Risk factors and reinsurers' performance: Analyzing the effects of underwriting, operational, retention, and investment risks on reinsurers in Nigeria

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Abstract

Purpose: This research investigated the impact of underwriting, operational, retention and investment risks on profit after tax and return on assets of reinsurers.
Design/methodology/approach: The study used an ex-post facto research design using quarterly time series data of the selected reinsurance company for a 13-year period from 2013 to 2024. Eviews 9 was used to perform descriptive analysis, correlation analysis, unit root test and regression analysis to test the effects of the underwriting, operational, retention and investment risks on the profit after tax and return on assets of reinsurers.
Findings: The results revealed that underwriting, operational and retention risks have negative and insignificant effects on return on assets. The effects of the trio on profit after tax is negative but significant. Investment risk has positive and significant effect on both return on assets and profit after tax of reinsurers. This shows that high underwriting, operational, retention risks reduce the profitability of reinsurer while high investment risk increases reinsurers' profitability there by cushioning the effect of the other risks on profitability.
Limitations and Research implications: As the paper relied heavily on secondary data, primary empirical validation is limited. Future research should include field studies or surveys to validate the conceptual framework and explore sector-specific challenges in greater detail.
Practical Implications: Understanding the collective and individual impact of underwriting, operational, Investment and retention risks allows reinsurers to better manage and mitigate their exposure.
Originality/value: This study fills the literature gap on studies on risk and reinsurer's performance as most of the existing studies focused on risk and insurers' performance leading to paucity of research on risk and reinsurers' performance.
Keywords: investment risk, operational risk, reinsurance performance, retention risk, underwriting risk

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Introduction

The insurance sector is a key financial institution that stimulates economic growth and advancement by accepting risk from the economy and contributing to the inflow of funds into the economy (Olarewaju & Msomi, 2022). Within the insurance industry, reinsurance companies support insurance companies in developing the economies of both developed and developing nations (Tsvetkova, 2021). While insurers accept risks from policyholders, reinsurers, as insurers of primary insurers, provide risk transfer solutions that allow primary insurers to stabilize their operations and meet policyholders' obligations.

Reinsurers play a critical role in the insurance industry and the global economic ecosystem by offering primary insurers underwriting, pricing, claim management, and consultancy services, which enable primary insurers to protect the insuring public against various risk exposures

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(Biener et al., 2017). The risk absorption role of reinsurers increases the primary insurers' capacity to write more business and protects them against balance sheet fluctuations caused by large and unexpected losses (Haueter, 2020). Similarly, primary insurers rely on reinsurers to reduce the volatility of financial results, stabilize solvency, and efficiently utilize capital (Olarewaju & Msomi, 2022).

However, reinsurance companies operate in a volatile environment characterized by significant exposure to various types of risks, including underwriting risk, operational risk, retention risk, and investment risk. Effective management of these risk exposures is essential for the survival and sustainability of the insurance industry as well as the stability of the economy. This is because reinsurers play a vital role in the insurance ecosystem by redistributing risks, which allows primary insurers to manage their risk exposure effectively (Ogunlami, 2021).

Underwriting risk, which results from the uncertainty associated with accurately estimating the frequency and severity of losses, is a primary concern because poor underwriting practices can lead to adverse selection, where reinsurance companies inadvertently assume risks that exceed their capacity to manage, potentially jeopardizing their solvency (Eling & Luhnen, 2010). Operational risks are risks associated with internal processes, systems, and human errors, such as inadequacies in claim management systems or failures to comply with regulatory requirements, which can result in financial and reputational damage (Basel Committee on Banking Supervision, 2004).

Retention risk refers to the proportion of risk that reinsurance companies retain, as opposed to ceding it to other reinsurers or retrocessionaires. While higher retention levels may increase profitability during favourable periods, they also amplify exposure to catastrophic losses, particularly during periods of systemic crises or natural disasters (Cummins, Phillips, & Smith, 2001). Striking an optimal balance is therefore a central component of risk management. Studies have shown that over-utilization of reinsurance increases cost, leading to higher prices and lower profit for primary insurance (Lee & Lee 2012). Investment risk is a critical consideration, as reinsurance companies, like primary insurers, rely on their investment portfolios to generate income in addition to their underwriting profits to support their liabilities. Market volatility, interest rate fluctuations, and credit risks associated with investment portfolios can significantly impact the financial stability and performance of reinsurance firms (Adams, Hardwick, & Zou, 2008).

NAICOM's regulatory oversight may shape the relationship between reinsurers' risk exposure and their performance. Through capital adequacy standards, risk-based supervision, investment regulations, and the approval of reinsurance arrangements, NAICOM can directly influence reinsurers' exposure to underwriting, operational, investment, and retention risks. This could limit excessive risk-taking and strengthen solvency and market stability. While such regulatory constraints may reduce short-term profitability, they are linked to higher profit stability and more sustainable long-term performance (Cummins & Weiss, 2014; IAIS, 2019).

The existing literature on the risk and performance of the insurance industry has focused on primary insurers, leaving an empirical gap in understanding how specific risks influence reinsurers, despite their strategic role in the Nigerian risk management framework. For example, studies such as Fung et al. (2024), Mallam Fali et al. (2020), and Lee & Lee (2012) have investigated the impacts of risks on the performance of primary insurers. This gap is significant for two main reasons. First, Nigeria's reinsurance market operates under unique macroeconomic conditions marked by exchange rate volatility, inflationary pressures, and low insurance penetration, which may influence the risk–performance relationship differently from that in developed markets. Second, without context-specific evidence, reinsurance managers and regulators may rely on generic strategies that fail to address local market realities, potentially compromising the sector's ability to support primary insurers during adverse events.

Given the importance of reinsurance to the stability of the insurance industry and the economy, understanding how key risk factors, underwriting, operational, retention, and investment risks, affect performance indicators such as Return on Assets (ROA) and Profit after Tax (PAT) is critical. This study aims to fill this gap by providing evidence-based insights that can inform managerial decision-making and guide regulatory frameworks for sustainable performance in Nigeria's reinsurance sector.

The explicit objectives of the study are:

1. To determine the effect of underwriting risk on ROA and PAT
2. To assess the impact of operational risk on ROA and PAT
3. To determine the impact of retention risk on ROA and PAT
4. To assess the impact of investment risk on ROA and PAT

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Literature Review

Underwriting Risk

Underwriting is the core function of reinsurance operations, and the success of a reinsurance organization relies on its ability to underwrite effectively (Horvey & Odei-Mensah, 2024). Underwriting is the process of selecting good risks that have the potential to generate profit and rejecting those that do not meet the underwriting criteria of the insurance company, which could lead to loss (Wandosen et al., 2024). Underwriting risk occurs when the claims paid exceed the premium income earned (Horvey & Odei-Mensah, 2024). Underwriting risk exposure can be increased by unhealthy competition, which prompts reinsurers to set abnormally low premium rates or overpay claims in an attempt to attract more clients or expand their market share and premium income (Akotey et al., 2023). Kumar et al. (2022) suggested that cautious risk selection, adhering to strict management guidelines, and diversification of risks can significantly contribute to underwriting success.

Operational Risk

Operational risk impacts the losses or gains of reinsurance companies. Operational risk refers to all the risks associated with the operations of a reinsurance company, relating to the risk of direct or indirect loss due to the failure or inadequacy of internal processes, systems, and personnel (Kiptoo et al., 2021). Operational risks span all units of an insurance company; therefore, effective operational risk management should be integrated into the organization's policies, culture, structure, and processes at all levels (Torre-Enciso & Barros, 2012). According to Olarewaju & Msomi (2022), effective operational risk management often leads to operational efficiency through an organization's ability to mitigate adverse situations and optimize resources to deliver excellent products and services to customers. Thus, the ability of reinsurers to pay claims and finance other operational expenses from the net premium earned often impacts their profitability. Mitigating operational risk requires various measures, such as effective management information systems and contingency planning, as there is no single approach to dealing with operational risks (Jose, 2002). Harwani (2021) relates operational risk management to the management's ability to ensure safe operation in accordance with necessary and applicable internal and external regulations, and further concludes that effective management of operational risk translates to sound management and improves performance. Managing operational risk is crucial in the management and corporate governance of insurance companies, as it has significant implications and interactions with other risks to which the insurer is exposed (Torre-Enciso & Barros, 2012). The analysis and management of operational risk is crucial for insurers and reinsurers, presenting

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prospects for development and an important field of study on conceptual and practical issues due to the specificity and complexity of this risk.

Retention Risk

Reinsurers, after accepting risk ceded by primary insurers, have to choose between holding the risk internally and hedging part of the risk accepted through retrocession (purchasing reinsurance from another reinsurance company). Retention risk arises when a reinsurer retains more or less than the appropriate proportion of risk. Retaining higher levels of risk can increase profitability during periods of low claims but exposes the company to significant financial strain during adverse events, such as natural disasters or economic crises (Cummins & Trainar, 2009). Risk retention is a crucial indicator of underwriting efficiency and a determinant of financial strength, as excessive transfer of accepted risk is an indication of insolvency (Dansu & Obalola, 2018). Balancing risk retention is therefore a strategic decision. Studies have shown that setting an optimal retention level can enhance profitability while maintaining sufficient liquidity for unexpected claims and attaining the overall corporate objectives (Adams et al., 2008; Oladunni & Okonkwo, 2022).

Investment Risk

Investment risk refers to the uncertainty in returns from a reinsurer's investment portfolio, which typically comprises fixed-income securities, equities, and alternative investments (Jinks et al., 2019). Reinsurers rely on investment returns to complement underwriting profits and manage liabilities. However, market volatility, interest rate fluctuations, and credit risks can adversely affect their financial stability (Eling & Schaper, 2017). The study by Xiao and Qiu (2021) suggests that optimal investment risk management involves a mix of risk-bearing and risk-free investments. Diversifying investments into risk-free assets and various risky assets increases the wealth of insurers and reinsurers. Aligning investment risk management with a reinsurer's risk appetite and liability profile is crucial for achieving sustainable performance, as demonstrated in studies such as Adams et al. (2008). Ivantsova and Leverty (2022) established a link between investment risk, underwriting returns, and the overall profitability of the insurer.

Financial Performance of Reinsurers

Financial performance is an all-encompassing assessment of a firm's overall financial health, encompassing assets, liabilities, equity, expenditure, income, and general profitability, measured through various financial indicators that enable users to calculate precise details regarding a company's potential effectiveness (Orji et al., 2023). Kayode (2024) described financial performance as a yardstick for evaluating and measuring the results of a company's policies, operations, and overall financial soundness over a specified period. Kayode (2024) further explained that financial performance can be used to compare similar companies in the same industry or to compare industries or sectors in the economic ecosystem.

The performance of reinsurers is influenced by a multitude of factors, including risk management, underwriting practices, firm-specific characteristics, and macroeconomic conditions. Olarewaju and Msomi (2022) emphasize that the profitability of reinsurers, is influenced by gross domestic product, competition, premium growth, investment performance, underwriting risk, and operational efficiency. Reinsurers' performance is measured using variables like net operating income to net premium earned, yield on invested assets, and loss reserves to net premium written, combined ratio, return to policyholders' surplus, and net premiums written to policyholders' surplus (Chen & Hamwi, 2000). Other

variables used to measure reinsurers' performance are return on assets (ROA) and return on equity (Olarewaju & Msomi, 2022).

Theoretical Framework

Demand for Underwriting Theory

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The theory of demand for underwriting was propounded by Browne and Kamiya (2012). The theory states that underwriting is a critical aspect of insurance, as it involves assessing and pricing risk, thereby influencing market equilibrium and the availability of coverage. Browne & Kamiya (2012) posit that underwriting improves equilibrium in insurance markets and enhances market efficiency, particularly in mitigating adverse selection and moral hazard. This is made possible by the accurate assessment of risks, which enables insurers and reinsurers to set premiums that accurately reflect the true risk levels of policyholders.

The implication of the demand for underwriting theory on this study is that, since it has been established that effective underwriting practices allow reinsurers to assess and price risks accordingly, underwriting risk can be linked to the performance of reinsurers.

Modern Portfolio Theory

Modern Portfolio Theory (MPT) was developed by Harry Markowitz in the 1950s. MPT focuses on building investment portfolios that strike a balance between risk and return. The theory emphasizes the diversification of investments across different asset classes to reduce risk. The theory postulates that an investment portfolio comprising assets that are not perfectly correlated is more likely to achieve a more efficient risk-return trade-off (Scott et al., 2024).

The implication of the MPT on this study is that managing investment risk through spreading investment between a mix of risk-bearing and risk-free assets could help reinsurers maintain efficient investment portfolios that provide the best expected return for a given level of risk, and achieve optimum profitability.

Empirical Review

Akotey et al. (2023) studied the reasons for high underwriting losses experienced by Ghanaian insurers, focusing on 34 insurers from 2007 to 2017. Data was analyzed using dynamic panel regression to identify the factors responsible for the rise in underwriting losses experienced by the Ghanaian insurance sector. The study found that unhealthy competition, targeting market share growth by taking on more risks than their financial and technical capacity allows, negatively impacts insurers' underwriting profitability. The high underwriting risk indicates that insurers charge unreasonably low premiums for the risks they underwrite. This may indicate that some insurers are under-pricing to increase their customer base. The study found that underwriting risk has a significant impact on performance. Whilst the study focused on emerging markets using a longitudinal data set, it only considered underwriting risk without considering other risk exposures, such as investment, operational, and retention risks.

Ivantsova and Leverty (2022) investigated the reasons for variations in underwriting profitability in the U.S. property-liability insurance industry. Their findings showed that variations in underwriting profitability cannot be explained by insurer business mix, firm characteristics, or over-optimism. However, the study found that the variations can be explained by the insurer's expense structure; however, the magnitude is insufficient to explain the large variations in underwriting returns. The study also found that insurers with consistently high underwriting profits tend to have relatively low-risk investment portfolios, while those with steadily low

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underwriting returns tend to invest in riskier assets. The insight from Ivantsova and Leverty (2022) supports the conceptual framework of this study by emphasizing the importance of balancing underwriting and investment risks to achieve sustainable performance; however, the study focused on primary insurers.

Olarewaju and Msomi (2022) conducted a quantitative study on the factors affecting the profitability of reinsurers in Sub-Saharan Africa from 1991 to 2020. Using the system-generalized method of moments to analyze data collected from 42 reinsurers, the findings revealed that underwriting risk, risk retention ratio, and inflation negatively impact the profitability of reinsurers in Sub-Saharan Africa. On the other hand, investment performance, gross domestic product, competition, operational efficiency, exchange rates, interest rates, premium growth, liquidity, and size all positively impact the profitability of Sub-Saharan African reinsurers. This study utilized a robust dataset to investigate the determinants of the profitability of reinsurers in Sub-Saharan Africa. The study focused on a highly under-researched segment of the insurance sector.

Sidhu and Verma (2017) examined the factors affecting the profitability of reinsurers in India. The findings showed that underwriting risk has a negative and statistically significant effect on the profitability of reinsurers, while retention has a negative and significant impact on the profitability of reinsurers. Investment income and premium growth have a positive and significant impact on profitability. Liquidity has a positive and insignificant impact on the reinsurer's profitability. The study is strengthened by its use of a time-series econometric approach and consideration of both short-term and long-term effects. It is, however, limited by its single-firm focus on GIC Re and its reliance on secondary data. Despite this weakness, the study provides a valuable empirical foundation for exploring the interplay between underwriting, investment, and profitability in reinsurance, an area that is rarely researched.

Mukherjee et al. (2020) studied the performance of the General Insurance Corporation of India (GIC Re) over 17 years, from 2002 to 2018, using various performance ratios. They also examined the homogeneity of several financial performance indicators of GIC Re, the probability of GIC Re going into financial distress, and the internal growth capacity of GIC Re. The study measures the underwriting risk management capacity, operational efficiency, return on assets, retention risk management, overall financial performance, and internal growth capacity (IGR) of GIC Re. Results showed that the degree of homogeneity among the various financial performance indicators of GIC Re for the studied period is insignificant. Findings further suggest that GIC Re lacks the capacity for internal growth, i.e., utilizing its own internal funds. Lastly, the findings suggest a high likelihood that GIC Re will experience financial distress again. This study emphasizes that the financial performance of reinsurers is influenced by multiple interrelated factors.

Morara and Sibindi (2021) assessed the solvency and underwriting Risk in relation to the profitability of the Kenyan Insurance Sector from 2009 to 2018. The study employed a census sampling method, utilizing data from all 52 insurance firms in Kenya. The study's findings established that solvency was positively correlated to profitability, measured by return on equity (ROE). The study further revealed that underwriting risk is positively associated with both Return on Assets and Return on Equity as measures of financial performance. While this study considers underwriting risk as a determinant factor of profitability, it ignores other risk factors such as investment risk, retention risk, and operational risk. The study also focused on primary insurers, ignoring the reinsurance sector.

Angima et al. (2017) examined the impact of actuarial risk management practices on underwriting risk and the performance of Property & Casualty insurers in East Africa. Actuarial risk management practices were proxied by pricing, underwriting, claims management scores, and reinsurance and retention. The study utilized primary and secondary data collected from 82 non-insurers in Kenya, Uganda, and Tanzania. The study's findings revealed a positive and significant correlation between actuarial risk management practices and non-financial

performance. However, the correlation between actuarial risk management practices and financial performance was insignificant. Furthermore, the study demonstrated that underwriting risk has a significant impact on non-financial performance.

Agboola and Obalola (2024) studied the impacts of financial risks on the financial performance of insurance firms in Nigeria. Financial risk was proxied by liquidity risk, credit risk, and underwriting risk. The study employed an ex post facto research design and data from 10 insurance companies spanning the period from 2012 to 2023. The study's findings demonstrated that liquidity risks, credit risks, and underwriting risks have a significant impact on the financial performance of Nigerian insurers.

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Oko-osi and Aroyehun (2024) extended the degree to which underwriting practices influence the financial performance of insurers in Nigeria. The study was carried out using expo-facto research design and cross-sectional analysis. Secondary data from 10 insurance companies, covering the period from 2013 to 2022, were used in the study. The study's findings reveal that underwriting practices have a significant influence on the financial performance of insurance companies. Usman et al. (2024) examined the impact of risk retention on the profitability of selected insurers in Nigeria. Using an ex-post factor research design and cross-sectional data of eight life insurance companies from 2011 to 2021. The study found that risk retention has an insignificant impact on the profitability of life insurers in Nigeria.

Hypotheses Development

Based on the reviewed literature, the following hypotheses are developed for empirical testing:

Ho_1: Underwriting risk has no significant effect on ROA and PAT

Ho_2: Operational risk has no significant impact on ROA and PAT

Ho_3: Risk retention has no significant effect on ROA and PAT

Ho_4: Investment risk has no significant effect on ROA and PAT

Methodology

The study employed an ex-post facto research design, utilizing quarterly time series data from the selected reinsurance company for the period from 2013 to 2023. The population of the study consists of all registered reinsurance companies that transact reinsurance business in the Nigerian insurance sector. The total number of reinsurance companies in Nigeria is 3 (NAICOM 2024). This study employed the purposive sampling technique to select one reinsurance company out of the three operating in Nigeria, based on the availability of complete data for the study period. The reinsurance company used for the study is Continental Reinsurance Plc. The secondary data used for the study were extracted from the Nigerian Insurers Association's publication, titled NIA Digest, as well as the quarterly financial statements of the selected reinsurer. E-views 9 software was used to analyze the data for the study. The statistical analysis employed consisted of preliminary investigations, including a unit root test to verify stationarity in the time series, a multicollinearity test, and a heteroskedasticity test to assess the correlation between independent variables. Descriptive analysis to examine the features of the data, and inferential analysis through the use of regression analysis to test the hypothesis of the study.

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Operationalization of variables

The variables used in this study relate to the operations of reinsurance companies during the study period. The notations of these variables are presented in Table 1.

Table 1. The Variables of Study

VN	Variables	Definition	Variable type	Measurement	Source
Y_1	ROA	Return on asset	Dependent	$\frac{\text{profit after tax}}{Total\ assets}$	NIA Digest
Y_2	PAT	Profit After Tax	Dependent	Profit after tax	NIA Digest
X_1	UNR	Underwriting risk	Independent	$\frac{gross\ claims\ paid}{gross\ premium\ written}$	NIA Digest
X_2	OPR	Operational risk	Independent	$\frac{\text{management expenses} + \text{underwriting commisssion}}{net\ written\ premium}$	NIA Digest
X_3	RTR	Retention risk	Independent	$\frac{Net\ written\ premium}{Gross\ written\ premium}$	NIA Digest
X_4	INR	Investment risk	Independent	$\frac{investment\ income}{Total\ investment}$	NIA Digest

Sources: authors' compilation

The models for this study are as specified below:

Y1=a + b1X1it + b2X2it + e

Y2=a + b1X1it + b2X2it + e

Where Y1= Dependent variable represented by Return on assets (ROA).

Y2= dependent variable represented by Profit after Tax (PAT).

α = Constant.

X1 = Independent variable 1 represented by Underwriting risk (UNR)

X2 = Independent variable 2 represented by Operational risk (OPR)

X3 = Independent variable 3 represented by Retention risk (RTR)

X4 = Independent variable 4 represented by Investment risk (INR)

b (1,2,3,4 ...) = Regression coefficient of each independent variable.

e = Error term

t = time.

i = company

RESULTS

Stationarity Test

The stationarity test, also known as the unit root test, is used to conclude whether a time series is stationary. The null hypothesis for the stationarity test is that there is a unit root, i.e., the series is stationary. The decision rule is to reject the null hypothesis if P ≤ 0.05. The result of the stationarity test presented in Table 2 shows that UNR, OPR, RTR and ROA are stationary at level and first difference while INR and PAT are stationary at first difference. The study concludes the series is stationary.

Table 2. Augmented Dickey-Fuller Unit Root Test

Variables	Levels		1st Difference		Decision
	Intercept	Intercept & Trend	Intercept	Intercept & Trend	
UNR	0.0000	0.0000	0.0000	0.0000	Stationary
OPR	0.0000	0.0000	0.0000	0.0000	Stationary
RTR	0.0000	0.0000	0.0000	0.0000	Stationary
INR	0.2779	0.2203	0.0000	0.0000	stationary at 1st difference
PAT	0.3124	0.0538	0.0000	0.0000	stationary at 1st difference
ROA	0.0167	0.0320	0.0000	0.0000	Stationary

Source: EViews 9 Output (Computed by the Author)

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Descriptive statistics

The descriptive statistics for the study variables are presented in Table 3. Table 3 provides insight into the independent variables ROA and PAT, as well as the dependent variables UNR, OPR, RTR, and INR. The mean and median values of ROA, PAT, UNR, and RTR are close, indicating a relatively symmetric distribution. However, the mean and median for OPR and INR are not close. This suggests some deviation. The Range (maximum – minimum) indicates the spread of values. INR has the widest variation (0.382046), while RTR is relatively consistent (0.591111 to 0.991719). Standard deviation shows the variability in each variable. The variability is highest in PAT (1.212). This means that it fluctuates more than other variables. INR also has significant variation (0.100).

Table 3. Descriptive Statistics

	UNR	OPR	RTR	INR	ROA	PAT
Mean	0.472942	0.404766	0.819603	0.096981	0.053002	21.02804
Median	0.458258	0.389673	0.858566	0.064538	0.04203	21.01141
Maximum	0.789528	1.006225	0.991719	0.382046	0.171267	23.39859
Minimum	0.053212	0.158831	0.591111	0	0.000549	16.88333
Std. Dev.	0.132592	0.119877	0.099493	0.100037	0.043645	1.212104
Skewness	0.005186	2.478212	-0.47244	1.979882	1.514006	-0.81158
Kurtosis	4.36536	14.66247	2.090758	5.975639	4.964474	4.854619
Jarque-Bera	3.728633	321.1587	3.439041	49.0683	26.05603	12.14856
Probability	0.155002	0	0.179152	0	0.000002	0.002301
Sum	22.7012	19.42876	39.34092	4.65508	2.544112	1009.346
Sum Sq. Dev.	0.826292	0.675412	0.465248	0.470351	0.089531	69.05222
Observations	48	48	48	48	48	48

Source: Eviews 9 Output (Computed by the Author)

Skewness measures the degree of asymmetry of time series data. OPR (2.478) and INR (1.98) are highly positively skewed. This means that most values are concentrated on the lower side. ROA (1.5140) also exhibits positive skewness, but not as extreme. RTR (-0.472) and PAT (-0.811) show moderate negative skewness, indicating a slight leftward tilt. UNR (0.005) is nearly symmetric. Peaked-ness or flatness of a distribution is measured by kurtosis. Table 3 shows that OPR (14.66) and INR (5.98) have very high kurtosis. This means that they have extreme values (heavy tails). ROA (4.96) and PAT (4.85) also show leptokurtic tendencies (more peaked than a normal distribution). RTR (2.09) is close to normal.

Jarque-Bera and Probability Values test the null hypothesis of a normal distribution. UNR and RTR with Jarque-Berra probabilities of 0.155 and 0.179, respectively, which are greater than 0.05, indicate normal distributions. OPR, INR, ROA, and PAT at p values 0, 0, 0.000002, and

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0.002301, respectively, which are all < 0.05, indicating significant deviations from normal distribution. The variables that are not normally distributed could be a result of high disparity of variations from the sample mean in the data.

Correlation and Collinearity Analysis

Correlation analysis is used to check the connection between variables (see Table 4). Collinearity analysis is used to check for correlation between independent variables. It is essential to test for the connection between independent variables, as high correlation between them can lead to an unreliable estimate of the coefficients. Table 4 shows collinearity between the two independent variables, ROA and PAT. The result reveals a moderate positive relationship between ROA and PAT, with a correlation coefficient of 0.608757, which is less than the 0.7 threshold of acceptable collinearity. Hence, there is no severe multicollinearity between the independent variables.

Table 4. Correlation Analysis

Correlation	UNR	OPR	RTR	INR	ROA	PAT
UNR	1					
OPR	-0.19961	1				
RTR	0.238545	-0.35457	1			
INR	0.171463	-0.12507	0.012907	1		
ROA	0.124188	-0.21416	-0.05742	0.832445	1	
PAT	-0.27918	-0.19903	-0.31383	0.490641	0.608757	1

Source: Eviews 9 Output (Computed by the Author)

Regression Analysis

Table 5 presents the results of the regression analysis, which explains the relationship between the dependent variable ROA and the four independent variables: UNR, OPR, RTR, and INR. An R-squared value of 0.7189 indicates that 71.89% of the variation in ROA is explained by the independent variables (UNR, OPR, RTR, and INR). An Adjusted R-squared value of 0.6927, which accounts for the number of predictors, shows that the model is robust. This suggests that the model has a strong explanatory power. The F-statistic of 27.49 and p-value of 0.0000 indicate that the model is statistically significant.

The results show that UNR (underwriting risk) has a coefficient of -0.00627 and a p-value of 0.8240, which is greater than 0.05, indicating a negative and insignificant effect on ROA. OPR (Operational Risk) with a coefficient of -0.05755 at p=0.0785 > 0.05 negatively and insignificantly impacts ROA. RTR (Retention Risk) with a coefficient of -0.05241 at p = 0.1823 > 0.05 also has a negative and insignificant effect on ROA. INR (Investment Risk) with a coefficient of 0.35666 at p=0.0000 positively and significantly affects ROA.

Table 5. Panel Regression Analysis Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.08763	0.039047	2.244211	0.0300
UNR	-0.00627	0.027989	-0.223829	0.8240
OPR	-0.05755	0.031933	-1.802328	0.0785
RTR	-0.05241	0.038666	-1.355533	0.1823
INR	0.35666	0.03604	9.896118	0.0000

Source: Eviews 9 Output (Computed by the Author)

The model demonstrates a good overall fit as presented in Table 6. The R-squared value of 0.7189 indicates that approximately 71.9% of the variation in the dependent variable is explained by the independent variables. The adjusted R-squared value of 0.6927 remains high and close to the R-squared value, suggesting that the model is well-specified without overfitting. Furthermore, the F-statistic is statistically significant at the 1% level (Prob. = 0.0000), confirming that the explanatory variables jointly have a significant effect on the dependent variable. The Durbin–Watson statistic of 1.382 indicates that there is no serious autocorrelation issue in the model residuals.

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Table 6. Model Fit and Diagnostic Statistics

Statistic	Value	Statistic	Value
R-squared	0.71886	Mean dependent var	0.0530
Adjusted R-squared	0.69270	S.D. dependent var	0.0436
S.E. of regression	0.02419	Akaike info criterion (AIC)	-4.5071
Sum squared resid	0.02517	Schwarz criterion (SC)	-4.3121
Log likelihood	113.16930	Hannan–Quinn criterion (HQ)	-4.4334
F-statistic	27.48671	Durbin–Watson stat	1.3820
Prob(F-statistic)	0.00000		

Source: Eviews 9 Output (Computed by the Author)

Table 7 shows the result of the regression analysis between the dependent variable PAT and the independent variables UNR, OPR, RTR, and INR. An R-squared value of 0.5262 indicates that the model accounts for 52.62% of the variation in PAT based on the independent variables. While the remaining 47.38% variations can be explained by other factors not included in the model. An Adjusted R-squared value of 0.4822 accounts for the number of predictors and is slightly lower than R^2. This means that some variables may not contribute significantly to the explanatory power. The F-statistic of 11.9412 and p-value of 0.000001 indicate that the model is statistically significant, meaning that at least one of the independent variables has a significant effect on PAT.

Table 7. Regression analysis of PAT and UNR, OPR, RTR, and INR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	26.81993	1.407666	19.05276	0.0000
UNR	-3.18695	1.009037	-3.158412	0.0029
OPR	-3.33666	1.151198	-2.898429	0.0059
RTR	-4.31639	1.393924	-3.096574	0.0034
INR	6.224446	1.299275	4.790707	0.0000
R-squared	0.526249	Mean dependent var		21.0280

Source: Eviews 9 Output (Computed by the Author)

UNR (underwriting risk) with a coefficient of -3.1870 and p=0.0029 < 0.05 has a negative and significant effect on PAT. OPR (Operational Risk) with a coefficient of -3.3367 at p = 0.0059 (< 0.05) has a negative and significant effect on PAT. RTR (Retention Risk) with a coefficient of -4.3164 at p = 0.0034 < 0.05 also has a negative and significant effect on PAT. INR (Investment Risk) with a coefficient of 6.2244 at p = 0.0000 has a positive and significant effect on PAT.

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Discussion and Implications

The study aimed to examine the effects of underwriting risk (UNR), operational risk (OPR), retention risk (RTR), and investment risk (INR) on the performance of reinsurers, specifically in relation to Return on Assets (ROA) and Profit after Tax (PAT).

Using ROA as a Measure of Profitability

Findings from the study showed that underwriting risk has a negative and statistically insignificant effect on ROA, a measure of the reinsurer's performance. The findings show that a 1 unit increase in underwriting risk leads to a 0.63% decrease in ROA. The negative effect, though currently insignificant, suggests that there is a slight tendency for higher underwriting risk to reduce reinsurers' ROA. This implies potential losses due to poor risk selection are being offset by profit from other sources, such as investment income. It is also possible that ROA, as a measure of performance, is not capturing the true impact. The finding is consistent with the findings of Agboola and Obalola (2024), Olarewaju and Msomi (2022), Angima and Mwangi (2017), which found that underwriting risk has a negative and insignificant effect on reinsurers' performance.

OPR (Operational Risk) has a negative and insignificant effect on ROA as a measure of a reinsurer's performance. Each 1-unit increase in operational risk reduces ROA by -0.58%. This suggests that while operational inefficiencies might slightly reduce profitability when ROA is used as a measure of performance, they are not substantial enough to impact the overall performance due to other factors such as strong risk management practices, regulatory control, and good investment returns to cushion the effects of losses that could result from operational inefficiencies. However, the effect could become significant in the long run. This finding contradicts that of Olarewaju and Msomi (2022), which found that operational risks have a positive and significant impact on profitability.

The effects of RTR (Retention Risk) are negative and insignificant on ROA, a performance indicator for reinsurers. For every 1-unit increase in retention risk, ROA decreases by 0.52%. This could be due to a well-diversified risk portfolio, which mitigates the impact of a single large claim from a retained risk on reinsurers' profitability. This finding aligns with the results of Olarewaju & Msomi (2022), who discovered that retention risk has a negative and statistically insignificant effect on reinsurers' performance. This finding, however, contradicts the findings of Dansu and Obalola (2018) and Sognon (2019), which showed that retention has a positive and significant impact on financial performance.

Investment risk has a positive and significant impact on ROA, serving as a proxy for financial performance. Every 1 unit increase in investment risk increases ROA BY 35%. A well-diversified investment portfolio, which has a balanced mix of risk-free and risky investments, will most likely lead to high investment returns, which can help lessen the impact of other factors that can reduce the reinsurer's profitability. The finding, in tandem with the findings of Sidhu and Verma (2017), Olarewaju and Msomi (2022), and Ivantsova and Leverty (2022), which found that investment risk significantly affects profitability.

Using PAT as a Measure of Profitability

The study found that underwriting risk (UNR) has a negative and significant effect on profit after tax (PAT). This suggests that 1% increase in underwriting risk decreases the profit after tax of reinsurers by 3.19% units. This emphasizes the detrimental impact of underwriting on the financial performance of reinsurers. The result aligns with the findings of Mukherjee et al. (2020). The study revealed that operational (OPR) risk has a negative and significant effect on PAT. The results show that the PAT decreases by 3.34% for every 1% increase in operational

risk. This finding is consistent with Harwani's (2021) findings but contradicts those of Olarewaju and Msomi (2022). The study reveals that retention risk has a negative and statistically significant impact on profitability. The study revealed that for every 1% increase in retention risk, PAT reduces by 4.32%. This indicates that a higher retention risk has a severe and adverse impact on profitability, underscoring the need for a meticulous retention risk management strategy. This result agrees with the findings of Sidhu & Verma (2017).

Investment risk was found to have a positive and significant impact on the PAT of reinsurers. The study shows that a 1% increase in investment risk increases profitability by 4.32%, confirming the well-known principle "the higher the risk, the higher the potential returns". This suggests that reinsurers who invest in high-risk investments are likely to earn higher investment returns, which could mitigate the potential losses posed by other risks. This finding aligns with the results of Sidhu and Verma (2017), Olarewaju and Msomi (2022), and Ivantsova and Leverty (2022).

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Conclusion

From the results of the study, it is important to affirm that underwriting risk, operational risk and retention risks reduce the profitability of reinsurers. The effect of the trio (underwriting, operational and retention risks) is insignificant on ROA as a measure of profitability but significant for PAT as a measure of profitability. This suggests that these risks if not mitigated reduces the profitability of reinsurers. Investment risk on the other hand has positive and significant effect on both ROA and PAT as measures of profitability. Hence the study concludes that high investment risk increases reinsurers' profitability, thereby reducing the extent to which underwriting risk, operational risk and retention risk can decrease reinsurers' profitability. The study is delimited by the use of one reinsurer (Continental Re) due to the unavailability of up-to date data for the other reinsurers.

Recommendation

Following the results of this study, reinsurance companies should refine their underwriting practices to mitigate underwriting risk. This can be achieved by implementing and enforcing stricter underwriting guidelines to mitigate high-risk exposures, adopting AI-driven models to enhance risk assessment, and diversifying risk portfolios by expanding into different markets and product lines. Reinsurers should enhance operational efficiency by digitalizing to automate key operational functions to reduce cost, investment in cyber security measures to protect against operational disruption, and streamline the regulatory compliance process to avoid fines and penalties. Reinsurers should optimize their risk retention strategies by maintaining an optimal balance between risk retention and retrocession, thereby protecting capital and enhancing profitability. Reinsurers should adopt optimal investment risk management practices, which involve investing in a mix of risk-bearing and risk-free assets. Diversifying investments into risk-free assets and various risky assets increases the profitability of reinsurers.

Suggestion for Future Research

Future researchers can study the impact of risks on the performance of reinsurance companies by analyzing all reinsurance companies in Nigeria. Future researchers can conduct qualitative studies to investigate the effectiveness of procedures and processes adopted by reinsurers to mitigate these risks. Future researchers could conduct a study on the risk and performance of reinsurers using data from all reinsurers in Nigeria.

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