Profitability determinants of life insurance companies in the Republic of Serbia

Miloš Pjanić
Faculty of Economics in Subotica, University in Novi Sad, Segedinski put 9-11, 24000, Subotica, Serbia
https://orcid.org/0000-0001-8521-8559

Mirela Mitrašević
Faculty of Business Economics in Bijeljina, University of East Sarajevo, Semberskih ratara bb, 76300, Bijeljina, Bosnia and Herzegovina
https://orcid.org/0000-0001-5393-4139

Stefan Luković
Faculty of Economics in Kragujevac, University in Kragujevac, Đure Pucara Starog 3, 34000, Kragujevac, Serbia
https://orcid.org/0000-0002-8248-3549

Abstract

Background: Based on the results of research on the influence of certain internal and external factors on the profitability of insurance companies in the countries in Europe, America, Asia and Africa in the 21st century which were published in a significant number of scientific and professional papers, the present study analyses insurance companies in Serbia in the period from 2015 to 2021. We chose this analysis bearing in mind the previous negative experiences and expressed distrust in the financial system, which greatly affected the readiness of policyholders to invest in life insurance products, as well as affecting significantly the development of life insurance in Serbia.

Purpose: The aim of the paper is to present the business results of the insurance companies on the Serbian market in the analysed period and to determine which business performance the management of an insurance company should pay attention to in order to ensure positive business results.

Study design/methodology/approach: We applied a fixed effects model on the nine selected variables. In the model, return on assets (ROA) is used as a dependent variable, while operating margin, expense ratio, investment ratio, growth rate of written premium of a company, company size, log (financial leverage), log (liquidity ratio), and market share are independent variables.

Findings/conclusions: The results of the research indicate that there is a statistically significant and positive impact of operating margin and liquidity ratio on ROA, and statistically significant but negative impact of expense ratio and financial leverage on ROA.

Limitations/future research: The limitation of our profitability analysis is that we were unable to analyse the impact of individual life insurance products on profitability. Bearing in mind numerous and significant social and economic changes over the last two years, the directions of our future research will be focused on their impact on the business operation of insurance companies.

Keywords

life insurance; profitability; insurance companies; fixed effects model

Introduction

In the paper, we examine the impact of market share as an external factor and selected internal factors listed in annual financial statements on the profitability of business operations of companies dealing with life insurance in Serbia. This topic is especially relevant when taking into account the research related to the mutual connection between the development of the insurance market and

economic growth, including Mitrašević, Pjanić & Novović Burić (2022), and the fact that the offer of life insurance products is a significant factor in the development of the insurance market conditioned by the profitability of the business. The significance of the topic is also confirmed by the observed trend of the development of the life insurance market in Serbia shown in the research Ostojić (2014) and Pjanić, Kalaš, Vasić (2016), covering the period before and after the outbreak of the global economic crisis.

A large number of scientific papers have analysed the impact of specific business factors on the profitability of insurance companies expressed through return on assets (ROA). In the literature review we have selected the papers that use correlation and regression analysis on panel data in some countries in Europe, America, Asia and Africa in the 21st century. The indicators that can negatively affect business results are profitability decline, sales volume decline, increase in indebtedness, liquidity decline, decease in market share, and company size. The aforementioned analysis, combined with the analysis of economic and social factors (Cicea et al., 2019), can serve as a part of a systematic process for obtaining valid information on the performance of the organization and the factors that influence performance, which is explained in more detail in Heather & Brian (2021). The research of Ahmed, Xie & Issam (2021) proves its importance from the aspect of life insurance companies, in which it is claimed that lower investor confidence has a negative impact on the demand for life insurance. Actually, one should bear in mind the advantage of modern information technologies to provide data and data processing and, as Norikumo (2021) emphasises, to increase customer satisfaction as well.

In most papers, return on assets (ROA) indicator is used as a measure of profitability calculated as the ratio of net results (profit/loss) and average assets in the observed year. Return on equity (ROE) indicator is often used as well and it represents the ratio of net profit in a certain period and the equity of insurers.

Operating ratio is often used as a measure of the profitability of business operations of insurance companies, which expresses the amount of profit from insurance and investment business activities that a company realizes per premium. The results of Hussanie & Bashir (2019) show that this ratio had a statistically significant positive impact on life insurance companies in India in the period 2005-2015. The profitability of insurers is determined by the performance of insurance business (claims ratio and expense ratio) and investment performance. Expense ratio is obtained as the ratio of operating expenses and premium retention. Operating expenses include acquisition costs, administration costs, and other transaction-related costs. Small expense ratio does not always mean that a company has good business performance. In some cases, this may indicate that small amount of resources is allocated to the expenses which can lead to negative selection and result in high insurance premiums (Mitrašević, 2010).

Due to this time lag between the receipt of premiums and the payment of insured amounts, an insurer creates technical reserves, which it invests in various types of assets, earning return on investment. A longer time lag between the collection of insurance premiums and the payment of claims enables the growth of investment results. Extremely low interest rates have caused a number of undesirable consequences to a large number of industries, especially life insurance companies which invest a significant part of technical reserve funds in bonds and deposits. The impact of changes in interest rates on the balance sheet and income statement depends on the extent to which this type of assets has been used to cover liabilities, as well as on the quality of cash flow and the maturity of assets and liabilities. Regardless of the fact that Serbia has switched to a market-oriented economic system, it has failed to sufficiently develop its capital market (Leković et al., 2020). The results of the research of Kočović et al. (2014) indicate that the investment ratio had a statistically significant positive effect on non-life insurance companies in Serbia.

The growth of premiums affects the market share of insurance companies and also enables the reduction of the relative share of fixed costs and thus achieves the benefits of economies of scale. In the papers by Pjanić et al. (2018) and Kočović et al. (2014), the positive impact of premium growth on ROA in non-life insurance companies in Serbia is illustrated. Unlike the aforementioned papers that dealt with the profitability of non-life insurance companies in Serbia, in our research, we will examine the key profitability factors of life insurance companies. In doing so, we focused on the factors of the internal environment. This research is immensely important both from the perspective of the managers and persons who have a stake in the ownership of the companies that operate in still underdeveloped Serbian life insurance market, as well as from the perspective

of the persons who are interested in investing in life insurance products.

Numerous empirical studies show that large companies are better positioned in the market and have a greater impact. In accordance with the Law on Accounting ("Official Gazette of RS", no. 73/2019 and 44/2021 - other law) the average number of employees, operating income and total assets are used as criteria for classification of legal entities. A positive statistically significant impact of company size on ROA is also shown in Meher & Zewud 2020.

Financial leverage reflects the ability of an enterprise to have impact on the size of its profits by changing its long-term capital structure. It involves selecting and balancing the proportion between equity and borrowed funds, taking into account the degree of risk to ensure an acceptable level of return on equity. When observing this indicator, insurance companies should have regulatory capital requirements aimed at reducing the probability that an insurer will not be able to meet its obligations to policyholders. Moreover, the specificity of the business operations of insurance companies is reflected in the fact that the largest items of liabilities are technical reserves generated to settle liabilities to policyholders. The results of Meher & Zewudu (2020) in the Ethiopian market in the period from 2002 to 2016 showed that financial leverage has a significant negative impact on ROA.

For an insurance company to provide liquidity, i.e. to be able to meet liabilities on time, it is necessary to take into account the structure and quality of assets and the maturity of assets and liabilities. The liquidity of an insurance company is determined as the ratio between liquid assets and liabilities. While Pjanić et al. (2018) prove that liquidity ratio does not have a statistically significant impact on ROA in the non-life insurance market in Serbia, Hussanie & Bashir (2019) claim that this impact is statistically significant but negative.

Market share is the company's position in the market in relation to its competitors and is determined as the share of gross premiums in the total premium of the market as a whole. The research by Meher & Zewudu (2020) indicated that market share has a statistically significant positive impact on ROA.

After reviewing the literature, we are going to define the methodology and describe the used variables, and then the empirical results are going to be presented and discussed at the end of the paper followed by concluding remarks.

1. Literature review

The analysis of the influence of certain internal and external factors on the profitability of insurance companies is presented in a large number of scientific papers. In the following table, we have selected the papers coming from a large number of countries that use correlation and regression analysis on panel data.

Table 1 Analysis of previous literature

Authors/ Paper	Sample/ Countries	Variables	Method
NON-LIFE INSURANCE COMPANIES			
Pjanić et al. (2018)	Serbia (2010-2015)	**Dependent Variable:** ROA **Independent Variables:** Asset growth (Log of total assets), Company growth (Assets growth), Premium growth (Premium t – premium t-1)/ premium t-1, Liquidity ratio (Current assets/Current liabilities), Debt ratio (Total equity/Total assets), Operating costs (Salary costs/Written premium), Underwriting risk (Gross (net) premiums/Equity), Financial leverage (Total debt/Equity) Profit growth (Net result/ Total revenue), Constant, Error –	Multiple linear regression without panel analysis
Olarewaju& Msomi, (2021).	South African Development Community (2008 -2019) 56 companies	**Dependent Variable:** ROA **Independent Variables:** Business's Value Added ((Operating Profit, Employee Cost, Depreciation And Amortisation Cost)/Capital), Total Employee Cost, Value Creation Process, Underwriting Risk, Leverage Ratio (Total Debt/ Total Asset), Size (Logarithm Of Total Assets)	Static (two stage least square, fixed and random effect) and dynamic panel regression analysis (two step system generalised method of moments)
Zhao et al. (2021)	China (2013-2017) 53 companies	**Dependent Variable:** Profit Ratio Efficiency (PE) **Independent Variables:** Asset (Natural Logarithm Of The Total Asset), Product Diversification, Firm Age	Tobit regression analysis
Ofori-Boateng et al. (2022)	Ghana (2008–2019) 29 companies	**Dependent variable:** ROA **Independent variables:** market structure, efficiency scores (DEA methodology), GDP growth, inflation, Size, Risk, Leverage	Least Squares Panel-Corrected Standard Errors (OLS-PCSE)

Authors/ Paper	Sample/ Countries	Variables	Method
Bhattar (2020)	Nepal (2012- 2017) 10 companies	**Dependent variable:** ROA **Independent variables:** Expenses Ratio, Financial Leverage and Size of Company	Multiple regression analysis
Kočović et al., (2014)	Serbia (2006-2013) 12 insurance companies	**Dependent variables:** ROA **Independent variables:** number of years the company has operated in the Serbian insurance market, combined ratio of the company, percentage growth rate of written premium of company, Hirschman index, investment ratio, leverage of company (percentage ratio of technical reserves and capital), liquidity ratio (percentage ratio of current assets less inventories and current liabilities), retention rate (percentage ratio of net earned premium and gross earned premium of the company), size of the company.	Multiple linear regression
Kaya (2015)	Turkey (2006–2013) 24 companies	**Dependent variables:** technical profitability ratio, sales profitability ratio; **Independent variables:** size of the company; age of the company; loss ratio; insurance leverage ratio; current ratio; premium growth rate; motor insurance (including land vehicle and land vehicle liability branches); premium retention ratio	Fixed effects models

LIFE and NON-LIFE OR COMPOSITE INSURANCE COMPANY

Authors/ Paper	Sample/ Countries	Variables	Method
Pavić Kramarić et al. 2017	Croatia, Slovenia, Hungary and Poland (2010 – 2014)	**Dependent variables:** ROA and ROE, **Independent variables:** a) insurance company - specific factors (size (total gross written premium), type, share of reinsurance (share of premium ceded to reinsurance in total gross written premium), combined ratio, age, organizational form); b) structural factors (ownership) and, c) macroeconomic factors (real GDP per capita growth).	Static unbalanced panel data analysis
Camino-Mogro, &Bermúdez-Barrezua. (2019)	Ecuador 2001 to 2017 29 life and 38 non-life	**Dependent variable:** ROA, investment income, profit-after-taxes **Independent variables:** Net premium, technical reserves, Liquidity (current assets/current liabilities), Liabilities/Equity, Equity/Assets, Capital intensity, Labor intensity, Claims, Technical efficiency (DEA), Size, HHI Herfindahl–Hirschman index, Market share, credit volume, Cyclical output, Annual inflation, Annual placement interest rate, Control (Multinational, Bank related)	Panel corrected standard errors regression
Meher and Zewudu (2020)	Ethiopia (2002 to 2016) 17 companies	**Dependent variable:** ROA **Independent variables:** Company Size (total assets), Asset growth rate (Percentage change in total assets between the current year and previous year to the previous year), Underwriting risk (The ratio of net claims incurred to net premium earned), Volume of capital (total capital to total assets) Leverage (Total debts to total capitals) Liquidity (Current assets to current liabilities), Market share (Total gross written premium of an insurance company to total gross written premium of the industry at a given period), Gross domestic product per Capita, Annual inflation rate	Pearson's correlation and OLS regression model
Muchie & LiJuan (2021).	Ethiopia (2005 to 2020) 17 companies	**Dependent variable:** ROA **Independent variables:** Age, Size, Leverage, Asset Tangibility, Liquidity, Premium Growth, Loss Ratio, Reinsurance Dependence, GDP Growth, Inflation, Education, Trade Openness, Government Effectiveness, Monetary Freedom, And Exchange Rate	Fixed-effect model
Brogi et al. (2022)	SAD (2010–2018) 107 companies	**Dependent variable:** ESG (Environmental, social, and governance)scores **Independent variables:** Return on Assets; Solvency Ratio; Total Assets	Scoring and regression models
Morara& Sibindi (2021)	Kenya (2009-2018) 37 non-life and 16 life	**Dependent variable:** ROA and ROE **Independent variables:** Debt ratio, Reinsurance ratio, Investment ratio, Size of insurer, Age	Pooled ordinary least squares (POLS), fixed effects and random effects models.
Dorofti & Jakubik (2015)	30 European countries (2005-2012)	**Dependent variable:** ROA, ROE **Independent variables**: real GDP growth, unemployment rates, the stock market index, long-term interest rates, inflation rates and alternatively real interest rates calculated by the Fisher equation.	Dynamic panel estimation

Authors/ Paper	Sample/ Countries	Variables	Method
LIFE INSURANCE			
Shieh, Hu, & Ang (2020)	Mainland China and Taiwan (2005-2011)	**Input variables:** Total asset, Employee, Total equity **Output variables:** Insurance revenues, Investment revenues	Metafrontier and four-stage data envelopment analysis (DEA)
Ishtiaq and Siddiqui (2019)	Pakistan (2008 – 2017) 9 companies	**Dependent variables:** ROA **Independent variables**: Liquidity, Tangibility, Equity ratio (investment leverage), Debt to Equity Ratio, Insurance Leverage, Size, Premium Growth, Underwriting Risk, Capital adequacy ratio, External Variable, Gross Domestic Product, Inflation, Market Share	Panel ordinary least square regression and Panel generalized method of moment regression method

Source: the authors

Analysing the profitability of non-life insurance companies in the Republic of Serbia in the period from 2010 to 2015, by using multiple linear regression and independent variables: asset growth, company growth, premium growth, liquidity ratio, debt ratio, operating costs, underwriting risk, financial leverage and profit growth, Pjanić et al. (2018) indicated that premium growth, debt ratio, operating cost and profit growth positively and statistically significantly affected the profitability of non-life insurance companies.

Olarewaju & Msomi (2021) analyse the impact of intellectual capital on the financial performance of the insurance companies in the South African Development Community for the period 2008 to 2019. Their results indicate that intellectual capital, human capital and structural capital have a statistically significant and direct relationship with ROA. The selected control variables – underwriting risk, insurer size and leverage – have a statistically significant and inverse effect on ROA.

Zhao, Pei, & Pan (2021) use profit ratio efficiency calculated using DEA methodologies as a measure of profitability. The application of the Tobit regression method shows that company size has a U shaped relationship with profitability, and that product diversification has a positive effect on profitability. Additionally, the length of company's operation has a negative impact on profitability, which gives an advantage to newly established companies.

In the case of 29 non-life insurance companies in Ghana in the period 2008-2019, Ofori-Boateng, Ohemeng, Boro, & Agyapong (2022) apply Panel Corrected Standard Error and Random Effect techniques showing that leverage, inflation and underwriting risk have a statistically significant impact on profitability while company size does not have a statistically significant impact.

Based on the panel data of 10 Nepalese insurance companies in a five-year period using ordinary least square regression, Bhattar (2020)

shows that expense ratio does not have a statistically significant influence on ROE, as a chosen indicator of profitability, while the influence of financial leverage and company size is statistically significant.

By applying multiple linear regression, Kočović et al. (2014) analysed the impact of independent variables, such as number of years of operating in the Serbian insurance market, combined ratio of a company, percentage growth rate of written premiums of company, Hirschman index, investment ratio, leverage of company, liquidity ratio, retention rate, size of a company on the profitability of non-life insurance companies in Serbia from 2006 to 2013. The results of this study indicated a statistically significant but negative impact of combined ratio, financial leverage and retention rate on the profitability of non-life insurance companies. Moreover, the results indicated that there was a statistically significant and positive impact of written premium growth rate, return on investment and company size on the profitability of non-life insurance companies in Serbia.

In the period from 2006 to 2013, by using fixed effects model, Kaya (2015) examined the impact of independent variables: the size of a company, the age of a company, loss ratio, insurance leverage ratio, current ratio, premium growth rate, motor insurance (including land vehicle and land vehicle liability branches), premium retention ratio on the profitability of non-life insurance companies in Turkey. Empirical results showed that the size of a company, the age of a company, loss ratio, current ratio, and premium growth rate affected the profitability of non-life insurance companies. At the same time, there was a statistically significant and positive relationship between the size of a company and premium growth rate and profitability. On the other hand, there was a statistically significant but negative relationship between the age of a company, loss ratio, current ratio, and profitability.

Analysing the profitability of insurance companies in the selected countries of Central and Southeast Europe (Croatia, Poland, Hungary, and Slovenia) in the period from 2010 to 2014, by using panel analysis and variables of a) insurance company-specific factors (size (total gross written premium), type, share of reinsurance (share of premium ceded to reinsurance in total gross written premium), combined ratio, age, organizational form); b) structural factors (ownership) and, c) macroeconomic factors (real GDP per capita growth), Pavić Kramarić et al. (2016) outlined that the variable age and GDP positively affected the profitability of insurance companies.

A similar study using panel analysis was conducted in Ecuador in the period from 2001 to 2017 by using a large number of micro and macro variables, where the obtained results indicated that micro variables net premiums, technical reserves, capital ratio and score efficiency had a significant impact on business insurance companies, while in non-life insurance companies claim level and liquidity ratio had a significant impact on business performance. Out of macro variables, interest rate had a significant impact on the operations of both life and non-life insurance companies, while Herfindahl–Hirschman concentration index had a significant impact on the profitability of life insurance companies (Camino-Mogro & Bermúdez-Barrezueta, 2019).

In Ethiopia in the period from 2002 to 2016, while analysing the impact of both micro and macro variables, Meher & Zewudu (2020) indicated that size, market share, GDP per capita and asset growth had a positive and statistically significant impact on the profitability of insurance companies, and underwriting risk had a negative and statistically significant impact on profitability. The volume of capital, liquidity, and inflation showed a positive relationship with profitability that was not statistically significant, while leverage showed a negative relationship with profitability that was not statistically significant as well.

As for 17 insurance companies in Ethiopia in the period 2005-2020, by using the regression analysis, Muchie & LiJuan (2021) conclude that leverage ratio, liquidity ratio and the tangibility of assets have a negative impact on ROA, while company's age and market share premium growth have a positive impact. Moreover, their results display that capital adequacy ratio and reinsurance dependency do not have a statistically significant impact on profitability.

Based on 107 large, listed US insurance companies for the period 2010–2018, Brogi et al. (2022) find a connection between profitability and solvency of insurance companies and environmental, social, and governance awareness.

Morara & Sibindi (2021) investigate the determinants of profitability of 37 general insurers and 16 life insurers for the period running from 2009 to 2018 in Kenya. The results of pooled OLS, fixed effects and random effects models demonstrate a positive influence of company size and leverage on insurer financial performance and a negative influence of a company's length of business operation.

The specificity of the research conducted by Dorofti & Jakubik (2015) on a sample of 30 European countries was reflected in the analysis of the impact of only macroeconomic variables on the profitability of insurance companies. The empirical results indicated that low interest rates with limited economic growth, poor capital market performance and high inflation negatively affected the profitability of insurance companies.

Applying the metafrontier and four-stage data envelopment analysis (DEA) on life insurance companies in mainland China and Taiwan from 2005 to 2011, Shieh, Hu, & Ang (2020) come to the conclusion that environmental factors have a statistically significant influence on the efficiency of the analysed insurance companies.

Ishtiaq and Siddiqui (2019) apply regression analysis on 9 life insurance companies in Pakistan in the period from 2008 to 2017, and their results show a positive influence of liquidity, insurance risk, equity capital and inflation, as well as negative influence of market share, insurance leverage and GDP on the financial performance of the life insurance companies in Pakistan.

2. Methodology and data

The first phase of our research involved analysing the features of the Serbian insurance market in order to choose the time frame within which we will examine the influence of internal and external factors on the profitability of the life insurance companies. In 2021, 4 reinsurance companies and 16 insurance companies operated on the insurance market of Serbia. The research will focus on the business results of 4 insurance companies that were exclusively engaged in life insurance and 6 composite companies, i.e. the companies that performed both life and non-life insurance in 2021 not including the company that in the chosen period 2015- 2021 ceased to operate.

In the second phase of the analysis, we selected the variables that we would use in the analysis of the impact on return on assets, as the selected indicator of profitability. For this purpose, based on the previous researches in this area, in addition to operating margin, expense ratio and investment ratio, we chose the indicators of liquidity, indebtedness, company size and market share, as well as growth rate of written premium. As a secondary source of data, we used the balance sheets and income statements of the companies listed on the website of the National Bank of Serbia (www.nbs.rs) which also supervises the insurance sector in Serbia.

The description of the variables that we will use in the research is shown in the following table.

Table 2 Dependent and independent variables

Acronym	Variable	Calculation method
ROA	Return on assets (%)	(Profit after tax $_t$ /Total assets $_t$)•100
OM	Operating margin (%)	(Net Operating Income $_t$ / Net earned premium $_t$)•100
ER	Expense ratio (%)	(Operating expenses $_t$ / Net earned premium $_t$)•100
IR	Investment ratio (%)	(Investment return $_t$ /Net earned premium $_t$)•100
GR	Growth rate of written premium of company (%)	(Life premiums written$_t$/ Life premiums written $_{t-1}$-1)•100
S	Company size	Log (Total Assets $_t$)
FL	Log (Financial leverage)	Log (Total debt $_t$ /Equity $_t$)
L	Log (Liquidity ratio)	Log (Current Assets $_t$ / Current Liabilities $_t$)
Ms	Market share (%)	(Life premiums written$_t$ /Total Life premiums written $_t$)•100

Source: the authors

In the previous table, net earned premium in composite companies also includes non-life insurance premiums.

Before we move on to the third phase of the research in which we select the appropriate panel model, after the descriptive analysis, the correlation analysis will be presented to establish the presence of multicollinearity and detect whether the selected variables are suitable for conducting regression analysis.

Afterwards, we will conduct tests aimed at choosing between three panel models: pooled model, fixed effects model, and random effect model. By using F-test we are going to check whether pooled model or fixed effects model is more suitable while using the software package R. The test will confirm whether there are fixed effects. In the case of rejecting null hypothesis, we can conclude that fixed effects model is more adequate.

In order to make a choice between fixed model and random effect model, Hausman test along with EViews software package will be used. If the test shows that we should reject null hypothesis, we can conclude that fixed effects model is a better choice (Gujarati, 2004).

We base our research on the following hypotheses:

Hypothesis 1: Growth of operating ratio has a positive impact on ROA

Hypothesis 2: Growth of expense ratio has a negative impact on ROA

Hypothesis 3: Growth of investment ratio has a positive impact on ROA

Hypothesis 4: Growth of gross written premium has a positive impact on ROA

Hypothesis 5: Growth of an insurance company has a positive impact on ROA

Hypothesis 6: Growth of debt-to-equity ratio has a negative impact on ROA

Hypothesis 7: Growth of liquidity ratio has a positive impact on ROA

Hypothesis 8: Growth of market share has a positive impact on ROA

Linear panel model used in this paper has the following form:

$$ROA_{it} = \alpha_{it} + \beta_1\ OM_{it} + \beta_2 ER_{it} + \beta_3\ IR_{it} + \beta_4\ GR_{it} + \beta_5\ Sit + \beta_6\ FL_{it} + \beta_7\ L_{it} + \beta_8 MS_{it} + u_{it}:$$

α_{it}- intercept,
β_{1it} − regression coefficient of explanatory variable,
u_{it} − stochastic error term,
$i = 1$, M (M=10 of life insurance companies,
$t = 1$,n (N=7- the period from 2015 to 2021.

The assumptions on which fixed individual effects model is based are, among others, that there is no autocorrelation in random errors model and that they are homoskedastic. We will check whether the basic assumptions of the model are violated on the basis of Breusch-Godfrey/Wooldridge test of serial correlation in panel models and Breusch-Pagan

heteroskedasticity test by using software package *R*. The results of the applied tests on selected life insurance companies in the insurance market in Serbia in the observed period 2015-2021 are presented in the following part of the paper.

3. Empirical results

The analysis of the relationship between insurance profitability and selected business indicators of life insurance companies begins with a descriptive analysis whose results are shown in Table 3. The table shows mean, standard deviation, minimum and maximum value of the selected variables for 10 insurance companies in the period from 2015 to 2021.

Table 3 Descriptive analysis

	ROA	OM	ER	IR	GR	S	FL	L	MS
Mean	1.103286	2.205638	39.55491	11.91745	41.58612	13.41182	1.273194	22.19524	10.00000
Median	1.592213	2.489411	35.94491	9.963648	20.76854	15.26928	1.193195	11.27269	7.098833
Maximum	13.26718	4.153030	114.8512	37.36123	387.1430	18.11191	2.791235	126.1142	34.39680
Minimum	-18.16738	-4.014795	17.60218	-0.292514	0.499759	5.681417	-0.569844	1.143963	0.409846
Std. Dev.	4.405601	1.626335	16.60188	9.889086	59.46194	4.302621	0.707574	29.30909	9.290285

Source: the authors' calculation

The following table displays Pearson's correlation coefficients which are used to identify the problem of multicollinearity in empirical papers based on panel models.

Table 4 Pearson's correlation coefficients

Correlation/ Probability	ROA	S	OM	L	IR	GR	ER	FL	MS
ROA	1.000000								

S	0.006367	1.000000							
	0.9583	-----							
OM	0.280439	-0.053888	1.000000						
	0.0187	0.6577	-----						
L	0.080076	0.040791	0.014745	1.000000					
	0.5099	0.7374	0.9036	-----					
IR	0.238687	-0.176479	0.085445	0.652315	1.000000				
	0.0466	0.1439	0.4819	0.0000	-----				
GR	0.197578	0.086978	0.014956	-0.093876	-0.004406	1.000000			
	0.1011	0.4740	0.9022	0.4395	0.9711	-----			
ER	-0.606388	-0.198861	-0.236786	-0.235041	-0.404715	-0.077440	1.000000		
	0.0000	0.0989	0.0484	0.0502	0.0005	0.5240	-----		
FL	0.221171	0.043419	0.490726	-0.115348	0.217512	0.116894	-0.545870	1.000000	
	0.0658	0.7212	0.0000	0.3417	0.0705	0.3352	0.0000	-----	
MS	0.395836	0.194234	0.351110	0.228856	0.359400	0.156634	-0.541321	0.317218	1.000000
	0.0007	0.1071	0.0029	0.0567	0.0022	0.1954	0.0000	0.0075	-----

Source: the authors' calculation

The previous results demonstrate that none of the variables used in the analysis is strongly correlated, i.e. correlation coefficients are less than 0.7 indicating the absence of multicollinearity. Asteriou & Hall (2007) and Hair et al. (2006) in the research imply that a serious problem of multicollinearity does not exist if correlation coefficient is less than 0.9, while in Malhotra (2007) the threshold is 0.75.

We will check the suitability of fixed effects model compared to pooled model on the basis of F - test determining the existence of fixed (individual) effects. Using R statistical software we get:

$F= 4.5734$, df1= 9, df2 = 52, p-value = 0.0001818

Since the obtained *p* value is less than 0.01, we reject the null hypothesis, leading to the conclusion that fixed effects model is more adequate. Hausman test with Eviews statistical software, whose results are shown in the following table, will be used to choose between fixed and random effects models.

Table 5 Hausman test results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	33.801419	8	0.0000

Source: the authors' calculation

The test shows that we should reject null hypothesis, i.e. random effects model is not a good choice and it is better to opt for fixed effects model shown in Table 6.

Table 6 Results of the fixed effects model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OM	1.150812	0.371803	3.095220	0.0032
ER	-0.254043	0.051713	-4.912522	0.0000
IR	0.051642	0.055601	0.928793	0.3573
GR	0.006130	0.006323	0.969368	0.3368
S	-0.041144	0.088303	-0.465937	0.6432
FL	-2.300934	1.013142	-2.271088	0.0273
L	2.183144	0.647975	3.369178	0.0014
MS	0.113027	0.088828	1.272421	0.2089
C	4.486157	2.826356	1.587258	0.1185
R-squared	0.714154			
Adjusted R-squared	0.620704			
F-statistic	7.642122			
Prob (F-statistic)	0.000000			

Source: the authors' calculation

Based on the coefficient of determination of 0.714154, it can be concluded that 71.42% of the variations in ROA can be explained by the selected variables in the model. The values of F-statistics show the existence of a statistically significant linear relationship between dependent and independent variables.

The results show a statistically significant positive impact of operating ratio and liquidity ratio on ROA, and a statistically significant negative impact of expense ratio and financial leverage on ROA. The other variables were not statistically significant to explain ROA size.

In the following part of the paper, we are going to test the assumptions of non-existence of autocorrelation and homoskedasticity of random error model.

The results of the Breusch-Godfrey/Wooldridge test, whose task is to detect serial correlation in panel models, are as follows:

chisq = 4.464463, df = 3, p-value = 0.2155

We can conclude that there is no serial correlation in the model at the significance level of 5%. The results of Breusch-Pagan test used to establish the presence of heteroskedasticity are as follows:

BP = 4.7266, df = 2, p-value = 0.09411

Based on the previous results, null hypothesis of the presence of homoskedasticity cannot be rejected at the significance level of 5%.

Discussion and concluding remarks

The aim of this study was to examine the impact of the selected independent variables on ROA of the companies that performed life insurance business operations in the territory of the Republic of Serbia in 2021, and we excluded from the analysis the companies that ceased their operations in the period from 2015-2021. After the correlation analysis showed that there was no problem of multicollinearity and that the selected variables were suitable for conducting the regression analysis, we proceeded to create a linear panel model. To this end, based on the results of F-test, whose task was to indicate whether pooled model or fixed effects model was more adequate along with Hausman test which served to make a choice between fixed and random effects models, we applied fixed effects model on the selected variables. Fixed effects model was also used in Kočović et al. (2014) with the aim to describe the impact of internal factors on ROA on the sample of 12 non-life insurance companies that operated in the territory of the Republic of Serbia in the period 2006-2013. This model was also chosen by Olarewaju & Msomi (2021) for analysing 56 non-life companies in South African Development Community in the period from 2008 to 2019, Muchie & LiJuan (2021) in case of 17 insurance companies in Ethiopia in the period from 2005 to 2020, Morara & Sibindi (2021) on a sample of 37 non-life and 16 life insurance companies in Kenya in the period 2009-2018, and Kaya (2015) who researched the non-life insurance market in the period 2006-2013 in Turkey.

In our study, the coefficients obtained using fixed effects model show that the growth of operating ratio has a statistically significant

positive impact on ROA, while the growth of expense ratio has a statistically significant negative impact on ROA; therefore the first and second hypotheses cannot be rejected. The results of Bhattarai (2020) confirmed a positive impact of the operating ratio on ROE indicator.

As assumed by the third and fourth hypotheses, the growth of investment ratio and gross written premiums has a positive impact on ROA; however, the regression coefficients are not statistically significant. Contrary to the expectation that the size of insurance companies has a positive impact on ROA (hypothesis 5), negative regression coefficient was obtained, but it is not statistically significant.

The results show that the growth of debt-to-equity ratio has a negative statistically significant impact on ROA, while the growth of liquidity ratio has a positive impact on ROA; thus the sixth and seventh hypotheses cannot be rejected. In addition, the size of regression coefficient indicates that ROA is most sensitive to changes in these two ratios. The results of Olarewaju & Msomi (2021) also showed that financial leverage had a negative impact on ROA. In contrast to our results, Ishtiaq & Siddiqui (2019) indicated a positive impact of liquidity ratio on ROA, while the results of Muchie & LiJuan (2021) show a negative impact, yet not statistically significant.

Applying the chosen model in the observed period, we have realised that the growth of market share has a positive impact on ROA (hypothesis 8), but it is not statistically significant. The results of Camino-Mogro & Bermúdez-Barrezueta (2019) which analysed the life and non-life insurance market of Ecuador in the period 2001-2017, showed that the life insurance market had a statistically significant negative effect on the profitability of insurance companies.

We can conclude that insurance companies that conducted life insurance business activities in the Serbian market, which in the observed period were able to manage operating costs, debt-to-equity ratio and liquidity well, were more profitable. Regardless of the fact that our results do not show that the growth of insurance premiums is an important factor for profitability, bearing in mind that the life insurance market in Serbia is still underdeveloped, special attention should be paid to the growth potential of this market in the modern market conditions characterized by numerous demographic, political, social, and economic changes.

The limitations of our profitability analysis can be seen in the fact that we base it on the entire portfolio of life insurance products, while due to the non-transparency of data on the characteristics of life insurance products, we were unable to analyse the profitability of individual life insurance products and the risks characteristic of these products, as Sakálová and Krčová (2016) had done on the example of Loan protection insurance as a type of term insurance product.

References

Ahmed, D., Xie, Y., & Issam, K. (2021). Investor confidence and life insurance demand: can economic condition limit life insurance business? *International Journal of Emerging Markets.* https://doi.org/10.1108/IJOEM-06-2020-0650

Asteriou, D., & Hall, S. G. (2007). *Applied econometrics: a modern approach using EViews and Microfit*, revised edition. Hampshire: Palgrave Macmillan.

Bhattarai, B. P. (2020). Factors influencing profitability of insurance companies in Nepal. *International Journal of Management*, *11*(9). 9-14. https://doi.org/10.34218/IJM.11.9.2020.002

Brogi, M., Cappiello, A., Lagasio, V., & Santoboni, F. (2022). Determinants of insurance companies' environmental, social, and governance awareness. *Corporate Social Responsibility and Environmental Management 29* (5), 1357-1369. https://doi.org/10.1002/csr.2274

Camino-Mogro, S., & Bermúdez-Barrezueta, N. (2019). Determinants of profitability of life and non-life insurance companies: evidence from Ecuador. *International Journal of Emerging Markets*, *14*(5), 831-872. https://doi.org/10.1108/IJOEM-07-2018-0371

Cicea, C., Popa, I., Marinescu, C., & Cătălina Ștefan, S. (2019). Determinants of SMEs' performance: evidence from European countries. *Economic research-Ekonomska istraživanja*, *32*(1), 1602-1620. https://doi.org/10.1080/1331677X.2019.1636699

Dorofti, C., & Jakubik, P. (2015). Insurance Sector Profitability and the Macroeconomic Environment. *EIOPA Financial Stability Report - Thematic Articles 4*, 56-71.

Gujarati, D.N. (2004). *Basic econometrics*. New York: Tata McGraw Hill.

Hair, J., Black, W., Babin, B., Anderson, R. & Tatham, R. (2006). *Multivariate Data Analysis (6th ed.)*, New York: Pearson Prentice Hall.

Ishtiaq, N., & Siddiqui, D. A. (2019). Factors affecting financial performance of life insurance sector in Pakistan, *International Journal of Social and Administrative Sciences, 4(2),* 178-199. http://dx.doi.org/10.2139/ssrn.3400728

Kaya, E.Ö. (2015). The effects of firm-specific factors on the profitability of non-life insurance companies in Turkey. *International Journal of Financial Studies 3 (4),* 510-529. https://doi.org/10.3390/ijfs3040510

Kočović, J., Paunović, B., & Jovović, M. (2014). Determinants of business performance of non-life insurance companies in Serbia. *Ekonomika preduzeća*, *62*(7-8), 367-381. https://doi.org/10.5937/ekopre1408367K

Leković, M., Jakšić, M., Gnjatović, D. (2020). Portfolio performance evaluation of mutual funds in the Republic of Serbia. *Serbian Journal of Management*, *15 (2)*, 295-318. https://doi.org/10.5937/sjm15-21145

Malhotra, N. (2007). *Marketing research; an applied orientation (5th ed.)*, New Jersey: Pearson/Prentice Hall.

McGee, H. M., & Crowley-Koch, B. J. (2021). Performance assessment of organizations. *Journal of Organizational Behavior Management*, 41(3), 255-285. https://doi.org/10.1080/01608061.2021.1909687

Meher, K. C., & Zewudu, T. (2020). Determinants of firms' internals & macroeconomic factors on financial performance of Ethiopian insurers. *DLSU Business & Economics Review 29 (2),* 71-80.

Mitrašević, M. (2010). *Actuarial and financial analysis of capital adequacy of non-life insurance companies*, Unpublished doctoral dissertation, Faculty of Economics Belgrade, Belgrade.

Mitrašević, M., Pjanić, M., Novovic Burić, M. (2022). Relationship between insurance market and economic growth in the European Union, Politická ekonomie, 70 (4), 395-420. https://doi.org/ 10.18267/j.polek.1358

Morara, K., & Sibindi, A. B. (2021). Determinants of financial performance of insurance companies: empirical evidence using Kenyan data. *Journal of Risk and Financial Management*, *14*(12), 566. https://doi.org/10.3390/jrfm14120566

Muchie A. Z., LiJuan S. (2021). The microeconomic determinants of insurance profitability in Ethiopian insurance industry—evidenced from life and non-life insurance products. *Journal of Insurance and Financial Management, 5(1),* 87-123

Norikumo, S. (2021). Informatization of Life Insurance Companies and Organizational Decision Making (Case of Nippon Life Insurance Company). In: Czarnowski, I., Howlett, R.J., Jain, L.C. (eds) *Intelligent Decision Technologies. Smart Innovation, Systems and Technologies, vol 238 (pp. 649-657)* Springer, Singapore. https://doi.org/10.1007/978-981-16-2765-1_54

Ofori-Boateng, K., Ohemeng, W., Ahawaadong Boro, E., & Kwame Agyapong, E. (2022). Efficiency, market structure and performance of the insurance industry in an emerging economy. *Cogent Economics & Finance*, *10*(2068784), 1-14. https://doi.org/10.1080/23322039.2022.2068784

Olarewaju, O. M., & Msomi, T. S. (2021). Intellectual capital and financial performance of South African development community's general insurance companies. *Heliyon*, *7*(4), 1-10. https://doi.org/10.1016/j.heliyon.2021.e06712

Ostojić, S. (2014). Global trends in the insurance market and the functioning of the insurance market in Serbia. *Strategic Management*, *19 (3),* 18-30.

Pavić Kramarić, T., Miletic, M., & Pavić, I. (2017). Profitability determinants of insurance markets in selected Central and Eastern European countries. *International Journal of Economic Sciences, International Institute of Social and Economic Sciences*, 6 (2), 100-123. https://doi.org/10.52950/ES.2017.6.2.006

Pjanić M., Kalaš B., Vasić N. (2016). Analysis of life insurance market in Serbia and countries in the region. *Anali Ekonomskog fakulteta u Subotici*, *36*, 145-160.

Pjanić, M., Milenković, N., Kalaš, B., & Mirović, V. (2018). Profitability determinants of non-life insurance companies in Serbia. *Ekonomika preduzeća*, 66 (5-6), 333-345. https://doi.org/10.5937/EKOPRE1806333P

Sakálová, K., Ondrejková K. I. (2016). Measures of profitability in life insurance product management, *Strategic Management, 21(1),* 8-15.

Shieh, H.-S., Hu, J.-L., & Ang, Y.-Z. (2020). Efficiency of Life Insurance Companies: An Empirical Study in mainland China and Taiwan. *SAGE Open*, 10(1). https://doi.org/10.1177/215824402090206

Zhao, T., Pei, R., & Pan, J. (2021). The evolution and determinants of Chinese property insurance companies' profitability: A DEA-based perspective. *Journal of Management Science and Engineering*, *6*(4), 449-466. https://doi.org/10.1016/j.jmse.2021.09.005

✉ **Correspondence**

Mirela Mitrašević

Faculty of Business Economics in Bijeljina, University of East Sarajevo, Semberskih ratara bb, 76300, Bijeljina, Bosnia and Herzegovina
E-mail: mirela.mitrasevic@fpe.ues.rs.ba