THE PROGNOSIS OF THE MAIN INDICATORS FOR SIZING THE GLOBAL INSURANCE MARKET

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ABSTRACT: *The paper aim is the prognosis of indicators sizing international life insurance market using models autoregressive. The evolution of the volume of gross premiums, insurance density was studied over a period of 15 years. The models that we used for this prognosis were monovariabile models, specific for economic systems, with one input variable and one variable output (SISO). The prognosis of indicators shows that there will be not major fluctuations on the worldwide life insurance market, that it sees not a spectacular future, even the indicators will record a slight decline in the coming years.*

KEY WORDS: *insurance market, premium, insurance density, crisis effects, prognosis.*

JEL CLASSIFICATION: *G01, G14, G22.*

1. ITRODUCTION

The single element which has not a price in our society is "life". Human care for the present, and especially for the future, gave birth to the insurance, its purpose is to ensure protection against uncertain or sure events. Today, when nothing is imagination, except insurances, every house, every car, every loan, and every new life automatically imply buying an insurance policy, because a modern thinking is based on the natural sense of prevention, on education, on the natural way of thinking in perspective, and even on instincts. The worldwide insurance evolution proved the opportunity of protection against risks and especially the need to transfer risk from bearers to specialized companies. In developed countries, the life insurance sector is considered very important, and his influence on economic development is obvious, and vice versa, this marks the complex interdependence between the concepts of "welfare" and "insurance". For this reason, the resources of this area reach in some countries,

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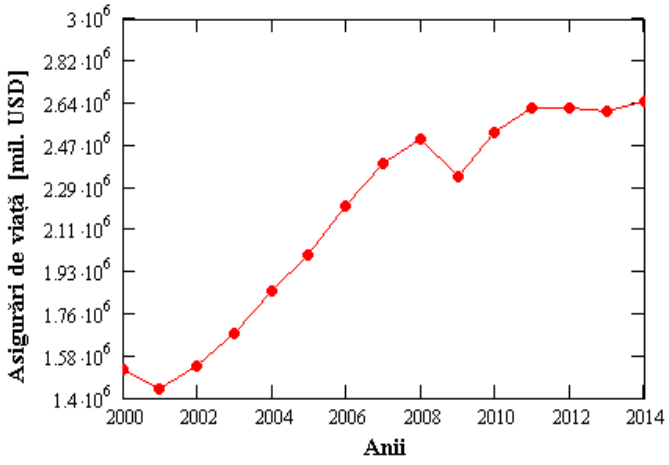
significant values compared to GDP, because there is the belief that the insurance investment, returns in at some point in the economy. In other states, the polarization of population income had the effect of reducing demand for these products although they have diversified.

2. THE PROGNOSIS OF THE GROSS PREMIUMS VOLUME

The worldwide crisis has left its mark on the international insurance market differently from one region to another, from one country to another. The developed countries were less affected than emerging economies. Financial instability is a very important issue for developing countries and currency mismatch is one of many causes of financial crises. However, currency mismatch is most likely to be linked to other fundamental causes of financial crisis, such as excessive corporate leverage, overheating and fiscal deficits, rather than the cause of crisis itself (Lomborg, 2004).

Economic and social reality is localized in space and time, time being a fundamental coordinate during human existence. In other words, each economic process takes place over time, the projection of time-based variables as a means of investigating dynamics, time series.

ANI	Asigurări de viață [mil. U.S.D.]
2000	1.521.253
2001	1.439.177
2002	1.536.122
2003	1.672.514
2004	1.848.688
2005	2.003.558
2006	2.209.318
2007	2.393.088
2008	2.490.421
2009	2.331.566
2010	2.520.072
2011	2.627.168
2012	2.620.864
2013	2.608.091
2014	2.654.549



Source: Author's processing

Figure 1. The evolution of the volume of life insurance premiums subscribed globally

For the data series analyzed, the input variable (x_i, $i=\overline{1,15}$) is the time period (2000-2014), and the output variable is (y_i, $i=\overline{1,15}$) the volume of life insurance premiums subscribed globally. Using the Eviews 8.00 program, we have

determined the time evolution of global subscribed premiums and the values are determined by using the least squares method. Finally, the forecast is the volume of gross premiums for the next 4 years.

The model that we used to determine the predictions is a parabolic non-linear one, pattern of the following form:

$$y_i = c_1 + c_2 \cdot x_i + c_3 \cdot x_i^2 + e_i, \quad i = \overline{1,14} \tag{1}$$

Using the Eviews program, the nonlinear model is determined by the following relationship:

$$y = -21510149801,5 + 21340453,7309 \cdot x - 5292,35790061 \cdot x^2 \tag{2}$$

In table 1, the estimated values of model parameters can be seen in the second column. Also, the quality of the estimated values of the model coefficients (R-squared value has a value very close to 1), as well as the values of the applied tests, is very good.

Table 1. Estimated values of the model parameters applied to the volume of life insurance premiums

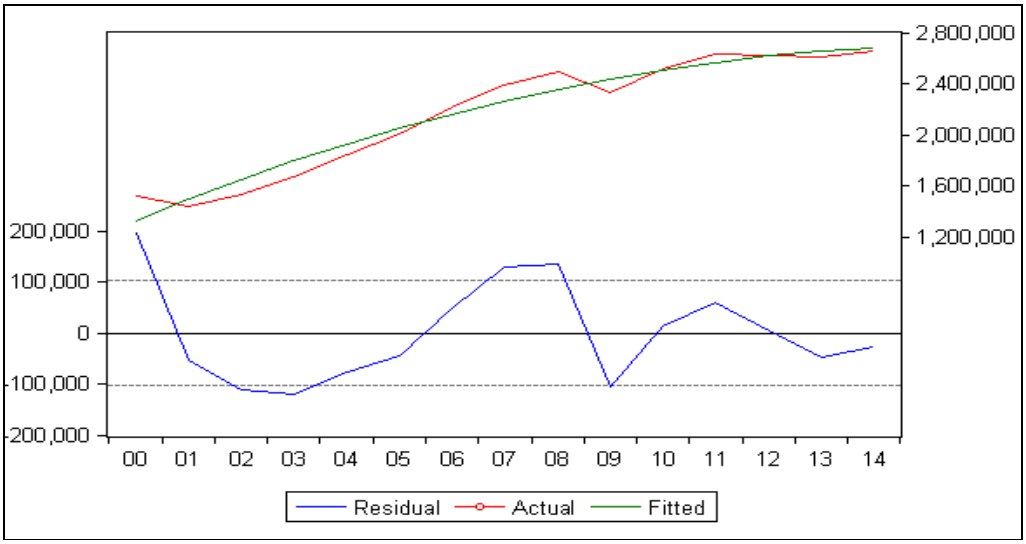
Dependent Variable: Y
Method: Least Squares
Date: 07/02/15 Time: 12:19
Sample (adjusted): 2000 2014
Included observations: 15 after adjustments
Y=C(1)+C(2)*X+C(3)*X^2

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-2.15E+10	6.53E+09	-3.291919	0.0064
C(2)	21340454	6511459.	3.277369	0.0066
C(3)	-5292.358	1622.186	-3.262485	0.0068

R-squared	0.954713	Mean dependent var	2165097.
Adjusted R-squared	0.947165	S.D. dependent var	453280.3
S.E. of regression	104190.3	Akaike info criterion	26.12268
Sum squared resid	1.30E+11	Schwarz criterion	26.26429
Log likelihood	-192.9201	Hannan-Quinn criter.	26.12117
F-statistic	126.4881	Durbin-Watson stat	1.249370
Prob(F-statistic)	0.000000		

Source: Author's processing

Figure 2 shows the time variation of the real values of the analyzed indicator compared to the estimated time variation of the nonlinear regression model with the residue being shown.



Source: Author's processing

Figure 2. The variation of the gross premiums volume (red) compared to the estimated change in the non-linear regression (green) with the residue (blue)

In Figure 3 the evolution in time of the predicted values for the analyzed indicator is represented in the yellow band. The predicted values are given in table 2.

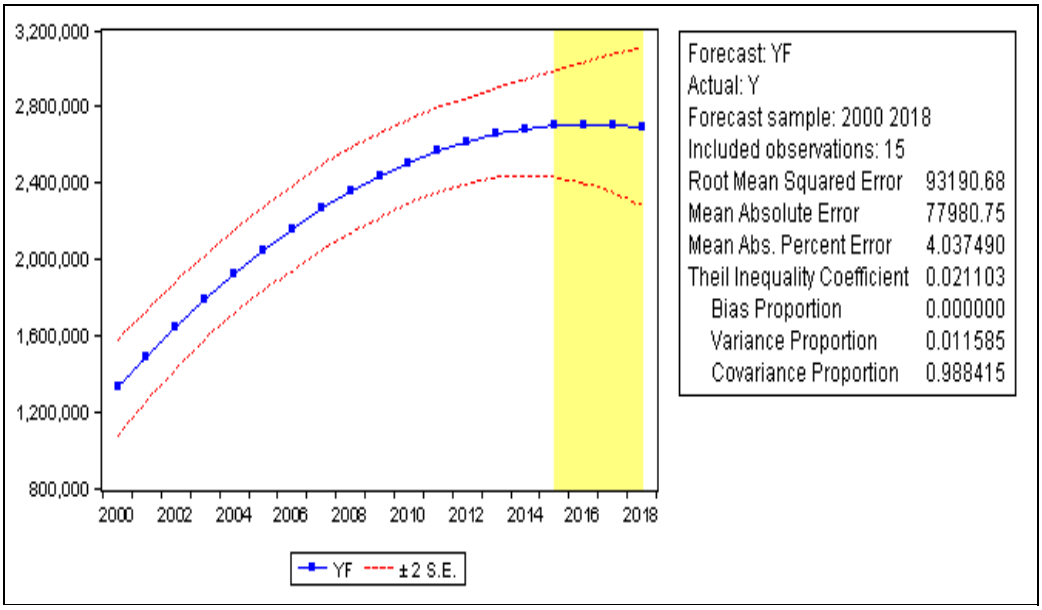


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Figure 3. The time evolution of the projected gross premiums volume (blue), with a projection of the expected range (yellow)

Table 2. The predicted values for the gross premiums volume

Years	2015	2016	2017	2018
The predicted values for the gross premiums volume [mil.USD]	2700609.31	2707568.35	2703942.66	2689732.27

Source: Author's processing

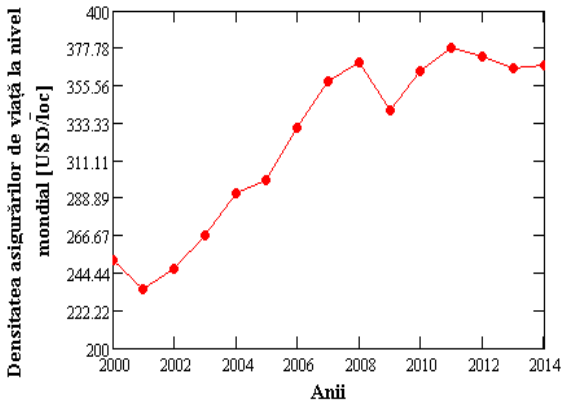
As it can be seen, it has an increasing trend for the first two years of the forecast period, namely by 2015 will increase by 1.73% compared to the previous year, and in 2016 will increase by 0.26% compared to the year 2015. These increases are insignificant, with no spectacular events in the next years on the international insurance market. In 2017, the model predicts a decrease of 0.13% compared to the previous year, and in the last year projected the decrease continued by 0.53%.

In conclusion, the international life insurance market, viewed from the perspective of the volume of gross premiums, will stagnate, the values of the analyzed indicator increase or decrease from one year to another by approximately 1 percent.

3. THE PROGNOSIS OF THE LIFE INSURANCE DENSITY

In this paragraph, we will analyze the evolution of the life insurance density in the world over a period of 15 years, as shown in fig. no. 4. For the analyzed data series, the input variable (x_i, $i=\overline{1,15}$) is the time period (2000-2014), and the output variable is (y_i, $i=\overline{1,15}$) in this case the life assurance density at a global level.

ANI	Densitatea asigurărilor de viață la nivel mondial [USD/loc]
2000	252,10
2001	235,00
2002	247,30
2003	267,10
2004	291,50
2005	299,50
2006	330,60
2007	358,10
2008	369,70
2009	341,20
2010	364,30
2011	378,00
2012	372,60
2013	366,00
2014	368,00



Source: Author's processing

Figure 4. The evolution in time of the life insurance density worldwide

The model that we use to determine the predictions for this size is a 4-armed autoregressive, ARMA model. The name of these models comes from the English - Auto Regressive Moving Average.

Model parameters as well as specific indicators are found in table no. 3, where we can see in the second column the estimated values of the parameters of the ARMA model.

Also, the quality of the estimated ARMA coefficient values (R-squared value is very close to 1), as well as the values of the applied tests, is very good.

Table 3. Estimated values of the model parameters applied for life assurance density

Dependent Variable: Y
Method: Least Squares
Date: 07/02/15 Time: 16:00
Sample (adjusted): 2004 2014
Included observations: 11 after adjustments
Convergence achieved after 24 iterations
MA Backcast: 2000 2003

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X	-7.090536	4.382600	-1.617884	0.1497
C	14675.71	8849.746	1.658320	0.1412
AR(4)	0.469660	0.120564	3.895525	0.0059
MA(4)	-0.999986	0.029723	-33.64395	0.0000

R-squared	0.974819	Mean dependent var	349.0455
Adjusted R-squared	0.964027	S.D. dependent var	29.91526
S.E. of regression	5.673887	Akaike info criterion	6.584913
Sum squared resid	225.3509	Schwarz criterion	6.729603
Log likelihood	-32.21702	Hannan-Quinn criter.	6.493707
F-statistic	90.32894	Durbin-Watson stat	2.561433
Prob(F-statistic)	0.000006		

Inverted AR Roots	.83	.00-.83i	-.00+.83i	-.83
Inverted MA Roots	1.00	-.00+1.00i	-.00-1.00i	-1.00

Source: Author's processing

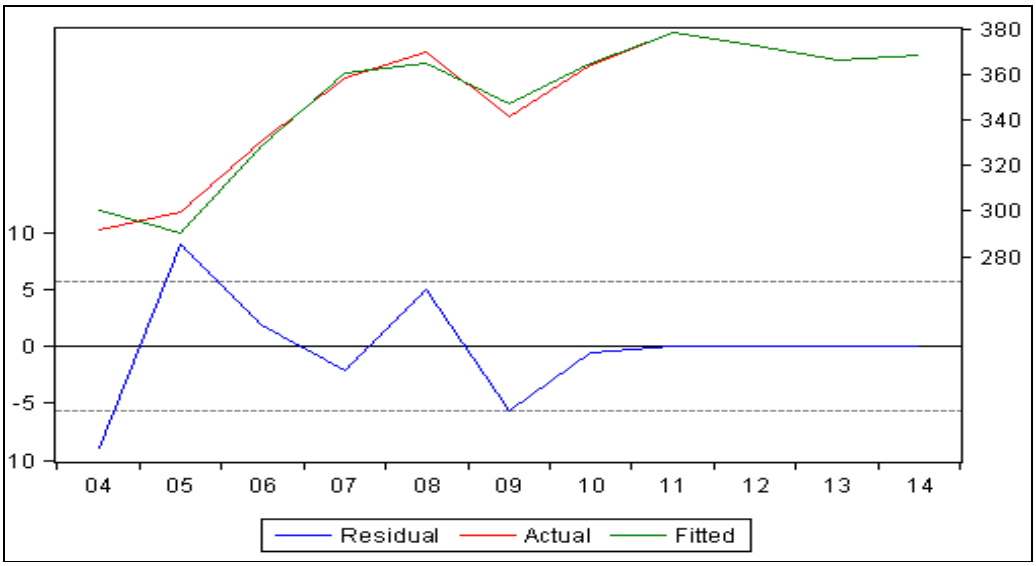
Figure 5 shows the variation in time of the real values of the analyzed indicator, compared to the estimated time variation of the model, showing the residue. It is noted that the estimated evolution of life insurance density worldwide, in a very high percentage, with its real evolution. The small oscillations of the model fall within the permissible error of evolution estimation.

In Figure 6, the evolution over time of predicted values for global life insurance density is represented in the yellow band. As we can see, it has a slightly decreasing trend throughout the forecast period.

The predicted values are given in the table 4.

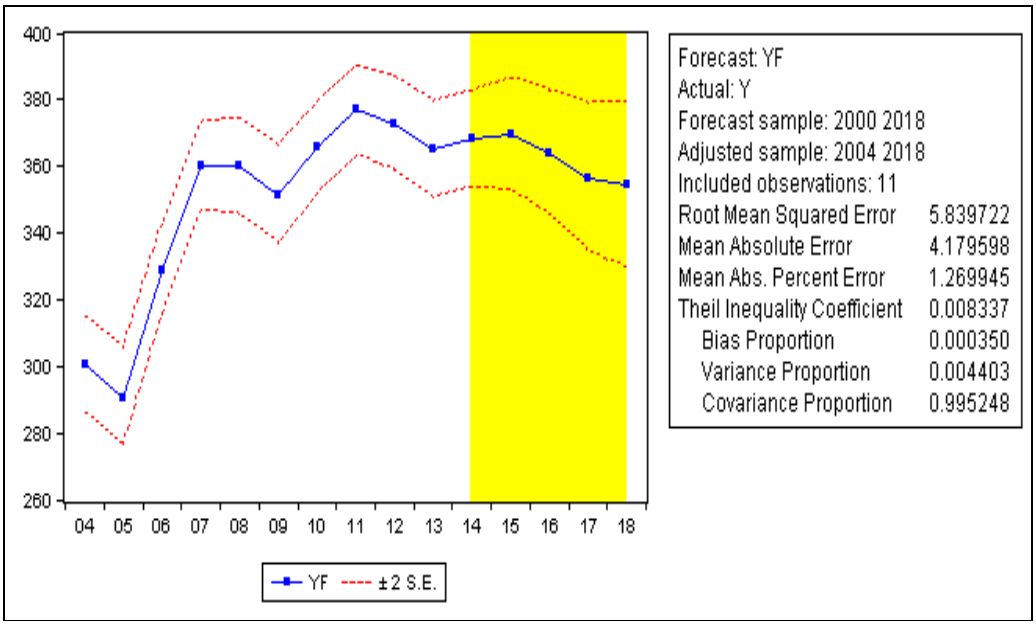
As a result, the insurance density will decrease in the coming years, only this year the model forecasts a 0.43% increase in the indicator compared to last year. In 2017, the highest decrease is expected by 2.03% compared to the previous year and in the last year projected the decrease is decreasing (-0.67% compared to 2017).

Indicator fluctuations are insignificant approximately 1-2%, global life assurance density will not change consistently in the coming years.



Source: Author's processing

Figure 5. The variation in time of life insurance density worldwide (red) compared to the estimated time variation of ARMA (green) with residue (blue)



Source: Author's processing

Figure 6. The evolution over time of the life insurance density (blue), with the forecasting of the predicted range (yellow)

Table 4. Predicted Life Insurance Density Values

Years	2015	2016	2017	2018
Predicted Life Insurance Density Values [USD/loc]	369,59	364,01	356,62	354,23

Source: Author's processing

4. CONCLUSIONS

Global crisis has left its mark on the international insurance differently from one region to another, from one country to another. Currently there are large differences in insurance coverage, varying by country, hundreds of thousands of under-insured individuals needing financial protection provided by these products.

On the basis of mathematical models, we determined the predicted values of these indicators that we can say that the volume of premiums to be received from life insurance will stagnate, the values of the indicator under analysis will increase or fall from one year to another over the next four years and insurance density will fall in the next few years.

The life insurance sector can only develop if the efforts, as results of science, people desire and people income, are concentrated together, down to up, from individuals to specialized companies, because the concerns of the insurers to develop and promote high quality products, can be useless if the people does not realize the usefulness of a life insurance, do not want and / or cannot afford them because they do not have enough money.

REFERENCES:

[1]. Briys, E.; De Varenne, F. (2001) *Insurance from underwriting to derivatives*, John Willey @Sons Ltd

[2]. Ciurel, V. (2011) *Asigurări şi reasigurări. O perspectivă globală*, Editra RENTROP & STRATON, Bucureşti

[3]. Cizek, P.; Hardle, W.; Weron, R. (2005) *Statistical tools for finances and insurance*, Springer-Verlag, Berlin, Germany

[4]. De Jong, P.; Gillian Z.; Eller, H. (2008) *Generalized linear models for insurance data*, Cambridge University Press, UK

[5]. Gourieroux, C.; Jasiak, J. (2007) *The Econometrics of Individual Risk Credit, Insurance, and Marketing*, Princeton University Press, Princeton and Oxford

[6]. Lomborg, B. (2004) *Global Crises, Global Solutions*, Cambridge University Press, New York

[7]. Jungmann, J.; Sagemann, B. (2011) *Financial Crisis in Eastern Europe*, Gabler Verlag, Germany

[8]. Negru, T. (2010) *Economia asigurărilor. Metode, tehnici, soluţii*, Editura Wolters Kluwer România

[9]. Swiss Re, Sigma (2000-2015) *Anual Raports*