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WHAT ARE THE FACTORS THAT DETERMINE RISK-ADJUSTED RETURNS OF CROATIAN LIFE INSURERS?

Abstract

Purpose: When conducting their business, insurers face various risks that are controlled for in order to mitigate them and protect the insured, inter alia. Moreover, being aware of the factors that determine the reward-to-risk ratio for insurers is also of crucial importance. Thus, the aim of this research is to identify potential factors that influence risk-adjusted returns of life insurance companies.

Methodology: The analysis is conducted on a sample of life insurers that operated in Croatia in the period from 2016 to 2020. For this purpose, risk-adjusted ROA, i.e. the Sharpe ratio, is used as a risk-adjusted return measure, while independent variables encompass several insurance firm-oriented and insurance industry-specific variables, as well as variables depicting the level of macroeconomic development, stock market, bond market and institutional development.

Results: After conducting dynamic panel analysis, the obtained results suggest that the premium growth rate, asset-based size, the net premium to surplus ratio, i.e. leverage, as well as bond market development are significant factors when determining risk-adjusted returns.

Conclusion: Risk-adjusted returns are determined by insurance firm-oriented factors which are important not only to investors but also to insurance market regulators and insurance firm managers.

Keywords: Risk-adjusted returns, life insurers, Croatia

1. Introduction

The importance of the role of insurance business is reflected in the provision of economic protection contributing to the development of the financial system and economy of a country. Insurance firms are an important part of the Croatian financial system with a share of 6.47% in the total assets of all financial institutions in 2021, after commercial banks and mandatory pension funds (Croatian Insurance Bureau, 2021a). However, when observing the share of the life insurance premium in total premiums, which was 25.27% in 2020 (Croatian Insurance Bureau, 2021b), it is evident that it significantly lags behind the EU average of 53% (Insurance Europe, 2020a). Moreover, the share of the life insurance premium in GDP in 2020 in Croatia was 0.73% compared to the EU average of 3.96%, while insurance density was EUR 88, lagging behind EUR 1,178 realised in the EU (Insurance Europe, 2020b).

Although insurance "contributes to financial stability, including by providing long-term sources of funding to other institutions and by promoting risk management through the pooling and diversification of risk" (IAIS, 2019), there are various risks inherent in insurers which need to be identified, addressed and managed. The legal framework regulating the insurance industry is constantly evolving with the aim of controlling risk-taking, mitigating risks of failure and protecting the insured (Gaganis et al., 2015). Although a relatively large number of studies deal with the determinants of insurers' risk (Baranoff & Sager, 2003; Chen et al., 2010; Cheng et al., 2011; Eling & Marek, 2014; Lee & Lin, 2016), the studies examining determinants of risk-adjusted returns are rather scarce.

Although there are papers dealing with determinants of the Croatian insurance market, they mostly employ accounting-based performance measures such as ROA and ROE (e.g. Ćurak et al., 2011; Kramarić et al., 2018; Pavić Kramarić et al., 2018). Moreover, since traditional performance measures fail to consider the risks of the underlying business (Crouhy et al., 1999), our study aims to determine the factors that influence risk-adjusted returns of life insurers. Specifically, distinguishing several attributes of insurer-oriented, industry-specific, stock market, bond market and institutional development as well as macroeconomic variables, the authors estimate the model using dynamic panel analysis in order to understand the factors that influence risk-adjusted performance of Croatian insurers. By measuring risk-adjusted returns with the Sharpe ratio, which takes into account profits but also their variability, the authors also consider insurer's risk tolerance. Empirical analysis covers 11 insurance companies including insurers conducting exclusively life insurance activities as well as the life segment of composite insurers that were active in the 2016-2020 period. Thus, our study adds to scientific thought given the fact that this is the first analysis of factors influencing risk-adjusted returns of insurance companies on the example of an emerging economy. The findings might be of interest to various stakeholders encompassing supervisory bodies, shareholders, managers, and the insured.

The rest of the paper is organised as follows. After the introductory part, theoretical and conceptual background is given in the literature review section. A methodology and data are provided in the third section. Furthermore, the fourth section presents empirical data and results, while a conclusion follows in the fifth section.

2. Literature review

Despite the fact that understanding determinants of insurers' reward-to-risk ratio is essential to regulators, investors and managers, as stated by Zhang et al. (2019), research dealing with determinants of risk-adjusted returns of insurers are rare, and the most prominent ones are presented below.

One of the studies dealing with risk-adjusted returns in the insurance industry is by Ma & Elango (2008) who investigate whether exposure to international markets improves risk-adjusted returns of property-liability insurers that operated in the 1992-2000 period. As a risk-adjusted return the authors employ risk-adjusted ROA by dividing insurer's ROA with its standard deviation. In addition to product diversification, several other explanatory variables are encompassed with the analysis such as market coverage, size, group dummy, stock insurer dummy, independent agency dummy, investments in common stocks, and usage of reinsurance. Their findings reveal that specialised insurers regarding product lines offered perform better in terms of risk-adjusted returns when they engage in international operations.

Gaganis et al. (2015) examine how regulations concerning capital requirements, technical provisions, investment restrictions, corporate governance and internal control, supervisory power and disclosure requirements affect profitability expressed with ROA and risk-adjusted returns expressed with a modified Sharpe ratio. Furthermore, a set of firm-specific attributes is also controlled for. Since they deal with European insurers from 18 countries, the authors also consider the macroeconomic environment they operate in, stock market development, overall quality of institutions and legal origins. Seven models are estimated for each dependent variable with one of the regulatory variables introduced alternately. In the models where the Sharpe ratio acted as a dependent variable, three regulatory requirements show statistically significant influence including capital requirements, technical provisions, corporate governance and the internal control index.

Another paper oriented to risk-adjusted returns in the insurance industry is by Shim (2017) who examines the effects of product diversification on risk-adjusted returns of US non-life insurers that operated in the 1996-2010 period. In particular, the author wants to find out whether the offering of multiple products by financial firms such as insurers leads to the exploitation of economies of scope. This is done using a quantile regression method which reveals that product diversification negatively affects risk-adjusted returns in lower quantiles and vice versa. However, in addition to product diversification variables and its impact on different performance measures, the author employs control variables that include size, leverage, geographical diversification, asset growth, stock investment, industry concentration, reinsurance as well as dummy variables reflecting mutual, group, publicly traded shares and distribution system. The influence of control variables is not uniform but depends on the quantile as well as on the dependent variable used.

Consigli et al. (2018) introduce a dynamic stochastic programming formulation by analysing the implications for capital allocation, as well as risk-return trade-offs of an optimisation problem. Specifically, the authors introduce risk-adjusted returns containing investment value surplus (IVS) and return on risk-adjusted capital (RoRAC) in asset-liability management connecting "the definition of the optimal strategy to a sufficient return generation and an effective control of the risk exposure." (Consigli et al., 2018, p. 602). Using a global insurance company, the authors emphasise the effectiveness of applied dynamic stochastic programming which is relevant for both institutional investors and regulators.

Zhang et al. (2019) examine the impact of insurer-oriented financial attributes and executive compensation structures on both insurer risk and reward-to-risk. In order to measure reward-to-risk, the authors employ the Sharpe and Treynor ratios, while explanatory variables include profitability, liquidity, leverage, size, business growth, management compensation, type of insurer and major stock exchange. Their analysis is conducted for life, non-life and reinsurance companies altogether that were active in the 1992-2011 period. Among other things, their findings suggest that profitability and executive incentive pay positively affect the Sharpe ratio, whereas the opposite is true for the size variable.

3. Methodology and data

For the purpose of econometric data analysis, dynamic panel data analysis was employed in the research. The dynamic panel data was estimated using Arellano & Bond's (1991) estimator. The Arellano and Bond dynamic panel estimator with independent variables is shown by the following equation:

$$y_{it}=\mu+\gamma y_{i,t-1}+x'_{it}\beta+\alpha_i+\varepsilon_{it}, \quad i=1,\dots,N,\ t=1,\dots,T \ , \tag{1}$$

where y_{it} is the dependent variable presented with risk-adjusted ROA or the Sharpe ratio, $y_{i,t-1}$ is a lagged dependent variable, x'_{it} is a matrix of type 1×K independent variables discussed below, α_i is an unobserved individual effect and e_{it} is an unobserved white noise disturbance, while γ and β are regression coefficients.

A risk-adjusted return represents the profit in terms of the amount of risk assumed to achieve it. The authors have opted for an approach proposed by Gaganis et al. (2015) and Shim (2017). Specifically, a risk-adjusted return is calculated as follows:

$$Risk-adjusted\ ROA=\frac{ROA}{\sigma \mathrm{ROA}} \ , \tag{2}$$

i.e. as an insurer's ROA over a three year-varying standard deviation of ROA, where ROA represents an accounting-based measure of profitability calculated as net profit over total assets, while a standard deviation of ROA, calculated in a three-year window, reflects volatility of investment returns, with the larger the standard deviation, the wider the range of returns.

A three-year rolling window is used following the work of Cummins et al. (2017) and Pasiouras & Gaganis (2013), who deal with financial soundness expressed by the Z-score, the calculation of which requires, *inter alia*, the standard deviation of ROA.

The risk-adjusted return, known as the Sharpe ratio, expresses the profit of an investment relative to the degree of risk taken throughout the observed period. It is thought to be a suitable indicator of an insurer's risk due to the fact that it captures the total return volatility (Shim, 2017). Firms experiencing greater volatility in their profits achieve lower values of risk-adjusted returns (Ma & Elango, 2008). With all else being equal, the higher the risk-adjusted ROA, the better.

Based on the relevant literature, the authors have identified a set of firm-oriented, insurance industry-specific, stock market, bond market and institutional development variables as well as macroeconomic variables that might explain a significant portion of variations in risk-adjusted returns. These are size, premium growth, leverage, a share of premium in GDP, stock market capitalisation, bond market development, institutional development variables and GDP per capita growth.

The size of an insurer, calculated as the natural logarithm of total assets (SIZE), is employed in the analysis following e.g. Ma & Elango (2008), Gaganis et al. (2015), and Zhang et al. (2019). Larger insurers may exploit economies of scale, experience lower volatility of claim costs and face lower risks (Shim, 2017; Camino-Mogro & Bermúdez-Barrezueta, 2019; Killins, 2020), and, according to Zhang et al. (2019), these are the reasons why larger insurers achieve a greater reward-to-total-risk. Therefore, a positive sign of this variable might be expected. A positive impact of the size variable on the risk-adjusted return was found by Ma & Elango (2008), Gaganis et al. (2015), whereas Zhang et al. (2019) provide evidence of its negative impact on the Sharpe ratio.

Business growth can be presented with asset growth but due to the fact that the focus of our analysis is on insurers, we decided that business growth should be presented with premium growth (prem_growth). It is calculated as the percentage change in gross written premium of an insurer in each year using the following formula:

$$premium\ growth = \frac{GWP_t - GWP_{t-1}}{GWP_{t-1}} * 100 \qquad (3)$$

While exploring determinants of risk-adjusted returns, Zhang et al. (2019) also employ business growth expressed as the percentage change in net premium earned. If insurers are characterised with healthy business growth, they "are more likely to be financially strong and perceived as less risky by investors due to improved cash-flow performance and added economic value" (Zhang et al., 2019, p. 9), and a positive impact on risk-adjusted returns can be expected. Nevertheless, the same authors also note that companies with higher business growth require more capital and resources to sustain that growth, adding that higher uncertainty and costs of capital increase their vulnerability. Moreover, since Chen & Wong (2004) add that insurers that strictly focus on growth might neglect other important goals, which would consequently result in self-destruction, a negative sign of this variable can also be expected.

The leverage ratio (LEV) is included in the analysis as net premium to policyholder surplus following Shim (2017). As stated by Shim (2017, p. 8), "if the insurers issue new policies that generate additional liabilities, they must be supported by surplus due to regulatory capital requirement". Leverage expressed as net premiums to policyholder surplus negatively affects insurers' financial soundness, as found by e.g. Shim (2015) and Cummins et al. (2017), since lower values of net premium to policyholder surplus is perceived as financial strength. Since "customers of financial intermediaries are strongly risk-averse to firm default risk and customers are willing to pay higher premium for safer firms" (Shim, 2017, p. 8), a negative influence of this variable is expected.

In order to reflect the level of life insurance market development, the share of premium in GDP (PREM_in_GDP) is employed in the analysis following the papers of Pasiouras & Gaganis (2013) and Cummins et al. (2017). These authors expect that more developed insurance markets will experience greater financial soundness. Thus, a positive influence of this variable on the risk-adjusted return can be expected as well.

Stock market capitalisation represents the share of market capitalisation in GDP (STOCK_CAP) with the aim of controlling for stock market development. Citing Demirgüç-Kunt & Levine (1996), Gaganis et al. (2019, p. 108) add that "large stock markets are more liquid thus offering the ability to mobilise capital and diversify risk". Moreover, in an environment characterised by increased stock market activity, a firm's preference for equity over debt increases (Ramli et al., 2019) enhancing firm's performance. However, Gaganis et al. (2015) find its negative impact on risk-adjusted returns represented with the Sharpe ratio. Such finding can be rationalised with the fact that in the case of greater stock market development, insurers might invest in more volatile types of assets including stock resulting in higher standard deviation of ROA (Shim, 2017). Thus, the expected sign of this variable is ambiguous.

Since insurance firms are considered as very conservative long-term investors and in order to take into account specifics of the Croatian insurance market, the level of bond market development (BOND) is employed in the analysis as well. Specifically, the share of investments in bonds amounted to 66.3% in the insurers' asset structure (Croatian Insurance Bureau, 2021b). The level of bond market development is expressed by total bonds outstanding issued on both the domestic and the international market as a percentage of the country's GDP (Burger & Warnock, 2006). Since debt instruments are considered to be a less risky form of investment compared to equity investments such as stocks and might be more reliable and consistent over a number of years, a positive sign of this variable is expected.

In order to capture the institutional setting, we include an institutional development variable (INST_DEV) that encompasses several different governance features including voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and corruption control. The average of these six factors was also used in Gaganis et al. (2015) who investigated risk-adjusted returns and found their impact on the Sharpe ratio to be either insignificant or positive. Since according to the Worldwide Governance Indicators project reports, governance implies, among others, the capability of the governments to effectively create and implement sound policies as well as the respect of the state and its citizens for the institutions that carry out economic and social interactions among them, we also expect a positive sign of this variable. Institutional development is also used by e.g. Gaganis et al. (2019), who explore risk-taking and national culture, Cummins et al. (2017) and Rubio-Misas (2020), while investigating financial soundness of insurers.

GDP per capita growth (GDP_pc_growth) is encompassed with the analysis in order to capture the macroeconomic environment the insurers operate in. Gaganis et al. (2015) find a statistically significant and positive impact of this variable in all estimated models.

The data necessary for conducting such analysis are collected from multiple sources. In order to calculate insurer-specific variables, data from unconsolidated annual reports were collected either through publicly available insurer corporate websites or the Financial Agency (FINA). The data on market capitalisation of listed domestic companies expressed as percentage of GDP as well as data on GDP per capita growth are retrieved from the World Bank database (World Bank 2021a; 2021b), while the insurance industry-oriented data regarding the share of premium in GDP stem from the European insurance industry database published by Insurance Europe. Data on total bonds outstanding necessary for the calculation of bond market development indicators are retrieved from the Croatian National Bank (2021). Furthermore, institutional development indicators are collected from the Worldwide Governance Indicators (World Bank, 2021c).

4. Empirical data and results

Descriptive statistics for all individuals in the research period considered are provided in Table 1.

Table 1 Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
RISK-ADJUSTED ROA	55	4.87	9.02	-18.55	56.75
Prem_growth	55	1.53	18.14	-33.64	82.03
SIZE	55	20.68	1.38	17.57	22.16
LEV	55	0.88	0.48	0.33	2.43
STOCK_CAP	55	37.39	2.66	32.95	40.50
INST_DEV	55	0.44	0.01	0.43	0.45
PREM_in_GDP	55	0.79	0.04	0.73	0.84
BOND	55	62.02	3.86	59.13	69.75
GDP_pc_growth	55	0.47	4.20	-7.69	4.06

Source: Authors

The matrix of Pearson correlation coefficients was implemented to test the problem of multicollinearity. The correlation matrix for independent variables is shown in Table 2. Since the absolute value of the Pearson coefficient greater than 0.7 indicates a strong correlation between independent variables, it is evident that the multicollinearity problem occurs between the institutional development variable (INST_DEV) and GDP per capita growth and bond market development variables. Therefore, variable institutional development (INST_DEV) was omitted from further analysis.

Table 2 Correlation matrix

	RISK-ADJUSTED ROA	Prem_growth	SIZE	LEV	GDP_pc_growth	STOCK_CAP	INST_DEV	PREM_in_GDP	BOND
RISK-ADJUSTED ROA	1.0000								
Prem_growth	-0.1048	1.0000							
SIZE	0.3013*	-0.1633	1.0000						
LEV	-0.0447	0.2717*	-0.0282	1.0000					
GDP_pc_growth	0.1605	0.3700*	-0.1055	0.1828	1.0000				
STOCK_CAP	0.0708	-0.1984	-0.1424	-0.0749	-0.3153*	1.0000			
INST_DEV	0.175	0.3576*	0.0242	0.1999	0.9074*	-0.5209*	1.0000		
PREM_in_ GDP	0.0986	0.3727*	-0.3841*	0.2785*	0.6861*	-0.1417	0.6915*	1.0000	
BOND	-0.1597	-0.3409*	0.0618	-0.2051	-0.6044*	0.4224*	-0.9197*	-0.6039*	1.0000

*p<10%
Source: Authors

After examining the potential multicollinearity problem and omitting the institutional development (INST_DEV) variable from further analysis, the Arellano and Bond dynamic panel estimator was used in the research. Table 3 shows the results of dynamic panel data analysis. The Sargan test and Arellano-Bond test results for autocorrelation are also provided in the same table. Based on the p-value of the Sargan test, which is 0.3689, it can be concluded that the instruments are not correlated with the residuals and that there is no endogeneity problem in the model. Based on the p-value of the m2 test (the Arellano-Bond test for autocorrelation of the second order), which is 0.3359, the null hypothesis of no correlation is not rejected. Therefore, it can be concluded that there is no autocorrelation problem in the model.

Table 3 Parameter estimates of dynamic panel model

Variables	RISK-ADJUSTED ROA
RISK-ADJUSTED ROA L1	0.2666637*** (0.0725586)
Prem_growth	0.2809238** (0.1375816)
SIZE	-25.52818** (10.46226)
LEV	-17.33386* (9.507569)
GDP_pc_growth	-0.4932825 (0.3001593)
STOCK_CAP	0.8844465 (0.7356879)
PREM_IN_GDP	8.795477 (66.83263)
BOND	-0.8544198*** (0.3239708)
cons	570.1518** (282.0401)
Number of instruments	11
Number of groups	11
Sargan test	p-value = 0.3689
Arellano-Bond test for autocorrelation - order 2	p-value = 0.3359

*, **, *** Statistically significant at the 10%, 5%, and 1% level, respectively. Robust standard errors are in parentheses.
Source: Authors' calculation

As presented in Table 3, premium growth rate (prem_growth), size (SIZE), leverage expressed by the net premium to surplus ratio (LEV) and BOND variables are statistically significant factors when explaining risk-adjusted returns of Croatian life insurers. Specifically, the size variable based on total assets negatively affects risk-adjusted returns of Croatian life insurers.

Insurer size has a negative impact on risk-adjusted ROA, i.e. the Sharpe ratio, which indicates that larger life insurers do not operate as efficiently as their smaller counterparts. Despite the common view that larger insurers exploit economies of scale and consequently face a lower level of risk and improved risk-adjusted returns, such finding is not uncommon. In particular, this is also found by Zhang et al. (2019, p. 16), who explain the negative impact of size on the Sharpe ratio with the fact that "risk-oriented activities do not generate adequate profit to compensate the increased risk for larger… insurers."

The premium growth rate has a positive impact on risk-adjusted returns measured by the Sharpe index. According to the healthy business growth hypothesis suggested by Zhang et al. (2019), strong and stable business growth improves the reward-to-total risk ratio.

Moreover, leverage, expressed by the net premium to surplus ratio has a statistically significant and negative impact on risk-adjusted returns. Such finding is in accordance with authors' expectations. The negative sign of the leverage ratio is also found by Shim (2017, p. 22) suggesting "that insurers with lower premium-to-surplus ratios achieve higher risk-adjusted performance, possibly because risk-averse policyholders are willing to pay higher prices for safer insurers".

Contrary to our expectation, the level of bond market development negatively affects firm performance. This can be rationalised by the fact that the bond market is generally considered risk-free, thus, it comes with low yields. Interest rates on bonds are typically lower than stockholders require, which is especially true in a low-interest rate environment as it has been in recent years.

5. Conclusion

It can be said that research investigating factors that determine risk-adjusted returns in the insurance industry is still underdeveloped. Thus, this paper provides evidence of the factors exploring risk-adjusted returns in an emerging economy such as Croatia using a sample of 11 life insurers in the period 2016-2020. To this end, the authors estimate a dynamic panel model using a set of firm-oriented, industry-specific variables, stock and bond market development indicators as well as the macroeconomic variable. In particular, the findings reveal a negative impact of size based on total assets, leverage expressed as the net premium to surplus ratio, as well as the bond market development indicator, while premium growth proved to have a positive effect on risk-adjusted return represented by the Sharpe ratio.

Our research has certain limitations that are primarily reflected in the fact that the sample included in the analysis is relatively small, although it encompasses all insurers that deal exclusively with life insurance business and the life segment of composite insurers. Moreover, the analysis period is also rather short, but imposing a longer observation period could result in a loss of observations as not all life insurers would be present in the market for a longer period of time. Future research might address the non-life insurance segment to allow for comparability. Furthermore, since risk-adjusted returns might be affected by various factors, some other factors can be taken into account, depending on data availability. Moreover, it might be interesting to extend the sample to other insurance markets that are comparable in terms of the level of development with the aim of observing the specificities that affect their risk-adjusted returns.

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