

# EVOLUTION OF ECONOMY AND ITS IMPACT ON INSURANCE MARKET – A STATISTICAL ANALYSIS

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## Abstract.

*The economic context has a strong impact on the insurance sector. On the one hand, the decisions related to sector regulation could influence the life of the insurance companies. On the other hand, taxes and other measures that may affect purchasing power, economic instability represent a threat. It is a fact that insurances are products that customers and companies access them when economic conditions are predictable and budgets could be accurately predicted.*

*The paper mainly analyzes in terms of indicators, the impact of the economy on the insurance sector. We are talking about the interrelationships between Gross Written Premiums (the insurance "Budget") and some macroeconomic indicators characterizing the Romanian economy, such as Gross Domestic Product, net average earnings, the average number of employees etc. Statistical analysis is performed for a 12-year period during 2002-2013. This analysis is based on official statistics published by the National Institute of Statistics, the National Forecasting Commission and the National Bank of Romania. The methodology consists of correlation and regression analysis. Of the variables used in the study we mention: Gross Domestic Product, the number of employees, employment, net average earnings, the activity rate of the working age population (15-64 years), non-governmental domestic credit. The analysis of correlation between the studied variables reveals that is a strong correlation between Gross Written Premiums and GDP, the number of employees, average earnings and non-government domestic credit.. Thus, economic growth, rising incomes, the increasing number of employees and facilitating credit conditions could be some elements that would lead to sustainable growth of the insurance market.*

**Keywords:** Gross Written Premiums; Gross Domestic Product; insurance market; correlation and regression analysis.

**JEL Classification:** C15 – Statistical Simulation Methods; E44 – Financial Markets and the Macroeconomy; G17 – Financial Forecasting and Simulation;

## 1. INTRODUCTION

The economic history of the last 25 years has induced, as in the past, the conclusion of a permanent correlation between the growth indices in this field with the progress of the insurance sector. The general rule is that a prosperous society tends to defend, and thus, welfare, while as a society under the poverty has little interest in the protection of poverty.

Thus, in its simplest expression, the quarter of the century separates us from communism, alternated the long period of turbulence and decline, during the transition from centralism and dirigisme, to market dominance, as later, during the crisis of 2009-2012, with well experienced growth period during 2006-2009 and a slow recovery, still fragile, in the coming years by 2012. However, we must admit, that even in the difficult years and even in the relatively more comfortable years, Romanian society has not benefited of a comprehensive vision and, therefore, could not be managed neither dramatic effects nor the relatively favorable ones.

Increasing and decreasing curves of the economy have been harmonized with insurance penetration rate, but at least in the auspicious periods, their development was not generally as expected. Finally, the loan policy has increased more in the years 2005-2008 and then record a constantly decline, much

aggravated by the fluctuations of currencies, such as recently, the Swiss franc and the US dollar.

All these, the fragile and inconsistent economic growth, catastrophic decrease of the number of jobs, the loan policy at the discretion of banks, should not suffer any damage, even if their borrowers have exhausted all the resources, outlined a framework unfavorable to the insurance market, led modest rates of growth or alternated stagnation with decline periods. Adding and historical factors (lack of a culture of saving and protecting property, possible to complete in time) and some psychological factors (Romanian fatalism and distrust that has been lost through mismanagement or in consequence of a cataclysm, however unpredictable, not can be recovered anymore) we have almost complete picture of the situation in this field, in early XXI century.

In Romania, insurance penetration rate is still very low, ranking us among the last places among the countries of the European Union. Insurance penetration in Romania has been on a downward trend in the period 2011-2014, as a result of internal macroeconomic context and the international financial situation. Thus, reporting total Gross Written Premiums (GWP) by insurance companies in the first half of 2014 to the Gross Domestic Product (GDP), insurance penetration in GDP amounted to 1.42%, down compared to the same period of past, when it was

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1.61%, according to data from the Financial Supervisory Authority.

For 2015, the National Forecasting Commission estimates, similar to 2014, an economic growth of 2.5%, according to data contained in the autumn forecast. However, most analysts expect a growth between 2.2% and 2.5%.

Unemployment in Romania is anticipated by the International Monetary Fund to decrease slightly, from 7.3% in 2013 to 7.2% in 2014 and 7.1% in 2015. The Romanian employers report that will continue to increase its number of employees and in the first quarter of 2015, but growth will again be modest, says the latest edition of the Manpower Employment Outlook Labor. Most active labor market are forecast in the manufacturing and finance, insurance, real estate and business services.

The loan policy is expected to recover slightly in 2015, after two years of decline, due to the increasing number of loans in local currency, to facilitate credit conditions and slowing bank deleveraging. The National Bank of Romania aims sustainable revival of lending, such as to contribute to a balanced and sustainable economic growth.

As before, the insurance industry will be influenced by developments in the local economy, which depends on global economic developments, especially European ones. 2015 could be the year a slight increase in the insurance market. The positive elements in the economy or in industrial growth, export growth, increased individual consumption and markets developments, closely related to the insurance market will favorably influence the insurance market.

Among existing threats are: the relatively low purchasing power of the population, lack of trust of potential customers, economic instability. Economic growth, which might reflect the incomes of Romanians, investment and development projects from European funds, goods or services in continuous development, decrease unemployment by increasing the number of employees, an facilitating credit conditions could be, for insurance market, the opportunities of 2015.

## 2. DATA DESCRIPTION

The statistical data used in the study are the official statistics data, published by the National Institute of Statistics, National Forecasting Commission and the National Bank of Romania. The variables used in the analysis of the correlation are:

- Insurance Gross Written Premiums – GWP (RON);
- Gross Domestic Product –GDP (million RON);
- Net Average Earnings –NAE (RON);
- Non-Governmental Domestic Credits – NGDC (million RON);
- Average Number of Employees – ANE

(thousands of people);

- Employed population – EP (thousands of people);
- The activity Rate of the Working Age Population (15-64 years old) – RWAP (%)

The period covered by analysis is 2002-2013.

## 3. STATISTICAL ANALYSIS

The methodology consists of correlation and regression analysis, to assess the impact of some macroeconomic indicators on the volume of insurance Gross Written Premiums.

### 3.1. CORRELATIONS BETWEEN GWP AND SEVERAL MACROECONOMIC INDICATORS

The correlation between Gross Written Premiums (GWP) ratio and each macroeconomic indicator is listed below:

Table no.1.

Correlations. Marked correlations are significant at $p < .05000$ N=12						
	GDP	ANE	EP	NAE	RWAP	NGDC
GWP	0.95	0.89	0.38	0.96	0.37	0.97

One can notice that the correlation matrix shows that the best correlation between the GWP and the macroeconomic indicators are  $r_{GWP;GDP} = 0.95$ ,  $r_{GWP;NAE} = 0.96$ ,  $r_{GWP;ANE} = 0.89$ , and, respectively,  $r_{GWP;NGDC} = 0.97$ , where  $r_{X,Y}$  represent the correlation coefficient between the variables X and Y. All these correlation coefficients indicate the strongest relationship between variables.

### 3.2. EMPIRICAL ANALYSIS

In the first part of the analysis and study the dependence of the amount of insurance and some indicators with significant correlation coefficients.

1) From regression results<sup>1</sup> the linear regression equation for the GWP dependent variable and independent variables are following:

$$GWP = 0.0185 * GDP - 779.5683 \quad (1)$$

$$GWP = 4.5 * ANE - 23949.9 \quad (2)$$

$$GWP = 6.753 * NAE - 476.167 \quad (3)$$

$$GWP = 0.0244 * NGDC + 1833.216 \quad (4)$$

or, after normalization:

$$GWP = 0.918258 * GDP, \quad R^2 = 0.843 \quad (5)$$

$$GWP = 0,872167 * ANE, \quad R^2 = 0.7606 \quad (6)$$

$$GWP = 0.925004 * NAE, \quad R^2 = 0.84119 \quad (7)$$

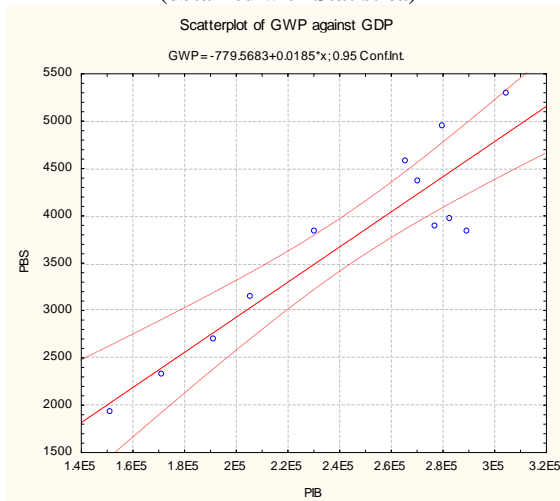
$$GWP = 0.907017 * NGDC, \quad R^2 = 0.82268 \quad (8)$$

<sup>1</sup> See Tables 5-8, Appendix

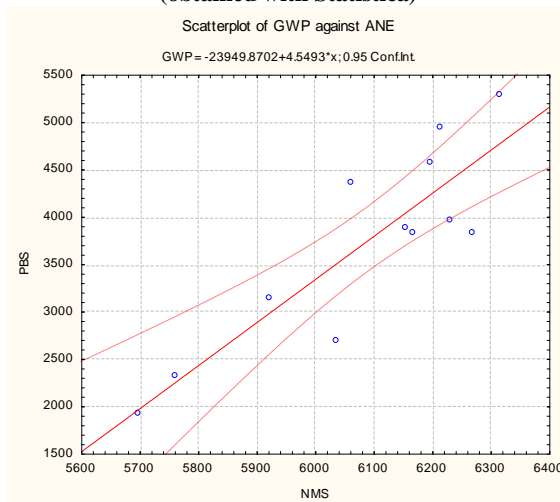
The coefficients of the independent variables: Gross Domestic Product (GDP), Average Number of Employees (ANE), Net Average Earning (NAE) and Non-Governmental Domestic Credits (NGDP) are significant for a probability of 95%.

- According to the model (1), if GDP would increase by EUR 1 million, the GWP would increase by an average of 0.0185 million RON.
- According to equation (2), the regression coefficient indicates a change in the volume of GWP, an average of 4.5 million USD, an amendment to the ANE with 1000 employees.
- According to the equation (3) if the net average earnings would increase by 1 RON, then GWP volume would increase on average by 6.753 million RON.
- A change of 1 million USD of NGDC volume will be accompanied by a change in the volume of Gross Written Premiums, an average of 0.0244 million RON, according to (4).

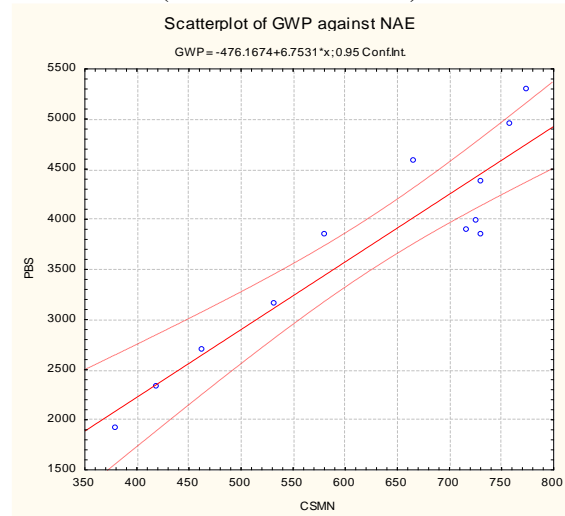
**Figure 1. Graph of the regression line (1) (obtained with Statistica)**



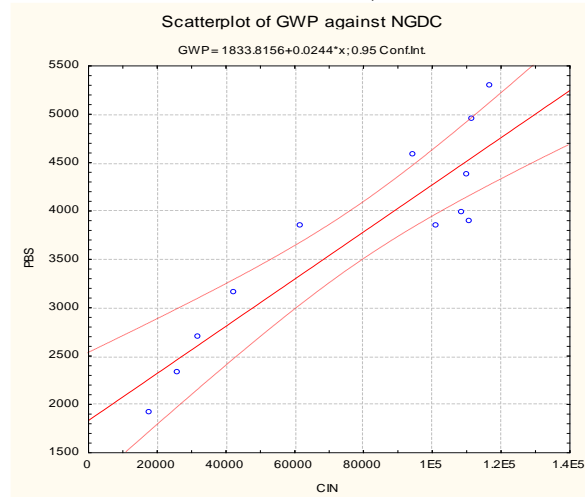
**Figure 2. Graph of the regression line (2) (obtained with Statistica)**



**Figure 3. Graph of the regression line (3) (obtained with Statistica)**



**Figure 4. Graph of the regression line (4) (obtained with Statistica)**



In the second part of the analysis, we study the dependence of the amount of insurance, on the one hand, and Gross Domestic Product (GDP), Average Number of Employees (ANE), Net Average Earnings (NAE) and Non-Governmental Domestic Credit (NGDC) volume on the other.

Multifactorial regression equation<sup>2</sup> is:

$$GWP = 0.00425 * NGDC + 10.924 * NAE + 2.73 * ANE - 14114.4$$

or, after normalization:

$$GWP = 0.15817 * NGDC + 1.49638 * NAE + 0.52368 * ANE$$

The coefficients of the independent variables are significant for a probability of 95%.

Thus:

- if non-governmental domestic credits volume would increase by EUR 1 million, the Gross Written Premiums would increase on average by 4250 RON,

<sup>2</sup>See Table 9, Appendix

while other factors remain stable.

- if the net average earnings would rise by 1 RON and other factors of influence would remain constant, the amount of insurance would increase on average by RON 10.9 million.

- if the average number of employees would increase by 1,000 persons, the Gross Written Premiums of insurance would increase by EUR 2.7 million, if other factors remain stable.

#### 4. EVOLUTIONAL SCENARIOS

##### 4.1. HYPOTHETICAL SCENARIO

To calculate the economic impact of macroeconomic indicators on Gross Written Premiums from insurance, we assume that the indicators will increase as follows: GDP increases by 2.5% per year, NAE increases by 1.5% per year, NGDC increases by 2.5% per year and, respectively, ANE increases by 0.25% per year during 2014-2020. *If the indicators increase with mentioned percentages, what will be the impact on Gross Written Premiums, during 2014-2020?*

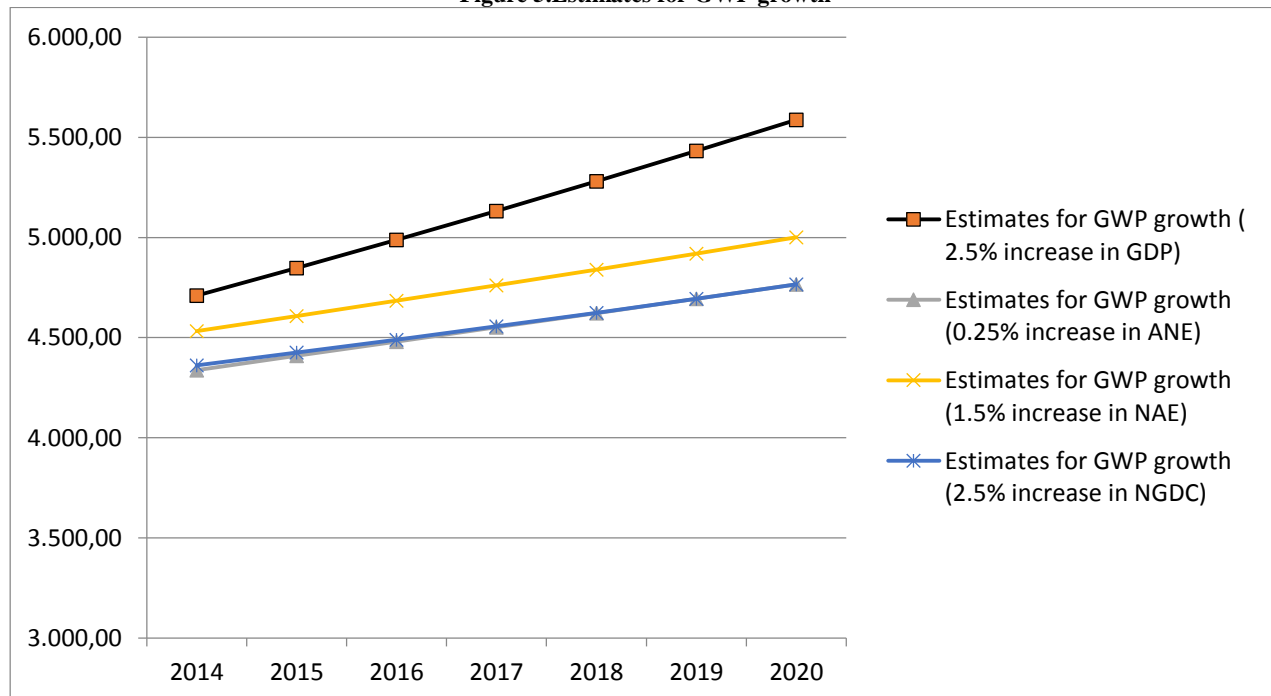
The estimates for Gross Written Premiums growth rate for 2014-2020 are noted in the table below,

using the regression equations (1)-(4) and an evolution analysis of the indicators during 2002-2013.

Table no.2. (million RON)

Year	Estimate s for GWP growth ( 2.5% increase in GDP)	Estimate s for GWP growth (0.25% increase in ANE)	Estimate s for GWP growth (1.5% increase in NAE)	Estimate s for GWP growth (2.5% increase in NGDC)
2014	4,710.24	4,338.34	4,532.35	4,361.67
2015	4,847.48	4,409.06	4,607.48	4,424.88
2016	4,988.16	4,479.96	4,683.74	4,489.67
2017	5,132.35	4,551.04	4,761.14	4,556.08
2018	5,280.15	4,622.29	4,839.70	4,624.15
2019	5,431.64	4,693.72	4,919.43	4,693.93
2020	5,586.92	4,765.33	5,000.37	4,765.45

Figure 5. Estimates for GWP growth



##### 4.2. HISTORICAL SCENARIOS

- *If the financial crisis that emerged in 2009 reoccurs in 2014, what will be the impact on Gross Written Premiums growth?*

The estimated value of Gross Written Premiums for 2014 (assuming that the crisis reoccurs) used in the above mentioned multifactorial linear regression equations are shown in the following bold font value:

Table no.3

Predicting Values for variable: GWP (mil.RON)			
	B-Weight	Value	B-Weight - * Value
<b>GDP</b>	-0.02431	279652.1	-6799.3
<b>NGDC</b>	0.00425	111543.6	474.1
<b>NAE</b>	10.92441	759.5	8296.9
<b>ANE</b>	2.73154	6213.0	16971.1
<b>Intercept</b>			-14114.4
<b>Predicted</b>			<b>4828.4</b>
<b>-95.0%CL</b>			4003.1
<b>+95.0%CL</b>			5653.8

$GWP_{2014/2002} = 4828.4$  million RON, represents GWP (2014/2002 - current period/period of reference) which transformed again using the consumer price index, is  $GWP_{2014} = 10.525,43$  million RON

• *If evolution during 2000-2008 (the economic boom period of Romania), reoccurs in 2014, what will be the impact on Gross Written Premiums?*

The estimated value of Gross Written Premiums for 2014 (assuming that the economic boom reoccurs) used in the above mentioned multifactorial linear regression equations are shown in the following bold font value:

Table no.4

Predicting Values for variable: GWP (mil.RON)			
	B-Weight	Value	B-Weight - * Value
<b>GDP</b>	-0.02431	325291.8	-7909.0
<b>NGDC</b>	0.00425	138807.1	590.0

## 6. APPENDIX

Table no.5

Regression Summary for Dependent Variable: GWP						
R= .91825773 R <sup>2</sup> = .84319726						
Adjusted R <sup>2</sup> = .82751699 F(1,10)=53.774 p						
	Beta	Std.Err. - of Beta	B	Std.Err. - of B	t(10)	p-level
<b>Intercept</b>			-779.568	627.8845	-1.24158	0.242724
<b>GDP</b>	0.918258	0.125221	0.019	0.0025	7.33310	0.000025

Table no.6

Regression Summary for Dependent Variable: GWP						
R= .87216686 R <sup>2</sup> = .76067503 Adjusted R <sup>2</sup> = .73674253 F(1,10)=31.784 p						
	Beta	Std.Err. - of Beta	B	Std.Err. - of B	t(10)	p-level

<b>NAE</b>	10.92441	823.4	8994.8
<b>ANE</b>	2.73154	6381.0	17429.8
<b>Intercept</b>			-14114.4
<b>Predicted</b>			<b>4991.4</b>
<b>-95.0%CL</b>			4152.7
<b>+95.0%CL</b>			5830.1

In this case,  $GWP_{2014/2002} = 499.4$  million RON, respectively  $GWP_{2014} = 10,880.75$  million RON (transformed using the consumer price index).

## 5. CONCLUSIONS

Analysis of the relationship between economic growth and the insurance market, which took into account the current year (2015), for which it was investigated the correlation between Gross Written Premiums of insurance (GWP) and some macroeconomic indicators Gross Domestic Product (GDP), the Average Number of Employees (ANE), Employed Population (EP), Net Average Earnings (NAE), the activity Rate of the Working Age Population (RWAP), Non-Governmental Domestic Credit-(NGDC), filed, in context, two scenarios: one hypothetical, the other historical. Forecast is prudently positive, estimating the expected economic growth (in industry, exports, services, European funds) with consequences for consumption growth, enabled the new tax code and regulations (which will be at the debate in the near future), in a European context and favorable due to a possible increase in investments.

Hostile factors are those which could cause instability and lack of confidence that could maintain insurance penetration rate in the future in the same downward trend.

<b>Intercept</b>			-23949.9	4912.760	-4.87503	0.000647
<b>ANE</b>	0.872167	0.154701	4.5	0.807	5.63775	0.000216

Table no. 7

Regression Summary for Dependent Variable: GWP R= .92500407 R <sup>2</sup> = .85563254 Adjusted R <sup>2</sup> = .84119579 F(1,10)=59.268 p						
	<b>Beta</b>	<b>Std.Err. - of Beta</b>	<b>B</b>	<b>Std.Err. - of B</b>	<b>t(10)</b>	<b>p-level</b>
<b>Intercept</b>			-476.167	559.6900	-0.850770	0.414804
<b>NAE</b>	0.925004	0.120153	6.753	0.8772	7.698551	0.000016

Table no.8

Regression Summary for Dependent Variable: GWP R= .90701736 R <sup>2</sup> = .82268050 Adjusted R <sup>2</sup> = .80494855 F(1,10)=46.395 p						
	<b>Beta</b>	<b>Std.Err. - of Beta</b>	<b>B</b>	<b>Std.Err. - of B</b>	<b>t(10)</b>	<b>p-level</b>
<b>Intercept</b>			1833.816	308.6868	5.940700	0.000143
<b>NGDC</b>	0.907017	0.133161	0.024	0.0036	6.811415	0.000047

Table no.9

Regression Summary for Dependent Variable: GWP R= .93762522 R <sup>2</sup> = .87914106 Adjusted R <sup>2</sup> = .81007881 F(4,7)=12.730 p						
	<b>Beta</b>	<b>Std.Err. - of Beta</b>	<b>B</b>	<b>Std.Err. - of B</b>	<b>t(7)</b>	<b>p-level</b>
<b>Intercept</b>			-14114.4	12003.75	-1.17583	0.278100
<b>NGDC</b>	0.15817	1.067404	0.0	0.03	0.14818	0.886378
<b>NAE</b>	1.49638	1.340791	10.9	9.79	1.11604	0.301245
<b>ANE</b>	0.52368	0.489967	2.7	2.56	1.06881	0.320623

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