THE GEOGRAPHICAL DISTRIBUTION OF UNEMPLOYMENT AT LOCALITIES DESEGREGATION LEVEL.
CASE STUDY FOR SOUTH MUN TENIA REGION - ROMANIA

Cristina Lincaru*, Vasilica Ciucă

Cristina Lincaru
INCSMPS , Povernei Street No. 6-8, Bucharest, District 1,
Email: cristina.lincaru@yahoo.de
*corresponding author

Biographical notes

Cristina Lincaru is a mechanical engineer, specialized in Fine mechanics, optical and biomedical apparatus (1992) and also Doctor in Management since 9th December 2005 with the thesis: “Labour market in Romania. Organizing, working and directions to ameliorate its performances”, under the coordination of Prof. Univ. Dr. Gheorghe Raboaca. She has been working as a scientific researcher at INCSMPS Romania since 1996. Her scientific career on the long term is aimed at achieving high expertise in the field of quality in employment in the knowledge based society context in transition countries. As specific objectives she intends to study how quality in employment is linked to some distinct domains such as: knowledge management, stimulation of innovation, increasing the long term competitiveness, sustainable development, wage developments, improving bargaining and social dialog, as well as identifying new opportunities to create more and better jobs.

Abstract

The fifth Cohesion Report highlighted the strategic perspective of the new cohesion policy, expressed by the „added territorial cohesion to the twin goals of economic and social cohesion”. The expected contribution of the cohesion policy is strongly linked to overcoming the crisis, reducing disparities and reaching the ambitious objectives of Europe 2020 Strategy. Unemployment represents the reverse of the medal, a concept and a measure at the intersection of many dimensions, complex and with a large spectrum of interpretations. The spatial dimension of the unemployment was relatively recently addressed by new regional theories, which focused on its: geographical/spatial concentration [Alonso-Villar O. and Del Rio C (2008)], agglomeration, returns and spatial unemployment disparities [Suedekum J. (2004)] with aspects of dynamic [Martin R. (1997)], persistence, factors, regional policy rethinking [Chisholm M. (1976)], convergence/divergence of regional disparities [Marshall (1920), Krugman (1991) and Krugman/Venables (1995)], etc. Overman and Puga (2002) bring empirical evidences regarding the spatial effects of „Unemployment clusters across European regions and countries”. Following Niebuhr idea, by measuring the spatial autocorrelation, „regions marked by high unemployment as well as areas characterised by low unemployment tend to cluster in space” (Niebuhr, 2005). Therefore, we analysed the case of intra-regional unemployment disparities at the region level (NUTS2 level - for the case of South Muntenia Region), by using the finest possible disaggregated level for data - the localities. The interest to measure the intraregional unemployment clusters is based on (Goschin, Roman, Ileanu, 2008) the characteristic of the current state and dynamics of regional disparities in Romania described as “low amplitude of both inter-regional and intra-regional disparities”, with the distinction that, “intra-regional disparities are much higher than the inter-regional disparities.” Next to agglomeration and persistence of unemployment in some specific areas, the crisis period and its persistence during the period 2009-2010, emphasized the European tendency of increasing „regional disparities” 4. In order to better respond to the crisis’ pressure, Romania, started in 2010 a massive process of budgetary sector restructuring, folowed by important exits from employment to unemployment. The significant number of persons without a job suddenly increased the pressure over the labour market institutions

and diminished the dynamics of the labour market (induced by the limited occupational mobility) acting as a shock (intense and/or long time pressure probability) and being very difficult to be compensated in time by policies.

The variables are built with one set of reference data and one set of working data, all for the characteristics: age between 18-62 years (total, feminin and masculin (calculated). The reference data was provided by The National Institute of Statistics (INS) demographic data, respectively the stable population registered at the level of a locality, considered to be constant during the analysed period. The working data was obtained from ANOFM/AJOFM (National Employment Agency) and covers 567 localities out of the total number of 2121 localities from South Muntenia Region, including the number of registered unemployed people under the administrative definiton (unemployed people with indemnisation and without indemnisation), for the characteristic total, female and male (calculated). The secondary working data set is represented by the share of unemployed people as a proxy for the unemployment rate. Using administrative data implies both disadvantages and advantages. Some limits of this method induced by the indicators source are: reduced comparability, national unemployment definition, the statistical quality of data, the interval 18-62 years represents the functional age for entrance and exist in and out of the labour market in Romania. We consider very important to emphasis the advantages of this approach, especially in the context of the cohesion policy future development. Thus, the advantages refer to: data is public, covers the finest regional level (localities, over LAU /2, 3174), is available with the best frequency among the labour market indicators - monthly frequency, are the main indicators used in the labour protection policy implementation, etc. Another very important advantage is the perspective of using the flux data (entrance and exits in unemployment at the localities level) next to the stock data we used in our model.

We used the Anselin method, 20055/ Varga, 20096, to analyze the Local Spatial Autocorrelations characteristics, to identify the clusters HH, LL with different significance level, for the unemployment and the share of unemployment in the stable population for the mentioned characteristics (total, feminine, masculine, age 18-62 years, at locality level), for December 2009 compared to March 2010, at locality level using Arc GIS 9.3. (Arc GIS Catalog and Arc MAP)7.

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5 Anselin, L. (2005), *Exploring Spatial Data with GeoDaTM : A Workbook Spatial Analysis Laboratory Department of Geography University of Illinois*, Urbana-Champaign Urbana, IL 61801, [http://sal.uiuc.edu/Pg.6](http://sal.uiuc.edu/Pg.6), Center for Spatially Integrated Social Science [http://www.csiss.org/Revised Version, p.106](http://www.csiss.org/Revised Version, p.106)
6 Varga, A. (2009), *Introduction to Applied Spatial Econometrics*, course presentation, DIMETIC Pécs
Spatial econometrics through the GeoDa software\(^8\) was applied under the hypothesis that localities represent the centres of the Thiessen polygons, using rook contiguity weight file. Results are presented through maps and tables indicated the localities situated in the HH and LL clusters.

**JEL Classification J64, R11**

**Key words:** regional unemployment, spatial analysis, spatial concentration, defavorised areas

**Introduction**

The recent “Fifth Cohesion Report” stressed out the strategic perspective of the new cohesion policy, expressed by the „added territorial cohesion to the twin goals of economic and social cohesion”.\(^9\) The expected contribution of the cohesion policy is strongly linked with passing over the crises, reducing disparities and fulfilling the ambitious objectives of Europe 2020 Strategy.


Following Niebuhr idea, by measuring the spatial autocorrelation, „regions marked by high unemployment as well as areas characterised by low unemployment tend to cluster in space”\(^10\) (Niebuhr, 2005). Therefore, we analysed the case of intra-regional unemployment disparities at the region level (NUTS2 level - for the case of South Muntenia Region), by using the finest possible disaggregated level for data - the localities. The interest to measure the intraregional unemployment clusters is based on (Goschin, Roman, Ileanu, 2008) the characteristic of the current state and dynamics of regional disparities in Romania descried as “low amplitude of both inter-regional and intra-regional disparities”, with the distinction that, “intra-regional disparities are

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\(^8\) The GeoDa Center for Geospatial Analysis and Computation succeeds the Spatial Analysis Laboratory (SAL) which was founded by the new School of Geographical Sciences Director Luc Anselin while at the University of Illinois. [http://geodacenter.asu.edu/about](http://geodacenter.asu.edu/about)


much higher than the inter-regional disparities.”

Next to agglomeration and persistence of unemployment in some specific areas, the crisis period and its persistence during the period 2009-2010, emphasized the European tendency of increasing „regional disparities”.

In the attempt to resist the crisis’ pressure, Romania, started in 2010 a massive process of budgetary sector restructuring, followed by important exits from employment to unemployment. The significant number of persons without a job suddenly increased the pressure over the labour market institutions and diminished the dynamics of the labour market (induced by the limited occupational mobility) acting as a shock (intense and/or long time pressure probability) and being very difficult to be compensated in time by policies.

1. Identifying the most defavourised areas from the perspective of labour force employment and unemployment from South Muntenia using the spatial analyse

Based on Niebuhr’s observation, we tried to identify the regions/areas characterised by high unemployment level and also the regions/areas characterised by low unemployment levels. We used the Local Indicators of Spatial Association (LISA) to underline the presence or absence of significant spatial clusters. We note the local hot spots as:

[A] hot spot of type H-H (High-High) are locations as centres of the clusters named “defavourised areas”:

- a1 - “defavourised quantitative areas” shaped by the areas with high number of unemployed people (N) surrounded by areas (localities) with high number of unemployed people, by total, female and male - represents the case HHN „LISA univariate”. This indicator reflects the magnitude of the phenomenon, the inertia of the problem and requires adequate intervention solutions;

- a2 - “defavourised qualitative areas” shaped by the areas with high share (P) of number of unemployed people in the stable population of the locality (total, female, male) with ages between 18-62 years, surrounded by areas with high share of number of unemployed people, by (total, female, male)- represents the case HHP „LISA univariate”. This indicator reflects the depth of the phenomenon, in terms of degree of “contagion” and requires adequate intervention solutions;

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13 Every hot spot type corresponds to an output indicator. The output indicators calculated are characterised by different level of pseudo significance, simulated through 999 permutations with the levels: c=0,001 high significant level- high probable; a=0,01 significant level -probable; b=,05 low level of significance - low probable, see Figure 1.
The character of defavourised areas for these locations is given by the high level of unemployment, in locations that indicate an agglomeration built in time with high probability of its persistence. This indicator signals the underutilisation of human capital, an economic activity with problems and indicates the special attention from the policy development and implementation;

[B] hot spot of type LL (Low-Low) locations as centres of the clusters named “competitive areas”;
- b1 - “competitive quantitative areas” shaped by the areas with low number of unemployed people (N) surrounded by areas (localities) areas with low number of unemployed people, by total, female and male - represents the case LLN „LISA univariate”. These locations could reflect an important potential of development centres in the region - aspect that could be exploited in view of developing interregional relationships and of course specific policies;
- b2 - “competitive quantitative areas” shaped by the areas with low share (P) of unemployed people (total, female, male) in the stable population of the locality, surrounded by areas with low number of unemployed people, with ages between 18-62 years by (total, female, male)- represents the case LLP. This indicator could indicate that the economic activity is dynamic, intense and diverse, the labour force utilization is efficient and probable is increasing the demand of labour force.

The character of competitive areas for these locations is given by the low level of unemployment, in locations that indicates an agglomeration built in time with high probability of socio-economic development. This indicator signals the efficient utilisation of human capital, an economic activity with good performances and indicates the need of different interventions from the policy development and implementation side.

2. Methodology

The methodology we used in this paper is Anselin, 2005\textsuperscript{14}/ Varga, 2009\textsuperscript{15}, which analyses the Local Spatial Autocorrelations characteristics, to identify the clusters HH, LL with different significance level, for the unemployment and the share of unemployment in the stable population for the mentioned characteristics (total, feminine, masculine, age 18-62 years, at locality level), for December 2009 compared with March 2010, at locality level using Arc GIS 9.3. (Arc GIS Catalog and Arc MAP)\textsuperscript{16}. Spatial econometrics through the GeoDa software\textsuperscript{17} was applied.

\begin{footnotesize}
\begin{thebibliography}{99}
\item Anselin, L. (2005), Exploring Spatial Data with GeoDaTM : A Workbook Spatial Analysis Laboratory Department of Geography University of Illinois, Urbana-Champaign Urbana, IL 61801, \url{http://sal.uiuc.edu/Pg_6}, Center for Spatially Integrated Social Science \url{http://www.csiss.org/Revised Version, p.106}
\item Varga, A. (2009), Introduction to Applied Spatial Econometrics, course presentation, DIMETIC Pécs
\item ArcGIS Desktop Help 9.3, including 9.3.1, \url{http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?TopicName=How%20Spatial%20Autocorrelation%3AMoran's%20I%20(Spatial%20Statistics)%20works}
\end{thebibliography}
\end{footnotesize}
under the hypothesis that localities represent the centres of the Thiessen polygons, using rook contiguity weight file. Results are presented through maps and tables indicating the localities situated in the HH and LL clusters, localities that are positive local correlated.

Among the limits of this method, we can mention: the univariate analysis (mask multivariate associations, variability related to scale mismatch, and other spatial heterogeneity)\(^\text{18}\), the use of Thiessen polygons in order to overcome the limits of GEODA program regarding the LISA univariate analysis applied to islands (considering that the analysis at the localities level makes localities similar to islands), the LISA “maps is based on pseudo p-values that are dependent on the run number of permutations\(^\text{19}\).

2. Data and indicators used in the South Muntenia Region Analysis

The variables are built with one set of reference data and one set of working data, all for the characteristics: age 18-62 years (total, feminin and masculin (calculated), see Figure 1.

The reference data was made available by National Institute of Statistics (INS) demographic data, respectively the number of the stable population registered in the locality considered as constant through analysis period.

The working data was made available by the ANOFM/AJOFM (National Employment Agency) and covers 567 localities from the total of 2121 localities of South Muntenia Region, including the number of registered unemployed people under the administrative definition (unemployed people with indemnisation and without indemnisation), for the characteristics total, female and males (calculated).

The secondary working data set is represented by the share of unemployed people as a proxy for the unemployment rate. Using the administrative data implies both disadvantages and advantages. The limitations of this method are induced by indicators source and refer to reduced comparability, national unemployment definition, statistical quality of data, the 18-62 years interval represent the functional age for entrance and exist in and out of the labour market in Romania.

In the cohesion policy future development, we consider it is very important to emphasize the advantages of this approach: the data is public, covers the finest regional level (localities, over LAU /2, 3174), is available with the best frequency among the labour market indicators - monthly frequency, are the main indicators used in the labour protection policy implementation, etc. Another important advantage is the perspective of using the flux data.

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\(^{17}\) The GeoDa Center for Geospatial Analysis and Computation succeeds the Spatial Analysis Laboratory (SAL) which was founded by the new School of Geographical Sciences Director Luc Anselin while at the University of Illinois. [http://geodacenter.asu.edu/about](http://geodacenter.asu.edu/about)

\(^{18}\) [http://geodacenter.asu.edu/node/390#ppvalue](http://geodacenter.asu.edu/node/390#ppvalue)

\(^{19}\) [http://geodacenter.asu.edu/node/390#ppvalue](http://geodacenter.asu.edu/node/390#ppvalue)
(entrances and exits in unemployment at the localities level) next to the stock data we used in our model, respectively the entrances and exits in and out of unemployment.

Fig. 1 Sources, data and indicators used in the South Muntenia Region Analysis

**Input**

(Important observation: for this indicator there is not mentioned the source. Usually is measured through census - INS)

**Reference data** (constant, without variation for the reports of the months: December 2009 and March 2010)

- The number of stable population in the locality in age 18-62 years (total, female and male)
- The total number of the stable population in age 18-62 years at locality level (input data)
- The total number of the females in age 18-62 years at locality level (input data)
- The total number of the males in age 18-62 years at locality level (input data)

**Working data - indicators provided by ANOFM (National Agency for Labour Force Employment / AJOFM - County Agency for Labour Force Employment) with monthly variation, covering 567 localities /2121 localities from Region South Muntenia**

For every locality that monthly reports the unemployment number of persons - administrative unemployment - we consider the indicators with the characteristics:

- Number of registered unemployed people at locality level = number of unemployed people that receive unemployment benefit + number of unemployed people without receiving unemployment benefit
- Reference data (constant, without variation for the reports of the months: December 2009 and March 2010)

**Output**

The output indicators calculated are characterised by different levels of pseudo significance, simulated through 999 permutations with the levels: c=0,001 high significance level - high probable; a=0.01 significant level - probable; b=0.05 low level of significance - low probable.
Every hot spot type corresponds to an output indicator. The result could be presented under the 36 lists/month for each cell presented in the output module in the figure 1= 3 demographic characteristics (T,M,F)* 3level of significance (c,a,b)*2 cluster type (HH,LL)*2 indicator type(N, P).

3. Results

As Figure 1 shows, the calculated modules are grouped in results. So, for each month (December 2009 and March 2010), for each characteristic (total, female and male), for each type of indicator (Number N, share P) and for each type of cluster HH and LL we obtained 72 new indicators of the region description at locality level with 36 new indicators/month, with the assigned values 0 for “FALSE” or 1 for “TRUE”. The detailed results could be analysed under three types of groups by interpretation:

3.1. Spatial volume distribution type of results perspective for the unemployment in a month at locality level

The partial results of the method applied on volume indicators (number of unemployed persons) are presented in:

a. Table 1- The most defavourized localities under the employment performance and unemployment level in the South Muntenia Region, December 2009. The hierarchy resulted from the spatial distribution of the number of the unemployed persons (total, feminine and masculine) by different significance level;

<table>
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<tr>
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<th>UNITADM</th>
<th>JUDET</th>
<th>HHNS1A</th>
<th>HHNS1B</th>
<th>HHNS1C</th>
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### a. The most competitive localities (LL number of unemployed people)

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Legend: c=0.001 high significance level - high probable; a=0.01 significant level - probable; b=0.05 low level of significance - low probable

### b. The first map – South Muntenia Region (12.2009) general representation (T, F and M) of the “defavorised area type” localities: **HH** localities with an high number of unemployed people surrounded by localities with a high rate of unemployed (area made by the significance level) and the „competitive areas” **LL**: localities with low rate of unemployed people surrounded by localities with a small number of unemployed people – probably development centres, both calculated for December 2009.
Map 1 – Region South Muntenia (12.2009) general representation (T, F and M) of the "defavorised area type" localities: HH localities with an high number of unemployed people surrounded by localities with an high number of unemployed (area made by the significance level) an the "competitive areas" LL: localities with small number of unemployed people surrounded by localities with small number of unemployed people - probably development centres.
Map 2 – Region South Muntenia (12.2009) general representation (T, F and M) of the "defavoured area type" localities: HH localities with an high share of (T,F,M) unemployed people in the stable population from locality, with ages between 18-62 years, surrounded by localities with an high share of (T,F,M) unemployed people in the stable population from locality, with ages between 18-62 years (area made by the significance level) an the "competitive areas" LL: localities with small share of (T,F,M) unemployed people in the stable population from locality, with ages between 18-62 years number of unemployed people surrounded by localities with small share of (T,F,M) unemployed people in stable population from locality, in age of 18-62 years number of unemployed people - probable development centres.
3.2. **Spatial intensity distribution type of results perspective for the unemployment in a month at locality level**

The results of the method we used for intensity indicators (share of unemployed persons in the stable population of the locality) are presented in the second map - South Muntenia Region (12.2009) general representation (T, F și M) of the “defavorised area type” localities: HH localities with an high share of (T,F,M) unemployed people in stable population at locality level, with ages between 18-62 years, surrounded by localities with an high share of (T,F,M) unemployed people in the stable population at the locality level, with ages between 18-62 years (area made by the significance level) and the „competitive areas” LL: localities with small share of unemployed people in the stable population at the locality level with ages between 18-62 years (by T, F, M), surrounded by localities with small share of unemployed people in stable population from locality, in age of 18-62 years (T,F,M) - probably development centres.

3.3. **Spatial contagion effect: the unemployment spatial distribution evolution made of it’s the volume (or intensity), marking the spreading directions for the studied phenomenon.**

If the method is applied identically for every month and then we compare the maps for the spatial distribution of the volume or of the intensity indicators, we can point some spreading directions / progress of the contagion of regression for the studied phenomenon. Our results covers March 2010 and December 2009 moments, based on the stock data (measured at the end of the month at locality level). Because of the extended volume of results (detailed lists for the 36 output indicators, for each locality with values for unemployment) we present only one synthetic example in Table 2: “The cluster "defavourised areas - type HH unemployment” identified by the spatial distribution of the number of the unemployed persons - comparing the centre identified in March 2010 with the centre identified in December 2009 by different significance level”.

The monitoring of the locality dynamic under the characteristic of being a hot spot - centre of clusters of HH or LL type, with its significance level- offers an image of the transition speed from one state to another. We note as “old” the localities that get out from the initial reference state (defavorised area) and describe them as: localities that belong to a specific cluster /active in December 2009 and inactive in March 2010. Similarly, we consider that “new” reflects the transition of the localities from the “neutral” or inactive state, in December 2009 to the active state, indicating the locality has become a centre of cluster by March 2010, relatively to belonging to an cluster type HH or LL, under the analyse criteria. The last used label is “ct” that reflects the
constancy of the status, noted as "active in December 2009 and active in March 2010" indicating that the locality is still a cluster centre.

Table 2
The cluster "defavourised areas - type HH unemployment" identification by the spatial distribution of the number of the unemployed persons - comparing the centre identified in March 2010 with the centre identified in December 2009 by different significance level

<table>
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<th>Locality administrative unit</th>
<th>Significance</th>
<th>March 2010</th>
<th>December 2009</th>
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<td>JUDET/county</td>
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<td>b=0.05</td>
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Legend: a=0.01 significant level - probable; b=0.05 low level of significance - low probable
Centre grouping by the typology of the significance level considering the general direction description based on the labels:
old = "active in December 2009 and inactive in March 2010";
ct = "active in December 2009 and active in March 2010";
new = "inactive in December 2009 and active in March 2010".

4. Final remarks
This spatial analysis could be a measure of the new cohesion policy, focused on territorial, economic and social cohesion in view to implement a strategic perspective. There are some advantages to be considered in view to improve the efficiency and coordination the Europe 2020 Strategy implementation process at regional level, advantages like:
- a relatively easy to use method with visual friendly results, addressed to a large spectrum of users, presented under the 36 lists/month for each cell presented in the output module in Figure 1= 3 demographic characteristics (T,M,F)* 3 level of significance (c,a,b)*2 cluster type (HH, LL)*2indicator type (N, P).
- a useful instrument that exploits and valuate indicators that already exist and opens new possibilities to be improved - as a secondary analysis low cost result;
- an easy to adapt method for monitoring the effect of different policies on the labour market, at locality level (monitoring the transition speed of the localities by cluster type entrance, joining and exit), on short term, with an improved accuracy. At this stage it is more an alarm signal that points out the hot spot that needs more/specific attention.
All the maps are doubled with indexed lists that allow identifying the localities under different characteristics quantitative/ volume, qualitative/intensity by demographic characteristics (total, female, male) under spatial distribution perspective.

All this information can be correlated with other data spatially distributed, offering the opportunity to develop multivariate analysis for better shaping the interactions, effects and problems at local level, measuring the intraregional unemployment clusters and their dynamic interaction.

Acknowledgments

The results presented in this paper represent some outputs of the research activity carried out within the projects funded from the National Research Fund under Nucleu Programs: PN 09-420 -101 Models of job creation/destruction and their impact over the quality of employment, coordinated by Dr. Vasilica Ciucă; PN 09-420103.01: Econometric spatial models and techniques for the analysis of the labour market at regional level, focused on the interregional competitiveness stimulation, coordinated by Dr. Cristina Lincaru. The research transfer of the detailed results of this application was made possible through the consultancy contract: “Study regarding the unemployment rate in the most devafourized areas in the Region South Muntenia”, as a document in the project „the Regional Pact for Employment and Social Inclusion for the Region South Muntenia, Technical Secretariat”, POSDRU/10/3.3/S/5 during 2010, with beneficiaries: Targoviste Valahia University din Targoviste; The Management Authority for the Sectorial Operational Programme for the Human Resources Development.

5. References:


10. Varga, A. (2009), Introduction to Applied Spatial Econometrics, course presentation, DIMETIC Pécs


14. The GeoDa Center for Geospatial Analysis and Computation succeeds the Spatial Analysis Laboratory (SAL) which was founded by the new School of Geographical Sciences Director Luc Anselin while at the University of Illinois. <http://geodacenter.asu.edu/about>
