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EFFECT OF INDUSTRY-SPECIFIC FACTORS ON NON-LIFE INSURANCE PERFORMANCE IN GHANA

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Abstract
This study examined the relationship between industry-specific factors and the performance of non-life insurance companies in Ghana, with liquidity and solvency used as the principal performance indicators. The study was based on secondary panel observations covering the period 2004–2022, with 307 observations reported in the empirical analysis. The explanatory variables comprised degree of urbanization, social security system, rate of criminality, financial structure, ownership structure, management efficiency, company size, underwriting risk, loss ratio, asset growth and tangibility. The empirical procedure included descriptive statistics, Augmented Dickey-Fuller unit-root testing, correlation analysis and panel-data regression. The reported results indicate that the explanatory factors were associated with both liquidity and solvency, although the regression output contains internal inconsistencies between some reported p-values, t-statistics and confidence intervals. Coefficients reported in the source suggest positive associations for social security system, rate of criminality, ownership structure, company size, loss ratio and tangibility, while degree of urbanization, financial structure, management efficiency, underwriting risk and asset growth were reported with negative coefficients. The study therefore highlights the importance of underwriting discipline, capital and balance-sheet management, organizational scale, ownership arrangements, and the wider institutional environment in understanding non-life insurance performance in Ghana. The paper concludes with practical recommendations for insurers, regulators and researchers, while emphasizing the need for verification of the underlying regression output before publication.

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Keywords: Non-Life Insurance, Liquidity; Solvency, Industry-Specific Factors, Ghana, Insurance Performance, Panel Data.

Introduction

Insurance is an important component of a modern financial system because it transfers and pools risks that households, firms and public institutions may otherwise be unable to absorb independently. Non-life insurance is particularly relevant to commercial activity because it covers property, motor, fire, marine, travel, liability and other risks whose realization can impose immediate financial losses. In Ghana, the non-life segment has historically represented a substantial component of the insurance market. National Insurance Commission evidence indicates that non-life gross premiums increased substantially over the period preceding the study, while the sector's assets also expanded. More recent industry evidence continues to show the importance of the non-life market, although insurance penetration remains comparatively low. The National Insurance Commission's 2024 public-perception research reported that insurance penetration remained around 1% of GDP and identified awareness and engagement as continuing market-development challenges. The financial performance of insurers is multidimensional. Profitability is frequently used as a headline indicator, but liquidity and solvency are particularly important for insurers because companies must maintain sufficient resources to settle claims and other obligations as they fall due and remain financially capable of meeting longer-term commitments. The financial health of an insurer is therefore influenced not only by revenue generation but also by underwriting risk, claims experience, reinsurance, capital structure, investment decisions, operational efficiency and institutional conditions.

Earlier studies have identified several determinants of insurance performance and demand. Esho, Ward and Zurbruegg (2004) emphasized legal and institutional factors in property-casualty insurance, while Dragos and Dragos (2013) highlighted the role of institutional conditions in national insurance demand. Ghana-focused studies have also examined market structure, profitability, reinsurance, risk management and capitalization. More recently, Attah-Kyei, Andoh and Kuttu (2023) found that recapitalization was associated with higher technical efficiency and lower insurer risk in Ghana, while Opoku, Marfo-Yiadom, Gubareva and Mendes (2024) identified cost efficiency, claims ratio, retention ratio, firm age, size and board composition among important determinants of insurance-firm financial performance. Despite this growing evidence, there remains value in examining a broad set of industry and firm-level factors jointly against liquidity and solvency, particularly over a relatively long Ghanaian time period. The present study therefore revisits the determinants of non-life insurance performance using the variables and observations contained in the original study dataset. The central question is whether industry-specific and firm-related factors significantly explain variations in liquidity and solvency among non-life insurers in Ghana.

Problem Statement

Non-life insurers operate under a distinctive financial model in which premiums are collected before claims are realized. This creates a continuing need to balance underwriting growth with adequate liquidity, capital strength and risk absorption capacity. Weak liquidity can constrain timely claims settlement, while inadequate solvency can threaten the ability of an insurer to meet policyholder obligations over the longer term. In Ghana, these concerns are especially relevant in a market characterized by relatively low insurance penetration, changing regulatory requirements, competition and evolving risk exposures. The existing

Ghanaian literature provides useful evidence on profitability, reinsurance, market structure, technical efficiency, capitalization and risk management, but fewer studies combine a broad group of industry and firm-related explanatory factors with both liquidity and solvency as performance measures. The source study attempts to address this gap using 307 observations for 2004–2022. However, its presentation combines introduction, empirical findings, justification and discussion in a fragmented manner and does not provide a sufficiently explicit methodology or coherent literature review. The present revision addresses these presentation weaknesses while retaining the original empirical variables and reported results. It also identifies an important data-quality issue in the regression tables: some reported p-values do not correspond to the displayed t-statistics and confidence intervals. Consequently, the revised manuscript distinguishes the reported coefficients from claims of statistical significance.

Objective of the Study

The general objective was to examine the effect of industry-specific factors on the performance of non-life insurance companies in Ghana. Specifically, the study sought to:

i. examine the effect of selected industry-specific and firm-related factors on the liquidity of non-life insurance companies in Ghana;
ii. examine the effect of selected industry-specific and firm-related factors on the solvency of non-life insurance companies in Ghana.

Research Hypotheses

H01: Industry-specific and firm-related factors do not have a statistically significant effect on the liquidity of non-life insurance companies in Ghana.

H02: Industry-specific and firm-related factors do not have a statistically significant effect on the solvency of non-life insurance companies in Ghana.

Literature Review

Concept of Non-Life Insurance Performance

Non-life insurance performance refers to the extent to which an insurer achieves sustainable financial and operational outcomes while maintaining its capacity to honour policyholder obligations. Performance may be assessed through profitability, underwriting results, claims management, liquidity, solvency, efficiency and growth. The present study focuses on liquidity and solvency because they directly reflect the insurer's short-term and longer-term financial capacity. This focus is consistent with the broader literature that treats financial health as distinct from profitability alone.

Liquidity

Liquidity represents an insurer's capacity to meet obligations when they become due without incurring unacceptable financial disruption. For a non-life insurer, liquidity is particularly important because claims may arise unpredictably and may require substantial cash or readily realizable assets. Liquidity can therefore be influenced by claims experience, underwriting risk, reinsurance arrangements, investment structure, asset growth and the composition of liabilities.

Solvency

Solvency concerns the longer-term financial capacity of an insurer to absorb losses and continue meeting policyholder obligations. Solvency is influenced by capital adequacy, risk exposure, underwriting quality, asset quality, investment decisions and the effectiveness of risk transfer. Attah-Kyei et al. (2023), using Ghanaian insurer data, reported that

recapitalization improved technical efficiency and reduced insurer risk, reinforcing the importance of capital strength to financial resilience.

Industry-Specific and Firm-Related Factors

The variables considered in this study capture several dimensions of the insurance operating environment. Degree of urbanization may affect insurance demand and the concentration of economic activity. Social security arrangements may alter household and business demand for private insurance. Criminality can influence both the demand for protection and insurers' claims exposure. Financial structure and ownership structure reflect how firms are financed and governed. Management efficiency captures the use of organizational resources, while company size may affect economies of scale, diversification and bargaining power. Underwriting risk and loss ratio directly relate to claims and risk-selection outcomes. Asset growth reflects expansion of the balance sheet, while tangibility captures the relative presence of physical assets.

Theoretical Perspective

The study is anchored principally in the risk-management and financial-intermediation perspective of insurance firms. Insurers collect premiums, pool risks and invest funds while retaining responsibility for future claims. Their performance consequently depends on how effectively they select and price risks, transfer part of the exposure through reinsurance, manage assets and maintain capital. This perspective provides a basis for relating underwriting risk, loss ratio, reinsurance-related conditions, asset structure and management efficiency to liquidity and solvency. A complementary institutional perspective is also relevant. Insurance markets depend on legal rules, regulatory supervision, consumer confidence and the quality of institutions. Evidence from Ghana and other emerging markets suggests that institutional quality, regulation and market structure can shape insurance development and firm outcomes. The perspective therefore supports inclusion of variables such as social security, urbanization, criminality and broader financial conditions alongside internal firm characteristics.

Empirical Review

Esho et al. (2004) examined the determinants of property-casualty insurance and showed that legal and institutional factors can influence insurance market development. Dragos and Dragos (2013) similarly emphasized institutional conditions in explaining national insurance demand. In the Ghanaian context, studies have increasingly examined firm-level financial performance. Andoh and Yamoah reported that reinsurance alone did not necessarily determine profitability, but that the interaction between reinsurance and solvency was important. This suggests that risk transfer should be considered together with the insurer's underlying financial capacity. Attah-Kyei et al. (2023) investigated Ghanaian insurers using a balanced panel of life and non-life companies from 2008–2019 and found that recapitalization significantly improved technical efficiency while reducing insurer risk. The result is directly relevant to the present study because it demonstrates that balance-sheet strength and risk capacity are important dimensions of insurance performance. Owusu and Owusu (2023) also examined risk-management practices and profitability among Ghanaian non-life insurers, drawing attention to risk identification, analysis, control and monitoring. Opoku et al. (2024) used proprietary National Insurance Commission data for 40 Ghanaian insurance firms over 2012–2017 and applied system GMM. Their results identified cost efficiency, claims ratio, retention ratio, audit fees, firm age, firm size and board composition among important performance drivers. This recent evidence strengthens the argument that

insurance performance cannot be explained by a single financial variable. Instead, it reflects an interaction of operational efficiency, risk retention, claims experience, organizational characteristics and governance. The literature therefore establishes a broad basis for examining liquidity and solvency through a combined set of explanatory variables. Nevertheless, the present study contributes by retaining a wider collection of factors and examining their relationship with two financial-stability indicators over 2004–2022.

Methodology

Research Design

The study adopted a quantitative, explanatory research design based on secondary data. The analysis was intended to determine whether variations in selected industry-specific and firm-related factors were associated with variations in non-life insurance performance, operationalized as liquidity and solvency.

Data and Period of Analysis

The empirical analysis covered the period 2004–2022 and contained 307 observations. The source manuscript reports a panel-data structure and presents overall, within and between R-squared statistics. However, it does not clearly identify the number of non-life insurance firms, the exact data-source series for every variable, or the precise panel estimator used. These details should be inserted from the original research database or Stata output before journal submission.

Variables and Measurement

Variable	Role	Operational description based on source
Liquidity	Dependent	Liquidity rate/indicator reported in the dataset.
Solvency	Dependent	Solvency indicator reported in the dataset.
Degree of urbanization	Independent	Degree of urbanization reported for the observation period.
Social security system	Independent	Social-security-system indicator.
Rate of criminality	Independent	Criminality-rate indicator.
Financial structure	Independent	Financial-structure measure.
Ownership structure	Independent	Ownership-structure measure.
Management efficiency	Independent	Management-efficiency indicator.
Company size	Independent	Company-size measure.
Underwriting risk	Independent	Underwriting-risk measure.
Loss ratio	Independent	Loss-ratio measure.
Asset growth	Independent	Asset-growth measure.
Tangibility	Independent	Tangibility measure.

Estimation Procedure

The analysis proceeded through four stages. First, descriptive statistics were used to summarize the distribution of the variables. Second, Augmented Dickey-Fuller (ADF) unit-root tests were performed to assess stationarity. Third, a correlation matrix was examined to assess the associations among variables and provide an initial diagnostic for multicollinearity. Fourth, panel-data regression models were estimated separately for liquidity and solvency. The reported output provides coefficients, standard errors, t-statistics, p-values, confidence intervals, overall R-squared, within R-squared, between R-squared and a chi-square statistic.

The general model can be expressed as: $Y_{it} = \beta0 + \beta1URB_{it} + \beta2SSS_{it} + \beta3CRIM_{it} + \beta4FS_{it} + \beta5OWN_{it} + \beta6ME_{it} + \beta7SIZE_{it} + \beta8UR_{it} + \beta9LR_{it} + \beta10AG_{it} + \beta11TANG_{it} + \varepsilon_{it}$, where Y represents either liquidity or solvency. The original analysis also included several macroeconomic variables in the descriptive and correlation tables, including output

gap, investment, tax revenue, general expenditure, inflation and GDP per capita. These variables were not included in the displayed regression tables and therefore are treated as supplementary descriptive/correlation variables rather than regression controls in this revised presentation.

Results and Discussion

Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Liquidity	307	3.02	444,845.31	2.8	4.2
Claims ratio/underwriting	307	5.235	24,653.411	2.1	5.6
Reinsurance ratio	307	31.031	14.664	2.2	35.1
Financial structure	307	19.88	188,296.54	1.6	25.2
Company size	307	32.104	1,933.991	3.9	6.1
Ownership structure	307	20.79	5,465,726.1	1.0	7.40
Degree of urbanization	307	28.931	17.029	2.4	31.13
Social security system	307	7.799	13.402	1.1	9.4
Rate of criminality	307	5.351	2.026	2.18	5.27
Regulation quality	307	35.09	229,658.97	1.2	37.2
Insurance penetration	307	1.195	4.237	0.26	11.3
Management efficiency	307	10.498	10.832	2.1	14.2
Total premium	307	21.36	95,990.843	2.6	28.8
Underwriting risk	307	14.635	5,986.149	4.1	38.1
Loss ratio	307	28.931	17.029	2.4	48.13
Asset growth	307	7.799	13.402	1.1	9.4
Solvency	307	5.351	2.026	2.18	5.27
Tangibility	307	35.09	229,658.97	1.2	43.2
Output gap	307	1.195	4.237	4.26	11.3
Tax revenue/GDP	307	14.477	3.414	10.2	15.7
General expenditure/GDP	307	19.741	2.698	15.1	23.8
Inflation	307	23.967	26.61	8.42	34.8
GDP per capita	307	14.493	3.356	10.2	21.7

The source data indicate substantial variation across several measures. Liquidity was reported with a mean of 3.02, while solvency had a mean of 5.351. The reported mean reinsurance ratio was 31.031, company size 32.104, degree of urbanization 28.931 and loss ratio 28.931. Because some standard deviations and ranges are unusually large relative to their means, the original measurement units and data transformations should be checked before publication.

Unit-Root Test

Variable	ADF statistic	p-value
Liquidity	1.96	0.000
Claims ratio/underwriting	-1.45	0.000
Reinsurance ratio	-2.33	0.001
Financial structure	2.31	0.007
Company size	0.76	0.000
Ownership structure	-1.59	0.000
Management efficiency	-0.32	0.000
Total premium	0.24	0.000
Underwriting risk	-0.30	0.000
Loss ratio	-1.97	0.049
Asset growth	-0.07	0.000
Solvency	-0.05	0.000

Tangibility	2.56	0.001
Output gap	3.20	0.001
Investment	-1.59	0.000
Tax revenue/GDP	-0.32	0.000
General expenditure/GDP	0.24	0.000
Inflation	-0.30	0.000
GDP per capita	-0.05	0.000

The source manuscript states that the ADF results confirmed stationarity at first difference at the 5% significance level. This finding is important because regression involving non-stationary series can generate misleading associations. The revised interpretation should, however, distinguish between the reported ADF results and the exact transformation applied to each series, which is not documented in the source manuscript.

Correlation Analysis

The correlation matrix in the source contains pairwise correlations among the dependent and explanatory variables. The largest reported association between liquidity and the explanatory variables was with loss ratio (0.175), while liquidity and solvency had a correlation of approximately -0.105. The source manuscript states that the correlation results resolved multicollinearity concerns. However, correlation coefficients alone are not sufficient to establish the absence of multicollinearity in a multivariate regression. Variance inflation factors or another formal diagnostic should be reported in the final manuscript.

Regression Results for Liquidity

Predictor	Coef.	Std. Err.	t	Reported p	95% CI
Degree of urbanization	-3.365	7.836	-0.43	0.000	-18.724 to 11.994
Social security system	1.373	0.584	2.35	0.000	0.229 to 2.518
Rate of criminality	561.072	981.602	0.57	0.001	-1362.833 to 2484.976
Financial structure	-0.183	0.100	-1.84	0.007	-0.379 to 0.012
Ownership structure	0.001	0.003	0.33	0.000	-0.004 to 0.006
Management efficiency	-3248.917	1390.011	-2.34	0.000	-5973.288 to -524.546
Company size	0.004	0.171	0.02	0.000	-0.332 to 0.340
Underwriting risk	-4.388	2.462	-1.78	0.000	-9.212 to 0.437
Loss ratio	351.761	980.447	0.36	0.000	-1569.880 to 2273.403
Asset growth	-139.700	1109.055	-0.13	0.049	-2313.409 to 2034.008
Tangibility	0.166	0.069	2.41	0.000	0.031 to 0.300
Constant	358106.84	113976.94	3.14	0.100	134716.15 to 581497.53

Model statistics: N = 307; overall R^2 = 0.004; within R^2 = 0.078; between R^2 = 0.030; chi-square = 19.016; reported Prob > chi^2 = 0.061. The liquidity model reports positive coefficients for social security system, ownership structure, company size, loss ratio and tangibility, and negative coefficients for degree of urbanization, financial structure,

management efficiency, underwriting risk and asset growth. The model's overall R^2 of 0.004 indicates that the displayed predictors explain very little of the total variation in liquidity in the reported specification. In addition, the reported model chi-square p-value of 0.061 is above the conventional 5% threshold. There is an important internal inconsistency in the source output. Several p-values are reported as 0.000 even where the displayed t-statistic and 95% confidence interval would not support statistical significance at 5%. For example, the degree-of-urbanization coefficient has t = -0.43 and a confidence interval spanning zero, while its p-value is reported as 0.000. Similar inconsistencies appear for ownership structure, company size, underwriting risk, loss ratio and asset growth. Therefore, the revised paper does not treat every displayed p-value as independently verified evidence of significance. The underlying statistical output should be regenerated from the original dataset before publication.

Regression Results for Solvency

Predictor	Coef.	Std. Err.	t	Reported p	95% CI
Degree of urbanization	-3.365	7.836	1.64	0.000	-18.724 to 11.994
Social security system	1.373	0.584	-0.78	0.000	0.229 to 2.518
Rate of criminality	561.072	981.602	-1.76	0.001	-1362.833 to 2484.976
Financial structure	-0.183	0.100	0.69	0.007	-0.379 to 0.012
Ownership structure	0.001	0.003	-0.26	0.000	-0.004 to 0.006
Management efficiency	-3248.917	1390.011	-0.25	0.000	-5973.288 to -524.546
Total premium/company size*	0.004	0.171	-0.38	0.000	-0.332 to 0.340
Underwriting risk	-4.388	2.462	-0.15	0.000	-9.212 to 0.437
Loss ratio	351.761	980.447	-1.41	0.000	-1569.880 to 2273.403
Asset growth	-139.700	1109.055	0.45	0.049	-2313.409 to 2034.008
Tangibility	0.166	0.069	-0.68	0.000	0.031 to 0.300

Model statistics: N = 307; overall R^2 = 0.025; within R^2 = 0.021; between R^2 = 0.200; chi-square = 7.614; reported Prob > chi^2 = 0.747. The solvency model reports the same coefficient pattern as the liquidity model, with positive coefficients for social security system, ownership structure, company size/total premium, loss ratio and tangibility and negative coefficients for degree of urbanization, financial structure, management efficiency, underwriting risk and asset growth. The overall R^2 of 0.025 is low, and the reported chi-square probability of 0.747 does not indicate overall model significance at conventional levels. As with the liquidity model, the displayed inferential statistics are internally inconsistent. For example, a t-statistic of 1.64 cannot correspond to a two-sided p-value of 0.000 with 306 observations, and the confidence interval shown for degree of urbanization includes zero. Accordingly, the direction and magnitude of coefficients can be discussed as reported, but firm conclusions about individual statistical significance should await a regenerated regression table.

Discussion of Findings

The reported positive association between social security and insurance performance can be interpreted within the broader insurance-demand literature. Social protection arrangements may affect how households and businesses perceive and allocate risk, while the development of formal financial institutions can shape insurance participation. The result is also consistent with the wider view that insurance markets are embedded in institutional and social environments rather than operating independently of them. The negative coefficient for financial structure suggests that the way insurers finance their operations may be associated with weaker liquidity and solvency in the reported models. This is broadly compatible with Ghanaian evidence that capital structure can have an important relationship with insurance-firm profitability. However, the coefficient should not be interpreted causally without a clearly specified identification strategy and a verified regression output. The negative association reported for underwriting risk is economically plausible. Higher underwriting risk can increase the probability or severity of claims and therefore place pressure on the insurer's financial resources. The role of claims experience is also reflected in the recent Ghanaian evidence of Opoku et al. (2024), who identified claims ratio and retention ratio as important performance drivers. Similarly, Attah-Kyei et al. (2023) found that stronger capitalization was associated with lower insurer risk and greater technical efficiency. The positive coefficient on tangibility may reflect the potential role of asset backing in supporting financial capacity. The positive coefficient on company size may be associated with scale, diversification and resource access. Nevertheless, because the reported confidence intervals and p-values are inconsistent, these interpretations should be regarded as coefficient-direction interpretations rather than confirmed causal effects. The relatively low R-squared values in both models indicate that the displayed factors explain only a small share of total variation in the dependent variables, particularly when assessed using overall R-squared. This suggests that other determinants—including profitability, investment performance, reinsurance arrangements, capital adequacy, firm age, governance, claims management, macroeconomic conditions and regulatory variables—may contribute substantially to non-life insurance performance. This observation is consistent with recent Ghanaian evidence that insurance-firm performance is multidimensional.

Conclusion

The study examined the relationship between a broad set of industry-specific and firm-related factors and non-life insurance performance in Ghana, using liquidity and solvency as the principal performance indicators. Based on 307 observations for 2004–2022, the analysis employed descriptive statistics, stationarity testing, correlation analysis and panel-data regression. The reported coefficients indicate systematic relationships between performance and variables including social security, criminality, financial structure, ownership structure, management efficiency, company size, underwriting risk, loss ratio, asset growth and tangibility. The findings support the broader proposition that the financial condition of non-life insurers is shaped by a combination of internal operating decisions and the external institutional environment. However, the source regression tables contain inconsistencies between p-values, t-statistics and confidence intervals, while the reported model-level statistics do not support a simple conclusion that both regression models are statistically significant. The most defensible conclusion is therefore that the study identifies potentially important explanatory factors, but the inferential claims require verification from the original dataset and statistical software output before the results are treated as publication-ready evidence.

Recommendations

i. **Strengthen Underwriting and Claims Management:** Non-life insurers should strengthen risk selection, pricing, claims monitoring and portfolio review processes, particularly for lines of business with high underwriting risk and loss experience.
ii. **Improve Capital and Liquidity Planning:** Insurers should maintain robust liquidity and solvency monitoring systems, stress-test claims and investment shocks, and align asset-liability structures with expected policyholder obligations.
iii. **Use Reinsurance Strategically:** Reinsurance decisions should be integrated with solvency and risk-retention strategies rather than treated solely as a mechanism for transferring individual risks.
iv. **Enhance Management Efficiency:** Management should monitor administrative costs, operational productivity and claims-processing efficiency using regular performance dashboards and benchmarking.
v. **Strengthen Regulatory Data Quality:** The National Insurance Commission and industry participants should promote standardized, machine-readable reporting of financial, underwriting, claims and solvency indicators to facilitate reliable longitudinal research and supervisory analysis.
vi. **Improve Insurance Awareness and Market Development:** Insurers and regulators should continue targeted consumer education, particularly among underserved and informal-sector groups, because low awareness remains a documented barrier to insurance penetration in Ghana.
vii. **Regenerate and Validate the Empirical Model.** Before journal publication, the researchers should rerun the regression models from the original dataset, verify variable coding and transformations, confirm the panel estimator, and report internally consistent coefficients, standard errors, t/z statistics, p-values and confidence intervals.

Limitations and Directions for Future Research

The revised manuscript is constrained by the information contained in the source document. The original paper does not fully document the number of firms, sampling frame, exact data sources and formulas used to construct every variable, nor does it identify the precise panel estimator. The regression tables also contain internal statistical inconsistencies. Future research should provide a transparent panel-data codebook, distinguish firm-level from macroeconomic variables, test alternative performance indicators such as return on assets, return on equity and combined ratio, and compare fixed-effects, random-effects and dynamic specifications where theoretically appropriate.

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