Effect of Marine Insurance Policy on The Return on Assets of Quoted Insurance Firms in Nigeria

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Abstract
This study examines the effect of marine insurance policy, measured by the natural logarithm of annual marine insurance premium income (LNMAR), on the return on assets (ROA) of quoted insurance firms in Nigeria. Annual data for 1995–2024 are analysed with the autoregressive distributed lag (ARDL) bounds-testing approach, which suits the mixed order of integration of the series: ROA is stationary at level, whereas LNMAR is stationary only after first differencing. The bounds test points to a long-run relationship ($F = 5.259$, above the 5% upper bound of 4.16), and the error-correction term (-0.777) indicates fast adjustment towards equilibrium. Nevertheless, the short-run coefficient (10.463, $p = 0.232$) and the lagged level term of marine premium (4.089, $p = 0.225$), which implies a long-run effect of 5.262, are positive but statistically insignificant, so the null hypothesis of no significant effect is not rejected. Serial-correlation, functional-form and parameter-stability tests are satisfactory. The results suggest that expanding marine premium volume alone does not raise asset returns; underwriting quality, claims control and reinsurance management appear more decisive.

Keywords: *marine insurance; return on assets; ARDL; bounds test; Nigeria; insurance performance*

JEL classification: G22, C22, L25

1. Introduction

Insurance penetration in Nigeria remains low, which raises a practical question for insurers and regulators: which product lines convert premium income into sustainable profit? Marine insurance is a natural candidate for scrutiny. Nigeria depends heavily on the seaports of Lagos, Port Harcourt and Onne for trade, and marine cover (cargo, hull and marine liability) gives insurers a revenue stream tied to trade cycles rather than to the domestic property and motor markets (Akintayo, 2019). Specialised underwriting, exposure to international shipping risks and dependence on reinsurance, however, mean that premium volume does not automatically become profit (Olaniyi & Onifade, 2023). Aggregate data show why the question matters. Marine premium income in this study's sample rose from ₦9,083 million in 1995 to ₦50,853 million in 2024, but the path was erratic, with sharp collapses in 1996 and 1998 and a fall of about 44% in 2013, while ROA moved between 10.79% and 69.17% over the same period (Section 4.1). A line whose premium volume swings this widely, and whose profit depends on large single losses and reinsurance recoveries, cannot be assumed to raise profitability simply by growing. Evidence on marine business in Nigeria is thin and mixed. Marine premium has been found to have a negative and insignificant effect on insurer profitability (Kologa & Nwite,

2023); marine insurers' management expenses have exceeded the indemnity they pay out (Onwuegbuchunam et al., 2017); and marine cover has been linked to better outcomes only on the policyholder side, among manufacturing firms (Nafiu & Feyisayo, 2024). Most other Nigerian studies examine customer perceptions, actuarial pricing or the macroeconomic role of insurance, or treat product diversification as a single aggregate construct (Fadun & Oluwaleye, 2023; Orjinta, 2024). Three gaps follow. First, the marine-specific evidence is descriptive, perception-based or confined to the policyholder side, so it does not estimate how marine premium affects the insurer's own asset returns. Second, the closest profitability study treats marine as one of several non-life premium lines and ends in 2020. Third, the studies reviewed do not report the full set of unit-root, bounds, serial-correlation, functional-form and stability tests needed to judge whether a marine–ROA relationship is reliable. Insurance managers therefore lack clear evidence on whether growth in marine business improves return on assets (ROA), the efficiency with which a firm converts its asset base into profit after tax. Uncertainty about this relationship affects decisions on how much underwriting capacity, reinsurance protection and technical staff to commit to the line.

This study addresses a single question: *to what extent does marine insurance policy affect the return on assets of quoted insurance firms in Nigeria?* The objective is to determine the short-run and long-run effect of marine insurance premium on ROA over 1995–2024. The study tests one null hypothesis:

H_0: Marine insurance policy has no significant effect on the return on assets of quoted insurance firms in Nigeria.

The findings are relevant to insurers allocating underwriting capacity and capital, to the National Insurance Commission (NAICOM) in designing product and solvency policy, and to investors assessing the earnings quality of quoted insurers. Academically, the study contributes in three ways: it isolates marine insurance in a dedicated bivariate ARDL framework rather than pooling it with other lines; it extends the sample to 2024, covering thirty years of data; and it reports a full set of diagnostic and stability tests alongside the coefficient estimates. The paper is organised as follows: Section 2 reviews the literature, Section 3 describes the data and method, Section 4 presents and discusses the results, and Section 5 concludes.

2. Literature Review and Theoretical Framework

2.1 Marine insurance policy

Marine insurance indemnifies the insured against loss of or damage to vessels, cargo or freight arising from perils of transit, and in modern practice extends to multimodal sea, air and land movements (Akintayo, 2019). For a quoted insurer it offers premium income from importers, exporters, shipping companies and logistics operators, and it supports cross-selling of complementary covers such as warehouse fire and inland transit policies (Werigbelegha & Oyinmiebi, 2023). Against this, marine underwriting demands technical expertise in cargo, routes and maritime law, and operates within international rules and the oversight of the Nigerian Maritime Administration and Safety Agency (Olaniyi & Onifade, 2023). Predictable pooling of transit risks can stabilise cash flows and thereby support ROA (Fadun & Oluwaleye, 2023), but large single losses and slow claims settlement can offset that benefit.

2.2 Firm performance

ROA, defined as profit after tax divided by total assets, is the performance measure used here. It captures both profitability and the effectiveness of asset utilisation, which matters for insurers whose balance sheets combine underwriting liabilities and investment portfolios. Studies of listed Nigerian insurers associate ROA with firm size, leverage, premium earnings and

reinsurance (Abass et al., 2021; Abass, 2019), which indicates that premium growth is only one of several drivers of profitability.

2.3 Theoretical framework

The study is anchored on the Resource-Based View (Barney, 1991), which holds that sustained advantage derives from valuable, rare and hard-to-imitate resources. In marine insurance such resources include specialist underwriters, risk-assessment models and relationships with port and shipping stakeholders; insurers that possess them should earn higher returns from marine business. Portfolio Theory (Markowitz, 1952) adds that a line whose losses are imperfectly correlated with domestic lines can lower earnings volatility. Both perspectives predict a positive effect of marine business on ROA, conditional on capability and on the risk-return profile of the line, and that prediction is what the analysis tests.

2.4 Empirical evidence and gap

The wider diversification–performance literature is divided. Lee (2017) found that product diversification was negatively related to the risk-adjusted ROA and ROE of Taiwanese property–liability insurers, consistent with a diversification discount, but also that diversification raised the performance of large insurers and that the fire and marine business lines had significant effects on performance. Shim (2017), studying US property–liability insurers over 1996–2010, showed that the relationship is not uniform: there is a discount for firms in the lower part of the return distribution and a premium for those in the upper part. Duijm and Van Beveren (2022) report gains from diversification in property–liability markets, and Lee (2020) finds that diversification lowers the risk taken by Taiwanese insurers, in line with portfolio theory. Outside insurance, Adamu et al. (2011) examined product diversification and the financial performance of Nigerian construction firms and Afza et al. (2008) studied diversification and corporate performance in Pakistan. Effects vary with the type of diversification and with the firm's risk-management capacity (Oladele, 2012).

Nigerian evidence on insurer performance is narrower. Orjinta (2024) links diversification to performance among diversified Nigerian firms, and Fadun and Oluwaleye (2023) examine the same question for Nigerian insurance companies. Other work looks at the drivers of insurer profitability: Abass (2019) examines reinsurance dependence and the profitability of general insurance business, Abass et al. (2021) relate performance to firm-level characteristics of listed insurers, and Olaniyi and Onifade (2023) study underwriting practices and firm performance with evidence from marine and motor business. Fadun et al. (2023) apply the ARDL approach to non-life insurers over 2007–2021 and find that reinsurance premiums ceded and accepted both raise gross premium income, recommending greater underwriting capacity in high-risk classes such as oil and gas, marine and aviation. These studies show that premium growth in a line depends on capacity and reinsurance support, but they do not show whether that growth reaches the insurer's return on assets. Studies that focus on marine business are fewer still. Onwuegbuchunam et al. (2017) analysed marine-portfolio insurers over 1974–2013 with analysis of variance and an augmented SWOT framework. Firms earned more premium than they paid in indemnity, yet management expenses exceeded indemnity paid, and poor service quality, customer distrust and inadequate technical manpower were the main weaknesses. Their analysis is descriptive and does not link marine business to profitability. Kologa and Nwite (2023) used unit-root tests and ARDL on 1981–2020 data and found that fire, motor and miscellaneous premiums raised the profitability of Nigerian insurers, whereas marine, accident and employers' liability premiums had negative and statistically insignificant effects. Their result is the closest to the present question, but marine is one of several regressors and the sample stops in 2020. Nafiu and Feyisayo (2024) report that motor, marine and aviation, and fire insurance significantly improved the sustainable performance of Nigerian manufacturing

companies over 2008–2019, which measures the benefit to the insured firm rather than the return earned by the insurer.

Three points emerge. First, the Resource-Based View and Portfolio Theory predict a positive marine–ROA effect, but the closest empirical evidence shows no significant effect for marine premium, so the direction and strength of the relationship are an open empirical question. Second, no study reviewed isolates marine premium in a dedicated model of insurer ROA over a long horizon that includes recent years. Third, no study reviewed reports the full unit-root, bounds-test, error-correction and stability diagnostics that give a time-series estimate its credibility. This study fills that gap with a bivariate ARDL analysis of marine premium and ROA over 1995–2024.

3. Methodology

3.1 Research design and data

The study adopts an *ex post facto* design suited to historical data that cannot be manipulated. It uses annual time-series observations for 1995–2024 (30 observations) on marine insurance premium income (₦ million) and ROA (%), compiled from the Central Bank of Nigeria Statistical Bulletin, NAICOM market statistical publications and World Bank data. The dependent variable is ROA; the independent variable is marine insurance policy, represented by marine premium income in natural logarithm (LNMAR) so that coefficients can be read in semi-elasticity form and the skewed premium series is stabilised. Estimation and testing follow the standard EViews ARDL workflow, and all outputs below are reported in the layout of EViews output tables.

3.2 Model specification

The relationship between performance and the marine line is specified with one dependent and one independent variable:

$$ROA_t = \beta_0 + \beta_1 LNMAR_t + \varepsilon_t \quad (1)$$

where β_0 is the intercept, β_1 the effect of marine insurance policy on ROA and ε_t the error term. Because unit-root tests (Section 4.2) show that ROA is I(0) and LNMAR is I(1), the ARDL(1,1) model is estimated:

$$ROA_t = c + \varphi ROA_{t-1} + \delta_0 LNMAR_t + \delta_1 LNMAR_{t-1} + u_t \quad (2)$$

and re-parameterised in its conditional error-correction form:

$$\Delta ROA_t = c + \rho ROA_{t-1} + \theta LNMAR_{t-1} + \gamma \Delta LNMAR_t + u_t \quad (3)$$

where $\gamma = \delta_0$ is the short-run effect of marine premium, $\rho = \varphi - 1$ is the speed-of-adjustment (error-correction) coefficient, and the long-run effect is $\beta_1 = -\theta/\rho$, which is zero only if θ is zero, so its significance is judged from the t-statistic on θ.

3.3 Estimation procedure

The analysis proceeds in five steps: (i) descriptive statistics, including the Jarque–Bera normality test; (ii) the Augmented Dickey–Fuller (ADF) unit-root test with intercept (Dickey & Fuller, 1979; MacKinnon, 1996); (iii) the ARDL bounds test for a level relationship using the Pesaran et al. (2001) critical values (Case 2: restricted constant and no trend, $k = 1$), valid for any mix of I(0) and I(1) regressors; (iv) estimation of the conditional error-correction regression and, once the bounds test confirms a long-run relationship, the error correction model (ECM) for the short-run effect and the speed of adjustment; and (v) residual and stability diagnostics, namely the Breusch–Godfrey LM test for serial correlation (Breusch, 1978; Godfrey, 1978), the Ramsey (1969) RESET test for functional form, and the CUSUM of squares test on recursive residuals (Brown et al., 1975). All inference is at the 5% level.

4. Results and Discussion

4.1 Data presentation and descriptive statistics

Table 1: Descriptive statistics

	ROA	LNMAR
Mean	39.999333	9.387710
Median	42.900000	9.711903
Maximum	69.170000	10.836694
Minimum	10.790000	7.392648
Std. Dev.	16.288969	0.978808
Skewness	-0.181212	-0.591347
Kurtosis	2.087159	2.318075
Jarque-Bera	1.205786	2.329735
Probability	0.547226	0.311964
Sum	1199.980000	281.631300
Sum Sq. Dev.	7694.584987	27.783897
Observations	30	30

Source: Author's computation.

Marine premium rose from ₦9,083 million in 1995 to ₦50,853 million in 2024, but not smoothly: it collapsed to ₦2,772 million in 1996 and ₦1,624 million in 1998, recovered strongly to ₦26,077 million by 2012, and fell by about 44% in 2013 (Figure 1). Mean ROA is 40.00% with a standard deviation of 16.29, ranging from 10.79% to 69.17%, which shows that profitability is highly volatile and is not tracking premium growth in any simple way. Jarque–Bera probabilities of 0.547 (ROA) and 0.312 (LNMAR) exceed 0.05, so normality is not rejected for either series, and the log transformation reduces the skewness of premium from 0.86 (raw) to −0.59.

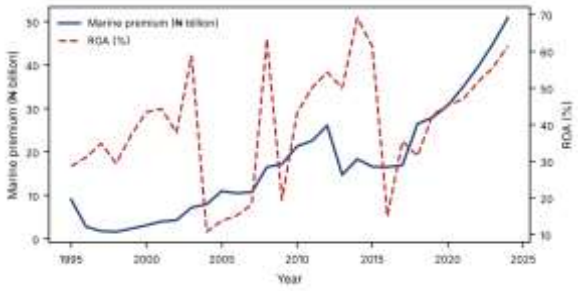


Figure 1: Marine insurance premium and ROA, 1995–2024. *Source: Author's computation from CBN, NAICOM and World Bank data.*

4.2 Unit-root tests

Table 2: Augmented Dickey–Fuller (ADF) unit-root test summary

Variable	ADF test at level (t-Stat)	Prob.	Stationarity at level	ADF test at 1st difference (t-Stat)	Prob.	Stationarity at 1st diff.	Order of integration
ROA	-3.802	0.007	Stationary	—	—	—	I(0)
LNMAR	-0.293	0.934	Non-stationary	-6.199	0.000	Stationary	I(1)

Source: Author's computation. Decision rule: 5% level (critical values −2.968 at level and −2.972 at first difference).

Table 2 summarises the ADF results. ROA is stationary at level: the ADF statistic of −3.802 is below the 5% critical value of −2.968 (and the 1% value of −3.679), with p = 0.007. LNMAR has a unit root at level (t = −0.293, p = 0.934) but is stationary after first differencing (t =

−6.199, $p < 0.001$). ROA is therefore I(0) and LNMAR is I(1), with no I(2) series, which is the mixed case for which the ARDL bounds approach is designed.

4.3 Bounds test for a long-run relationship

Table 3: ARDL bounds test

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.258631	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Source: Author's computation; critical values from Pesaran et al. (2001), asymptotic (n = 1000).

The F-statistic of 5.259 exceeds the I(1) upper bound at the 10%, 5% and 2.5% levels but not at 1%, so the null of no level relationship is rejected at the 5% level: ROA and marine premium move together in the long run. Because ROA is itself stationary, this result is partly driven by ROA's own mean reversion and should be read together with the coefficient estimates rather than as proof of a strong marine–ROA link. Because the model contains a single regressor, the bounds test already covers the ROA–LNMAR relationship, so the conditional error-correction regression (Table 4) and the error correction model (Table 5) follow directly.

4.4 ARDL estimation

Table 4: ARDL regression output (conditional error-correction form)

Dependent Variable: D(ROA)
Method: Least Squares
Sample (adjusted): 1996 2024
Included observations: 29 after adjustments
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.164543	29.534328	-0.242584	0.8103
ROA(-1)*	-0.776979	0.195776	-3.968715	0.0005
LNMAR(-1)	4.088608	3.283897	1.245048	0.2247
D(LNMAR)	10.462701	9.042729	1.157029	0.2582

R-squared	0.413946	Mean dependent var	1.131379
Adjusted R-squared	0.343620	S.D. dependent var	19.586416
S.E. of regression	15.868388	Akaike info criterion	8.493977
Sum squared resid	6295.143084	Schwarz criterion	8.682570
Log likelihood	-119.162666	Hannan-Quinn criter.	8.553042
F-statistic	5.886061	Durbin-Watson stat	1.918156
Prob(F-statistic)	0.003488		

*Note: * p-value incompatible with t-Bounds distribution. Source: Author's computation.*

The error-correction term, ROA(-1)*, is negative and large ($\rho = -0.777$): about 78% of any deviation from the long-run path is corrected within a year, which is consistent with the level relationship found by the bounds test. The asterisk marks a p-value that does not follow the

standard t distribution under the bound's framework, so inference on cointegration rests on the F-bounds test in Table 3 rather than on that p-value. Contemporaneous marine premium has a positive coefficient of 10.463 (p = 0.258), meaning that a 1% rise in marine premium is associated with only about 0.10 percentage points of additional ROA, an effect that is statistically indistinguishable from zero. The lagged level term, LNMAR (-1), is also positive but insignificant (θ = 4.089, p = 0.225); together with ρ = −0.777 it implies a long-run effect of $\beta_1 = -\theta/\rho = 5.262$, which is zero only if θ is zero and is therefore likewise insignificant. The regression explains about 41.4% of the variation in the change in ROA and the overall regression is significant (Prob(F) = 0.0035), but this is attributable mainly to the error-correction term. The Durbin–Watson statistic of 1.92 indicates no first-order autocorrelation. With both effects statistically indistinguishable from zero, the evidence does not support a reliable marine-premium effect on ROA.

4.5 Error correction model

Table 5: ARDL error correction regression

ARDL Error Correction Regression
Dependent Variable: D(ROA)
Selected Model: ARDL(1, 1)
Case 2: Restricted Constant and No Trend
Sample: 1995 2024
Included observations: 29
ECM Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMAR)	10.462701	8.550426	1.223647	0.2317
CointEq(-1)*	-0.776979	0.188235	-4.127707	0.0003

R-squared	0.413946	Mean dependent var	1.131379
Adjusted R-squared	0.392240	S.D. dependent var	19.586416
S.E. of regression	15.269363	Akaike info criterion	8.356046
Sum squared resid	6295.143084	Schwarz criterion	8.450342
Log likelihood	-119.162666	Hannan-Quinn criter.	8.385578
		Durbin-Watson stat	1.918156

*Note: * p-value incompatible with t-Bounds distribution. Source: Author's computation.*

Because the bounds test confirms a long-run relationship, the error correction model in Table 5 is estimated. The coefficient on the error-correction term, CointEq(-1), is negative and large (−0.777): about 78% of any deviation of ROA from its long-run path is corrected within one year, which confirms the level relationship. As in Table 4, the asterisk marks a p-value that is not valid under the t-bounds distribution. The short-run coefficient on D(LNMAR) is positive (10.463) but statistically insignificant (p = 0.232), so changes in marine premium do not significantly move ROA in the short run. The model explains about 41.4% of the variation in the change in ROA, and the Durbin–Watson statistic of 1.92 indicates no first-order autocorrelation.

4.6 Diagnostic tests

Table 6: Breusch–Godfrey serial correlation LM test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	2.201185	Prob. F(2,23)	0.1334
Obs*R-squared	4.659040	Prob. Chi-Square(2)	0.0973

Source: Author's computation.

Table 7: Ramsey RESET test

Ramsey RESET Test
Specification: ROA ROA(-1) LNMAR LNMAR(-1) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.626475	24	0.5369
F-statistic	0.392470	(1, 24)	0.5369
F-test summary:	Sum of Sq.	df	Mean Squares
Test SSR	101.287699	1	101.287699
Restricted SSR	6295.143084	25	251.805723
Unrestricted SSR	6193.855386	24	258.077308

Source: Author's computation.

The Breusch–Godfrey test does not reject the absence of serial correlation up to order two (Prob. F = 0.133; Prob. Chi-Square = 0.097). The RESET test gives t = 0.626 with probability 0.537, so there is no evidence of functional-form misspecification or omitted non-linearity at the 5% level. The CUSUM of squares plot (Figure 2) stays inside the 5% bounds throughout, so the estimated relationship is stable over the sample.

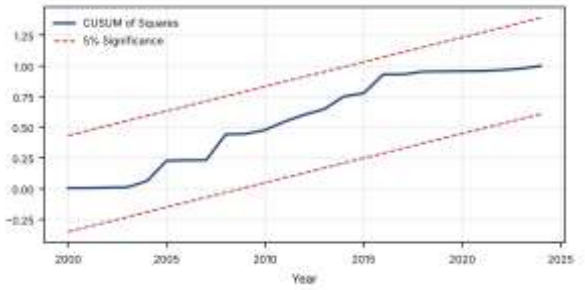


Figure 2: CUSUM of squares stability test (5% significance). *Source: Author's computation.*

4.7 Test of hypothesis

H_0: Marine insurance policy has no significant effect on the return on assets of quoted insurance firms in Nigeria. The coefficient on marine premium is 10.46 in the short run (p = 0.232), and the lagged level term that carries its long-run effect is 4.09 (p = 0.225). Both p-values exceed 0.05, so **H_0** is **not rejected**: marine insurance policy has a positive but statistically insignificant effect on ROA.

4.8 Discussion

The positive sign agrees with the Resource-Based View and Portfolio Theory, which predict that capable underwriters and a trade-linked, imperfectly correlated line should add to returns (Barney, 1991; Markowitz, 1952). The lack of significance, however, suggests that these

advantages are not consistently realised across Nigerian insurers, and it is consistent with Kologa and Nwite (2023), who also found no significant effect of marine premium on insurer profitability, although the sign here is positive rather than negative. Three explanations are plausible. First, marine is only one of several lines in an insurer's portfolio, so its premium variation explains little of the very large swings in ROA, which fell from 58.77% in 2003 to 10.79% in 2004 and rose to 63.35% in 2008. Second, marine business is reinsurance-intensive and exposed to large single losses, so gross premium growth need not raise profit after claims and cessions, in line with the view that underwriting quality outweighs volume (Olaniyi & Onifade, 2023). Third, ROA is influenced by firm size, leverage, reinsurance and investment income (Abass et al., 2021), none of which is controlled for in a deliberately single-variable model. The large error-correction term indicates that ROA reverts quickly to its own mean, which limits the persistence of any premium-driven gain. Practically, an insurer that increases marine premium by 10% can expect, on the point estimates, roughly one percentage point of extra ROA in the short run, but with a standard error of the same order of magnitude as the estimate, so the gain cannot be relied upon. This finding does not mean that marine business is unprofitable; it means that premium volume alone is a weak signal of profitability, and that margin management matters more than growth.

5. Conclusion and Recommendations

This study estimated the effect of marine insurance policy on the ROA of quoted insurance firms in Nigeria using an ARDL bounds-testing framework and annual data for 1995–2024. A long-run relationship exists and adjustment is fast, but the short-run and long-run effects of marine premium on ROA are positive and statistically insignificant, so the null hypothesis is not rejected. Premium growth in marine business alone is therefore not a reliable route to higher asset returns. Insurers should prioritise the quality of marine underwriting (risk selection, pricing by cargo and route, and accumulation control), invest in specialised marine skills and claims-handling efficiency, and structure reinsurance so that growth in premium is matched by retention of profitable risks. NAICOM and the Nigerian Maritime Administration and Safety Agency can support this by strengthening trade-data sharing and enforcing claims-settlement standards. Investors should look at marine loss ratios and reinsurance dependence rather than premium growth when judging earnings quality.

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