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## Regional Dynamics of Insurances in Romania

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**50<sup>th</sup> ANNIVERSARY EUROPEAN CONGRESS  
OF THE REGIONAL SCIENCE ASSOCIATION INTERNATIONAL  
19–23 AUGUST 2010, JÖNKÖPING, SWEDEN**

**REGIONAL DYNAMICS OF INSURANCES IN ROMANIA**

*Dan CONSTANTINESCU <sup>\*)</sup>  
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Marius-Nicolae JULA <sup>\*\*\*)</sup>*

**Abstract**

In the paper we analyze the economic, social, cultural, institutional and political factors that determine regional demand for services like "insurance". As economic factors, we analyze the impact of non-governmental credit over the insurance market. Development of an econometric model is based not only on the actual loan methodology (involving the securities, life insurance for applicants and guarantors), but also on direct connections from the range of credit risk insurance products. On the other hand, non-government credit growth, by enhancing repayment commitments, leads to a reduction in financial resources that can be used, for example, to voluntary/optional insurances, not directly linked with loan process. Last but not least, above-mentioned interferences put footprint on specific partnerships, such as – for example – bancassurance.

The residues from the regression equation specific to each region can be explained by social and cultural characteristics. Based on these results, we considered two scenarios for the regional evolution of Romanian insurance market, first determined by the significant factors of this process (GDP/ capita, monthly nominal average wage/capita, population, size of distribution network) as they were outlined in a previous study, the second taking into account the new predictions of non-governmental loan in terms of economic and financial crisis.

**Key-words:** insurance (life/general and on types), loans (on categories), regional distribution, disparities, correlations, concentration, panel model, forecast

**JEL Classification:** G21, G22, R12

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## **Premises**

Development Regions in Romania are correspondent to the partitions at NUTS-II level of EU. Although they become more and more significant in the Regional development area, the Regions have no administrative status, with no legislative or executive bodies. Development Regions are not legally established, they only result from agreements between county and local administrations. Their function is to allocate EU structural funds for Regional development, to research and analyze Regional statistics. Regions also coordinate infrastructure Regional projects and become members of Region Committee after Romania's integration in EU from 2007.

Romania is organized from administrative point of view in eight development Regions (that include 2-7 counties<sup>1</sup>), named after geographic position: North-East, South-East, South-Muntenia, South-West Oltenia, West, North-West, Centre, Bucharest-Ilfov.

## **Regional disparities of insurance and nongovernmental credit**

In a previous research, we've noted that distribution on development regions of written gross premiums for insurance is mainly dependent on the territory repartition of nongovernmental loan and for this reason we will further analyze comparative regional distributions of the two categories of indicators for the year 2009.

In Figure 1 it can be seen that about half of total gross written premiums and more than a third of non-governmental credit is located in the region of Bucharest-Ilfov.<sup>2</sup> Share this region is higher for life insurance (65.33%) and loans to companies (39.61%).

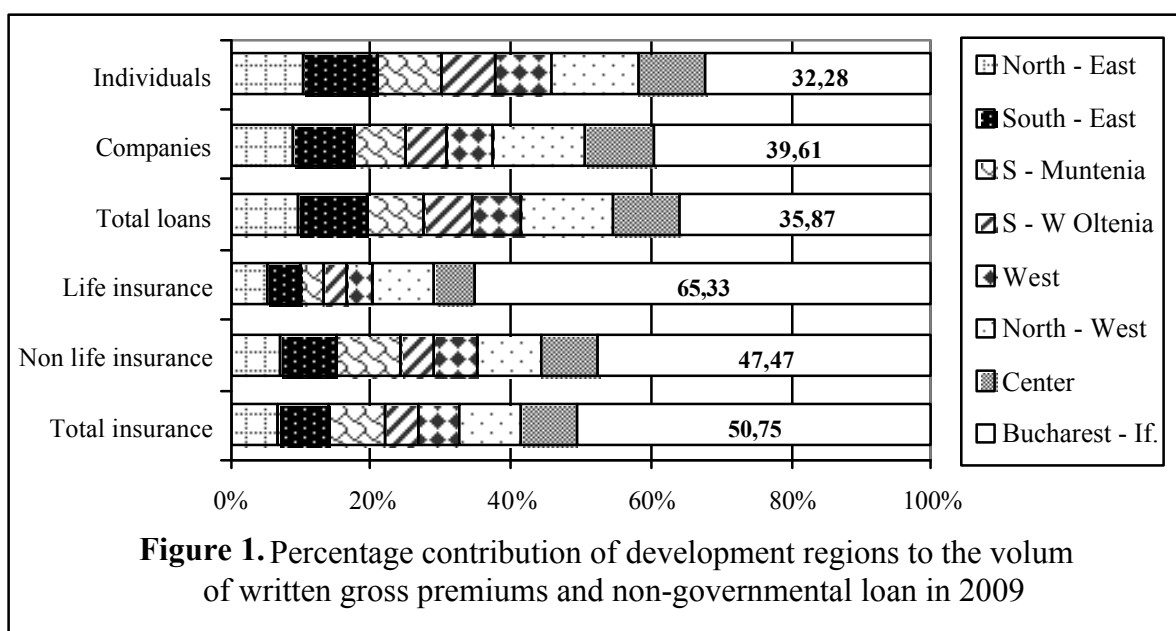
An explanation of this phenomenon is that negotiation for collective life insurance and loans is made, as a rule, at the central management (Head Quarter) of the recipient companies, most of them located in Bucharest. Here operates the overwhelming majority of plants and banks and insurance companies. Finally, the distribution of insurance products and credit, which originally focused on covering the country's capital, induced a comparative advantage of this area in terms of institutional offer.

In addition, as we show below, the development of Bucharest-Ilfov region, reflected by indicators as GDP/inhabitant or net nominal average monthly earning is highly above national average, favorably influencing demand for the analyzed financial products.

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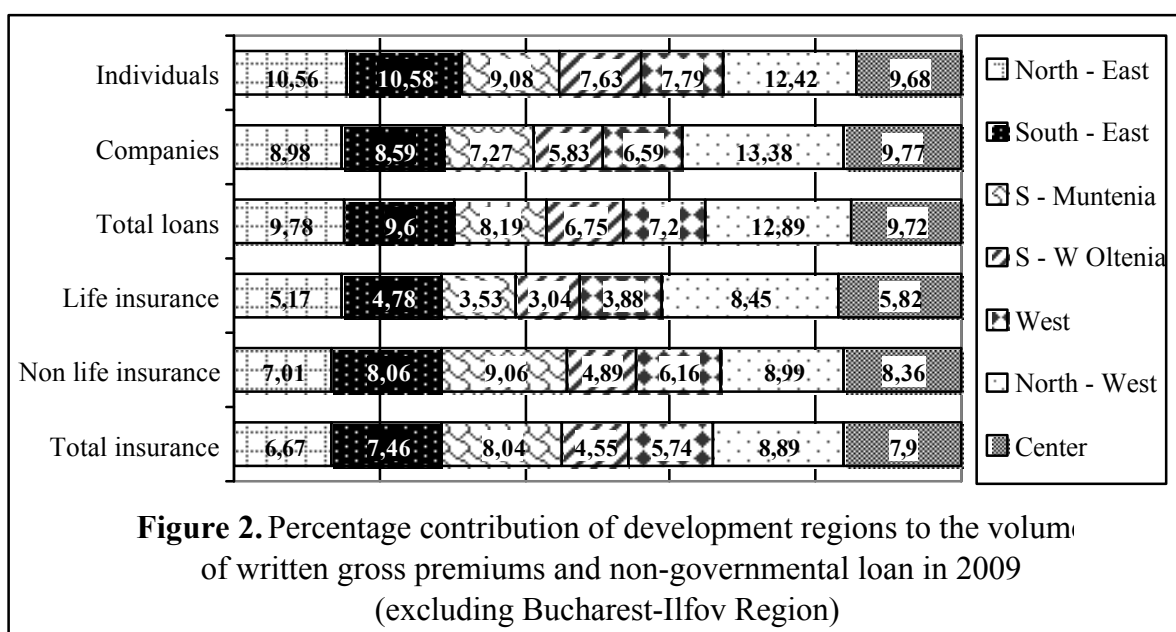
<sup>1</sup> correspondent to the partitions at NUTS-III in EU

<sup>2</sup> including the capital city



If we eliminate from the presentation Bucharest-Ilfov region (Figure 2) a relative distribution of insurance and credit balance on the other developing regions can be observed, with inter-regional variations ranging from simple to double, while the range of variation is only slightly wider for life insurance.

The lowest weights for all indicators can be found in South-West Oltenia region, while North-East region is on the opposite side for insurance contributions and percentage of total loans, with maximum values for these weights.

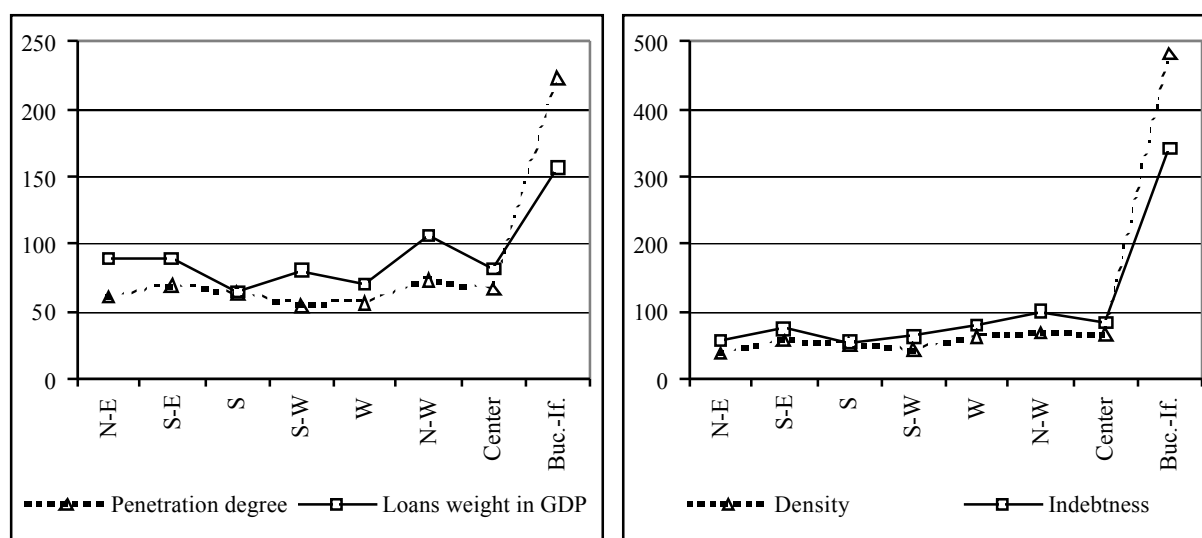


No doubt that the present disparities seen in developing regions in terms of population and development level put their mark on the territorial distribution of insurance and non-government credit, and for this reason we further use for comparison a series of intensive indicators regarding the accession to the respective financial products, namely: the insurance penetration rate (in GDP) and their density, i.e. the share in GDP and the degree of indebtedness.

Regions	Penetration degree (%)	Density (ron/hab.)	Loans weight in GDP (%)	Indebtedness (ron/hab.)
North - East	1,09	158,90	35,66	5200,87
South - East	1,25	234,49	36,05	6741,51
South - Muntenia	1,14	217,30	25,87	4944,89
South - West Oltenia	0,97	178,87	32,16	5919,30
West	1,01	264,02	28,43	7399,59
North - West	1,32	289,13	42,83	9363,18
Center	1,19	276,55	32,78	7604,70
Bucharest - Ilfov	4,00	1988,91	63,19	31397,48
TOTAL	1,80	411,86	40,24	9198,84

**Table 1.** Regional distribution of intensive indicators for insurance and non-governmental loans access

Note that the disparity indexes<sup>3</sup> for the respective indicators, as presented in Figure 3, show a similar dispersion for the values corresponding to penetration of insurance and non-government credit share in GDP, i.e. insurance density and indebtedness.

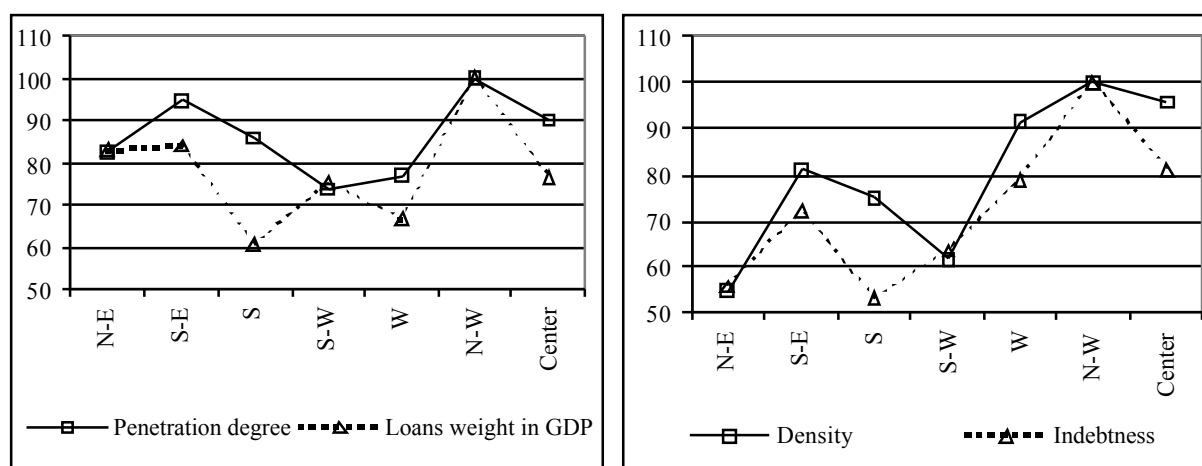


**Figure 3.** Disparity indexes

<sup>3</sup> as determined by reporting regional level to national level

Significant differences from the average, related Bucharest-Ilfov region may be linked to the high levels that this region also record for the disparity indexes related to gross domestic product per capita (217.32% compared with the national average) and net average monthly nominal earnings (141.56%). In addition, as stated above, the capital holds a significant share of distribution networks and also for products as credit and insurance.

Given these issues, regional disparities calculation was performed by comparing the values for the Northwest region, placed on the second position in the range of the respective indicators, while the Bucharest-Ilfov region is deliberately omitted from the graphs presented.



**Figure 4.** Regional disparities

Regarding the share in GDP of the analyzed financial products, we noticed a group of three development regions (South, Southwest and West) standing below 80% of the standard region, and another group of three regions (North East, South and Central America) which recorded values above this level. A similar situation reveals the volume of financial products related to population, noted that the Northeast region replaced Western region in the group standing below the 80% of the standard region.

Another mean for analyzing the regional structure of gross written premiums (overall and by insurance) in connection with the territorial distribution of non-governmental credit may be carried out based on the Herfindahl index<sup>4</sup> and Gini-Struck coefficient<sup>5</sup> (Table 2).

$$^4 HHI = \sum_{i=1}^n g_i^2$$

$$^5 GS = \sqrt{\frac{n \sum g_i^2 - 1}{n-1}}$$

Concentration indexes	Gross Written Premium			Non-governmental loans		
	Total	Non life	Life	Total	Companies	Individuals
Herfindahl	0,2936	0,2662	0,4459	0,1900	0,2127	0,1714
Gini-Strück	0,4389	0,4017	0,6056	0,2725	0,3167	0,2303
<i>Herfindahl</i> <sup>1)</sup>	<i>0,1484</i>	<i>0,1481</i>	<i>0,1594</i>	<i>0,1490</i>	<i>0,1532</i>	<i>0,1466</i>
<i>Gini-Strück</i> <sup>1)</sup>	<i>0,0801</i>	<i>0,0784</i>	<i>0,1390</i>	<i>0,0849</i>	<i>0,1100</i>	<i>0,0662</i>

<sup>1)</sup>without Bucharest-Ilfov Region

**Table 2.** Concentration levels for gross written premium and non-governmental loans

In insurance area, we observe a relatively lower level of concentration from the average for general insurance (non life), since they include a number of classes of mandatory insurance, such as, for example, car insurance (motor third part liability insurance), while life insurance is more dependent on the territorial structure of the distribution network and other elements of the sales policy of the involved companies. The influence of these companies over the degree of concentration on overall insurance is quite low because their share in gross written premium volume is below 20%.

Some less significant changes in terms of concentration of the non-government credit are encountered, justified by the higher values on loans to companies given by the significant economic potential for above average development of the region including the capital city.

Excluding this region from the calculation, it may be observed that the values of indicators for insurance and credit concentration are significantly closer, this relative uniformity being explained by the extension of bancassurance.

### **The role of binomial demand-supply to regional disparities**

Given the available information, we considered that offer of the insurance industry can be highlighted by the size of the sale forces, as defined represented by the territorial structure of the network of insurance companies (Branch Network - Bn) and individual insurance agents (Ag) and brokerage firms (Bk).

Regression equations that capture the influence of the distribution network of insurance brokers on the relevant territorial structure of the volume of gross written premiums (GWP) are as follows (in brackets t-Statistic):<sup>6</sup>

$$\text{GWP} = 21556907,93 \text{ Bn} - 322588,17 \text{ Ag} - 238291616,9, R^2 = 0,9128$$

$$\begin{array}{ccc} [14,0508] & [-5,5623] & [-2,7187] \end{array}$$

<sup>6</sup> to increase the number of degrees of freedom, we further used detailed data on the indicators on the 42 counties, which correspond to territorial structures NUTS-III

$$\text{GWP} = 8525019,04 \text{ Bk} + 57686226,64, R^2 = 0,6733^7$$

$$[8,9650] \quad [7,3121]$$

In the first instance, the influence of demand on the territorial distribution of gross premiums written was determined from the structure on counties of gross domestic product (GDP), the average net nominal monthly earnings (ANME) and population (P), based on regression equation:

$$\text{GWP} = 0,06 \text{ GDP} - 532657,03 \text{ ANME} - 772,92 \text{ P} + 529319725,9, R^2 = 0,9486$$

$$[12,4410] \quad [-2,5829] \quad [-3,3334] \quad [2,1166]$$

Yet, we consider that a greater degree of significance may be obtained by introducing as intermediate variable the regional distribution of non-government credit (Total Loans - TL), and the regression equation becomes:

$$\text{GWP} = 0,06 \text{ TL} - 86431501,85, R^2 = 0,9656$$

$$[33,0619] \quad [-3,9053]$$

As noted in a previous research, the influence of regional distribution of non-governmental credit on the regional distribution of insurance is carried on more coordinates. First, through consumer credit (CC), whose granting procedure normally requires a life insurance policy (L):<sup>8</sup>

$$\text{GWP}_L = 0,06 \text{ CC} - 65160160,2, R^2 = 0,9595$$

$$[30,4126] \quad [-8,9857]$$

Second, mortgage loans (ML) represent a favorable mechanism for property insurance (Pr):

$$\text{GWP}_{Pr} = 0,06 \text{ ML} - 4823945,24, R^2 = 0,9799$$

$$[43,6144] \quad [-2,4773]$$

Remaining loans to individuals (Other Loans - OL) are intended mainly for purchase of cars which requires a mandatory liability insurance and sometimes it involves a voluntary insurance type named CASCO (collectively named, Auto Insurance - Au) :

$$\text{GWP}_{Au} = 1,63 \text{ OL} - 53225715,2, R^2 = 0,9789$$

$$[42,5623] \quad [-5,4366]$$

Another common limitation concern the credit and guaranties insurance (CG) accessed during the granting of credit for businesses (Companies Loans - CL):

$$\text{GWP}_{CG} = 0,0027 \text{ CL} - 1478740,43, R^2 = 0,9737$$

$$[38,0021] \quad [-3,5331]$$

<sup>7</sup> we excluded from the calculation Bucharest, which concentrates more than 50% of all brokerage companies

<sup>8</sup> regression equations on correlations of different substructures of insurance and loans were determined based on data for 2008



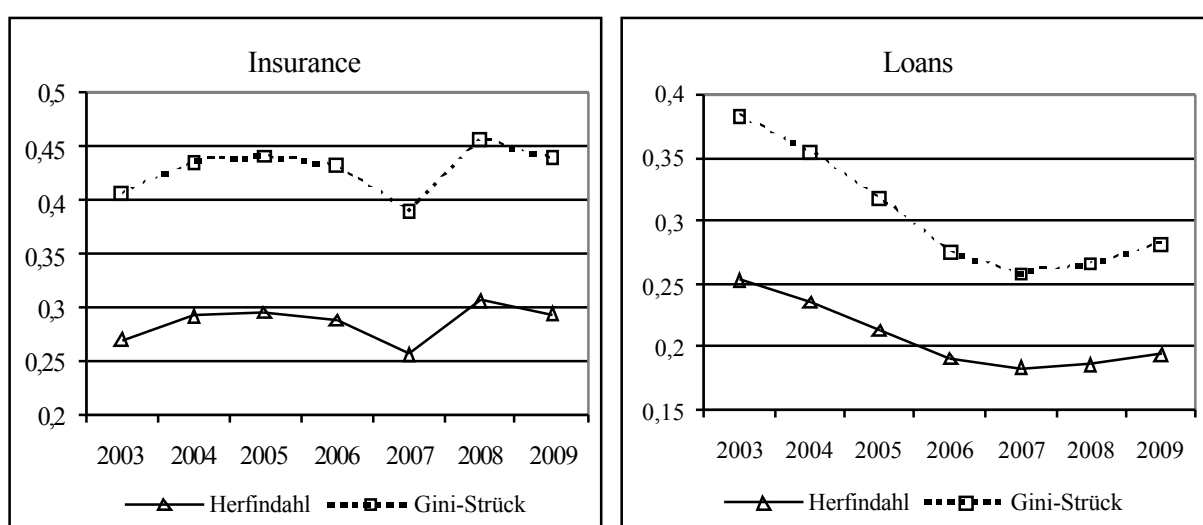
Obviously, regional distribution of non-governmental credit is also determined by differences in the level of development of the administrative-territorial entities, level measured by GDP per capita (GDP/hab) and average net nominal monthly earnings (ANME):

$$TL = 448359,24 \text{ GDP/hab} + 30644541,19 \text{ ANME} - 40897411871, R^2 = 0,7310$$

$$[1,8805] \quad [2,9541] \quad [-4,2231]$$

### Considerations on the dynamics of regional distribution of insurance

A first analysis of the evolution of regional security structure in the period 2003-2009 was carried out based on indicators concerning their level of concentration (Figure 5).



**Figure 5.** Evolution of concentration level in regional profile for insurance and loans

In insurance three distinct phases there can be easily observed. Thus, until 2005, the effort of intensive exploitation of geographical coverage was maintained, until the end of the previous decade, as localized mainly in the capital and major urban centers, that leading to an increased territorial concentration. Meanwhile, credit markets tend to mature and penetration with a dispersed regional markets showed a steady trend of reduction in concentration degree.

The “Explosion” in consumer credit and real estate development credit increased after 2005, sustain this trend, but in the same time, require insurance companies to offer a wider opening for their related products within province, including smaller localities, that leading to a reduction in the degree of territorial concentration of insurance. During this period, the efforts to widen the market niche targeted, in particular, those areas where the population coverage for life insurance was lower.

After 2007 we see some moderation of territorial expansion of banking networks, linked to a relative saturation of solvent demand, which is why promotion policies in the field of credit and are moving towards a reconfiguration of supply diversification, driven by traditional supply basins with higher potential, leading to a slight increase in concentration. The phenomenon is aggravated by the emergence of crisis, which affected to a greater extent the less economically developed areas.

Linkage of increasing both the financial markets, including bancassurance system, is forcing the insurance industry to follow the same trend, with an even bigger magnitude, but the presence - still – of the substantial portfolio of mandatory insurance leads in 2009, to an interruption of the increasing concentration trend.

A more detailed analysis, which includes the influence factors for regional distribution, has been achieved by developing a panel model, for the period 2003-2009 and the 41 administrative territorial structures (counties), that correspond to the partitions at NUTS-III in EU.<sup>9</sup>

Further a regression model is presented reflecting the link between the territorial distribution of the volume of gross written premiums (Gross Written Premiums - GWP) and non-government credit (Total Loans - TL) reported to population (P).

Dependent Variable: GWP/P?  
Method: Pooled EGLS (Period SUR)  
Date: 06/17/10 Time: 13:50  
Sample (adjusted): 2003 2009  
Included observations: 7 after adjustments  
Cross-sections included: 41  
Total pool (balanced) observations: 287  
Linear estimation after one-step weighting matrix  
Period SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TL/P?	0.043234	0.001573	27.48612	0.0000
C	6.079085	4.559869	1.333171	0.0018

Weighted Statistics

R-squared	0.731216	Mean dependent var	0.940545
Adjusted R-squared	0.730273	S.D. dependent var	2.057386
S.E. of regression	0.968278	Sum squared resid	267.2054
F-statistic	775.3309	Durbin-Watson stat	1.836602
Prob(F-statistic)	0.000000		

<sup>9</sup> for data comparability reasons, figures for Bucharest and Ilfov county are cumulated

### Unweighted Statistics

R-squared	0.774598	Mean dependent var	176.1412
Sum squared resid	2967418.	Durbin-Watson stat	0.167257

As predicted in our previous analysis, a strong and stable relationship between GWP/inhabitant and TL/inhabitant may be revealed.

There is also a significant link between TL/inhabitant and GDP/capita, respectively average net nominal monthly earnings (ANME), as follows:

$$(TL/inhabitant)_{it} = \alpha_{it} + \beta \cdot (GDP/inhabitant)_{it} + \gamma \cdot ANME_{it} + \varepsilon_{it}, \quad \text{where:}$$

i = 1,40 – counties

t = time.

The results of this model are:

Dependent Variable: TL/P?

Method: Pooled EGLS (Period SUR)

Date: 06/17/10 Time: 13:48

Sample (adjusted): 2003 2009

Included observations: 7 after adjustments

Cross-sections included: 41

Total pool (balanced) observations: 287

Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP/P?	306629.2	22937.69	13.36792	0.0000
ANME?	3.033650	0.482126	6.292238	0.0000
C	-3253.160	180.3649	-18.03654	0.0000

### Weighted Statistics

R-squared	0.755739	Mean dependent var	0.773473
Adjusted R-squared	0.754019	S.D. dependent var	1.737647
S.E. of regression	0.924505	Sum squared resid	242.7376
F-statistic	439.3446	Durbin-Watson stat	1.910147
Prob(F-statistic)	0.000000		

### Unweighted Statistics

R-squared	0.802388	Mean dependent var	3830.859
Sum squared resid	8.33E+08	Durbin-Watson stat	0.190370

It is true that, on the same type of model, we can show a direct link between insurance distribution and the indicators that reflect the degree of territorial development, respectively GDP and ANME.

Dependent Variable: PBS?/POP?  
Method: Pooled EGLS (Period SUR)  
Date: 06/17/10 Time: 14:43  
Sample (adjusted): 2003 2009  
Included observations: 7 after adjustments  
Cross-sections included: 41  
Total pool (balanced) observations: 287  
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PIB?	0.014462	0.000601	24.05292	0.0000
CN?	0.100782	0.012990	7.758188	0.0000
C	-35.01109	4.956888	-7.063120	0.0000
Weighted Statistics				
R-squared	0.813198	Mean dependent var	1.358016	
Adjusted R-squared	0.811882	S.D. dependent var	1.972108	
S.E. of regression	0.992280	Sum squared resid	279.6317	
F-statistic	618.1622	Durbin-Watson stat	2.069329	
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.935531	Mean dependent var	176.1412	
Sum squared resid	848730.5	Durbin-Watson stat	0.355305	

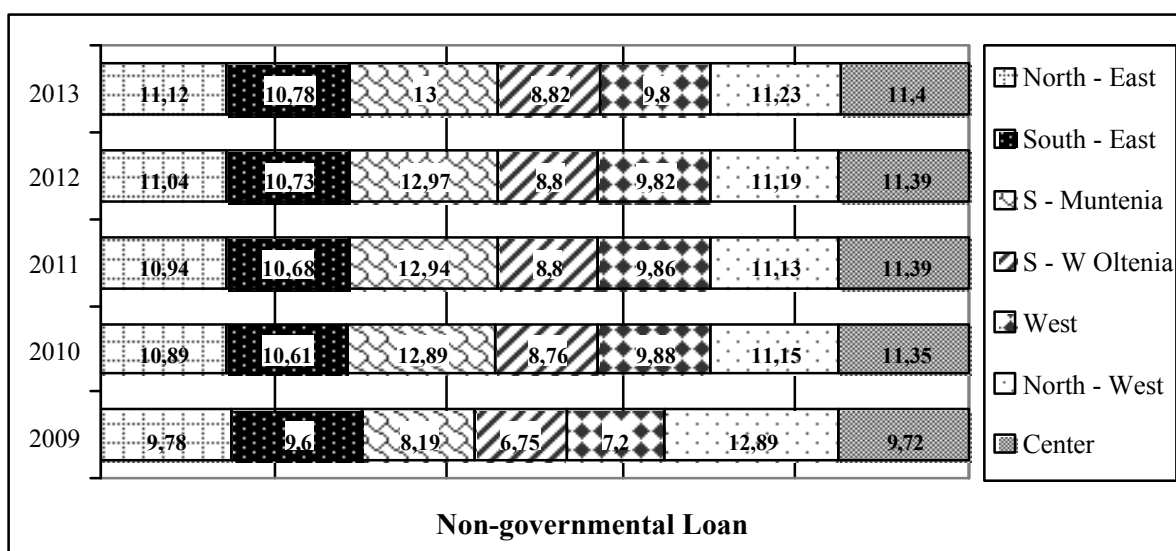
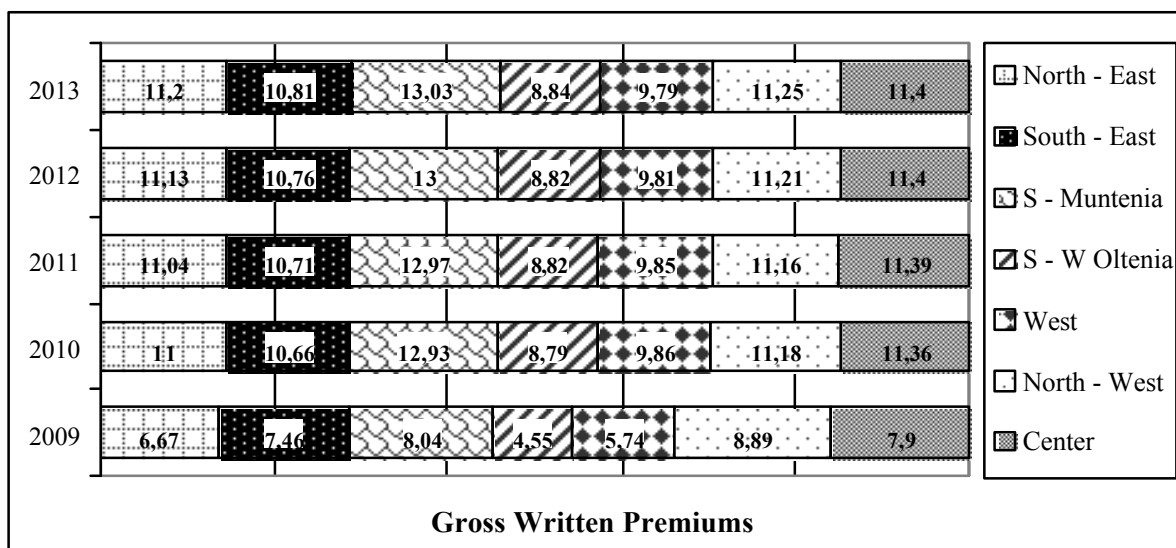
The above measurements were done based on models as uniform panel (with common effects,  $\alpha_{it} = \alpha$ ,  $\beta_{it} = \beta$ ,  $\gamma_{it} = \gamma$ ), which was used as a method for solving SUR<sup>10</sup> (periods) to attenuate heteroskedasticity and contemporaneous correlation in the errors across equations.

As noted, the model specification tests that are checked.

### **Alternatives for estimating the future evolution of regional distribution of insurance**

Based on the analysis performed in the previous section, we have developed a first draft forecast for the period 2010-2013 of the regional structure of gross written premiums depending on the territorial distribution of non-government credit, dependent on its turn on the level of development indicators related to administrative-territorial entities (GDP and ANME).

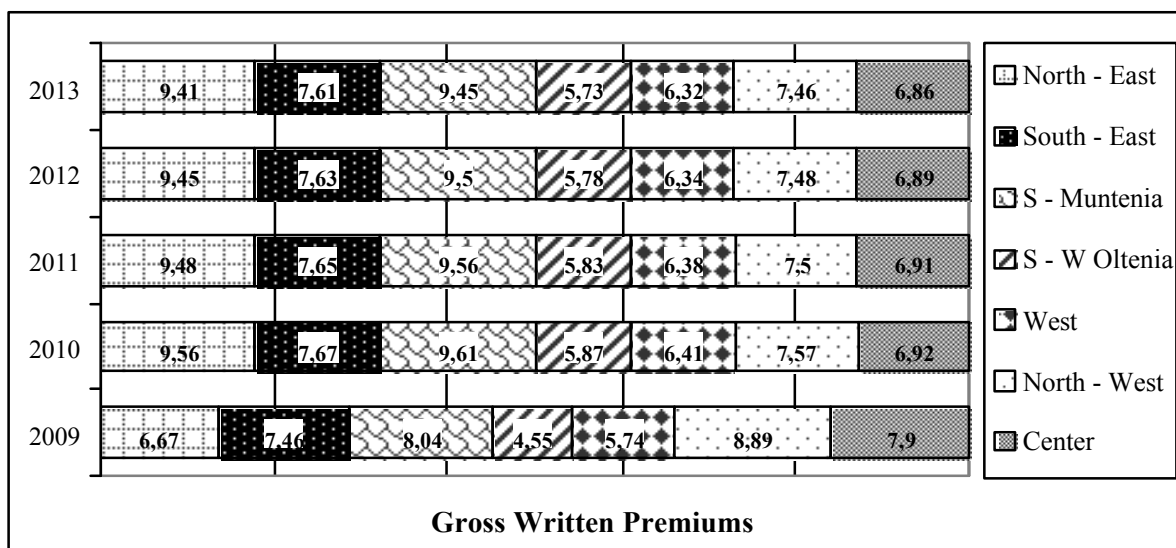
<sup>10</sup> Seemingly Unrelated Regression



**Figure 6.** Forecast for regional distribution of gross written premiums in relation to territorial development non-governmental credit structure

The second option eliminates the variable term prognosis (non-government credit distribution) and shape the regional structure of gross premiums written directly by the structures of regional development indicators, indicators on which the estimated demand for insurance products was based.

We removed from the graphical presentation the Bucharest-Ilfov region, due to the outlier nature of its volume compared with other data on gross written premiums (50.75% of total in 2009).



**Figure 7.** Forecast for regional distribution of gross written premiums in relation to GDP in territorial development and ANME

We consider that the first variant of forecasting, which estimates an increase of weights of all developing regions, with the exception and on the account of Bucharest-Ilfov region, is adequate for the periods of economic expansion, when the connection between credit and insurance is greater and the degree of concentration of insurances tends to be reduced in territorial profile.

Naturally, we consider that the second option is more adequate for forecasting recession periods, when both lending and insurance product distribution are reduced and, consequently, their degree of interconnection is lower. For this reason, factors that will influence stronger and directly the demand for insurance are the perception on the global economic environment, measured by the level of economic activity (GDP) and the specific level of individual income, determined based on average net nominal monthly earnings.

Presumably, in such periods, marketing of the specific companies would shift to traditional distribution basins with high potential, for which we foresee an increase in territorial concentration of the volume of gross written premiums for insurance.

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