THE EVOLUTION OF THE REGIONAL DISPARITIES OF FOREIGN DIRECT INVESTMENTS IN ROMANIA

RALUCA GEORGIANA POPESCU, DENISIA VINTILĂ, RALUCA ERDINC
THE ACADEMY OF ECONOMIC STUDIES, Bucharest, Romania raluca_1st@yahoo.com,
denamv20@yahoo.com, ralucagpopa@yahoo.com

Abstract:
Romania is one of the countries with wide regional development gaps that need to be reduced in order to obtain a balanced economic development. The European Union membership was hopped to bring new foreign direct investments in areas which lack financial capital, but soon after the integration of Romania, the global economic crisis emerged, diminishing investment initiatives. Within this article we identify the diffusion of foreign direct investments across the country along with certain regional economic indicators that have proved to improve the local attractiveness for investors. We use a cluster analysis technique to see which development regions (NUTS II) group together and how the regional imbalances evolved from 2006 to 2009, before and after the EU integration.

Key words: foreign direct investments, regional development disparities, regional attractiveness

JEL Classification: F15, G01, R12

INTRODUCTION

The purpose of the analysis is to examine how the Romanian development regions cluster together according to several indicators of economic development in 2006 and 2009, these being the years around the integration in the European Union and the burst of the economic crisis. The results should indicate the way the crisis influenced the formation of foreign direct investment companies' agglomerations in relation to the regional advantages that these companies searched for in their location decision. The immense impact that the 2009 economic crisis had on the most of the macroeconomic indicators is expected to have changed the disparities of the development regions of Romania and the formation of different clusters.

Cluster analysis is usually an additional instrument to traditional regression analysis, where the relation between exogenous and endogenous variables is determined from the outset. While the latest provides information about complex interrelationships between variables, the first does not produce any definitive results or causality prescriptions. The limitations of cluster analysis consist in the fact that it is difficult to determine the correct number of clusters or whether the formed clusters represent significantly different groups (Korobow and Sthur, 1991). We are using this type of analysis, as it is useful when describing data, usually being a statistical exploratory technique.

On the other hand, cluster analysis can be used to reduce the data, or to see the similarities between the observations, such as in our case, the similarity between the country's development regions.

In this study, we focus on determining how the regions could cluster together in order to obtain the highest intra-cluster homogeneity and the highest inter-cluster heterogeneity. The paper is structured as follows: section 2 describes the methodology that was used, section 3 the datasection explains the main findings, and section 4 comprises the concluding remarks.

METHODOLOGY

We have conducted a separate cluster analysis for both 2006 and 2009 NUTS II levels in order to accomplish a more accurate identification of the economically developed areas.

In order to determine the regional clusters, we have used the Ward method (Ward, 1963), first of all because it is a hierarchical clustering method and the only method in which the distance between clusters is evaluated by maximizing the degree of the clusters' homogeneity or by minimizing the variability inside the clusters. The degree of homogeneity of a cluster is considered to be the highest as the total sum of the within cluster square standard deviation is the smaller.

In Ward's method ("of minimum-variance"), the distance between two clusters is calculated as the sum of squares between the two clusters added up over all the variables. At each generation that it determines, the within-cluster sum of squares is minimized over all partitions obtainable by merging two clusters from the previous generation. The sums of squares are than divided by the total sum of squares to give proportions of variance (squared semipartial correlations), in order to be easier to interpret.

Using Ward's method we will start out with all sample units in n clusters of size 1 each. In the first step of the algorithm, n-1 clusters are formed, one of size two and the remaining of size 1. The error sum of squares and r^2 values are then computed. The pair of sample units that yield the smallest error sum of squares, or equivalently, the largest r^2 value will form the first cluster. Then, in the second step of the algorithm, n - 2 clusters are formed from that n-1 clusters defined in step 2. These may include two clusters of size 2, or a single cluster of size 3 including the two items clustered in step 1. Again, the value of r^2 is maximized. Thus, at each step of the algorithm clusters or observations are combined in such a way as to minimize the results of error from the squares or alternatively maximize the r^2 value. The algorithm stops when all sample units are combined into a single large cluster of size n.

The hierarchical clustering methods group the observations two by two until all of them are compound into a single cluster. We decided, in this study, to focus on a certain number of clusters to obtain a clearer comparison between the two periods of time. We kept only three clusters, which group the eight development regions. We had in mind the fact that the most plausible grouping would take into consideration three types of regions: the central regions (closer to the capital region, here we have the Bucharest-Ilfov, the Centre and the South), the regions which are next to the Western border and implicitly to the EU countries (the West, the North-West) and the regions which are not neighbors of the EU (South-West, South-East and North-East). We are willing to find whether the cluster structure has any similarities with the structure that we expected and how much these patterns changed after the EU integration.

The output of the hierarchical cluster analysis is graphically represented into a 'dendogram', which is a diagram that shows each step of the final cluster composition using a tree shape.

Due to the fact that the groups of development regions should be based on a better similarity across all the variables, the Euclidean type of measurement of the distance between clusters was used. The Euclidean distance emphasizes the outliers, which describes extreme values. The same method was used in some studies from the same reason (Wolfson 2004, Guttierez and Sorensen 2006).

DATA

Keeping in mind the data availability, we have considered the variables that have the most important positive influence on the location decision of FDI because they are mainly indicators of a good economic development. These are: the regional GDP (million RON) the total number of students in universities, the total business turnover and the gross investments of the local companies (million RON), the road density (per 1000 sq km), the monthly medium nominal net wage (lei), the medium number of employees (thousands of people), the expenditures and the number of employees in research and development and the rate of criminality in 2006 and 2009 respectively. The cluster analysis uses these variables to characterize each development region next to the foreign investment companies' total subscribed capital (thousands of RON). Most of these variables are usually seen by foreign investors as a factor of attractiveness because they indicate either resources, or the fact there have been successful businesses in the area.

The average salary must be smaller comparing to the home country of the investor because it represents an important cost, mostly in labour intensive industries. The crime rate has a negative impact on the investment decision. Nevertheless, the cluster analysis does not show the relation between variables and which is influenced by another but the agglomerations that are formed, considering all the variables in the same time and equally important to the formation of the clusters. Several studies, using a variety of methodologies, have led to the conclusion that the variables that we have chosen have a significant influence on the location choice of FDI: the employment level (Hilber and Voicu, 2007), the monthly net average nominal earnings (Traistaru, 2001; Goschin, 2008; Pusterla, 2007) and the density of public roads and railways/1000 sq. km. of territory (Hilber and Voicu, 2007; Traistaru, 2001 and Pusterla, 2007).

The clear disparities at regional level are caused by the small mono-industrial towns, with often closed or restructured unprofitable companies, but also by the little reduced economic diversification of the big cities and Romania's dependence on imported goods and services. We can also see the incapacity of the urban centers of becoming development vectors for the surrounding areas to create true agglomerations. Still a high percentage of population is involved in unprofitable agricultural activities due to uncorrelated and unfriendly agricultural policies. The entrance in the European Union has been far from having a positive effect on this highly important sector that also could have been extremely attractive for foreign investments. Nonetheless, the absorption of European structural funds is expected to bust the agriculture in the future years.

At regional level, Romania has important disparities among the Bucharest-Ilfov region and all the other regions considering almost all the indicators included in the analysis, both at 2006 and 2009 level. It is obvious that it is the favorite location of foreign investors as they find here educated workforce and business connections. The Bucharest-Ilfov region is the country's most important business center, where the companies reach the highest total turnover. The increased labour demand, which also comes from the FDI companies, determines higher wages and migration of population to the main city.

The road density is relatively constant throughout the eight regions; the development of certain agglomerations has not determined any extensions of road infrastructure. It shows that the policies of regional development or the FDI policies have not been as intense as expected. In developing countries, infrastructure extension and improvement is made by foreign companies who have a notorious experience. This takes place in the first phase of FDI implantations (the construction companies) and creates a good access to areas in which new investments can be made. A good

infrastructure is a precondition of investments because firms need a good access to its facilities, to transport and their raw materials and their finished products.

At the opposite pole from the Bucharest-Ilfov region is the South-Western region that has attracted the smallest amount of foreign capital and has the smallest regional GDP in both 2006 and 2009. The main causes and effects seem to be the low level of economic activity developed in the area and the workforce shortage. The region with the lowest level of tertiary education seems to be the Southern region, but because the FDI level is relatively high, probably this indicator does not have an important impact. The level of expenditures and the number of employees in research and development suggest the same thing. Probably the foreign investors, who are established here, are interested in activities that need lower qualification or they are not so labor intensive. The choice to invest in this area is strongly influenced by the small distance to Bucharest and is also encouraged by a high road density.

As we travel to the East, in the South-Eastern region, almost all the indicators have smaller levels, except for the tertiary education, that again does not seem to have a relevant influence. Compared to the Western side of the Southern region (which surrounds Bucharest), the South-Eastern region is more developed due to the sea ports (which determines important commercial and touristic activities) but also to its larger surface. The main sea ports have attracted many foreign investments in the main cities, Constanta and Mangalia (ex: Daewoo Mangalia Heavy Industries S.A.), although far from reaching its potential.

The proximity to the Western border creates positive effects in the North-Western and Western regions, as shown especially by the business turnover and less by the foreign capital that has been invested. This is due to the entrance of Romania in the European Union and the enhancement of the commercial exchanges. The similarity between the cultures of the people who live on the two sides of the border facilitates business relations. Nevertheless, these similarities do not have such a great positive effect on the economic development of the Eastern regions due to the countries that are not in the EU area and that do not have advanced economies themselves.

The data that we used in the study was at NUTS II level for 2006 and 2009. The source of the data was the Romanian National Institute of Statistics, Eurostat and the National Trade Register Office.

RESULTS

The cluster analysis grouped the eight development regions in the following three clusters:

Cluster Number	Included Development Regions (2006)	Included Development Regions (2009)
1	North-West, West, Centre, North-East	North-East, West, South-East, South, South-West
2	South-East, South, South-West	Centre, North-West
3	Bucharest-Ilfov	Bucharest-Ilfov

In 2006, the first regions, which clustered together, were the North-East and the West with an insignificant distance from one another. During the second step, two other regions clustered together, the North-West and the Center. This is the group of the most similar regions, especially concerning the level of FDI and the number of employees, which have reached the lowest average in this cluster.

The second cluster formed, which contains the South-Western, Southern and South-Eastern regions, has a larger degree of similarity (the Euclidean distance) among the two components, comparing to the distances among the components of the first

cluster, which is the most homogenous. Cluster 1 is firstly united with cluster 2 and then cluster 3 is added up until there is only one cluster. The mechanism works identically in the second period of time.

In 2009 the closest counties were North-East and West, the distance between them (the Height) being close to 0. The first cluster is the most homogenous one and the third cluster has the smallest values of the variables used in the analysis. The most economically developed area is the one of country's capital. The Bucharest-Ilfov region differs significantly from all the other regions. It is the most urbanized region and it is clearly the area where most of the foreign companies prefer to invest and most of the workers prefer to find jobs, fact that determines increased salaries. The business turnover and the gross investments are generally directly proportional to the foreign investment companies' amount of subscribed. The crime rate affects negatively the level of FDI and the level of development. The highest crime is in the South-West region. The exception is in the capital region, which does not have the lowest crime rate, this being on the effects of congestion. The most important cause that increases criminality doesn't even seem to be a low standard of living because the region with the lowest average wage is not Soth-West, it is North-West in 2009 and North-East in 2006. The only variable that has quite constant values among all the development regions is the road density.

The most important change that happened in 2009 is the development of the Centre and the North-West, especially in the FDI stock, number of employees, regional GDP, business turnover, R&D activity and a decrease in the criminality rate. This could be a first clue that the foreign investments contributed to the welfare of the companies. An important advantage was the low average salary, which stayed among the lowest in the country in 2009, mostly in North-West (1161 RON) although the companies' earnings increased. This comparative advantage of the region was maintained in order to stimulate the investments.

Both the Centre and the North-West region were chosen mainly by the investors coming from the EU. This applies for all the regions in the country, but these regions were predominantly chosen for implantation due to the geographic proximity to the other EU member countries, but also due to the cultural similarities. The Centre and the North-West form a corridor from the EU border to the capital region. The architecture of the infrastructure also underlines this observation.

In the year after the European Union accession and the beginning of the crisis, the Bucharest-Ilfov region remained on the same position being the mostly isolated from all the others. The gap between the leading capital region and the other development regions was extremely large in both 2006 and 2009. Nevertheless in 2009, the Bucharest-Ilfov region was at a similar Euclidean distance (between the means) from the cluster formed of the other regions, comparing to 2006 (1,94550 and 1,94272 respectively), showing a similar gap.

Among the regions, except Bucharest, the disparities became rather smaller in 2009 comparing to 2006. So, considering the variables that we used in the analysis, the EU integration slightly reduced the regional development gap.

The most unexpected change that took place in 2009 was the decrease of the stock of foreign direct investments in the South, while all the other regions increased their stocks, some of them even more than double. It is a possible effect of the crisis and an obviously diminished interest in the region. This, of course, determined the reorganization of the clusters.

To sum up, even if 2009 still brought a positive evolution of foreign direct investments and its determinants, the gap between the development regions hasn't decreased accordingly since 2006, although there has been an improvement. In the future, if this situation does not suffer a clearer change, it will create social costs and

migration of population that might extend the discrepancies between the areas of the country.

The government's crisis management plan should take into consideration the imbalances created between the development regions. Compiling a cluster analysis, which takes into consideration a large sample of indicators, with the purpose of describing the evolution of entrepreneurship (as a determinant of regional development) at county level in Romania, Cojanu (2006) emphasizes the means to reduce regional discrepancies. The study draws the attention to a new type of industrial policy, applied specially in the European Union, meant to bring more competitiveness through economies of scale. To this purpose, the agglomeration economies are planned in accordance to the industrial and regional policies that must be coordinated to each other. A more equal development must be obtained in this way, including in the investment plan both the rural and small urban localities. The EU points out the fact that governments need to focus on the areas that lack economic activity and need to increase employment. The projects of agglomeration economies do not take into account the national borders within the European Union.

CONCLUSIONS

The magnitude and implications of the current economic crisis on Romania's inward foreign direct investments has been different from one development region to another, but they had a small influence in reducing the development gap. This is the conclusion that the comparison of the results of two cluster analysis, of the eight development regions of Romania, led to. Using parallel data from 2006 and 2009 of the stock of foreign direct investments in each development region and some of their location decision determinants, the regional clusters that were formed were slightly different but the Euclidean distance between them increased considerably. Analyzing the stock of foreign direct investments and their location determinants from 2006 and 2009, the regional clusters were composed with little differences. More important than their composition was the Euclidean distance between the clusters, suggesting increased regional disparities.

Analyzing the raw data, one can observe that the integration in the European Union and the economic crisis has actually brought a positive evolution on the values of the macroeconomic indicators that determine the location decision in the development regions of Romania. The mostly developed regions are the ones that were mostly sought by the foreign investors: Bucharest-Ilfov, Centre and North-West. This has brought an increase in the indicators regarding the company performance, but in the Centre and north-West the population still lives from small wages, maintaining the comparative advantage of these regions. Bucharest-Ilfov receives a more important contribution to its performance from the Romanian investors, being more independent.

Our expectation that clusters would be formed according to the EU neighborhood and the capital proximity was infirmed mainly because Bucharest has strong particularities, which keep it at a considerable 'distance' from the other areas. The regions that surround it have not been improved as much as the regions that connect the capital with the other European Union member countries.

Regarding the future development of the analysis, we believe that more clear results might be obtained running a more detailed cluster analysis at county level (NUTS III) and the study other a longer period of time.

BIBLIOGRAPHY

Cojanu, Valentin, „Entrepreneurship and Regional Development in Romania", Studia Europaea LI: 2, 2006, p.p. 175-192

Dardac, Nicolae and Boitan, Iustina, „The Financial Crisis Impact on the Degree of Economic Integration in the EU Countries", The Annals of the Stefan cel Mare University of Suceava, ISSN 2066-575X, vol. 10, No. 1 (11), 2010, p.p. 19-27

Goschin, Z., Constantin, D., Roman, M., Ileanu, B., „The Current State and Dynamics of Regional Disparities in Romania", Romanian Journal of Regional Science, Vol. 1, No. 2, 2008, p.p. 80-105.

Gutierrez J.M.P. and C.K.Sorensen, „Euro area banking sector integration using hierarchical cluster analysis techniques", ECB Working Paper Series no. 627, 2006.

Hilber, Christian and Voicu, Ioan „Agglomeration Economies and the Location of Foreign Direct Investment: Empirical Evidence from Romania", Munich Personal RePEc Archive Paper No. 5137, 2007.

Korobow, L. and Stuhr D.P., "Using cluster analysis as a tool for economic and financial analysis", Federal Reserve Bank of New York, Research Paper No.9132, 1991.

Pusterla, F., Resmini, L., "Where do foreign firms locate in transition countries? An Empirical Investigation", The Annals of Regional Science, 2007, p.p. 835-856.

Romanian National Institute of Statistics (INSSE) (2008), „Regional Statistics" [http://www.insse.ro/cms/rw/pages/statRegionale.en.do], 2 October 2010

Romanian National Bank (BNR) (2007-2009), „Foreign Direct Investments in Romania (FDI) – Annual Statistics Research" [http://www.bnr.ro/Investitiile-straine-directe-(ISD)-in-Romania-3174.aspx], 1 January 2011.

Traistaru, Iulia: „Regional Patterns of Private Enterprise Development in Romania", European Regional Science Association, ERSA Conference Papers, ersa01p198, Vienna, 2001.

Ward, J. H., „Hierarchical Grouping to Optimize an Objective Function", Journal of the American Statistical Association, 58, 1963, p.p. 236 - 244.

Wolfson M., M. Zagros, P. James, "Identifying national types: a cluster analysis of politics, economics and conflict", Journal of Peace Research, vol. 41, no.5, 2004, pp. 607-623.