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CONTRIBUTION TO STUDIES ON PERIPHERAL REGIONS OF CZECHIA

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Abstract: The article deals with the research on peripheral regions of Czechia. The primary question of the authors' team was, which factors are the most influential in the qualitative differentiation of the Czech districts. The evaluation was done with by the means of component (factor) analysis, enabling to obtain out of 15 physical geographical and social economic characteristics several principal synthetic factors explaining the differentiation of territorial units. Three of them, explaining in total nearly 70% of the variability of the group, are interpreted and their influence in the districts is showed in cartograms. On the base of the value of the factor score for individual districts, a delimitation of peripheral areas with different degree of intensity was done with the help of point hierarchization. Main peripheral regions of Czechia are briefly commented.

Key words: periphery, Czech districts, factor analysis, delimination

1. INTRODUCTION

Peripheral regions, or marginal regions, were initially studied in the Czech geographic literature within the research on settlement system (see for instance Hampl, Kühnl and Gardavský, 1989) and they were generally conceived as a complement to individual central regions. At the end of the 1980's, Musil (1988) and Illner (1988) also studied these problems. Both authors grasped it mainly from the social viewpoint at the smaller than district level (they used the so-called general units). They stated in conformity that peripheries often copy the administrative boundaries of regions. The theme of research on peripheral regions is close to studies of rural areas (for instance Perlín, 1998) and of border regions (at present for instance a grant of Grant Agency of Czech Republic). Methods for delimitation of rural areas were elaborated also by the

OECD, but not for district level (for NUTS). The European Union defines zones off less favoured areas.

2. RESEARCH METHODS

Till the beginning of our work, the research team was aware that the evaluation of the Czech Republic's territory must be done for the smallest possible administrative units. The lack of statistical data for units smaller than district was surmounted by a double level of evaluation and by analysis of several typologically different microregions:

1. On the base of cartographic data, the so-called potential peripheries, that is areas with a certain intensity of the evaluated phenomenon, were delimited. Map sources were divided into four thematic blocs:
   a) territorial administrative bloc - it included for instance the delimitation of regions that had been judicial districts in the past, and in 1949 allocated to several present districts or regions,
   b) economic bloc including for instance determination of areas with a lower intensity of agricultural production or delimitation of areas not covered by mobile telephone network Paegas,
   c) physical geographical bloc, within which altitude or relief sloping maps was analysed.

   The maps of peripheral areas obtained in this way were transferred into GIS.
2. As the second level of evaluation was chosen statistical analysis of district units characterised by 15 physical geographical and social economic indices. However, district units offer a largely deformed view on the reality, as they are strongly influenced by their centre (or several centres). Districts with large cities appear then as quite non-peripheral (for instance České Budějovice). Peripheral character of districts situated next to large cities but not having larger settlement centres (districts Plzeň-south, Plzeň-north, Brno-country, etc.) is on the contrary strengthened. The evaluation on the base of districts was thus corrected by the results of area method. The superimposition of both research levels helped to exclude central non-peripheral parts of districts.
3. A detailed questionnaire inquiry was done in the determined peripheral territories. The following microregions were selected:
   a) Moravské Kopanice, that is 5 villages of solitary cottages (Žitková, Vápenice, Vyškovec, Lopeník and the centre of the region Starý Hrozenkov). It is a territory of a dispersed type of settlement, adjacent to the border with the Slovak Republic. It is separated from the inland by the main ridge of the Bílé Karpaty Mountains. This territory that up to recently was situated in the middle of the state may become

peripheral, especially if the Czech Republic and the Slovak Republic do not enter in the same time the European Union.

b) Jemnice region, which is an example of an inland long-term peripheral territory, next to Austrian border. The former judicial district of Jemnice belongs today to 4 districts, respectively to three new higher territorial and administrative units.

c) Český Krumlov region representing territories adjacent to the former iron curtain. In addition, the research took up with a similar research done in the early 1990's on the Austrian side of the border.

This paper evaluates the statistical level of the research.

3. STATISTICAL EVALUATION

The evaluation of the Czech Republic on the level of districts was done with the help of component (factor) analysis, enabling to obtain out of many characteristics several principal synthetic factors explaining the differentiation of territorial units. Thanks to this method, it is thus possible to get answer to the question **which factors most influence the qualitative differentiation of districts**. In total 15 characteristics (given in Table 1) were used for evaluation. On the base of the value of the factor score for individual districts, a delimitation of peripheral areas with different degree of intensity was done with the help of point hierarchisation.

Table 1 Survey of indices used in component analysis

	Indices	Name of Variable
1	average altitude of the district	ALTI
2	sloping character of agriculture lands	SLOPE
3	intensity of farming	FARM
4	percentage of rural population of the district	RURAL
5	percentage of inhabitants in communes of less than 499 inhabitants	LESS499
6	age index	INDAGE
7	index of progressivity of employment structure	INDEMP
8	Employment in financial intermediation	BANK
9	level of material investments	INVEST
10	gross industrial production	GIP
11	number of foreigners staying overnight	FOREIG
12	average wages	WAGES
13	number of persons applying for one offered job	JOB
14	number of secondary schools per km^2	SCHOOL
15	number of crimes per 1000 inhabitants	CRIME

When choosing characteristics, we defined peripheries as areas situated outside economically exploited regions, characterised by a long distance from settlement centres, poor transport accessibility and a low density of population. In the same time, we tried to discern physical geographical and social economic aspects of the districts. The two first characteristics thus express the impact of natural conditions on the level of the district's development. The indices RURAL, LESS499 and INDAGE (pre-working to post-working age ratio) characterise the age and settlement structure of the district, FARM and GIP represent the level of farming and industrial production, the variable BANK indicates representation of progressive services. The total progressivity of economic structure is expressed by the synthetic index INDEMP constructed as a sum of parts of economically active population employed in primary, secondary and tertiary sectors expressed by values 1, 2 and 4 (in the given order). The variable FOREIG characterises the state of active tourism in the district and the number of crimes per 1000 inhabitants evaluates the quality of social environment. The data from the year 1996 were taken (eventually modified) from the publication of the Czech Statistical Bureau - Okresy 96 (Districts 96). All indices were standardised with the help of average and authoritative variation. The consecutive calculations were done by the SPSS software.

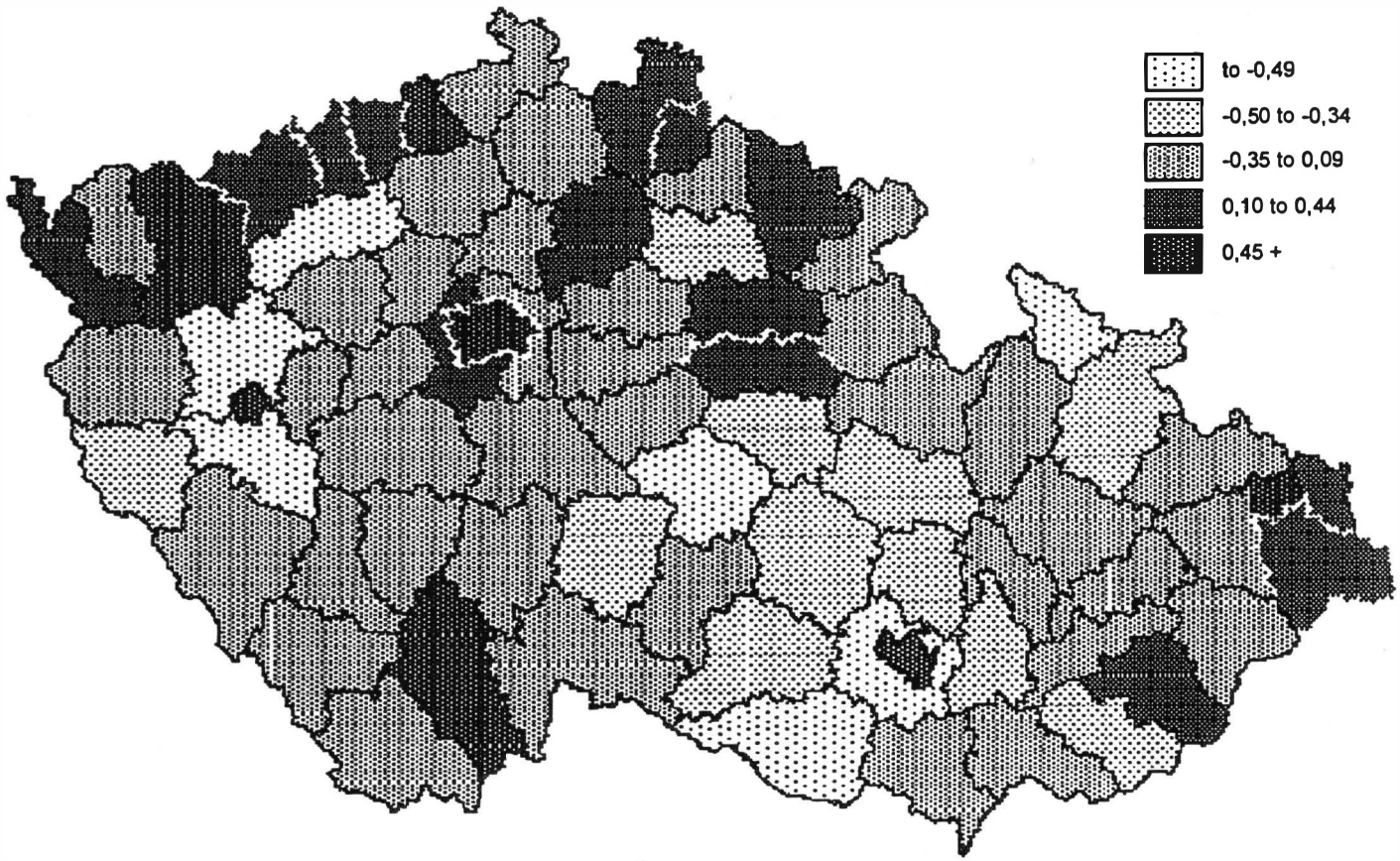
A view on correlation coefficients values (*Table 2*) shows that there are the statistically strongest correlation between the number of committed crimes and the volume of material investments, respectively the number of overnight staying foreigners (correlation coefficient superior to 0.9), and correlation between the number of committed crimes and the gross industrial production, respectively the number of secondary school per km^2 and between the gross industrial production and the volume of material investments (correlation coefficient between 0.8 and 0.9). When considering the number of interpreted factors (components), the 10% criterion was established. The first three of the extracted factors fulfilled this condition. They explain in total nearly 70% of the variability of the group (more precisely 69.46%), interpretation in this extent being thus sufficient.

1. Characteristic for the **first factor** (component) are high positive levels of the following indices: number of crimes, volume of investments, number of overnight staying foreigners, gross industrial production, level of wages, number of secondary schools per km^2 and characteristics of employment progressivity (BANK, INDEMP). The strongest negative levels are found in the percentage of rural population and in the percentage of population living in communes with less than 499 inhabitants. A practically nil impact is registered in this component in physical geographical characteristics: arable land sloping, average altitude, FARM) and number of persons applying for one offered job. This first component, explaining 42.16% of the total variability of the group and **being thus the main factor influencing the differentiation of Czech districts**, may be understood as a level of especially tertiary and quaternary economic branches mainly bound to non rural urbanised areas, and that independently on the altitude and the relief. This interpretation is also confirmed by *Cartogram 1* depicting the level of factor scores of the Factor 1 (component 1) in individual districts. Intervals were chosen in this cartograms, as well as in the following ones, in a way to make appear the most extreme levels (both positive and

Table 2 Correlation matrix

INDICES	ALTI	SLOPE	FARM	RURAL	LESS499	INDAGE	INDEMP	BANK	JOB	WAGES	SCHOOL	FOREIG	INVEST	GIP	CRIME
ALTI	1,000	0,414	-0,336	0,051	0,119	-0,382	-0,210	-0,153	-0,102	-0,383	-0,260	-0,016	-0,167	-0,285	-0,184
SLOPE	0,414	1,000	-0,266	-0,055	-0,404	-0,355	-0,060	-0,169	0,055	-0,207	-0,114	-0,020	-0,137	-0,098	-0,108
FARM	-0,336	-0,266	1,000	-0,026	0,019	0,323	0,054	0,112	-0,013	-0,037	0,349	-0,102	0,034	0,002	0,022
RURAL	0,051	-0,055	-0,026	1,000	0,616	0,096	-0,491	-0,519	-0,062	-0,600	-0,586	-0,324	-0,418	-0,540	-0,416
LESS499	0,119	-0,404	0,019	0,616	1,000	0,271	-0,502	-0,284	-0,169	-0,426	-0,421	-0,245	-0,313	-0,402	-0,326
INDAGE	-0,382	-0,355	0,323	0,096	0,271	1,000	0,176	0,390	-0,257	0,189	0,357	0,305	0,286	0,181	0,310
INDEMP	-0,210	-0,060	0,054	-0,491	-0,502	0,176	1,000	0,637	0,149	0,548	0,578	0,452	0,501	0,398	0,520
BANK	-0,153	-0,169	0,112	-0,519	-0,284	0,390	0,637	1,000	-0,040	0,578	0,714	0,697	0,773	0,604	0,754
JOB	-0,102	0,055	-0,013	-0,062	-0,169	-0,257	0,149	-0,040	1,000	-0,028	-0,054	-0,105	-0,058	-0,057	-0,055
WAGES	-0,383	-0,207	-0,037	-0,600	-0,426	0,189	0,548	0,578	-0,028	1,000	0,655	0,493	0,661	0,789	0,634
SCHOOL	-0,260	-0,114	0,349	-0,586	-0,421	0,357	0,578	0,714	-0,054	0,655	1,000	0,690	0,779	0,750	0,814
FOREIG	-0,016	-0,020	-0,102	-0,324	-0,245	0,305	0,452	0,697	-0,105	0,493	0,690	1,000	0,901	0,719	0,946
INVEST	-0,167	-0,137	0,034	-0,418	-0,313	0,286	0,501	0,773	-0,058	0,661	0,779	0,901	1,000	0,835	0,956
GIP	-0,285	-0,098	0,002	-0,540	-0,402	0,181	0,398	0,604	-0,057	0,789	0,750	0,719	0,835	1,000	0,834
CRIME	-0,184	-0,108	0,022	-0,416	-0,326	0,310	0,520	0,754	-0,055	0,634	0,814	0,946	0,956	0,834	1,000

Note: Pearson's correlation coefficient



Cartogram 1 Faktor Scores of Factor 1 - 42,16 % of variance

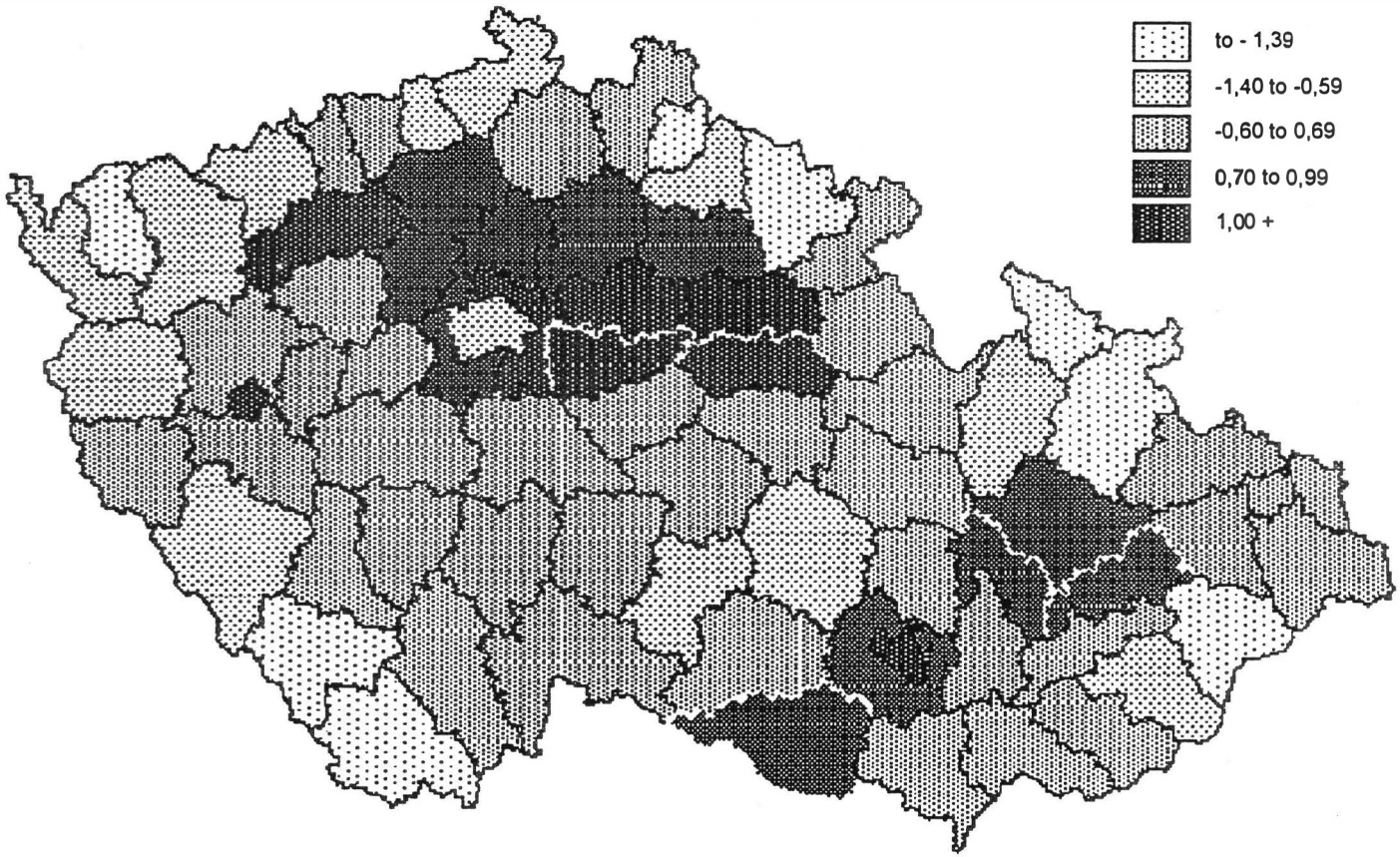
negative), the highest frequency of districts near the zero level was included into the middle of the 5 intervals. The factor 1 is mostly implemented in districts including regional centres, in the urbanised region of the Krušné hory Mountains, in the district of Mladá Boleslav (especially thanks to the investments to the Škoda Auto factory) and Trutnov (where the impact of the touristically attractive region of Krkonoše Mountains is apparent). **On the contrary, the Factor 1 ("tertiary") is negatively implemented in pronouncedly rural of strongly agriculturally oriented regions of Plzeň, Louny, Jeseníky Mountains or Českomoravská vrchovina (Bohemian-Moravian Highland).**

Table 3 Rotated component matrix and percentage of total variance explained by components 1, 2 and 3

Indices	Component / Factor		
	1	2	3
NADMVYS	-0,137	-0,776	0,199
SVAZIT	-7,580E-02	-0,695	-0,287
INTZHP	-2,283E-02	0,697	-7,305E-02
VENKOV	-0,554	3,443E-02	0,587
DO499	-0,393	0,187	0,771
INDSTAR	0,326	0,580	0,474
IND124	0,598	0,166	-0,423
BANKY	0,830	0,164	-3,547E-02
UCHAZEC	-0,145	6,634E-02	-0,551
MZDA	0,738	0,212	-0,297
SŠNAKM	0,844	0,268	-0,172
CIZINCI	0,913	-0,133	0,193
INVEST	0,950	3,809E-02	5,812E-02
HPP	0,866	6,861E-02	-0,125
KRIMI	0,960	3,134E-02	5,991E-02
% of total variance	42,16	14,28	13,02
Cumulative %	42,16	56,44	69,46

Extraction method: Principal Component Analysis, Rotation Varimax

2. **The second interpreted factor** (component) is mainly saturated by characteristics of intensity of farming, age index (both positively), average altitude of the district and sloping of arable lands (both negatively). As neutral appear here characteristics of progressivity of economic structure (INDEMP), percentage of economically active population in financial sphere, percentage of rural population and number of overnight staying foreigners. In other words, Factor 2 gets applied mainly in flat districts with lower altitude, a high intensity of agricultural production and older population, and that independently on the fact whether the district is or is not urbanised. In a simplified way, the factor 2 can be thus called "rich agriculture". The distribution of factor score on the *Cartogram 2* clearly expresses the expected strongest impact of the factor in the fertile regions along the Elbe and in Moravian vales. **The Factors 2 has a negative impact in highland and mountain areas with**



Cartogram 2 Faktor Scores of Factor 2 - 14,28 % of variance

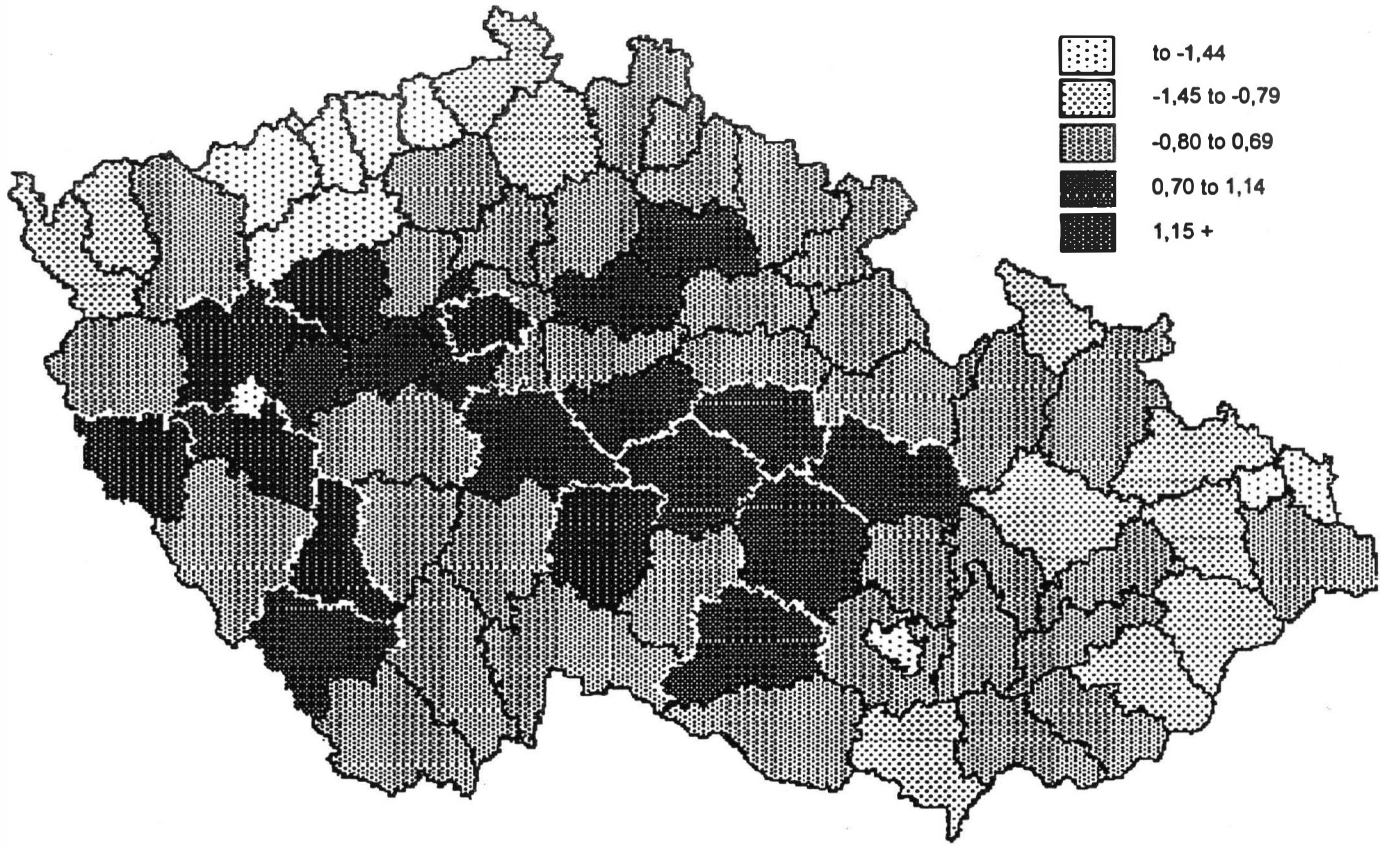
worse conditions for agricultural production, and thus also in border regions with a relatively young age structure of population. The factor 2 explains 14.28% of the total variability of the group and is roughly 3 times less important in explaining the differentiation of Czech districts than the Factor 1 "Tertiary".

3. **The third one of the interpreted factors** (components) with a 13.02% explication of variability of the group also belongs to feeble, complementary factors of differentiation. It is characterised by positive levels in indices percentage of population living in communes of less than 499 inhabitants, percentage of non rural population and age index, by negative levels in indices of number of applicants for one offered job and progressivity of economic structure. A narrow variation span of factor balance in this factor is due to its somehow complicated impact in district units (*Cartogram 3*). **The Factor 3 is frequent especially in rural districts with sparse settlement structure - in the Českomoravská vrchovina Highland, in the Plzeň region, along the southern and south-western border of the Central Bohemian region - that is partly also on the territory of the so-called inner peripheries.** Specific is the position of Prague among the districts with the highest levels of factor score, which in the case of the capital can be explained by outlying levels of indices of age index, number of overnight staying foreigners and number of applicants for one offered job. This factor also somehow complicates the position of Prague in the total evaluation of peripheries, described in the following chapter.

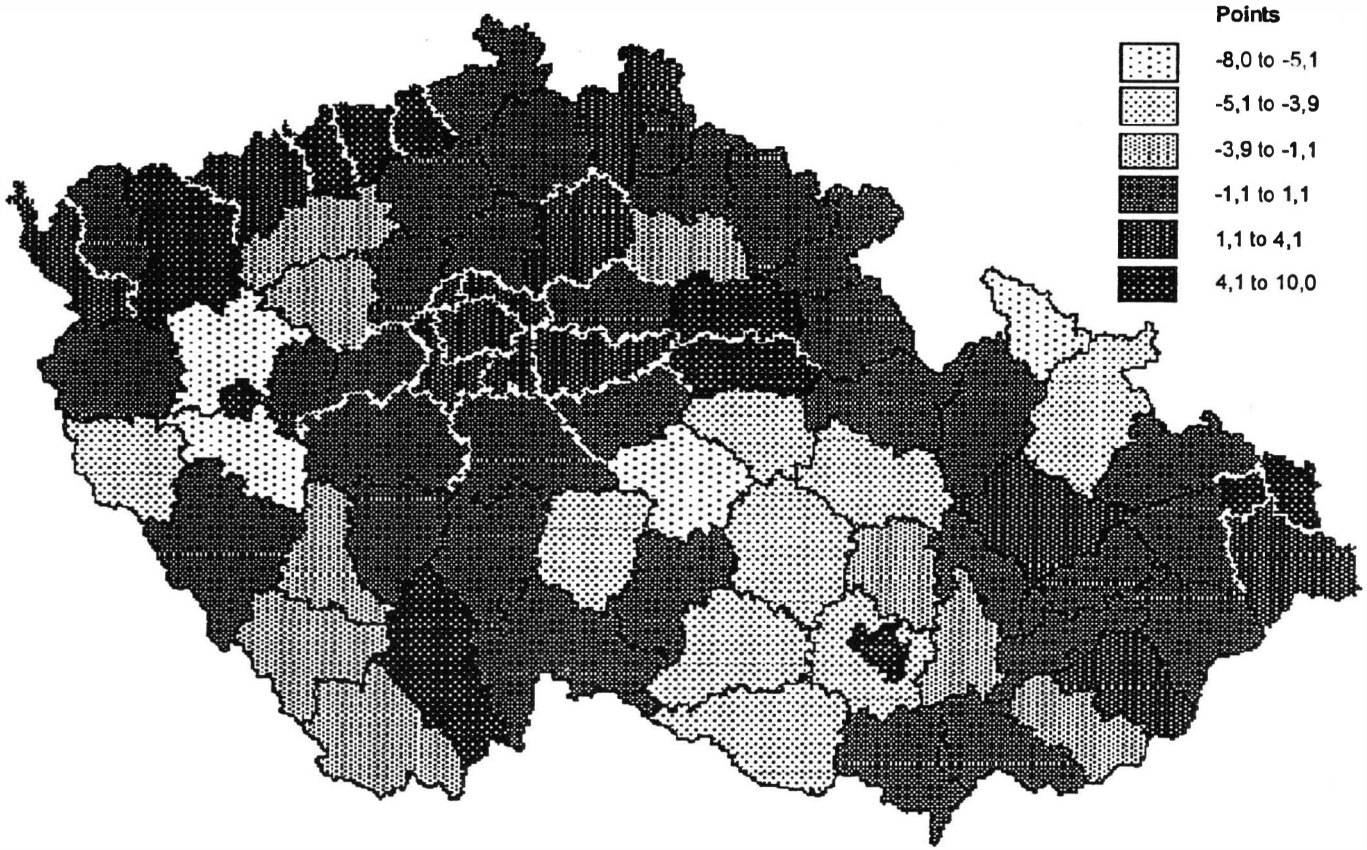
4. DELIMITATION OF PERIPHERAL REGIONS OF CZECHIA

The next step of our analysis was the point evaluation of individual factors of differentiation (factor balance) in districts according to the degree of their effect and the consequent division of the Czech Republic into central regions and into more or less peripheral regions. The districts were allocated points according to their position in intervals used for depicting individual factor scores on Cartograms 1, 2 and 3, the most significant Factor 1 having a triple importance. The total sum of points is shown in *Cartogram 4*. Central regions are thus urbanised areas, as well as some districts strongly influenced by their regional centres (for instance the districts of Zlín, Mladá Boleslav and Liberec). Peripheral districts were divided into three groups. The most problematic is the position of the districts Plzeň-North, Plzeň-South, Havlíčkův Brod and Jeseník. When associating peripheral districts into larger regions, we can distinguish in Czechia several principal peripheral regions.

1. It is above all the **region of the Českomoravská vrchovina (Bohemian-Moravian Highland)**, whose peripheral character is the most apparent in its centre and feebler towards its margins. In the limelight of the region is the district of Jihlava with the town of the same name, which is the only bigger settlement centre in the central part of the mountains. The described state shows that the planned establishment of the Jihlava region will be, in spite of problems connected with its delimitation, a



Cartogram 3 Faktor Scores of Factor 3 - 13,02 % of variance

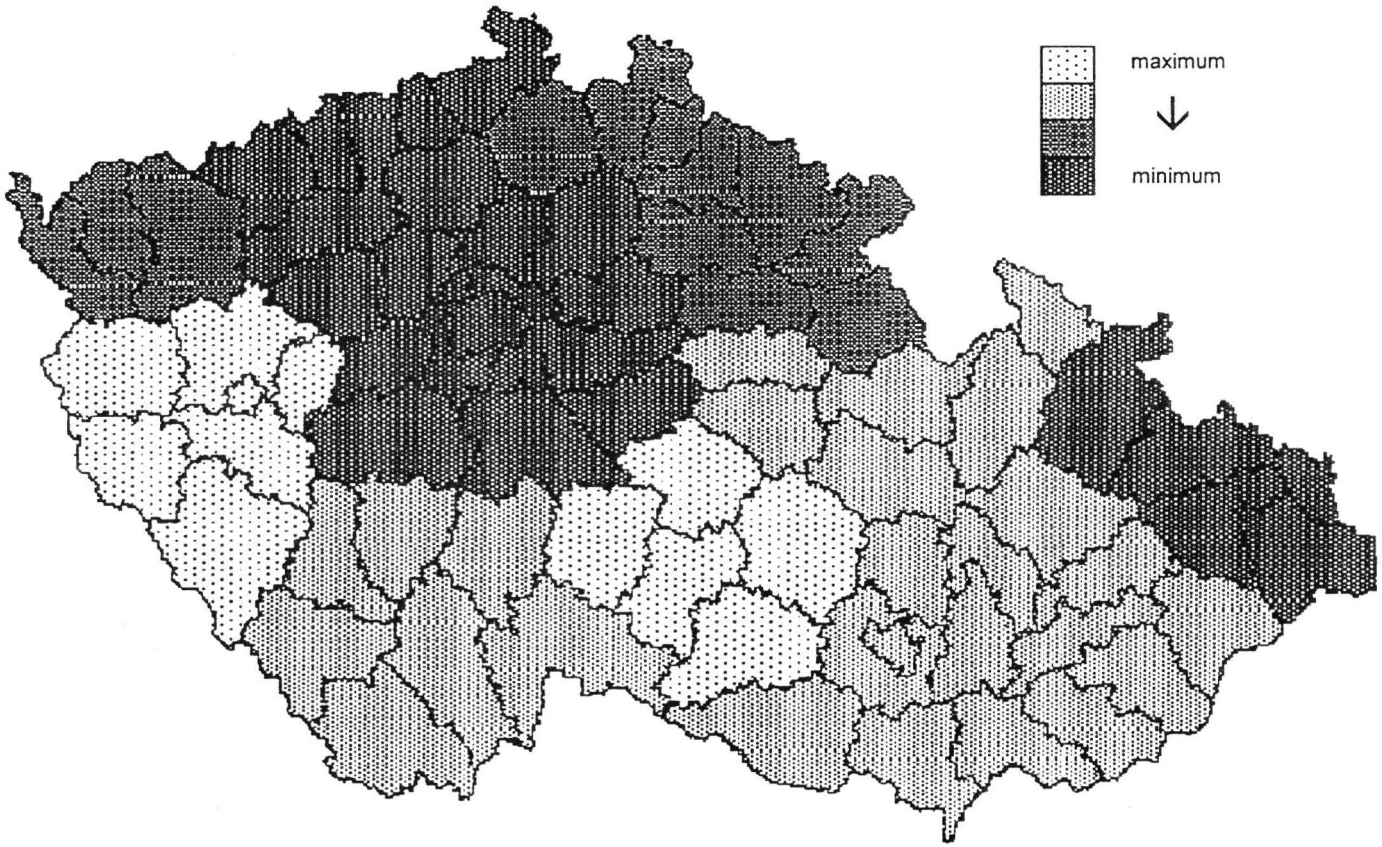


Cartogram 4 Typology of Peripheral Regions by the Faktor Scores

significant contribution to the future development of the area, because peripheral territories up to now situated at the periphery of regions, will be situated in the centre of the new region.

2. The second clearly peripheral regions is that of **Jeseníky Mountains** including the districts of Jeseník, Šumperk (both will be a part of the Olomouc region) and Bruntál (future Ostrava region). It is a region affected by the post-war displacement of German population and the consequent insufficient settlement, thus a region with a low density of population and little progressive economic structure.
3. The post-was displacement also touched another peripheral region, the sparsely urbanised region of the **Šumava and Český les Mountains**, where, in addition, a wide near-border belt along the iron curtain was enclosed. This region is typical for its sparse settlement, feebly developed infrastructure, its' orientation at agricultural production and forestry and locally for tourism (mainly the district of Klatovy). These "southern" Sudeten thus differ from the Krušné hory Mountains that were not situated at the border with Western Europe, had been industrialised since the end of the 19th century and the post-war settlement was there relatively successful.
4. Another case of an expressively inland peripheral region is, besides the Českomoravská vrchovina Mountains, **the larger neighbourhood of Plzeň** with its relatively sparse settlement structure, remoteness from larger settlement centres and a high part of primary economic branches.
5. It will be very interesting to observe the development at the **Moravian-Slovak border** that could possibly become a periphery, especially in the case of non-simultaneous entry of the Czech and the Slovak Republics into the European Union. At present, our evaluation shows as problematic only the district of Uherské Hradiště, the position of the districts of Vsetín and Kroměříž is neutral, the district of Zlín appears, thanks to its district centre, to be one of the central regions.

If we make a sum of point evaluation of the districts **within the new higher territorial administrative units ("provinces 2000")**, we can see in the *Cartogram 5* that from the view of peripheral character, the regions of Jihlava and Plzeň will have the feeblest position. On the contrary, as central appear the regions of Central Bohemia and Prague (they were taken together for the sake of calculations), Ústí nad Labem and Ostrava. Among other regions, a better position is held by the districts of Karlovy Vary, Liberec and Hradec Králové, a worse one then by those of České Budějovice, Pardubice, Brno, Olomouc and Zlín. Both in Bohemia and Moravia, the historically conditioned dichotomy north south is visible. It is however evident that this evaluation strongly levelled the differences within regions, but the aim of this analysis - to inform responsible institutions, was fulfilled.



Cartogram 5 Provinces 2000 by the Degree Peripherality

5. CONCLUSION

In spite of the sceptic position of the authors mentioned in the introduction the results of this statistical evaluation at the districts level show that they could be a stimulating contribution to studying of peripheral regions, mainly when looking for factors causing differentiation on the territory of Czechia and for a more precise definition of peripheral regions.

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Resume

Příspěvek ke studiu periferních oblastí Česka

Autoři příspěvku se pomocí metody komponentní (faktorové) analýzy pokusili získat odpověď na otázku, které faktory nejvíce působí na diferenciaci českých okresů. Z 15 vstupních charakteristik (tabulka 1) bylo extrahováno několik syntetických faktorů, z nichž tři, vysvětlující celkem téměř 70 % variability souboru (tabulka 3), byly interpretovány. První faktor vysvětluje 42,16 % celkové variability souboru. Vyhodnocení zátěží ukazuje, že tento faktor může být chápán jako úroveň terciálních a kvartérních odvětví hospodářství v okrese, vázaných především na urbanizované prostory. Kartogram 1 zobrazuje hodnoty faktorových skóre Faktoru 1. Negativně Faktor 1 působí v silně venkovských či výrazně zemědělsky zaměřených oblastech Plzeňska, Lounska, Jeseníků a Českomoravské vrchoviny.

Druhý interpretovaný faktor (14,28 % variability) se uplatňuje v rovinatých okresech s nižší nadmořskou výškou, s vysokou intenzitou zemědělské výroby a starším obyvatelstvem (kartogram 2). Faktor 2 můžeme tedy zjednodušeně nazvat "bohaté zemědělství". Třetí faktor (13,02 %) působí především ve venkovských okresech s rozdrobenou sídelní strukturou, částečně na území tzv. vnitřních periferií.

Na základě míry působení jednotlivých faktorů diferenciace (faktorových vah) v okresech bylo provedeno jejich bodové ohodnocení vyúsťující v rozčlenění ČR na oblasti jádrové a periferní. Faktoru 1 jako nejvýznamnějšímu byla dána trojnásobná váha. Výsledná suma bodů je znázorněna na kartogramu 4. Po sloučení periferních okresů do větších regionů, můžeme hovořit o několika hlavních periferních oblastech Česka:

a) Oblast Českomoravské vrchoviny,

b) oblast Jeseníků,

c) území Šumavy a Českého lesa a

d) širší okolí Plzně.

Zajímavé bude sledovat vývoj na moravskoslovenském pomezí, které se může potenciálně stát novou periferií. Kartogram 5 znázorňuje součet bodového ohodnocení okresů v rámci nových VÚSC.