FACTORIAL ANALYSIS OF TERRITORIAL DISPARITIES ON THE HUNGARIAN-ROMANIAN BORDER REGION

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ABSTRACT – During the socialist era, a significant developmental slope was settled along the Hungarian-Romanian border region, which separated a relatively more advanced Hungarian side from a backward Romanian one. Using a quantitative methodology, we try to identify the current territorial disparities on a lower spatial scale – namely on the level of communities – in order to highlight the presumably lagging-behind status of a narrower border strip. According to our hypothesis, this peripheral strip has a disadvantageous status mainly because of its increased isolation. The factorial analysis confirmed this fact on the Hungarian side; however, it was disproved on the Romanian side because of the presence of large cities and basic infrastructure networks on the proximity of the border.

Keywords: Hungarian-Romanian border region, factorial analysis, principal component, social periphery, positional periphery

INTRODUCTION

Border studies are frequently focusing on pointing out the territorial disparities between the two sides of the border, especially on those border regions that were considerably isolated, or followed a very different path of evolution in a certain period of history. The Hungarian-Romanian border region was the one of the most isolated borders in Europe in the cold-war period, though it separated two similar socialist states on the same allied political system. Hence the Neo-Stalinist Ceauşescu regime transformed Romania in one of the poorest European countries, which had its repercussions on the border region, too. Meanwhile, the socialist Hungary developed a quite liberal economic policy, which allowed a relative high life standard, a veritable socialist welfare-state which deepened the asymmetry on the border line with Romania. The Hungarian side of the common border maintained its backward status due to the drawing of the border line after World War I, which separated the border strip from its former polarisation centres. The "periphery's periphery" syntagm was used for denoting the multiple disadvantages of this border area (Baranyi, 2004).

The aim of the current study is to highlight territorial disparities in the first decade of our century by using the statistical method of factorial analysis. Specifically, we want to test the mentioned method and to check if it gives consistent results as some our previous one-dimensional analysis did (Nagy, 2006 a, b; 2007). Moreover, we are interested in examining to what extent the positional periphery overlaps with the social one in the case of the analyzed territory. The study comprises four directly neighboured counties on the northern part of the Hungarian-Romanian common border. Two of them are Hungarian counties (Szabolcs-Szatmár-Bereg and Hajdú-Bihar), and another two are Romanian counties (Satu Mare and Bihor).

In the Romanian related literature, the country and county level analyses were in the centre of attention. Voineagu outlined the territorial division based mainly on the achievements of the small and medium enterprises, but he did not conduct any analysis on the sub-regional administrative level (Voineagu et. al., 2002). According to these analyses the two Romanian counties of our study fell into the category with an economic growth higher than the average of the country. Kurkó Ibolya also conducted county level analyses during the territorial analysis work, and Timiş and Arad counties

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ranked in top positions in the different dimensions described (general development, employment, infrastructure, demographic conditions) (Kurkó, 2010).

In the Hungarian related literature the territorial analysis with a single variant used by Süli – Zakar István pointed out the underdevelopment of the northern Hungarian regions, mainly the peripheral character of the border zone in more aspects (Suli – Zakar, 1992, 1993, 1996). Pénzes János and Molnár Ernő also discuss the "dead-end"-like development and the limited possibilities of development for the agglomerations between neighbouring county centres, mostly with a one-dimension character (Pénzes and Molnár, 2007, 2008).

In the case of country analyses, Nemes Nagy József and Faluvégi Albert conducted studies on the micro-region level, which showed the border region of our study as the loser of the economic transition, as falling behind or stagnating microregions (Faluvégi, 2000). The study conducted by Nemes Nagy, similarly to that conducted by Faluvégi, outlined the countries' NW – SE line of economic division, in the Romanian border region of the Dél-Alföld. This is the so-called BB (Békés – Balassagyarmat) line that more or less overlaps with the SS line (Sarkad – Szécsény) of Beluszky Pál (Nemes Nagy, 1995, 1999).

METHODOLOGY

Factorial analysis is an advanced statistical method using multiple variables and multiple dimensions based on the reduction of variables and the conception of new ones by merging the primary indicators. The new merged variables called factor components will represent a new dimension which, in our case, will be able to explain in an integrated manner the part played by more variables (that are in a very strong negative or positive connection with this component) in determining the social-economic level of development (Székely-Barna, 2004; Nemes Nagy, 2005).

The factorial analysis using SPSS was applied separately for the Romanian and the Hungarian counties as, with the exception of the demographical indicators, the economic variables in the two countries were not comparable. Thus, different statistical methodologies needed to be used. Unfortunately, this fact did not allow an integrated analysis of the region but offered a clear delimitation of regions that displayed different degrees of development. A fundamental criterion for the applicability of the factorial analysis methodology is to have more cases than variables; in our case the criterion was fulfilled as in the case of the Romanian counties we had 23 variables for 154 villages and on the Hungarian side we had 25 variables for 308 villages.

The variables analyzed in the study fall into three main dimensions: the first one reflects the demographical component; the second one regards the quality of life (the infrastructure of public utilities) and the third, the economic one, reflects the efficiency of enterprises. The demographical and the "quality of life – related" variables reflect the results of the last census in both countries (2001 in Hungary and 2002 in Romania). The economic data are from 2004 in Hungary and 2005 in Romania. Here is the list of indicators:

- birth rate
- mortality
- population increase
- immigration
- emigration
- migration balance
- infant mortality
- ratio of the young population
- ratio of the middle-aged population
- ratio of the population aged over 60
- ratio of university/college graduates
- illiteracy rate
- ratio of population occupied in the primary sector
- ratio of population occupied in the secondary sector
- ratio of population occupied in the tertiary sector

- the public water supply system
- the public sewage supply system
- the natural gas supply system
- the financial balance of the enterprises
- the taxes paid by the enterprises
- the basic capital of the enterprises
- the export sales from the total turnover
- the net income of the enterprises
- the unemployment rate
- the gross profit of the enterprises
- the net profit of the enterprises
- the total turnover of the enterprises
- the level of foreign direct investments

In order to avoid the distortion of the analysis results with the extremely positive variables within the regional centres, we decided not to take into consideration the following towns: Oradea, Satu Mare, Debrecen, and Nyíregyháza. As it will appear in the study, this approach was not completely successful as it did not totally avoid the territorial duality effect along the rural-urban overlap. However, the county capitals were also put on the maps on the account that they naturally belong to the most advanced category; by not taking them into consideration in the analysis we expected to put the spotlight on the discrepancies at the microregional level.

After trying different approaches we decided to use as the most appropriate procedure within the factorial analysis, namely the decomposition/deconstruction of the principal component; we also decided to ignore a series of demographical variables as they were not relevant for the studied issue (they did not cluster to the value of 0.25) and were discarded. This procedure used in factorial analysis (namely that of the principal component) tries to focus the explanation of different variables on the merge of one component factor.

Finally, in what the Romanian side is concerned, after discarding the items that have no relevance, we focused on the following indicators (that are identical with those used in our previous analysis):

- the ratio of population employed in the primary sector
- the ratio of population employed in the secondary sector
- the ratio of population employed in the tertiary sector
- the percentage of households connected to the public water supply system, to the public sewage supply system and the natural gas supply system
- the gross profit of the enterprises
- the net profit of the enterprises
- total turnover of the enterprises
- the level of foreign direct investments

RESULTS

The correlation matrix has sufficient values of significance below 0.05; consequently, the factorial analysis could be performed. The KMO test has a sufficient high value (>0.5); the same is true for the CHI square test, the value of significance keeping a reduced level in the Bartlett test, too. All these indicate very good conditions for doing the analysis.

The extracted values of the items are above 0.25 providing a clear indication that the variables could be kept during the analysis. Moreover, as a result of the calculations, the program highlighted a second component besides the main component, the two summed up components explaining 78% of the phenomena described by the initial variables. However, we are going to focus on the main component that also explains the state of development in a proportion of 55%, an excellent percentage explained by variance.

Therefore, the main component describes the level of development, which is generally tightly interrelated with the sectorial distribution of the labour force (on the one hand, it indicates a high negative correlation above the value of 0.5 for the primary level, namely with the rural, agricultural areas and, on the other hand, a high positive correlation with the percentage of the people involved in services). It also shows a positive correlation with the level of development of the public utilities but mostly with the total turnover of enterprises and with the foreign direct investments. The second factor component is positively correlated with the large amount of the population employed in agriculture and has a tight negative correlation with those employed in the secondary and tertiary sector, being, though, an obvious indicator of ruralness of the human resources.

Table 1. *The matrix of the factor components in the Romanian counties*

Variables included in analysis	Components	
	1	2
Primary sector	-.682	.682
Secondary sector	.529	-.638
Tertiary sector	.652	-.504
Water	.731	-
Sewage	.802	-
Gross profit	.853	-
Net profit	.837	.486
Total turnover	.865	-
Direct foreign investments	.684	-

As the main component indicates the level of development and using the scores calculated by the SPSS program, we put the villages from the Romanian counties into five categories, according to the level of their socio-economical development as follows: active territorial units, balanced territorial units, critical territorial units, regressive territorial units, and marginalized territorial units with persistent crisis.

The *active territorial units* are characterized by socio-economic dynamism and are specific to urban areas and to rural areas next to large towns. The *balanced territorial units* are those units that succeeded quite successfully to avoid the large majority of the negative effects of crisis connected to a transformation in the last one and a half decade. The *critical territorial units* are those areas that either develop or decline from a socio-economic point of view. The *regressive territorial units* are those villages that are characterized by an evident economic decline. The *marginalized territorial units* could be divided into margin or inner periphery having a low economic status, being an obvious failure product of the transition period. Their situation is the result of summing up a series of unfavourable socio-economic indicators.

We highlighted the two extreme categories and found out that the active territorial units on the Romanian side are the urban and peri-urban areas (Botiz, Livada, Oşorhei, Sânmartin, Sântandrei, Nojorid, Borş). Some settlements in the north-eastern Bihor are revealed as a result of some traditional activities that have been revitalized (oil refinement in Suplacu de Barcău) or investments related to the activity of rich business people (the village of Balc in the north-east of Bihor county with investments from the company owned by Ion Ţiriac; the villages in the south-east of Bihor area dynamized by the business performed there by Micula brothers – European Drinks and Foods Company). Some other villages took advantage from investments related to logistics (Tileag – MOL Hungarian Oil and Gas Company) or from the speculations related to the status of disfavoured territorial units (Şuncuiuş – assistance for the abandoned mining sector). The town of Negreşti-Oaş and the village of Certeze, located in the northern edge of Satu Mare county, took advantage from the money transfer done by their numerous inhabitants that had a temporary residence in different countries of Europe. The villages which fall into the category of persistent crisis are situated in the south and north-west of Satu Mare county and in the north and south of Bihor county, respectively. They could be put into the category of inner periphery. This fact underlines once again that *the positional periphery on the Romanian side of the trans-border region is not a periphery from a social point of view* as the command centres and many other urban settlements are situated alongside the borderline.

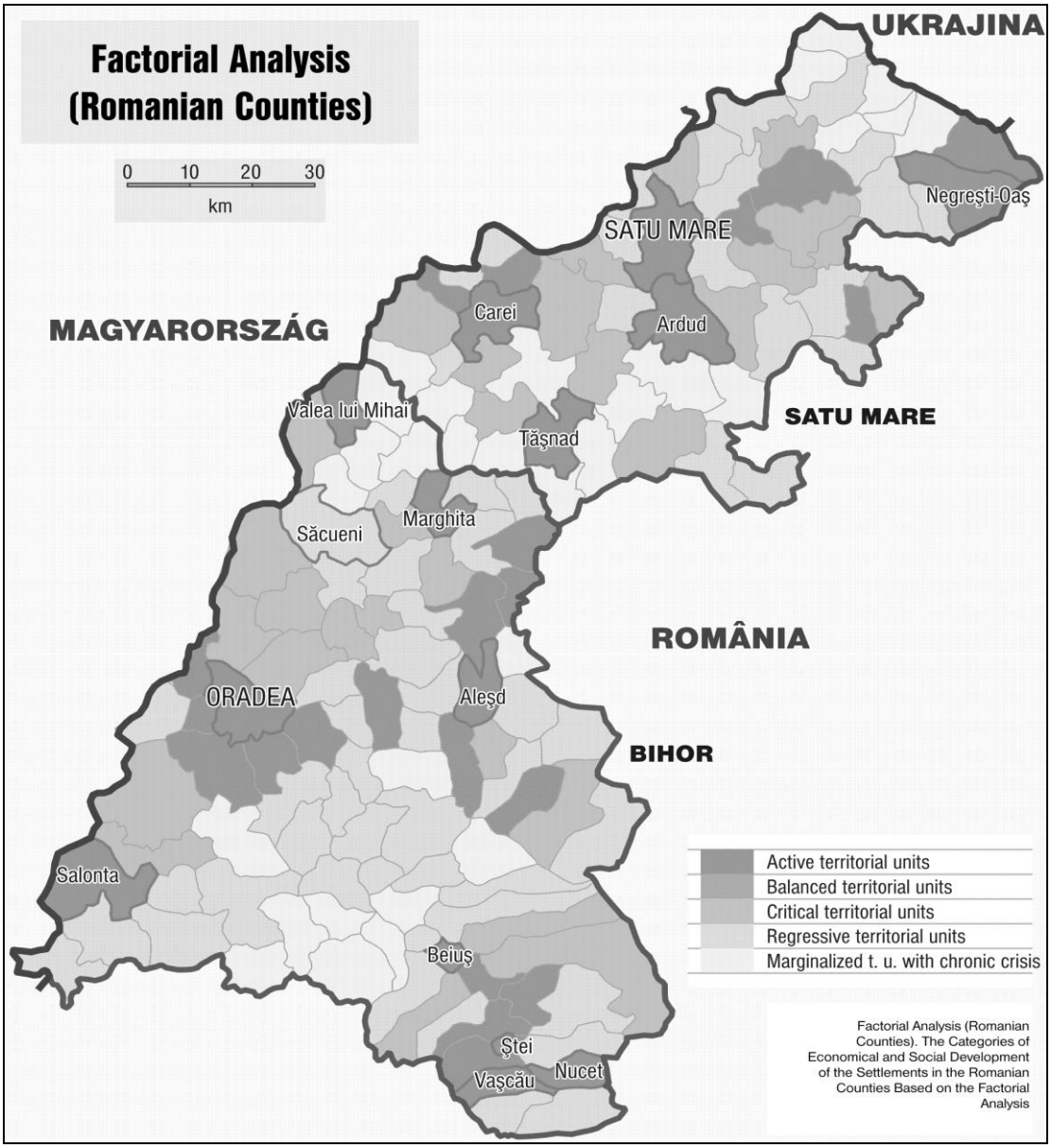

Figure 1. *Categories of economic and social development of the settlements on the Romanian side (Bihor and Satu Mare counties)*

As for the Hungarian side, the variables introduced in the study have many reduced values of significance (<0.5) in the correlation matrix, making the factorial analysis possible. The KMO test (Kaiser-Meyer-Olkin) has sufficient high values (above 0.5) and the Bartlett test of sphericity indicates a Chi square with high value and reduced significance, consequently, the conditions for conducting a factorial analysis with interpretable results are fulfilled.

The values of communalities surpass the value of 0.25, consequently, the used variables could be kept in the analysis. The variance of the main component is sufficiently high; it explains 43.2% of the used variables, and together with the secondary component, this figure goes up to 65.9%.

The main component indicates a tight correlation with the majority of variables, mostly with the performance indicators of the economic agents. Moreover, we notice a weak correlation with the level of the public water supply system and unemployment, this last correlation demonstrating the

extremely spread nature of this social inconvenience in North-Eastern Hungary. Anyway, the second component, as an expression of backwardness has a stronger correlation (0.433). Consequently, with this indicator, unemployment will be taken into account as a secondary component. The secondary component is more correlated with the human resources indicators and besides the positive correlation with unemployment, the tight negative correlation with the ratio of the population employed in services is also evident. This fact underlies once again the connection between the secondary component and the social-economic backward.

Table 2. *Matrix of factor components for the Hungarian counties*

Variables included in the analysis	Components	
	1	2
Water	.469	.427
Financial turnover	.770	-
Taxes	.908	-
Subscribed social capital	.917	-
Net profit	.921	-
Unemployment	.313	.433
Tertiary sector	-	-.810
Secondary sector	-	.828

Figure 2. *Categories of economic and social development of the settlements on the Hungarian side (Hajdú-Bihar and Szabolcs-Szatmár-Bereg counties)*

Therefore, the first component being a reflection of a higher level of development, the scores of the component correlated with the territorial units were put into five categories after the already used model for the Romanian counties.

Consequently, on the Hungarian side of the trans-border region, the factorial analysis had a quite distorted result because it was not possible to clearly avoid the fragmentation of space on the basis of the rural-urban dichotomy. Though, in the central parts of the Hajdú-Bihar county, a large active territorial unit is evident, which is deceiving and is due, on the one hand, to the high concentration of the towns in the area (the "hajdú" towns) and, on the other hand, to the large areas of administratively homogenous surrounding terrains. We have the same situation in the south and the centre of the Szabolcs Plain, in the Szabolcs-Szatmár-Bereg county, in the peri-urban area of Nyíregyháza. Besides the above-mentioned areas, in the category of active settlements on the Hungarian side, we also have to mention the towns more randomly spread in the territory.

As expected, the territorial units suffering from persistent major crisis (the last quintal) are situated on the borderline of Szatmár-Bereg, Bihar, and Tisa floodplain regions. Consequently, on the Hungarian side, the border area is negatively affected by the peripheral position effect, with repercussions on the general standard of life.

CONCLUSIONS

Gathering all data in a final conclusion we can say that factorial analysis, as a synthetic and comprehensive methodology, gave similar results with the empirical researches that used unidimensional, singular variables. Thus, the maps clearly demonstrate that, in the case of the Hungarian side, the proximity of the border (namely the peripheral position) intensifies the status of social periphery. On the contrary, the closeness of the border on the Romanian side does not necessarily amplify the social periphery status. This is a result of the fact that alongside the borderline we find a line of large and smaller-sized towns in the Romanian Western Plain, fact that represents an obvious advantage for that border area. Moreover, the analysis highlights once again the differences in development that persist between rural and urban areas on both sides of the border. Here, we can also underline the validity of the so-called Williamson hypothesis (Nemes Nagy), which postulates that in transitional periods the territorial disparities are increasing especially between different settlement categories at the expense of rural areas. After the installation of a relative territorial convergence, there are no more significant differences along the urban-rural cleft, and the spatial asymmetries will be highlighted between developed and lagging behind regions. In this last case, it has no more importance whether somebody is living in a town or a village, because, for instance, the quality of life and the generally perceived development has a similar level in rural and urban areas and the socio-economic space becomes more homogenous.

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