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Financial Risk and Stability Assessment of Insurance Firms in Mongolia

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Abstract

This study investigates the determinants of financial stability in the Mongolian insurance sector using firm-level panel data from 16 insurance companies over the period 2016-2021. Financial stability is measured using Return on Assets (ROA), Return on Equity (ROE), and the Altman *Z*-score. A fixed-effects panel regression approach is employed to examine the effects of profitability, firm size, liquidity, reserve ratios, capital structure, investment levels, and the COVID-19 pandemic on financial stability. The results show that profitability, investment strength, and capitalization significantly enhance financial stability, while excessive reserves and high liquidity levels may adversely affect certain performance indicators. Firm size improves solvency but is associated with lower asset efficiency. The COVID-19 pandemic has a negative and significant effect on the *Z*-score, indicating heightened insolvency risk during the crisis. These findings provide valuable insights for strengthening risk management practices, improving financial policies, and informing regulatory strategies aimed at enhancing stability in the insurance sector.

Keywords: insurance companies, financial stability, ROA, ROE, *Z*-score, panel analysis, COVID-19

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Introduction

The financial stability of insurance companies has emerged as a critical topic in both developed and emerging markets, particularly in the years following global financial shocks and the unprecedented disruptions caused by the COVID-19 pandemic. As key institutional players in national financial systems, insurance companies perform essential economic functions by pooling risks, protecting households and firms from adverse events, and channeling long-term funds into the capital market. Their stability is therefore vital not only for policyholders but also for the broader financial sector and macroeconomic stability. Internationally, periods of economic uncertainty have highlighted the vulnerability of insurers to market volatility, rising claims, operational disruptions, and liquidity pressures, factors that underscore the importance of understanding the drivers of financial resilience within the industry.

In Mongolia, the insurance sector has grown steadily over recent decades, expanding the range of products offered and increasing penetration across households and businesses. Currently, 16 insurance companies operate in the domestic market, providing various types of general and long-term insurance products. Despite this progress, the sector faces structural and operational challenges typical of emerging markets, including limited market size, fluctuating profitability, varying reserve adequacy, and exposure to macroeconomic shocks. The COVID-19 pandemic has further emphasized the need to assess the sector's financial soundness, as insurers encountered disruptions in premium collection, changes in claim patterns, and increased operational risks.

Financial stability in the insurance sector is influenced by multiple interrelated factors, such as profitability, liquidity, reserve management, firm size, capital structure, and investment performance. While these determinants have been widely studied in other countries, empirical research specific to the Mongolian insurance industry remains scarce. Existing studies in Mongolia have largely focused on descriptive financial analysis or sectoral overviews, leaving a gap in empirical evidence regarding how firm-level characteristics shape financial stability across the industry. Addressing this gap is important for regulators, practitioners, and policymakers seeking to strengthen the sector's resilience and ensure its sustainable development.

The purpose of this study is to empirically examine the determinants of financial stability among Mongolian insurance companies using firm-level panel data from 2016 to 2021. The analysis employs three established indicators of financial stability, Return on Assets (ROA), Return on Equity (ROE), and the Altman Z-score, and investigates the effects of profitability, firm size, liquidity, reserve levels, capital structure, investment ratios, and the COVID-19 pandemic. By applying a fixed-effects econometric framework, the study isolates the impact of key financial characteristics on insurers' solvency and performance, offering evidence-based insights into the sector's strengths and vulnerabilities.

This research contributes to the literature in three significant ways. First, it provides one of the few empirical analyses of financial stability in Mongolia's insurance industry using multi-year firm-level data. Second, it incorporates the COVID-19 shock, offering

timely evidence on how systemic disruptions affect insurer solvency in emerging markets. Third, it identifies the specific financial factors that enhance or weaken stability, providing clear implications for financial regulators and insurance managers.

Overall, the study aims to deepen the understanding of financial stability determinants within Mongolia's insurance sector and support informed decision-making to promote a more resilient and sustainable industry.

Literature Review

Research on the financial stability of insurance companies has expanded considerably over the past decade, particularly following global financial shocks and the COVID-19 pandemic. Scholars have examined both firm-level determinants, such as profitability, liquidity, leverage, and firm size, and macroeconomic factors, including GDP growth, inflation, and crisis-related disruptions. This section reviews the existing empirical and theoretical literature related to the determinants of financial stability in insurance markets.

Pulawska (2021) investigates how COVID-19 affected the financial stability of European insurance companies by examining indicators such as return on assets (ROA), solvency ratios, the share of receivables, profitability, and liquidity. Her findings reveal that the pandemic negatively impacted insurers' profitability, with ROA declining notably in countries such as Germany and Italy. Solvency ratios also weakened in Belgium, France, and Germany. However, the study finds no significant changes in Z-scores, suggesting that the crisis did not immediately threaten insolvency risk in all markets. Across Europe, the pandemic increased the value of receivables, pointing to heightened credit risk.

In Central and Eastern Europe, Kramarić *et al.* (2019) analyze the financial stability of insurers in Hungary and Poland using variables such as claim growth, GDP per capita, firm size, premium-to-profit ratios, and reinsurance dependence. Their analysis shows that firm size, measured by total assets, has a strong positive effect on insurers' financial health. Larger insurers benefit from diversification and stronger capital buffers. The authors also find that companies relying more on reinsurance exhibit higher stability, particularly in markets exposed to catastrophic risks.

Several studies highlight the effects of pandemics and systemic shocks on insurance markets. Babuna *et al.* (2020) conduct an early assessment of COVID-19's impact on Ghana's insurance industry, drawing comparisons with previous global outbreaks such as SARS, H1N1, and MERS. Their findings indicate that insurers faced operational challenges, including remote work transitions, cyber-security risks, and increasing claim pressures. To mitigate systemic risk, the authors recommend enhancing digital claims management and strengthening interagency coordination among health, finance, and regulatory institutions.

Beyond the pandemic context, other scholars have explored broader determinants of financial distress and stability. Zelie (2019), studying Ethiopian insurers, identifies leverage, liquidity, and underwriting performance as strong predictors of financial distress. Firms with higher debt ratios and

weaker liquidity positions face significantly greater insolvency risks, supporting the relevance of classical financial theory in emerging markets.

Studies in Asian markets also provide useful insights. For instance, Al-Shami (2013) analyses stock returns of GCC insurance firms and finds that market performance is influenced by underwriting profit, financial leverage, and investment income. These findings highlight the dual nature of insurance operations, where both core underwriting activities and investment portfolios contribute to overall financial stability.

In addition to firm-level variables, macroeconomic and structural determinants have been noted in the literature. Studies such as Malik (2011) and Boubaker *et al.* (2020) argue that inflation, GDP growth, equity market performance, and regulatory quality can shape the financial soundness of insurers. These findings are especially relevant for emerging markets like Mongolia, where economic volatility and regulatory reforms remain ongoing.

Overall, prior research consistently identifies profitability (ROA, ROE), liquidity, leverage, firm size, reserve adequacy, and investment performance as key determinants of financial stability in insurance companies. Moreover, systemic shocks, such as the COVID-19 pandemic, pose unique risks that amplify insolvency pressures and disrupt operational efficiency. Building on these insights, the present study contributes to the limited empirical literature on Mongolia's insurance sector by examining how firm characteristics and the COVID-19 pandemic influenced financial stability between 2016 and 2021.

Methodology

This study adopts a quantitative research design using annual panel data from 16 insurance companies operating in Mongolia during the period 2016-2021. The dataset was constructed from audited financial statements submitted to the Financial Regulatory Commission, ensuring that all variables are derived from standardized and publicly accessible reports. A balanced panel structure allows the analysis to control for unobservable firm-specific characteristics that remain constant over time, such as risk culture, managerial style, underwriting discipline, or internal governance practices.

To evaluate financial stability, the study employs three commonly used indicators in the insurance and corporate finance literature: Return on Assets (ROA), Return on Equity (ROE), and the Altman Z-score for non-manufacturing entities. ROA and ROE capture profitability-based dimensions of stability, whereas the Z-score reflects overall solvency strength and bankruptcy risk. These indicators have been widely used in previous research examining the determinants of financial health in insurance markets across both developed and emerging economies.

Explanatory variables were selected based on theoretical considerations and prior empirical findings, particularly studies by Kramarić *et al.* (2019), Pulawska (2021), Zelie (2019), and Babuna *et al.* (2020). These include firm size, profitability, liquidity position, reserve adequacy, capital structure, the ratio of premiums to reserves, and the level of investments relative to total assets. In addition, the study incorporates a COVID-19 dummy variable to capture the pandemic's impact on financial stability during 2020. The definitions and measurement methods

of all variables used in the analysis are summarized in Table 1.

To assess the relationship between financial stability and its determinants, the following baseline panel regression model is estimated:

$$FS_{it} = \alpha_i + \beta X_{it} + \gamma_t + \varepsilon_{it}$$

where, FS – indicators of financial stability (ROA, ROE, Z-score); α – firm-specific fixed effects; X – vector of explanatory variables (firm size, reserves ratio, liquidity, profitability, etc.); γ – time fixed effects (to capture macroeconomic shocks); ε – error term; i – firm; t – year.

The empirical estimation is carried out using a fixed-effects panel regression model. This approach is appropriate because it accounts for unobserved firm-specific characteristics that could otherwise bias the regression results. In line with best practices in panel data econometrics, the fixed-effects specification was validated through the Hausman test, which confirmed that the fixed-effects estimator is preferred over the random-effects alternative for models using ROA and ROE as dependent variables. Although the Hausman statistic for the Z-score model did not reject the random-effects specification, the fixed-effects model was retained for consistency and comparability across the three measures of financial stability.

Time fixed effects were also included in the estimation to control for macroeconomic shocks, regulatory changes, and industry-wide developments that affect all insurers simultaneously. Robust standard errors were applied to correct for heteroskedasticity and ensure reliable inference.

Overall, the methodological framework integrates established financial stability indicators, theoretically grounded explanatory variables, and a widely accepted econometric strategy suitable for analyzing firm-level panel data in the insurance sector.

Results

The empirical analysis begins with an examination of the descriptive statistics for all variables included in the study. As shown in Table 2, the financial performance and structural characteristics of Mongolian insurance companies exhibit substantial variation during the period 2016-2021. The mean values of ROA and ROE indicate moderate profitability across the sector, while the wide range in ROE, from significantly negative to strongly positive, suggests notable performance heterogeneity among

Table 1. Description of Variables

Variable	Type	Description
roa	Dependent	Indicator of financial stability measured as net income relative to total assets
roe	Dependent	Indicator of financial stability measured as net income relative to shareholders' equity
zscore	Dependent	Altman Z-score for non-manufacturing firms used to assess insolvency risk
covid19	Independent	Dummy variable equal to 1 for the year 2020 and 0 otherwise
size	Independent	Natural logarithm of total assets
prof	Independent	Natural logarithm of net profit
liq	Independent	Ratio of current assets to total assets
resrat	Independent	Insurance reserves as a share of total assets
elrat	Independent	Shareholders' equity relative to total liabilities
invrat	Independent	Total investments as a share of total assets

insurers. The average Z-score reflects generally sound solvency conditions, although extremely low minimum values signal that certain companies faced elevated financial distress during some years. Liquidity levels are high overall, consistent with the operational requirements of insurance firms, and the distribution of reserve ratios and equity-to-liability ratios highlights meaningful differences in risk management and capital structure across the sample.

To further explore potential relationships among the variables, the correlation matrix in Table 3 provides pairwise correlation coefficients between all independent variables. The correlations are generally modest, indicating that multicollinearity is unlikely to bias the regression estimates. The COVID-19 dummy variable is weakly correlated with all financial indicators, suggesting that its impact must be captured through multivariate regression rather than simple pairwise associations. The absence of strong correlations among the key explanatory variables supports the suitability of a multivariate fixed-effects framework for analyzing the determinants of financial stability.

Building on these preliminary observations, the fixed-effects regression results presented in Table 4 provide a more rigorous assessment of how firm-level factors influence financial stability. The models for ROA, ROE, and the Z-score are all statistically significant, with relatively high explanatory power, particularly the Z-score model, which exhibits an R^2

Table 2. Descriptive Statistics

Variable	Obs.	Mean	St.Dev.	Min	Max
roa	87	0.0713	0.0547	0.0000	0.3055
roe	87	0.1059	0.1346	-0.7473	0.5419
zscore	87	8.5986	2.9874	0.0000	23.7532
covid19	87	0.1609	0.3696	0.0000	1.0000
size	87	16.3524	1.3034	9.1685	17.8867
prof	84	13.2482	1.5591	7.3456	15.7863
liq	87	0.8987	0.0964	0.6439	1.0000
resrat	87	0.1684	0.1105	0.0000	0.7352
elrat	87	1.9757	2.3174	-0.9222	16.2069
invrat	87	0.5399	0.2756	0.0000	0.9618

Table 3. Correlation Matrix

	covid19	*prof*	*liq*	*resrat*	*elrat*	*invrat*
size	-0.0366					
prof	0.0664	0.5163 ***				
liq	0.0131	0.2379 **	0.5621 ***			
resrat	-0.1236	0.1744	-0.0007	-0.0209		
elrat	-0.0291	-0.0257	-0.1255	-0.0442	-0.2295 **	
invrat	-0.0038	0.1704	0.1218	0.1767	-0.0793	0.4413 ***

*Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.*

of 0.94. Across the three specifications, profitability emerges as one of the most robust determinants of financial stability. Higher profit levels significantly increase both ROA and ROE and contribute to a higher Z-score, indicating reduced insolvency risk. This aligns with theoretical expectations and previous international studies emphasizing the central role of underwriting performance and investment returns.

Firm size exhibits a dual effect. While larger firms tend to record lower ROA, possibly due to scale-related inefficiencies, the positive and highly significant coefficient in the Z-score model suggests that size enhances overall solvency. This implies that larger insurers benefit from stronger capital buffers, more diversified portfolios, and greater shock-absorption capacity, even if their asset-based profitability declines as they expand.

The impact of liquidity is also mixed. Higher liquidity improves ROA but significantly reduces ROE, suggesting that while maintaining liquid assets supports operational efficiency, it may reduce returns to equity holders by limiting opportunities for higher-yield investments. Reserves, meanwhile, display contrasting effects: higher reserve ratios are associated with increased ROA but lower ROE and significantly reduced Z-scores, indicating that although reserves support short-term profitability, excessively large reserves may signal heightened claim obligations or risk exposure.

Capital structure, measured by the equity-to-liability ratio, plays a protective role in financial stability. Although it does not significantly influence ROA, a stronger capital position reduces downside risk, as

Table 4. Regression Results

Variable	ROA	ROE	Z-onoo
covid19	-0.0075	-0.0244	-0.2382 *
size	-0.0238 *	0.0302	0.7027 ***
prof	0.0274 ***	0.0337 ***	0.1932 ***
liq	0.2108 **	-0.9289 ***	-0.0196
resrat	0.1124 **	-0.4360 ***	-3.6482 ***
elrat	0.0035	-0.0330 ***	0.7831 ***
invrat	-0.0186	0.1759 **	0.9362 ***
Сул гишүүн	-0.0999	-0.1374	-6.3168 **
F/χ^2 статистик (p-value)	16.88 (0.0000)	10.75 (0.0000)	860.01 (0.0000)
R^2	0.66	0.51	0.94
Түүврийн тоо	84	84	84
Компанийн тоо	16	16	16
Hausman test	29.20 (0.0003)	38.62 (0.0000)	7.08 (0.4211)

*Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.*

reflected in its positive and significant effect on the Z-score. However, the negative impact on ROE implies that maintaining high equity levels may dilute returns to shareholders.

Finally, the COVID-19 dummy variable has no significant effect on ROA or ROE but negatively and significantly affects the Z-score. This finding indicates that the pandemic increased insolvency risk rather than directly diminishing profitability, consistent with global evidence showing that systemic crises often affect solvency buffers more than short-term earnings.

Taken together, these results highlight that profitability, investment strength, capital structure, and firm size are key drivers of financial stability among Mongolian insurers, while liquidity and reserves must be managed carefully to avoid unintended effects on solvency and profitability. The negative impact of COVID-19 on the Z-score further underscores the sensitivity of insurers to systemic shocks and the importance of maintaining robust risk-management practices.

Conclusion

This study examined the determinants of financial stability in the Mongolian insurance sector using panel data from 16 insurance companies over the period 2016-2021. By employing fixed-effects regression models with ROA, ROE, and the Altman Z-score as measures of financial stability, the analysis provides comprehensive insights into how firm-level characteristics influence insurer performance and solvency.

The results indicate that profitability, investment strength, and capital structure are among the most important drivers of financial stability. Larger firms tend to exhibit stronger solvency but lower asset-based profitability, suggesting operational efficiency challenges as insurers scale. Liquidity and reserve ratios produce mixed effects, highlighting the delicate balance insurers must maintain between ensuring adequate claim-paying capacity and sustaining profitability. Furthermore, the significant negative impact of the COVID-19 pandemic on the Z-score emphasizes the sector's sensitivity to systemic disruptions and the necessity of resilient financial management practices.

In summary, the study contributes to the limited body of empirical research on Mongolia's insurance sector by identifying key financial and operational factors that shape stability, offering evidence-based insights relevant for both practitioners and policymakers.

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