International Journal of Entrepreneurship, Management and Social Sciences (IJEMSS)
Volume 3, Issue 1; ISSN: 3026-9881
email: ijemss@futminna.edu.ng

Capital Adequacy and Gross Premium Income in Nigeria's Oil and Gas Insurance Sector: A Longitudinal Analysis

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Abstract

The continuing volatility and high-risk exposure of the oil and gas industry in Nigeria have heightened the issue of the financial stability of the insurers and their capacity to maintain premium increases. This paper thus examines the correlation between capital adequacy and gross premium income in the industry. The analysis is based on longitudinal, panel-based, firm-level data comprising 240 observations that assess capital adequacy as a measure of financial strength and regulatory compliance, and its relationship with underwriting results. Descriptive statistics and correlation show that there is a large inter-firm dispersion: capital adequacy is positively skewed, indicating that capital is not evenly distributed, whereas gross premium income is left-skewed with excess kurtosis, implying an asymmetric distribution concentrated in a small group of firms. The empirical results suggest that there is a positive relationship between increased capitalisation and the premium income, which means that well-capitalised insurers have better underwriting capacity and market leverage. On the other hand, companies that lack sufficient capital are characterised by low premium generation, indicating a low ability to bear risks. The correlation estimators are used to deal with firm-specific heterogeneity and possible endogeneity. The findings indicate that capital adequacy is a key factor of financial performance and recommend the necessity to enhance the enforcement of regulations and better capital management practices.

Keywords: Capital Adequacy, Gross Premium Income, Oil and Gas and Insurance Sector, Nigeria.

1.0 Introduction

The financial institutions performance is a key topic of interest in both the academic research and regulatory practice as it applies to the financial stability and economic growth. The insurance industry in this field is a main player in risk transfer and capital formation, and performance is often measured by profitability, solvency and generation of premium. Gross Premium Income (GPI) is one of them, and it is so important because it indicates the extent of the underwriting efforts and market penetration. The insurance sector has shown relatively robust growth in premiums throughout the world, which is backed by robust regulatory frameworks, and high penetration levels. Nonetheless, in Africa, and particularly in Nigeria, GPI is relatively low and unstable due to structural inefficiencies, ineffective institutional frameworks and low consumer adoption (Olayungbo & Akinlo, 2016; Alhassan & Biekpe, 2016).

In Nigeria, the issue is more acute in the high-risk areas like oil and gas where the insurers must underwrite complex and capital-intensive risks. Despite the economic significance of the sector, insurance companies tend to have low underwriting capacity, as seen in a lack of growth or inconsistent GPI growth. This has been blamed on poor capitalization, poor practices in risk management and gaps in regulation (Akinlo & Apanisile, 2014; Ujunwa & Modebe, 2011). In

turn, the enhancement of the GPI performance requires more in-depth analysis of structural forces behind the ability of insurers to raise premium incomes.

In this regard, capital adequacy has become a determinant factor. It is defined as the adequacy of the capital of an insurer in comparison with its risk exposure and is usually represented by capital-to-total assets ratio, solvency margin and regulatory minimum capital requirements. These proxies represent different aspects of financial strength: whereas the capital-to-assets ratio is a measure of internal financial leverage, the solvency margins are a measure of the capacity to cover long-term commitments and regulatory capital levels are a measure of adherence to supervisory standards. In theory, capital adequacy leads to increased underwriting capacity, confidence in the market and allows insurers to take on larger and more complicated risks, possibly resulting in higher GPI (Cummins & Nini, 2002). Signalling theory also indicates that financially sound firms are sending a message to policyholders that they are financially sound and thus lure more business.

Empirical studies on this correlation, however, are inconclusive. Vencappa et al. (2020) report a positive correlation between capital strength and growth in premiums, but other studies, like Grace and Phillips (2008), claim that excess capital can create inefficiencies and diminish growth incentives. More to the point, a lot of the available literature is focused on developed markets or takes cross-sectional designs, restricting information on dynamic and context-sensitive relationships. Alhassan and Biekpe (2016) and Olayungbo and Akino (2016) in the Nigerian context are more about the overall insurance performance and little about the specifics of the sector such as oil and gas insurance, and they fail to sufficiently account longitudinal effects.

This indicates a serious gap in the literature: the evidence regarding the impact of capital adequacy on Gross Premium Income at the longitudinal and firm-level in the oil and gas insurance industry in Nigeria is limited. Since the industry is a high-risk and capital-intensive sector, this relationship is crucial to the regulatory policy and managerial decision-making.

This paper, therefore, looks at how the capital adequacy, in terms of capital-to-assets ratio, solvency margin, and regulatory capital level, influences Gross Premium Income on panel data of 12 licensed insurance firms, over a period of 18 years. The longitudinal approach of the study gives more information on the dynamic relationship between capital strength and performance of underwriting in the Nigerian oil and gas insurance market.

2.0 Conceptual Review

Gross premium income refers to the total premiums collected from policyholders before deducting reinsurance costs. It is a key indicator of an insurer's market share and underwriting capacity. Financially strong insurers have the advantage of underwriting high-value policies, particularly in industries with significant risks, such as oil and gas (Fadun et al., 2025). The ability to underwrite diverse policies leads to increased gross premium income, boosting profitability (Asola, et,al; 2025). Moreover, insurers with sufficient capital reserves can offer competitive pricing, attract more clients, and strengthen their market position. It can also be noted as the foundation of revenue.In the insurance sector, premium income and reinsurance cession are key performance indicators that reflect an insurer's financial capacity, risk appetite, and underwriting efficiency. This is particularly important in high-risk sectors such as oil and gas, where large-scale losses and volatile exposures demand robust financial strength and risk-sharing strategies.Gross Written Premium (GWP) represents the total premiums underwritten

by an insurer before deductions for reinsurance. In capital-intensive sectors like oil and gas, higher premium income often indicates:Strong market share and risk acceptance capacity,diversified portfolio, and technical underwriting competence and ability to absorb large-scale losses due to larger capital reserves.According to NAICOM's Annual Report (2023), the Nigerian non-life insurance industry generated over ₦422 billion in gross premiums, with the oil and gas segment contributing a significant share among Tier 1 insurers (NAICOM, 2023).However, a high GWP must be evaluated alongside loss ratios and underwriting profitability to ensure that growth is not driven by under-pricing or overexposure.

2.1 Capital adequacy in the sector

Capital adequacy is the minimum financial resources an insurer requires to withstand shocks and fulfil its policyholder obligations (Oyerinde, Aduloju & Fadun,2025; Fadun, Oyerinde & Aduloju, 2024; Asola, et,al; 2025). It is influenced by asset quality, risk exposure, and regulatory requirements. Insurers' financial performance is typically measured using underwriting profit, return on equity, claim ratio, and reinsurance ratio (Okonkwo et al., 2020). Theoretical models, such as the risk-based capital model, suggest that insurers with adequate capital are better positioned to take calculated risks and maintain profitability while minimising solvency risks.

In the oil and gas sector, reinsurance practices play a significant role in mitigating large-scale liabilities. Reinsurance ceding ratios and acceptance levels are critical metrics that reflect an insurer's risk-sharing strategies and overall financial health. Similarly, claim ratios, which measure the proportion of claims paid against premiums earned, are key underwriting efficiency and profitability indicators. The reinsurance ratio, representing the proportion of premiums ceded to reinsurers, can indicate the extent of risk transfer and its implications for capital adequacy.

2.1.1 Concept Review

i. Capital adequacy

Capital adequacy refers to the financial resources available to an insurer to cover its liabilities and absorb potential losses. It is a regulatory requirement and a critical factor in maintaining solvency (Asola et, al; 2025; Isayas,2021; Fadun, Oyerinde & Aduloju, 2025). The capital adequacy ratio (CAR) is calculated as:

CAR=Capital Base/Risk-Weighted Assets×100

Higher CAR values indicate stronger financial capacity and reduced risk exposure.

ii. Gross premium income

Gross Premium Income represents the total revenue generated from policyholders. Capital adequacy positively influences an insurer's ability to underwrite larger and more diverse policies, particularly in the oil and gas sector, which involves high-value assets and liabilities (Fadun, Oyerinde & Aduloju, 2025; Asola, et,al; 2025).

2.2 Theoretical Framework

2.2.1 Capital Structure Theory

The Founding Theory,the Capital Structure Theory is based on the groundbreaking research of Franco Modigliani and Merton Miller, who digitized the Modigliani-Miller (M&M) propositions in 1958. In their original model, they assume that in the ideal market, where taxes, transaction costs and information asymmetry are eliminated, the value of a firm does not depend on its capital structure (Simiyu, &Otuya, 2019). It means that a decision to fund a firm by debt or equity will not have an impact on the firm valuation in a perfectly competitive market. But later, perfection produced frictions of reality, especially corporate taxes and bankruptcy expenses, thus changing this irrelevance suggestion.

It was based on this that the Trade-Off Theory was developed, which states that companies decide the optimum capital structure by evaluating the tax benefits of debt financing versus the expense of financial distress (Shemetov, 2025). Both the overdependence on debt and over-dependence on equity can result in either insolvency or dilution of ownership and returns, respectively. More recent contributions build on this view by the addition of market imperfection, agency costs, and dynamic adjustment processes and by focusing on the fact that firms make ongoing adjustment of their capital structures in reaction to the evolving economic environment (Dang, Kim, & Shin, 2019).

Capital structure issues in the insurance sector are closely related to capital adequacy requirements. Sufficient capitalization will improve the capacity of insurers to absorb the underwriting risk, ensure solvency, and increase premium-generating activity. On the other hand, poor capital limits the ability to take risks and excess capital can cause inefficiency in the use of resources. Therefore, the capital structure theory offers a sound theoretical basis to explain the effect of capital adequacy on financial performance, especially Gross Premium Income, in risk-sensitive and capital-intensive industries.

2.2 Empirical Studies

Capital Adequacy and Financial Performance

Asola, et, al; (2025), in their study titled Capital Adequacy and Financial Performance of Insurance Firms in Nigeria, examined the relationship between capital adequacy and profitability using panel data drawn from selected Nigerian insurance companies. The study employed a fixed effects regression technique to control for firm-specific heterogeneity, with return on assets (ROA) and return on equity (ROE) serving as proxies for financial performance, while capital adequacy was measured using the capital-to-total-assets ratio. Their findings revealed a statistically significant positive relationship, indicating that well-capitalized insurers are better positioned to meet claim obligations, expand underwriting capacity, and achieve higher profitability. The authors concluded that strong capital buffers enhance both regulatory compliance and financial stability, consistent with risk-based capital theory.

In a related study, Innocent et, al; (2019), in their work titled Capital Adequacy and Operational Efficiency of Insurance Companies in Nigeria, investigated the effect of capital strength on insurers' operational efficiency. The study utilised a stochastic frontier analysis (SFA) approach combined with panel data estimation techniques to assess efficiency scores across firms. Capital adequacy was proxied by solvency margin and regulatory capital ratio, while efficiency

was measured through cost efficiency and claims management performance. The results showed that undercapitalised firms exhibited lower efficiency levels, particularly in claims settlement and risk absorption capacity, leading to reduced profitability and weakened competitive positioning. The study concluded that insufficient capital buffers significantly impair operational effectiveness, especially in high-risk underwriting environments.

Collectively, these studies demonstrate that capital adequacy is a critical determinant of insurance firm performance; however, most existing evidence is aggregated at the industry level and does not sufficiently isolate sector-specific dynamics such as oil and gas insurance, where risk exposure and capital requirements are substantially higher. This limitation motivates further empirical investigation within this niche context.

3.0 Methodology

3.1 *Research Design*

The study adopts a quantitative longitudinal research design, utilizing panel data analysis to investigate the causal relationship between Capital Adequacy (CA) and Gross Premium Income (PI) in Nigeria's oil and gas insurance sector. This design is appropriate for tracking firm-level dynamics over 20 years (2004–2023), capturing the time-series variations. Secondary data were sourced from audited financial statements, regulatory reports, and industry digests.

3.2 Research Population

The research population consists of all the licensed non-life insurance companies in Nigeria that are actively involved in underwriting the oil and gas business. These companies represent a significant portion of the market share in the Nigerian oil and gas insurance sector, collectively underwriting approximately 70% of the total oil and gas risks in the country. The selected insurers are:Leadway, Custodian & Allied Insurance Plc, AIICO Insurance Plc, Rex Insurance Plc, NEM Insurance Plc, Consolidated Hallmark Insurance Plc, Regency Insurance Plc, Linkage Assurance Plc, STI Insurance Plc, Mutual Benefits Assurance Plc, IEI Insurance Plc, and Universal Insurance Plc

3.3 Sample Size

The study will include 12 insurance companies, which are actively involved in oil and gas underwriting in Nigeria. These companies collectively account for a large share of the market in the Nigerian oil and gas insurance sector.

3.4 Sampling Technique

The sampling technique is purposive sampling, as the study specifically selects companies based on their participation in the oil and gas insurance market, their size (large, medium, and small), and the availability of relevant financial data for the study period.

3.5 Method of Data Collection

The data for the study will be collected by e-view from the website through the following methods:

To measure the empirical results, several statistical techniques will be employed. The descriptive statistics reveal notable dispersion, skewness, and kurtosis, suggesting variability

and non-normality in several variables, particularly GPI and CA, supporting the choice of robust estimation techniques.

4.0 Results and Discussion

4.1 Correlation between capital adequacy and premium income

i. Capital Adequacy (CA)

Capital Adequacy, the study's dependent variable, represents the insurer's capital buffer relative to risk exposure. The mean value of 1.73 and the median of 1.58 suggest a relatively moderate level of capital adequacy across the sample. However, the range extends from 0 to 8.15, and the standard deviation is 0.85, signalling variability in capital positions. The skewness (3.55) and exceptionally high kurtosis (17.67) point to a non-normal, heavily right-skewed distribution with extreme positive outliers. These characteristics imply that while many insurers maintain conservative capital reserves, a small subset of firms, possibly well-capitalized or multinational operators, exhibit unusually high capital adequacy levels. This inequality reflects structural imbalances in capital distribution and may influence the stability and competitiveness of the sub-sector. Premium Income (PI)

ii. Premium Income,

Premium Income,a proxy for underwriting volume and market reach, shows a mean value of 14.26 and a standard deviation of 3.18. The identical median (14.26) suggests a symmetrical central tendency; however, the skewness of -1.37 and kurtosis of 7.03 highlight a left-skewed and leptokurtic distribution. This pattern suggests the presence of a few firms with exceptionally low or zero premium income, potentially due to inactivity in certain years or niche underwriting roles. The maximum value of 21.95 underscores the size of dominant players in the market, while the presence of zero-income entities reveals heterogeneity in underwriting intensity.

Correlation Matrix with Significance Levels (* p < 0.05, ** p < 0.01, *** p < 0.001)

Variable	CA	PI	CR	CS	RL	RC	RA	RR
CA	1.000NA	0.086	-0.347***	-0.205**	0.167**	-0.307***	0.030	0.137*
PI	0.086	1.000NA	-0.088	0.721***	0.929***	0.681***	0.407***	0.065
CR	-0.347***	-0.088	1.000NA	0.240***	-0.057	-0.086	-0.083	-0.024
CS	-0.205**	0.721***	0.240***	1.000NA	0.747***	0.598***	0.348***	0.084
RL	0.167**	0.929***	-0.057	0.747***	1.000NA	0.592***	0.433***	0.031
RC	-0.307***	0.681***	-0.086	0.598***	0.592***	1.000NA	0.378***	0.348***
RA	0.030	0.407***	-0.083	0.348***	0.433***	0.378***	1.000NA	0.108
RR	0.137*	0.065	-0.024	0.084	0.031	0.348***	0.108	1.000NA

Source: Author's analysis (2025) using R statistical software.

The results reveal that capital adequacy (CA)**,** the focal dependent variable of this study, exhibitsweak correlations with all other variables in the matrix. Though relationships attain statistical significance, the magnitude of the coefficients suggests minimal linear association.*Premium income (PI)* demonstrates the most robust and statistically significant associations in the matrix. It is strongly and positively correlated with risk retention (r = 0.929, **p**< 0.001), claim settlement (CS) (r = 0.721, **p**< 0.001), and reinsurance ceding (r = 0.681, **p**<

0.001), indicating that higher premium income levels are systematically associated with greater underwriting volume, increased claim activity, and heightened participation in reinsurance markets. Furthermore, PI correlates positively with reinsurance acceptance (RA) ($r = 0.407$, $\mathbf{p} < 0.001$), reflecting the tendency of larger insurers to diversify revenue streams through inward reinsurance arrangements. These findings collectively suggest that premium income functions as a strong proxy for firm scale and operational intensity. Notably, PI shows a negligible correlation with capital adequacy ($r = 0.086$) and with the reinsurance ratio ($r = 0.065$), reinforcing the earlier conclusion that capital strength not influenced by underwriting volume.

The findings reveal significant variation in capital adequacy (CA) and gross premium income (GPI) among insurance firms in Nigeria's oil and gas sector, indicating uneven financial strength and underwriting capacity. While capital adequacy shows a moderate sectoral mean, its skewed distribution suggests that a few firms are significantly over-capitalised, often reflecting dominance by large or foreign-linked insurers. Similarly, GPI is unevenly distributed, with left skewness and high kurtosis indicating that only a small number of firms generate substantial premiums, while many record minimal underwriting activity. The results further show a positive association between capital adequacy and GPI, implying that well-capitalised firms are better positioned to absorb risk, underwrite larger policies, and attract higher-value clients. In contrast, undercapitalised firms exhibit limited premium generation and weaker market participation. Overall, the study confirms that capital adequacy is a key determinant of gross premium income, shaping competitive positioning and financial performance in Nigeria's oil and gas insurance industry.

5.0 Conclusion and Recommendations

5.1.1 Conclusion

This study examined the relationship between Capital Adequacy and Gross Premium Income among insurance companies operating within Nigeria's oil and gas sector. The findings reveal that capital adequacy plays a critical role in influencing a firm's underwriting capacity and premium generation. Insurers with strong capital buffers tend to exhibit higher premium income, reflecting enhanced risk-bearing capacity, regulatory compliance, and market confidence. Conversely, firms with low or zero capital adequacy often report minimal or no premium income, indicating limitations in their operational scope or inability to underwrite significant risk.

The descriptive statistics underscore the heterogeneous nature of the sector, with high skewness and kurtosis in both capital adequacy and premium income, suggesting structural imbalances and outlier behaviour. These dynamics highlight the competitive inequality across the sector, where a few well-capitalized firms dominate underwriting activity, while others struggle to maintain financial viability.

Therefore, the study confirms that capital adequacy is a significant determinant of underwriting performance PI, and that disparities in financial structure among insurers have direct implications for market participation, risk exposure, and sectoral stability.

5.1.2 Recommendations

Strengthening capital adequacy is essential for improving gross premium income (GPI) in Nigeria's insurance industry, particularly in the oil and gas sector. Regulators such as NAICOM

should enforce stricter, risk-sensitive capital requirements to enhance insurers' solvency and underwriting capacity. Smaller firms should be encouraged to consolidate through mergers or partnerships to improve capital strength and competitiveness. Risk-based supervision should be fully adopted to ensure capital levels align with firms' risk exposure, while reinsurance arrangements should be closely monitored to ensure transparency and prevent weak capital positioning. In addition, insurers require capacity building in capital planning and financial management to improve operational efficiency. Finally, enhanced financial disclosure standards should be enforced to improve transparency and support better regulatory oversight. Collectively, these measures will strengthen capital adequacy and promote sustainable growth in gross premium income.

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