THE SOLVENCY MARGIN DETERMINANTS FOR MACEDONIAN INSURANCE SECTOR

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Abstract

The subject of this paper is to define and explore the solvency margin determinants for the Macedonian insurance sector. We use the solvency margin values as the dependent variable to model the relationship with other independent variables such as capital, losses, premium, provisions and costs. Time series VECM model is applied on the quarterly data for the presented variables for Macedonian insurance sector for the period between 1 quarter 2010 and 4 quarter 2016. The goal of this analysis is to determine the statistical significance of the relations of the solvency margin with other independent variables as capital, losses payed, premium obtained, provisions payed and administrative costs. Finding of this paper indicate that Macedonian insurance sector well positioned to risk and that Macedonian insurance companies manage risk with proper consideration.

Key words: life and non-life insurance, Macedonian insurance sector, solvency margin

***Classification JEL**: G22, G28, G32*

1. Introduction

Macedonian insurance sector faces with different types of risks challenges and concerns. In the center of all of them are the values of the solvency margin of each of the insurance companies and of the overall insurance sector. From special interest is the analysis for the solvency margin driven from the life, non- life and overall insurance sector of the Republic of Macedonia.

The calculation of the solvency margin values according to the Macedonian regulation is calculated by the strict rules imposed by the regulator and regulation act and for each and every insurance company as part of the Macedonian insurance sector. However the values of the capital, losses, premium, provisions and costs are specific for every insurance company and for the Macedonian insurance sector in general. The business segments subject of interest for this analysis are life insurance, non-life insurance, and the total life and non-life insurance business segment of Macedonian insurance sector.

The relevant literature research presents many studies that examine the performance of the insurance companies as a part of the insurance sector (1, 2). The literature focuses on determinants of insurance sector (3-6),(7, 8).
Problem of evaluation of Macedonian insurance sector has been subject of empirical analysis. Significant contribution for and insight related to general perspective of the Macedonian insurances sector is provided by Pervan et al., (9, 10) (2014). The performance perspective of the Macedonian insurance companies is elaborated by Micajkova (11) and by Pervan et al (10).
Other papers study the problem of micro and macroeconomic determinants for the profitability of the Macedonian insurance sector (12), and the problem of the shock resilience of the Macedonian insurance sector (13)

2. Data and Methodology

This section presents the sources of our data, and provides definitions of the dependent and independent variables and explain the regression model used to analyze the solvency margin determinants.
In this study we use time series based VECM model with data used from first quarter 2010 to fourth quarter 2016. Data consists three business segments- life, non-life, and life and non-life insurance segments.
The solvency margin is predefined value subject to the predetermined formula for calculation. Its core value is determined by the loss reserve of the company and the risk capital. However this values regarding the life, non-life and life and non-life segment represent the solvency of the Macedonian insurance sector.

Chart 1 Values of solvency margin total, non-life and life for the 2010-2016 period

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The presented values of the dynamics for the period 2010-2016 indicate that the values of solvency margin represented by the trend in all three lines suggests the increased overall level of solvency for the Macedonian insurance sector.
Values of the capital represent the values of the capital as the total values for all market insurance companies, structured as life, non-life and life and non-life. This variable is important for the comparison of the values performed at same or different level of capital by the companies or the insurance sector. Although the variable of the capital will determine the significance and relation with other variables and the dependent variable used in the model. Data for the variable representing loss is data collected from the quarterly reports for the loss payed for the life, non-life and life and non-life insurance market.
Premium variable represents the data from the premium payed by the customer for the life and non-life insurance in Macedonian insurance market for the period 1q2010- 4q2016. The values of the premium variable are used in their total values as represented in the quarterly reports for Macedonian insurance sector. In this case the use of the values for technical premium could be considered as a more appropriate choice but because the data for certain periods was not available, and could not be included as relevant variable to this analysis.
The values form the provision variable are the value payed as the costs for agents and other intermediary involved in the Macedonian insurance market. Variable of the costs included in this study are the administrative costs of the companies for the business operations regarding the life and non- life insurance business in Macedonia.

3. Model, estimation and results

Models in this research have intention to determine the relationship between the solvency margin and relevant variables indicators used in the study. Another aspect of this paper aims to determine the risk management performance and the capacity of the risk management on the insurance sector level.

The model selection of this study tries to determine the dynamic relationship of the solvency margin indicator and their relations with other relevant indicators (14). Thus the selection of time series VECM model meets the required specification, we use this technique to model the dependent and independent variables relationship.

Model equation of specified models subject of this research takes the following form:

$Yit = \beta 0 + \beta 1*X1it + \beta 2*X2it + \beta 3*X3it + \beta 4*X4it + \beta 5*X5it + \varepsilon t$

where Yit represent the values of solvency margin of life, non-life, and life and non-life business segment in model one, two and three. The impact of dependent form the independent variables is to be determined from the coefficients $\beta_{1\text{-}5.}$Note that *i* corresponds to the values from the quarter reports of the Macedonian insurance sector of the sample and *t* to the year and ε is the error term.

Table 1 Dependent and independent variables included in the specified models

Variables	Model 1	Model 2	Model 3
Y	Solvency margin total	Solvency margin non-life	Solvency margin life
X1	Capital total	Capital non-life	Capital life
X2	Loss total	Loss non-life	Loss life
X3	Premium total	Premium non-life	Premium life
X4	Provision total	Provision non-life	Provision life
X5	Costs total	Costs non-life	Costs life

Source: Authors calculations

For the purpose of the model data stationary assumption, in addition are presented the following results of the unit root test (15):

Table 2 Unit root test

Variable	at Level	First diff
Capital non-life		I(1)***
Capital total		I(1)***
Capital life		I(1)***
Loss non-life	I(0)***	
Loss total		I(1)***
Loss life		I(1)***
Solvency margin non-life		I(1)***
Solvency margin total		I(1)***
Solvency margin life		I(1)***

Premium non-life		I(1)***
Premium total		I(1)***
Premium life		I(1)***
Provision non-life		I(1)***
Provision total		I(1)***
Provision life	I(0)***	
Costs non-life		I(1)***
Costs total		I(1)***
Costs life		I(1)***

*** significance of 1 %

** significance 5 %

* significance 10 %

Source: Authors calculations

The results from the table provide evidence of the data stationary at level and at first difference which provide direction to continue with the VECM model. Other condition for the use of the VECM model is fulfilled with the co-integration test results obtained with the Johansen counteraction test available upon request to the authors (16).

Estimations in table 3 present the results of the model estimation in the case of all three specified models and should provide the needed evidence for the relations between the net interest margin, profit, ROA and other independent variables.

Table 3 VECM estimations of the specified models

Coeficient	M1	M2	M3
X1	0.467546***	-3.462586***	2.468463**
X2	-0.824458*	4.574639**	-5.902374*
X3	-3.073035***	-17.13794***	-1.756243**
X4	6.764086***	94.23519***	8.472346*
X5	2.310592*	9.53302**	-27.88602*
CointEq1 (t-statistics)	0.005032	-0.000724	-0.064017
R-squared	0.043429	0.053471	0.170904
Adj. R-squared	-0.32857	-0.314623	-0.151523
Sum sq. resids	12500000000	10100000000	1.11E+11
S.E. equation	26367.61	23668.49	78576.85
F-statistic	0.116745	0.145265	0.530055
Log likelihood	-296.7892	-293.9814	-325.1796
Akaike AIC	23.44532	23.22934	25.6292
Schwarz SC	23.83243	23.61644	26.01631
Mean dependent	12242.46	5147.231	19056.31

S.D. dependent	22875.91	20642.86	73224.83
critical values t- stat	two tail student t	0.10 (1.701)	0.05 (2.048) 0.01 (2.763)

*** *significance of 1 %*

** *significance 5 %*

* *significance 10 %*

Source: Authors calculations

According to the presented results in Table 3, the *capital* variable form the long run perspective is highly significant with significance of 1% in the case of the models with total and non-life values and with the significance of 5% with the model with life values. The coefficient indicator has a positive sign, which indicates the strong relation and causality with the solvency margin indicator as dependent variables. This indicates that increased capital values can highly contribute in the values of solvency margin. This present the fact that Macedonian insurance sector, according to specified models indicators is highly dependent on capital values, and especially this concerns the risk capital values as the primary input for the solvency margin. This suggest that the solvency of Macedonian insurance companies on the long run is closely related to capital level of the companies.

The long- run parameter of the *losses payed* is negative and is significant with significance of 10% in the case of the models with total and life values and with the significance of 5% with the model with non-life values. This suggests that the losses payed in the case of Macedonian insurance sector has logically statistical significance for the solvency margin. This result is in correlation with the practice due to increasing risk for the next period as a result of the losses payed by the companies.

The long- run parameter of the *premium* is negative and is significant with significance of 1% in the case of the models with total and non-life values and with the significance of 5% with the model with life values. This represent the situation increased risk due to sale of the insurance premium. Therefore the premium payed by the customers increases the risk capital and directly negatively influence the solvency of the Macedonian insurance sector. Previous elaboration of the premium relation also represents the long run relationship of the premium variable with the solvency margin indicator.

The long- run parameter of the *provision of the agents and other intermediaries* is positive and is significant with significance of 1% in the case of the models with total and non-life values and with the significance of 5% with the model with life values. This represent the proportion of the active participants in the solvency margin values creation. Positive relation indicates the functioning of business model which considers risk seriously and shows that high values of provisions are performed with less risk for the insurance companies.

The long- run parameter of the *administrative costs* is positive and is significant with significance of 5% in the case of the models with *administrative costs* total and life values and with the significance of 5% with the model with non-life values. This represent the proportion of the administration costs input in the solvency margin values creation. Positive relation indicates the administration operations within the business model also manages risk properly

Error correction coefficient in all three models is insignificant and indicates that the long run equilibrium cannot be determined. However this does not exclude previously established long run relationship of the variables and their significance.

4. Conclusion

This paper analyzed relationship between solvency margin of Macedonian insurance sector and several internal variables, in the period between 2010 and 2016 using time series VECM model. Solvency and soundness of the Macedonian insurance sector is represented with solvency margin in all three model, with life, non-life and life and non-life values. This

three models as an independent variables use the following variables: capital, losses payed, premium obtained, provisions payed and administrative costs.
According to our results, the solvency and the risk of the Macedonian insurance sector is determined by the capital, losses payed, premium obtained, provisions payed and administrative costs, which have high strong relation and causality with the dependent variables.
The variables loss payed and premium showed a negative statistical significance on solvency margin, while capital, administrative costs and intermediary provision payed, showed positive statistical significance on the same explanatory variables. This means that the insurance companies provide positive results with solid risk management. In this case we must consider that the results and conclusion regarding the premium variable are represented on the basis of total premium and they refer to the variable of total premium for Macedonian insurance sector.
This results in general suggest that the Macedonian insurance companies and Macedonian insurance sector is relatively well positioned from the aspect of the risk and solvency. The practically implies that Macedonian insurance management in order to maintain the well-established position must continue with already established and improved risk management practice supported with the supervision mechanism by the regulator.

Bibliography

[1] Prokop J, Pfeifer D. How do you deal with operational risk? A survey of risk management practices in the German insurance sector. Journal of Risk Management in Financial Institutions. 2013;6(4):444-54.
[2] Rutledge D, Tuckwell R. Economies of scale in Australian life insurance: An empirical note. Economic Record. 1974;50(3):443-8.
[3] Kozak S. Determinants of profitability of non-life insurance companies in Poland during integration with the European financial system. Electronic Journal of Polish Agricultural Universities. 2011;14(1):01.
[4] Ab Rahim F, Amin H. Determinants of Islamic insurance acceptance: an empirical analysis. International Journal of Business and Society. 2011;12(2):37.
[5] Malik H. Determinants of insurance companies profitability: an analysis of insurance sector of Pakistan. Academic Research International. 2011;1(3):315.
[6] Hammond J, Houston DB, Melander ER. Determinants of household life insurance premium expenditures: An empirical investigation. Journal of Risk and Insurance. 1967:397-408.
[7] Yusuf TO, Gbadamosi A, Hamadu D. Attitudes of nigerians towards insurance services: an empirical study. 2009.
[8] Choi BP, Weiss MA. An empirical investigation of market structure, efficiency, and performance in property-liability insurance. Journal of Risk and Insurance. 2005;72(4):635-73.
[9] Pervan M, Ćurak M, Poposki K. Insurance industry in Macedonia: A general overview. International Journal of Economics and Statistics. 2014;2:161-9.
[10] Pervan M, Poposki K, Curak M. how well insurance companies in Macedonia perform. Recent Researches in Applied Economics and Management. 2014;1.
[11] Micajkova V. Efficiency of Macedonian Insurance Companies: A DEA Approach. Journal of Investment and Management. 2015;4(2):61-7.
[12] Drvoshanova-Eliskovska T. Microeconomic and macroeconomic determinants of the profitability of the insurance sector in Macedonia 1. Economics and Business Review. 2015;1(3):38.
[13] Petreski B. Empirical Analysis of the Risks and Resilience to Shocks of the Macedonian Insurance Sector. The Geneva Papers on Risk and Insurance-Issues and Practice. 2015;40(4):678-700.
[14] Engle RF, Granger CW. Co-integration and error correction: representation, estimation, and testing. Econometrica: journal of the Econometric Society. 1987:251-76.

[15] Dickey DA, Hasza DP, Fuller WA. Testing for unit roots in seasonal time series. Journal of the American Statistical Association. 1984;79(386):355-67.
[16] Greene WH. Econometric analysis: Pearson Education India; 2003.