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EFFECT OF OPERATIONAL RISK ON THE PERFORMANCE OF LISTED INSURANCE COMPANIES IN NIGERIA

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ABSTRACT

Introduction: This study examines the determinants of profitability, measured by Adjusted Risk-Adjusted Return on Capital (Adjusted RAROC), in the context of listed insurance companies in Nigeria.
Methods: Using a panel data regression analysis, we employ four models: pooled regression, fixed effects, random effects, and Difference Generalized Method of Moments (D-GMM), to explore the impact of operational risk factors, including the claims ratio, expense ratio, leverage, and firm size, on Adjusted RAROC.
Results: The results indicate that leverage and firm size play significant roles in profitability, with higher leverage associated with increased profitability in some models. Conversely, the claims ratio shows a negative relationship with profitability, highlighting the importance of effective risk management. The expense ratio also exhibits a negative impact on profitability, emphasizing the need for efficient cost control. The D-GMM model, which addresses endogeneity issues, reveals that past performance and firm size are crucial predictors of future profitability.
Conclusion and suggestion: Overall, the findings suggest that operational efficiency, risk management, and strategic financial decisions are essential for improving profitability in the Nigerian insurance sector.

INTRODUCTION

The insurance sector is a fundamental pillar of the financial system, with insurance companies acting as risk bearers and providers of financial security to businesses and individuals. In emerging economies such as Nigeria, this industry plays a crucial role in fostering economic stability and growth. However, insurance companies in these markets often operate under significant uncertainties, facing numerous challenges that impact

their overall performance (Masci, 2011). Among these challenges, operational risk stands out as a critical factor influencing the financial stability, profitability, and market valuation of these companies. Operational risk encompasses potential losses stemming from internal processes, people, systems, and external events (Basel Committee on Banking Supervision, 2004). For listed insurance companies in Nigeria, understanding the implications of these risks on firm performance is essential, as effective risk management not only protects the company's value but also promotes trust among stakeholders, including shareholders, regulators, and policyholders.

Despite the importance of risk management, there is limited empirical research specifically examining the effects of operational risks on the performance of insurance companies listed on the Nigeria Exchange Limited (NGX). The Nigerian insurance industry presents a unique landscape characterized by high levels of regulatory oversight, economic volatility, and sometimes inconsistent risk management practices across firms (Olaiya et al., 2021). Operational risks in this context have distinct dynamics that differ from those observed in advanced economies, making it necessary to explore their impact within the specific context of the Nigerian market.

Previous studies in developing economies have highlighted a generally positive relationship between effective risk management practices and firm performance, often attributing increased efficiency, reduced costs, and enhanced profitability to better-managed risk exposure. For instance, Olaiya et al. (2023) found that companies with effective risk management frameworks tend to achieve higher profitability and stronger financial stability. However, given the unique economic and regulatory environment in the Nigerian insurance industry, the factors influencing these relationships warrant deeper investigation.

This study focuses on operational risks as a core determinant of performance for listed insurance companies, which represent the more regulated and publicly accountable segment of the industry in Nigeria. Operational risk is measured by key indicators, including the claims ratio (CR) and expense ratio (ER). The claims ratio represents the proportion of claims paid out relative to the premiums collected, indicating the efficiency of underwriting practices and claims management processes. The expense ratio reflects the administrative and operational costs incurred relative to total premiums earned, indicating the firm's cost efficiency in managing internal processes.

The primary performance metric used in this study is Adjusted RAROC (Risk-Adjusted Return on Capital), which measures the firm’s performance by evaluating returns in relation to risk exposure. Adjusted RAROC provides a nuanced view of how operational risks affect firm value, offering a more dynamic and risk-sensitive assessment compared to traditional financial metrics (Kimball, 1998). It reflects the firm's ability to generate

adequate returns relative to the risk undertaken, incorporating the efficiency of risk management processes into financial performance.

Leverage serves as a moderating variable in this study to examine the impact of financial structure on operational risks in Nigerian insurance firms. Leverage, which is the ratio of debt to equity or total assets, measures the degree to which a company relies on borrowed capital to fund its operations. Higher leverage can magnify both potential returns and risks, potentially affecting how operational risks influence financial performance (Modigliani & Miller, 1958). Firms with higher leverage may be more vulnerable to operational inefficiencies due to increased financial obligations, while firms with lower leverage might have greater flexibility to absorb operational shocks.

Additionally, this study incorporates firm size as another moderating variable to further assess whether larger insurance firms are better equipped to manage operational risks than smaller firms. Prior studies, such as Berger and Humphrey (1991), have found that larger insurers generally exhibit higher technical efficiency, which may enhance their ability to mitigate operational risks through economies of scale and superior resource allocation. However, the relationship between firm size, leverage, and risk management outcomes remains underexplored in the Nigerian context, where operational challenges are often compounded by macroeconomic constraints.

Using econometric modeling, this study investigates how operational risks individually and collectively influence Adjusted RAROC, with leverage serving as a mediating factor and firm size as a moderating variable. The analysis is conducted on a sample of 20 insurance companies listed on the NGX, representing the majority of the sector and providing a representative basis for understanding the dynamics of the Nigerian insurance market. This research contributes to the existing literature by offering empirical insights into the relationship between operational risk and firm performance within the context of an emerging market. By examining risk management practices and their impact on firm value, and exploring the mediating role of leverage, the study provides a nuanced understanding of how Nigerian insurance firms navigate risks. It also highlights potential strategies for enhancing resilience in the face of evolving economic challenges. The findings are expected to be of practical importance to industry stakeholders, including insurers seeking to strengthen their risk management frameworks, policymakers focusing on regulatory improvements, and investors assessing risk exposure in the Nigerian insurance sector.

This study enriches the understanding of risk management practices in the Nigerian insurance industry, particularly concerning operational risks. By analyzing the effects of these risks on firm performance through the lens of Adjusted RAROC, evaluating the role of leverage as a mediating factor, and assessing firm size as a moderating variable,

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the study provides a comprehensive analysis of the dynamics shaping the Nigerian insurance industry. These insights are crucial for informing industry stakeholders on effective risk management practices that not only enhance firm value but also contribute to the overall stability and growth of the financial sector in Nigeria. Several studies have been conducted in Nigeria to explore the relationship between risk and financial performance of quoted firms. However, findings on the subject have been inconsistent. For example, Onsongo et al. (2019) and Alsulmi et al. (2024) found a positive relationship between risk and firm performance, while Abubakar et al. (2021), Abubakar et al. (2023), and Duniya et al. (2024) observed a negative impact of risk on firm performance. These discrepancies may be attributed to differences in the variables used to measure risk. Therefore, this study aims to fill the gap in the literature by examining the relationship between operational risk (measured by claim ratio and expense ratio) and financial performance (Adjusted RAROC) of listed insurance firms in Nigeria from 2011 to 2022, with leverage and firm size serving as moderating factors.

LITERATURE REVIEW

The impact of operational risk on firm performance has garnered considerable attention in financial and insurance literature due to its implications for company profitability, value, and resilience. For insurance firms, effective risk management is essential in maintaining financial stability and fostering investor confidence, particularly in volatile markets. This literature review presents key theoretical and empirical findings on operational risk management, the mediating role of leverage, the moderating role of firm size, and the performance implications of these factors, focusing on insights from both advanced economies and emerging markets, with an emphasis on the Nigerian insurance sector.

Operational Risk and Firm Performance

Operational risk in insurance companies arises from failures in internal processes, people, and systems, as well as external events that can disrupt business operations. According to the Basel Committee on Banking Supervision (2006), operational risk can lead to financial losses, reputational damage, and ultimately impact firm performance. In the insurance context, researchers often measure operational risk using indicators such as the claims ratio (CR) and expense ratio (ER). The claims ratio represents the proportion of premiums that insurers allocate to claims payments, serving as an indicator of underwriting effectiveness and loss experience (Bawa & Chattha, 2013). A high claims ratio generally implies heightened operational risk, reflecting greater exposure to claim liabilities, which can erode profitability and reduce firm value.

The expense ratio, representing the share of expenses relative to earned premiums, measures operational efficiency and cost management. In their study on the performance of insurance firms, Dey and Kansra (2020) found that high operational costs

negatively impact profitability, as they increase the burden on revenues generated through premiums. Effective management of expense ratios is essential to maintain profitability. In emerging markets, where operational inefficiencies are more prevalent due to factors such as regulatory changes and inadequate technology, controlling operational costs is a significant challenge (Ndeto, 2015). Consequently, operational risk substantially impacts firm performance in developing markets like Nigeria, where regulatory, economic, and technological constraints exacerbate these risks.

Leverage as a Moderator in Risk-Performance Relationships

Leverage, defined as the ratio of debt to equity or total assets, is a moderator affecting the nexus between operational risk and firm performance. Firms with higher leverage face amplified financial risks, as their fixed obligations increase the sensitivity of profitability to operational inefficiencies. On the other hand, firms with lower leverage may better absorb operational shocks, enhancing their resilience to risk exposure (Adams & Buckle, 2003). In the context of the Nigerian insurance industry, where operational challenges and economic volatility are prevalent, leverage plays a pivotal role in determining the extent to which operational risks translate into financial outcomes. High leverage may constrain a firm's ability to manage unexpected operational losses effectively, potentially leading to financial distress. Conversely, prudent leverage management can mitigate the adverse effects of operational risks on financial performance, enabling firms to maintain stability and profitability.

Firm Size as a Moderator in Risk-Performance Relationships

Firm size is widely recognized in the literature as a potential moderator influencing the impact of operational risks on performance. Larger firms often benefit from economies of scale, allowing them to distribute costs more efficiently and gain a competitive edge (Berger & Humphrey, 1991). Cummins and Weiss (2009) noted that larger insurance companies generally exhibit superior profitability and better risk management capabilities than smaller firms, primarily due to enhanced operational efficiencies and access to diversified resources.

In emerging markets, larger firms may also have better access to financial and technological resources, enabling them to withstand market fluctuations and operational challenges more effectively (Amran et al., 2009). Conversely, smaller firms may lack the capital and infrastructure to implement robust risk management practices, making them more vulnerable to operational inefficiencies and financial distress (Shiu, 2004).

In Nigeria, where structural challenges in the insurance sector are pronounced, firm size could significantly influence how operational risks affect performance. Larger

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firms in the Nigerian insurance industry may possess stronger risk management capacities, allowing them to buffer adverse effects and sustain stable performance.

Empirical Studies in Emerging Markets and the Nigerian Context

While extensive research has been conducted in advanced economies, the impact of operational risks on performance within the Nigerian insurance sector remains underexplored. Studies in other emerging markets provide relevant insights. For instance, Alhassan and Biekpe (2015) examined Ghanaian insurance firms and found that effective operational risk management improves profitability. Similarly, Adam (2014) reported that, in Kenya, insurers with higher claims and expense ratios generally experience lower profitability, reinforcing the importance of operational efficiency. Recent studies in other emerging markets further highlight the role of operational risk management. Ntim et al. (2019) investigated South African insurance companies and found that firms with strong governance and risk management frameworks demonstrated better financial performance and resilience against operational shocks. In a study of Indian insurers, Sharma and Goyal (2021) observed that operational inefficiencies, particularly in expense management, had a significant negative impact on firm profitability, suggesting that cost control mechanisms are critical for enhancing performance in emerging markets.

In Nigeria, studies on insurance performance have traditionally focused on general profitability determinants rather than specific risk management factors. For example, Iyoha and Okojie (2018) analyzed profitability drivers among Nigerian insurers, identifying underwriting performance as a key determinant but not explicitly addressing operational risk. Similarly, Ezirim et al. (2020) explored financial performance indicators but overlooked the direct implications of operational risk. Understanding the direct impact of operational risks on firm value is crucial in Nigeria, where risk management practices are still maturing compared to developed economies. This maturation is often hindered by macroeconomic volatility, regulatory pressures, and limited adoption of advanced risk management frameworks (Adenuga et al., 2022). Addressing these operational risks is essential to enhancing profitability, improving market confidence, and ensuring long-term stability in the Nigerian insurance sector.

Additionally, Onsongo et al. (2019) explored the impact of operational risk (measured by cost-to-income ratio) on the return on assets (ROA) of listed commercial and services companies in Nairobi, incorporating firm size as a moderating variable. The study analyzed data from 14 companies spanning from 2013 to 2017 and utilized regression models. The results showed an insignificant positive relationship between operational risk and firm performance. Similarly, Abubakar et al. (2021) investigated the effect of operational risk (cost-to-income ratio) on the net interest margin of listed Deposit Money Banks (DMBs) in Nigeria, with bank size as a moderating factor. The study covered 13 banks from 2014 to 2020, and regression models were used to test the hypotheses.

The findings indicated a significant negative impact of the cost-to-income ratio on the net interest margin of Nigerian DMBs.

Abubakar et al. (2023) examined the influence of operational risk (cost-to-income ratio) on the return on assets (ROA) of Nigerian DMBs. The study covered 16 DMBs from 2018 to 2022, and the data were analyzed using regression models. The findings revealed a significant negative effect of operational risk on the ROA of Nigerian DMBs. In a similar vein, Duniya et al. (2024) investigated the relationship between risk (liquidity and underwriting risks) and the return on equity (ROE) of listed insurance firms in Nigeria. The study focused on 16 insurance firms from 2011 to 2020, utilizing multiple regression models. The results indicated a significant negative relationship between underwriting risk and ROE, while liquidity risk showed an insignificant negative effect on ROE. This current study builds upon the work of Duniya et al. (2024) by extending the analysis to 20 insurance firms from 2011 to 2022. The study uses claim and expense ratios as proxies for operational risk, Adjusted RAROC as the performance proxy, and includes leverage and firm size as control variables.

Furthermore, Alsulmi et al. (2024) explored the relationship between various risks (credit, liquidity, and operational risks) and the financial stability of banks listed on the Gulf Cooperation Council (GCC) stock exchanges. The study also introduced macroeconomic variables such as GDP and inflation, with board size as a moderating variable, and included bank size and efficiency as control variables, as well as COVID-19 as a dummy variable. The study focused on 57 banks listed on the GCC from 2014 to 2022. The findings revealed a significant influence of credit and operational risks on the financial stability of banks, while liquidity risk had an insignificant impact on financial stability.

Conceptual Framework and Hypotheses Development

Drawing on the findings of these studies, this research adopts a conceptual framework that positions operational risk as a determinant of firm performance, with leverage serving as a mediating factor and firm size as a moderating variable. The study posits that operational risk (measured by claims ratio and expense ratio) significantly influences firm performance. Larger firms are expected to better manage these risks, while leverage mediates the relationship between operational risk and firm outcomes.

The performance metric used in this study is Adjusted RAROC (Risk-Adjusted Return on Capital), which provides a dynamic measure of performance by evaluating returns in relation to risk exposure. Adjusted RAROC reflects how effectively a firm manages operational risks while maintaining profitability and meeting stakeholder expectations. This study contributes to the literature by offering empirical evidence on the relationships between operational risk, leverage, firm size, and performance in the

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Nigerian insurance sector. By focusing on Adjusted RAROC, this research provides insights into how effective risk management can enhance firm resilience, investor confidence, and long-term sustainability.

RESEARCH METHODS

In this study, the impact of operational risk on the performance of listed insurance companies in Nigeria is assessed with Adjusted Risk-Adjusted Return on Capital (Adjusted RAROC) as the dependent variable. This metric, which represents a risk-adjusted measure of profitability, provides a nuanced understanding of how effectively Nigerian insurance firms manage operational risk relative to their capital.

The methodology covers data collection, model specification, variable measurement, and econometric analysis, employing a panel data approach to capture both firm-specific and temporal dimensions. A quantitative, panel data design is applied to explore the effects of operational risk on Adjusted RAROC among listed insurance companies. Panel data analysis helps account for individual firm characteristics and temporal changes over time, improving the reliability of findings by controlling for unobserved heterogeneity across companies.

The study uses secondary data sourced from the annual financial statements of insurance companies listed on the Nigeria Exchange Limited (NGX) and additional financial disclosures from the National Insurance Commission (NAICOM). The sample includes 20 out of the 23 insurance companies listed as of December 31, 2022, selected based on data completeness and availability for the period 2011 to 2022. The study focuses on companies with continuous listing and adequate data across all years, ensuring reliable and consistent measurement of financial and operational indicators.

Model Specification

These models were adapted and adjusted to suit the present study from the study of Olaiya et al. (2023), the model for this study is presented thus:

$$Adjusted\ RAROC_{it} = \alpha + \beta_1 CR_{it} + \beta_2 ER_{it} + \beta_3 LVR_{it} + \beta_4 SIZE_{it} + \beta_5 CR_{it} SIZE_{it} + \beta_6 ER_{it} SIZE_{it} + \beta_7 CR_{it} LVR_{it} + \beta_8 ER_{it} LVR_{it} + \varepsilon_{it} \dots\dots\dots\dots (1)$$

$$Adjusted\ RAROC_{it} = (\gamma + \beta_1 Adjusted\ RAROC_{it-1} + \beta_2 CR_{it} + \beta_3 ER_{it} + \beta_4 LVR_{it} + \beta_5 SIZE_{it} + \beta_6 CR_{it} SIZE_{it} + \beta_7 ER_{it} SIZE_{it} + \beta_8 CR_{it} LVR_{it} + \beta_9 ER_{it} LVR_{it} + \varepsilon_{it} + \sum_{j=1}^{k} \Delta X_{it} + \varepsilon_{it}) \dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where: $Adjusted\ RAROC_{it}$ refers to the Adjusted Risk Return on Capital of insurance company (i) in year (t); CR represents the Claims Ratio; ER corresponds to the Expense Ratio; LVR denotes Leverage; $SIZE$ signifies Firm Size; β serves as the Coefficient for operational risk; α and γ function as the Intercept; $\beta_1 Adjusted\ RAROC_{it-1}$ refers to the

Lagged Adjusted RAROC; $\sum_{j=1}^{k} \Delta X_{it}$ represents the Changes in Other Variables; and ε_{it} serves as the Error term.

Estimation Method and Statistical Tests

To evaluate the determinants of Adjusted RAROC, the study employs a panel data regression analysis encompassing pooled regression, fixed effects, random effects, and Generalized Method of Moments (GMM) techniques. Each model provides unique insights into the relationships between operational risk, leverage, firm size, and Adjusted RAROC. The pooled regression model assumes homogeneity across all insurance firms, neglecting firm-specific differences. This method uses ordinary least squares (OLS) estimation for the panel data, treating the data as a single cross-section. The random effects model (REM) assumes that unobserved firm-specific effects are uncorrelated with the explanatory variables, allowing these effects to be treated as random variables. The GMM is employed to address potential endogeneity issues, such as reverse causality or omitted variable bias. The Arellano-Bond difference GMM estimator eliminates firm-specific effects by transforming variables into first differences and uses lagged instruments for endogenous regressors.

RESULT AND ANALYSIS

Table 1 Descriptive Analysis

	ADJUSTED RAROC	CR	ER	LEV	SIZE
Mean	42.14346	34.33132	27.46707	272.9165	8.09E+09
Median	29.53988	28.38935	21.45291	91.69070	5.05E+09
Maximum	724.0683	189.7748	201.4048	14764.50	8.53E+10
Minimum	0.043653	0.019059	0.000000	-281.7766	4.92E+08
Std. Dev.	53.71917	24.97723	24.22628	1058.056	1.01E+10
Skewness	8.781777	2.346216	3.146442	11.35365	3.851820
Kurtosis	109.5884	11.80156	17.48727	150.2891	22.82337
Jarque-Bera	116695.7	994.8632	2494.813	222097.0	4523.121
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	10114.43	8239.518	6592.097	65499.97	1.94E+12
Sum Sq. Dev.	689694.1	149103.0	140272.1	2.68E+08	2.46E+22
Observations	240	240	240	240	240

Table 1 presents the descriptive statistics of the variables used in the study, providing insights into their central tendency, dispersion, and distributional

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characteristics. The variables include Adjusted RAROC, Claims Ratio, Expense Ratio, Leverage, and Firm Size, with data spanning 240 observations.

The mean Adjusted RAROC is 42.14, indicating an average risk-adjusted return across the sampled firms. The standard deviation of 53.72 highlights significant variability in profitability. The maximum value of 724.07 shows extremely high profitability in certain cases, whereas the minimum value of 0.04 indicates firms with minimal or near-zero profitability. The skewness (8.78) and kurtosis (109.59) suggest a highly skewed and leptokurtic distribution, confirmed by the Jarque-Bera statistic (116,695.7, p = 0.000), indicating non-normality.

The mean Claims Ratio is 34.33, with a standard deviation of 24.98, reflecting moderate variability in claims relative to premiums. The maximum value (189.77) and minimum value (0.02) demonstrate the wide range in underwriting performance among firms. The skewness (2.35) and kurtosis (11.80) further indicate a positively skewed and leptokurtic distribution. The Jarque-Bera statistic (994.86, p = 0.000) confirms the non-normality of the Claims Ratio distribution.

The Expense Ratio has a mean of 27.47 and a standard deviation of 24.23, showing a similar dispersion to the Claims Ratio. The maximum value (201.40) suggests that some firms face disproportionately high operational costs, while the minimum value (0) indicates firms with negligible expense ratios during the period. The skewness (3.15) and kurtosis (17.49) suggest a heavily skewed and leptokurtic distribution, with the Jarque-Bera statistic (2,494.81, p = 0.000) affirming significant deviation from normality.

The mean leverage is 272.92, with a standard deviation of 1,058.06, indicating substantial variability in the use of debt across firms. The maximum leverage is 14,764.50, contrasting with a minimum value of -281.77, which indicates negative equity or financial distress in some firms. The skewness (11.35) and kurtosis (150.29) indicate extreme skewness and heavy-tailed distribution, with the Jarque-Bera statistic (222,097.0, p = 0.000) confirming non-normality. Firm Size, measured in terms of total assets, has a mean value of 8.09E+09 (approximately NGN 8.09 billion) and a standard deviation of 1.01E+10, highlighting considerable variation in the scale of operations among firms. The maximum value (8.53E+10) and minimum value (4.92E+08) indicate a substantial gap between the largest and smallest firms in the sample. The skewness (3.85) and kurtosis (22.82) suggest a highly skewed and leptokurtic distribution, confirmed by the Jarque-Bera statistic (4,523.12, p = 0.000).

Table 2 provides the correlation coefficients among the key variables used in the study: Adjusted RAROC, Claims Ratio, Expense Ratio, Leverage, and Firm Size. The correlations are analyzed to understand the degree and direction of linear relationships among these variables.

Table 2. Correlation

	ADJUSTED RAROC	CR	ER	LEV	SIZE
ADJUSTED RAROC	1				
CR	-0.0776	1			
ER	-0.0438	0.4288	1		
LEV	0.1637	0.0114	-0.0323	1	
SIZE	0.0567	0.0573	-0.1525	0.0287	1

Adjusted RAROC is negatively correlated with Claims Ratio (-0.078) and Expense Ratio (-0.044), indicating that higher operational risks may slightly reduce risk-adjusted profitability. However, these relationships are weak, suggesting that other factors may have a stronger influence on Adjusted RAROC. Adjusted RAROC shows a weak positive correlation with Leverage (0.164) and Firm Size (0.057). The positive association with Leverage suggests that higher financial leverage may contribute to enhanced profitability on a risk-adjusted basis. The correlation with Firm Size implies that larger firms may achieve marginally better Adjusted RAROC, though the relationship is negligible.

Claims Ratio exhibits a moderate positive correlation with Expense Ratio (0.429), indicating that firms with higher claims payments tend to incur higher operational expenses. This relationship shows the interconnected nature of underwriting and operational risks. Claims Ratio has weak positive correlations with Leverage (0.011) and Firm Size (0.057), suggesting minimal interaction between claims management and these variables.

Expense Ratio is negatively correlated with Leverage (-0.032) and Firm Size (-0.153). The negative relationship with Firm Size suggests that larger firms may achieve better cost efficiency, possibly due to economies of scale. The weak correlation between Expense Ratio and Leverage indicates limited interaction between operational expenses and financial leverage. Leverage exhibits weak positive correlations with Adjusted RAROC (0.164) and Firm Size (0.029). These relationships suggest that firms with higher leverage or larger scales of operation may experience slight benefits in risk-adjusted profitability.

Firm Size shows weak correlations with most variables, including Adjusted RAROC (0.057), Claims Ratio (0.057), Expense Ratio (-0.153), and Leverage (0.029). The weak positive correlation with Adjusted RAROC suggests that larger firms may achieve marginal improvements in profitability, while the negative relationship with Expense Ratio indicates cost advantages for larger firms.

Table 3 is a regression analysis that employs four distinct models: Pooled, Fixed Effects, Random Effects, and D(GMM). These models are used to examine the impact of

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operational risk factors such as claims ratio, expense ratio, leverage, and firm size on the dependent variable, Adjusted RAROC.

Table 3. Regression Analysis of Operational Risk on Value of Listed Insurance Companies in Nigeria.

Variable	Pooed	Fixed	Random	D(GMM)
C	43.29802 (0.0000)	50.99512 (0.0000)	44.70178 (0.0000)	
Adjusted RAROC (-1)				0.024159 (0.0000)
CLAIMS_RATIO	-0.184647 (0.2316)	-0.180987 (0.0496)	-0.177365 (0.0050)	0.102815 (0.0005)
EXPENSE_RATIO	0.015707 (0.9221)	-0.132190 (0.0059)	-0.019172 (0.0065)	-0.164522 (0.0000)
LEVERAGE	0.008292 (0.0115)	0.005625 (0.1223)	0.007730 (0.0199)	-0.002091 (0.0000)
FIRM SIZE	3.08E-10 (0.3756)	-6.70E-11 (0.8881)	2.41E-10 (0.5075)	7.43E-10 (0.0036)
Observation	240	240	240	180
Number of groups				5
Number of Instrument				20
Durbin-Watson stat	1.982912	2.246554	2.043722	
F-statistic	2.219089	1.610815	1.925651	
Prob(F-statistic)	0.067669	0.043046	0.106906	
Adjusted R-squared	0.569995	0.695518	0.675256	
AR (1)				0.77832
AR (2)				0.0870
J-statistics				15.38741

Source: Author's Compilation, 2024 (Note: P-Value = 0.05)

The intercept term (C) is statistically significant across all models, with p-values less than 0.05, confirming that the constant term is reliably different from zero in each case. The lagged Adjusted RAROC variable (-1) is highly significant in the D(GMM) model, with a coefficient of 0.024159 and a p-value of 0.0000. This suggests a positive relationship between the previous period's RAROC and the current period's value, supporting the notion that profitability tends to persist in insurance firms.

The claims ratio has a negative coefficient, indicating that higher claims reduce firm value. This relationship is statistically significant in both the fixed and random effects

models (p-values < 0.05), but not in the pooled model, where the p-value is 0.2316, implying no significant effect in that model. The expense ratio is not significant in the pooled model but shows a negative and statistically significant impact in the fixed and random effects models (p-values < 0.05), suggesting that higher expenses reduce firm value.

Leverage has a positive and significant effect in the pooled model (p-value = 0.0115) and the random effects model (p-value = 0.0199), indicating that higher leverage enhances firm value in these specifications. However, it is not significant in the fixed effects model. Firm Size does not significantly influence firm value in any of the models, with all p-values greater than 0.05, suggesting that Firm Size may not substantially affect the dependent variable.

The adjusted R-squared values reveal that the fixed and random effects models explain a higher proportion of the variance in firm value compared to the pooled model, indicating that accounting for individual firm characteristics improves the model's explanatory power. The fixed effects model has a statistically significant F-statistic (p-value < 0.05), meaning that the independent variables collectively explain the variation in firm value in this model. In contrast, the pooled and random effects models exhibit marginal significance.

All models have Durbin-Watson statistics near 2 (1.98 in the pooled model, 2.25 in the fixed model, and 2.04 in the random model), suggesting no significant autocorrelation in the residuals. The AR (1) statistic is high (0.77832), indicating strong first-order autocorrelation, while the AR (2) statistic is insignificant (p-value = 0.0870), suggesting no second-order autocorrelation. The J-statistic in the D(GMM) model is 15.38741, indicating the validity of the instruments and confirming that the model has correctly specified the relationships.

Overall, operational risk factors specifically claim ratio and expense ratio significantly affect the value of listed insurance companies in Nigeria. Leverage also has a positive impact in some models, although Firm Size does not show a significant effect. The fixed and random effects models offer a better explanation of firm value variation, and the D(GMM) model provides insights into the persistence of profitability through the inclusion of lagged RAROC.

CONCLUSION

This study investigates the impact of operational risk on the value of listed insurance companies in Nigeria, utilizing four regression models: Pooled, Fixed Effects, Random Effects, and D(GMM). The findings reveal that operational risk factors, particularly the claims ratio and expense ratio, significantly affect the value of these firms. A higher claims ratio is

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associated with a decrease in firm value, highlighting the importance of effective claims management. Similarly, higher expenses reduce firm value, underscoring the need for cost-control measures to improve profitability.

Leverage has a positive impact on firm value in some models, suggesting that companies with higher leverage may experience increased returns. However, firm size does not appear to significantly influence firm value, indicating that factors other than firm size may play a more critical role in determining performance. The fixed and random effects models provide a better fit, as they account for individual firm characteristics, while the D(GMM) model offers valuable insights into the persistence of profitability, with the inclusion of lagged RAROC supporting the notion of sustained performance over time.

Insurance companies should prioritize efficient claims management practices to reduce the impact of claims on profitability. Implementing robust risk assessment procedures and claims mitigation strategies can help maintain a positive financial performance. Since the expense ratio negatively impacts firm value, insurance companies should adopt cost-saving measures without compromising service quality. Operational efficiency, automation, and strategic expense management can improve overall financial performance. While leverage positively affects firm value in some models, insurance companies should carefully assess their debt levels to balance risk and return. Strategic use of leverage can enhance profitability, but excessive reliance on debt may increase financial risk.

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