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20 December 2011

Online at <https://mpra.ub.uni-muenchen.de/35628/>  
MPRA Paper No. 35628, posted 30 Dec 2011 02:16 UTC

# **The identification of regional disparities regarding the population employment according to activity fields in Romania in 2009**

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## **Abstract**

*One of the difficult issues of the economic territorial strategies and policies is represented by the highlighting and quantifying of the regional disparities. The disparities existing among different areas and regions express differences among the development levels generated by both the conditions of economic, demographic and historical development, and the varying endowment with natural resources. The aim of this research is to identify the differences between the eight regions of Romania regarding the population employment in respect of activity fields. The statistical method used for analyzing the data and highlighting the regional disparities is the correspondences factorial analysis (CFA).*

**Keywords:** regional disparities, regional development, employed population, CFA

**JEL Classification:** C16, J21, R12

## **1. Introduction**

The issue of highlighting and researching the regional disparities is highly important for developing the strategies of reducing the regional differences existing on both national and international level.

This research aims to identify the disparities among the 8 regions of our country by using the correspondences factorial analysis (CFA) as statistical method. The data used in the analysis are taken over from *Anuarul statistic al României, INS, București, 2010* (The statistical year book of Romania) and represent values of the indicators registered on regional level in 2009. The data were processed by using the statistical software SPSS, version 20.0.

The article has the following structure: in Section 2 some theoretical aspects are presented regarding the importance of identifying disparities on regional level; Section 3 briefly describes the methodological elements of the research used in the study; in Section 4 the data

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are analyzed, the results are pointed out and interpreted, and the last section presents the conclusions of the study.

## **2. Theoretical aspects**

The highlighting of the specific social and economic characteristics and the classification of the regions related to their potential and the employment level of the population in regard of activity fields are of high importance in adopting the political economy measures whose target is the harmonious development of the country regions.

In Romania have been registered especially after the '90s deeper and deeper gaps among the economic growth rhythms on regional levels, as a result of both economic activity restructuring requested by the market economy, and the dynamics of the regional development potential under the influence of the globalization of economies [Jaba, 2007]. This resulted in deeper and deeper differences among the territorial-administrative (regional) units according to the level of economic growth. In this context, a harmonious development of the regions involves taking measures for diminishing the differences existing among these.

The regional development is the process by means of which the conditions and factors that run on community level are changed, so that, as a result of these changes, the community registers higher levels of the life standard [Ungureanu G., 2009].

According to the level of the economic growth, the intensity of the social problems, as well as the amplitude of the regional disparities, an entire range of preoccupations regarding the setting of the type of regional differences, which the policy in the field tackles, can be observed.

The identification of these disparities can be carried out by analyzing the level and the structure of employment and also unemployment in these regions. Although the unemployment level is connected to the economic welfare of a certain region, it is also used as an independent estimation indicator of the social disparities, whereby also its impact on the individual and society is taken into consideration.

The regional development policy is one of the most important and complex policies of a country because through its objective of diminishing the economic and social disparities existing among different regions it acts on some areas which are significant to development such as economic growth and small and very small companies, transports, agriculture, urban development, environment protection, employment and professional training, education, gender equality, etc.

These differences among the development levels of the regions have mainly occurred due to the following factors:

- the existence of some sparsely populated regions or with production coming mainly from primary sectors;
- the change of the economic conditions due to the development of new economic fields or the decline of some old ones;
- the economic growth is concentrated in certain regions;
- the migration of population to the developed areas.

### 3. Research methodology

The research starts from the **hypothesis** that in Romania there are disparities among regions regarding *population employment in respect of activity field*.

**The target** of the research is to highlight the profile of each region in our country according to the activity field of the civil employed population.

**The main objective** of this study is to identify regional disparities from point of view of population employment according to the main activity fields with a view to finding a solution for their diminishing.

**The statistical method** used for identifying disparities is the *correspondences factorial analysis (CFA)*.

*CFA* is a descriptive method of data multivariate analysis which describes the connections between two non-numerical (categorical) variables.<sup>2</sup>

The method points out a system of factorial axes which, starting from an ample data table, concentrates the initial information into a graphical format easy to interpret. The representation of this graph is performed in a small-sized Euclidian space. The axes are descendingly ordered according to the importance in explaining the total variant of the obtained cloud of points.

Two categorical variables are considered  $X$  and  $Y$ , with  $X : (x_i), i=1,m$  and  $Y : (y_j), j=1,p$ . The distribution of the statistical units is presented in the contingency table  $(n_{ij})$  with non-negative values, where  $n_{ij}$  is the absolute frequency of the observations belonging to  $i$  category, according to the first variable, and  $j$  category, according to the second variable. In such a table, the rows and the columns represent two partitions of the same population and thus play identical roles. The initial information contained in the table is concentrated in a system of factorial axes on which are projected the points represented by the categories of the registered variables. It is aimed to find those orthogonal axes which are not correlated between them, on

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<sup>2</sup> Jean-Paul Benzécri et coll, *L'analyse des données*, 2 vol., Dunod, Paris,1973

which the row points cloud, and the column points cloud, respectively should be projected. This is carried out by calculating the own values ( $\lambda_k$ ) of the inertia matrix and the coordinates of the own vectors associated to each value ( $\lambda_k$ ).

The distance between two points is established by using the  $\chi^2$  distance. In order to allocate a sense to the distance between the row points and the column points, it is necessary to calculate the relative frequencies, obtaining thus the row “profiles” and the column “profiles”, respectively, through the usual transformations in the descriptive statistics.

By settling the size of the graph to  $m \times p$ , we define:

- $n_{ij}$ , the effective capacity of a cell;
- $n_{i\cdot} = \sum_j n_{ij}$ ,  $n_{\cdot j} = \sum_i n_{ij}$ , the absolute frequencies;
- $\sum_i n_{i\cdot} = \sum_j n_{\cdot j}$ ,
- $n = \sum_i \sum_j n_{ij}$ , the total effective capacity;
- $f_{i\cdot} = n_{i\cdot} / n$ ,  $f_{\cdot j} = n_{\cdot j} / n$ , the relative margin frequencies;
- $n_{ij} / n_{i\cdot}$ ,  $j=1, 2, \dots, p$ , is the profile of the  $i$  row;

A row profile indicates for each  $x_i$  value of the X variable the ratio of the statistical units by  $y_j$  values of the Y variable.

- $n_{ij} / n_{\cdot j}$ ,  $i=1, 2, \dots, m$ , is the profile of the  $j$  column.

A column profile indicates for each  $y_i$  value of the Y variable the ratio of the statistical units by  $x_j$  values of the X variable.

#### 4. Data analysis and results presentation

Starting from the hypothesis that there are *regional disparities* in our country, in order to elaborate strategies for their diminishing, their *identification and quantification* is necessary. In order to highlight the disparities and carry out a classification of the Romanian regions, we shall analyze the **employed population** according to activity fields (agriculture, industry, constructions, retail, transportations, hotels, finances-insurances, professional and technical activities, services, education, health) per thousand persons in 2009.

In this study the *correspondences factorial analysis* applies to the non-numerical variables *regions* and *activity fields*.

As a result of data processing regarding Romania’s employed population in terms of regions and the main activity fields, we have obtained the table of row profiles and the table of column profiles.

The row profiles table looks as follows:

**Table 1. The row profiles table**

reg	Activity fields											
	agric	ind	constr	retail	trans	hotels	fin-insur	technical	services	adminis	educ	health
N-V	.326	.239	.067	.134	.051	.015	.011	.015	.015	.022	.055	.052
Cent	.252	.276	.069	.147	.058	.021	.012	.015	.021	.026	.055	.049
N-E	.418	.176	.062	.121	.039	.011	.008	.010	.014	.026	.059	.056
S-E	.335	.205	.083	.130	.059	.017	.009	.012	.022	.029	.048	.050
S	.376	.227	.062	.118	.048	.010	.007	.015	.019	.030	.044	.044
B-IF	.033	.178	.142	.220	.069	.024	.046	.068	.074	.040	.051	.055
S-V	.401	.199	.071	.114	.040	.011	.008	.009	.021	.029	.049	.048
V	.257	.285	.065	.148	.053	.017	.010	.016	.019	.027	.050	.052
Mass	.300	.221	.078	.142	.052	.016	.014	.020	.026	.029	.051	.051

\* Source: table processed in the SPSS program, based on the data from the *Anuarul statistic al României, INS, București, 2010* (The Statistical Year Book of Romania)

The data from Table 1 indicate *the distribution according to activity fields* of the employed population for each region. For instance, out of the total number of the employed persons in the South-West region (S-W), 40,1% work in agriculture, 19,9% in industry, 7,1 % in constructions, etc. These values represent the *row profile* of the South-West region.

The column profiles table looks as follows:

**Table 2. The column profiles table**

reg	Activity fields											
	agric	ind	constr	retail	trans	hotels	fin-insur	technical	services	adminis	educ	health
N-V	.151	.150	.118	.131	.135	.131	.104	.100	.080	.106	.148	.141
Cent	.101	.150	.106	.125	.133	.159	.098	.086	.095	.110	.129	.117
N-E	.203	.116	.116	.125	.108	.106	.082	.072	.081	.131	.166	.161
S-E	.135	.113	.129	.111	.138	.131	.081	.072	.104	.122	.112	.119
S	.176	.145	.112	.117	.130	.092	.071	.103	.104	.147	.121	.121
B-IF	.015	.108	.245	.208	.178	.207	.437	.444	.383	.189	.134	.146
S-V	.136	.092	.093	.082	.078	.071	.056	.046	.082	.104	.096	.095
V	.083	.125	.080	.101	.099	.104	.070	.077	.071	.090	.093	.100

\* Source: table processed in the SPSS program, based on the data from the *Anuarul statistic al României, INS, București, 2010*

The values of this table indicate *the regional distribution of the employed population* according to activity fields. For instance, out of the employed persons in agriculture, 20.3% are from the North-East region (N-E), 17,6% are from South (S), 15,1% from North-West (N-W), etc. These values represent *the column profile* of the Agriculture field (*agric*).

The analysis of the values of this table reveals the existence of similar regional distributions between the Finance-Insurances (*Fin-insur*) and the Technical activities (*technical*) field: out of the total employed persons in these fields, most of them are situated in the Bucuresti-Ilfov (B-IF) region. In the system of the first factorial axes, these two activity fields shall be situated very close to each other.

The testing of the independence hypothesis between variables is carried out based on the calculated value of the  $\chi^2$  statistics, represented in Table 3.

**Table 3. (Summary)**

Dimension	Singular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Confidence Singular Value	
					Accounted for	Cumulative	Standard Deviation	Correlation
1	.322	.104			.888	.888	.010	.193
2	.103	.011			.092	.979	.011	
3	.035	.001			.010	.990		
4	.029	.001			.007	.997		
5	.014	.000			.002	.999		
6	.009	.000			.001	.999		
7	.008	.000			.001	1.000		
Total		.117	938.457	.000 <sup>a</sup>	1.000	1.000		

a. 77 degrees of freedom

The testing of the independence hypothesis means putting forward the following hypotheses:

- H<sub>0</sub>: the variables independence hypothesis;
- H<sub>1</sub>: the dependence hypothesis.

The calculated value of the test statistics for the analyzed data is  $\chi^2= 938.457$ . This is compared to the value from the  $\chi^2$  table for a risk  $\alpha=0.05$  and  $v=(m-1)*(p-1)=77$  freedom degrees ( $\chi^2_{0.05;77}= 98.49$ ). It can be noticed that the calculated  $\chi^2$  is higher than  $\chi^2_{0.05;77}$  from the table, which points out that the H<sub>0</sub> hypothesis is rejected. With a 95% probability it can be guaranteed that there are connections between the considered variables.

For each category of the two variables are calculated the coordinates on the factorial axes, the contributions of the points to the axis inertia and the contributions of the axes to the inertia of a point.

By analyzing the results of the row points (Table 4), it can be noticed that the point Bucuresti-Ilfov (B-IF) has a positive coordinate on the first factorial axis, and the points N-E, S-W, S have positive coordinates on this axis. The position of these points in the system of the first two factorial axes indicates that the greatest differences in the employed population in terms of activity fields are registered between B-IF region, on one side and N-E, S-W, S regions, on the other side.

The most important contribution to the creation of the first factorial axis has the B-IF region by a proportion of 80.2%. On the other hand, the inertia of the B-IF point is explained to 99.3% by the first factorial axis and to 0.7% by the second factorial axis.

**Table 4. Row Points Overview <sup>a</sup>**

regions	Mass	Score in Dimension		Inertia	Contribution Of				
		1	2		Point to Inertia of Dimension		Dimension to Inertia of Point		
					1	2	1	2	Total
N-W	.139	-.182	.153	.002	.014	.031	.726	.164	.890
Center	.120	.030	.517	.003	.000	.311	.010	.960	.970
N-E	.146	-.437	-.396	.012	.086	.221	.760	.201	.961
S-E	.121	-.147	-.092	.002	.008	.010	.522	.065	.587
S	.141	-.316	-.066	.005	.044	.006	.860	.012	.872
B-IF	.134	1.387	-.209	.084	.802	.057	.993	.007	1.000
S-W	.102	-.378	-.295	.006	.045	.085	.809	.158	.967
W	.097	-.003	.545	.003	.000	.278	.000	.970	.970
Active Total	1.000			.117	1.000	1.000			

\* Source: table processed in the SPSS program, based on the data from the *Anuarul statistic al României, INS, București, 2010*

By analyzing the results of the column points (Table 5), it can be noticed that the Agriculture (*agr*) point has a negative coordinate on the first factorial axis, and the points Finance-Insurances (*fin-insur*), Technical (*technical*), Services (*services*) have positive coordinate on this axis. This shows that there is a *significant differentiation* between the region distribution of the employed population in Agriculture, on the one hand, and the region distribution of the employed population in Finance-Insurances, Technical, Services, on the other hand. The regions, where the number of the population employed in Financial Activities, Technical field or Services is high, feature a low level of the population employed in agriculture and vice versa.

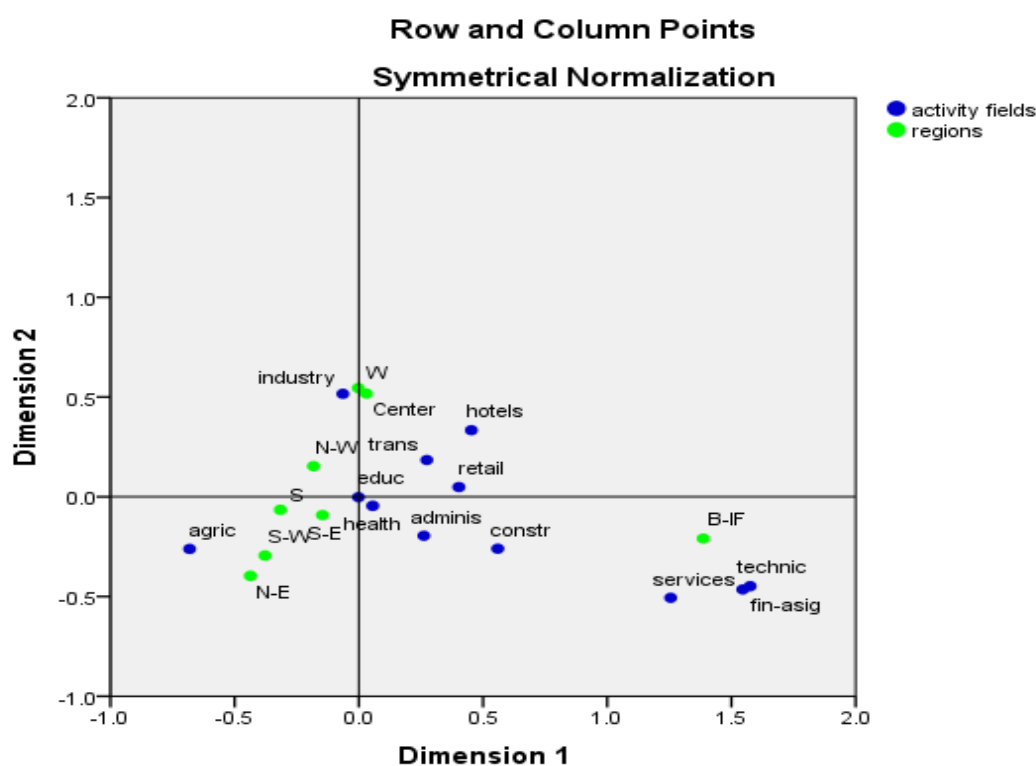
**Table 5. Column Points Overview**

activity	Mass	Score in Dimension		Inertia	Contribution Of				
		1	2		Point to Inertia of Dimension		Dimension to Inertia of Point		
					1	2	1	2	Total
agric	.300	-.681	-.262	.047	.433	.199	.954	.045	1.000
industry	.221	-.064	.516	.007	.003	.568	.045	.933	.979
constr	.078	.559	-.260	.009	.076	.051	.910	.063	.974
retail	.142	.403	.049	.008	.071	.003	.981	.005	.985
trans	.052	.274	.184	.002	.012	.017	.708	.103	.811
hotels	.016	.453	.333	.001	.010	.017	.732	.128	.860
fin-insur	.014	1.545	-.465	.011	.105	.029	.966	.028	.994
technical	.020	1.575	-.448	.017	.158	.040	.958	.025	.983
services	.026	1.256	-.507	.014	.126	.064	.939	.049	.988
adminis	.029	.262	-.195	.001	.006	.011	.681	.122	.803
educ	.051	-.002	-.002	.000	.000	.000	.000	.000	.000
health	.051	.056	-.045	.000	.000	.001	.164	.035	.199
Active Total	1.000			.117	1.000	1.000			

\* Source: table processed in the SPSS program, based on the data from the *Anuarul statistic al României, INS, București, 2010*



From this table it can be also noticed that the point „*agric*” explains in a proportion of 43.3% the inertia of the first factorial axis, followed by “*technical*” and „*services*”, which explain in proportion of 15.8% and 12.6%, respectively, the inertia of this axis. On the other hand, the inertia of the point „*agric*” is explained in proportion of 95.4% by the first factorial axis, and in proportion of 4.5% by the second factorial axis. The biggest *difference among regions* from the point of view of employed population in terms of activity fields are induced by the regional distribution of the employed population in agriculture, finance-insurances, technical field and services.



**Picture 1.** The representation of the statistical variables categories in the system of the first two factorial axes

By analyzing the chart in **Picture 1**, it can be noticed that the greatest distance between the points represented by the column profiles is registered between the fields „*agr*” and „*fin-insur*”. Among the points represented by the row profiles, the greatest distance is the one between the regions North-East and București-Ilfov.

This representation of the two factorial axes points out the significant regional differences from the point of view of the employed population in respect of activity fields. It

can be noticed that in the București-Ilfov region the activities in the financial field, constructions, transportation and retail are prevalent. The N-E, S-E, S-W and S regions have a high ratio of the population employed in agriculture. Industry is the most important activity field in the N-W, Center and W regions.

This analysis pointed out significant differences among the eight regions of Romania. These regional differences regard the significant differences in the structure of the employed population in terms of activity fields: in the N-E, S-W, S regions the prevalent activity field is agriculture, and Bucuresti-Ilfov stands out through the highest ratio of the employed population in the following fields: finances, services and technical activities, in comparison to all the other regions.

## **5. Conclusions**

The study performed on the Romanian regions in 2009 by using the *SPSS* program and the *correspondences factorial analysis* points out that there are regional differentiations in relation to the analyzed social and economic indicator (the activity fields of the employed population).

The economic decision makers should pay attention to concluding the specific characteristics of our country's regions and identifying the disparities on regional level.

The identification of the regional disparities is a highly important issue for Romania, because the European Union requires such a realistic approach of the regional development aspects and the orientation of the economic policy to the harmonization of the development levels of the regions. In the predominantly agrarian regions measures of economic policy should be applied in order to diversify the types of economic activities.

The encouraging and diversification of the economic activities in different regions, the stimulation of investments in the private sector, the contribution to the unemployment diminishing, and, last but not least, the elaboration of strategies to improve the standard of living can be measures for reducing the differences existing among regions and their harmonious development.

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