MARKET RISK DYNAMICS AND FINANCIAL PERFORMANCE OF LIFE INSURANCE COMPANIES IN NIGERIA

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ABSTRACT

This study examined the relationship between market risk factors and the financial performance of life insurance companies in Nigeria using panel data from thirteen licensed life insurers over the period 2012–2023. An ex post facto research design was adopted, and a census sampling approach was employed. The Two-Stage Least Squares (2SLS) estimation technique was applied to address endogeneity concerns, alongside simple and multiple regression analyses to test the hypotheses. The results indicated that exchange rate volatility has a statistically significant positive effect on financial performance, whereas interest rate risk and equity market volatility do not individually have significant effects. However, when examined jointly, these market risk variables exert a statistically meaningful influence on return on assets (ROA). The study concluded that enterprise risk management (ERM) frameworks incorporating integrated risk management strategies are essential for life insurance firms operating in volatile emerging markets. Insurers should develop comprehensive risk management strategies that address exchange rate fluctuations, interest rate movements, and equity market uncertainties through portfolio diversification, asset-liability matching, and dynamic hedging strategies.

Keywords: Exchange rate, interest rate, equity market, volatility, market risks and hedging

1.0 INTRODUCTION

Insurance plays a catalytic role in modern economies through financial intermediation and risk pooling, contributing 5–7% of global GDP (Swiss Re Institute, 2023). Nigeria, Africa's largest economy, remains a striking outlier with insurance penetration at only 0.3–0.5% of GDP, far below peers such as Kenya (2.9%), South Africa (12.2%), and the global average (Ecofin Agency, 2023; Finance in Africa, 2025). Despite this underdevelopment, Nigeria's life insurance industry has shown accelerating growth, with premiums expanding at compound annual rates of 8–12% between 2012 and 2023, supported by regulatory modernisation under the National Insurance Commission (Statista, 2024; NAICOM, 2017).

Within this evolving market, Nigerian life insurers face acute exposure to three correlated market risks: exchange rate volatility, interest rate fluctuations, and equity market swings. The Nigerian Naira has suffered catastrophic depreciation, falling from ₦197/USD in 2015 to ₦1,600/USD in 2024 (Central Bank of Nigeria, 2024), amplifying foreign exchange losses for insurers with offshore commitments. Simultaneously, aggressive monetary tightening raised the Monetary Policy Rate from 11% in 2018 to 26.75% in 2024 (Swiss Re Institute, 2023), eroding the value of bond portfolios, which typically account for 70–80% of life insurers' assets (Celik, 2020). Equity market volatility further compounds uncertainty, with sharp fluctuations in the Nigerian Exchange All-Share Index between 2018 and 2024 (PricewaterhouseCoopers, 2023).

Despite growing scholarly attention to market risk, significant gaps persist in emerging markets. Most empirical work focuses on developed economies with stable currencies (Buyukkara et al., 2019; Mouna & Anis, 2016). Nigerian studies assess risk factors in isolation (Henry et al., 2020; Iyodo et al., 2020), ignoring the interdependencies that produce simultaneous shocks. While NAICOM reforms reflect enterprise-wide risk management frameworks (Oxford Business Group, 2017), evidence is lacking on whether integrated approaches outperform silo-based models. This study investigates the joint influence of interest rate fluctuations, exchange rate volatility, and equity market volatility on the financial performance of Nigerian life insurance companies (2012–2023). Using panel data from 13 NAICOM-regulated insurers (156 firm-year observations), Return on Assets (ROA) measures financial performance (Desalegn, 2019), while market risks are quantified as annual volatility (Mouna & Anis, 2016).

The following hypotheses were tested:

Ho1: Interest rate fluctuation does not have a significant effect on financial performance among life insurance companies in Nigeria.

Ho2: Exchange rate volatility does not significantly influence financial performance among life insurance companies in Nigeria.

Ho3: Equity market volatility does not significantly affect financial performance among life insurance companies in Nigeria.

Ho4: Interest rate fluctuations, exchange rate volatility, and equity market volatility do not jointly have a significant influence on financial performance among life insurance companies in Nigeria.

2.0 REVIEW OF LITERATURE

2.1 Conceptual Review

Market Risk

Market risk denotes the possibility of incurring losses due to unfavourable fluctuations in market factors, including interest rates, equity prices, currency rates, and commodity prices. These fluctuations affect the value of financial instruments held by firms, particularly insurance companies that invest policyholder funds to generate returns (Fadun et al., 2025a; Celik, 2020; Koluku et al., 2015). Market risk dynamics describe how market risk evolves over time in response to changing economic conditions, investor sentiment, policy decisions, and global events, frequently marked by volatility clustering (Yakub et al., 2019). Macroeconomic shocks such as monetary tightening, rising inflation, or political instability can amplify market risk, while financial globalisation increases risk contagion (Jorion, 2007).

Interest rate risk results from changes in interest rates that impact a company's profits and the worth of its assets and liabilities, manifesting as repricing risk, basis risk, yield curve risk, and option risk (Mouna & Anis, 2016). Exchange rate risk reflects the influence of currency fluctuations on firms engaged in international trade or cross-border financial activities, particularly affecting developing economies with depreciating currencies (Mechri et al., 2019). Equity market volatility represents the degree of fluctuation in stock prices, divided into systematic risk driven by macroeconomic events and unsystematic risk that is firm-specific (Fransisca et al., 2017).

Macroeconomic Variables

Macroeconomic variables influence firms' operations by shaping the economic environment in which financial and non-financial institutions operate (Fadun & Oluwaleye, 2023; Fadun & Silwimba, 2023). Among these variables, the inflation rate plays a central role in determining costs, purchasing power, investment behaviour, and financial conditions that affect firm performance. Inflation denotes the continual rise in the overall price level of goods and services. Rising inflation reduces consumer purchasing power, increases production costs, and can erode firms' profit margins (Adjei, 2018). High and unpredictable inflation discourages savings and investment, disrupts long-term planning, and introduces uncertainty into pricing, interest rates, and exchange rates (Afangideh et al., 2020).

Inflation also raises transaction costs, complicates contract negotiations, and reduces incentives for investment, potentially slowing economic growth (Ali-Momoh & Fajuyagbe, 2022). Excessive inflation can depress firm valuations, weaken productivity growth, and contribute to recessionary pressures (Ebizie & Abude, 2023). Despite its adverse effects, moderate inflation may stimulate investment by adjusting real interest rates and supporting capital allocation to productive activities (Ali & Ibrahim, 2018). Firms, therefore, need to assess inflation risk carefully and adopt strategies that preserve profitability and investment capacity.

Financial Performance

Financial performance is the outcome of achieving a company's internal and external goals and serves as a common indicator of an organisation's capacity for sustained expansion, survival, and competitiveness (Osasona et al., 2025; Desalegn, 2019). It reflects the extent to which a company's financial objectives are met and provides a metric for comparison to

assess performance levels (Fali et al., 2020). Financial performance represents a company's performance over a given time period, measured by profits or losses, enabling decision-makers to objectively assess strategic results in monetary terms (Fadun et al., 2025b; Kokobe & Gemechu, 2016). In this study, financial performance is proxied by return on assets (ROA), computed as the ratio of profit after interest and tax to total assets, reflecting the extent to which a firm efficiently utilises its asset base to generate profits.

2.2 Theoretical Framework

Three theories provide a comprehensive understanding of how market risks influence the financial performance of life insurance companies. Together, Financial Distress Theory, Modern Portfolio Theory, and Risk Management Theory frameworks offer complementary perspectives on risk exposure, portfolio construction, and proactive risk mitigation strategies.

Financial Distress Theory

Financial Distress Theory, associated with Baldwin and Scott (1983), posits that firms experience distress when they are unable to meet financial obligations due to risk accumulation and adverse economic conditions. Market shocks such as interest rate volatility, exchange rate depreciation, and equity-market downturns can reduce asset values, compress earnings, and increase the likelihood of insolvency (Ohlson, 1980; Whitaker, 1999). For life insurers, whose long-term investment portfolios are highly sensitive to market fluctuations, these shocks may trigger liquidity constraints and impair their ability to honour policyholder claims (Acharya et al., 2017). This theory, therefore, explains what happens when market risks are not effectively managed: declining profitability, financial strain, and potential failure. The theory is particularly relevant for understanding how simultaneous exposure to multiple market risks can create compounded effects that exceed the capacity of traditional risk management approaches.

Modern Portfolio Theory

Modern Portfolio Theory (MPT), developed by Markowitz (1952), provides a foundational explanation of how investment risk relates to expected returns. MPT argues that investors can reduce unsystematic risk through diversification but remain exposed to systematic risks such as interest rate changes, currency movements, and equity price shocks. The theory emphasises constructing efficient portfolios that balance risk and return by combining assets with different risk-return characteristics. Because life insurers invest heavily in financial markets, typically allocating 70–80% of assets to bonds and fixed-income securities, their returns are directly affected by these systematic risk factors. MPT therefore explains how market risks alter the risk–return characteristics of insurers' portfolios, influencing profitability, solvency, and financial performance. In this study, MPT justifies examining interest rate, exchange rate, and equity market risks as key determinants of insurers' financial outcomes, as these represent systematic market forces that cannot be eliminated through diversification alone.

Risk Management Theory

Risk Management Theory asserts that firms create value by identifying, measuring, and mitigating financial risk exposures (Smith & Stulz, 1985). For life insurers, effective risk management practices (including hedging, diversification, duration matching, and reinsurance) can reduce the adverse effects of market volatility on earnings and solvency (Fadun et al., 2024). This theoretical perspective aligns with evolving regulatory expectations

such as NAICOM's emphasis on enterprise-wide risk management frameworks. The theory suggests that proactive risk management not only protects firms from downside losses but can also enhance strategic decision-making by providing a clearer understanding of risk exposures. Risk management theory, therefore, explains how firms can proactively respond to market risks, reducing the likelihood of financial distress and enhancing long-term financial performance through the systematic identification and mitigation of risk factors.

The integration of these three theories strengthens the study's analytical foundation. Financial Distress Theory explains the potential consequences of unmanaged market risks; Modern Portfolio Theory explains how market risk factors influence investment returns and portfolio volatility; and Risk Management Theory explains how insurers can mitigate these risks to safeguard financial performance. Together, these theories support the study's investigation into how key market risk dynamics, exchange rate volatility, interest rate risk, and equity market volatility jointly affect the financial performance of life insurance companies in Nigeria's volatile macroeconomic environment.

2.3 Empirical Review

Empirical studies demonstrate that risk factors exert measurable influence on financial outcomes, though direction and magnitude vary across sectors and countries. Several studies emphasise risk-management practices in strengthening financial performance. Adeusi et al. (2014), using panel data from Nigerian banks, reported that effective risk management, particularly through maintaining strong capital asset ratios, improves bank performance. However, their study does not isolate specific market-risk components.

Interest rate fluctuations have been widely studied. Kimita (2016), analysing Kenyan commercial banks, found that interest rate volatility has a marginal yet positive link with bank performance. Ahmed et al. (2018) observed that in Pakistani banks, rising interest rates reduce profitability. Njari (2016) showed that interest rate changes significantly influence loan performance and profitability in Kenyan insurance firms. Beyond profitability, Butler et al. (2017), using Swiss panel data, showed that interest rate shocks significantly restrict bank lending, with capitalisation moderating the impact.

Oduobuasi et al. (2020) examined market risk factors among Nigerian oil and gas firms and found that exchange rate fluctuations significantly affect ROA and ROE, while interest rate fluctuations notably affect ROE but not ROA. Overall, existing studies demonstrate that market-risk factors affect firm performance across financial and non-financial sectors. However, most literature is concentrated in banking, with limited insights into other sectors. Moreover, previous studies often focus on single risk components or yield mixed results, underscoring the need for integrated analyses that simultaneously examine multiple market-risk variables.

The foregoing empirical review reveals four critical research gaps that justify the present study. First, while existing literature extensively examines market risk effects in banking (Adeusi et al., 2014; Kimita, 2016; Ahmed et al., 2018; Butler et al., 2017), comparable evidence from the insurance sector, particularly life insurance, remains scarce, despite insurers' distinct asset-liability structures and regulatory environments. Second, previous studies predominantly adopt single-risk frameworks, analysing interest rates (Kimita, 2016; Ahmed et al., 2018), exchange rates (Kwofie & Ansah, 2018; Offiong et al., 2020), or equity volatility (Fransisca et al., 2017) in isolation, thereby overlooking potential interaction effects among correlated market risks. Third, methodological limitations persist, as many studies employ ordinary least squares without adequately addressing endogeneity arising from

simultaneity bias (Njari, 2016; Oduobuasi et al., 2020). Fourth, contextual gaps exist, with limited evidence from Nigeria's volatile macroeconomic environment characterised by persistent exchange rate depreciation, aggressive monetary tightening, and equity market instability. Addressing these gaps, this study investigates the joint influence of exchange rate volatility, interest rate risk, and equity market volatility on Nigerian life insurers' financial performance, employing Two-Stage Least Squares estimation to ensure robust causal inference. This integrated approach directly tests the four hypotheses specified earlier, providing empirically grounded insights for enterprise risk management in emerging insurance markets. Table 2.1 summaries the literature on market risk in the insurance sector.

Table 2.1: Summary of Literature on Market Risk in the Insurance Sector

Authors/Year	Problem	Purpose	Methodology	Findings	Gaps
Celik (2020)	Insurance companies face potential losses from market fluctuations impacting financial instruments.	To analyse the impact of market variables on insurance firm performance.	Quantitative analysis of stock returns and interest rate effects.	Market volatility affects insurance firm asset values; prudent investment strategies reduce risk.	Limited focus on Nigerian insurance firms and their unique market challenges.
Koluku, Sifrid & Pangemanan (2015)	Firms experience risk from market movements affecting returns.	Examine the relationship between market risk, firm size, financial leverage, and stock returns.	Regression analysis of non-banking firms listed in the LQ45 index.	Market risk and leverage significantly influence stock returns; larger firms manage risk more effectively.	The study excludes insurance companies and emerging African markets.
Jorion (2007)	Traditional risk metrics fail to capture dynamic market behaviour.	Introduce advanced risk assessment tools for predicting potential losses.	Theoretical and empirical review of VaR, Monte Carlo, and GARCH models.	Tools help forecast losses and enable stress-testing; proactive management is key.	The application of the insurance sector in developing economies is underexplored.
Mouna & Anis (2016)	Interest rate and equity market volatility threaten financial stability.	Assess how market, interest rate, and exchange rate risks affect stock returns during crises.	AGARCH-M approach on financial market data.	Market volatility, interest rate, and exchange rate risk significantly affect returns; high volatility increases losses.	Limited evidence on Nigerian insurance firms; focus is on financial markets generally.
Swiss Re Institute (2023)	Interest rate volatility affects the profitability of insurers.	Highlight the impact of interest rate movements on insurance operations.	Market analysis and industry report.	Moderate interest rate exposure is manageable; excessive volatility threatens capital adequacy.	Empirical quantitative studies on interest rate management in Nigerian insurance firms are scarce.
Kwofie & Ansah (2018)	Exchange rate fluctuations affect firm performance and competitiveness.	Investigate impact of exchange rate and inflation on stock market returns	Quantitative analysis of stock market data.	Exchange rate volatility significantly influences firm performance; depreciation	Limited studies on Nigerian insurance companies' exchange rate risk mitigation

		in Ghana.		raises domestic costs.	strategies.
Fransisca et al. (2017)	Equity market volatility increases uncertainty for firms.	Analyze the determinants of stock price volatility and firm risk.	Empirical analysis of stock market data across sectors.	Systematic and unsystematic risks significantly affect stock valuation; governance and managerial capacity matter.	Limited insights into insurance sector; Nigerian context largely absent.
Yakub et al. (2019)	Market risk evolves dynamically and unpredictably.	Explore the dynamics of market risk and volatility clustering.	Literature review and empirical analysis.	Volatility clusters over time; macroeconomic shocks amplify risk; proactive risk management is necessary.	Application to insurance companies, particularly in emerging markets like Nigeria, is limited.

Source: Researchers' Compilation (2025)

3.0 METHODS

An ex post facto research design was adopted as the analysis relies on historical financial data that cannot be manipulated by the researcher. The population comprised all life insurance companies operating in Nigeria as at 31st December 2024; therefore, a census approach was employed. Relevant data were extracted from the annual financial reports of life insurers and the Nigerian Insurance Digest published by the Nigerian Insurers Association (NIA). The dataset spans 12 years (2012–2023) and includes 156 firm-year observations, enabling comprehensive panel data analysis. Table 2.2 shows the variable measurement.

Table 2.2: Measurement of Variables

Variables	Indicators	Definition/Measurement	Source
Financial Performance	Return on Assets	Ratio of profit after tax to the Total assets of the company	Desalegn (2019)
Market Risk Dynamics	Exchange Rate Volatility	This is measured using the standard deviation in the prevailing exchange rate in the country for each year	Aliyu (2010; Mouna & Anis, (2016); Buyukkara *et al.*, 2019
	Interest Rate Risk	This measure uses the standard deviation of the real interest rate in the country	Koluku *et al*., 2015; Mouna & Anis (2016)
	Equity Market Volatility	This is the standard deviation of the real return on the equity market after adjusting for inflation	Mouna & Anis (2016); Koluku *et al.* (2015)
Control Variable	Inflation Rate	Rate of Change in Consumer Price Index	Kwofie & Ansah (2018); Chopra et al. (2018); Egbunike & Okerekeoti (2018)

Source: Authors' Compilation (2025)

3.1 Model Specification

The functional form of the model is expressed as:
Financial Performance = f (Market Risk Dynamics)
FP = f(ERV,IRR,EMV,INF) (3.1)

Where:
FP = Financial Performance (measured by ROA)
ERV = Exchange Rate Volatility
IRR = Interest Rate Risk
EMV = Equity Market Volatility
INF = Inflation Rate (control variable)

3.2 Panel Regression Equation

The following panel data model was specified:
$FPit = \beta0 + \beta1ERVit + \beta2IRRit + \beta3EMVit + \beta4INFit + \mu it$
Where:
FPit = Financial performance of firm *i* in year *t*
β_0 = Intercept term
$\beta_1 - \beta_4$ = Coefficients of the explanatory variables
μi = Unobserved firm-specific effect
i = 1, 2,…. (number of firms)
t = 2012,…,2023

This specification allows the model to control for firm-specific heterogeneity while assessing how market risk variables influence financial performance over time.

3.2.1 Model Selection: Fixed Effects versus Random Effects

The choice between fixed effects (FE) and random effects (RE) estimators was determined using the Hausman specification test. The test evaluates whether unobserved firm-specific effects (μi) are correlated with the explanatory variables. Under the null hypothesis, both FE and RE estimators are consistent, but RE is more efficient. If the null is rejected, only FE remains consistent.

The Hausman test statistic yielded $\chi^2(4) = 12.37$ ($p = 0.0149$), rejecting the null hypothesis at the 5% significance level. This indicates that firm-specific effects are systematically correlated with the regressors, violating the random effects assumption. Consequently, the fixed effects specification was adopted for subsequent analysis, as it accounts for time-invariant firm characteristics such as management quality, corporate culture, and historical market positioning that may correlate with both market risk exposure and financial performance.

3.2.2 Instrumental Variable Estimation: Two-Stage Least Squares (2SLS)

Preliminary diagnostic tests revealed potential endogeneity in the relationship between market risk variables and financial performance, arising from simultaneity bias (firms with better performance may actively manage risks differently) and measurement error in volatility calculations. To address this, the study employed Two-Stage Least Squares (2SLS) estimation with instrumental variables.

The following instruments were selected based on theoretical relevance and statistical validity:

1. Lagged Market Risk Variables (ERVt-1, IRRt-1, EMVt-1): Lagged values of exchange rate volatility, interest rate risk, and equity market volatility serve as valid instruments because they are predetermined and therefore uncorrelated with the current period's error term (εit), yet strongly correlated with current period risk exposures due to persistence in macroeconomic volatility patterns.

2. Global Risk Indicators: The VIX (CBOE Volatility Index) and crude oil price volatility were employed as external instruments. These global risk factors systematically influence Nigerian market conditions through international capital flows and commodity price linkages, yet remain exogenous to individual firm-level performance decisions.

3. Regulatory Dummy Variable: A binary indicator for years following major regulatory reforms (NAICOM risk-based capital requirements introduced in 2013) captures exogenous shifts in risk management practices independent of firm performance.

The validity of the research instruments was assessed through:

i) Relevance (First-Stage F-statistic): The first-stage regressions yielded F-statistics ranging from 18.42 to 24.67, all exceeding the threshold of 10, confirming strong instrument relevance and mitigating weak instrument bias.
ii) Exogeneity (Sargan-Hansen J-statistic): The overidentification test statistic was $\chi^2(2) = 3.14$ ($p = 0.208$), failing to reject the null hypothesis of instrument validity, thereby supporting the exogeneity assumption.

These diagnostics confirm that the chosen instruments satisfy both relevance and exogeneity conditions, ensuring consistent and efficient 2SLS estimates.

3.3 Methods of Data Analysis

Descriptive statistics were first employed to summarise the data and identify distributional characteristics of key variables. Inferential analysis was conducted using panel regression techniques, specifically employing fixed effects estimation with Two-Stage Least Squares (2SLS) to address endogeneity concerns. Regression analysis enabled the study to quantify the extent to which market risk dynamics affect financial performance while controlling for firm-specific heterogeneity and time-invariant characteristics. Diagnostic tests, including the Variance Inflation Factor (VIF) for multicollinearity, the Breusch-Pagan test for heteroskedasticity, and the Durbin-Wu-Hausman test for endogeneity, were conducted to ensure model robustness and validity of statistical inference.

4.0 RESULTS

4.1 Descriptive Statistics

This section presents the summary statistics of the variables under investigation: Exchange Rate Volatility (EXR), Interest Rate Risk (IRR), Equity Market Volatility (EMV), Inflation (IFR), and Return on Assets (ROA).

Table 4.1: Summary Statistics

Sample Structure: *N* = 13, *T* = 12 (2012 – 2023)

	ROA	EMV	IRR	EXR	IFR
Mean	0.039050	0.008516	0.061825	347.2980	0.142875
Median	0.032656	-0.04875	0.059250	306.5023	0.127350
Maximum	0.410794	0.367800	0.136000	899.8900	0.289200
Minimum	-0.16204	-0.30735	0.009200	157.3117	0.080500
Std. Dev.	0.063103	0.261778	0.039667	189.2504	0.055528
Skewness	1.184234	0.179202	0.376764	1.877077	1.293684
Kurtosis	10.79675	1.348066	2.167778	6.352239	4.428533
Jarque-Bera	431.5932	18.57272	8.192581	164.6527	56.77867
Probability	0.000000	0.000093	0.016634	0.000000	0.000000
Observations	156	156	156	156	156

Source: Researchers' Computation (2025)

The descriptive results show substantial variation across variables (N = 13, T = 12, 2012–2023). ROA has a mean of 3.91% and median of 3.27%, indicating slight right skewness. Its high standard deviation (6.31%) and kurtosis (10.80) suggest extreme values, confirmed by the Jarque-Bera statistic indicating non-normality. Equity Market Volatility exhibits a low mean (0.85%) and negative median (–4.88%), suggesting more firms experienced equity losses than gains. Its high standard deviation (26.18%) reflects substantial volatility. Interest Rate Risk shows moderate variation, with a mean of 6.18% and standard deviation of 3.97%. Exchange Rate Volatility displays a high mean (347.3), significant spread, and pronounced right skewness (1.88), indicating large fluctuations. Inflation shows moderate dispersion with skewness (1.29) and kurtosis (4.43) revealing deviations from normality. Overall, all variables deviate from normality, implying the need for robust estimation techniques.

4.2 Test of Multicollinearity

The Variance Inflation Factor (VIF) test was employed to examine multicollinearity among the explanatory variables, as shown in Table 4.2.

Table 4.2: Variance Inflation Factor (VIF)

Variable	Coefficient Variance	Uncentered VIF
EMV	0.000403	1.125458
IR	0.036545	2.654532
EXR	0.004609	7.042196
IFR	0.070203	9.866436
Mean VIF	**5.1722**	.

Sample: *N* = 11, *T* = 11 (2013 – 2023); Dependent Variables: ROA

Source: Researcher's computation (2025).

All VIF values fall below the threshold of 10, indicating the absence of severe multicollinearity. Although EXR and IFR have relatively higher VIF values, they remain within acceptable bounds. Thus, the explanatory variables do not exhibit problematic correlation level.

4.3 Model Estimation and Results

Given the panel structure (N = 13, T = 12), the study employed static panel estimators. Prior to estimation, endogeneity was assessed.

4.3.1 Endogeneity Test

Before estimating the model, an endogeneity test was conducted to determine the presence or absence of endogeneity in the models under consideration. Table 4.3 shows the results.

Table 4.3: Endogeneity Test Results

Sample: *N* = 13, *T* = 11 (2012 – 2023)

Model	H_0	Durbin Chi2	*p*-value	Wald Test F-stat.	*p*-value
OA	Exogenous	1.562272	0.000005	2.215942	0.0890

Source: Research's computation (2025)

The Durbin Chi-square statistic (p = 0.000005) rejects the null hypothesis of exogeneity, indicating endogeneity in the ROA model. The Wald statistic also shows weak significance at the 10% level. Thus, the assumption of strict exogeneity is violated, necessitating the use of an instrumental variable estimator. A 2SLS estimator is therefore appropriate for the analysis. The panel model estimation results is presented in Table 4.4

Table 4.4: Panel Model Estimation Results (2SLS)

Variable	B	p-value	Effect	Decision
Exchange Rate Vol.	0.000147	0.015	Significant +	Reject H_0
Interest Rate Risk	0.030579	0.867	Not significant	Fail to reject H_0
Equity Market Vol.	0.020746	0.259	Not significant	Fail to reject H_0
Inflation Vol.	−0.188256	0.447	Not significant	Fail to reject H_0

Panel Structure: *N* = 13, *T* = 11 (2012 – 2023) **Dependent Variable: *ROA***

Further Statistics and Tests	
Explanatory Power	
R-squared	0.310874
Adj. R-squared	0.231550
F-statistic (Prop)	**3.919052*** (0.000005)**
Diagnostics	
CD Test: BP LM test	123.5494 (0.0008)
Specification test (RESET)	2.015129 (0.0439)

Source: Researchers' Computation (2025)

4.4 Panel Model Estimation Results (2SLS)

The regression results (2012–2023) show that exchange rate volatility has a positive, statistically significant effect on ROA (β = 0.000147; p = 0.0151), indicating that currency fluctuations are associated with enhanced financial performance. However, this counterintuitive finding requires cautious interpretation within Nigeria's specific institutional context. Several context-specific mechanisms may explain this positive relationship:

1. Foreign Asset Revaluation Gains: Nigerian life insurers holding foreign-denominated assets (offshore investments, foreign currency deposits) experience accounting gains during Naira depreciation periods, temporarily boosting reported ROA despite underlying operational challenges.

2. Premium Indexation and Pricing Power: Some life insurance products incorporate foreign exchange indexation clauses or inflation-adjusted premium structures, enabling insurers to partially transfer exchange rate risk to policyholders during periods of currency instability.

3. Reinsurance Treaty Structures: Life insurers with favourable reinsurance treaties denominated in foreign currencies may benefit from exchange rate movements that reduce the Naira-equivalent value of reinsurance premiums payable, thereby improving net underwriting profitability.

4. Selection Bias in Sample Period: The study period (2012–2023) encompasses phases of gradual depreciation rather than sudden currency crises. Firms that survived this period may represent a selected sample of those with effective hedging strategies, creating survivorship bias in observed positive effects.

It is crucial to note that these positive effects may not be sustainable under scenarios of extreme currency volatility, rapid depreciation, or disruptions in foreign exchange markets. Moreover, accounting gains from revaluation do not necessarily translate into improved operational efficiency or long-term solvency. Future research should explore non-linear relationships and threshold effects to identify conditions under which exchange rate volatility transitions from beneficial to detrimental for insurer performance. Thus, while the null hypothesis for exchange rate volatility is rejected based on statistical significance, the economic interpretation remains context-dependent and warrants regulatory scrutiny. Interest rate risk (β = 0.030579; p = 0.8666), equity market volatility (β = 0.020746; p = 0.2592), and inflation volatility (β = –0.188256; p = 0.4467) all exhibit insignificant effects on ROA, suggesting limited direct influence on profitability when considered individually. For these variables, the null hypotheses are retained.

4.5 Model Diagnostics and Robustness

The Wald statistic of 2.2159 (p = 0.0890) indicates modest joint explanatory power, while the R-squared value of 0.3109 shows that approximately 31% of ROA variation is explained by included variables—reasonable for macro-financial panel data influenced by multiple external factors. The adjusted R-squared (0.2316) confirms moderate predictive strength after adjusting for explanatory variables. The F-statistic of 3.9191 (p = 0.000005) demonstrates that independent variables are jointly significant at the 1% level, confirming that market risk dynamics and inflation collectively exert statistically meaningful influence on ROA. The Breusch-Pagan LM statistic of 123.5494 (p = 0.0008) indicates significant cross-sectional dependence among firms, suggesting shocks affecting one insurer influence others expected given similar macroeconomic risk exposures. The RESET statistic of 2.0151 (p = 0.0439)

suggests possible model misspecification or omitted non-linear relationships. Future research should explore extended specifications capturing deeper interactions between market risks and financial performance.

4.6 Discussion

Exchange rate volatility exerts a statistically significant positive influence on Nigerian life insurance firms' financial performance. As discussed in Section 4.4, this relationship appears to operate through context-specific channels including revaluation gains on foreign-denominated assets, premium indexation mechanisms, and favourable reinsurance structures. This finding aligns with Offiong et al. (2020), who similarly observed positive exchange rate effects in Nigerian contexts, but contrasts with findings by Kwofie and Ansah (2018) and Owolabi and Adegbite (2013), who reported negative effects in banking and manufacturing sectors. The divergence in findings across sectors underscores the importance of industry-specific risk exposure profiles and risk management capabilities. Life insurers' long-term investment horizons and asset diversification strategies may enable them to benefit from short-to-medium-term currency fluctuations differently than banks or manufacturers with shorter-term operational cycles.

Interest rate risk shows no significant effect on ROA, consistent with Ehiogu and Nnamocha (2018), but contrasts with Mouna and Anis (2016) and Swiss Re Institute (2023), who emphasised interest rate volatility's impact on financial stability. The insignificance in this study may reflect Nigerian life insurers' conservative investment strategies, with substantial allocations to held-to-maturity government securities and well-structured asset-liability matching that buffers against short-term interest rate fluctuations. Long-term insurance contracts with embedded interest rate guarantees may also be priced with adequate risk margins, reducing sensitivity to moderate rate movements within the study period.

Equity market volatility demonstrates no significant independent effect on ROA, aligning with Celik (2020) regarding prudent investment strategies that limit equity exposure, but differing from Fransisca et al. (2017) on systematic risk effects. Nigerian regulatory restrictions limiting equity investments to 25–30% of total assets (NAICOM guidelines) may structurally constrain insurers' equity market exposure, thereby mitigating volatility transmission to overall profitability.

Despite the individual insignificance of interest rate and equity market risks, the joint significance tests (F-statistic = 3.9191; $p = 0.000005$) reveal that market risks collectively influence financial performance. This finding strongly supports Jorion (2007) and Yakub et al. (2019) on interconnected risk dynamics and validates the theoretical foundation of enterprise risk management (ERM) frameworks. The results demonstrate that market risks do not operate independently; rather, they exhibit complex interdependencies whereby simultaneous shocks across exchange rate, interest rate, and equity markets can compound effects on insurer performance. This empirical evidence addresses gaps identified by Koluku et al. (2015) regarding insurance sector-specific analysis in emerging markets and reinforces the necessity of integrated risk management approaches rather than siloed risk-by-risk strategies.

5. CONCLUSION

The study examined how exchange rate volatility, interest rate risk, equity market volatility, and inflation affect the financial performance of Nigerian life insurers. Findings show that

only exchange rate volatility has a statistically significant effect on ROA, reflecting insurers' exposure to foreign-denominated assets, reinsurance, and cross-border obligations. Although interest rate and equity market risks are individually insignificant, joint significance tests reveal that market risks collectively influence performance, highlighting their interconnected nature. Thus, while exchange rate volatility is the dominant driver, other risks remain relevant. The study concludes that integrated, enterprise-wide market risk management is essential for sustaining insurers' financial performance.

6. RECOMMENDATIONS

1. Prioritise Exchange Rate Risk Management: Life insurers should strengthen exchange rate volatility management through foreign-denominated asset diversification, currency exposure matching, and dynamic hedging mechanisms, including forward contracts and currency swaps, particularly for firms with substantial foreign reinsurance arrangements.

2. Integrate Market Risks into Enterprise Risk Management: Firms should adopt integrated risk management frameworks such as Dynamic Financial Analysis (DFA) and scenario-based modelling to manage aggregate market risks effectively. This holistic approach aligns with NAICOM's enterprise risk management guidelines, recognising that market risks are interdependent and often produce simultaneous shocks requiring coordinated mitigation strategies.

3. Strengthen Asset-Liability Management**:** Life insurers should enhance asset-liability matching strategies through duration matching for fixed-income portfolios, immunisation strategies, and adequate liquidity buffers to meet policyholder obligations during market stress. Regular stress testing and scenario analysis should assess portfolio resilience under various market conditions.

4. Foster Regulatory Collaboration**:** Stakeholders should collaborate closely with NAICOM and the Central Bank to support macroeconomic stability, particularly exchange rate reforms. Industry-wide dialogue on best practices for managing market risks in volatile emerging market conditions would benefit all stakeholders.

6.1 Research Implications

This study yields important implications for future research on market risk and financial performance in insurance and broader financial services contexts. The study highlights several directions for future research. First, it emphasises the importance of joint risk analysis, noting that market risks are more influential collectively than individually, and recommending integrated, multivariate modelling approaches to capture interaction and compounding effects. Second, it calls for dynamic modelling and stress-testing frameworks to address time-varying and non-linear risk-performance relationships, particularly under extreme market conditions. Third, the study suggests extending analysis beyond Nigerian life insurers to include non-life and reinsurance firms, as well as cross-country comparisons, to improve generalizability and account for institutional differences. Fourth, it encourages empirical investigation into specific risk management mechanisms (such as hedging, asset-liability management, and portfolio diversification) to assess their effectiveness in mitigating market risk impacts. Finally, it proposes incorporating behavioural and governance factors, including managerial characteristics and corporate governance quality, to understand how risk exposure and performance outcomes are shaped in emerging market insurance sectors.

7. CONTRIBUTION TO KNOWLEDGE

This study contributes to the literature in three key ways. First, it advances methodology by applying Two-Stage Least Squares (2SLS) estimation with appropriate instrumental variables to address endogeneity between market risk management and insurance performance, thereby enabling more credible causal inference than prior panel-based studies. Second, it introduces an integrated multi-risk framework that jointly examines exchange rate, interest rate, and equity market risks, demonstrating that their combined effects on life insurance performance are stronger than when risks are analysed individually, thus empirically supporting enterprise risk management theory. Third, the study provides context-specific evidence from Nigeria's highly volatile macroeconomic environment, offering insights into how life insurers operate under extreme exchange rate, interest rate, and equity market instability, and highlighting the importance of institutional and regulatory context in shaping risk–performance relationships. Collectively, these contributions have practical relevance for insurers, regulators, and future research in emerging insurance markets.

REFERENCES

Acharya, V. V., Pedersen, L. H., Philippon, T., & Richardson, M. (2017). Measuring systemic risk. *The Review of Financial Studies, 30*(1), 2–47.

Adeusi, S. O., Akeke, N. I., Adebisi, O. S., & Oladunjoye, O. (2014). Risk management and financial performance of banks in Nigeria. *European Journal of Business and Management, 6*(31), 336–342.

Adjei, F. (2018). An empirical examination of the effects of inflation on stock returns. *Journal of Economics and Finance, 42*(4), 696–711.

Afangideh, U. J., Umanah, J. E., & Udo, A. B. (2020). Inflation and stock market performance in Nigeria: Evidence from ARDL bounds test approach. *International Journal of Economics and Financial Issues, 10*(5), 181–187.

Ahmed, H., Awan, M. S., & Khan, M. A. (2018). Impact of interest rate on profitability of commercial banks in Pakistan. *Journal of Applied Environmental and Biological Sciences, 8*(6), 1–8.

Ali, M., & Ibrahim, S. B. (2018). Inflation and economic growth in Nigeria: An ARDL-bounds testing approach. *International Journal of Economics and Financial Research, 4*(3), 48–55.

Ali-Momoh, B. O., & Fajuyagbe, B. S. (2022). Inflation rate and stock market performance in Nigeria. *IOSR Journal of Economics and Finance, 13*(1), 46–54.

Baldwin, C. Y., & Scott, J. H. (1983). The resolution of claims in financial distress the case of Massey Ferguson. *The Journal of Finance, 38*(2), 505–516.

Butler, A. W., Cornaggia, J., & Gurun, U. G. (2017). Do local capital market conditions affect consumers' borrowing decisions? *Management Science, 63*(12), 4175–4187.

Buyukkara, G., Baha Karan, M., Temiz, H., & Yildiz, Y. (2019). Exchange rate risk and corporate hedging: Evidence from Turkey. *Emerging Markets Finance and Trade, 55*(8), 1737–1753.

Celik, İ. E. (2020). The effects of exchange rate and interest rate exposure on the stock returns and volatility of Turkish insurance companies. *İstanbul İktisat Dergisi - Istanbul Journal of Economics, 70*(1), 141–161.

Central Bank of Nigeria. (2024). *Dynamic effect of exchange rate gap shocks on stock market deepening in Nigeria*. CBN Research Department.

Desalegn, G. (2019). The effect of risk management on financial performance of insurance companies in Ethiopia. *International Journal for Innovative Research in Multidisciplinary Field, 5*(10), 1–12.

Ebizie, O. E., & Abude, K. (2023). Inflation and stock market performance in Nigeria. *Journal of Economics and Allied Research, 8*(1), 112–126.

Ecofin Agency. (2023). *South Africa, Morocco, Egypt, and Kenya dominate African insurance market in 2023*. https://www.ecofinagency.com/public-management/0511-46105

Ehiogu, O., & Nnamocha, P. N. (2018). Effect of interest rate on the performance of insurance companies in Nigeria. *International Journal of Innovative Finance and Economics Research, 6*(4), 51–59.

Fadun, O. S., Ochonogor, A. C., & Aduloju, S. A. (2025a). Determinants of Financial Performance of Non-Life Insurance Companies in Nigeria. *International Journal of Insurance, Risk and Management Sciences, 2(1),* 1–16.

Fadun, O. S., Oyerinde, M. T., & Aduloju, S. A. (2025a). Capital Adequacy and the Financial Performance of Insurance Companies: The Nigerian Experience. *International Journal of Insurance, Risk and Management Sciences, 2(1),* 17–38.

Fadun, O. S., & Oluwaleye, T. O. (2023). Impact of life insurance development on economic growth: A case study of Nigeria (2000-2022). *Gusau Journal of Economics and Development Studies, 4(1),* 162–181.

Fadun, O. S., & Silwimba, P. (2023). Does Insurance Promote Economic Growth? Evidence from Nigeria. *Nigeria Journal of Risk and Insurance, 13(1),* 1–24.

Fadun, O. S., Isimoya, O. A., & Ugwuoke, A. O. (2024). Socio-economic determinants of life assurance purchase in Nigeria. *EKSU Journal of the Management Scientists, 3(1),* 288–306.

Fali, I. D., Ahmad, A. U., & Ahmed, A. D. (2020). Moderating effect of board size on intellectual capital and financial performance of listed insurance companies in Nigeria. *Journal of Economics and Sustainability, 2*(2), 31–47.

Finance in Africa. (2025). *Insurance adoption trends in African countries: Penetration and growth insights 2025*. https://financeinafrica.com/guide/insurance-adoption-trends

Fransisca, A., Harmon, K., & Prasetyo, A. (2017). Analysis of financial performance and capital structure on stock return (Study on non-banking companies listed in LQ45 index period 2011–2015). *Jurnal Manajemen Maranatha, 16*(2), 143–152.

Henry, O. T., Oji-Okoro, I., & Afolabi, L. (2020). Exchange rate volatility and insurance sector performance in Nigeria: A vector error correction model approach. *Academy of Accounting and Financial Studies Journal, 24*(3), 1–12.

Iyodo, B., Samuel, S. E., Adewole, C., & Ola, P. O. (2020). Impact of non-life insurance penetration on the economic growth of Nigeria. *Research Journal of Finance and Accounting, 11*(2), 40–50.

Jorion, P. (2007). *Value at Risk: The new benchmark for managing financial risk* (3rd ed.). McGraw-Hill.

Kimita, E. M. (2016). *The effect of interest rate risk, credit risk and inflation rate on financial performance of commercial banks in Kenya* [Unpublished master's thesis]. University of Nairobi.

Kokobe, A. T., & Gemechu, D. T. (2016). Risk management techniques and financial performance of insurance companies. *International Journal of Accounting Research, 4*(2), 1–10.

Koluku, R. F., Sifrid, S., & Pangemanan, F. T. (2015). Analysis of market risk, financial leverage, and firm size toward stock return on non-banking companies listed in LQ45 index of IDX. *Journal of Finance and Investment, 8*(3), 45–59.

Markowitz, H. (1952). Portfolio selection. *The Journal of Finance, 7*(1), 77–91.

Mechri, N., Ben Hamad, S., & Peretti, C. (2019). The impact of the exchange rate volatilities on stock markets dynamics: Evidence from Tunisia and Turkey. *Economia Internazionale/International Economics, 72*(1), 107–138.

Mouna, A., & Anis, J. (2016). Market, interest rate, and exchange rate risk effects on financial stock returns during the financial crisis: AGARCH-M approach. *Cogent Economics & Finance, 4*(1), 1125332.

National Insurance Commission. (2017). *Enterprise risk management and corporate governance guidelines for insurance and reinsurance companies in Nigeria*. NAICOM.

Njari, E. N. (2016). *The effect of interest rate on the financial performance of insurance companies in Kenya* [Unpublished master's thesis]. University of Nairobi.

Oduobuasi, O. L., Onuoha, C. E., & Ihemeje, J. C. (2020). Market risk and financial performance of quoted oil and gas firms in Nigeria. *International Journal of Research and Innovation in Social Science, 4*(10), 168–177.

Offiong, A. I., Wilson-Oshilim, U. D., & Ifurueze, M. K. (2020). Effect of market risks on the financial performance of firms in Nigeria. *European Journal of Accounting, Auditing and Finance Research, 8*(6), 28–45.

Ohlson, J. A. (1980). Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research, 18*(1), 109–131.

Osasona, A. V., Isimoya, O. A., & Fadun, O. S. (2025). Claims Management Practices and Financial Performance of Insurance Companies in Nigeria. *EBSU International Journal of Business Ethics and Corporate Governance, 2(1)*, 83–94.

Oxford Business Group. (2017). *Nigeria: An eye on risk—The industry is transitioning to risk-based supervision*. In Africa 2017 Report.

PricewaterhouseCoopers. (2023). *Nigeria economic outlook: Top 10 themes for 2023*. PwC Nigeria.

Smith, C. W., & Stulz, R. M. (1985). The determinants of firms' hedging policies. *Journal of Financial and Quantitative Analysis, 20*(4), 391–405.

Statista. (2024). *The insurances market in Nigeria is projected to reach a market size of US$8.08bn in 2024*. https://www.statista.com/outlook/fmo/insurances/nigeria

Swiss Re Institute. (2023). *Risks on the rise as headwinds blow stronger: Insurance market outlook*. Swiss Reinsurance Company Ltd.

Whitaker, R. B. (1999). The early stages of financial distress. *Journal of Economics and Finance, 23*(2), 123–133.

Yakub, J. O., Bello, H. T., & Adenuga, I. A. (2019). Modelling volatility persistence and asymmetry with exogenous breaks in the Nigerian stock returns. *CBN Journal of Applied Statistics, 10*(1), 173–206.