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The Effect of Liquidity, Claim Expense Ratio, and Profitability on the Solvency of Life Insurance Companies in Indonesia

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ABSTRACT

Objective: *This study examines the effect of liquidity (Current Ratio), claim burden (Claim Expense Ratio), and profitability (Return on Assets/ROA) on the solvency level of life insurance companies in Indonesia, proxied by Risk Based Capital (RBC). Using 159 firm-year observations from annual financial statements over the 2022–2024 period.* ***Method:*** *The study applies pooled multiple linear regression to panel-structured data. To address differences in measurement scales and improve coefficient comparability, the independent variables are standardized using Z-scores prior to estimation. The analysis incorporates classical diagnostic tests including normality, multicollinearity, heteroskedasticity, and autocorrelation as well as panel-data diagnostics to assess potential cross-sectional dependence and ensure the robustness of the estimates.* ***Results:*** *The results indicate that the model is jointly significant ($F = 4.256$; $p = 0.006$). Partially, Current Ratio has a positive and significant effect on RBC ($B = 0.174$; $p = 0.028$), while Claim Expense Ratio has a negative and significant effect ($B = -0.246$; $p = 0.002$). ROA does not significantly affect RBC ($B = -0.036$; $p = 0.642$).* ***Novelty:*** *The model explains 7.6% of the variation in RBC ($R^2 = 0.076$; Adjusted $R^2 = 0.058$), indicating that capital adequacy is influenced by broader structural and regulatory risk factors beyond short-term financial ratios. This implies that while liquidity and claims are critical, 92.4% of life insurance solvency is driven by other operational factors such as reinsurance or investment strategy.*

INTRODUCTION

Risk Based Capital (RBC) constitutes a primary indicator of capital adequacy in the insurance industry, as it measures a company's capacity to absorb risk by comparing its solvency level with the minimum risk-based capital requirement (Azizah & Perwita Sari, 2025). Regulators mandate that insurance companies maintain an RBC level of at least 120 percent as a benchmark of financial soundness (William & Colline, 2022). This regulatory threshold is designed to ensure that insurers possess sufficient capital buffers to withstand underwriting risk, market fluctuations, and operational uncertainty. Despite this standardized benchmark, considerable variation in RBC levels persists across insurance companies and observation periods, indicating heterogeneity in financial resilience and risk management practices.

Such variation suggests that solvency is influenced not only by regulatory compliance but also by firm-specific financial characteristics. Differences in asset allocation, underwriting quality, liquidity management, and earnings capacity may contribute to disparities in capital adequacy. Consequently, identifying the internal financial determinants of RBC becomes essential for understanding how managerial decisions and performance indicators shape solvency within the life insurance industry.

Liquidity represents a fundamental component of solvency management because insurers must fulfil claim obligations and short-term liabilities without destabilizing their capital structure (A. U. Anggraini & Aminah, 2023). Adequate liquidity reduces the

likelihood of forced asset liquidation and mitigates short-term financial stress, thereby supporting capital stability (Jamiah et al., 2024). From a theoretical perspective, stronger liquidity positions enhance a firm's ability to absorb operational shocks and maintain regulatory capital buffers. Although excessive liquidity may reduce investment efficiency, its protective role as a financial buffer remains dominant in solvency theory. Therefore, liquidity is expected to positively influence RBC. Based on this reasoning, the first hypothesis is formulated as follows:

H1: Liquidity (Current Ratio) has a positive effect on Risk Based Capital (RBC).

Beyond liquidity considerations, underwriting performance plays a critical role in shaping solvency. The claim expense ratio reflects the proportion of premium income allocated to claim payments and serves as an indicator of underwriting quality and risk exposure (Khalimah, 2021). An increase in claim expenses directly reduces retained earnings and intensifies capital pressure. Within a risk-based regulatory framework, higher claim volatility may increase capital requirements, thereby weakening solvency positions (M. Anggraini et al., 2022). Consequently, firms with elevated claim burdens are theoretically more vulnerable to reductions in RBC. In light of this capital erosion mechanism, the second hypothesis is proposed as:

H2: Claim Expense Ratio has a negative effect on Risk Based Capital (RBC).

In addition to liquidity and underwriting risk, profitability represents another dimension of financial performance that may influence capital adequacy. Return on Assets (ROA) measures a firm's ability to generate earnings from its asset base. From a capital accumulation perspective, higher profitability strengthens retained earnings and enhances internal capital formation, which should improve solvency (Albastiah & Isnaen, 2021; Gaganis et al., 2015). However, in life insurance companies, profits are frequently allocated to technical reserves, long-term investment commitments, and claim obligations. As a result, short-term profitability does not always translate directly into immediate improvements in RBC. Despite this complexity, financial theory generally predicts a positive association between profitability and capital strength. Accordingly, the third hypothesis is formulated as follows:

H3: Profitability (Return on Assets) has a positive effect on Risk Based Capital (RBC).

Although prior studies have examined the determinants of insurance solvency, empirical findings remain inconclusive. Some studies report a positive relationship between liquidity and solvency, while others find insignificant or context-dependent effects (Afiqah & Laila, 2021). Similarly, evidence regarding the impact of claim burden and profitability on RBC varies across countries, regulatory environments, and observation periods. Moreover, limited research simultaneously examines liquidity, underwriting risk, and profitability within a unified framework focusing specifically on Indonesian life insurance companies during the post-pandemic recovery period. This gap is particularly relevant given the structural adjustments in asset allocation, claim volatility, and capital management observed after 2020. By integrating these three financial dimensions into a single empirical model, this study contributes to the literature by providing updated evidence on the internal determinants of RBC within a developing insurance market context.

RESEARCH METHOD

This study employs a quantitative explanatory research design to examine the effect of liquidity ratio, claim expense ratio, and profitability on the solvency level of life insurance companies in Indonesia. A quantitative approach is appropriate because the objective is to test causal relationships among measurable financial variables derived from published financial statements. The study is designed to ensure clarity in variable operationalization and analytical procedures, thereby enhancing transparency and replicability.

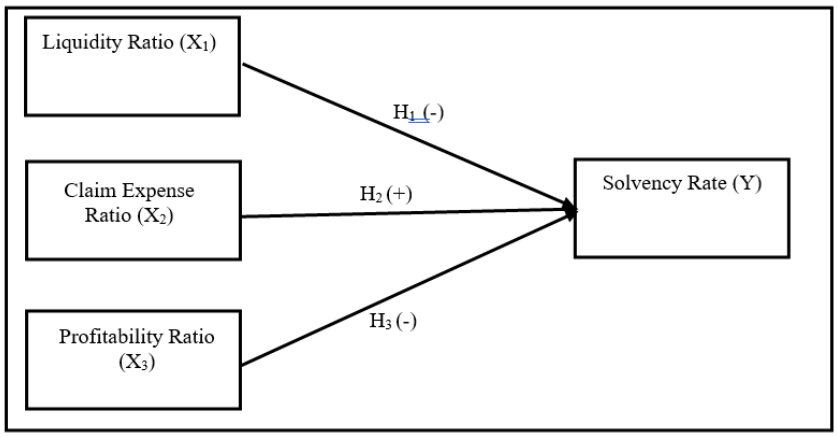

Figure 1. Conceptual Framework

The population consists of all life insurance companies operating in Indonesia and registered with the Indonesia Life Insurance Association during the 2022–2024 period. The sample is selected using purposive sampling based on data completeness and reporting consistency. Companies included in the sample must (1) publish audited annual financial statements for three consecutive years (2022–2024), (2) disclose Risk Based Capital (RBC) figures, and (3) provide complete data required to compute all research variables. Firms with incomplete or inconsistent disclosures are excluded. The final sample consists of 53 life insurance companies observed over three years, resulting in 159 firm-year observations. The dataset therefore forms a balanced panel structure.

Secondary data are obtained from audited annual financial statements published through official company disclosures and regulatory sources. Solvency is measured using Risk Based Capital (RBC). Liquidity is proxied by the Current Ratio, claim risk is measured by the Claim Expense Ratio, and profitability is measured by Return on Assets (ROA). To address differe3nces in measurement scales and improve coefficient comparability, all independent variables are transformed into Z-scores prior to estimation. As a result, the regression coefficients represent standardized beta coefficients, indicating the change in RBC (in standard deviation units) associated with a one standard deviation change in each independent variable. The empirical model is specified as follows:

$$RBC_{it} = \beta_0 + \beta_1 ZCR_{it} + \beta_2 ZCER_{it} + \beta_3 ZROA_{it} + \varepsilon_{it}$$

Where i denotes the firm and t denotes the year.

Data analysis is conducted using pooled multiple linear regression (common effect model) applied to the balanced panel dataset. Descriptive statistical analysis is first performed to describe the characteristics of the data. Prior to hypothesis testing, classical assumption tests are conducted to ensure model validity. Normality of residuals is assessed using the Kolmogorov–Smirnov test. Multicollinearity is examined using Variance Inflation Factor (VIF) and tolerance values. Heteroscedasticity is tested using the scatterplot visual test. Autocorrelation is examined using the Durbin–Watson statistic.

Hypothesis testing is conducted at a 5 percent significance level using partial significance tests (t-tests) and simultaneous significance tests (F-tests). The coefficient of determination (R^2 and Adjusted R^2) is used to evaluate the explanatory power of the model. The results are interpreted by integrating statistical findings with theoretical arguments and prior empirical evidence to explain the determinants of solvency in Indonesian life insurance companies.

RESULTS AND DISCUSSION

Results

Classical Assumption Tests

Before estimating the regression model, classical assumption tests were conducted to ensure the validity of the pooled ordinary least squares estimation.

Table 1. Summary of Classical Assumption Tests (Z-Score)

Variable	Indicator	Result	Interpretation
Normality	Kolmogorov–Smirnov Sig.	0.000	Not normally distributed
	Shapiro-Wilk Sig	0.000	Not normally distributed
Multicollinearity	VIF – Current Ratio	1.029	No multicollinearity
	VIF – Claim Expense Ratio	1.039	No multicollinearity
	VIF - ROA	1.015	No multicollinearity
Heteroscedasticity	Scatterplot Inspection	No Clear Pattern	Homoscedasticity acceptable
Autocorrelation	Durbin-Watson	1.258	Mild positive autocorrelation

The Kolmogorov–Smirnov and Shapiro–Wilk tests indicate significance values of 0.000 ($p < 0.05$), suggesting that the residuals are not perfectly normally distributed. However, given the relatively large sample size ($n = 159$), the deviation from normality is considered acceptable under the Central Limit Theorem. Multicollinearity diagnostics show that all Variance Inflation Factor (VIF) values are close to 1 and well below the threshold of 10, indicating no multicollinearity problem among the independent variables. The scatterplot of standardized residuals does not show a clear systematic pattern, suggesting no strong evidence of heteroscedasticity. The Durbin–Watson statistic of 1.258 indicates mild positive autocorrelation. Considering the short time dimension (three years) and pooled regression specification, this issue is not expected to substantially bias the coefficient estimates.

Regression Analysis

The regression was estimated using pooled multiple linear regression on a balanced panel dataset consisting of 53 life insurance companies observed over three years (2022–2024), resulting in 159 firm-year observations.

Table 2. Summary of Regression Result (Z-Score)

Variable	Unstandardized B	Standardized B	t	Sig.	VIF
Constant	3.918E-16		0.000	1.000	
Z(Current Ratio)	0.174	0.174	2.223	0.028	1.029
Z(Claim Expense Ratio)	-0.246	−0.246	-3.120	0.002	1.039
Z(ROA)	-0.036	−0.036	-0.465	0.642	1.015

Because both dependent and independent variables were standardized using Z-scores prior to estimation, the coefficients represent standardized beta values. As expected in a fully standardized model, the intercept is approximately zero.

Model Summary and Hypothesis Testing

The overall adequacy of the regression model is assessed through model summary statistics, which evaluate both explanatory power and statistical significance. The coefficient of determination reflects the proportion of variation in RBC explained by the independent variables, while the F-statistic tests whether the model is jointly significant. Additionally, the Durbin–Watson statistic is reported to detect potential autocorrelation in the residuals.

Table 3. Model Summary

Statistic	Value
N	159 (53 firms × 3 years)
R	0.276
R^2	0.076
Adjusted R^2	0.058
F-statistic	4.256
Sig. (F)	0.006
Durbin–Watson	1.258

The model yields an R^2 value of 0.076 and an Adjusted R^2 of 0.058, indicating that liquidity, claim burden, and profitability collectively explain 7.6% of the variation in RBC. Although the explanatory power is relatively limited, the F-statistic of 4.256 with a significance level of 0.006 ($p < 0.05$) confirms that the independent variables jointly have a statistically significant effect on RBC.

The Durbin–Watson statistic of 1.258 suggests mild positive autocorrelation. However, given the short time dimension (three years) and the pooled regression specification, this issue is not expected to substantially distort the coefficient estimates.

The partial effects of each independent variable were examined using t-tests to evaluate H1, H2, and H3. Liquidity (Current Ratio) has a positive and significant effect on RBC ($\beta = 0.174$; $t = 2.223$; $p = 0.028$), supporting H1. The Claim Expense Ratio has a negative and significant effect on RBC ($\beta = -0.246$; $t = -3.120$; $p = 0.002$), supporting H2. This variable shows the strongest standardized effect among the predictors. Return on Assets (ROA) does not have a significant effect on RBC ($\beta = -0.036$; $t = -0.465$; $p = 0.642$); therefore, H3 is not supported. Overall, solvency appears to be more sensitive to liquidity management and underwriting risk than to short-term profitability.

Discussion

The regression results indicate that liquidity has a positive and significant effect on the solvency level of life insurance companies. This finding suggests that stronger liquidity positions are associated with higher Risk Based Capital (RBC) levels. In the context of life insurance operations, adequate liquidity enhances a firm's ability to meet short-term obligations and claim payments without disrupting capital buffers (Jamiah et al., 2024; Simbolon & Siagian, 2021). The positive linear relationship identified in this study supports the view that liquidity functions as a financial safeguard that contributes to capital stability (Albastiah & Isnaen, 2021; Rahmawati, 2018).

The Claim Expense Ratio is found to have a negative and significant effect on RBC. This result indicates that higher claim burdens reduce solvency levels, reflecting the direct impact of underwriting risk on capital adequacy. As claim expenses increase relative to premium income, retained earnings decline and capital pressure intensifies (Azzahra, 2020; Pada et al., 2015). The magnitude of this effect, which is stronger than that of liquidity in the standardized model, highlights the central role of underwriting discipline and claim risk management in maintaining regulatory capital compliance (Insani, 2016; N & Nofrianto, 2021).

Profitability, measured by Return on Assets (ROA), does not have a statistically significant effect on RBC. This finding suggests that short-term accounting performance does not directly translate into improvements in capital adequacy within the life insurance industry(Aniseh et al., 2019; William & Colline, 2022). RBC appears to be more sensitive to risk exposure and capital requirements than to earnings performance alone (Haerani & Kholis, 2024).

Overall, the results demonstrate that solvency in life insurance companies is more strongly influenced by liquidity management and underwriting risk control than by profitability (Aniseh et al., 2019; Jamiah et al., 2024). These findings align with the risk-based capital framework, where capital adequacy is primarily determined by exposure to risk rather than by accounting returns.

CONCLUSION

Fundamental Finding: This study demonstrates that the Current Ratio and the Claim Expense Ratio are significant determinants of Risk-Based Capital (RBC) in life insurance companies in Indonesia during the 2022–2024 period. **Implication:** The Current Ratio has a positive and significant effect on RBC, while the Claim Expense Ratio has a negative and significant effect. Return on Assets (ROA) does not significantly influence RBC, indicating that short-term profitability is not a direct determinant of capital adequacy within the observed period. **Limitation:** The study is subject to several limitations. The

relatively low R^2 value indicates that variations in RBC are influenced by additional factors beyond the variables included in the model. Moreover, the analysis employs a static panel regression approach, which does not account for potential dynamic effects or endogeneity issues. In practice, capital adequacy in the current period is likely influenced by prior-period RBC levels due to regulatory capital adjustment mechanisms and internal capital planning. **Future Research:** Therefore, future research is encouraged to apply Dynamic Panel Data Models, such as the Generalized Method of Moments (GMM), to address potential endogeneity and capture the persistence effect of solvency over time. Incorporating lagged dependent variables would provide a more robust understanding of the dynamic behaviour of RBC in the insurance industry.

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