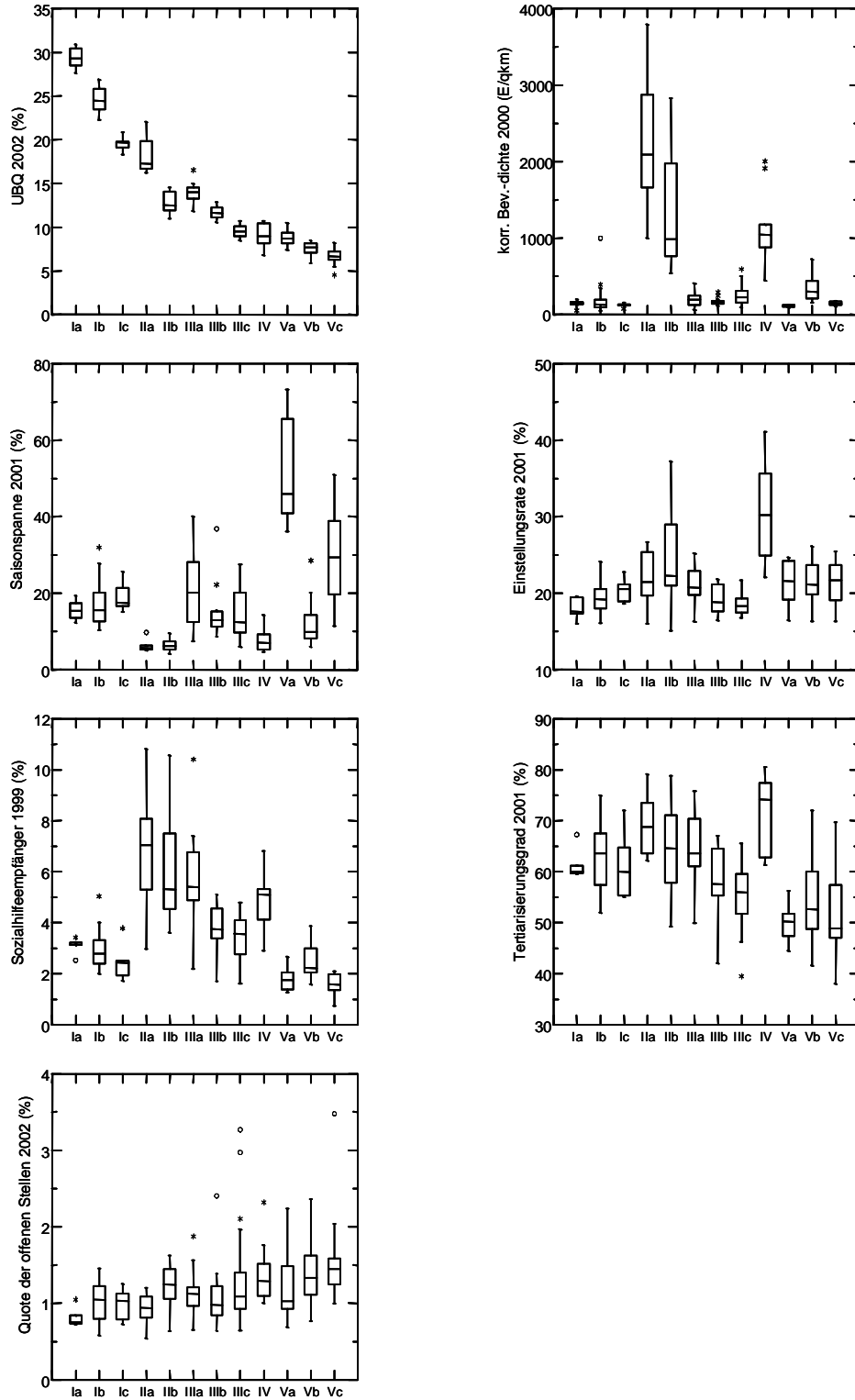
Comparison / strategy type	Name	Brief description	Employment agencies	Number
<b>I</b>	<b>Areas in eastern Germany with a dominant job deficit</b>			<b>33</b>
I a	Areas in eastern Germany with the poorest labour market conditions	<ul style="list-style-type: none"> <li>• Highest underemployment</li> <li>• Below-average population density</li> <li>• Least movement on the labour market</li> </ul>	Neubrandenburg, Merseburg, Altenburg, Bautzen, Sangerhausen	5
I b	Areas in eastern Germany with poor labour market conditions (typical employment agency in eastern Germany)	<ul style="list-style-type: none"> <li>• Very high underemployment</li> <li>• Little movement on the labour market</li> </ul>	Cottbus, Dessau, Halberstadt, Halle, Stendal, Wittenberge, Oschatz, Riesa, Gera, Nordhausen, Rostock, Stralsund, Eberswalde, Frankfurt/O., Neuruppin, Plauen, Erfurt, Zwickau, Chemnitz, Magdeburg, Pirna, Leipzig, Annaberg,	23
I c	Areas in eastern Germany with high unemployment, some on border to west	<ul style="list-style-type: none"> <li>• High underemployment</li> <li>• Moderate movement on the labour market</li> </ul>	Schwerin, Jena, Potsdam, Gotha, Suhl	5
<b>II</b>	<b>Areas characterised by big cities, mainly in western Germany, with high unemployment</b>			<b>22</b>
II a	Areas characterised by big cities, with high unemployment	<ul style="list-style-type: none"> <li>• High underemployment</li> <li>• Highest population density</li> <li>• Moderate movement on the labour market</li> <li>• Large proportion of social-assistance recipients / problem groups</li> <li>• Above-average degree of tertiarisation</li> </ul>	Berlin, Bochum, Duisburg, Dortmund, Gelsenkirchen, Dresden	6
II b	Areas mainly characterised by big cities, with moderately high unemployment	<ul style="list-style-type: none"> <li>• Average underemployment (above-average by western standards)</li> <li>• High population density</li> <li>• Above-average movement on the labour market</li> <li>• Large proportion of social-assistance recipients / problem groups</li> </ul>	Hamburg, Köln, Mönchengladbach, Aachen, Krefeld, Hagen, Oberhausen, Hamm, Bremen, Saarbrücken, Recklinghausen, Hannover, Essen, Solingen, Bielefeld, Wuppertal	16

Comparison / strategy type	Name	Brief description	Employment agencies	Number
<b>III</b>	<b>Medium-sized towns and rural areas in western Germany with average unemployment</b>			<b>63</b>
III a	Medium-sized towns and rural areas with above-average unemployment but moderate dynamics	<ul style="list-style-type: none"> <li>• Above-average underemployment (high by western standards)</li> <li>• Moderate movement on the labour market</li> <li>• Above-average proportion of social-assistance recipients / problem groups</li> <li>• Low population density</li> </ul>	Flensburg, Heide, Leer, Hameln, Lübeck, Uelzen, Emden, Göttingen, Wilhelmshaven, Goslar, Bremerhafen, Kiel, Braunschweig, Kassel, Hof	15
III b	Rural areas with average unemployment	<ul style="list-style-type: none"> <li>• Average underemployment (above-average by western standards)</li> <li>• Little movement on the labour market</li> <li>• Low population density</li> </ul>	Lüneburg, Celle, Neumünster, Oldenburg, Helmstedt, Hildesheim, Kaiserslautern, Bad Hersfeld, Pirmasens, Paderborn, Bad Kreuznach, Bayreuth, Coburg, Detmold	14
III c	Mainly rural areas with below-average unemployment and weak dynamics	<ul style="list-style-type: none"> <li>• Below-average underemployment (average by western standards)</li> <li>• Little movement on the labour market</li> <li>• Below-average population density</li> </ul>	Coesfeld, Hanau, Mayen, Brühl, Bad Oldesloe, Gießen, Neuwied, Wesel, Düren, Limburg, Landau, Verden, Bamberg, Elmshorn, Wetzlar, Trier, Fulda, Nienburg, Ludwigshafen, Stade, Marburg, Korbach, Neunkirchen, Saarlouis, Ahlen, Nordhorn, Osnabrück, Bergisch-Gladbach, Schweinfurt, Herford, Soest, Siegen, Meschede, Iserlohn	34
<b>IV</b>	<b>Centres in western Germany with a good labour market situation and strong dynamics</b>			<b>10</b>
IV	Centres with a good labour market situation and strong dynamics	<ul style="list-style-type: none"> <li>• Below-average underemployment</li> <li>• High population density</li> <li>• Greatest movement on the labour market</li> <li>• High degree of tertiarisation</li> <li>• Little seasonal employment</li> <li>• Above-average proportion of social-assistance recipients / problem groups</li> </ul>	Bonn, Wiesbaden, Offenbach, München, Stuttgart, Frankfurt/M., Münster, Nürnberg, Düsseldorf, Mannheim	10



Comparison / strategy type	Name	Brief description	Employment agencies	Number
<b>V</b>	<b>Areas in western Germany with a good labour market situation and strong dynamics</b>			48
V a	Rural areas with a good labour market situation and strong seasonal dynamics	<ul style="list-style-type: none"> <li>• Below-average underemployment</li> <li>• Lowest population density</li> <li>• Below-average proportion of social-assistance recipients / problem groups</li> <li>• Greatest seasonal span</li> </ul>	Ansbach, Weißenburg, Pfarrkirchen, Weiden, Traunstein, Vechta, Degendorf, Schwandorf, Passau	9
V b	Areas with SME structure and a good labour market situation	<ul style="list-style-type: none"> <li>• Low underemployment</li> <li>• Average population density</li> <li>• Below-average proportion of social-assistance recipients / problem groups</li> <li>• Above-average rate of reported vacancies</li> </ul>	Darmstadt, Montabaur, Rheine, Mainz, Konstanz, Koblenz, Ulm, Aschaffenburg, Augsburg, Ludwigsburg, Göppingen, Reutlingen, Waiblingen, Offenburg, Rastatt, V.-Schwenningen, Lörrach, Heidelberg, Heilbronn, Karlsruhe, Freiburg, Pforzheim, Aalen, Balingen	24
V c	Areas with best labour market situation and strong dynamics	<ul style="list-style-type: none"> <li>• Lowest underemployment</li> <li>• Below-average population density</li> <li>• Great movement on the labour market</li> <li>• Lowest proportion of social-assistance recipients / problem groups</li> <li>• Large seasonal span</li> </ul>	Donauwörth, Nagold, Freising, Weilheim, Rosenheim, Landshut, Ingolstadt, Würzburg, Kempten, Memmingen, Regensburg, Ravensburg, Rottweil, Schwäbisch Hall, Tauberbischofsheim	15

**Fig. 1: Boxplots of the classification variables by *comparison types***



The boxplots make it clear that the ranges of values for the classification variables of the individual spatial types more or less overlap. A better division of the types was not possible as the reality of Germany's labour market does not show any clear dividing lines; instead transitional areas can be detected. Nevertheless, due to the preliminary causal analysis, it is possible to claim to have found in the classification a key dimension of reality for labour market policy. The fact that clear trends in the included variables can generally be determined for the types supports this claim; in particular the underemployment rate has a considerable effect on the order of the types. Some variables only show values diverging from the average for certain types. This is true, for example, of the population density.

### **3.2 Strategy types**

For strategic purposes (e.g. for labour market schemes) the 12 *comparison types* were combined into five *strategy types* according to only two criteria, the unemployment rate and the population density. The types are:

- I: Areas in eastern Germany with a dominant job deficit
- II: Areas characterised by big cities, mainly in western Germany, with high unemployment
- III: Medium-sized towns and rural areas in western Germany with average unemployment
- IV: Centres in western Germany with a good labour market situation and strong dynamics
- V: Areas in western Germany with a good labour market situation and strong dynamics

The five types determined, together with the employment office areas assigned to them, are shown in Map 2 and Appendix 1.

## **4. Applications and further perspectives**

Two variants of the classification scheme for employment office areas were developed, one with five and the other with twelve types. The more refined classification can be converted into the coarser by means of aggregation. The narrower classification is intended for the development of policy strategies. The other one serves to facilitate comparisons of the employment office areas.

The *comparison types* permit a differentiated portrayal of regional labour markets: Employment office areas with similar structures are grouped together in the same type. This classification enables employment offices to compare themselves with others in the appropriate peer

group. The solution to current problems, the blend of labour market policy measures, the success of certain approaches – all this can now be subjected to comparative analyses within one type. Although important differences remain within the types as regards the basic conditions set by the labour market, the complexity of reality is nonetheless reduced. It is further possible to differentiate within types, since the results of the distance matrix between all labour market areas is available.

This classification has been applied for many practical purposes, by the Federal Employment Agency. Since 2003 the allocation of budgetary resources for active labour market policy has been done at least partly (parallel to the use of an indicator (in a formula allocation), cf. Blien 2004) on the basis of target agreements with the decentralised units of the Federal Employment Agency, where their respective types have provided some orientation. Reports on current issues are routinely based on the classification scheme presented in this paper. In controlling, these types are frequently employed for current comparisons of the efficiency of employment offices (with regard to countless dimensions). For instance, performance regarding the integration of target groups among the unemployed is assessed by comparison of employment offices of the same type.

Here it can be established that many people guiding practical labour market policy also use the aids on offer and interpret the types quite correctly. Employment offices which differ in some way from the respective type are treated accordingly.

*Strategy types* provide an appropriate classification for all purposes that require a more abstract assessment of the individual employment agencies' situation. This concerns in particular the development of policy strategies, which is facilitated by an orientation towards a smaller number of types. Since the labour market situation in Germany varies so much between regions, the type specific strategies are very different. In type I regions (parts of East Germany with a pronounced job deficit) mobility subsidies and job creation schemes constitute an appropriate response whereas in type V regions (prosperous parts of West Germany) the emphasis is on improved job matching.

The classification scheme is used in further studies, since descriptive analyses show that many variables characterising the labour market reveal different values according to the types. Since our classification scheme was obtained on the basis of theory-based regression analyses, it can be used for more than purely descriptive characterisations. Several studies on labour market evaluation recently carried out have found this classification useful (see e.g. Hujer et al. 2005). More micro-level analyses on the effects of labour market policy will apply the types as controls for different labour market situations. There is a comprehensive research programme on the effects of the labour market reforms which started in autumn 2004. In this programme – carried out by research groups of several German institutes – the *strategy types* will be employed.

We plan to update the classification every two years. Since the basic structure of the classification scheme should be retained, the cluster centroids of the *comparison types* will be taken as a starting point with the cases subsequently classified by the k-means procedure performed

on new data. The variables and their weights should remain unchanged, if possible, at least for some time. The *k-means* procedure is compatible with Ward's method. There are good prospects of obtaining a result that is similar to the present one, since regions generally change only slowly (this is due to path dependency in Krugman's sense). For example, the correlation of unemployment rates between 2003 and 2004 is 0,9938. It is this persistence property that justifies a less frequent updating. Only the occurrence of structural breaks would require a more fundamental adaptation of our approach.

## Appendix 1:

### Type membership of the employment office areas, and regional values of the classification variables

The definition of the following variables is given in Appendix 2.

- (1) Underemployment rate 2002
- (2) Adjusted population density 2000
- (3) Rate of vacancies 2002
- (4) Hiring rate 2001
- (5) Rate of social-assistance recipients 1999
- (6) Degree of tertiarisation 2001
- (7) Seasonal span 2001

			UBQ02	KORRBEVD00	OFFSTQ02	EINQ01	HLUQ99	TERT01	SAISON01
			1	2	3	4	5	6	7
<b>Type Ia</b>									
MV	31	Neubrandenburg	30.40	55.49	0.75	19.48	3.42	67.26	17.45
SN	72	Bautzen	27.59	148.36	0.74	17.26	2.53	59.67	12.26
ST	46	Merseburg	29.32	161.29	0.84	17.59	3.21	60.06	13.51
ST	47	Sangerhausen	30.89	133.14	1.05	19.60	3.14	61.18	15.38
TH	70	Altenburg	28.53	200.68	0.72	16.01	3.12	59.71	19.37
<b>Arith. mean</b>			29.35	139.79	0.82	17.99	3.08	61.58	15.59
<b>Minimum</b>			27.59	55.49	0.72	16.01	2.53	59.67	12.26
<b>Maximum</b>			30.89	200.68	1.05	19.60	3.42	67.26	19.37
<b>Std. dev.</b>			1.34	53.37	0.14	1.53	0.33	3.23	2.88
<b>Type Ib</b>									
BB	35	Cottbus	26.74	92.59	0.77	18.34	2.95	62.02	13.98
BB	36	Eberswalde	26.85	70.74	0.71	17.79	2.81	66.13	14.07
BB	37	Frankfurt (Oder)	23.32	101.13	0.58	18.50	2.58	66.10	15.57
BB	38	Neuruppin	24.47	67.47	0.58	18.68	2.63	60.89	10.34
MV	32	Rostock	24.38	108.13	1.44	20.19	3.40	73.10	12.56
MV	34	Stralsund	26.78	86.62	1.10	22.19	3.42	73.83	21.70
SN	71	Annaberg	25.16	207.00	0.93	18.25	2.29	51.99	27.85
SN	73	Chemnitz	23.40	288.57	1.11	19.74	2.68	64.65	11.71
SN	75	Leipzig	24.24	1000.00	1.46	23.28	3.99	72.94	10.98
SN	76	Oschatz	24.44	127.30	0.70	17.75	2.05	57.59	17.54
SN	77	Pirna	23.67	164.88	1.03	16.10	2.56	54.92	21.65
SN	78	Plauen	22.27	194.22	0.94	21.01	2.33	55.74	31.98
SN	79	Riesa	24.98	171.43	1.03	17.08	2.49	55.99	12.99
SN	92	Zwickau	23.35	389.39	1.12	19.33	1.99	56.99	12.65
ST	42	Dessau	26.36	133.19	1.28	20.74	4.00	65.90	12.57
ST	43	Halberstadt	24.33	126.81	0.78	17.60	3.24	65.19	16.71
ST	44	Halle	26.27	346.31	1.11	20.28	5.03	74.95	12.29
ST	45	Magdeburg	23.54	139.48	1.22	22.81	3.75	68.97	16.51
ST	48	Stendal	25.30	51.27	0.81	19.21	2.80	63.61	23.79

			UBQ02	KORRBEVD00	OFFSTQ02	EINQ01	HLUQ99	TERT01	SAISON01
			1	2	3	4	5	6	7
ST	49	Wittenberg	26.72	87.64	1.04	18.45	3.13	56.62	17.85
TH	93	Erfurt	23.03	202.84	1.23	24.11	3.13	70.47	12.53
TH	94	Gera	22.57	166.15	1.32	19.82	2.09	62.94	20.31
TH	97	Nordhausen	25.21	114.33	1.33	17.04	1.99	58.94	19.82
<b>Arith. mean</b>			24.67	192.93	1.03	19.49	2.93	63.50	16.87
<b>Minimum</b>			22.27	51.27	0.58	16.10	1.99	51.99	10.34
<b>Maximum</b>			26.85	1000.00	1.46	24.11	5.03	74.95	31.98
<b>Std. dev.</b>			1.43	195.98	0.26	2.11	0.76	6.74	5.63
<b>Type Ic</b>									
BB	39	Potsdam	18.31	116.14	0.73	22.79	2.42	72.04	15.08
MV	33	Schwerin	19.70	72.92	0.79	18.60	3.78	64.78	16.61
TH	95	Gotha	19.80	139.55	1.03	20.56	2.50	55.29	21.28
TH	96	Jena	20.83	157.39	1.26	21.17	1.94	59.96	17.53
TH	98	Suhl	19.07	129.76	1.13	18.88	1.71	55.03	25.65
<b>Arith. mean</b>			19.54	123.15	0.99	20.40	2.47	61.42	19.23
<b>Minimum</b>			18.31	72.92	0.73	18.60	1.71	55.03	15.08
<b>Maximum</b>			20.83	157.39	1.26	22.79	3.78	72.04	25.65
<b>Std. dev.</b>			0.93	31.85	0.22	1.72	0.80	7.15	4.26
<b>Type IIa</b>									
NW	321	Bochum	16.22	2873.79	0.81	21.67	5.28	65.85	6.29
NW	333	Dortmund	17.01	1664.70	1.20	21.25	7.33	71.76	5.50
NW	341	Duisburg	16.70	2211.64	0.81	19.68	8.09	63.57	5.27
NW	345	Gelsenkirchen	17.47	1976.69	1.07	15.99	6.77	62.18	5.05
BL	900	Berlin	22.04	3792.99	0.54	26.71	10.81	79.06	5.97
SN	74	Dresden	19.82	1000.00	1.09	25.38	2.98	73.48	9.71
<b>Arith. mean</b>			18.21	2253.30	0.92	21.78	6.88	69.32	6.30
<b>Minimum</b>			16.22	1000.00	0.54	15.99	2.98	62.18	5.05
<b>Maximum</b>			22.04	3792.99	1.20	26.71	10.81	79.06	9.71
<b>Std. dev.</b>			2.26	974.79	0.24	3.89	2.64	6.54	1.73
<b>Type IIb</b>									
HH	123	Hamburg	12.07	2271.08	1.28	36.08	9.91	78.79	7.71
NI	237	Hannover	14.21	1047.67	1.06	29.82	7.33	73.17	9.44
HB	214	Bremen	14.05	1000.00	1.57	28.20	10.55	69.02	6.31
NW	311	Aachen	11.79	599.91	0.97	22.50	5.13	64.55	6.11
NW	317	Bielefeld	12.10	544.64	1.01	25.08	3.87	57.25	5.12
NW	343	Essen	14.54	2829.64	1.41	27.24	6.88	74.73	5.89
NW	347	Hagen	12.03	974.10	1.14	19.20	4.49	56.14	6.22
NW	351	Hamm	13.77	748.65	1.04	16.81	5.16	62.05	7.33
NW	357	Köln	13.36	2376.61	1.49	37.23	7.68	77.98	4.17
NW	361	Krefeld	11.62	771.45	1.31	21.77	4.57	58.43	4.62
NW	365	Mönchengladbach	10.99	946.46	1.63	20.79	4.50	62.47	5.54

			UBQ02	KORRBEVD00	OFFSTQ02	EINQ01	HLUQ99	TERT01	SAISON01
			1	2	3	4	5	6	7
NW	371	Oberhausen	12.66	2346.80	1.09	22.06	5.49	66.99	5.60
NW	375	Recklinghausen	14.18	800.39	0.64	15.08	5.32	64.64	4.59
NW	385	Solingen	11.07	1000.00	1.22	22.04	3.61	49.28	7.83
NW	391	Wuppertal	12.33	1673.95	1.27	21.19	5.28	53.84	6.63
SL	555	Saarbrücken	14.11	633.14	1.51	33.86	8.41	66.13	7.35
<b>Arith. mean</b>			12.80	1285.28	1.23	24.94	6.14	64.71	6.28
<b>Minimum</b>			10.99	544.64	0.64	15.08	3.61	49.28	4.17
<b>Maximum</b>			14.54	2829.64	1.63	37.23	10.55	78.79	9.44
<b>Std. dev.</b>			1.21	752.21	0.26	6.61	2.10	8.60	1.40
<b>Type IIIa</b>									
SH	119	Flensburg	11.81	112.78	1.19	23.77	5.84	71.34	29.00
SH	127	Heide	12.98	87.85	1.16	22.64	5.08	64.80	34.80
SH	131	Kiel	12.26	258.85	1.13	20.83	7.28	75.82	12.31
SH	135	Lübeck	13.98	256.98	1.57	24.70	7.16	71.41	22.75
NI	211	Braunschweig	13.70	406.81	0.93	23.13	5.70	61.67	7.46
NI	224	Emden	14.46	144.39	1.88	25.16	5.41	61.61	40.01
NI	227	Goslar	14.98	235.07	0.91	16.75	5.40	61.14	14.24
NI	231	Göttingen	14.67	199.07	0.99	19.85	4.64	60.96	12.54
NI	234	Hameln	13.53	198.45	0.89	16.29	5.32	58.50	15.85
NI	247	Leer	13.29	116.03	1.29	20.74	4.48	56.65	28.63
NI	271	Uelzen	14.03	63.10	1.13	20.86	4.70	64.55	24.12
NI	281	Wilhelmshaven	14.97	261.81	0.99	20.14	6.35	71.34	20.16
HB	217	Bremerhaven	16.52	174.48	1.06	19.72	10.40	69.32	9.22
HE	435	Kassel	13.25	240.51	0.65	19.17	7.41	63.62	9.02
BY	731	Hof	14.47	164.17	1.24	19.95	2.18	49.93	27.74
<b>Arith. mean</b>			13.93	194.69	1.13	20.91	5.82	64.18	20.53
<b>Minimum</b>			11.81	63.10	0.65	16.29	2.18	49.93	7.46
<b>Maximum</b>			16.52	406.81	1.88	25.16	10.40	75.82	40.01
<b>Std. dev.</b>			1.17	87.32	0.29	2.59	1.82	6.77	10.05
<b>Type IIIb</b>									
SH	139	Neumünster	11.32	144.67	0.74	20.79	4.51	67.10	13.54
NI	221	Celle	10.71	130.47	0.84	18.53	4.55	64.56	15.47
NI	241	Helmstedt	12.86	166.02	2.40	17.55	3.56	42.08	8.67
NI	244	Hildesheim	11.53	244.22	0.64	17.62	4.70	56.72	9.95
NI	251	Lüneburg	10.57	155.61	0.80	16.42	3.97	67.06	11.97
NI	261	Oldenburg	12.50	200.55	1.39	21.80	5.11	65.56	11.17
NW	331	Detmold	12.22	292.86	0.98	17.75	3.09	52.39	14.50
NW	373	Paderborn	11.12	182.45	1.22	19.13	3.50	56.44	12.26
HE	411	Bad Hersfeld	12.14	114.95	1.11	19.43	4.56	56.15	15.18
RP	511	Bad Kreuznach	10.65	136.05	0.92	17.20	3.39	58.47	14.73
RP	515	Kaiserslautern	11.66	183.63	1.25	17.87	3.88	62.05	9.61



			UBQ02	KORRBEVD00	OFFSTQ02	EINQ01	HLUQ99	TERT01	SAISON01
			1	2	3	4	5	6	7
RP	551	Pirmasens	12.39	171.61	1.11	21.82	3.60	55.35	11.90
BY	723	Bayreuth	11.58	147.02	0.98	21.24	1.88	58.43	36.81
BY	727	Coburg	11.68	158.90	0.92	21.15	1.70	44.61	22.24
<b>Arith. mean</b>			11.64	173.50	1.09	19.16	3.71	57.64	14.86
<b>Minimum</b>			10.57	114.95	0.64	16.42	1.70	42.08	8.67
<b>Maximum</b>			12.86	292.86	2.40	21.82	5.11	67.10	36.81
<b>Std. dev.</b>			0.72	47.21	0.43	1.87	1.00	7.64	7.16
<b>Type IIIc</b>									
SH	111	Bad Oldesloe	9.21	201.68	1.40	18.48	3.78	58.76	12.98
SH	115	Elmshorn	10.54	282.10	1.15	19.34	4.26	61.00	10.75
NI	254	Nienburg	9.40	96.20	3.27	17.09	4.28	56.84	24.71
NI	257	Nordhorn	9.41	122.82	0.81	18.78	3.18	54.22	20.20
NI	264	Osnabrück	9.71	230.85	1.21	21.68	3.53	59.94	12.44
NI	267	Stade	9.68	113.62	0.93	19.29	4.50	58.48	21.29
NI	277	Verden	8.62	134.57	1.30	17.68	3.50	62.18	15.17
NW	313	Ahlen	9.18	212.93	1.45	17.05	2.77	48.35	9.64
NW	315	Bergisch Gladbach	10.20	505.13	0.81	18.72	3.68	52.19	6.34
NW	325	Brühl	9.19	330.08	1.09	20.70	3.92	60.77	6.60
NW	327	Coesfeld	8.67	227.20	1.38	17.62	2.25	52.45	8.53
NW	335	Düren	10.74	285.53	1.04	16.98	4.33	57.69	7.48
NW	353	Herford	10.67	360.51	1.09	20.65	2.54	52.92	11.68
NW	355	Iserlohn	10.65	431.99	1.07	18.30	3.07	39.48	7.17
NW	363	Meschede	9.36	143.89	1.02	17.89	2.67	46.50	19.63
NW	381	Siegen	8.83	237.47	0.77	18.66	2.62	48.38	11.55
NW	383	Soest	10.67	230.79	1.22	16.94	2.76	52.42	9.19
NW	387	Wesel	10.08	340.17	1.52	17.55	3.58	57.20	5.99
HE	423	Fulda	9.00	157.72	0.76	20.13	4.33	58.80	23.29
HE	427	Gießen	9.58	183.95	0.96	17.47	4.80	65.59	10.51
HE	431	Hanau	8.69	310.30	0.99	18.35	3.61	57.43	10.82
HE	439	Korbach	10.00	92.27	0.88	18.18	4.10	53.59	22.42
HE	443	Limburg	8.48	237.43	1.05	16.92	4.16	63.75	12.50
HE	447	Marburg	9.74	173.26	1.97	19.59	3.91	61.01	16.80
HE	455	Wetzlar	9.39	228.26	0.92	18.32	3.49	46.24	12.48
RP	523	Ludwigshafen	9.60	590.50	2.97	19.83	3.83	50.38	9.64
RP	531	Mayen	8.82	170.24	1.28	16.82	2.50	59.59	25.74
RP	543	Landau	8.58	244.43	2.11	16.76	2.49	58.11	10.78
RP	547	Neuwied	9.66	253.40	0.90	18.62	2.94	51.37	13.30
RP	563	Trier	8.92	105.38	1.57	20.34	2.88	60.56	24.12
BY	719	Bamberg	8.90	184.08	0.64	18.07	1.62	52.72	27.57
BY	747	Schweinfurt	10.27	123.38	1.02	18.33	2.52	51.73	23.53
SL	539	Neunkirchen	10.03	365.33	1.13	17.06	4.60	55.05	8.59
SL	559	Saarlouis	10.11	313.22	1.47	17.77	4.02	50.35	12.98
<b>Arith. mean</b>			9.55	241.78	1.27	18.41	3.44	55.18	14.31
<b>Minimum</b>			8.48	92.27	0.64	16.76	1.62	39.48	5.99
<b>Maximum</b>			10.74	590.50	3.27	21.68	4.80	65.59	27.57
<b>Std. dev.</b>			0.68	115.72	0.57	1.28	0.79	5.70	6.44

			UBQ02	KORRBEVD00	OFFSTQ02	EINQ01	HLUQ99	TERT01	SAISON01
			1	2	3	4	5	6	7
<b>Type IV</b>									
NW	323	Bonn	8.63	1000.00	1.03	22.93	5.11	74.52	7.33
NW	337	Düsseldorf	10.71	1912.90	1.37	35.23	5.27	77.42	4.93
NW	367	Münster	9.26	877.06	1.11	31.68	5.09	80.53	6.73
HE	419	Frankfurt	8.17	1091.02	1.47	41.09	5.31	79.96	5.21
HE	451	Offenbach	9.39	600.00	1.00	22.06	5.49	63.74	9.28
HE	459	Wiesbaden	8.70	447.82	1.10	24.88	6.81	75.91	8.96
BW	644	Mannheim	10.60	1175.04	1.52	27.54	4.54	62.41	4.64
BW	677	Stuttgart	7.75	1149.87	2.32	35.65	3.87	61.32	6.74
BY	735	Nürnberg	10.47	1000.00	1.22	28.68	4.12	62.83	13.59
BY	843	München	6.78	2000.00	1.76	39.39	2.92	73.73	14.29
<b>Arith. mean</b>			9.05	1125.37	1.39	30.91	4.85	71.24	8.17
<b>Minimum</b>			6.78	447.82	1.00	22.06	2.92	61.32	4.64
<b>Maximum</b>			10.71	2000.00	2.32	41.09	6.81	80.53	14.29
<b>Std. dev.</b>			1.30	496.39	0.41	6.77	1.06	7.76	3.42
<b>Type Va</b>									
NI	274	Vechta	8.72	123.77	2.24	24.23	2.66	44.48	40.93
BY	711	Ansbach	7.74	96.57	0.69	19.16	1.27	50.23	45.92
BY	743	Schwandorf	9.36	101.98	1.03	20.01	1.38	47.35	51.10
BY	751	Weiden	10.17	91.98	0.88	21.58	1.54	51.12	41.76
BY	755	Weißenburg	8.14	110.07	0.93	16.44	1.39	48.12	36.13
BY	815	Deggendorf	9.03	108.60	1.81	22.20	1.76	51.82	65.49
BY	847	Passau	10.49	132.16	1.16	24.17	2.06	55.47	73.34
BY	851	Pfarrkirchen	8.36	126.44	0.94	18.95	2.00	46.34	40.18
BY	859	Traunstein	7.37	120.72	1.48	24.66	2.15	56.28	65.58
<b>Arith. mean</b>			8.82	112.48	1.24	21.27	1.80	50.13	51.16
<b>Minimum</b>			7.37	91.98	0.69	16.44	1.27	44.48	36.13
<b>Maximum</b>			10.49	132.16	2.24	24.66	2.66	56.28	73.34
<b>Std. dev.</b>			1.05	14.06	0.51	2.84	0.46	4.00	13.56
<b>Type Vb</b>									
NW	377	Rheine	8.29	242.69	1.25	16.69	2.52	55.24	13.27
HE	415	Darmstadt	7.89	397.71	1.49	20.77	3.51	59.61	7.95
RP	519	Koblenz	8.40	226.20	2.06	23.40	3.87	72.06	28.54
RP	527	Mainz	8.48	415.17	2.37	23.14	3.64	69.97	7.72
RP	535	Montabaur	8.10	186.84	1.08	16.32	2.36	52.21	16.32
BW	611	Aalen	8.15	210.96	0.93	18.21	2.14	41.61	9.41
BW	614	Balingen	8.16	153.80	1.11	16.64	1.80	44.06	10.76
BW	617	Freiburg	7.80	270.00	1.35	24.03	3.35	64.98	11.91
BW	621	Göppingen	6.31	590.04	1.25	21.20	2.05	48.51	9.55
BW	624	Heidelberg	7.50	501.74	1.58	25.15	1.95	66.65	5.99
BW	627	Heilbronn	7.63	366.94	1.78	22.13	2.09	50.44	6.97
BW	631	Karlsruhe	7.64	554.76	1.42	25.80	2.58	65.81	8.34
BW	634	Konstanz	8.19	290.50	1.11	23.06	3.33	55.78	20.22

		UBQ02	KORRBEVD00	OFFSTQ02	EINQ01	HLUQ99	TERT01	SAISON01	
		1	2	3	4	5	6	7	
BW	637	Lörrach	7.40	197.17	0.77	17.88	3.20	49.77	9.99
BW	641	Ludwigsburg	5.89	724.74	1.32	21.51	1.58	50.64	9.69
BW	651	Offenburg	6.87	220.52	1.19	20.80	2.77	52.97	13.25
BW	654	Pforzheim	8.13	461.49	1.37	20.16	1.93	45.71	7.27
BW	657	Rastatt	6.90	314.06	1.68	21.06	1.97	46.91	9.86
BW	664	Reutlingen	6.48	301.57	1.03	20.18	2.25	56.08	8.78
BW	671	Waiblingen	6.50	476.97	1.06	19.69	2.04	48.80	7.60
BW	684	Ulm	7.43	205.39	1.87	26.08	2.10	59.09	13.58
BW	687	Villingen- Schwenningen	7.28	205.17	1.91	24.89	2.12	49.29	15.75
BY	715	Aschaffenburg	8.26	306.91	1.58	19.94	2.24	48.54	14.97
BY	811	Augsburg	8.43	308.14	1.26	24.66	2.21	60.38	18.41
<b>Arith. mean</b>			7.59	338.73	1.41	21.39	2.48	54.80	11.92
<b>Minimum</b>			5.89	153.80	0.77	16.32	1.58	41.61	5.99
<b>Maximum</b>			8.48	724.74	2.37	26.08	3.87	72.06	28.54
<b>Std. dev.</b>			0.75	148.29	0.39	2.93	0.65	8.39	5.19
<b>Type Vc</b>									
BW	647	Nagold	6.27	167.73	1.36	18.85	1.36	51.76	17.72
BW	661	Ravensburg	6.25	170.57	1.70	20.68	1.95	48.88	21.48
BW	667	Rottweil	6.51	182.07	1.26	19.18	1.99	38.07	11.44
BW	674	Schwäbisch Hall	6.99	129.82	1.54	18.89	1.98	47.58	11.96
BW	681	Tauberbischofsheim	7.45	117.86	1.01	16.32	2.06	47.28	16.63
BY	739	Regensburg	8.22	148.05	1.31	24.04	2.07	55.42	34.21
BY	759	Würzburg	7.09	181.27	1.50	21.69	2.09	63.15	22.75
BY	819	Donauwörth	5.68	109.42	1.25	18.68	1.56	44.26	31.08
BY	823	Freising	4.53	160.62	2.05	25.47	0.74	69.76	44.06
BY	827	Ingolstadt	7.03	153.45	1.63	21.92	1.49	46.86	28.02
BY	831	Kempten	7.36	137.62	1.00	24.96	1.67	56.14	35.60
BY	835	Landshut	6.62	125.22	3.48	22.57	1.25	43.85	42.19
BY	839	Memmingen	7.40	180.46	1.16	20.97	1.33	48.50	29.42
BY	855	Rosenheim	6.51	146.56	1.51	25.19	1.59	61.39	43.56
BY	863	Weilheim	5.50	120.48	1.45	23.34	1.35	58.73	50.97
<b>Arith. mean</b>			6.63	148.75	1.55	21.52	1.63	52.11	29.41
<b>Minimum</b>			4.53	109.42	1.00	16.32	0.74	38.07	11.44
<b>Maximum</b>			8.22	182.07	3.48	25.47	2.09	69.76	50.97
<b>Std. dev.</b>			0.91	24.66	0.60	2.77	0.39	8.50	12.38
<b>All EOs</b>									
<b>Arith. mean</b>			12.92	432.01	1.22	21.11	3.63	59.28	16.89
<b>Minimum</b>			4.53	51.27	0.54	15.08	0.74	38.07	4.17
<b>Maximum</b>			30.89	3792.99	3.48	41.09	10.81	80.53	73.34
<b>Std. dev.</b>			6.37	591.99	0.45	4.43	1.87	9.03	12.17

## **Appendix 2: Definition of the indicators included**

(1) *Underemployment rate*: The denominator of the underemployment rate is composed of the dependent labour force (including 4,021,163 unemployed in the Federal Republic of Germany for 2002) and participants in the following measures (2002):

Job-creation measures	127,811
Structural adjustment measures without SAM-OfW (SAMs for business enterprises in eastern Germany)	54,415
Full-time further vocational training measures	299,029
Rehabilitation measures aimed at occupational reintegration	38,319
German language courses	23,956
Short-time work in the full-time equivalent	85,488
Partial retirement	59,050
Benefit recipients in accordance with § 428 Social Code III	274,451

The sum of the measures together with the unemployed form the numerator of the rate

(2) *Adjusted population density*: For this the population figures of the employment office areas was related to their surface areas. In order to balance out large differences in the territory covered by the employment offices (in the case of Nürnberg the surrounding area belongs to the employment office area, in the case of Hannover it does not), the value for some city employment offices was adjusted.

(3) *Rate of vacancies*: The vacancies reported to the Federal Employment Agency were related to the dependent labour force.

(4) *Hiring rate*: The recruitments in employment subject to social security contributions in one year were related to the dependent labour force.

(5) *Rate of social-assistance recipients*: The recipients of social assistance aged between 18 and 65 (1999) were related to the reference quantity of the underemployment rate (2002).

(6) *Degree of tertiarisation*: Here the people in employment subject to social security contributions in the economic activities 62-94 (WZ73) are counted as a proportion of employment as a whole.

(7) *Seasonal span*: For this, moving annual averages are applied to the monthly values of the time series and in this way the “level”, the “trend” of the series is calculated. For the reference year (here 2001), the relative seasonal deflection is calculated for each month. Then the maximum and minimum of the seasonal deflections during the reference year are ascertained. The seasonal span then results as the difference between the maximum and the minimum. When determining the moving annual averages the calculation generally used in the Federal Employment Agency moving over 13 months is taken, i.e. the starting and finishing months each count as half.

Unless stated otherwise, annual averages were always used. In the case of 2002, the figures referred to the first ten months of that year and the last two months of 2001.

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