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How increasing commuting influences Labour Market Regions

Per Kropp
Barbara Schwengler

For additional information please contact:

Dr. Per Kropp
IAB Saxony-Anhalt-Thuringia
(IAB Regional in der Regionaldirektion Sachsen-Anhalt-Thueringen)
Frau-von-Selmnitz-Straße 6
D - 06110 Halle
Germany
E-Mail: Per.Kropp@iab.de
Phone: +49 345 / 1332 236

Barbara Schwengler
Institute for Employment Research of the Federal Employment Agency
(Institut fuer Arbeitsmarkt- und Berufsforschung (IAB) der Bundesagentur fuer Arbeit)
Regensburger Straße 104
D - 90478 Nuernberg
Germany
E-Mail: Barbara.Schwengler@iab.de
Phone: +49 911 / 179 3029

How increasing commuting influences Labour Market Regions

Dr. Per Kropp, Barbara Schwengler
Institute for Employment Research (IAB), Nuernberg, Germany

Content

Abstract

In recent years, several studies in various countries have addressed the delineation of functional regions based on commuting flows. Most of these studies have focused on one method and have used data from one year. Due to increasing number of commuters and distances of home-to-work travel in recent decades, this study extends the research on how increased commuting influences the shape and size of functional labour market regions in Germany over time.

Applying a three-step method, functional labour market regions are delineated by using commuting data for all employed persons in Germany on municipality level from 1993 to 2013 and the results are aggregated into seven groups of three years. By comparing the results of these different delineations with each other, regions are classified into three categories as stable “core regions”, “related regions” and “overlapping regions”.

The main finding is that regions surrounding important labour market centres form stable labour markets. Over time, most employees belong to the same labour market region or parts of it. However, increasing mobility has reduced the share of the regional labour force living and working within labour market regions. As a result, both the number of labour market regions and the quality of the delineations have decreased over time. Applying the three categories “core regions”, “related regions” and “overlapping regions” and the three-step method, this study can assess the quality and robustness of this method and analyse stability over time.

JEL-Codes: D85, J61, R23

Keywords: Functional regions, Regional Labour Markets, Commuting flows, Delineation, Stability, Germany

1 Introduction

In recent years, several studies in various countries have addressed the delineation of functional regions based on commuting flows (Spain: Casado-Díaz (2000); Great Britain: Coombes/Green/Openshaw (1986); the Netherlands: Cörvers/Hensen/Bongaerts (2009); Van der Laan/Schalke (2001); Sweden: Karlsson/Olsson (2006); Flanders: van Nuffel (2007); Belgium: Persyn/Torfs (2011); Denmark: Andersen (2002); US: Tolbert/Sizer (1996); Australia: Mitchell/Watts (2007); New Zealand: Papps/Newell (2002)). Most of these studies have focused on one method and, with some exceptions (Andersen 2002; Persyn/Torfs 2011), have used data from one year.

Because the number of commuters and the distances of home-to-work travel have increased in recent decades, this study extends the research on how increased commuting influences the shape and size of functional labour market regions in Germany over time. Applying the first two steps of the three-step method (Kropp/Schwengler 2016), functional labour market regions are delineated by aggregating German municipalities for all years from 1993 to 2013. By comparing the results of these different delineations with one another, the hierarchical structure of stable cores, related regions, and overlapping areas can be identified. Applying these three categories and the method described above, this study can assess the stability of functional labour market regions over time. The main finding is that regions surrounding important labour market centres form stable labour markets. Over time, most employees belong to the same labour market region or parts of it. Researchers who want to analyse labour market processes over time may apply this approach to find robust regional units for their country.

The following section outlines key features of the literature on the delineation of labour market regions. The third section presents the data and method employed in this study. The impact of increased commuting distances on the delineation results and the stability of labour market regions over time are presented in the fourth section. The fifth and final section concludes by summing up the salient research results and recommending how to apply them in practice.

2 Literature review

Functional regions are an important tool for analyses of the labour market and economic policy (Van der Laan/Schalke 2001). These regions are defined as areas with resident populations and industries with strong commuting and economic activities and few connections with outside regions (Hensen/Coervers 2003). A specific advantage of functional regions is that they are suitable territorial units that combine places of residence and places of employment for regional analyses within their boundaries. In contrast, administrative units were typically historically designed for administrative purposes and ignore present commuting and economic patterns. As analytical results strongly depend on data quality and are considerably influenced by

the boundaries of underlying territorial units, which is known as the modifiable areal unit problem (MAUP) (ESPON 2006; Openshaw 1984), functional regions should thus be delineated optimally. For this reason, concerted efforts have been made in Europe, for example, to create a common definition of local labour market areas (LLMAs) to compare regions within European Member States (Coombes et al. 2012).

In recent decades, a number of studies have proposed and applied various methods for delineating functional regions. Although some of these studies delineate city regions (Kauffmann 2012), metropolitan areas (Bode 2008) and housing market areas (Rusche 2009), most studies focus on labour market regions (Casado-Díaz 2000; Hensen/Cörvers 2003; Van der Laan/Schalke 2001; van Nuffel 2007). These functional labour market regions are usually based on commuting flows and other methods. In Germany, commonly used regional labour markets (RLMs) are defined by factor analysis (Eckey/Kosfeld/Tuerck 2006; Kosfeld/Werner 2012). Studies in Great Britain (Office for Nationals Statistics [ONS] 1998) and Spain (Casado-Díaz 2000) use threshold methods for delineating travel-to-work areas (TTWAs) and local labour market areas (LLMAs). In the Netherlands (Cörvers/Hensen/Bongaerts 2009; Van der Laan/Schalke 2001) and the USA (Tolbert/Sizer 1996), LLMAs and standard metropolitan areas (SMAs), respectively, are delineated by cluster analysis.

In recent decades, home-to-work commuting has increased in all modern countries (Coombes et al. 2012: 31 f.). Several studies have shown that the number of commuters and average commuting distances have increased. In the United States, the number of commuters more than doubled from 1960 to 2009 (McKenzie/Rapino 2011: 3), and in the UK, it increased 5.8 % from 2001 to 2011 (ONS 2014: 4). The average commuting distance increased in Canada from 7 km in 1996 to 7.6 km in 2006 (Statistics Canada 2008: 9), in the Netherlands from 13 km in 1985 to 17 km in 2001 (Statistics Netherlands 2002), in Belgium from 10.73 km in 1981 and 11.84 km in 1991 to 14.61 km in 2001 (Persyn/Torfs 2011: 11), in Denmark from 13 km in 1980 to 15.8 km in 1995 (Andersen 2002: 837), and in the UK from 13.4 km in 2001 to 15.0 km in 2011 (ONS 2014: 1). A study in France of three urban areas revealed an increase in the average commuting distance from 1990 to 1999 (Aguilera 2005).

Similar results have been found for Germany. According to the National Travel Survey in West Germany, the distances of home-to-work commuting increased from 357 million km per day in 1982 to 496 million km per day in 2002 (Lipps/Kunert 2005: 25). Based on longitudinal data from the German Socio-Economic Panel (GSOEP), the daily average commuting distances in Germany increased from approximately 12.7 km to 14.5 km from 1998 to 2009, while most employees commuted less than 50 km between home and work daily (Pfaff 2014: 120 f.). In a similar study, using the same database for the period 1996 to 2004, Einig and Pütz (2007: 73) found that 14 % of all employees in Germany commuted 25 km or more in 1996. This rate increased to 17 % in 2004. The share of commuters with a one-way distance between their

home and their workplace of at least 50 km increased from 4 % in 1996 to 5 % in 2004, whereas travel-to-work distances of less than 10 km declined from 56 % to 52 % during the same period. Although the mean commuting distances have been relatively stable in Germany since 2008, there has been an increase over the long run (Pütz 2015: 6).

Only a few studies have investigated the effects of increased mobility on labour market delineations. In their study on Belgium, Persyn and Torfs (2011: 10) found a decreasing number of labour markets over time as the size of labour markets increased due to increased commuting in 1981, 1991 and 2001. Similar results were found by Andersen (2002: 835) for Denmark for 1986 to 1996 and Istat for Italy for 2001 to 2011 (ISTAT 2014).

This paper seeks to explore the stability of functional delineations considering changing commuting patterns. It does so by applying the three-step method (Kropp/Schwengler 2016) to delineate labour market regions in Germany over different time periods. This study examines whether and how the increase in commuting distances over recent decades has influenced the results of delineations of functional labour market regions in Germany over time. Lack of space in this paper precludes a detailed discussion of the reasons for increasing commuting distances and of the commuting concept.

3 Data and method

This analysis uses commuting data between German municipalities from the German Federal Employment Agency statistics for all employed persons in Germany who were covered by social security from 1993 to 2013. There were between 26,060 and 29,145 million such employees, which equals approximately 70 % of all gainfully employed persons in Germany. The starting year is 1993 because valid data have been available only since then for all of Germany. To minimize possible errors in commuting data, the number of commuters during the 1993–2013 period is summed up within each group of three years (1993–1995, 1996-1998,…, and 2011-2013; cf. Van der Laan/Schalke 2001: 206). Due to the past municipality reforms in Germany, and to use a consistent regional basis for the analysis, the commuting data of all years use present municipality borders.

The three-step method (Kropp/Schwengler 2016) is applied to the data of each three-year group. This method combines a graph theoretical approach (Nystuen/Dacey 1961) with the threshold method to create meaningful delineations for different thresholds and various iterations. In the first step, the commuters' shares (inward and outward flows) of all employees living in the same region are computed for all commuting links between municipalities in Germany. If a small region is connected to a larger region, the largest share is labelled a dominant flow. Regions are merged when the dominant flow exceeds a certain threshold value. After recalculating the commuting

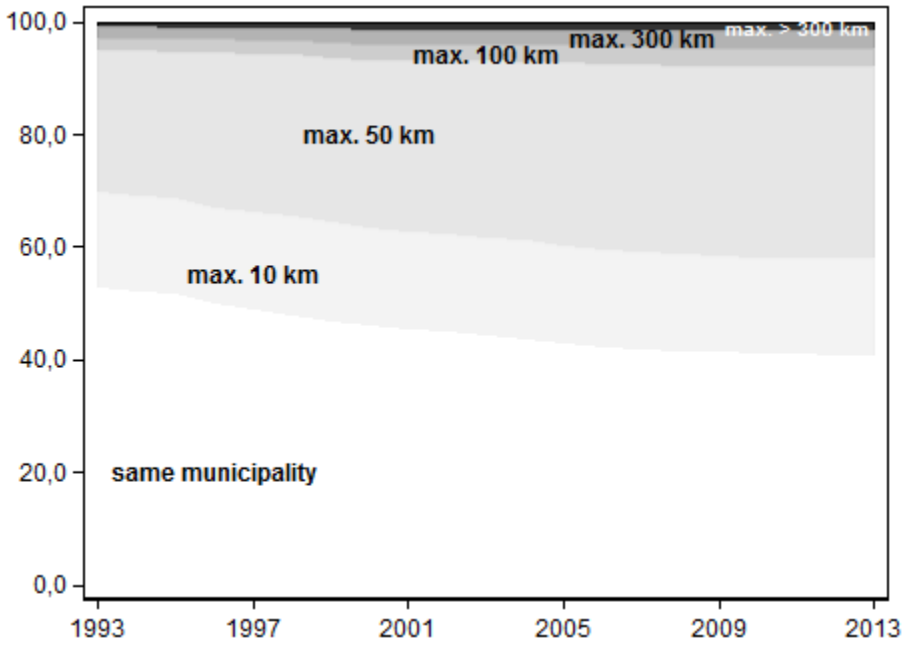
flows between individual regions, between individual regions and aggregated regions, and between aggregated regions, the procedure is iterated with the same thresholds until no more changes occur. Depending on the threshold values and the number of iterations, many possibly meaningful delineations of labour market regions are generated. In the second step, the optimal solution of this variety of results is identified through the application of modularity value Q of Newman and Girvan (2004) as a quality measure and through the selection of the delineation with the highest value. The modularity approach compares the actual link values within and between labour market regions with the link values expected if they were random. If the number of links in a labour market region is greater than the number of links in the null model, modularity value Q falls between zero and a maximum of one. In network research, where the modularity approach is commonly used as a tool for community detection (i.e., finding groupings or clusters), values generally fall between 0.3 and 0.7 (see Fortunato 2010: 86, for a recent discussion in this field). In this analysis, the values for commuting data are much higher, and the best modularities reach values between 0.83 and 0.88 for the three-year groups. One striking advantage of the modularity measure is that in contrast to other commonly used measures, such as the commuting ratio or the self-containment ratio, it is not necessarily improved if regions are merged, i.e., it does not depend on the number of delineated regions. For purposes of this paper, this study omits the third step of the method, which attempts to optimize the results by grouping very small regions (mostly islands) or isolated municipalities into nearby larger labour market regions.

4 Results

4.1 Increasing commuting distances

Our analyses of the data for all employees in Germany from 1993 to 2013 confirm an increasing number of commuters and increasing average commuting distance. The percentage of employees living and working in the same municipality decreased from 53 % in 1993 to 41 % in 2013. During that time, the number of employees who crossed municipality borders when commuting from home to work increased. Whereas the share of employees commuting short distances (less than 10 km) remained stable (17 %), the share of those who commuted longer distances increased considerably. For distances up to 50 km, the share increased from 25.2 to 34.1 %; for distances from 50 to 100 km, it increased from 2.2 to 3.3 %; for distances from 100 to 300 km, it increased from 2.0 to 3.0 %; and for even longer distances, it increased from 1.0 to 1.7 % (see Figure 1). This result is in line with Pütz (2015: 7), who found that commuting flows have increased since 2007 and, in particular, between regional centres in Germany, and the greatest commuter flows are directed to regional centres.

Figure 1
Change in commuting distances in Germany from 1993 to 2013 in per cent



Source: Bundesagentur fuer Arbeit (Federal Employment Agency); authors' own illustration.

Over the same time period, the average commuting distance increased from 15 km to 23 km. For commuters crossing municipality borders, it increased from 33 km to 39 km. Because distances are measured between the centres of municipalities, they depend on the size and distribution of the municipalities and can only approximate real commuting distances, particularly with regard to smaller distances. Despite these shortcomings, the change in the average commuting distance over time is reliable.

4.2 Delineation results over time

Because commuting interactions are calculated by adding inward and outward commuting flows, the direction of the flow is immaterial. Therefore, the results should be relatively robust despite changes in commuting within the hinterland and from the centre to the hinterland. However, it is notable that commuting patterns change only over the long term, so delineations for every year should differ only slightly.

To illustrate important changes over time, the twenty best results for delineations of labour market regions are identified for each three-year period between 1993 and 2013 (see Appendix A). Figure 2 below presents the changes in modularity, and Figure 3 shows the number of labour market regions for each of the seven three-year groups.

Figure 2
The twenty best modularities for each of the seven three-year groups

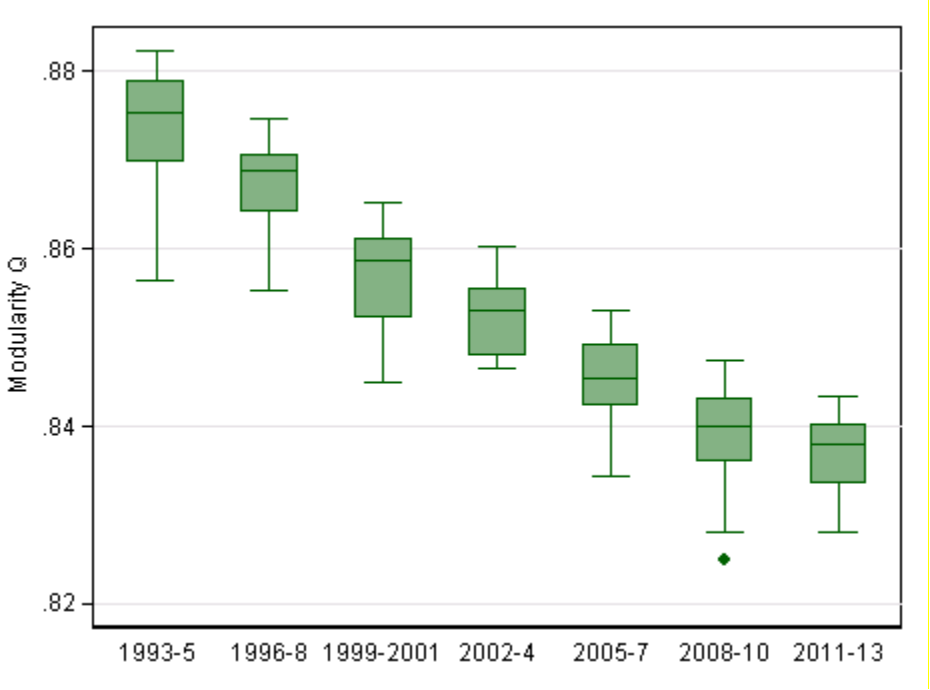
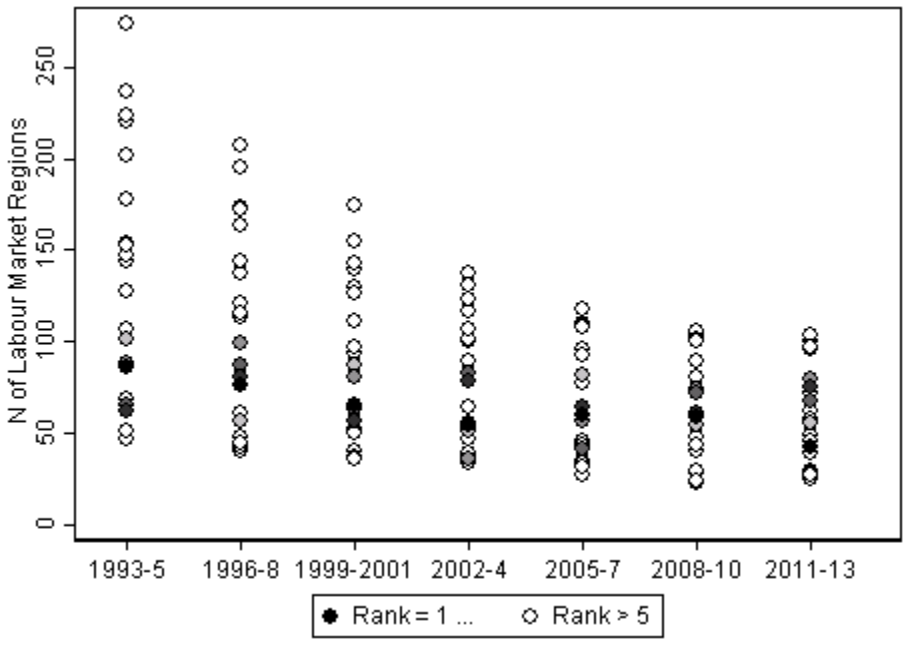


Figure 3
Number of labour market regions for the twenty best modularities for each of the seven three-year groups



Source: Bundesagentur fuer Arbeit (Federal Employment Agency); authors' own illustration.

The modularity values decrease from the past to the present because of the increase in both daily and long-distance commuting, as described in section 4.1. While considerably high modularity values were achieved over a decade ago, recent modularity

values remain high (above 0.83) and show that the applied method provides good results – even for delineations of labour market regions with more commuters and longer commuting distances.

During the same evaluation period, the number of the twenty best delineations of labour market regions varied between 23 and 274 with a declining median value from 136 (1993–1995) to 57 (2011–2013). Figure 3 shows that the best five results of each three-year group, displayed as dark circles, varied within a much smaller range – between 36 and 102 labour market regions – throughout the time period.

As a consequence of the increasing commuting distances over time, the best delineation result for functional labour market regions declined from 86 units (1993–1995) to 43 units (2011–2013; see Appendix A).

4.3 Stability of delineations over time

The best results across the seven time periods are achieved with an algorithm that has a threshold value of four after two iterations. This algorithm produces between 42 and 88 labour market regions with modularity values between **0.841** and **0.881**. With one exception, it ranks among the top 5 results for each of the three-year groups (Appendix A). To test the stability of the delineations over time, the seven delineations of this best overall algorithm are compared. To illustrate this comparison, the borders of these seven regional labour market delineations of each time period are placed one on top of the other. The German labour market is thus divided into 220 partial regions (see also Figure 4). These regions can be classified as follows:

- **Core regions**: Municipalities belong to the same labour market region in every three-year period.
- **Related regions**: Municipalities sometimes form a separate labour market region of their own and sometimes belong to one particular labour market region.
- **Overlapping regions**: Municipalities belong to different labour market regions.

Table 1
Descriptive statistics of the best overall delineation of labour market regions distinguishing three quality levels

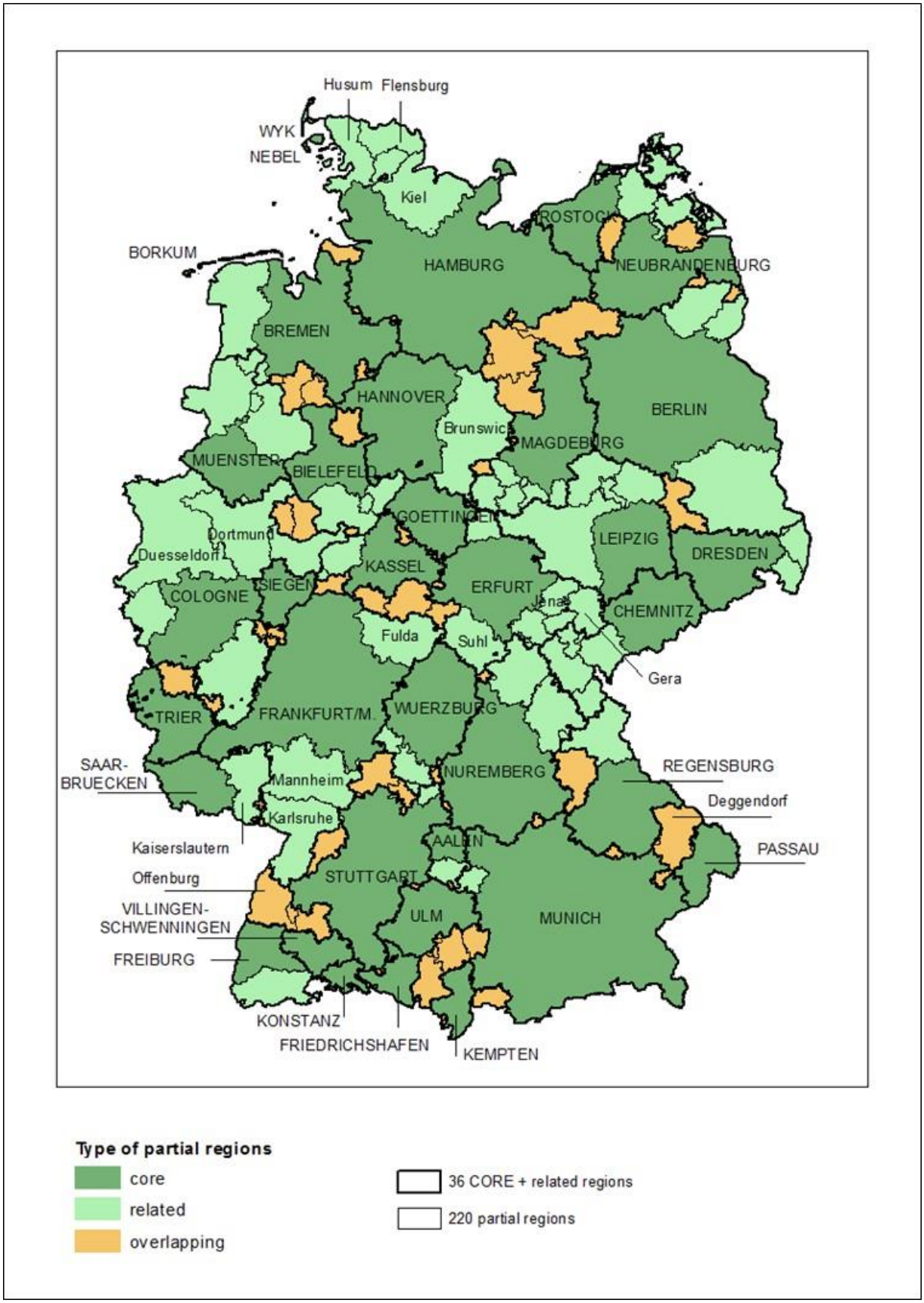
Type of region	*Number of regions*	*Number of municipalities*	*Municipalities in per cent*	*Number of employees (thousands)*	*Employees in per cent*
Core	36	6,730	60.5	19,001	66.3
Related	88	3,473	31.2	8,501	29.7
Overlapping	96	914	8.2	1,146	4.0
Total	220	11,117	100.0	28,648	100.0

Source: Bundesagentur fuer Arbeit (Federal Employment Agency); authors' own calculation.

The results of the analysis reveal 36 regions formed by municipalities that belong to the same labour markets over time, 88 regions that sometimes form separate labour markets, and 96 typically very small regions that form combinations of various labour markets. At first blush, the comparison of 36 stable regions with 96 overlapping regions seems to argue strongly for instability. However, the 36 core regions cover 60.5 % of all German municipalities and approximately two-thirds of its workforce, while the 96 overlapping regions are small, containing just 1.1 million of the more than 28.6 million employees in Germany.

In Figure 4, core, related and overlapping regions have different colours: Dark green regions in the map represent the 36 core labour market regions, with 66.3 % of all employees. Light green regions, with 29.7 % of all employees, are independent in some time periods but belong to one particular labour market region in other years (related labour markets). Core labour market regions and regions that are sometimes and exclusively assigned to this labour market region are marked by black border lines. The red-coloured regions belong to different labour market regions over time.

Figure 4
Map of the best overall delineation of labour market regions distinguishing three types of regions



Source: Bundesagentur fuer Arbeit (Federal Employment Agency); authors' own illustration.

The dark and light green areas outweigh the red ones and confirm the assumption of the temporal stability of the applied delineation method.

Unsurprisingly, most of the eleven metropolitan areas[1] in Germany (BBSR/IKM: 2012) correspond well with core areas. While larger core areas represent the most important economic centres in Germany, some core areas seem to be rather isolated peripheral regions. With regard to the number of employees working there, Table 2 shows the five largest labour market regions, the median labour market region and the five smallest labour market regions for each different type of labour market region: core, related and overlapping.

Table 2
Descriptive statistics for selected partial regions in 2012

		rank	**employees** (1,000)	**inhabitants** (1,000)	**unempl.** (%)	**GDP p. empl.** (1,000€)	**wage p. empl.** (1,000€)
CORE REGIONS (sum / mean)		**1-36**	**19,001**	**52,311**	**6.5**	**64**	**28**
FIVE LARGEST	MUNICH	1	2,273	5,884	3.5	72	30
	FRANKFURT/M	2	2,167	5,767	5.6	70	30
	STUTTGART	3	1,724	4,492	4.0	71	32
	BERLIN	4	1,717	5,165	11.2	57	25
	HAMBURG	5	1,708	4,722	7.0	66	27
MEDIAN	*ULM*	*18*	*298*	*759*	*3.2*	*68*	*30*
FIVE SMALLEST	KEMPTEN	32	80	223	3.5	58	26
	AALEN	33	66	173	3.7	71	31
	WYK	34	3	8	7.0	58	22
	BORKUM	35	2	5	6.4	62	23
	NEBEL	37	1	2	7.0	58	22
RELATED REGIONS (sum / mean)		**1-88**	**8,501**	**25,060**	**7.9**	**62**	**27**
FIVE LARGEST	COLOGNE_Duesseldorf	1	2,076	6,028	9.2	68	29
	COLOGNE_Duesseldorf_Dortmund	2	1,025	3,263	9.9	62	28
	FRANKFURT/M_Karlsruhe_Mannheim	3	691	1,933	5.3	66	29
	FRANKFURT/M_Karlsruhe	4	493	1,319	4.1	68	30
	Brunswick_HANNOVER	5	418	1,121	6.9	65	28
MEDIAN	*Heidenheim/MUNICH*	*44*	*20*	*62*	*2.5*	*61*	*26*

[1] The German metropolitan areas are Munich, Nuremberg, Stuttgart, Rhine-Neckar, FrankfurtRheinMain, Rhine-Ruhr, Mitteldeutschland, Berlin-Brandenburg, Hamburg, Hannover Braunschweig, Goettingen, Wolfsburg and Bremen-Oldenburg.

		rank	employ-ees (1,000)	inhabit-ants (1,000)	unem-pl. (%)	GDP p. empl. (1,000€)	wage p. empl. (1,000€)
FIVE SMALLEST	Kaiserslautern_Karls-ruhe_SAARBRUECKEN	84	0.015	0.140	4.6	59	22
	B.Hersfeld_ERFURT	85	0.013	0.180	6.1	54	23
	Flens-burg_Kiel_Husum_HAM-BURG	86	0.007	0.042	7.0	58	22
	Fulda_ERFURT_Suhl	87	0	0.164	6.9	48	22
	Duesseldorf_TRIER	88	0	0.044	3.0	61	26
OVERLAPPING REGIONS (sum / mean)		**1-96**	**1,147**	**397**	**5.1**	**60**	**26**
FIVE LARGEST	FRANKFURT/M_FREI-BURG_Offenburg	1	133	358	3.6	63	28
	FRANKFURT/M_ STUTTGART	2	104	314	4.7	65	29
	MUNICH_PASSAU_ Deggendorf	3	66	192	3.6	57	25
	HANOVER_BIELEFELD	4	65	199	6.1	65	27
	Osnabrueck_Vechta_ BREMEN_MUENSTER	5	59	134	3.8	57	24
MEDIAN	*Helgoland_HAMBURG_ HANNOVER*	*48*	*0.858*	*1.356*	*5.5*	*62*	*27*
FIVE SMALLEST	COLOGNE_Koblenz_ TRIER_KEMPTEN	92	0.002	0.200	3.8	53	22
	Duessedorf_TRIER_ SAARBRUECKEN	93	0.001	0.048	3.0	61	26
	FRANKFURT/M_TRIER	94	0.000	0.018	3.0	61	26
	COLOGNE_FRANK-FURT/M_TRIER	95	0.000	0.055	3.0	61	26
	FRANKFURT/M_ ERFURT_Gera_Jena	96	0.000	0.116	7.3	50	22

Notes: City names in all capital letters are core labour market regions.
All other city names are related labour market regions.

Source: Bundesagentur fuer Arbeit (Federal Employment Agency); authors' own illustration.

The five largest core regions correspond to the most important metropolitan areas in Germany. Only the largest official metropolitan area, Rhine-Ruhr, is missing because it is divided into the core area around its largest city (COLOGNE, ranked 6th largest of the core regions) and the two by far most important related labour market regions (COLOGNE_Duesseldorf and COLOGNE_Duesseldorf_Dortmund). The polycentric structure of this area makes it difficult to find suitable functional regions. Thus, Blotevogel and Schulze (2010) propose dividing the area into different possible metropolitan areas.

In addition to very large related regions, there are some very small regions – even some without any employed persons in 2012. This is at least partially due to the use of municipalities as basis regions. In particular, very small municipalities, such as in Rhineland-Palatinate, are prone to data problems. If just two of three employees work

in different labour market regions, as most employees in surrounding municipalities do, the algorithm creates a particular related region. The same holds if an important employer in a municipality registers its employees in a subsidiary in another region.

Comparing the sizes of partial regions for the different types of regions reveals that core regions are by far larger than related regions and that the latter are much larger than overlapping areas, in terms of the number of both employees and inhabitants. This becomes particularly clear when comparing the values of the median regions of the different types of regions.

Table 2 shows additional descriptive statistics, such as the unemployment rate or indicators of regions' economic strength. The mean unemployment rate is highest for related regions (7.9 %), followed by core regions (6.5 %) and overlapping regions (5.1 %). As expected, the economic strength of core regions as economic centres ranks highest in terms of both GDP per employee and average yearly wages. However, these differences are small compared to the differences within the types of regions.

5 Conclusion and recommendations for future research

This paper contributes to the literature of functional regions by examining the stability and robustness of delineations of labour market regions over time. Because commuting distances have increased in recent decades and the delineation of labour market regions has gained importance in regional science and regional policy, this topic is the focus of this study. The results show that the quality and number of the delineated labour market regions have declined as commuting distances have increased.

Distinguishing three different types of labour market regions, our findings confirm the stability and the robustness of the applied delineation method over time. The main result is a delineation of 36 stable core labour market regions that include almost two-thirds of all employees during the entire 21-year period. Another 29.7 % of all employees belonged to related labour market regions, which sometimes form a labour market on their own and sometimes belong to one other labour market, in particular. Only 4.0 % of all employees were assigned to different labour market regions.

Delineations are basically a theoretical concept of areas surrounded by borders. To capture economic interactions, functional delineations such as labour market regions have the disadvantage of trying to find exact borders for functional regions. A more suitable approach would be to map the density of labour market interactions. This approach was applied in this study by distinguishing core and related labour markets to provide a more differentiated picture and to introduce a simple hierarchical relation, i.e., the relation between core and related labour markets. The third category, overlapping regions, captures an important feature of real-world interaction that is typically

ignored in functional delineations. As a recommendation for researchers, labour markets, which consist of a core and related parts, are suitable units in analyses of labour market processes over time in their country. If there is a need for small-scale units for practical application, cores and parts can be analysed separately. The method applied in this paper identifies 36 core labour markets and their related parts, or 124 smaller labour markets for Germany. Overlapping areas can be ignored for certain research questions or can be assigned to core or partial labour markets based on the strongest interaction they have with one of these. The same holds for very small regions.

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Appendix

Appendix A: The twenty best overall results (bold: the best results for each time period)

Threshold	Iteration	Rank overall	N 1993-1995	Q 1993-1995	Rank 1993-1995	N 1996-1998	Q 1996-1998	Rank 1996-1998	N1999-2001	Q 1999-2001	Rank 1999-2001	N 2002-2004	Q 2002-2004	Rank 2002-2004	N 2005-2007	Q 2005-2007	Rank 2005-2007	N 2008-2010	Q 2008-2010	Rank 2008-2010	N 2011-2013	Q 2011-2013	Rank 2011-2013
4	2	2.9	88	0.8809	**4**	**76**	**0.8748**	**1**	**66**	**0.8653**	**1**	**55**	**0.8603**	**1**	**42**	**0.8515**	**3**	44	0.8415	9	**43**	**0.8433**	**1**
7	5	5.0	144	0.8758	9	114	0.8704	7	87	0.8613	5	79	0.8573	2	60	0.8530	1	**59**	**0.8474**	**1**	58	0.8384	10
6	3	5.1	128	0.8788	6	99	0.8729	4	81	0.8631	4	65	0.8546	8	57	0.8502	4	55	0.8433	5	56	0.8403	5
7	4	6.0	154	0.8742	12	121	0.8701	8	94	0.8612	6	83	0.8570	3	64	0.8524	2	61	0.8473	2	62	0.8384	9
5	2	7.0	147	0.8756	10	116	0.8688	11	97	0.8594	9	89	0.8552	7	78	0.8490	6	72	0.8453	3	68	0.8421	3
5	3	7.1	**86**	**0.8823**	**1**	61	0.8701	9	50	0.8591	10	47	0.8542	9	43	0.8473	7	41	0.8417	7	39	0.8398	7
1	1	7.9	69	0.8772	8	57	0.8707	5	52	0.8606	7	51	0.8558	5	44	0.8445	11	44	0.8399	11	43	0.8391	8
6	4	8.1	107	0.8784	7	87	0.8739	3	63	0.8635	3	56	0.8521	12	46	0.8464	10	48	0.8401	10	49	0.8367	12
6	5	9.3	102	0.8790	5	81	0.8740	2	57	0.8643	2	53	0.8512	13	44	0.8436	14	44	0.8373	13	46	0.8335	16
7	3	9.3	178	0.8710	15	137	0.8676	13	111	0.8578	12	100	0.8542	10	82	0.8494	5	74	0.8450	4	72	0.8402	6
8	5	11.1	220	0.8654	19	164	0.8632	18	130	0.8555	13	102	0.8521	11	93	0.8466	9	81	0.8429	6	75	0.8423	2
3	2	12.4	51	0.8734	13	41	0.8706	6	40	0.8600	8	36	0.8561	4	34	0.8391	20	30	0.8347	18	30	0.8332	18
4	3	12.6	47	0.8751	11	43	0.8690	10	36	0.8583	11	34	0.8555	6	27	0.8440	12	23	0.8282	21	25	0.8333	17
8	4	12.7	224	0.8645	20	172	0.8612	20	140	0.8530	15	107	0.8511	14	96	0.8471	8	89	0.8415	8	80	0.8411	4
5	4	15.0	66	0.8817	3	48	0.8677	12	37	0.8515	17	39	0.8472	19	35	0.8425	15	28	0.8354	17	29	0.8282	22
6	2	16.0	202	0.8684	16	173	0.8614	19	143	0.8502	18	123	0.8476	17	109	0.8422	16	101	0.8364	15	96	0.8374	11
2	1	16.1	153	0.8733	14	144	0.8651	14	127	0.8548	14	117	0.8478	16	108	0.8405	17	100	0.8347	19	97	0.8328	19
5	5	17.7	62	0.8819	2	45	0.8650	15	36	0.8500	19	37	0.8472	18	32	0.8344	23	24	0.8249	24	27	0.8281	23
8	3	17.9	237	0.8623	22	195	0.8553	23	155	0.8499	20	131	0.8466	20	110	0.8439	13	106	0.8367	14	100	0.8356	13
9	5	18.3	274	0.8563	26	207	0.8556	22	175	0.8449	21	137	0.8479	15	118	0.8404	18	104	0.8383	12	104	0.8353	14

Source: Bundesagentur fuer Arbeit (Federal Employment Agency); authors' own illustration.