



# ANALYSIS OF ROMANIA'S ECONOMIC SECURITY IN THE CONTEXT OF GLOBAL SECURITY THROUGH ECONOMETRIC MODELING

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## Abstract

*In the context of globalization, the need for security is getting stronger economic valences. The vulnerability of the national economy to global insecurity factors amid the intensification of technology transfer and know-how is a subject of interest that involves a pertinent analysis of the positioning of the national economy in the global context. We intend to highlight by this work the role of guarantor of the economic security of the Romanian state through its specific security bodies and to develop an economic security model by quantifying the security risks and the protection measures that Romania can adopt in the geopolitical and geostrategic context.*

**Keyword:** economic security, guarantor role, economic security model, Romania, Eurostat.

**JEL Classification:** F42, F47

## I. Introduction

In the early 2000s, some authors of the specialty studies proposed a theory of international exchange values to prioritize the advancement of industrialized societies developed in terms of increasing the quality of life to obtain state security and an

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integrative model of the population in the new values promoted. In this sense, new school disciplines, from economic disciplines to disciplines related to political sciences - social psychology and sociology - have been promoted, which have demonstrated the instincts and insecurity (Hacker, 2008; Nichols, 2008). This technique of raising social values, amongst the population of school age, indicates that the dynamics of international markets and human cognition are factors that can temper economic insecurity by increasing managerial stability poles and forming new leaders (Fellner & Sutter, 2009).

The development of the private commercial sector need to be complemented by the active role of the government in different areas, such as provision of investment in health and education, ensuring enforcement of rules, regulations and ensuring security and cooperation with the private sector for technical and scientific progress (Galea, 2014).

Another formative aspect is the action in the private insurance markets in order to increase the security of the transactions and to ensure the import quotas in order to stabilize the internal market. Understanding risk areas in financial transactions is based on acquiring knowledge on the use of credit and social measures promoted by financial institutions to capture customers and to disperse financial risks to the loyal clientele - captive customers without a rich financial culture (Winkelman and Winkelman, 1998; Ligon & Schetcher, 2003).

The definition of economic security starts, according to some authors, from defining the degree to which the individual is protected against the risks caused by economic losses (financial cracks). Some authors (Osberg & Sharpe, 2005) have developed a weight-index theory of multi-measure valuation that quantifies the risk of financial crack, but unfortunately theories are limited to a certain geographical area, being adapted to the specificity of this area, following the interaction the relative impact of the different risk factors in the economy for which the index was developed.

## **II. Material and method**

In order to analyze the economic security of Romania in a European and global context, it used to evaluate the dynamics of the main macroeconomic indicators, namely gross domestic product, public debt service, occupancy rate of persons aged 20-64, GDP in value of investments foreign direct investment and net lending to resident enterprises, gross fixed capital formation (annual figures). These data were analyzed according to the information provided by Eurostat, in the dynamics, during the period 2013-2017, the relative values of the annual evolution of the indicators were calculated, after which the



value for Romania was compared with the value obtained at the level of EU28 [1], EU27 [2] and MG35 [3] (Overall average of the 35 countries surveyed).

For Romania, the evolution of GDP [4] over the period 2013-2017 was favorable in response to the economic security measures adopted by the National Bank through specific mechanisms and with the support of the benefits of strategic partnerships with N.A.T.O. and U.E. Economic stability and security in Romania was above the European average, registering an increase over the period under review in relation to GDP growth in EU28. Also, the security transposed into GDP was also reflected at the level of MG35, against which Romania has recorded, on average, supra-unitary growth values, according to the table below:

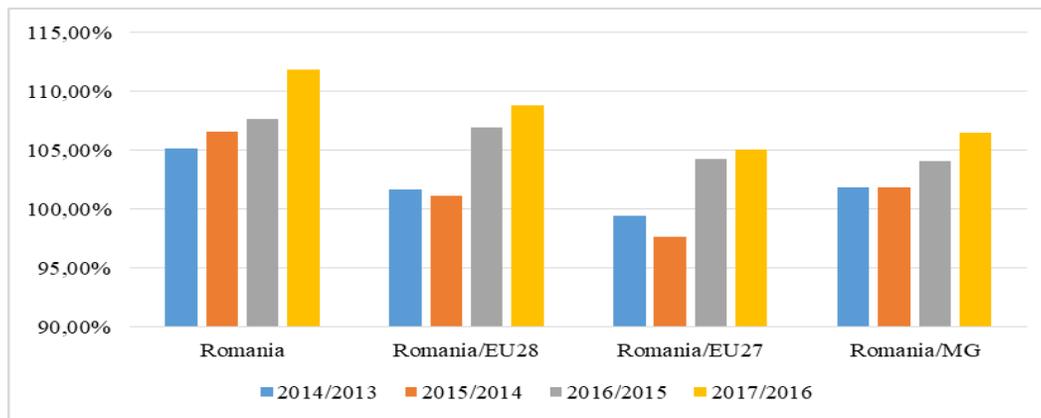
**Table 1-** GDP growth of Romania over 2013-2017 and with reference to the euro area and MG35

GDP dynamics	2014/2013	2015/2014	2016/2015	2017/2016
Romania	105,21%	106,58%	107,69%	111,90%
Romania/EU28	101,71%	101,14%	106,92%	108,82%
Romania/EU27	99,48%	97,67%	104,25%	105,09%
Romania/MG	101,85%	101,84%	104,11%	106,50%

Source: author's own calculations based on Eurostat data

The data from Table 1 are represented graphically as follows:

**Figure 1-** Graphic representation of GDP dynamics



Source: Table 1



The employment rate of people aged between 20 and 64 has experienced a reversal throughout the analyzed period, although in 2017 Romania faced intense social movements, changes in tax policies on part-time employment and not least of the policies on taxing wage income (see table 2). The dynamics of the trend was a supra-unit with an average growth rate of 1.56% per year and an average EU-wide increase of 0.19% per year and MG35 by 0.02% per year.

**Table 2-** The dynamics of the labor force absorption rate between 20-64 years of age in the workplace

Employment rate by sex, age group 20-64	2014/2013	2015/2014	2016/2015	2017/2016	2018*/2017
Romania	101,55%	100,46%	100,45%	103,77%	101,74%
Romania/EU28	100,37%	99,17%	99,04%	102,19%	97,95%
Romania/EU27	100,37%	99,31%	98,90%	102,19%	98,08%
Romania/MG	100,08%	99,06%	99,06%	101,89%	99,25%

Source: author's own calculations based on Eurostat data

\*2018 Forecast data

The analysis of labor force absorption is based on the need to identify the government policies that the Romanian state has made with regard to the average performance in the European Union and G35. The relative dynamics of an indicator were obtained by reporting the data presented on the Eurostat platform over the period 2013-2018 using the comparative analysis technique, the results being shown in the table below.

**Table 3-** Analise of the absorption of workforce

Absorption of workforce with ages between 20-64 in the workplace	2014/2013	2015/2014	2016/2015	2017/2016	2018*/2017
Romania	101,55%	100,46%	100,45%	103,77%	101,74%
Romania/EU28	100,37%	99,17%	99,04%	102,19%	97,95%
Romania/EU27	100,37%	99,31%	98,90%	102,19%	98,08%
Romania/MG	100,08%	99,06%	99,06%	101,89%	99,25%

Source: author's own calculations based on Eurostat data

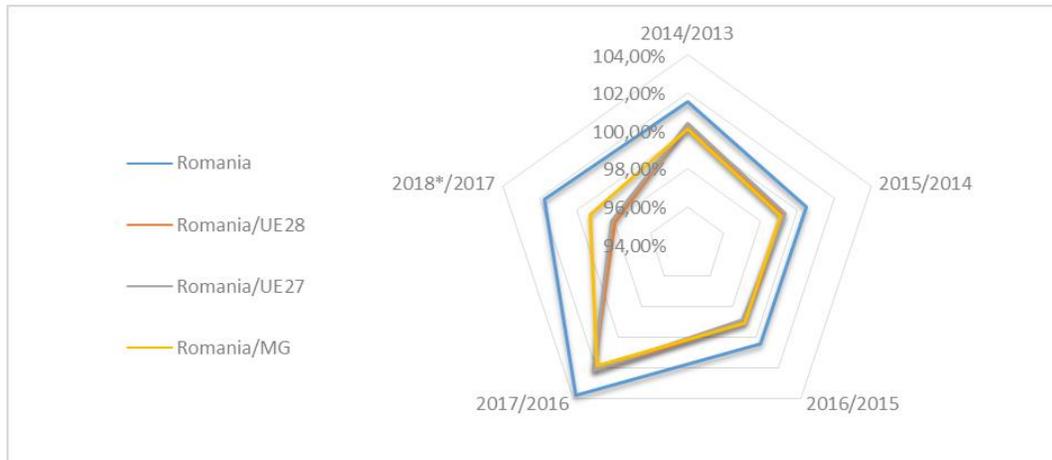
\*2018 Forecast data

As can be seen from the figure below, the external perimeter represents the value for Romania of the employment of adult population, during the period, which confirms



the existence of reliable policies for labor force absorption and professional reconversion, including by accessing non-reimbursable funds dedicated to this scope.

**Figure 2-** Graphic representation of workforce dynamics between 20-64 years of age in the workplace



Source: Table 2

The foreign investment policy in Romania and the lending of resident enterprises recorded an average increase of 0.5% per year, with the evolution curve being continually increasing, from negative growth rates in 2014 compared to 2013 of -4.08% to positive values of close to 3% per year at the end of the period. However, compared to the EU (EU28), the absorption rate of foreign investments was low, being sub-unitary and -6.3%, respectively. This trend is also found in relationships with MG35, where the decline is 4.6%.

**Table 4-** Dynamics of the value of foreign direct investment and net lending to enterprises resident in % GDP

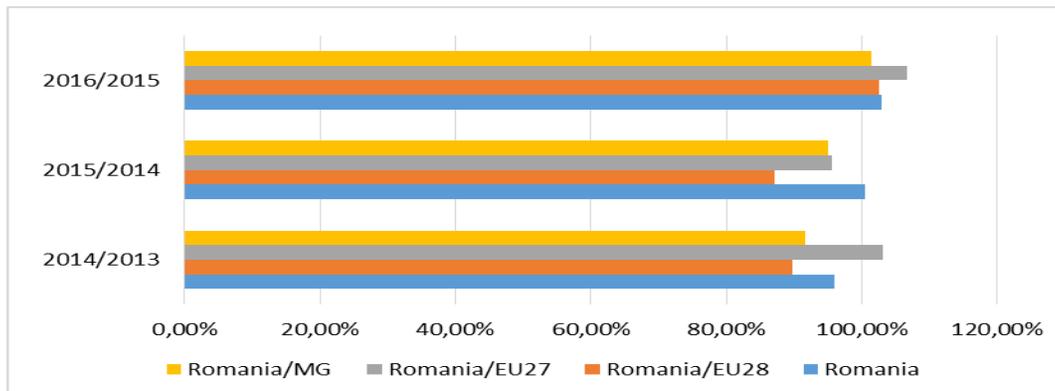
Foreign direct investment and net lending to resident enterprises in% of GDP	2014/2013	2015/2014	2016/2015
Romania	95,92%	100,50%	102,99%
Romania/EU28	89,77%	87,17%	102,55%
Romania/EU27	103,11%	95,54%	106,62%
Romania/ Overall average over the 35 analyzed countries	91,65%	95,06%	101,47%

Source: author's own calculations based on Eurostat data



Direct investment has witnessed a steady dynamic growth, a dynamic analysis compared to the poles of European influence, pointing out that there are some discrepancies in European politics, discrepancies that are more clearly mentioned in Figure 3.

**Figure 3-** Graphic representation of the dynamics of the value of foreign direct investment and net lending to resident enterprises in % GDP



Source: Table 3

The vulnerability generated in terms of the economic security of public debt service fluctuated in the range analyzed at the beginning of the period when Romania saw an increase of the public debt service by 4.27%, and then against the backdrop of the economic security measures that led ultimately to sustainable economic growth, the burden of public debt service has gradually begun to decrease so that on average, within the analyzed range the value of the indicator has decreased by 1.6% annually. Romania also recorded this performance in relation to the EU28, a percentage of -0.43% per year and MG35 as a percentage of -0.52% per year.

**Table 5-** Dynamics of Romania's public debt service over time and with reference to the EU average and MG35

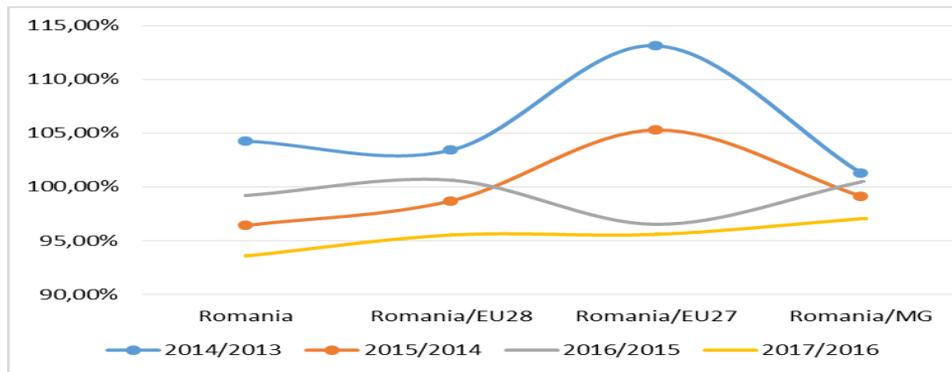
Romania's public debt service in time and with reference to the EU average and MG35	2014/2013	2015/2014	2016/2015	2017/2016
Romania	104,27%	96,42%	99,20%	93,58%
Romania/EU28	103,42%	98,70%	100,63%	95,53%
Romania/EU27	113,14%	105,30%	96,53%	95,59%
Romania/ Overall average of the 35 analyzed countries	101,28%	99,14%	100,47%	97,05%

Source: author's own calculations based on Eurostat data



Public debt is a strategic financial security element, its dynamics reflecting the success or failure of government policy, especially in comparison with GDP and foreign direct investments. In the figure below is represented the trend of evolution compared to the European power poles and the G35.

**Figure 4-** Graphical representation of the dynamics of Romania's public debt service over time and with reference to the EU average and MG35



Source: Table 4

From the point of view of the gross formation of the fixed capital compared to the other analyzed indicators, a vulnerability is associated with an economic risk of the highest amplitude in the context, the decrease of the indicator reaching over 10% on average, with a drastic reduction in the last two periods to 30% per year. Romania's position is also vulnerable to other EU28 and MG35 security areas, against which it has an average annual disadvantage of 10%.

**Table 6-** Dynamics of the value of foreign direct investment and net lending to enterprises resident in % GDP

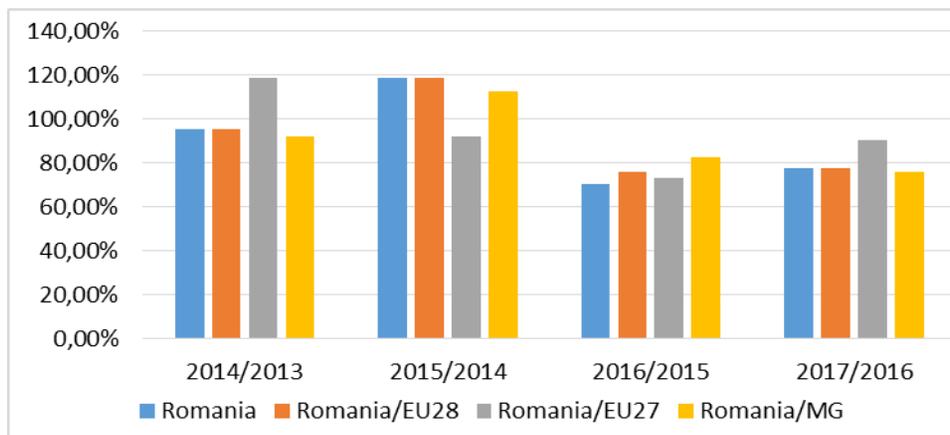
Gross fixed capital formation	2014/2013	2015/2014	2016/2015	2017/2016
Romania	95,56%	118,60%	70,59%	77,78%
Romania/EU28	95,56%	118,60%	75,82%	77,78%
Romania/EU27	118,60%	92,16%	73,13%	90,63%
Romania/ Overall average of the 35 analyzed countries	92,25%	112,59%	82,62%	76,15%

Source: author's own calculations based on Eurostat data



The gross fixed capital ratio reveals, at least for Romania, dynamically, an oscillating evolution assimilated to insecurity manifested especially at the end of the analysis period. In Figure 5 is represented by the graph of the dynamics distributions and the evolution of the gross capital formation in Romania in relation with the European Union and G35.

**Figure 5-** Graphical representation of the dynamics of gross fixed capital formation



Source: Table 5

The above-mentioned data can be transposed by econometric modeling into an economic security model, based on quantifiable factors calculated in dynamics over the analyzed period.

The model is made using the GRETl software and it has the following hypotheses:

- a) the risk value of the aggregate indicators varies over the multiannual average by +/- 0.2%; this value is also spread over the economic vulnerability in relation to the global economic security zones EU28 and MG 35;
- b) in the context of a stable economic growth, the reduction in the value of foreign investments may cause distortions in the gross formation of fixed capital, creating a breach of economic security at national level, a breach which on a statistically forecast horizon can be spread in other sectors of the economy;



- c) public debt service can be a decisive security factor in the context of successive positive GDP output, if and only if the labor force absorption rate is steadily increasing and macroeconomic stability is confirmed.

**Table 7-** Model indicators

2017/2013	Romania	Romania/ EU28	Romania/ EU27	Romania/ MG
GDP	1,078446	1,04648	1,016251	1,035766
Romania's public debt service over time	0,983683	0,995726	1,02639	0,994844
Absorption of workforce with ages between 20-64 in the workplace	1,015569	1,001925	1,001945	1,000214
Foreign direct investment and net lending to resident enterprises in% of GDP	1,005476	0,93757	1,034448	0,96415
Gross fixed capital formation	0,906316	0,919387	0,936287	0,90903
General government gross debt	0,983683	0,995726	1,02639	0,994844
Employment rate by sex, age group 20-64	1,015569	1,001925	1,001945	1,000214
Inward FDI stocks in % of GDP	1,005476	0,93757	1,034448	0,96415
General government gross fixed capital formation - annual data	0,906316	0,919387	0,936287	0,90903

The model can be statistically expressed as a cumulative regression model defined as follows:

$$C_n = \alpha_1 * \frac{C_n}{C_{z1}} + \alpha_2 * \frac{C_n}{C_{z2}} + \dots + \alpha_n * \frac{C_n}{C_{zn}} + \varepsilon, \text{ unde:}$$

- $C_n$  - National constant (Romania), calculated as a multiannual average for each indicator (out of the 5 of the model);
- $C_z$  - Zonale constanta (Cz1 - Romania / EU28, Cz2 - Romania / EU27, Cz3 - Romania /MG35), calculated as the average of the multiannual growth differences for each indicator (out of the 5 models);
- $\alpha_1, \dots, \alpha_n$  - the regression coefficients of the model;
- $\varepsilon$  - residual value.

The data disseminated statistically and processed through the GRETL statistical program generated the following coefficients of regression on the model principle described above:



$$\hat{\text{Romania}} = + 4,03 * \text{Romania/MG} - 2,12 * \text{Romania/EU28} - 0,859 * \text{Romania/EU27}$$

(0,684)            (0,491)            (0,217)

n = 5, sum of abs. residuals = 0,0554  
(standard errors in parentheses)

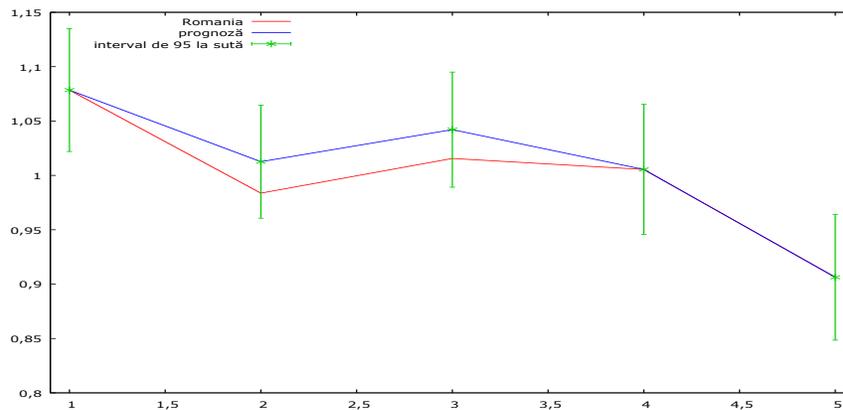
It is noted that the model is defined statistically, the representativity tests being presented in table below:

**Table 8-** Model 1: Quantile estimates, using observations 1-5

Dependent variable: Romania, $\tau = 0,5$					
	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
Romania/MG	4,03004	0,684034	5,892	0,0276	**
Romania/EU28	-2,12364	0,491422	-4,321	0,0496	**
Romania/EU27	-0,859420	0,217417	-3,953	0,0584	*
Median depend. var	1,005476	S.D. dependent var		0,062143	
Sum absolute resid	0,055430	Sum squared resid		0,001539	
Log-likelihood	14,04464	Akaike criterion		-22,08929	
Schwarz criterion	-23,26097	Hannan-Quinn		-25,23398	

The economic model generated statistical representativity tests with a statistically significant p-value and the sum of the residual deviations  $\geq 0.001$  and the standard deviation of the dependent variable  $\geq 0.06$ . The 95% confidence predictive statistic graph presents a trend with a 0.5% deviation from the trend of the dependent variable, as follows:

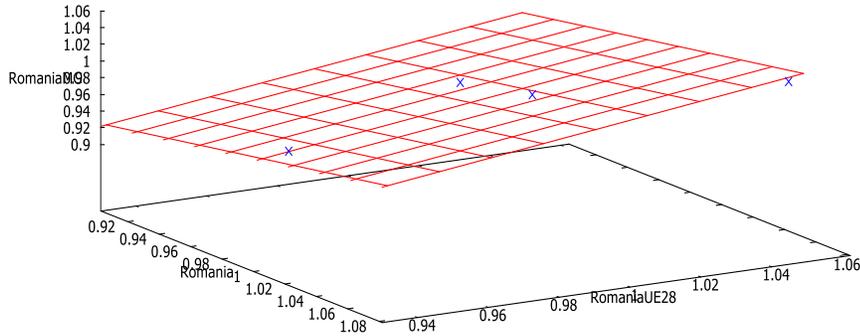
**Figure 6-** Statistical prediction chart



Source: author's own calculations based on GRETL software



**Figure 7-** The three-dimensional distribution of the national economic security phenomenon in relation to the international zoning phenomena



Source: author's own calculations using GRET software

The proposed model assesses Romania's economic security position as compared to European security areas and global areas, identifying vulnerable parts of Romania, especially as regards vulnerability due to indebtedness and the gross fixed capital formation section.

### III. Conclusion

Through the study, the national position of Romania in relation to the Eurozone against which it recorded an average annual vulnerability of 2% and the Global Zone (MG35) against which the vulnerability registered is slightly higher 0.6% higher than the Eurozone. The data were analyzed from the perspective of the relative dynamics, by comparing the growth or decreasing trends of the main financial indicators (GDP, public debt service, the labor force absorption capacity for the 20-64 age group, the ability to attract foreign investments, lending capacity of resident enterprises and gross fixed capital formation (annual figures)).

The model can be further expanded by incorporating consumer trends, inventory variation, trade balance, gross value added, etc. From the point of view of the economic security, the analysis allows to identify the vulnerabilities in the dynamics over a medium time period (3-10 years), in order to develop the methods of optimizing the action levers in a macro context for increasing the economic security.



*Other notes*

[1] UE28 – is a political and economic union of 28 member states that are located primarily in Europe

[2] UE27 –European Union in the period 2007–2013 when it had 27 countries

[3] G35 model is an estimated structural macroeconometric model of the world economy, disaggregated into 35 national economies, including 11 euro area countries

[4] GDP – Gross domestic product is the monetary value of all the finished goods and services produced within a country's borders in a specific time period

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