REGIONAL DEVELOPMENT SURVEY BY DATA PANEL MODELS

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Abstract

Regional development policy whose main objective is to perform an inter- and an intra-regional allocation of activities and results as efficiently and evenly as possible is one of the most important and most complex policies of the European Union. To identify influential factors of the nominal GDP and GDP per capita, pooled linear regression models with cross-sectional specific fixed effects data have been used and the data base has been made of the values of the significant indicators in the eight Romanian regions during 2007 – 2011. The survey shows that foreign direct investment and labour productivity are important direct influence factors on nominal GDP and, that the number of small and medium enterprises per 1,000 inhabitants and the unemployment rate are relevant factors which influence GDP **per capita***, the former directly and the latter inversely.*

Keywords: *regional development; nominal GDP; GDP per capita*; *panel data models; Romania.*

1. Introduction

Economic growth implies the development of regional or local economic capacity and the feedback to economic, technological and social changes etc. (Matei, 2005, pp. 119). Therefore, regional development lies with economic, social, technological issues etc. and refers to the progress of a regional economy's ability of encouraging stable economic and social growth. (Matei A. and Matei L., 2007). Regional development is a current concept based on a mainly economic development process in a certain region, leading to an increase in life quality. (Parlagi, 2000, pp. 53-54).

In the context of community structure accession, given the conditions that the process was not completed in 2007 but is to last for a while, the strategic aim of Romania's regional policy is to decrease regional economic and social imbalances (Antonescu, 2013).

It should also be noted that the Regional Development National Strategy for 2014-2020 is an integrating strategic document that aims at continuing and updating the development orientations laid down in the National Development Plan for 2007 – 2013 and the National Reference Strategic Framework in order to harmonize the existing policies and strategies in various fields of social and economic life having an impact at regional level (The Ministry of Regional Development and Public Administration, 2013).

The issue of regional development is the subject of several specialized literature surveys. Of these, some of the most recent ones in Romania are reviewed below. Mocanu-Perdichi (2009) proposes a sustainable development index at county and regional level, that is a composite indicator calculated according to 19 indicators, grouped into four dimensions (economic, social, institutional and environmental dimensions). Sandu (2011) analyzes the regional disparities in Romania in two ways: by aggregating the Social Development Index values (computed for each of the communes and cities in the country) and by considering the dynamics of the GDP per capita, the infant mortality rate and the life expectancy at birth. Frunză (2011) studies the interrelation of formal institutions – regional development and the ways these components support each other and analyzes the degree of convergence of Romania's eight regions, taking into account indicators such as: GDP per capita, average net wages, unemployment rate, labor productivity etc. Using Geographical Information Systems (GIS), Tache and others (2012) perform hierarchies of several territorial indicators at Second NUTS level, displayed as charts or maps underlining the development disparities at the socio-economic, cultural and environmental levels. Ioniță Predescu and others (2012) show Romania's sustainable development strategy at national, regional and local levels and analyzes the Regional Index of Sustainable Society for the eight regions in Romania. Antonescu (2013) emphasizes the new theoretical prospects of regional economic development, studies the issue of disparities with many facets introducing this concept (convergence, polarization, agglomeration, concentration, dispersion) and analyzes the assessment of public interventions at regional level. Repez (2014) shows the development of clusters in the European Union and Romania as well as the initiatives of European institutions meant to support such clusters, also outlining the importance they have to regional development.

Due to the complexity of processes and issues taking place regionally, the activity to emphasize economic laws governing them is decisively conditioned by the modelling process. Regional development models have been refined thanks to the analysis and assessment of various regional development strategy options which is reflected in specialized literature.

The panel data models consist of regression equations where one uses series that are combinations of time series and cross-sectional data series. Since this situation occurs frequently when analyzing the socio-economic issues and processes taking place regionally, the authors have chosen to apply this type of econometric models in this paper.

Models with panel data in specialized literature are used in many macroeconomic and microeconomic surveys. Thus, Judson and Owen (1999) research the connection between the savings rate and the income growth. Brueckner (2003) provides an overview of strategic interaction among local governments on the basis of two categories of models with panel data. Elhorst (2008) analyzes the variation of labour force participation rate relative to gender and age, using annual data from 154 regions across ten European Union member states for the period 1983–1997. Carneiro, Hansen, and Heckman (2003) apply these models in microeconomics for an education model and determines the intrinsic uncertainty agents face at the time they make their decisions about enrollment in school.

In finance, Lettau and Ludvigson (2001) explore the ability of the Capital Asset Pricing Model (CAPM) and the Consumption-based Capital Asset Pricing Model (CCAPM) to explain the representativeness of average profitability rates of assets. Likewise, Campbell, Lo, and MacKinlay (1997) provide several applications of factor models in finance.

The amplitude of research on panel data models has led to a very high rate of growth of the associated specialized literature. There are many book-length surveys devoted to econometrics of panel data such as: Dielman (1989), Matyas and Sevestre (1996), Nerlove (2002), Arellano (2003), Baltagi (2005) and Wooldridge (2010).

Likewise, the study of specific issues related to panel data models is the subject of numerous articles. Lee and Yu (2010) present some recent research in the specification and estimation of spatial autoregressive (SAR) panel data models for the static case and for the dynamic case. Baltagi, Song and Koh (2003) report several Lagrange Multiplier tests for panel data regression models with spatial error correlation and perform Monte Carlo experiments to study the performance of these tests. Bond (2002) focuses on the Generalized Method of Moments estimators in the context of a single autoregressive and distributed lag equation for panels with a large cross-sectional dimension and a small temporal dimension. Kapoor, Kelejian and Prucha (2007) regard a panel data model with error components that are both spatially and timely correlated, introduce generalizations of the method of moments for estimating the spatial autoregressive parameter and the components of disturbance variance and use those estimators to define a feasible generalized least squares method for regression parameters. Bruno (2005) extends the bias (deviation) approximations of the least squares dummy variable estimator for an unbalanced panel. Greene (2005) investigates several approaches to model heterogeneity in panel data for the stochastic frontier model. Elhorst (2003) effects a survey of the specification and estimation of spatial panel data models, in the circumstance of including the spatial error autocorrelation or using a spatially lagged dependent variable.

2. Panel Data Models

The model shown below is not a general but a particular form adapted to the scientific research in progress.

We consider the values of three variables x, y and z that are noted for N units (marked $1,2,\ldots,N$), called cross-sectional units for T consecutive periods ($t_0, t_0+1, t_0+2,\ldots,t_0+T-1$), thus obtaining the triplets of values.

$$(x_{i,t}, y_{i,t}, z_{i,t}),\ i=1,2,\ldots,N,\ t=t_0,t_0+1,t_0+2,\ldots,t_0+T-1$$

The cross-sectional dimension is N, and the temporal dimension is T, hence the size of the panel data is $N \cdot T$. We consider that x is an endogenous variable, and y and z are exogenous variables. For panel data, the basic class of models that can be estimated has the following form:

$$x_{i,t} = \alpha + \beta_1 y_{i,t} + \beta_2 z_{i,t} + \delta_i + \gamma_t + \varepsilon_{i,t},\ i=1,2,\ldots,N,\ t=t_0,t_0+1,t_0+2,\ldots,t_0+T-1 \quad (1)$$

where

α, β_1, β_2 are model parameters to be determined;

δ_i represents specific (random or fixed) effects for cross-sectional units;

γ_t represents specific (random or fixed) effects for time periods;

$\varepsilon_{i,t}$ is the error terms.

We will further use pooled linear regression equations with only cross-sectional fixed effects for cross-sectional section units , so that the model (1) is rewritten as such:

$$x_{i,t} = \alpha + \beta_1 y_{i,t} + \beta_2 z_{i,t} + \delta_i + \varepsilon_{i,t},\ i=1,2,\ldots,N,\ t=t_0,t_0+1,t_0+2,\ldots,t_0+T-1 \quad (2)$$

To specify the fixed effects models, first one computes the averages of values $x_{i,t}$, $y_{i,t}$, $z_{i,t}$ within each cross-sectional unit “group”.

$$\bar{x}_{i\bullet} = \frac{1}{T}\sum_{t=t_0}^{t_0+T-1} x_{i,t},\quad \bar{y}_{i\bullet} = \frac{1}{T}\sum_{t=t_0}^{t_0+T-1} y_{i,t},\quad \bar{z}_{i\bullet} = \frac{1}{T}\sum_{t=t_0}^{t_0+T-1} z_{i,t}$$

From relationship (2) there results

$$\bar{x}_{i\bullet} = \alpha + \beta_1 \bar{y}_{i\bullet} + \beta_2 \bar{z}_{i\bullet} + \delta_i + \bar{\varepsilon}_{i\bullet},\ i = 1,2,\ldots,N \quad (3)$$

Subtracting equation (2) from equation (3) we obtain

$$x_{i,t} - \bar{x}_{i\bullet} = \beta_1 \left(y_{i,t} - \bar{y}_{i\bullet}\right) + \beta_2 \left(z_{i,t} - \bar{z}_{i\bullet}\right) + \varepsilon_{i,t} - \bar{\varepsilon}_{i\bullet},\ i = 1,2,\ldots,N,$$
$$t = t_0, t_0 + 1, t_0 + 2, \ldots, t_0 + T - 1 \quad (4)$$

Using notations

$$x^*_{i,t} = x_{i,t} - \bar{x}_{i\bullet},\quad y^*_{i,t} = y_{i,t} - \bar{y}_{i\bullet},\quad z^*_{i,t} = z_{i,t} - \bar{z}_{i\bullet},\quad \varepsilon^*_{i,t} = \varepsilon_{i,t} - \bar{\varepsilon}_{i\bullet},$$

from relationship (4) we obtain the transformed regression equation

$$x^*_{i,t} = \beta_1 y^*_{i,t} + \beta_2 z^*_{i,t} + \varepsilon^*_{i,t},\ i = 1,2,\ldots,N,\ t = t_0, t_0 + 1, t_0 + 2, \ldots, t_0 + T - 1 \quad (5)$$

where fixed effects are eliminated. In order to estimate the coefficients of equation (5), one uses the ordinary least squares method. This estimator is known as the least squares dummy variables method estimator.

3. Model Variables and Equations

The model is made up of two independent behavioral equations and includes six variables. Using data about regions in Romania, the model pursues the evaluation of factors' influence related to business development (the number of small and medium enterprises per 1,000 inhabitants), economic efficiency (unemployment rate and labour productivity), and financial factors (foreign direct investment) upon some indicators that characterize growth level (GDP per capita and nominal GDP).

The following notations are used when writing the model:

PIB_pr_c = nominal gross domestic product (million Lei) (endogenous variable);

PIB_per_cap = gross domestic product per capita (Lei/inhabitant) (endogenous variable);

Prod_mun = labour productivity (Lei/inhabitant) (exogenous variable);

Inv_st_dir = foreign direct investment (million Euro) (exogenous variable);

R_som = unemployment rate (%) (exogenous variable);

R_IMM = number of small and medium enterprises per 1,000 inhabitants (exogenous variable);

a_{kl} = equations coefficients to be determined, $k = 1,2$, $l = 1,2,3$.

Estimating model equations (determining parameter estimators) has been done according to the values of the above indicators in eight Romanian regions, during 2007 – 2011. That is why we use two indices:

t = generic index of time, $t = 2007, 2008, \ldots, 2011$;

i = generic index of region, $i = 1, 2, \ldots, 8$, according to correspondence:

North-West region $\rightarrow 1$;

Central region $\rightarrow 2$;

North-East region $\rightarrow 3$;

South–East region $\rightarrow 4$;

South-Muntenia region $\rightarrow 5$;

Bucureşti-Ilfov region $\rightarrow 6$;

South-West Oltenia region $\rightarrow 7$;

West region $\rightarrow 8$.

The Equations of this model are customizations of equation (2) and have the following form:

$$\text{PIB\_pr\_c}_{i,t} = a_{11} + a_{12}\ \text{Inv\_st\_dir}_{i,t} + a_{13}\ \text{Prod\_mun}_{i,t} + \delta_i + \varepsilon_{i,t},\ i = 1,2,\ldots,8,\ t = 2007, 2008, \ldots, 2011 \quad (6)$$

$$\text{PIB\_per\_cap}_{i,t} = a_{21} + a_{22}\ \text{R\_IMM}_{i,t-2} + a_{23}\ \text{R\_som}_{i,t} + \delta'_i + \varepsilon'_{i,t},\ i = 1,2,\ldots,8,\ t = 2009, 2010, 2011; \quad (7)$$

where $\varepsilon_{i,t}$, $\varepsilon'_{i,t}$ are residual variables, and δ_i, δ'_i represent cross-section specific fixed effects.

4. Determination of Parameters and Statistical Analyis of a Model

To process data, one has used the Eviews 9.0 software package. The model shows the dependence of two important economic development indicators – the nominal GDP and the GDP per capita – on significant factors (foreign direct investment and labour productivity, respectively, unemployment rate and the number of small and medium enterprises per 1,000 inhabitants). Estimating the coefficients has been based on the data in Table 1 (evolution of nominal GDP, of foreign direct investment and of labour productivity during 2007-2011 for eight Romanian regions) – for the first equation and on the data in Table 2 (evolution of GDP per capita, of unemployment rate and of the number of small and medium enterprises per 1,000 inhabitants during 2007-2011 for eight Romanian regions) – for the second equation.

First, one performs the Hausman Test for determining the adequate specification of the model effects. The null hypothesis of the Hausman Test is that statistically there are no significant differences between the estimates of coefficients in the fixed and random effects models. If the null hypothesis is rejected, that is if the difference between the two estimators is large, then the fixed effects model is preferred. Instead, if the null hypothesis cannot be rejected, then the random effects model is preferred. The relevant portion of the test output is:

a) for the first equation

Correlated Random Effects - Hausman Test
Pool: POOL01
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	14.539226	2	0.0007

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
INV_ST_DIR?	1.542775	0.343122	0.242527	0.0149
PROD_MUN?	2.854061	3.282857	0.016586	0.0756

b) for the second equation

Correlated Random Effects - Hausman Test
Pool: POOL01
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.979110	2	0.3717

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
R_IMM?(-2)	596.802655	864.023207	54391.231437	0.2519
R_SOM?	-688.285105	-620.312708	2522.481668	0.1759

According to the above-shown information, the fixed effects are selected for both equations.

For obtaining the estimates of the panel data model, the Pooled Least Squares Method has been used for this type of data. At the same time, the variance-covariance matrix of estimators has been determined through the White cross-section method (that is derived by treating the pool regression as a multivariate regression (with an equation in each cross-section), and computing the White-type robust standard errors for the system of equations) because there is a suspicion of cross-section heteroscedasticity.

The above-mentioned software has provided the following information:

a) for the first equation

Dependent Variable: PIB_PR_C?
Method: Pooled Least Squares
Date: 05/15/14 Time: 12:10
Sample: 2007 2011
Included observations: 5
Cross-sections included: 8
Total pool (balanced) observations: 40
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-27219.38	8560.451	-3.179666	0.0034
INV_ST_DIR?	1.542775	0.765543	2.015269	0.0529
PROD_MUN?	2.854061	0.444856	6.415691	0.0000
Fixed Effects (Cross)				
_01--C	13289.20			
_02--C	430.2636			
_03--C	19020.64			
_04--C	4253.504			
_05--C	9495.411			
_06--C	-34149.45			
_07--C	-753.4417			
_08--C	-11586.12			

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.995221	Mean dependent var	62741.15
Adjusted R-squared	0.993788	S.D. dependent var	25541.35
S.E. of regression	2013.104	Akaike info criterion	18.26506
Sum squared resid	1.22E+08	Schwarz criterion	18.68728
Log likelihood	-355.3012	Hannan-Quinn criter.	18.41772
F-statistic	694.2199	Durbin-Watson stat	1.626702
Prob(F-statistic)	0.000000		

b) for the second equation

Dependent Variable: PIB_PER_CAP?
Method: Pooled Least Squares
Date: 05/15/14 Time: 12:34
Sample (adjusted): 2009 2011
Included observations: 3 after adjustments
Cross-sections included: 8
Total pool (balanced) observations: 24
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14444.19	7306.734	1.976832	0.0681
R_IMM?(-2)	596.8027	253.2194	2.356860	0.0335
R_SOM?	-688.2851	174.6145	-3.941741	0.0015
Fixed Effects (Cross)				
_01--C	-5561.619			
_02--C	-1180.532			
_03--C	-3749.681			
_04--C	-2843.416			
_05--C	1207.062			
_06--C	11010.16			
_07--C	256.3054			
_08--C	861.7181			

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.997039	Mean dependent var	25778.96
Adjusted R-squared	0.995136	S.D. dependent var	12951.62
S.E. of regression	903.2868	Akaike info criterion	16.74429
Sum squared resid	11422978	Schwarz criterion	17.23515
Log likelihood	-190.9315	Hannan-Quinn criter.	16.87452
F-statistic	523.8352	Durbin-Watson stat	1.961816
Prob(F-statistic)	0.000000		

By taking the estimated values of the parameters in the two equations (respectively $\hat{a}_{11}, \hat{a}_{12}, \hat{a}_{13}$ and $\hat{a}_{21}$, $\hat{a}_{22}$, $\hat{a}_{23}$) in the Coefficient column of the above tables and the cross-sectional unit fixed effects (respectively $\delta_1, \delta_2, \ldots, \delta_8$; and $\delta'_1, \delta'_2, \ldots, \delta'_8$), in the same column after the Fixed Effects (Cross) mention, functional relationships (6) and (7) become:

$$\text{PIB\_pr\_c}_{i,t} = \text{-27219,38} + \text{1,542775 Inv\_st\_dir}_{i,t} + \text{2,854061 Prod\_mun}_{i,t} + \delta_i + \varepsilon_{i,t}, \quad i = 1,2,\ldots,8, \; t = 2007,2008,\ldots,2011, \tag{8}$$

where $\delta_1 = 13289{,}20$, $\delta_2 = 430{,}2636$, $\delta_3 = 19020{,}64$, $\delta_4 = 4253{,}504$, $\delta_5 = 9495{,}411$, $\delta_6 = -34149{,}45$, $\delta_7 = -753{,}4417$, $\delta_8 = -11586{,}12$,

respectively

$$\text{PIB\_per\_cap}_{i,t} = \text{14444,19} + \text{596,8027 R\_IMM}_{i,t-2} \text{-688,2851 R\_som}_{i,t} + \delta'_i + \varepsilon'_{i,t}, \quad i = 1,2,\ldots,8, \; t = 2009,2010,2011, \tag{9}$$

where $\delta'_1 = -5561{,}619$, $\delta'_2 = -1180{,}532$, $\delta'_3 = -3749{,}681$, $\delta'_4 = -2843{,}416$, $\delta'_5 = 1207{,}062$, $\delta'_6 = 11010{,}16$, $\delta'_7 = 256{,}3054$, $\delta'_8 = 861{,}7181$

The significance levels to which the equation parameters are different from zero lie in the last column (Prob.) of the first section of tables, respectively

$$\alpha_{11} = 0{,}34\%, \quad \alpha_{12} = 5{,}29\%, \quad \alpha_{13} < 0{,}01\%,$$
$$\alpha_{21} = 6{,}81\%, \quad \alpha_{22} = 3{,}35\%, \quad \alpha_{23} = 0{,}15\%$$

All these values are less than the 5% threshold, except the second which is slightly higher than this level, and the fourth which is only almost 2 percent higher, so that one can accept that the model parameters are significantly different from zero.

The determination coefficient (R-squared) value for the first equation is 0.995221, which shows that 99.5221% of the nominal GDP variation is due to variables under consideration - foreign direct investment and labour productivity. The determination coefficient value for the second equation, too which is high (0.997039) indicates the fact that the fraction of the simultaneous influence of unemployment rate and the number of small and medium enterprises per 1,000 inhabitants in the total variation of GDP per capita is 99.7039%. Therefore, the factors considered in the model are essential. The adjusted coefficient of determination (Adjusted R-squared) is also used for measuring the fit of a regression equation, but it penalizes the addition of too many variables in order to get a good fit of the model (Ohtani, 2000). This coefficient is also high (respectively 0.993788 and 0.995136).

The significance level of the F-test (Prob(F-statistic)) for the two equations is less than the threshold we test, usually 0.05, so that we reject the null hypothesis that all the regressions coefficients are zero (excluding the constant). Therefore, one can see for the two equations that there is a statistically significant relationship between the dependent variable and at least one of the independent variables.

5. Economic Analysis of the Model

From the economic perspective, the model highlights univocal dependencies among economic-social variables related to business development, economic efficiency, financial field and development level, in the regions in our country. That is why one can say the model creates a clear picture of the influences among important regional development indicators.

The first equation quantifies the dependence of nominal gross domestic product on foreign direct investment and labour productivity and shows there are direct relationships to both factors. Therefore, increases in the foreign direct investment and labour productivity result in the increase in nominal gross domestic product. The very high determination coefficient value shows that foreign direct investment and labour productivity are decisive influence factors to the nominal gross domestic product.

The estimation value of the foreign direct investment coefficient in equation (8) shows that each newly invested million Euros generates an increase in the nominal gross domestic product by 1.542775 million Lei. Likewise, an increase in the labour productivity by 1 Leu/inhabitant determines an increase in the nominal gross domestic product by 2.854061 million Lei.

The second functional relationship shows the dependence of gross domestic product per capita on the number of small and medium enterprises per 1,000 inhabitants and unemployment rate. There is a direct relationship to the first factor and an inverse relationship to the second independent variable.

The above direct relationship to the first factor is explained this way: when the number of small and medium enterprises per 1,000 inhabitants rises, the value of final goods and services produced in an economy per 1,000 inhabitants also increases, which means an increase in gross domestic product per capita. Additionally, according to equation (9), an increase in the number of small and medium enterprises per 1,000 inhabitants by one business unit results in an increase in GDP per capita by 596.80 Lei over the next two years, since the lag of the variable is two years.

For the second factor, a reduction in the unemployment rate means an increase in the number of employees per 100 inhabitants, which leads to an increase in the volume of economic activities per capita and implicitly in the value of final goods and services produced in the economy per capita, that is in the gross domestic product per capita. At the same time, equation (9) indicates that a decrease in the unemployment rate by 1% has the effect of a rise in GDP per capita by 688.29 Lei.

6. Conclusions

The model shown is a regional development model that emphasizes functional relationships among important economic indicators. The economic analysis achieved demonstrates the utility of panel data models for well-founded scientific studies in the field of regional development.

The study results in the fact that foreign direct investment, the number of small and medium enterprises per 1,000 inhabitants and labour productivity are significant direct influence factors on economic development. Furthermore, unemployment rate is an important factor that inversely influences economic development.

However, taking into account that the temporal dimension of the statistical series used is rather small, in order to obtain results with better relevance it would be necessary to know the values of indicators over a longer period of time, preferably about at least 10-15 years. Additionally, the analysis can be extended by determining reciprocal or univocal correlations and dependencies among variables while introducing other significant indicators in the regional development, along the ones under consideration. To extend the model, in addition to the already highlighted equations, one should add simultaneous equations, defining equations, equilibrium equations and other behavioral equations.

The regional development model shown can also be used to forecast the economic and social processes at the regional level. The data from this analysis can be a starting point to improve integrated territorial development strategies and to correlate national development strategies with the regional ones so that to concentrate and specialize urban and rural areas.

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Dynamics of Nominal GDP, Foreign Direct Investment and Labour productivity during 2007-2011 in Romanian Regions

Table 1

Region	Nominal gross domestic product (million Lei)					Foreign direct investment (million Euro)					Labour productivity				
	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
North-West region	50724	58639	57900	59293	61370	1907	2108	1940	2232	2454	22992	24141	23754	24000	24648
Central region	49417	57303	57101	59120	63669	3541	4146	3703	3909	4215	25442	26816	27046	27539	29962
North-East region	45990	55022	54408	55669	60298	672	1136	975	1244	1627	19810	21549	21358	21559	22119
South-East region	44273	53851	52706	56340	60841	2448	3551	2938	3290	2970	22508	24969	24809	26488	27150
South-Muntenia region	52014	64535	65142	66115	70923	2942	3411	3576	3816	4059	23261	26398	26755	26765	29923
Bucureşti-Ilfov region	95798	134163	124289	131579	137579	27516	30594	31699	32720	34021	40532	51169	48376	50419	50820
South-West Oltenia region	34420	40340	39954	41941	44841	1379	1226	2058	1928	1806	21301	22803	22738	23570	24654
West region	42996	50393	49200	52983	56507	2365	2626	3095	3446	3987	27071	28796	28603	30518	32929

Source: The table data have been generated by the authors according to the information in the 2008-2012 Romanian Statistical Yearbook

Dynamics of GDP per capita, Unemployment rate and the Number of SME's per 1,000 inhabitants during 2007-2011 in Romanian Regions

Table 2

Region	GDP per capita (Lei/inhabitant)					Number of SME's per 1,000 inhabitants					Unemployment rate (%)				
	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
North-West region	18611	21542	21297	21827	22583	27.23	29.45	28.49	25.52	23.55	2.9	3.3	6.8	5.9	4.4
Central region	19580	22708	22619	23428	25239	25.85	27.42	26.72	24.03	22.09	4.8	5.2	9.5	8	6.1
North-East region	12341	14795	14649	15015	16282	15.69	16.78	16.36	14.76	13.58	5.1	5.3	8.6	7.8	5.8
South-East region	15642	19099	18738	20077	21709	22.13	23.71	23.33	21.28	19.56	4.4	4.7	8.4	8.1	6.1
South-Muntenia region	15758	19648	19914	20288	21798	16.96	18.48	18.26	16.92	15.75	5.1	5.2	9.4	8.8	6.5
București-Ilfov region	43037	59680	55079	58137	60677	55.15	58.46	57.65	52.62	48.48	1.7	1.6	2.4	2.4	2
South-West Oltenia region	15097	17832	17753	18735	20083	16.76	17.90	17.72	16.40	15.33	5.1	6.9	10.4	9.2	7.7
West region	22342	26173	25602	27640	29526	26.29	27.84	27.23	24.55	22.50	3.3	3.8	7.4	5.9	3.7

Source: The table data have been generated by the authors according to the information in the 2008-2012 Romanian Statistical Yearbook