

## **Investment Portfolio and Insurance Soundness: Evidence from Indonesia**

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This study examines the annual financial reports of all insurance companies to analyze the relation of investment portfolio and insurance soundness in Indonesia from 2008 – 2019 using Panel Random Effect Model. Our analysis shows that insurers' investment allocation affects their soundness. We also find that insurers' specific characteristics, risk profile, profitability, and total assets are positively associated with insurers' soundness. In addition, our results show that gross domestic product growth is positively associated with insurers' soundness. Our findings implied several policy implications. First, our study supports Indonesia Financial Services Authority/Otoritas Jasa Keuangan's (OJK) effort to enforce the supervision of insurers' investment strategy. Next, this study implied that the regulator supervision and development policy need to focus on high-risk insurers, especially their investment strategy.

*Keywords:* Insurance, Investment, Probability of Default, Soundness, Indonesia

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## 1. Introduction

The insurance industry in Indonesia has been on enormous growth in the past decade. Based on the amount of their investment allocation, the growing of the insurance industry can be scrutinized by the increase in investment in the capital market that have reached 200 percent from the last ten years. Stocks and mutual funds are the two main investment instruments for insurance companies in Indonesia's capital market with the fastest growth. By the end of 2020, the amount of insurance companies' investment allocation in stock market and mutual funds were IDR 152.69 trillion and IDR 186.22 trillion respectively, which constitute more than 50% of the total investment of insurance companies. The trend of positive growth in stocks and mutual funds then has become consideration of insurance companies to allocate their investment in capital market products.

Investment allocation by insurance companies have been regulated in POJK Number 71/POJK.05/2016 regarding Financial Health of Insurance and Reinsurance Companies, and POJK Number 72/POJK.05/2016 about Health Insurance and Reinsurance Companies with Sharia Principles, with quantitative and qualitative limitations that can be classified as follows.

Table 1. Quantitative and Qualitative Limitations of Investment Allocation

No.	Type of Investment	Quantitative Limit		Qualitative Limit
		Total Investment	Entity	
1.	Deposit -Commercial banks - BPR (Rural Banks)	- 5%	20% per Bank 1% per BPR (Rural Banks)	None
2.	T-Bills	-	-	None
3.	Stocks	40%	10% per Issuer	Stocks listed on the stock exchange
4.	Mutual Fund	50%	20% per MI	- Public offering Mutual Funds have received an effective statement from OJK. - Limited participation Mutual Funds have been registered with OJK.
5.	Corporate Bonds & Sukuk	50%	20% per Issuer	<i>Investment Grade</i>

In general, these provisions have mitigated investment risk of insurance companies in the capital market by regulating the maximum amount of investment in stocks and mutual funds, as well as regulating several qualitative limitations, i.e., it has obtained permission from the authority; it got listed from the authority, etc.

Even though the act of investment risk mitigation has been implemented by the authority for some time, the risk of investment allocation in the capital market by insurance companies still needs to be concerned about considering that stock prices are very sensitive to external sentiment. High stock price volatility eventually will cause insurance companies to face greater liquidity and solvency risks (Kopcke, 1996; Davis, 2000; Boon et al., 2018). Investment activities in the capital market with high level of risk are feared to deeply impacting the ability of insurance companies' to settled their obligations to the customers.

Thus, this will be interesting if we examine in further the investment risk from the allocation of the insurance company's investment, in order to identify the optimal investment limits in the Indonesian capital market. The results of this study are expected to be a policy recommendation for the practice of insurance companies in Indonesia, especially in order to mitigate excessive risk concentration in the implementation and strategy of insurance companies.

The importance of the regulatory and supervisory role of authorities on the health level of insurance companies (Pasiouras & Gaganis, 2013; Boon et al., 2018) and the limited study of insurance company investments, especially in the capital market, are the main reason on why we decide to analyzed the investment portfolio of insurance companies in the capital market and how it could influence the bankruptcy of insurance companies in Indonesia.

The rest of the paper is organized as follows. In Section 2, we provide the related literature, followed by the institutional setting in Section 3. In Section 4 and 5, we present and discuss the research method and empirical results, respectively. Finally, section 6 provides concluding remarks and policy implications.

## **2. Related Literature**

Some studies stated that risk-taking by insurance companies are indicated by the distribution of wealth allocation on riskier investment, as in capital market (MacMinn, 1992 and Grundl et al. 2016). In this section, we will elaborate the existing literatures regarding portfolio allocation of insurance company and

building hypothesis on the relation of portfolio allocation and their company risk. Similar studies relating to the riskiness of insurance companies are well scrutinized. Gaganis (2019) on the study about insurance companies' risk-taking strategy concluded that there is a strong and significant relationship between insurance companies' risk taking and firms' cultural characteristics - that could influence their strategic planning on their investment in capital market. Pasiouras (2013) also found that authorities and regulations related to companies' investment have an impact on insurance companies' risk. Furthermore, other studies with opposite conclusion by Jiang and Verado (2018) and Gonzalez (2020) who found that higher holding duration on insurance companies' stock allocation do not affect the firms' performance.

There are still not a lot of studies found in Indonesia about insurance companies' asset allocation and the relation to their risks. Hence, the studies about insurance companies' portfolio in Indonesia could fill the gap of literatures about insurance companies' risk taking that are already existed.

### 3. Methodology

#### 3.1. Data

We use annual financial report of all 132 insurance companies in which we include life insurance, general insurance, and reinsurance in Indonesia through the 2008 – 2019 periods. In order to analyze how insurance companies' investment allocation could affect the risk of bankruptcy of the firm, we use Z-Score which calculated by and Risk-Based Capital (RBC) as proxies for insurance companies. Furthermore, as we assumed that macroeconomic indicators would also likely affect financial institutions' activities in the industry (Pana et al., 2010; Shirasu, 2018), we also collect Gross Domestic Product (GDP) growth and Consumer Price Index (CPI) data from Indonesia Central Bureau of Statistics (Badan Pusat Statistik/BPS) website, and Composite Stock Price Index. The Descriptive Statistics are presented in Table 1.

**Table 2. Descriptive Statistics of Variables**

Variables	Definition	Obs	Mean	Std. Dev.	Min	Max
zscore	Parameter of Bankruptcy Z-score = (ROA+(equity/assets)) / standard deviation (ROA)	1,241	2.957095	2.123439	-18.1144	7.826114
rbc	RBC=1 if the RBC value <120; 0 sebaliknya.	1,241	924.5721	15635.2	-1616.23	550771.1
risaham	Stock investment ratio	1,241	0.085566	0.160986	0	0.933375
rireksa	Mutual fund investment ratio	1,241	0.162261	0.218728	-9.48E-09	0.907494

risahamreksa	Stock and mutual fund investment ratio	1,241	0.090766	0.167408	-9.48E-09	0.897014
rprop	Property investment ratio	1,241	0.018129	0.060684	0	0.684986
robli	Bond investment ratio	1,241	0.086393	0.123787	0	0.753731
rsbn	Treasury Bills investment ratio	1,241	0.110624	0.143048	0	0.907022
lnprofit	Natural logarithm of company profit	985	10.32949	1.945666	3.1394	15.51125
lna	Natural logarithm of total asset	1,241	13.57807	1.694544	7.447238	18.08881
pdb	Gross Domestic Product (annual)	1,241	5.376487	0.551048	4.63	6.22
inflasi	Inflation Rate (annual)	1,241	4.653648	2.079809	2.78	8.359133
ihsg	Composite stock price index (annual)	1,241	4622.018	1122.029	2534.36	6355.65

Table 3. Correlation Matrix

	zscore	rbc	risaham	rireksa	risahamreksa	rprop	robli	rsbn	lnprofit	lnta	pdb	inflasi	ihsg
zscore	1												
rbc	0.4013	1											
risaham	-0.0358	-0.01	1										
rireksa	-0.2631	0.088	-0.042	1									
risahamreksa	0.216	-0.069	0.28	0.2042	1								
rprop	-0.0808	-0.0859	-0.0563	-0.033	-0.0176	1							
robli	-0.0973	-0.08	-0.0289	-0.0689	-0.0079	-0.0703	1						
rsbn	-0.1984	0.0078	-0.0657	0.0379	-0.1891	-0.0763	0.0607	1					
lnprofit	-0.2542	-0.0835	0.2548	0.3414	0.0513	-0.0684	0.1399	0.1938	1				
lnta	-0.4374	-0.0715	0.309	0.4494	0.0004	-0.0329	0.1226	0.2675	0.8487	1			
pdb	0.1438	-0.0308	0.0581	-0.0056	0.0509	-0.0511	-0.0323	-0.046	-0.0224	-0.0806	1		
inflasi	0.0433	0.0202	0.0434	-0.0467	-0.0097	-0.0266	0.0068	-0.1229	0.0246	0.0068	0.2723	1	
ihsg	-0.1315	0.0894	-0.0208	0.0896	-0.007	0.0011	0.0498	0.1858	0.1663	0.2897	-0.2016	-0.024	1

### 3.2. Model

We employ panel Random Effect Model (REM) to our regression that also been utilized in prior literatures related to insurance company risk (Pasiouras, 2013; Boon, 2018; Gaganis, 2019).

1.  $ZScore_{it} = \alpha + \beta_1 X_{it} + \beta_2 Control_{it} + u_{it}$
2.  $ZScore_{it} = \alpha + \beta_1 X_{it} + \beta_2 C_{it} + \beta_3 X_{it} * C_{it} + \beta_4 K_{it} + u_{it}$
3.  $ZScorePAJ_{it} = \alpha + \beta_1 XPAJ_{it} + \beta_2 ControlPAJ_{it} + u_{it}$
4.  $ZScorePAJ_{it} = \alpha + \beta_1 XPAJ_{it} + \beta_2 CPAJ_{it} + \beta_3 XPAJ_{it} * CPAJ_{it} + \beta_4 K_{it} + u_{it}$
5.  $ZScorePAUR_{it} = \alpha + \beta_1 XPAUR_{it} + \beta_2 ControlPAUR_{it} + u_{it}$
6.  $ZScorePAUR_{it} = \alpha + \beta_1 XPAUR_{it} + \beta_2 CPAUR_{it} + \beta_3 XPAUR_{it} * CPAUR_{it} + \beta_4 K_{it} + u_{it}$

Our research models are adapted from Pasiouras (2013) and Gaganis (2019) that adopted Z-Score and RBC as proxies to measure risk of insurance companies. In the first estimation,  $Y_{i,t}$  is the dependent variables represent the soundness of insurance companies proxied by Z-Score, in which the higher number of Z-Score would represent the less probability of bankruptcy of insurance companies.

$X_{it}$  is set of variables of interest represent the ratio of stocks to total amount of investments (risaham) and the ratio of mutual fund investment to total amount of investments (rireksa). Other than measuring ratio of stocks and ratio of mutual fund investment, we decided to include other ratio of investments such as property investment ratio (rprop), bond investment ratio (robli), and Treasury Bills investment ratio (rsbn).  $Control_{it}$  are sets of control variables that include macroeconomic variables (GDP Growth, inflation, and composite stock index); insurance companies size proxied by ln (total asset) and insurance companies profitability proxied by ln (profitability); bank ownership dummy (ownership), which is one (1) for private national ownership and (0) otherwise; and insurance companies' category which is (1) for life insurance company and (0) otherwise.

In order to deepen our analysis about investment allocation of insurance companies, we also decided to analyze how riskier insurance company with more investment allocation in stock market would affect the soundness of its companies, as stated in second estimation. RBC is a dummy variable in which companies that are classified as risky (with the value of RBC is less than 120) would be categorized as '1' and '0' otherwise. On second estimation, our variable of interest is interaction variable of  $Risk_{it} * ratio\ investment_{it}$ , is a set of variables indicating interaction between risk and each investment ratio of asset allocation as shown in estimation number two.

We also classified the estimation into a group of life insurance estimation (stated as PAJ) which shown in third and fourth estimation and a group of non-life insurance estimation (stated as PAUR) which shown in fifth and sixth estimation.

#### **4. Empirical Results**

Our research analyzes the impact of insurers' investment portfolio on insurers' soundness captured with a Z-score in all of our samples. Table 4 shows that high-risk insurers have a negative association with insurers' soundness, while regarding the investment portfolio the findings show that stock investment positively associated with insurers' soundness. On the contrary, investment in government bonds is negatively associated with insurers' soundness. These findings are in line with Udaibir et al. (2003), Gaganis and Pasiouras, (2009), Moreno et al. (2021).

The firms' specific characters captured by profitability and size are positively associated with insurance soundness financial condition. In addition, the table also shows that gross domestic growth is positively associated with insurers' soundness.

In table 5, the variable of interest is the interaction of the dummy variable, the risky insurers, with the ratio investment. The interaction of high-risk insurer and stock investment ratio with insurers' soundness is significant and negative. It means if high-risk insurers increase their stock investment, it will reduce their financial soundness. The interaction of high-risk insurers and property investment ratio, company bond, and government bond shows the same result. The results imply that high risk needs to increase the previously said investment in other investments, such as time deposit, to increase their soundness.

For the table 6, the results are in line with the results from all-sample estimation for the high-risk insurers variable, stocks investment ratio variable, and government bond investment ratio variable. In addition, the results show that investment in mutual funds would decrease insurers' soundness. However, in life insurance, profitability has insignificant association with their soundness, while the equity composite index, positively associated with life insurers' soundness.

The variable of interest in table 7 is the interaction variable of high-risk life insurers with the specific type of investment. The interaction variable of high-risk life insurer with investment in stock, company bonds and government bond negatively associated with insurers' soundness. It means high-risk insurers decrease their soundness if they have a higher investment in stock, company obligation, and government bonds.

Table 8 shows the baseline regression with the sample only including the non-life insurance. The results are in line with all sample estimations, except for the investment in a government bond which has no significant association with the insurers' soundness.

The variable of interest in table 9 is the interaction variable of high-risk non-life insurers with the specific type of investment. The interaction variable of high-risk life insurer with investment in stock, mutual fund, company bond and government bond negatively associated with insurers' soundness. It means high-risk



insurers decrease their soundness if they have a higher investment in stock, mutual funds, company obligation, and government bonds.

Table 4 Baseline Regression of All Industry

<b>VARIABLES</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>
	<b>zscore</b>	<b>zscore</b>	<b>zscore</b>	<b>zscore</b>	<b>zscore</b>
<b>1.risiko</b>	-3.356*** (1.291)	-3.456*** (1.330)	-3.410*** (1.317)	-3.384*** (1.291)	-3.427** (1.336)
<b>risaham</b>	<b>1.761***</b> <b>(0.362)</b>				
<b>rireksa</b>		-0.181 (0.367)			
<b>rprop</b>			-0.503 (1.468)		
<b>robli</b>				-0.477 (0.665)	
<b>rsbn</b>					-0.822** (0.416)
<b>lnprofit</b>	0.140*** (0.0518)	0.148*** (0.0531)	0.146*** (0.0528)	0.151*** (0.0523)	0.140*** (0.0530)
<b>lnta</b>	-0.767*** (0.0990)	-0.734*** (0.104)	-0.741*** (0.104)	-0.738*** (0.104)	-0.724*** (0.104)
<b>pdb</b>	0.228*** (0.0470)	0.242*** (0.0466)	0.236*** (0.0502)	0.237*** (0.0473)	0.245*** (0.0467)
<b>inflasi</b>	0.00853 (0.0123)	0.00983 (0.0123)	0.0108 (0.0122)	0.0107 (0.0122)	0.00484 (0.0124)
<b>IHSG</b>	7.67e-05 (4.85e-05)	6.70e-05 (4.92e-05)	6.87e-05 (4.95e-05)	6.91e-05 (4.89e-05)	8.00e-05 (5.03e-05)
<b>PAJ</b>	-0.452 (0.363)	-0.315 (0.384)	-0.342 (0.365)	-0.346 (0.365)	-0.318 (0.367)
<b>Private_National</b>	-0.378* (0.219)	-0.324 (0.219)	-0.331 (0.224)	-0.311 (0.219)	-0.372* (0.222)
<b>Constant</b>	10.83*** (1.058)	10.36*** (1.104)	10.49*** (1.147)	10.41*** (1.118)	10.34*** (1.101)
<b>Observations</b>	985	985	985	985	985
<b>Number of id</b>	147	147	147	147	147

\*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively

**Table 5. Interacted variables of risk and ratio investment of all industry**

VARIABLES	(1) zscore	(2) zscore	(3) zscore	(4) zscore	(5) zscore
<b>1.risiko#c.risaham</b>	<b>-3.711*</b> (2.124)				
<b>1.risiko#c.rireksa</b>		-1.713 (1.098)			
<b>1.risiko#c.rprop</b>			<b>-15.87**</b> (8.004)		
<b>1.risiko#c.robli</b>				<b>-11.43***</b> (3.739)	
<b>1.risiko#c.rsbn</b>					<b>-11.14*</b> (6.404)
<b>lnprofit</b>	0.133** (0.0527)	0.140*** (0.0542)	0.137** (0.0540)	0.156*** (0.0531)	0.130** (0.0538)
<b>lnta</b>	-0.824*** (0.0987)	-0.797*** (0.103)	-0.781*** (0.105)	-0.783*** (0.0957)	-0.774*** (0.103)
<b>pdb</b>	0.268*** (0.0517)	0.278*** (0.0506)	0.272*** (0.0538)	0.244*** (0.0500)	0.269*** (0.0501)
<b>inflasi</b>	0.00584 (0.0127)	0.00811 (0.0126)	0.00565 (0.0126)	0.00949 (0.0131)	0.00219 (0.0126)
<b>IHSG</b>	0.000114** (4.78e-05)	0.000105** (4.85e-05)	9.59e-05** (4.89e-05)	7.75e-05* (4.74e-05)	0.000106** (4.91e-05)
<b>PAJ</b>	-0.531 (0.449)	-0.410 (0.480)	-0.320 (0.415)	-0.275 (0.345)	-0.380 (0.449)
<b>Private_National</b>	-0.511** (0.240)	-0.462* (0.239)	-0.419* (0.241)	-0.362 (0.225)	-0.497** (0.239)
<b>Constant</b>	11.34*** (1.117)	10.98*** (1.156)	10.86*** (1.197)	10.87*** (1.059)	10.95*** (1.135)
<b>Observations</b>	985	985	985	985	985
<b>Number of id</b>	147	147	147	147	147

\*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

**Table 6. Baseline regression of life insurance companies**

<b>VARIABLES</b>	<b>(1)</b> zscore	<b>(2)</b> zscore	<b>(3)</b> zscore	<b>(4)</b> zscore	<b>(5)</b> zscore
<b>1.risiko</b>	-3.122** (1.509)	-3.372** (1.634)	-3.256** (1.642)	-3.101** (1.477)	-3.038** (1.532)
<b>risaham</b>	1.583*** (0.506)				
<b>rireksa</b>		-1.019** (0.491)			
<b>rprop</b>			-3.447 (3.555)		
<b>robli</b>				-1.020 (1.789)	
<b>rsbn</b>					-2.143*** (0.756)
<b>lnprofit</b>	0.103 (0.0797)	0.118 (0.0844)	0.111 (0.0861)	0.122 (0.0823)	0.109 (0.0801)
<b>lnta</b>	-0.846*** (0.148)	-0.769*** (0.162)	-0.793*** (0.167)	-0.838*** (0.148)	-0.804*** (0.160)
<b>pdb</b>	-0.0923 (0.0923)	-0.0985 (0.0856)	-0.138 (0.0933)	-0.129 (0.0903)	-0.0893 (0.0899)
<b>inflasi</b>	0.00776 (0.0224)	0.00289 (0.0232)	0.0131 (0.0222)	0.0169 (0.0226)	0.00911 (0.0218)
<b>IHSG</b>	0.000253*** (7.87e-05)	0.000265*** (7.71e-05)	0.000263*** (7.85e-05)	0.000259*** (7.89e-05)	0.000245*** (7.55e-05)
<b>Private_National</b>	-1.011** (0.420)	-0.940** (0.395)	-0.824** (0.406)	-0.930** (0.409)	-1.062*** (0.381)
<b>Constant</b>	13.23*** (1.891)	12.44*** (2.009)	12.73*** (2.041)	13.30*** (1.870)	13.12*** (2.033)
<b>Observations</b>	284	284	284	284	284
<b>Number of id</b>	53	53	53	53	53

\*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

**Table 7. Interacted variables of risk and ratio investment of life insurance companies**

VARIABLES	(1) zscore	(2) zscore	(3) zscore	(4) zscore	(5) zscore
<b>1.risiko#c.risaham</b>	-3.305 (3.249)				
<b>1.risiko#c.rireksa</b>		-1.482 (1.118)			
<b>1.risiko#c.rprop</b>			-9.825 (6.154)		
<b>1.risiko#c.robli</b>				-9.615*** (2.634)	
<b>1.risiko#c.rsbn</b>					-10.81* (6.462)
<b>lnprofit</b>	0.117* (0.0640)	0.130* (0.0712)	0.117* (0.0705)	0.145* (0.0741)	0.116* (0.0649)
<b>lnta</b>	-0.871*** (0.164)	-0.812*** (0.189)	-0.828*** (0.186)	-0.893*** (0.148)	-0.841*** (0.168)
<b>pdb</b>	0.0400 (0.0972)	0.0350 (0.0850)	-0.0185 (0.0940)	-0.0774 (0.0791)	-0.00466 (0.0855)
<b>inflasi</b>	0.0278 (0.0228)	0.0262 (0.0234)	0.0317 (0.0216)	0.0244 (0.0235)	0.0232 (0.0222)
<b>IHSG</b>	0.000288*** (9.18e-05)	0.000306*** (8.98e-05)	0.000295*** (9.18e-05)	0.000255*** (8.05e-05)	0.000258*** (8.18e-05)
<b>Private_National</b>	-1.303*** (0.495)	-1.230** (0.478)	-1.172** (0.477)	-1.140** (0.459)	-1.284*** (0.416)
<b>Constant</b>	12.46*** (2.417)	11.86*** (2.677)	12.37*** (2.663)	13.55*** (1.996)	13.08*** (2.349)
<b>Observations</b>	284	284	284	284	284
<b>Number of id</b>	53	53	53	53	53

\*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

**Table 8. Baseline regression of non-life insurance companies**

<b>VARIABLES</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>
	<b>zscore</b>	<b>zscore</b>	<b>zscore</b>	<b>zscore</b>	<b>zscore</b>
<b>1.risiko</b>	-2.917*	-2.926*	-2.934*	-2.928*	-2.930*
	(1.623)	(1.613)	(1.605)	(1.608)	(1.598)
<b>risaham</b>	1.546***				
	(0.510)				
<b>rireksa</b>		0.646			
		(0.429)			
<b>rprop</b>			1.238		
			(1.359)		
<b>robli</b>				-0.160	
				(0.522)	
<b>rsbn</b>					0.210
					(0.439)
<b>lnprofit</b>	0.131**	0.131*	0.132**	0.129**	0.132**
	(0.0647)	(0.0669)	(0.0639)	(0.0655)	(0.0655)
<b>lnta</b>	-0.601***	-0.600***	-0.581***	-0.586***	-0.589***
	(0.124)	(0.129)	(0.129)	(0.129)	(0.128)
<b>pdb</b>	0.404***	0.415***	0.433***	0.424***	0.423***
	(0.0495)	(0.0499)	(0.0507)	(0.0490)	(0.0485)
<b>inflasi</b>	0.00362	0.00679	0.00431	0.00383	0.00605
	(0.0143)	(0.0138)	(0.0142)	(0.0141)	(0.0146)
<b>IHSG</b>	-4.94e-05	-5.70e-05	-6.08e-05	-5.60e-05	-6.39e-05
	(6.14e-05)	(6.20e-05)	(6.25e-05)	(6.17e-05)	(6.31e-05)
<b>Private_National</b>	0.0426	0.0762	0.109	0.0721	0.0908
	(0.164)	(0.173)	(0.171)	(0.173)	(0.176)
<b>Constant</b>	8.108***	8.061***	7.751***	7.933***	7.930***
	(1.331)	(1.407)	(1.468)	(1.428)	(1.403)
<b>Observations</b>	701	701	701	701	701
<b>Number of id</b>	94	94	94	94	94

\*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

**Table 9. Interacted variables of risk and ratio investment of non-life insurance companies**

<b>VARIABLES</b>	<b>(1) zscore</b>	<b>(2) zscore</b>	<b>(3) zscore</b>	<b>(4) zscore</b>	<b>(5) zscore</b>
<b>1.risiko#c.risaham</b>	-5.046*** (103.3)				
<b>1.risiko#c.rireksa</b>		-4.152*** (1.282)			
<b>1.risiko#c.robli</b>				-2.542*** (0.580)	
<b>1.risiko#c.rsbn</b>					-7.462*** (1.554)
<b>Inprofit</b>	0.134** (0.0673)	0.133* (0.0696)	0.138** (0.0662)	0.132* (0.0682)	0.135** (0.0679)
<b>Inta</b>	-0.608*** (0.124)	-0.607*** (0.128)	-0.592*** (0.128)	-0.593*** (0.129)	-0.597*** (0.127)
<b>pdb</b>	0.420*** (0.0573)	0.431*** (0.0579)	0.450*** (0.0586)	0.439*** (0.0570)	0.438*** (0.0564)
<b>inflasi</b>	-0.00422 (0.0162)	-0.000972 (0.0158)	-0.00449 (0.0161)	-0.00408 (0.0161)	-0.00135 (0.0163)
<b>IHSG</b>	-4.98e-05 (6.20e-05)	-5.73e-05 (6.26e-05)	-6.09e-05 (6.30e-05)	-5.63e-05 (6.23e-05)	-6.55e-05 (6.44e-05)
<b>Private_National</b>	0.0372 (0.164)	0.0721 (0.172)	0.104 (0.170)	0.0684 (0.173)	0.0901 (0.177)
<b>Constant</b>	8.124*** (1.327)	8.080*** (1.404)	7.772*** (1.460)	7.942*** (1.423)	7.950*** (1.399)
<b>Observations</b>	701	701	701	701	701
<b>Number of id</b>	94	94	94	94	94

\*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

## **5. Conclusion and Policy Implication**

We empirically analyze insurers' investment portfolio association with insurers' soundness. Using the insurance industry's panel data in Indonesia from 2009 to 2019, we show that insurers' investment share affects their soundness. In line with prior studies (Udaibir et al. (2003), Gaganis and Pasiouras, (2009), Moreno et al. (2021)), we also find that insurers' specific characteristics, risk profile, profitability, and total assets are positively associated with insurers' soundness. In addition, our results show that gross domestic product growth is positively associated with insurers' soundness.

Specifically, we find that insurers' investment in stocks is positively associated with insurers' soundness. On the contrary, investment in government bonds negatively associated insurers' soundness. The results are consistent with the results in life and non-life insurance. Incorporating high-risk insurer classification, we find that high-risk insurers decrease their soundness if they increase their investment in stock, property, company, and government funds. In the life insurance sample, the results only align with the high-risk life insurers' investment in company and government bonds. The results also show that the equity composite index has a positive association with the insurers' soundness. However, the last association mentioned does not appear in the non-life insurance.

Our findings implied several policy implications. First, our study supports Indonesia Financial Services Authority/Otoritas Jasa Keuangan's (OJK) effort to enforce the supervision of insurers' investment strategy. Next, this study implied that the regulator supervision and development policy need to focus on high-risk insurers, especially their investment strategy.



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