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Research Paper

Presenting the Early Warning System Model of Insurance Companies' Solvency Margin Ratio Using the Logit Panel Model, A Case Study: Iranian Insurance Companies[1]

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Introduction

To closely and proactively monitor insurance companies and protect policyholders, the insurance supervisors of countries have developed Early Warning Systems (EWS). The solvency Margin Ratio (SMR) is one of the important indicators that indicate the insurance company's ability to fulfilling its financial obligations. Therefore, the main goal of this paper is to design a model which can identify the main factors that affect SMR and forecast the probability of SMR of Iranian insurance companies. For modeling the effect of independent variables on the dependent variable (probability of decline of SMR) and estimating EWS, the logit panel econometric method and data from 18 insurance companies for a period of 10 years are used.

Materials and Methods

1. Hypotheses

The hypotheses of this research are as follows:

1- Macroeconomic variables have a significant effect on the probability of the SMR decline of Iranian insurance companies.

2- The financial variables have a significant effect on the probability of the decline in the SMR of Iranian insurance companies.

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3- The variables of corporate governance have a significant effect on the probability of SMR decline of Iranian insurance companies.

2. Methods

In this paper, an attempt has been made to measure the effect of various factors on the probability of SMR decline. The main difference between this papers from other studies is that independent variables are considered in three groups, and its scope is much wider than similar studies. Since the dependent variable (probability of a decline in the SMR) of the model is a dummy variable, we have used the logit panel model. In this regard, the Chow test and Hausman test are used to identifying the fixed effects against the pooled data and the random effect methods, respectively. Also, for choosing between the Logit and Probit models good fit criteria have been used.

3. Research Variables

1- Dependent variable: the probability of a decrease in the SMR.

2- Independent variables include; Financial variables (current ratio, Herfindahl-Hirschman Index (HHI) and loss ratio), macroeconomic variables (interest rate, international economic sanctions, and economic growth), and corporate governance variable ratio of changes in the board of directors.

Results and Discussion

The estimation of the EW model of solvency has been done using the Logit panel econometric model. According to related tests, the Logit model with fixed effects is preferable to the other models. The results of this model are described in Table 1.

Table 1. Early Warning Model of SMR

variable	coefficient	S.E	Z	P-Value	average	final effect
F8	-3/29	1/94	-1/70	0/090	1/73	-0/102
F10	11	5/17	2/13	0/033	0/28	0/055
R	101/37	48/96	2/07	0/038	0/16	0/295
DUM	-7/32	۳,۲۶	-2/24	0/025	۱	-0/131
G5	1/55	1/18	1/32	0/188	0/23	0/006
GDP(-2)	65/55	36/67	1/79	0/074	0/01	0/011
F6^3	1/32	0/59	2/21	0/027	0/74	0/039
DUM(-2)	4/23	2/09	2/02	0/043	۱	0/075
LR chi^2	20/69					
prob	0/0080					
f(DSMR)	1/78434%					
Source: calculations made using" Stata" software						

Interpretation of estimation results is as follows:

1- In this model, the interest rate and the ratio of changes in the board of directors have the greatest and least impact on the probability of a decline in SMR, respectively, and the loss ratio (LR) in its high values shows the greatest impact on the probability of solvency reduction.

2- HHI, interest rates, changes in the board of directors, economic growth, and loss ratio have a direct and significant relationship, and the current ratio and the outcome of international sanctions have an inverse and significant relationship with the probability of declining solvency margin.

3- Examining the hypotheses of this research;

The first hypothesis was confirmed at the confidence level of 90% for the interest rate variable and economic growth and rejected for the inflation rate variable. Also, there are no reasons to reject the hypothesis of the impact of economic sanctions on the probability of SMR decline.

The examination of the second hypothesis showed that at the 90% confidence level, the significance of the effect of the company's financial variables on the dependent variable was confirmed for the variables of current ratio, HHI, and LR, and for the index of the ratio of investment in risky assets to the total Assets rejected.

Examining the third hypothesis indicates that, with caution, at the 90% confidence level, there were no reasons for the lack of effect of changes in the board of directors on the probability of SMR decline.

Conclusion

In general, this paper indicated that the probability of decreasing SMR of insurance companies increases during economic growth, due to the increase in the probability of adverse selection of risk and also, the lack of capital increase in proportion to the growth of the premium portfolio. Increasing the LR and focusing on specific and high-risk insurance lines of business (LOBs) has made the insurance company face the risk of financial insolvency, and the stability of management in the insurance company reduces the risk. Also, economic sanctions have reduced the probability of SMR decline. According to the results obtained from the current research, the following practical suggestions can be considered by the insurance regulator and insurance companies:

- Since the increase of capital has the greatest effect on SMR, the policymakers of the insurance industry must pay more attention to the necessity of increasing the capital of insurance companies.

- The necessity of more effective risk management of the insurance portfolio by the insurance companies, taking into consideration the LR of each insurance LOBs.

Keywords: Early Warning System, Solvency Margin Ratio (SMR), Insurance, Logit, Combined Data.

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