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Microeconomic and macroeconomic determinants of the profitability of the insurance sector in Macedonia[1]

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Abstract: The aim of this paper is to investigate the impact of the most representative microeconomic and macroeconomic determinants on the profitability of the insurance sector in Macedonia.

The Johansen cointegration technique has been applied to the regression model with quarterly data for the period of time from 2006 to 2011. The results confirm the theoretical suggestions that the assets have a statistically significant positive impact on ROE, from the micro perspective. The interest rate on denar deposits without a currency clause for enterprises has a statistically significant positive impact on ROE and ROA, whilst the rate on deposits of non-financial entities in terms of GDP has a statistically significant negative impact on ROE and ROA, from the macro perspective. Recommendations for increasing the profitability of insurance companies: more productive use of their resources, launching innovative products, enlarging their portfolio, promotions to investors for recapitalization. Recommendations from the macro aspect: structural reforms, extension of savings investments in banks, implementation of new financial instruments, mutual projects amongst the insurance and banking sectors in order that they become complementary.

Keywords: microeconomic and macroeconomic determinants, cointegration, profitability, insurance.

JEL codes: C32, G22.

Introduction

Increased insurance activities enlarge the number of insurance companies as the main provider, which increases the chance of making a profit. Profitability is one of the most important goals of financial management, with a single priority – maximizing the wealth of the owner [Al-Shami 2008]. Special emphasis is placed on achieving profit under sudden and unexpected changes in eco-

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nomic circumstances. From a microeconomic perspective, wrong decisions in insurance companies' asset management generate bad loans that lead to: deterioration of the quality of their portfolio, increased risk and jeopardizing the liquidity in the insurance sector. Moreover with all side effects taken into account, this encourages negative macroeconomic implications which would have a negative impact on macroeconomic aggregates such as investment and gross domestic product.

We conducted this study: to examine the relationship between the determinants and the profitability of the insurance sector; to identify the microeconomic and macroeconomic determinants that influence the profitability of the insurance sector in Macedonia; and to conduct a systematic and detailed econometric analysis of the profitability of the insurance sector in Macedonia in the period 2006–2011 and its microeconomic and macroeconomic determinants.

The motives for identifying and exploring the determinants of the profitability of the insurance sector arise from their possible impact on the economy as a whole. Thorough knowledge of them enables more control of the driving trends ensuring better risk management. Insurance companies will be able to take the necessary actions to improve their profitability. The Insurance Supervision Agency of Macedonia (ISA) and all other relevant supervisory bodies can react anticipatively in moments of crisis and bankruptcies. Investors will have the opportunity to protect their investment and focus on the most cost-effective projects for the insurance companies. Insurance users will be able to make the best choice based on the results of the research. In order to create a systematic review of the effect of the current insurance activities on the economic fundamentals, regular analysis of the determinants of the profitability of the insurance sector is required.

The remainder of this paper is structured as follows: a review of the theoretical and empirical literature concerning the microeconomic and macroeconomic determinants of the profitability of the insurance sector is presented in Section 1. In Section 2 we present a brief review of the insurance sector in Macedonia, followed by Section 3 that demonstrates the empirical testing and analysis of the determinants of the profitability of the insurance sector in Macedonia. The final section offers conclusions and recommendations.

1. Theoretical and empirical literature

1.1. Microeconomic determinants of profitability in the insurance sector

A number of existing studies focus on analyzing the determinants of the profitability in the context of the banking sector. We find, however, no exhaustive empirical work for the insurance sector, especially about the economic transi-

tion in countries in Central and Eastern European (CEE). Some of the relevant, albeit general, studies are discussed in this section.

The profit rate is defined as a financial measure that is used to assess the ability of a company (industry) to generate gains compared to its total cost over a period of time. According to Al-Shami [2008], there are many different ways to measure profitability, such as the rate of return on assets – ROA and the return on equity – ROE. ROA is the indicator of the profitability of the company in terms of total assets. ROA indicates how efficiently management uses the funds to make a profit. ROE indicates the amount of profit the company realizes from the invested funds of shareholders.

The use of the single accounting system by life insurance companies [Wright 1992], makes it difficult to measure the profitability compared to other financial institutions or companies. As for insurance companies profitability depends on many factors, including the actual mortality rate, investment income, capital gains or losses, policy distribution of state dividends fees and taxes.

The difference in profit between insurance companies from the same geographic region suggests the existence of internal factors or features of the insurance companies themselves. Ćurak, Pepur, and Poposki [2011] researched the determinants of the financial performance of Croatian composite insurers, between 2004 and 2009. The determinants of profitability, selected as explanatory variables, include both internal factors, specific to insurance companies and external factors, specific to the economic environment. The results of the panel data show that *company size*, *underwriting risk*, *inflation* and *return on equity* have a significant influence on insurers' profitability (ROA). This survey indicates that the Croatian insurance market has a low level of development, but it is very dynamic.

Hrechaniuk, Lutz, and Talavera [2007] pointed out that *the size* of the insurer is important determinant of its profitability. In this context it is much harder for smaller companies to write insurance policies than for bigger ones, since smaller companies cannot secure their clients in the case of aggregate uncertainty or a big catastrophe. It is interesting to note that there are different results shown on the impact of the *size* of the insurance companies on profitability in Spain and Ukraine. Thus the influence in Ukraine is positive and negative in Spain. Most likely the negative relationship in Spain is due to high administrative costs, typical for the large insurance companies.

According to the survey of Kashish and Kasharma [1998], conducted for insurance companies in Jordan, profitability is treated as a dependent variable and is calculated as the rate of return on assets. A positive and statistically significant relationship has been found between *the age of the company* and its profitability for the year of 1994, whilst the results for 1995 are of lesser significance. The expectations for a positive relationship between the *age* and the profitability of the company are confirmed in the Vijayakumar and Kadirvelu [2004] study. The older the company is the greater will be the opportunities to

increase profitability, because the experience and efficiency in the manufacturing process can reduce costs. It was concluded that age is the strongest determinant of profitability.

The capital of a company represent its own funds which provide an opportunity to take on broader activities and achieve higher profits, on the one hand, but on the other, funds include their own costs. The relationship between the *volume of capital* and profitability in the banking sector has been analyzed by Buser et. al. [1981]. It was concluded that banks that have a relatively large volume of capital impose invisible barriers to the entry of competition in the banking industry. Actually these banks can financially serve more customers and can take higher risks, which will secure profitability, whilst other banks with lower levels of capital would be prevented from competing in the banking sector due to the increased costs. Empirical research on this was made by Berger [1995] in analyzing the US banking system. He identifies a positive relationship between the profitability of banks and their capitalization. He highlights that well-capitalized banks in case of a bankruptcy threat would face lower costs to overcome the situation, due to having a reduced cost of borrowing.

The choice of the appropriate rate of *borrowing* for the companies' management is not easy due to its vague effect on profitability, more precisely; sometimes the effect can be negative or positive. The theoretical findings show that companies choose the borrowing rate that best suits their capital structure and fit the characteristics and performance of the company. In this regard the study of Harrington [2005] supports the theory of capital structure in respect of the relationship between the rate of borrowing and the rate of profitability. He explains that when a company does well, then borrowing can contribute to the achievement of a higher rate of return on equity – ROE, assuming the fixed costs of the company remain unchanged or increase with low dynamics. In this way a financial leverage will be created, whereby the additional revenue will be distributed just amongst the equity holders and thus will increase profitability expressed by ROE. But this financial leverage also has its effect when the company operates with a negative financial result (negative ROA), thus the loss multiplies the decrease of invested capital, Petrevski [2008]. Hence it is important to determine the optimum level (the border line) of financial leverage and to take advantage of its positive effects. However a generally accepted opinion is that the company with a lower rate of indebtedness, i.e. a higher rate of own funds, is in better position to protect itself against various risks.

Hurdle [1974] also points out that the company with an increased rate of borrowing is exposed to greater financial risk than the company with a low rate of borrowing. Relevant in this context is the study of Vijayakumar and Kadirvelu [2004] with their theoretical assumptions about the negative relationship between debt and profitability. Although the estimated coefficient of indebtedness did not confirm their theory, (namely they received positive signs of the coefficient), still there is an empirical argument for the expect-

ed positive relationship between leverage and profitability in certain cases. The reason for such a result is the low level of indebtedness of the companies that had been taken in their sample as operated in the energy industry which had a high risk and required a high degree of capitalization. According to Panayiotis, Athanasoglou, and Delis [2008] survey that banks with lower rate of indebtedness (higher capital) will generally achieve a higher rate of ROA, but a lower rate of ROE. This study shows that ROA is valid as the main index by which to measure profitability, because the analysis of the link between debt and ROE shows that not enough attention is paid to the risk which is incurred through high indebtedness, which is often determined by the requirements of the legislation on the minimum capital of banks. Hutchison and Cox [2006] examined the relationship between financial leverage and ROE for the banking sector in the US. They found a negative relationship between debt (expressed as the ratio of capital and assets) and profitability of banks which was not relevant for the top banks.

The rate of loss is the ratio between the annual damages paid by insurance companies and collected premiums, Al-Shami [2008]. In insurance companies the annual damages paid tend to be lower than the collected premiums. Thus the rate of loss will be lower. Hrechaniuk, Lutz, and Talavera [2007] examined the performance and the determinants of profitability of the insurance sector in Spain, Lithuania and Ukraine in specific years. Their theoretical model anticipates that the rate of loss will affect adversely on the insurance companies' financial results. The results show that the rate of loss positively affects the financial results of companies in Lithuania, whilst it negatively affects profitability in Ukraine. The estimated coefficient for the rate of loss of insurance companies in Ukraine supports their hypothesis of an inverse relationship between the rate of loss and profitability of insurance companies which is statistically significant.

1.2. Macroeconomic determinants of profitability in the insurance sector

In the context of macroeconomic determinants only a few theoretical explanations for their impact on personal observations are found. We summarize them below.

Gross domestic product – GDP is the measure of overall economic activity in a country. When increasing economic factors work more and there are more opportunities for achieving positive financial results. From that perspective GDP growth is expected to have a positive impact on the profitability of the insurance sector.

Insurance companies, such as financial institutions, mobilize financial resources and have the opportunity to place them in the banks in the form of deposits or financial instruments in the stock market. Thus an increase in the

interest rate would lead to the expectation that the insurance sector would achieve higher interest income and increased profitability.

The banking and insurance sectors are structural elements of the wider financial system in the economy. As both sectors offer financial services they are unavoidably influenced by the nature of their business and have the ability to cooperate and they can be complementary. Furthermore these two sectors can act as competitors or substitutes in the fight for attracting customers wishing to save. Depending on the *development* of the financial system the effect of the activity *of the banking sector* can be either positive or negative with regard to the profitability of the insurance sector.

2. Brief review of insurance market in Macedonia

The insurance sector in Macedonia is the third segment in the financial system representing only 3.3% of the total assets in the financial market. It consists of 15 insurance companies, 26 insurance brokerage companies, 9 companies of insurance representation and 1 bank – acting in the field of life insurance. It is characterized by a moderate market concentration, a growth trend, especially in life insurance, which is dominantly in foreign ownership, in conformity with the regulatory framework and enhanced supervision.[3]

The basic indicators for the insurance sector in Macedonia are presented in Table 1 for the period of 2006 to 2011.

Table 1. Key indicators of the insurance sector in Macedonia

	Descriptive statistics						
	Gross Written Premiums (GWP) in MKD	**Insurance Pene-tration Rate (%)**	**Insurance Density Rate in MKD**	**Gross Paid Claims in MKD**	**Profit/loss – earnings before tax in MKD**	**ROA (%)**	**ROE (%)**
2006	5,445,239.00	1.70	2,669.00	2,797,124.00	311,710,863.00	1.86	8.58
2007	6,108,839.00	1.80	2,988.00	2,865,555.00	310,660,678.00	2.05	6.77
2008	6,421,435.00	1.60	3,135.00	3,182,341.00	275,818,962.00	1.66	4.65
2009	6,182,401.00	1.53	3,012.00	2,962,250.00	−100,848,992.00	−1.40	−3.99
2010	6,480,874.00	1.53	3,151.00	2,988,373.00	102,127,970.00	0.61	1.75
2011	6,808,264.00	1.50	3,304.00	3,006,170.00	−57,238,407.00	−0.57	−1.75

Source: Annual Reports of the insurance market in Macedonia from ISA, www.aso.mk.

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[3] Source: National Bank Of the Republic of Macedonia, Financial Report for stability in Macedonia for 2013.

According to the degree of development of the insurance market it can be noted that the level is appropriate to the level of the related group of countries in South East Europe emphasizing the potential for growth. Generally the main characteristics of the group of countries are: equal participation of the insurance sector in the structure of the financial system, common structure of the portfolio of the insurance products, where the most important product is the compulsory third party liability[4] cover for motor vehicles with a potential for covering more catastrophic risks.

3. Empirical testing and analysis of the determinants of profitability of the insurance sector in Macedonia

In order to review the theoretical suggestions and compare them with the results from the other surveys presented an empirical analysis is made of the determinants of profitability of the insurance sector. Research of this kind has not been conducted for Macedonia so far.

The most representative variables are taken in the regression model. These variables cover the main activities of the insurance sector from the micro and macro aspects which determine the profitability in the best manner. Variables are taken on an aggregate level in order to examine their impact on the whole insurance sector.

The following theoretical hypotheses are checked in this study as follows:
1. There is a positive relationship between the size of the insurance sector and the profitability of the insurance sector in Macedonia
2. There is a positive relationship between the volume of capital of the insurance sector and the profitability of the insurance sector in Macedonia
3. There is a negative relationship between the leverage of the insurance sector and the profitability of the insurance sector in Macedonia
4. There is a positive relationship between the economic activity in the country and the profitability of the insurance sector in Macedonia
5. There is a positive relationship between the investment level of the insurance sector and the profitability of the insurance sector in Macedonia
6. There is a negative relationship between the growth of the banking sector and the profitability of the insurance sector in Macedonia.

For these tests quarterly data for the period 2006 to 2011 are used. The data are taken from the websites of the ISA and the National Bank of the Republic of Macedonia (NBRM) websites to which a linear interpolation[5] is applied.

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[4] Source: National Bank Of the Republic of Macedonia, Financial Report for stability in Macedonia for 2013.

[5] Linear interpolation was performed using the standardized formula $y = y_0 + (x - x_0) \times (y_1 - y_0)/(x_1 - x_0)$, to t allow the interpolation of annual data for the variable of the insurance

The basic equation for the regression model is:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_n x_{ni} + \varepsilon_1, \quad (1)$$

where:

y_i – the dependent variable,

$x_{1i}, x_{2i}, \ldots, x_{ni}$ – the independent microeconomic variables,

$\beta_0, \beta_1, \beta_2, \ldots, \beta_n$ – the coefficients to be calculated,

ε_1 – the rated error which includes all the other factors that affect the dependent variable, but are not taken into the independent variables analyzed.

The applied variables in this model are as follows:

– *Dependent variables* (as a measure of the profitability of the insurance sector)
  - ○ ROE – Rate of Return on Equity in the insurance sector (calculated as the ratio between net income and equity), expressed as a percentage;
  - ○ ROA – Return On Assets of the insurance sector (calculated as the ratio between net income and assets), expressed as a percentage.
– *Independent microeconomic variables*
  - ○ LNASSETS – Natural logarithm of the assets of the insurance sector, where the assets are expressed in million denars (as a measure of the size of the insurance sector);
  - ○ LNEQUITY – Natural logarithm of equity in the insurance sector, where the capital is expressed in millions of denars (as a measure of the funds of the insurance sector);
  - ○ LEVERAGE – Rate of equity in relation to the assets of the insurance sector, expressed as a percentage (as a measure of leverage of the insurance sector).
– *Independent macroeconomic variables*
  - ○ GDPGROWTH – Growth rate of real gross domestic product, expressed as a percentage (as a measure of overall economic activity);
  - ○ INTEREST – Interest rate on denar deposits without a currency clause of enterprises expressed as a percentage (as savings which the insurance sector receives from the investment of funds in banks);
  - ○ DEPTOGDP – Rate on deposits of non-financial entities in terms of gross domestic product, expressed as a percentage (as a measure of the development of the banking sector and the major competitive sector of the insurance sector).

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sector on a quarterly basis by using data (annual and quarterly) for the same variable from the banking sector, which is the most appropriate sector, characterized by most of the similarities. So, y is the corresponding value of the quarterly interpolated net profit, equity and assets of the insurance sector, y_0 and y_1 are the annual value of net profits, equity and assets of the insurance sector, whilst x_0 and x_1 are the corresponding values of quarterly net profit, equity and assets of the banking sector taken from the website of the NBRM.

– *Dummy variables*[6]
  o DUM1 – The variable[7] which covers the impact of the global economic crisis;
  o DUM2 – The variable[8] which covers the impact of the increased cost of value adjustment of the claims against insurance premiums, as a result of the application of the regulation on the valuation of the items in the balance sheet (Annual Report, ISA 2012, p. 25).

The basic equation applied and adapted to the research of the relationship between determinants and profitability of insurance companies in Macedonia is presented as following:

y_i is the profitability of insurance companies, *ROE and ROA*, $x_{1i}, x_{2i}, \ldots, x_{ni}$ are *LNASSETS, LEVERAGE, LNEQUITY, GDPGROWTH, INTEREST, DEPTOGDP,* $\beta_0, \beta_1, \beta_2, \ldots, \beta_n$, are coefficients, the parameters to be calculated that determine the direction and intensity of the impact of the determinants on the profitability of insurance companies in Macedonia. In order to establish the regression model, it is first necessary to determine the integration features of the time series, which include the examination of the (non)stationary or the variables.

By using the two most popular tests, Augmented Dickey Fuller – ADP and Phillips Peron – PP one, the hypothesis that the time series has a single root (Unit Root), or that the time series is non-stationary was examined. Only variables integrated in the same order are progressed in the research process. The results of both tests are shown in the following tables.

As presented in the results the variable *Leverage* is excluded because it is undoubtedly integrated in the different level I (2).

The regression model developed can be shown in 4 specifications:

$$ROE_t = \beta_0 + \beta_{1*}LNASSETS_t + \beta_{2*}LNEQUITY_t + \varepsilon_t, \qquad (2)$$

$$ROA_t = \beta_0 + \beta_{1*}LNASSETS_t + \beta_{2*}LNEQUITY_t + \varepsilon_t, \qquad (3)$$

$$ROE_t = \beta_0 + \beta_{1*}GDPGROWTH_t + \beta_{2*}INTEREST_t + \beta_{3*}DEPTOGDP_t + \varepsilon_t, \quad (4)$$

$$ROA_t = \beta_0 + \beta_{1*}GDPGROWTH_t + \beta_{2*}INTEREST_t + \beta_{3*}DEPTOGDP_t + \varepsilon_t. \quad (5)$$

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[6] The presence of dummy variables should provide a stability to the estimated ratios especially in situations where exogenous factors affect the dependent variables, such as the economic crisis, whose greatest impact on the Macedonian economy as a whole was reflected in 2009, when it inevitably affected the results of the profitability of the insurance sector of Macedonia, as well as the effects of the application of the regulation on the valuation of the items in the balance sheet, which is an administrative measure and which had an effect of caunsing loss-making in the insurance sector in 2011.

[7] It takes the value 1 for the whole of the year of 2009 and 0 for all other periods.

[8] It takes the value 1 for the whole of the year of 2011 and 0 for all other periods.

Table 2. Unit root test ADF

Variable	Integrative characteristics of series									
	ADF-test									Conclusion
	In level			1st difference			2nd difference			
	t-statistic	Test critical values: 5%	Test critical values: 10%	t-statistic	Test critical values: 5%	Test critical values: 10%	t-statistic	Test critical values: 5%	Test critical values: 10%	
ROE	−1.99	−3.00	−2.64	−5.62	−3.00	−2.64				I(1)*
ROA	−2.00	−3.00	−2.64	−5.17	−3.00	−2.64				I(1)*
LNASSETS	−2.39	−3.00	−2.64	−2.66	−3.00	−2.64				I(1)**
LNEQUITY	−1.84	−3.00	−2.64	−3.52	−3.00	−2.64				I(1)*
LEVERAGE	−2.11	−3.00	−2.64	−1.93	−3.00	−2.64	−4.52	−3.00	−2.65	I(2)*
GDPGROWTH	−1.95	−3.00	−2.64	−5.38	−3.00	−2.64				I(1)*
INTEREST	−1.42	−3.00	−2.64	−7.11	−3.00	−2.64				I(1)*
DEPTOGDP	−1.60	−3.03	−2.66	−1.64	−3.03	−2.66	−21.83	−3.03	−2.66	I(2)*

* and ** means rejection of the Null Hypothesis: the appropriate variable has a unit root (is non-stationary) at 5% and 10% level of significance.

Table 3. Unit root test PP

Variable	Integrative characteristics of series									
	PP-test									Conclusion
	In level			1st difference			2nd difference			
	t-statistic	Test critical values: 5%	Test critical values: 10%	t-statistic	Test critical values: 5%	Test critical values: 10%	t-statistic	Test critical values: 5%	Test critical values: 10%	
ROE	−1.96	−3.00	−2.64	−7.37	−3.00	−2.64				I(1)*
ROA	−2.00	−3.00	−2.64	−5.43	−3.00	−2.64				I(1)*
LNASSETS	−1.74	−3.00	−2.64	−2.66	−3.00	−2.64				I(1)**
LNEQUITY	−1.84	−3.00	−2.64	−3.51	−3.00	−2.64				I(1)*
LEVERAGE	−1.79	−3.00	−2.64	−1.99	−3.00	−2.64	−4.52	−3.00	−2.65	I(2)*
GDPGROWTH	−2.04	−3.00	−2.64	−5.36	−3.00	−2.64				I(1)*
INTEREST	−1.81	−3.00	−2.64	−6.33	−3.00	−2.64				I(1)*
DEPTOGDP	−1.53	−3.00	−2.64	−12.44	−3.00	−2.64				I(1)*

* and ** means rejection of the Null Hypothesis: the appropriate variable has a unit root (is non-stationary) at 5% and 10% level of significance.

Regression equations (2) and (3) are used to assess the impact of microeconomic determinants to be examined, whilst regression equations (4) and (5) investigate the effect of macroeconomic determinants on the profitability of the insurance sector of Macedonia. This division is made in order to avoid increasing the parameterization of the model.

Accordingly possible endogeneity between variables and integration features of the time series, Johansen co-integration technique[9] are used. The order is defined as Vector Auto Regression – VAR which determines the number of past values of the variables or time delays (Lags).

The results indicate that the most appropriate order of the VAR-model in the first two specifications is VAR 2, and in the third and the fourth it is VAR 1, meaning the inclusion of 2 or 1 lags in the model which ensures correction

Table 4. VAR lag order selection criteria for the regression model

ROE = f (LNASSETS, LNEQUITY & DUM1, DUM2)					
Lag	LR	FPE	AIC	SC	HQ
0	NA	0.000320	0.461078	0.907414	0.566221
1	64.69490	1.32e–05	–2.764.171	–1.871.500	–2.553.885
2	28.90730*	3.61e–06*	–4.169628*	–2.830621*	–3.854198*
ROA = f (LNASSETS, LNEQUITY & DUM1, DUM2)					
Lag	LR	FPE	AIC	SC	HQ
0	NA	2.53e–05	–2.076.467	–1.630.131	–1.971.324
1	67.33993	8.85e–07	–5.467.030	–4.574.359	–5.256.744
2	29.92534*	2.24e–07*	–6.950797*	–5.611791*	–6.635368*
ROE = f (GDPGROWTH, INTEREST, DEPTOGDP & DUM1, DUM2)					
Lag	LR	FPE	AIC	SC	HQ
0	NA	3439.835	19.48785	20.08296	19.62804
1	42.43729*	946.9640*	18.11324	19.50184*	18.44035*
2	16.24436	1253.842	18.09103*	20.27311	18.60506
ROA = f (GDPGROWTH, INTEREST, DEPTOGDP & DUM1, DUM2)					
Lag	LR	FPE	AIC	SC	HQ
0	NA	320.6339	17.11497	17.71008	17.25516
1	45.80115*	70.53614*	15.51611*	16.90470*	15.84322*
2	12.03932	136.8805	15.87617	18.05825	16.39020

* indicates the order of VAR according to each criterion.

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[9] It allows mult-ivariate assessment based on the method of maximum likelihood.

for the possible endogeneity in the regression model. In determining the cointegration and the number of cointegrating relationships, i.e. cointegrating vectors amongst variables in the equations, we also, examined if there is a stationary linear combination, i.e. vector with I (0) integration process, amongst the variables that are not stationary. For this we employed Maximal Eigen value of the Stochastic Matrix – λmax and Trace of the Stochastic Matrix – λtrace.[10]

In economic practice the second, third and fourth option are most often used as evidenced in Johansen [1992] and Harris and Solis [2003]. Hence the results of the tests for the cointegration in the first and second regression specification clearly distinguish option 4 and in the third and fourth equations option 2 has been chosen as the optimum.

Table 5. Pantula-principle for determining the number of cointegration vectors in the model

ROE = ƒ (LNASSETS, LNEQUITY & DUM1, DUM2)				
Test type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Λtrace	1	2	2	1	2
Λmax	1	2	2	0	0
ROA = ƒ (LNASSETS, LNEQUITY & DUM1, DUM2)				
Test type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Λtrace	1	2	2	1	1
Λmax	1	2	2	1	1
ROE = ƒ (GDPGROWTH, INTEREST, DEPTOGDP & DUM1, DUM2)				
Test type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Λtrace	1	1	1	1	2
Λmax	1	1	1	0	0
ROA = ƒ (GDPGROWTH, INTEREST, DEPTOGDP & DUM1, DUM2)				
Test type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Λtrace	1	1	1	1	2
Λmax	1	1	1	1	1

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[10] Both tests test the null hypothesis, according to which it is claimed that there is no cointegration between variables, i.e. $r = 0$.

After determining the order of the VAR and cointegrating vector specifications the VAR-model is transformed into a method of vector error correction – VECM.[11] From all the econometric results for the developed regression model only those coefficients of the variables that established long-term equilibrium and which are statistically significant are interpreted.

Table 6. Estimated coefficients for the first specification

Dependent variable *ROE*; *ROE* = *f* (*LNASSETS, LNEQUITY* & *DUM*1, *DUM*2)							
Variable	Stan-dard error	t-statis-tic	Critical values at 1% signifi-cance level	Critical values at 5% signifi-cance level	Critical values at 10% signifi-cance level	Con-clusion
LNASSETS	0.24	0.12	1.89	2.82	2.07	1.72	*
LNEQUITY	–0.02	0.14	–0.13	–2.82	–2.07	–1.72	
TREND	–0.15	0.43	–0.35	–2.82	–2.07	–1.72	
Error correc-tion mecha-nism (ECM)	–0.69	0.21	–3.31	–2.82	–2.07	–1.72	***
Approximate time of ad-justment	1.45 quarters						
R^2	58.85%						

* and *** means rejection of the Null Hypothesis: the coefficient is not statistically different from zero at the10% and 1% level of significance.

The results from Table 5 indicate that if the variable *LNASSETS* increases by 1 percent then the variable *ROE* increases by an average of 0.24 percentage points, assuming other variables remain unchanged. The coefficient to the variable is statistically significant at the 10% level of significance. The coefficient before the variable *LNEQUITY* is negative and does not have a statistically significant impact on *ROE* taken as a dependent variable.

The coefficient before the *TREND* is negative and does not have a statistically significant impact on *ROE*.

The timing of adjustment from the short-term imbalance to the long-term equilibrium is 1.45 quarters and is statistically significant at all levels of importance, whilst the coefficient of determination R^2 indicates that 58.85% of the

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[11] This model enables the separation of long-term relationships between the variables from short-term relationships. Also it can calculate the adjustment from short-term imbalance to long-term equilibrium.

variance in the profitability of the insurance sector expressed through *ROE* is determined by the variances of the microeconomic determinants, assets and equity of the insurance sector.

Table 7. Diagnostic tests for first regression

Diagnostic tests for regression *ROE = f (LNASSETS, LNEQUITY & DUM1, DUM2)*			
	Calculated statistics	**Critical values at 1% significance level**	**Conclusion**
H_0: No serial correlation in the residuals	11.40	21.67	
H_0: Normality in the residuals	81.81	16.81	***
H_0: Homoscedastic residuals	81.97	88.38	

*** indicates rejection of the null hypothesis at 1% significance level.

The results from Table 6 indicate that the econometric results are relevant and unbiased in terms of the first and third test whilst the second test shows that residuals do not follow a normal distribution pattern and cannot be properly distributed logically since only a small sample of data is analyzed.

Table 8. Estimated coefficients for the second specification

Dependent variable *ROA*; *ROA = f (LNASSETS, LNEQUITY & DUM1, DUM2)*							
	Variable	**Standard error**	**t-statistic**	**Critical values at 1% significance level**	**Critical values at 5% significance level**	**Critical values at 10% significance level**	**Conclusion**
LNASSETS	0.03	0.03	0.91	2.82	2.07	1.72	
LNEQUITY	0.005	0.04	0.12	2.82	2.07	1.72	
TREND	−0.05	0.11	−0.45	−2.82	−2.07	−1.72	
Error correction mechanism (ECM)	−0.72	0.15	−4.80	−2.82	−2.07	−1.72	***
Approximate time of adjustment	1.39 quarters						
R^2	77.97%						

*** indicates rejection of the null hypothesis at 1% significance level.

The results from Table 7 show that the coefficients before the variables *LNASSETS* and *LNEQUITY* are positive and do not have a statistically significant impact on the profitability of the insurance sector when *ROA* is taken as a dependent variable. The coefficient before the *TREND* is negative and it does not have a statistically significant impact on *ROA,* taken as a dependent variable. Long-term coefficients are not statistically significant in this regression. The results of diagnostic tests for this specification are similar to the results from the first specification.

Table 9. Diagnostic tests for second regression

Diagnostic tests for regression *ROA* = f (*LNASSETS, LNEQUITY & DUM*1, *DUM*2)			
	Calculated statistics	**Critical values at 1% significance level**	**Conclusion**
H_0: No serial correlation in the residuals	11.99	21.67	
H_0: Normality in the residuals	59.30	16.81	***
H_0: Homoscedastic residuals	78.10	88.38	

*** indicates rejection of the null hypothesis at 1% significance level.

Table 10. Estimated coefficients for the third specification

Dependent variable *ROE*; *ROE* = f (*GDPGROWTH, INTEREST, DEPTOGDP & DUM*1, *DUM*2)							
	Variable	**Standard error**	**t-statistic**	**Critical values at 1% significance level**	**Critical values at 5% significance level**	**Critical values at 10% significance level**	**Conclusion**
GDPGROWTH	0.09	0.24	0.38	2.83	2.08	1.72	
INTEREST	2.79	0.69	4.04	2.83	2.08	1.72	***
DEPTOGDP	−0.13	0.02	−6.50	−2.83	−2.08	−1.72	***
Intercept	13.67	4.17	3.28	−2.83	−2.08	−1.72	***
Error correction mechanism (ECM)	−0.40	0.13	−3.08	−2.83	−2.08	−1.72	***
Approximate time of adjustment	2.50 quarters						
R^2	38.44%						

*** indicates rejection of the null hypothesis at 1% significance level.

The results from Table 9 reveal that if the variable *INTEREST* increases by 1 percentage point, the variable *ROE* increases by an average of 2.79 percentage points, assuming other variables remain unchanged. The coefficient before this variable is statistically significant at all levels of significance. If the variable *DEPTOGDP* increases by 1 percentage point, the variable *ROE* on average reduces by 0.13 percentage points, assuming other variables remain unchanged. The coefficient before the variable in question is statistically significant at all levels of importance. If the independent macroeconomic variables have value zero the *intercept* indicates that *ROE* will be 13.67%. The coefficient before this variable is statistically significant at all levels of importance. The *timing of the adjustment* from short-term imbalance to long-term equilibrium is 2.5 quarters and it is statistically significant at all level of importance. The coefficient of determination R^2 indicates that 38.44% of the variance in the profitability of the insurance sector expressed through *ROE* is determined by the variances of these macroeconomic determinants. The results indicate that the econometric results are relevant and unbiased in terms of all three tests.

Table 11. Diagnostic tests for third regression

Diagnostic tests for regression *ROE* = *f* (*GDPGROWTH, INTEREST, DEPTOGDP & DUM*1, *DUM*2)			
	Calculated statistics	**Critical values at 1% significance level**	**Conclusion**
H_0: No serial correlation in the residuals	15.57	32.00	
H_0: Normality in the residuals	12.62	20.09	***
H_0: Homoscedastic residuals	45.79	63.69	

*** indicates rejection of the the null hypothesis at 1% significance level.

The results from Table 11 indicate that if the variable *INTEREST* increases by 1 percentage point the variable *ROA* increases by 0.69 percentage points on average, assuming other variables remain unchanged. The coefficient before the variable in question is statistically significant at all levels of importance. If the variable *DEPTOGDP* increases by 1 percentage point, the variable *ROA* on average reduces by 0.02 percentage points, assuming other variables remain unchanged. The coefficient before the variable in question is statistically significant at all levels of importance. If the independent macroeconomic variables have value zero the *intercept* indicates that *ROA* will be 1.65%. The coefficient before the variable in question is statistically significant at 10% at all levels of importance. *Time adjustment* of short-term imbalance to the long run equilibrium is 2.22 quarters and it is statistically significant at all levels of importance whilst

Table 12. Estimated coefficients for the fourth specification

Dependent variable *ROA*; *ROA* = *f* (*GDPGROWTH*, *INTEREST*, *DEPTOGDP* & *DUM*1, *DUM*2)							
	Variable	Stan-dard error	t-statis-tic	Critical values at 1% signifi-cance level	Critical values at 5% signifi-cance level	Critical values at 10% signifi-cance level	Con-clusion
GDPGROWTH	0.06	0.06	1.00	2.83	2.08	1.72	
INTEREST	0.69	0.16	4.31	2.83	2.08	1.72	***
DEPTOGDP	−0.02	0.004	−5.00	−2.83	−2.08	−1.72	***
Intercept	1.65	0.96	1.72	−2.83	−2.08	−1.72	*
Error correc-tion mecha-nism (ECM)	−0.45	0.12	−3.75	−2.83	−2.08	−1.72	***
Approximate time of adjust-ment	2.22 quarters						
R^2	52.77%						

* and *** means rejection of the Null Hypothesis: the coefficient is not statistically different from zero at 10%, 5% and 1% significance level.

the coefficient of determination R^2 indicates that 52.77% of the variance in the profitability of the insurance sector expressed through *ROA* is determined by the variances of these macroeconomic determinants. The results indicate that the econometric results are relevant and unbiased in terms of all three tests.

Table 13. Diagnostic tests for fourth regression

Diagnostic tests for regression *ROA* = *f* (*GDPGROWTH*, *INTEREST*, *DEPTOGDP* & *DUM*1, *DUM*2)			
	Calculated statistics	Critical values at 1% significance level	Conclusion
H_0: No serial correla-tion in the residuals	11.47	32.00	
H_0: Normality in the residuals	8.66	20.09	
H_0: Homoscedastic residuals	50.65	63.69	

Conclusions and recommendations

The results for the specifications with microeconomic determinants indicate that only *assets* positively affect the profitability of the insurance sector expressed by *ROE* whilst none of the variables considered affects *ROA*. Moreover the specification using macroeconomic determinants was better because two macroeconomic variables affect the dependent variable. Namely, the *interest rate on deposits of enterprises* positively affects both measures of profitability whilst the *deposits of non-financial entities* adversely affect *ROE* and *ROA*, which indicates that the banking sector is more competitive than the insurance sector and it fullfils the function of a substitute for the insurance sector.

The most probable reason for such partially illogical results obtained from the specifications with microeconomic determinants arise from certain limitations such as the small sample taken for analysis and the fact that the annual data were interpolated to quarterly levels. Also the results of the third and fourth regression equation suggest that the *GDPGROWTH* does not affect profitability which is probably also due to the analysis for a short period of time and that gross domestic product may not be suitable as a variable in examining the profitability of the insurance sector. In order to be more precise it should be noted that this may be a consequence of the fact that the insurance sector has a small share in the overall financial sector and in general throughout the Macedonian economy. Specifically the assets of the insurance companies are only a 3.4% share of the total assets of the financial sector as of 2011 (FSR, NBRM, 2012) and from that point of view, due to the large discrepancy between these two variables, it can be concluded that the growth rate of real GDP does not affect the profitability of the insurance sector.

Taking into consideration the results obtained from the four regression equations, appropriate recommendations can be made to the planners of economic policies in order to increase the profitability of the insurance sector in Macedonia and implement more successful risk management.

Based on the results of the regression equations with microeconomic determinants recommendations are directed at the managers of insurance companies and investors:

1. The creation of conditions to increase the assets and equity of the insurance companies through more effective and efficient use of their resources, especially human resources, through the creation of ideas, projects and the launch of innovative products with lower prices in order to increase the profitability of the insurance sector.
2. An active promotion of the insurance industry to investors to raise capital which will allow expansion of the range of insurance products. Dialogue with the banks about investment projects, for loans or the exchange of securities for the purpose of recapitalization and the implementation of projects.

Based on the results of the regression equations with macroeconomic determinants, recommendations need to be made to the insurance companies and also to other entities whose decisions have a stake in macroeconomic movements such as the state, the NBRM, ISA and banks. In this respect we suggest the following recommendations:

1. In the process of the implementation of structural reforms in order to boost GDP in the form of infrastructure investment it is desirable to use a wider range of insurance products from domestic insurance companies to protect against possible risks to be used regularly with the aim of a greater stimulation of profitability.

2. In the context of the interest rate it would be a desirable extension of investment from insurance companies in the banks in the form of deposits in order to increase profitability. Better planning of investments is implemented in terms of stable interest rates. To maintain a stable monetary system – a fiscal mix is recommended.

3. In respect of the coefficient in front of the variable that represents the development of the banking sector, i.e. the share of deposits of non-financial entities in GDP, which indicates a substitutable effect, it is necessary for the insurance sector to enter into greater cooperation with the banking sector in order to become complementary, not substitutive. It would be worthwhile if announcements for the sale of life insurance are implemented by the raising of loans from the banks on mandatory basis for all types of loan on offer. In addition it would be wise to introduce new mutual products or projects in the banking and insurance sectors, by which means banks would ensure their investments in insurance companies. This product could increase the profitability of the insurance sector and improve the process of risk management in the banking sector. However care should be taken in introducing this product as it requires detailed analysis and the involvement of experts. The risk of the introduction of this product could mean a possible spillover of the risks from the banking sector into the insurance sector. To avoid this it is necessary for the insurance companies and banks to regularly update and strengthen their risk management policies as well as having a detailed involvement and cooperation with ISA institutions and the prudent supervision of the NBRM of such products, each in its own domain.

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